



NWE-THF-4536

Electronically filed

Debbie-Anne A. Reese
Secretary
Federal Energy Regulatory Commission
888 First Street, NE
Washington, DC 20426

March 19, 2025

Re: NorthWestern Energy Files 2024 Annual Activity, Fish Passage, and Bull Trout Take Report for Thompson Falls Hydroelectric Project (1869)

Dear Secretary Reese,

Herein attached, per Item D of Commission Order dated February 12, 2009, is NorthWestern Energy's 2024 Annual Activities, Fish Passage and Bull Trout Take Report for the Thompson Falls Project completed in consultation with the U.S. Fish and Wildlife Service (USFWS), Montana Fish, Wildlife and Parks (MFWP), and Confederated Salish and Kootenai Tribes (CSKT). The USFWS signature of approval (under their Section 7 Terms and Conditions Authority) for this report and filing with the Commission is included on page two.

Please contact Jon Hanson at 406-542-5961 or Jon.Hanson@NorthWestern.com with any questions.

Sincerely,

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The U.S. Fish and Wildlife Service has reviewed and by signature below, approves this Thompson Falls Project 2024 Annual Activity, Fish Passage and Bull Trout Take Report filing with the Commission.

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Montana Ecological Services

2024 Annual Report Fish Passage Project

Thompson Falls Hydroelectric Project

FERC Project Number 1869



NorthWestern[®]
Energy

Delivering a Bright Future

Electronically Submitted to:
Federal Energy Regulatory Commission
Washington, D.C.

Submitted by:
NorthWestern Energy Corporation
Butte, Montana

With Assistance From:
New Wave Environmental Consulting, LLC
Missoula, Montana

March 2025

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NorthWestern would like to thank the Technical Advisory Committee for their review of this report. We appreciate their collaborative efforts in monitoring and reporting in support of improving fish passage in the lower Clark Fork River. Previous annual reports prepared in support of the Thompson Falls Project are available at <https://northwesternenergy.com/clean-energy/hydropower/thompson-falls-hydro-project/annual-reports-ferc-orders>

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Acronyms

%	Percent
Avista	Avista Corporation
AWS	auxiliary water system
BiOp	Biological Opinion
BULL	Bull Trout
BL BH	Black Bullhead
BL CR	Black Crappie
°C	degrees Celsius
CFR	Clark Fork River
cfs	cubic feet per second
Ck	creek
Commission	Federal Energy Regulatory Commission
CPUE	catch per unit effort
CSKT	Confederated Salish and Kootenai Tribes of the Flathead Nation
EB	Brook Trout
EBx BULL	Brook x Bull Trout hybrid
EF	electrofishing
FERC	Federal Energy Regulatory Commission
FDX	full-duplex
FWP	Montana Fish, Wildlife and Parks
FWS or Service	U.S. Fish and Wildlife Service
GBT	gas bubble trauma
g	gram
HDX	half-duplex
hrs	hours
HP	holding pool
kg	kilogram
km	kilometer
L	length
fish ladder or ladder	Thompson Falls Upstream Fish Passage Facility
Licensee	NorthWestern Energy Corporation
LL	Brown Trout
LP	lower pool
LWF	Lake Whitefish
LT	Lake Trout
LMB	Largemouth Bass
LS SU	Largescale Sucker
LN SU	Longnose Sucker
MOU	Memorandum of Understanding
mm	millimeter
MDEQ	Montana Department of Environmental Quality
MWF	Mountain Whitefish
N	number
NorthWestern	NorthWestern Energy Corporation
NP	Northern Pike
NPMN	Northern Pikeminnow
PEA	Peamouth
PIT	passive integrated transponder
PPL Montana	PPL Montana, LLC

Project	Thompson Falls Hydroelectric Project
PUMP	Pumpkinseed
RB	Rainbow Trout
RBxWCT	Rainbow x Westslope Cutthroat Trout hybrid
SMB	Smallmouth Bass
SOP	Operational and Procedural Manual
TAC	Technical Advisory Committee
TCs	Terms and Conditions
TDG	total dissolved gas
TFalls	Thompson Falls
TRiver	Thompson River
USGS	U.S. Geological Survey
Wt	weight
WCT	Westslope Cutthroat Trout
WF	West Fork
YP	Yellow Perch
YL BL	Yellow Bullhead

Section 1.0 – Introduction

NorthWestern Energy Corporation (NorthWestern) is owner and operator of the Thompson Falls Hydroelectric Project FERC No. 1869 (Project). The Project is located on the Clark Fork River, near Thompson Falls in Sanders County, Montana. Preliminary development of the Project began in June 1912, by the Thompson Falls Power Company. Construction commenced in May 1913 and the first generating unit was placed in service on July 1, 1915. The sixth generating unit was placed in service in May 1917 (the addition of a new powerhouse and a seventh generating unit in 1993). Montana Power Company acquired the Thompson Falls Project in 1929.

The current Federal Energy Regulatory Commission (FERC or Commission) License was issued to Montana Power Company in 1979 (purchased by PPL Montana, LLC in 1999 and subsequently purchased by NorthWestern in 2014) and is scheduled to expire on December 31, 2025. In 2009 and 2010, the Licensee constructed the Thompson Falls Upstream Fish Passage Facility (fish ladder or ladder). Operations of the fish ladder commenced in 2011 and continue seasonally between March and October.

NorthWestern has prepared this report to fulfill the annual compliance reporting requirement per Term and Condition (TC) 7a of the 2008 U.S. Fish and Wildlife Service (FWS) Biological Opinion (BiOp). A summary of the 2024 operational season at the fish ladder, baseline fisheries monitoring, summary of compliance with the 2008 FWS's BiOp, and summary of incidental take for Bull Trout is provided in this report.

This document will be made available on the Project website and distributed to FWS and Thompson Falls Advisory Committee (TAC) members. Previous annual reports are available on the Project website, <https://www.northwesternenergy.com/clean-energy/hydropower/thompson-falls-hydro-project/annual-reports-ferc-orders>. NorthWestern will continue to prepare and submit annual reports to the Commission through the term of the existing license (2025).

Section 2.0 – Upstream Fish Passage Facility

Section 2.1 – Ladder Operations and River Conditions

The 2024 fish ladder operational season began March 13 and ended October 22. Peak flows were below average (<60,000 cfs), which allowed ladder operations to continue throughout the spring. The ladder operated in orifice mode and was checked 155 days during the season. The peak discharge in the Clark Fork River was approximately 40,700 cubic feet per second (cfs) on June 10 and 11, as measured by the United States Geological Survey (USGS) gage at Plains, Montana station #12389000.

In 2024, the water temperature in the ladder (pool 48) was recorded as a single measurement coinciding with each ladder check. The warmest water temperature recorded was 25.1 degrees Celsius (°C) on July 22. The mean daily streamflow (USGS station #12389000) and daily recorded water temperature in the ladder during the 2024 season is presented in Figure 1.

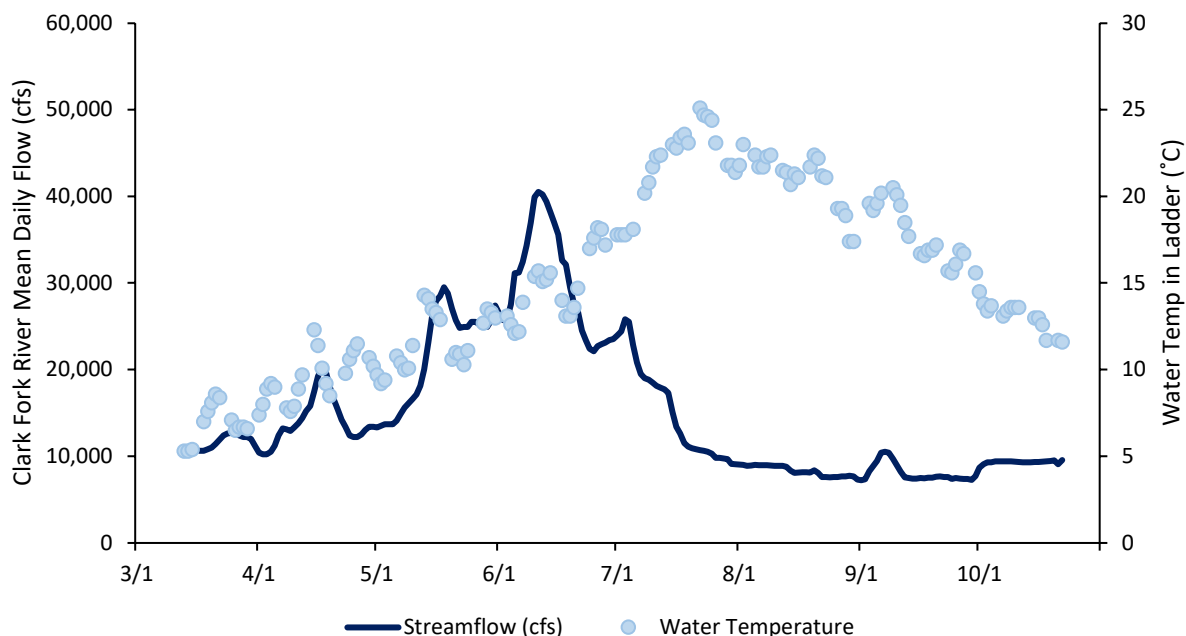


Figure 1. Mean daily streamflow in the Clark Fork River (USGS station#12389000) and water temperature recorded during each ladder check, March – October 2024.

Section 2.2 – Upstream Fish Passage Results

Since the ladder opened in 2011, over 43,750 fish representing 16 species, and three hybrids have ascended the ladder (Table 1) and just over 39,000 fish have been released upstream (Table 2). A total of 2,998 fish ascended the ladder in 2024 representing 534 salmonids and 2,464 non-salmonids (Figure 2).

Table 1. Total fish count, by species, for each year the ladder operated, 2011-2024.
 “-” indicate zero fish recorded for that year. * - fish were not passed upstream so fish count includes fish returning and ascending the ladder multiple times during the season.

Species by Year	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Grand Total
Largescale Sucker	418	1403	3041	2802	6327	2270	34	6	1018	805	823	631	441	1337	20,019
Northern Pikeminnow	1000	926	387	1003	3356	707	66	10	180	41	150	35	24	21	7,906
Smallmouth Bass	135	34	8	1356	1244	1007	123	5	339	347*	856*	953*	839*	1105*	8,351
Rainbow Trout	164	208	213	187	281	366	181	124	186	222	213	191	221	267	3,024
Brown Trout	28	42	111	81	184	204	108	63	210	123	249	195	236	238	2,072
Mountain Whitefish	17	24	2	254	54	8	-	4	4	11	3	6	-	1	388
Westslope Cutthroat Trout	21	21	48	36	37	36	14	14	21	33	20	9	15	21	346
Peamouth	-	-	-	-	122	2	-	-	-	-	-	-	-	-	124
Rainbow x Cutthroat hybrid	9	7	13	12	4	5	1	1	1	2	8	3	3	-	69
Longnose Sucker	10	-	2	1	26	6	-	-	-	-	-	-	-	1	46
Peamouth x Northern Pikeminnow hybrid	-	-	-	-	-	13	2	-	-	-	-	-	-	-	15
Bull Trout	2	2	5	1	2	3	1	-	1	1	1	2	2	-	23
Lake Trout	1	1	-	1	6	-	-	-	2	1	2	1	-	-	15
Brook Trout	-	-	-	1	2	1	-	-	-	1	1	-	-	-	6
Walleye	-	-	-	-	2	-	-	-	1	-	1	-	-	-	4
Largemouth Bass	-	-	-	-	-	1	-	-	-	-	-	-	-	-	1
Brook Trout x Bull Trout hybrid	-	-	-	-	-	1	-	-	-	-	-	-	-	-	1
Kokanee	-	-	-	-	-	-	-	-	-	-	1	-	-	7	8
Northern Pike	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1
Salmonids	242	305	392	573	570	624	305	206	425	394	498	407	477	534	5,952
Non-Salmonids	1,563	2,363	3,438	5,162	11,077	4,006	225	21	1,538	1,193	1,830	1,619	1,305	2,464	37,804
Grand Total	1,805	2,668	3,830	5,735	11,647	4,630	530	227	1,963	1,587	2,328	2,026	1,782	2,998	43,756

Table 2. Total number of fish (salmonids and non-salmonids) released upstream of Thompson Falls Dam each year, 2011-2024.

Year	Fish Released Upstream		
	Salmonids	Non-Salmonids	Total
2011	239	1,484	1,723
2012	302	2,358	2,660
2013	386	3,432	3,818
2014	572	5,161	5,733
2015	558	11,062	11,620
2016	611	4,000	4,611
2017	297	225	522
2018	205	21	226
2019	414	1,188	1,602
2020	377	840	1,217
2021	489	971	1,460
2022	356	665	1,021
2023	456	464	920
2024	533	1,357	1,890
Total	5,795	33,228	39,023

Cumulatively, the majority of fish recorded at the ladder are Largescale Sucker followed by Smallmouth Bass (Table 1). This year, Smallmouth Bass cumulative total exceeded Northern Pikeminnow. Since 2015, Northern Pikeminnow and Largescale Sucker numbers declined substantially at the ladder. Smallmouth Bass numbers appear to be trending upward since 2018. Rainbow and Brown trout represent the largest group of salmonids with over 5,000 fish recorded at the ladder since 2011. Rainbow trout counts remain relatively constant since 2011 and Brown trout counts are trending up since 2011.

A total of 1,890 fish were released upstream of Thompson Falls Dam in 2024. The fish released upstream included 533 salmonids, including seven fish (3 RB, 3 LL, 1 WCT) that ascended the ladder twice in 2024, and 1,357 non-salmonids (Table 2). Fish not released upstream this year included 1,105 Smallmouth Bass, 2 Largescale Sucker (mortality), and 1 Rainbow Trout mortality).

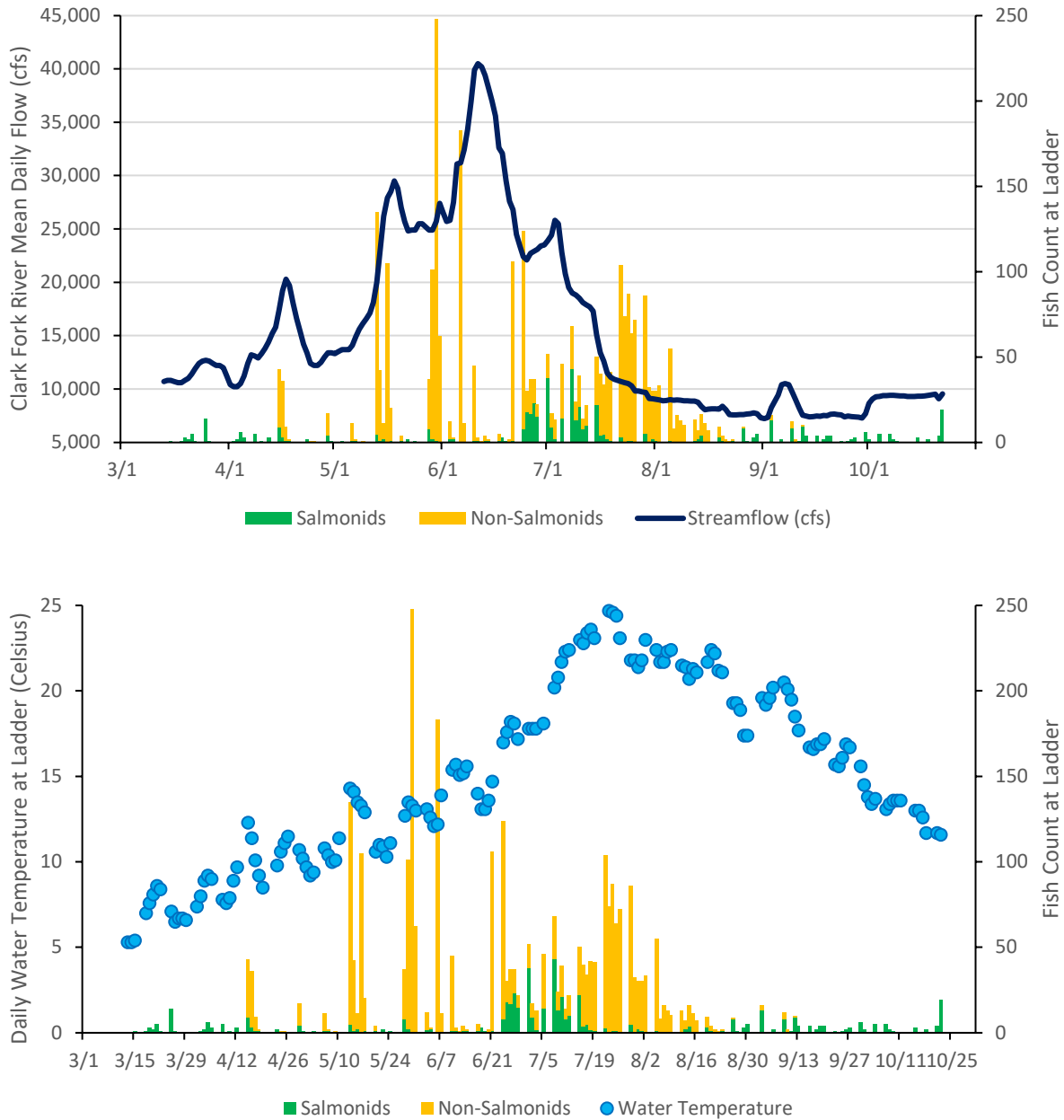


Figure 2. Number of salmonids and non-salmonids recorded at the workstation each ladder check and the mean daily streamflow in the Clark Fork River (USGS station#12389000), top figure, and the corresponding water temperature in the ladder (degrees Celsius), bottom figure, March 13 through October 22, 2024.

Section 2.3 – Bull Trout Detections in Project Area

In 2024, NorthWestern handled one Bull Trout in the Project area. This individual was captured during spring electrofishing in the upper Thompson Falls Reservoir in mid-April. The Bull Trout measured 178 mm in total length and weighed 42 grams, it was PIT tagged (#989001033212107)

and released. A genetic sample (#TFL0090) was taken and results indicate this fish most likely originated from West Fork Thompson River.

Since the ladder opened in 2011, a range of zero to five Bull Trout (maximum of 5), have ascended the ladder annually. In 2024, three Bull Trout were detected entering the ladder with one of those individuals detected in pools 7/8. All three fish were initially captured in 2021 or 2022 by Avista downstream of Cabinet Gorge Dam, transported upstream of Thompson Falls, and released in Region 4. Two fish were genetically assigned to the Thompson River drainage, West Fork Thompson River and Fishtrap Creek tributaries, and one fish was genetically assigned and transported to South Fork Jocko Creek in 2021 (Table 3).

Table 3. Summary of Bull Trout detection and movement history for three Bull Trout detected entering the ladder in 2024. None ascended past the lower pools 7/8. (LP = lower pools)

BULL ID	Dates	Location/ Event	Length (mm)	Most Likely Population of Origin
989001030299617/ 900228000078303	12/6/21	LPO Gillnet	621	Fishtrap Ck (R4)
	5/24/22	LCFR-ID Below CGD		
	5/27/22	Transport to Thompson River		
	6/20/22	Thompson River Array		
	9/14/22	Fishtrap Creek Array		
	9/17/22	Thompson River Array		
	5/12/24	TFalls Ladder Entrance & LP		
	5/14/24	TFalls Ladder LP		
	5/15/24	TFalls LP & Entrance		
	6/22/24	TFalls Entrance		
	7/29/24	Prospect Creek Array		
	7/30/24	Prospect Creek Array		
	8/08/24	Prospect Creek Array		
	9/14/24	Prospect Creek Array		
	982126050371142	6/16/22		
6/22/22		Transport Thompson River		
7/06/22		WF Thompson River Array		
9/29/22		WF Thompson River Array		
10/1/22		Thompson River Array		
10/3/22		Thompson River Array		
6/02/23		Prospect Creek		
6/07/23		Prospect Creek		
6/10/23		Prospect Creek		
6/14/24		TFalls Ladder Entrance		
6/22/24		TFalls Ladder Entrance		
6/23/24	TFalls Ladder Entrance			

BULL ID	Dates	Location/ Event	Length (mm)	Most Likely Population of Origin
982126050371177	9/13/21	LCFR-ID Below CDG	655	South Fork Jocko River (R4)
	9/21/21	Transport SF Jocko River		
	7/24/22	Prospect Creek Array		
	8/13-10/5/22	Prospect Creek Array		
	6/26-28/23	TFalls Ladder Entrance		
	7/17-9/16/23	Prospect Creek Array		
	5/30-6/5/24	TFalls Ladder Entrance		
	6/16-17/24	TFalls Ladder Entrance		
	6/23/24	TFalls Ladder Entrance		
	7/19-9/1/24	Prospect Creek Array		

In total, during the last 14 years of operation, 23 Bull Trout (representing 21 individuals) averaging 501 mm in length (range 285-620 mm) have ascended the ladder. Approximately 67 percent of the 21 unique individual Bull Trout ascending the ladder were genetically assigned to the Thompson River drainage (Fishtrap Creek or West Fork Thompson River) and approximately 29 percent of the Bull Trout ascending the ladder were genetically assigned to Fish Creek. Many of the Bull Trout assigned to the Thompson River drainage were subsequently detected in the Thompson River drainage via remote PIT tag array systems located in the mainstem and tributaries.

Section 2.4 – Fallback

Fallback is defined as a fish that ascends the ladder, receives a PIT, Floy, or other unique identification tag, is released upstream, and is later detected downstream of Thompson Falls Dam over a short interval of time. The interval of time has been evaluated on a calendar year in past annual reports. TAC members have recommended a smaller interval of two weeks or one month as the threshold for evaluating fallback. However, detecting fallback is limited to when a fish returns to the ladder or when a fish is recaptured/detected during sampling efforts downstream of the Thompson Falls Dam. Therefore, the number of fallback fish reported represents a minimum value. Also, the duration between the time a fish is released upstream of the dam and when it moves downstream of the dam is an estimate since tags are not detected moving over the spillway or at the turbines.

In 2024, three Rainbow Trout were detected downstream of Thompson Falls Dam within 14 days of their initial ascent and release upstream of the ladder; two returned to the ladder and one was detected in Prospect Creek (Table 4). Three fish (1 RB, 1 LL, 1 WCT) were detected within the 15- to 30-day interval and nine fish (3 RB, 4 LL, 2 WCT) were detected between 37 and 122 days downstream of the dam after their initial ladder ascent and release upstream. Detection of fallback fish downstream and detected in the ladder ranged from 6 days to 95 days after initial release upstream. Approximately half of the fish (3 RB, 3 LL, 1 WCT) in Table 4 ascended the ladder the second time in 2024 and were released upstream.

Table 4. Summary of 2024 fallback fish and the number of days between initial release upstream of the dam and subsequent detection downstream of the dam.

2024 Fallback Species	# of Days Between Release and Detection Downstream			Total
	≤14 days	15 to 30 days	> 30 days	
RB	3	1	3	7
LL	-	1	4	5
WCT	-	1	2	3
Total	3	3	9	15

Determining whether a fallback fish moved downstream over the spillway or through the turbines depends on streamflow conditions. The combined capacity of the seven generating units at the Project is approximately 23,000 cfs. When river inflows exceed this capacity, spill is initiated at the Main Dam spillway. Therefore, when streamflow is less than 23,000 cfs, downstream fish passage is most likely through the turbines. When streamflow is above 23,000 cfs, fish can pass downstream through the turbines or over the spillway. In 2024, streamflow exceeded 23,000 cfs from May 14 through July 4 (~48 consecutive days). Based on the detection dates it is likely one Rainbow Trout moved downstream through the turbine before being detected in Prospect Creek and the remaining 14 fish moved downstream either through the turbines or over the spillway.

Section 2.5 – Fish Tagging at the Ladder

As per ladder operations protocol, salmonids are implanted with a PIT tag at the ladder workstation until temperatures reach and exceed 20°C. Once temperatures exceed 20°C, salmonids are checked for existing PIT tags, but no new tags are implanted. Tagging Bull Trout at these warmer temperatures is at the discretion of the ladder operators.

Remote PIT arrays are located at the fishway entrances (upper and lower), in the lower pools (Pool 7 and 8), and the top of the ladder or holding pool (Pool 45). These arrays detect fish as they swim through. The efficiency of these remote arrays is not 100 percent but is assumed to be very high. Most PIT-tagged fish detected were initially tagged after their first ladder ascent. Other potential sources of PIT-tagged fish in the system originate from:

- Avista’s tagging efforts downstream of Cabinet Gorge Dam,
- Glaid’s (2017) study of juvenile Bull Trout in the Thompson River, upstream of the Project,
- FWP PIT tagging activities in tributaries (upstream and downstream of the Project), and
- Fish behavior study of Brown and Rainbow trout in the Project area with PIT tagging (and radio tagging) occurring during fish collection activities upstream of the dam and at the ladder in 2021, 2022, and 2023.
- Submersible tag array study below dam in near field included PIT tagged fish downstream of Thompson Falls Dam in 2024.

In 2024, there were 458 fish newly PIT-tagged at the ladder and 33 fish previously tagged recorded ascending the ladder. In total, 491 PIT-tagged fish were released upstream of the dam in 2024 (Table 5). The fish totals in Table 5 represent individual fish. There were 7 fish (3 LL, 3

RB, 1 WCT) that ascended the ladder twice (referred to as “fallback” fish) in 2024. These fish are accounted for one time in Table 5. A summary of the number of PIT-tagged and non-tagged fish released upstream of the dam in 2024 is provided in Table 5.

Table 5. Summary of PIT-tagged fish at the Ladder in 2024, new individuals tagged at the ladder, returning fish to the ladder, and un-tagged fish released upstream.

Species	PIT Tagged in 2024	Tagged in Previous Year at Ladder	Total # PIT-Tagged Fish Released Upstream	Total # Non-tagged Fish Released Upstream	Total # of Individual Fish Released Upstream
BULL	-	-	-	-	-
LL	145	17	162	73	235*
RB	158	15	173	90	263*
RBxWCT	-	-	-	-	-
WCT	16	-	16	4	20*
MWF	1	-	1	-	1
KOK	6	-	6	1	7
Salmonids	326	32	358	168	526 (+7 fallback*)
N PMN	15	1	16	5	21
LS SU	117	-	117	1,218	1,335
LN SU	-	-	-	1	1
Non-Salmonids	132	1	133	1,224	1,357
TOTAL	458	33	491	1,392	1,883 (+7 fallback*)

Notes: *3 LL, 3 RB, 1 WCT ascended the ladder twice in 2024.

Section 2.5.1 – Internal Fishway Efficiency

The Licensee has monitored movement of PIT-tagged-fish entering and ascending the ladder since 2011. Between 2011 and 2020, one limitation of the system was the first detection of a fish required the fish to enter the ladder and swim through the lower seven pools. Prior to the 2021 season, a PIT tag antenna was installed in the two entrances at the ladder and remained operational throughout the season. The 2021 data provides a more complete view of the number of tagged fish entering the ladder, moving to the lower pools (LP) seven and/or eight, and ascending to the top holding pool (HP). The first seven pools in the ladder operate in notch mode in contrast to the rest of the ladder that operates in orifice mode.

In 2024, the ladder operated in orifice mode for the entire season (except for the lower seven pools). Remote arrays in the ladder detected a total of 132 individual fish. The majority of fish were either Largescale Sucker (40%), Brown Trout (29%) or Rainbow Trout (22%). Other species detected included Northern Pikeminnow (5%), Bull Trout (2%), Westslope Cutthroat Trout (2%), and Rainbow hybrids (1%).

Salmonids are PIT-tagged at the ladder workstation annually. A total of 4,069 salmonids have been tagged since 2011, ranging from 175 to 525 tagged at the ladder per season. Non-salmonids were tagged at a lower frequency with a total of 281 fish PIT-tagged (NPMN, LSSU, LNSU) during four seasons (2011, 2017, 2018, 2019) and 132 PIT-tagged (LSSU, NPMN) in 2024. Many of the non-salmonids were tagged below the dam in 2024, as part of a separate study, thus explaining the higher number of non-salmonids detected in the ladder this year compared to previous years.

Internal efficiency at the ladder evaluates what proportion of the 132 PIT-tagged LSSU and NPMN detected entering the ladder continued to the lower pools and holding pool (Table 6). Internal efficiency at the ladder has been measured using two different calculations. From 2011 through 2020, the remote PIT tag array system in the ladder provided detection information for the lower pools (LP) seven and/or eight and the holding pool (HP), also referred to as the top of the ladder. This initial calculation provided a quantitative assessment of the proportion of fish detected in the LP continuing to the HP (referred to as the *Initial Calculation Method* in Table 6). The new calculation method was implemented after the remote PIT-tag arrays were installed in the lower and upper entrances to the fish ladder in 2021 (referred to as the *New Calculation Method* in Table 6). The new calculation method quantifies the proportion of PIT-tagged fish detected entering the ladder and continuing to the LP and/or HP.

Since 2021, the calculation method accounts for fish entering the ladder. The initial calculation method (using LP and HP detection data) likely overestimates ladder efficiency for fish with a disproportionately higher overestimation for non-salmonids. Based on the new calculation method (using entrance, LP and HP detection data), the data indicate that after a fish enters the ladder, those fish that continue to the LP have a higher likelihood of continuing to HP. Salmonids appear to have a higher likelihood of reaching the LP compared to non-salmonids entering the ladder. In 2024, about 75 percent of tagged salmonids entering the ladder continued to the LP in contrast to nearly 42 percent of tagged non-salmonids entering the ladder reaching the LP (Table 6). Salmonids, primarily represented by Rainbow and Brown trout continue to display a higher level of internal passage efficiency compared to non-salmonids.

Table 6. Summary of 2024 PIT-tagged fish entering the ladder and proportion fish ascending the ladder, including the number of fish recorded in the entrance, lower pool (LP), top holding pool (HP); the percentage of all fish detected entering the ladder detected in the LP and HP; and the percentage of fish detected in the LP continuing to the HP.

Ladder detects	# Fish @ Entrance	# Fish in LP	# Fish in HP	New Calculation Method (since 2021)		Initial Calculation Method (2011-2020)
				% Fish in LP	% Fish in HP	% Fish in LP to HP
Salmonids	77	58	48	75.3%	62.3%	82.8%
Non-salmonids	60	25	18	41.7%	30.0%	72.0%
Species	# Fish @ Entrance	# Fish in LP	# Fish in HP	% Fish in LP	% Fish in HP	% Fish in LP to HP
BULL	3	1	-	33.3%	-	-
LL	40	31	25	77.5%	62.5%	80.6%
RB	31	25	22	80.6%	71.0%	88.0%
RBxWCT	1	-	-	-	-	-
WCT	2	1	1	50.0%	50.0%	100%
NPMN	6	3	1	50.0%	16.7%	33.3%
LS SU	54	22	17	40.7%	31.5%	77.3%

Section 2.5.2 – Ascent Times in Ladder

In 2024, a total of 65 ascent times were recorded via the remote tag arrays in the fish ladder (entrance and pool 45). The ascent time is determined by calculating the duration between the last detection at the entrance array and the first detection at the holding pool array (Table 7). A few fish were not detected by the entrance array; thus, no data were available for the calculation.

In 2024, the median ascent times for 47 salmonids was 2.9 hours, which is the same as from 2023 (2.9 hours for 58 salmonids), and very similar to data from 2022 (2.6 hours for 70 salmonids) and 2021 (3.2 hours for 49 salmonids).

Table 7. Summary ascent information for 65 ladder fish, calculating the minimum, maximum, median, average time between the last entrance detection until the first holding pool detection by species.

Species	Number of Fish	Ascent Time (hours)			
		Min	Max	Median	Average
LL	25	1.0	92.8	3.1	9.6
RB	21	0.9	15.7	2.8	4.6
WCT	1			2.2	2.2
Salmonids	47	0.9	92.8	2.9	7.2
NPMN	1				2.9
LS SU	17	2.5	13.7	4.7	5.7
Non-Salmonids	18	2.5	13.7	6.7	3.3

Section 2.6 – Ladder Fish Detections in the Thompson River Drainage

The Thompson River is located approximately 6 miles upstream of Thompson Falls Dam. A remote PIT-tag antenna array was installed in the mainstem of the Thompson River on September 26, 2014. In 2024, the mainstem Thompson River array was offline between June 27 and July 1. The array does not detect directionality of fish, but the entry of the fish into the drainage can be assumed by cross-referencing the release date upstream of the ladder and the first detection recorded in the Thompson River.

In 2024, there were 247 unique individual fish detections in the Thompson River. The majority (~94%) of these fish ascended the ladder in 2024 or previous years, while 15 individuals had no ladder history (Table 8). The fish with no ladder history either had an unknown species/tagging history (4 fish) or were either tagged upstream of Thompson Falls Dam (6 BULL, 1 LL, 1 RB) or transported by Avista upstream of Thompson Falls Dam from downstream of Cabinet Gorge Dam (3 BULL). Brown and Rainbow trout represent most ladder-fish detected in the Thompson River (59% LL, 37% RB), nearly the same proportions documented in 2023, which is expected because the majority of salmonids recorded and PIT-tagged at the ladder comprise these two species. Of the 232 ladder-fish detected in the Thompson River in 2024, over half (67%) ascended the ladder in 2024, 21 percent last ascended the ladder in 2023, 8 percent last ascended in 2022, and 4 percent last ascended in 2021, 2020, and 2017 (Table 9).

Table 8. Summary of 2024 Thompson River individual fish detections.

Individual Fish Detected (2024)		
Fish Species	# With Ladder History	# Without Ladder History
BULL	1	9
LL	137	1
RB	85	1
RBxWCT	1	-
MWF	1	-
WCT	6	-
LS SU	1	-
Unknown	-	4*
Total	232	15

Table 9. Summary of the most recent year a fish was recorded at the ladder (2017, 2020, 2021, 2022, 2023, or 2024) for 232 individual fish detected in the Thompson River in 2024.

Fish Species	2017	2020	2021	2022	2023	2024
BULL	-	-	-	-	1	-
WCT	-	-	-	-	-	6
RB	-	1	6	9	22	48
RBxWCT	-	-	-	-	-	-
LL	1	2	1	9	25	99
MWF	-	-	-	-	-	1
LSSU	-	-	-	-	-	1
Total	1	3	7	18	48	155

There were 705 daily detections at the mainstem Thompson River array representing the 232 unique ladder fish. The majority of the detections are from tagged Brown and Rainbow trout. In 2024, a total of 491-tagged fish were released upstream of Thompson Falls Dam and 162-tagged fish were Brown Trout and 173-tagged fish were Rainbow Trout. Approximately 61 percent of the tagged-Brown Trout (99 of 162 LL) and 28 percent of tagged-Rainbow Trout (48 of 173 RB) released upstream of Thompson Falls Dam in 2024 were later detected in the Thompson River the same year. One Bull Trout that ascended the ladder in May 2023 was detected entering the Thompson River on May 9, 2024.

A summary of the daily detections representing the 232-ladder fish (by species) and mean daily streamflow in the Thompson River (USGS gage #12389500) is provided in Figure 3. Flow in the Thompson River peaked May 15 at approximately 955 cfs, nearly half the peak discharge in 2023 (1,870 cfs). Rainbow and Brown trout were detected in the mainstem Thompson River throughout the year with peak daily detections occurring in July, following the decline of the hydrograph (Figure 3).

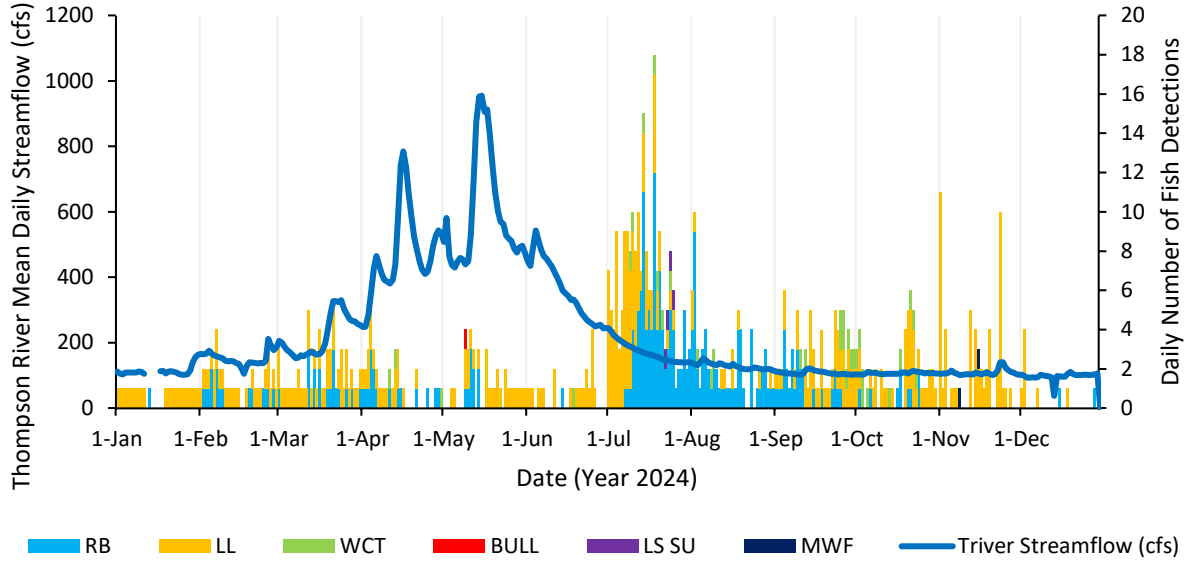


Figure 3. Summary of daily PIT tag array detections representing 231 individual ladder fish and the mean daily streamflow in Thompson River, 2024.

Section 2.6.1 – West Fork Thompson River and Fishtrap Creek

FWP also operated one PIT-tag array in Fishtrap Creek and one in West Fork Thompson River, both Bull Trout spawning tributaries in the Thompson River drainage. These arrays have functioned sporadically since installation (2014 in West Fork Thompson River; 2015 in Fishtrap) due to various challenges with batteries and access. Data collection has been more continuous since 2021. The number of ladder fish detected in the tributaries remains relatively low, one to eight salmonids a year (Table 10), compared to the number of PIT-tagged fish released upstream annually, 175 to 525 salmonids a year.

In 2024, there were six individual ladder fish detected in the tributaries, three fish in West Fork Thompson River (1 BULL, 1 RB, 1 WCT), and three fish in Fishtrap Creek (1 RB, 1 WCT, 1 LL). The two Westslope Cutthroat Trout and Brown Trout ascended the Thompson Falls fish ladder in 2024, while the Bull Trout and one Rainbow Trout ascended the ladder in 2023, and the other Rainbow Trout ascended the ladder in 2022. The Westslope Cutthroat Trout detected in the West Fork Thompson River ascended the ladder twice in 2024 (April 4 and May 29) before entering the Thompson River and West Fork Thompson River.

Table 10. Summary of ladder fish, by species detected in Fishtrap Creek and West Fork Thompson River, 2014 – 2024.

Year	BULL	WCT	RB	LL	Total
2014	-	-	-	1	1
2015	1	-	-	1	2
2016	-	-	2	5	7
2019	-	1	1	2	4
2020	-	1	3	-	4
2021	1	2	3	2	8
2022	2	1	3	1	7
2023	1	-	1	3	5
2024	1	2	2	1	6

Section 2.7 – Ladder Fish Detections in Prospect Creek

Prospect Creek is located about one-half mile downstream of Thompson Falls Main Dam. In August 2018, NorthWestern and Avista partnered to fund and install a remote PIT-tag array system in Prospect Creek (near the confluence with the Clark Fork River) with the capability of detecting directionality of upstream and downstream fish movement. There were some technical challenges with the array system, and it is unclear how efficient the system was at detecting PIT-tagged fish.

In 2024, the Prospect Creek array recorded 62 daily detections representing 24 individual fish (11 WCT, 9 RB, 2 BULL, 1 RBxWCT, 1 LL), shown in Figure 4. Approximately half of the fish (9 RB, 2 BULL, 1 RBxWCT, 1 LL) had a ladder history, either ascending the ladder or entering the ladder with no ascent. The Westslope Cutthroat trout were part of a salvage and transport program MFWP implements annually in Prospect Creek.

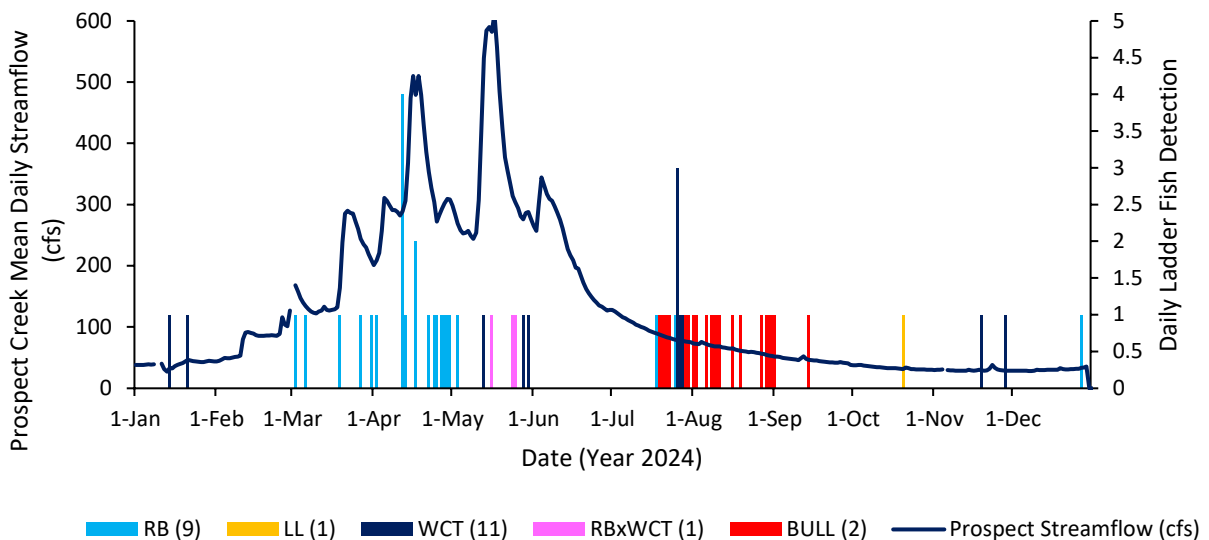


Figure 4. Summary of all daily PIT tag array detections by species (with number of individual fish) in Prospect Creek and mean daily streamflow, 2024.

The daily detections of the 24 individual fish with the mean daily stream flow for Prospect Creek (USGS gage #12390700) is provided in Figure 4. Peak mean daily flow was approximately 612 cfs on May 17, less than half the mean daily peak in 2023 (1,310 cfs). In general, Rainbow Trout are detected at the mainstem array in the spring, March through early May, and Bull Trout are detected in the summer (August) when mainstem Clark Fork River temperatures exceed optimal temperatures for Bull Trout.

Details on the two Bull Trout detected in Prospect are provided in Section 2.3. Both Bull Trout detected in Prospect Creek were initially captured by Avista downstream of Cabinet Gorge Dam and were tagged and transported to Region 4, upstream of Thompson Falls Dam.

Section 2.8 – Ladder Fish Detections by Angler Reports

Beginning in 2017, salmonids recorded at the ladder workstation receive a Floy tag that is visible to anglers, prior to being released upstream of the dam. FWP contact information is provided on the Floy tag. This section provides a summary of salmonids passed at the ladder that anglers have then captured and reported to FWP.

Since 2017, anglers have reported catching 122 salmonids that have ascended the fish ladder at Thompson Falls Dam. In 2024, anglers reported capturing 27 salmonids with Floy tags and history ascending the Thompson Falls fish ladder (Table 11).

In 2024, anglers reported capturing 32 individual fish with Floy tags. All fish except three (1 RB, 1 LL, 1 WCT) were reported from upstream of Thompson Falls Dam with 53 percent captured in the Thompson River drainage (9 LL, 6 RB, 2 WCT). Other fish were captured further upstream in the Clark Fork River near Dry Creek, Tamarack Creek, and Sneider Creek as well as in the Jocko River, St. Regis River, and Blackfoot River. Two fish (1 RB, 1 LL) were reported by anglers below Thompson Falls Dam and one WCT was reported further downstream in Vermilion Bay (Noxon Reservoir).

Table 11. Summary of Floy-tagged salmonids reported by anglers since 2017 (FWP, unpublished). Angler reports include fish caught upstream and downstream of Thompson Falls Dam.

Species	2017	2018	2019	2020	2021	2022	2023	2024	Total
LL		1	3	6	5	7	5	14	41
RB	1		9	12	15	15	9	14	75
WCT		1	1	2	1	1		4	10
RBxWCT							1		1
Total	1	2	13	20	21	23	15	32	127

Angler reported data continue to show the large geographical area fish are utilizing, both upstream and downstream of Thompson Falls Dam (Figure 5). Past reports include 190 miles upstream of the dam to the confluence of the Clearwater in the Blackfoot River as well as other long forays to the Jocko River in the Lower Flathead River, and to the middle Clark Fork River near the towns of St. Regis, Alberton, and Missoula.

The majority of angler reports are from upstream of Thompson Falls Dam, in the mainstem Clark Fork River and Thompson River drainages (Figure 5). Downstream, fish have been captured at the mouth of Prospect Creek extending downstream in Noxon Reservoir to Vermilion Bay and White Pine Creek, including downstream of Cabinet Gorge Dam.

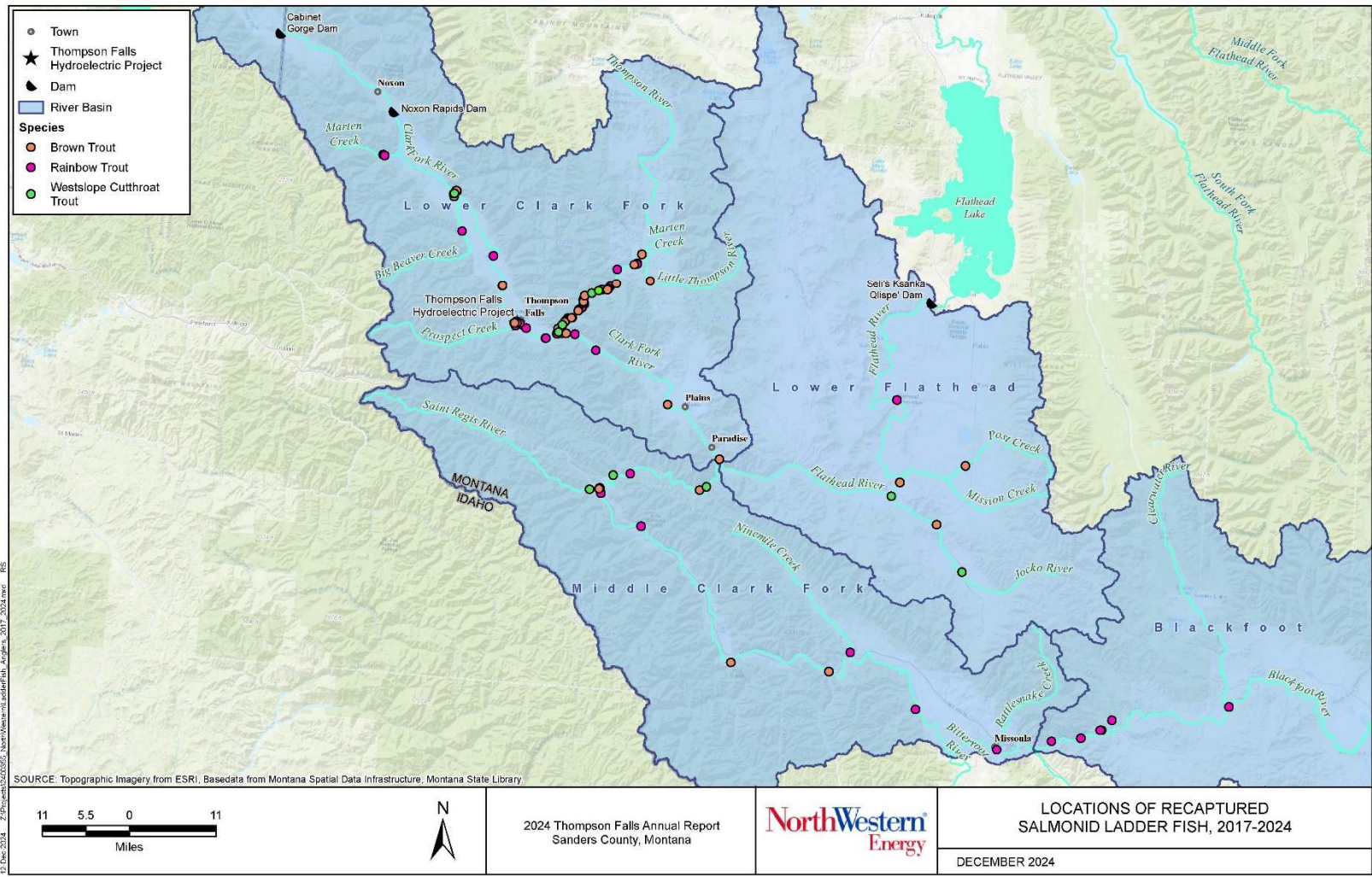


Figure 5. Summary of angler reports of recaptured salmonid ladder fish, 2017-2024.

Section 3.0 – Baseline Fisheries Surveys

The baseline fisheries surveys were set up with the intention of monitoring the impact of fishes passed upstream of Thompson Falls Dam. The objective for these sampling efforts is to establish baseline information on species composition and relative abundance within and upstream of the Thompson Falls Reservoir. This information helps track annual and long-term changes to the fish community, and if there is a measurable relation to the operation of the full-height fish ladder at the Project and upstream passage of over 39,000 fish since 2011 (*refer to* Table 2).

Baseline fisheries data collection includes electrofishing the Thompson Falls Reservoir (upper and lower sections) in the spring, electrofishing two reaches in the Clark Fork River (above the islands and between Paradise and Plains, Montana) in the fall, and fall gillnetting in Thompson Falls Reservoir. Monitoring via electrofishing began in 2009 in the Thompson Falls Reservoir and in 2010 in the Clark Fork River. Gillnetting in the Thompson Falls Reservoir has occurred annually each October, since 2004. In 2016 the TAC agreed to modify the frequency of the baseline surveys starting in 2017. Gillnet sampling continues to be annual, while electrofishing occurs every other year. A schedule of baseline fisheries monitoring is provided in Table 12. This section provides a summary of the 2024 spring and fall electrofishing surveys and the fall gillnetting survey.

Table 12. Baseline fisheries monitoring schedule 2022 through 2025.

Year	A	B	C
2022	X	X	X
2023			X
2024	X	X	X
2025			X

A = Thompson Falls Reservoir electrofishing, Spring (upper and lower sections)

B = Clark Fork River electrofishing, Fall (Paradise-to-Plains and Above Islands)

C = Gillnetting Thompson Falls Reservoir, Fall

Between 2011 and 2024, a total of 41 ladder fish (5 fish in 2024) have been recorded during the baseline surveys, including 30 Rainbow Trout, nine Brown Trout, and two Westslope Cutthroat Trout. The 41 fish represent 16 fish captured in the Clark Fork River above the islands complex reach, 14 fish captured in the upper section and five fish captured in the lower section of the Reservoir, three fish captured in the Paradise to Plains reach, and three fish captured gillnetting in the Reservoir. The baseline surveys have captured approximately one percent of the 4,069 salmonids PIT-tagged at the ladder (and released upstream) between 2011 and 2024.

Section 3.1 – Spring Electrofishing Thompson Falls Reservoir

Spring electrofishing in the Thompson Falls Reservoir consists of two locations, the lower section located immediately upstream of the Project and the upper section located immediately downstream of the confluence with the Thompson River (Figure 6). Spring electrofishing is conducted using boat-mounted electrofishing equipment. The boat is navigated slowly along the shoreline at night. The lower section is parallel with Highway 200 from the Wild Goose Landing boat launch, upstream to a location approximately 750 feet upstream of the pump house. The

upper section is on the right bank of the Clark Fork River from the confluence of the Thompson River to about 1 mile downstream of the Cherry Creek boat launch. The upper section has riverine characteristics, with noticeable flowing water, average widths around 459 feet, and little to no aquatic vegetation. The lower section has substantially lower water velocity, mean widths near 1,673 feet, abundant aquatic vegetation, and is off the main river channel. In 2024 sampling occurred on April 15 and 16, similar to the sampling dates from previous years. Table 13 summarizes sampling events since 2009, water temperature in Celsius ($^{\circ}\text{C}$), duration of electrofishing (hours), and mean daily streamflow (cfs) at the USGS gage #12389000 during the sampling period.

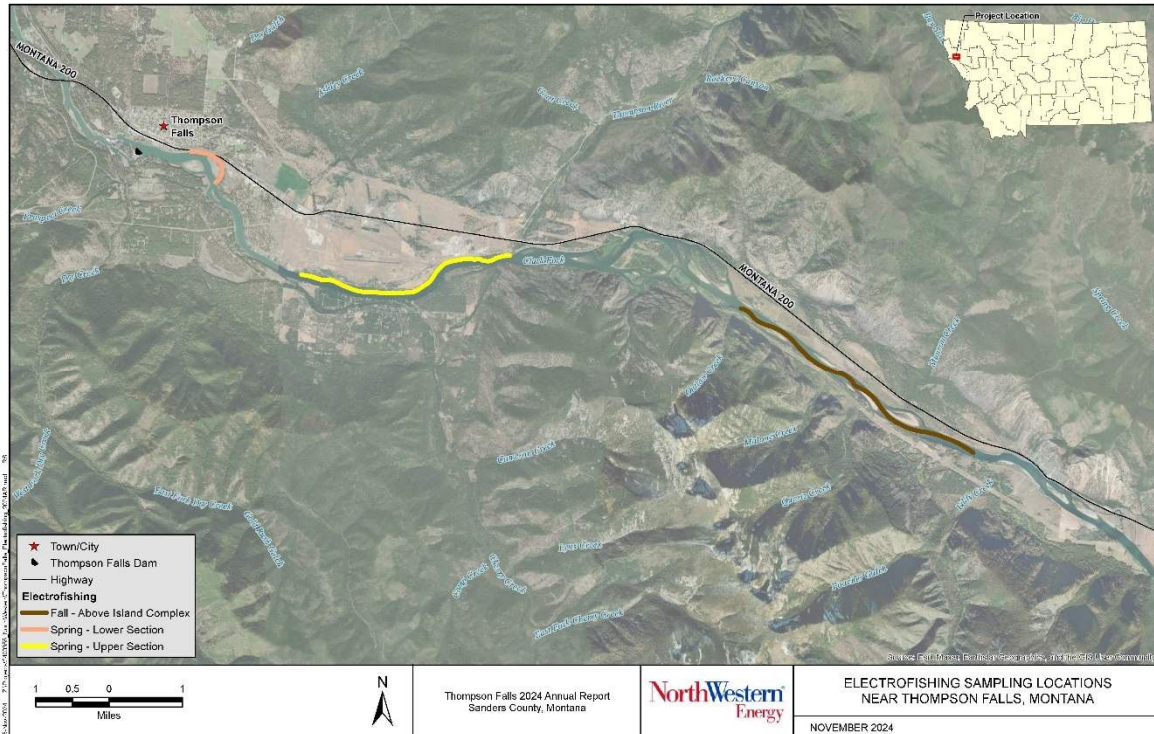


Figure 6. Electrofishing sampling locations near Thompson Falls, Montana.

Table 13. Summary of the sample dates, water temperature, duration of electrofishing efforts, and streamflow (USGS gage #12389000) completed in the lower and upper sections of the Thompson Reservoir 2009-2024.

Lower Section			Upper Section			USGS Gage
Date	Water Temperature °C	Duration of Electrofishing (hours)	Date	Water Temperature °C	Duration of Electrofishing (hours)	Streamflow (cfs)
4-20-09	10.0	0.6	4-21-09	10.5	0.6	17,000 - 18,200
4-28-10	9.0	0.9	4-29-10	7.5	2.1	14,300 - 14,600
4-13-11	5.8	1.0	4-14-11	5.1	1.9	24,500 - 25,100
4-16-12	7.4	0.8	4-17-12	7.2	1.9	14,400 - 14,900
4-11-13	7.0	0.9	4-10-13	7.0	1.9	21,000 - 21,800
4-14-14	7.0	1.0	4-15-14	7.0	2.1	27,800 - 27,500
4-14-15	6.4	1.0	4-13-15	7.0	2.1	24,900 - 25,200
4-12-16	11.0	0.9	4-11-16	10.7	1.9	20,800 - 22,600
4-18-18	5.5	0.8	4-17-18	5.5	2.0	26,700 - 27,800
4-23-20	11.5	1.2	4-16-20	8.8	2.7	12,700 - 14,900
4-20-22	5.5	1.0	4-21-22	6.5	2.3	18,800 - 18,900
4-16-24	11.2	0.8	4-15-24	12.2	2.0	17,400 - 19,200

The total catch per unit effort, fish per hour in the lower and upper sections from April 2024 are provided in Table 14.

Table 14. Summary of 2024 catch per unit effort by species in the lower and upper section of the Thompson Falls Reservoir.

April 2024 Species	Fish Per Hour	
	Lower Section	Upper Section
BL BH	7.7	-
BULL	-	0.5
LL	1.3	14.8
LMB	5.1	-
LS SU	-	9.4
NP	14.1	-
N PMN	1.3	3.9
PUMP	1.3	-
RB	1.3	8.9
SMB	-	3.5
YP	12.8	1.5
Salmonids	2.6	24.2
Non-Salmonids	42.2	18.2
Total	44.8	42.4

Section 3.1.1 – Lower Section

In 2024, spring electrofishing in the lower section captured 35 fish representing eight species. The most common species observed in 2024 were Northern Pike (n=11) and Yellow Perch (n=10). Other species recorded in 2024 include Black Bullhead (n=6), Largemouth Bass (n=4), Northern Pikeminnow (n=1), Pumpkinseed (n=1), Rainbow Trout (n=1), and Brown Trout (n=1). Over 94 percent of fish sampled were represented by non-salmonids (Table 14).

Since 2009, lower section surveys have observed between 34 and 207 individual fish, representing between seven and 15 species caught per sampling event. Non-salmonids continue to be more common in the lower section than salmonids, as shown by catch per unit effort during sampling efforts over the years (Figure 7).

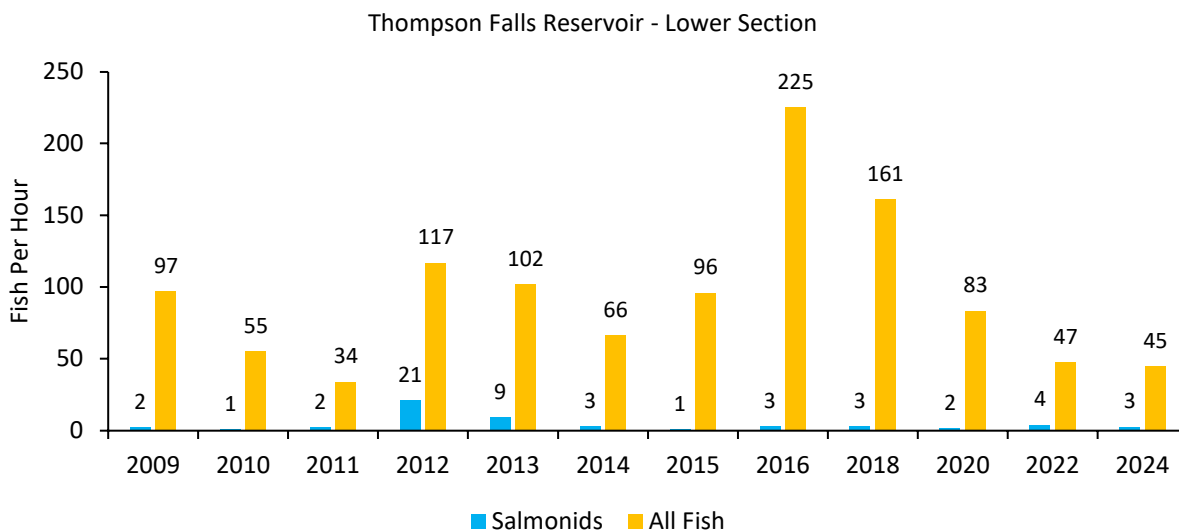


Figure 7. Summary of the 2009-2024 annual catch rate for salmonids and all fish species captured during spring electrofishing efforts in the lower section of the Thompson Reservoir.

Section 3.1.2 – Upper Section

The 2024 sampling of the upper section resulted in 86 fish captured, representing seven species. The most common species observed in 2024 were Brown Trout (n=30), Largescale Sucker (n=19) and Rainbow Trout (n=18). Other species documented included Northern Pikeminnow (n=8), Smallmouth Bass (n=7), Yellow Perch (n=3), and Bull Trout (n=1).

Since spring surveys began in 2009, the number of fish captured per sample event has ranged from 27 to 253 individual fish representing six to 13 species. Since spring monitoring began in 2009, salmonids continue to be more common in the upper section of the reservoir. Over half of the upper section was represented by salmonids in 2024. This was also the first year a Bull Trout was captured during spring electrofishing in the reservoir. The Bull Trout measured 178 mm in length and weighed 42 grams and was genetically assigned to West Fork Thompson River. This fish was PIT tagged and released alive at the sampling location and has no additional detections in 2024. The annual variability of results from the upper section, catch per hour for salmonids and all fish species, are shown in Figure 8.

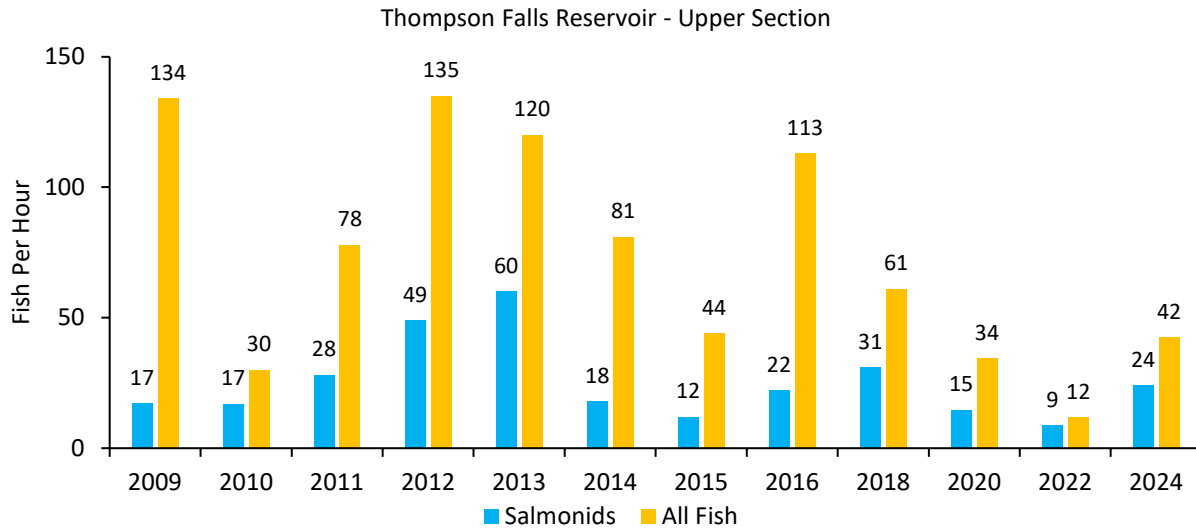


Figure 8. Summary of the 2009-2024 annual catch rate for salmonids and all fish species captured during spring electrofishing efforts in the upper section of the Thompson Reservoir.

Section 3.1.3 – Ladder Fish Captured Spring Electrofishing

Since baseline surveys began in 2011, six uniquely tagged ladder fish (5 RB, 1 WCT) were recorded in the lower section with one fish in 2024, one fish in 2022, two fish in 2016 and two fish in 2013. In 2024, one Rainbow Trout (#12227) was recorded electrofishing in the lower section and was recorded at the ladder workstation on September 12, 2023 prior to being released upstream.

In the upper section, 14 ladder fish (6 LL, 7 RB, 1 WCT) were recorded since the ladder began operations in 2011, including three fish in 2024, one fish in 2022, three fish in 2020 and in 2018, and four fish in 2016. In 2024, two Rainbow Trout (#12283, #12164) and one Brown Trout (#12633) were recorded during electrofishing in the upper section. The Brown Trout ascended the ladder and was released upstream on May 3, 2022 followed by Thompson River detections in 2022, 2023, and 2024 (1-day after the reservoir electrofishing). One Rainbow Trout ascended the ladder on March 25, 2024 and was released upstream with no additional detections. The second Rainbow Trout ascended the ladder on June 26, 2023 followed by detections in the Thompson River in July and August the same year.

Section 3.2 – Fall Electrofishing Clark Fork River

During the autumn of 2024, NorthWestern surveyed two reaches of the Clark Fork River; the above the island complex reach and the Paradise-to-Plains reach. The dates and approximate streamflow (based on the USGS gage #12389000 near Plains) during each survey year since 2009 are summarized in Table 15.

Table 15. Summary of autumn electrofishing efforts in the Above Islands reach and Paradise-to-Plains reach 2009-2024, including the year, date(s), and duration of sample in hours (hrs), approximate streamflow during sample event.

Year	Above Islands			Paradise to Plains		
	Date(s)	Duration of Electrofishing (hrs)	Approx. USGS Streamflow (cfs)	Date	Duration of Electrofishing (hrs)	Approx. USGS Streamflow (cfs)
2009	10/20-21	5.6	10,700	NA	-	-
2010	10/12-13	4.3	9,950	10/19	3.6	9,380
2011	10/5-6	4.6	9,225	10/20-21	3.5	16,150
2012	10/22-23	4.1	11,100	10/30	3.9	14,000
2013	10/22-23	4.4	10,900	NA	-	-
2014	9/25 & 9/29	4.1	8,320	10/22 & 10/28	4.1	12,850
2015	10/19-20	4.7	8,280	NA	-	-
2016	10/12-13	3.7	12,400	10/5	2.0	10,100
				10/20	1.8	13,700
2018	10/16-17	3.5	10,300-10,900	10/15	3.3	10,900
2020	10/21-22	4.3	11,700-13,000	10/28 & 11/2	4.1	12,500
2022	10/18-19	4.3	10,100-10,200	10/25-26	4.7	7,480-8,020
2024	10/14-15	5.0	9,150-9,300	10/21-22	4.6	8,980-9,360

Section 3.2.1 – Above the Island Complex

In 2024, electrofishing efforts in the Clark Fork River were completed from the confluence with Eddy Creek downstream to the island complex, also known as the above the island complex reach (*refer to* Figure 6). The above island complex reach is characterized as riverine habitat. The 2024 survey covered the same length of reach surveyed annually since 2010. The 2009 survey extended further downstream to the confluence of the Thompson River.

In 2024, river left was sampled the night of October 14 and river right was sampled the night of October 15. Stream temperatures were approximately 13.3°C. The sampling efforts resulted in 146 fish recorded (79 fish from the right bank, 67 fish from the left bank representing nine species). There were 72 salmonids represented by four species (40 MWF, 17 LL, 13 RB, 2 WCT).

The catch per unit effort (fish per hour) by species in the above island complex was dominated by Mountain Whitefish (8.0 fish per hour) followed by Largescale Sucker (4.4 fish per hour). Most species (LL, NPMN, NP, RB, SMB) catch rate ranged between 2.0 to 3.4 fish per hour. As in 2022, the catch rate for Westslope Cutthroat Trout (0.4 fish per hour) and Yellow Perch (1.8 fish per hour) were the lowest (Figure 9).

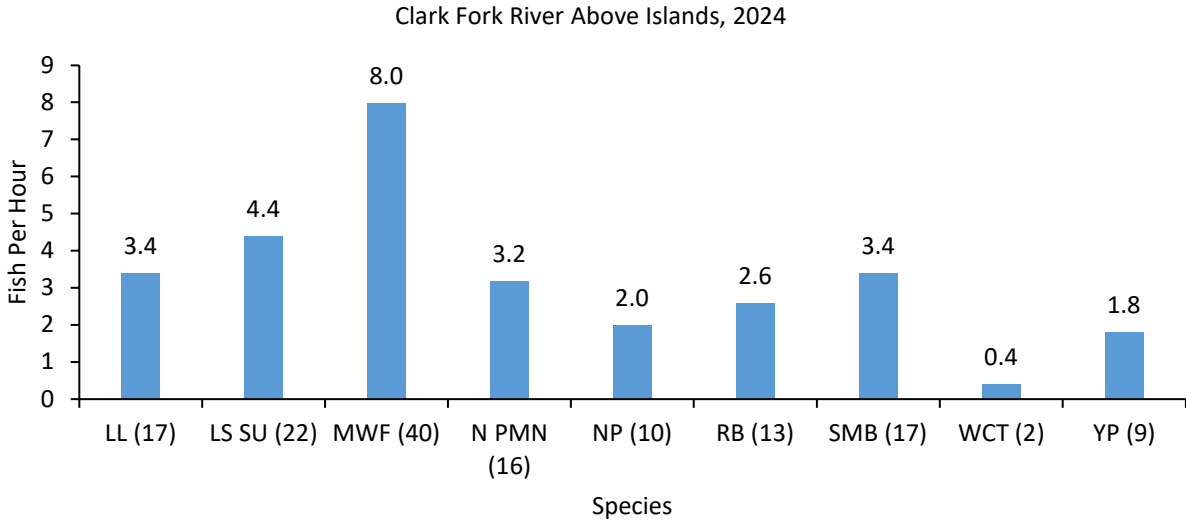


Figure 9. Summary of the catch rate (fish per hour) annually in the Clark Fork River – Above the Island Complex, October 2024.

In 2024, the overall catch rate was 29 fish per hour, the lowest rate since monitoring began in 2009. The overall catch rate has steadily declined since 2012 (Figure 10). Salmonid catch rate was also the lowest rate at 14 salmonids per hour. Since 2014, salmonid catch rates have ranged from 14 to 39 fish per hour, substantially lower than the initial monitoring year (2009-2013) when salmonid catch rate were between 46 and 111 fish per hour. Catch rate (total fish per hour and salmonids per hour) for all years is shown in Figure 10.

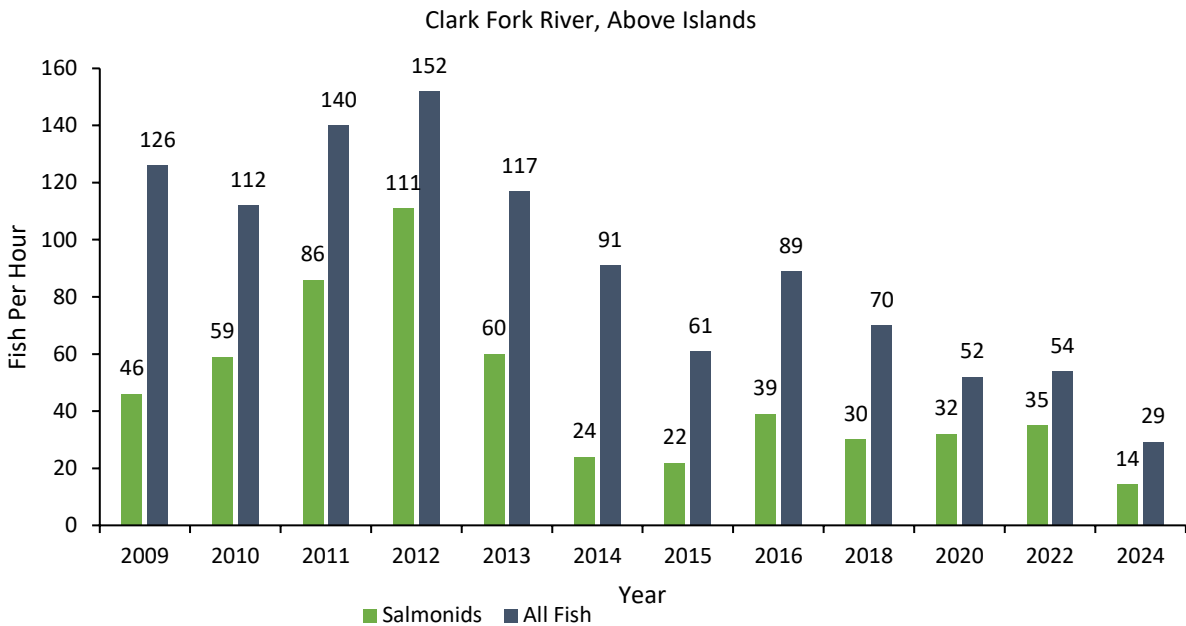


Figure 10. Summary of the 2009-2024 annual catch rate for all salmonids and all fish captured in the Clark Fork River – Above the Island Complex.

The variability in catch rates among the sampling years (Figure 10) may be related to several factors, including but not limited to the timing of each annual sampling event, streamflow, stream temperatures, etc. Sampling in the above islands section is generally completed the third week in October each year. However, sampling has occurred anytime between late September and the end of October, depending on availability of personnel and equipment.

Section 3.2.2 – Paradise to Plains

In 2010, a new electrofishing sampling section between the towns of Paradise and Plains was added to acquire basic species composition in the Clark Fork River approximately 35 miles upstream of the Project. This reach was sampled annually for 3 years (2010-2012) before transitioning to every other year sampling schedule. Every even year from 2012 through 2024, this Paradise to Plains reach has been electrofishing in the fall. Electrofishing began approximately 1.5 miles downstream of the Clark Fork/Flathead River confluence, immediately downstream of Montana Highway 200 bridge at the town of Paradise and ended at the USGS gage station #12389000 located near the town of Plains, approximately 4 miles downstream (Figure 11).

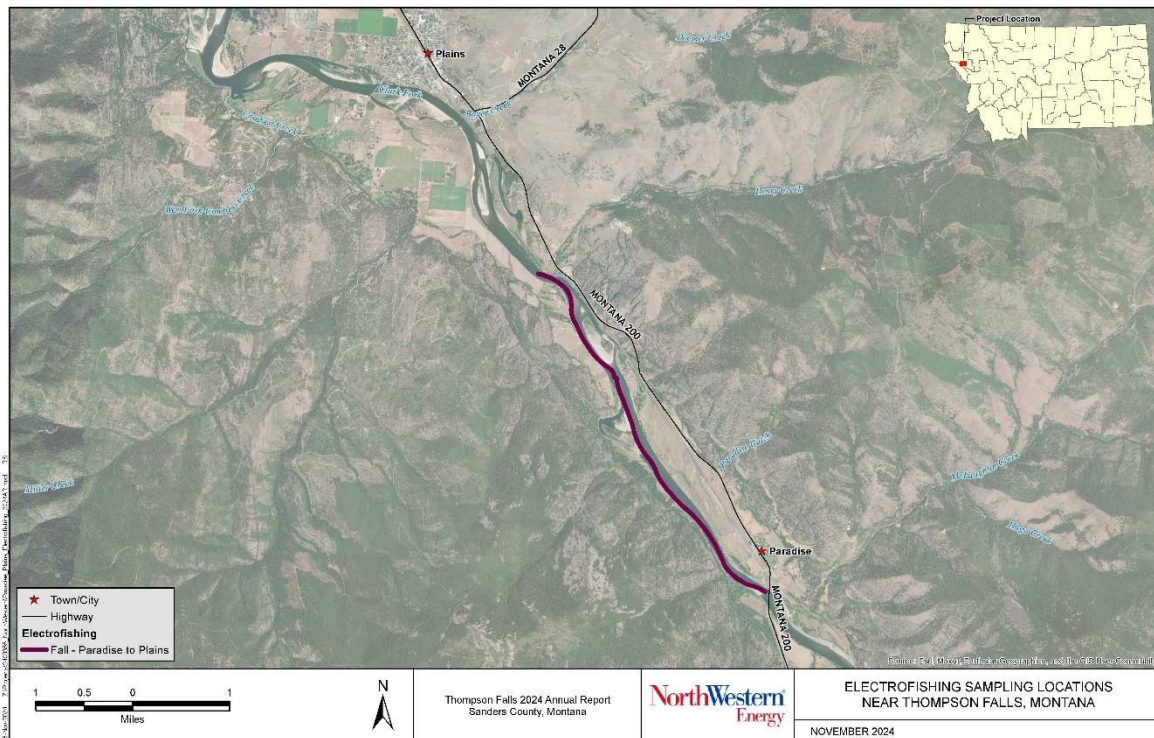


Figure 11. Electrofishing Reach between Paradise and Plains, Montana.

In 2024, river left was sampled the night of October 21 and river right was sampled the night of October 22. Stream temperatures were approximately 12.2°C. The sampling efforts resulted in 328 fish recorded (139 fish from the right bank, 189 fish from the left bank). There were 242 salmonids and 86 non-salmonids representing nine species plus one hybrid. The catch rate for all fish was 70.7 fish per hour and 52.2 salmonids per hour in 2024 (Figure 12). Salmonids represent 74 percent of species captured. Mountain Whitefish are the most prevalent salmonid species recorded, representing 62 percent of salmonids in 2024 compared to representing 90

percent of salmonids in 2022 (Figure 13). In all survey years, except in 2020, Mountain Whitefish were the most prevalent salmonid.

Since 2010 sampling began, non-salmonid species in the Paradise to Plains reach were dominated by Largescale Sucker and Northern Pikeminnow. These two species represented 50-65 percent of the total fish catch rate from 2010 to 2016. Since 2018, the catch rate for both species has declined from an average of 80 fish per hour (2010-2018) to 6 fish per hour (2020, 2022) and 7.5 fish per hour (2024). In 2024, these two species represented about 11 percent (nearly evenly split) of the total fish catch, a decline from 15 percent in 2022 (NorthWestern 2023). Other non-salmonids species such as Northern Pike, Smallmouth Bass, and Yellow Perch maintain low catch rates in 2024 (less than 2 fish per hour). The 2024 catch rates by species are illustrated in Figure 13.

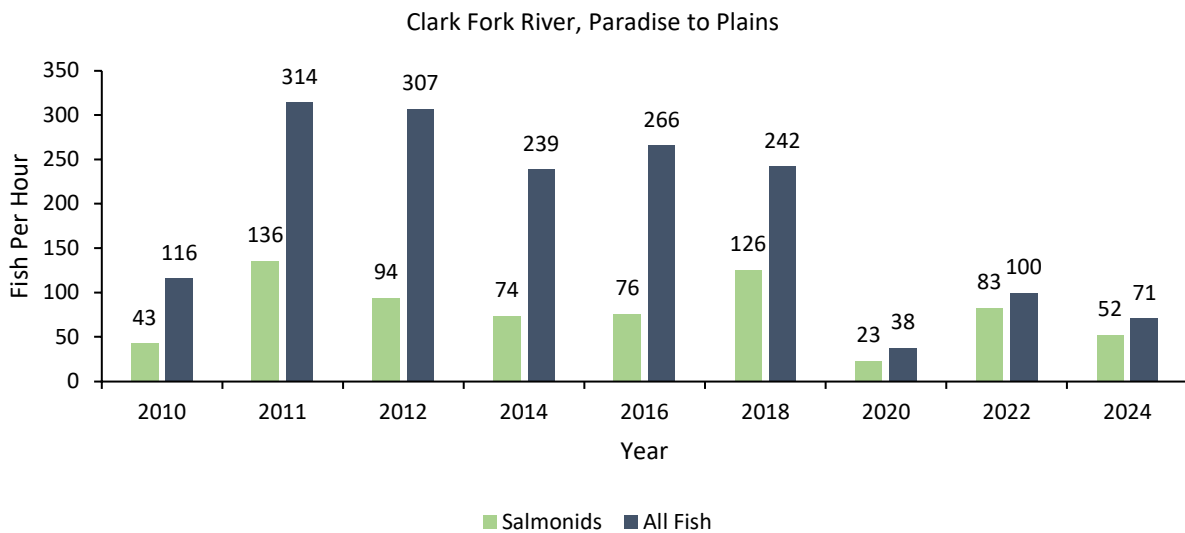


Figure 12. Summary of the annual catch rate for all salmonids and all fish captured in the Clark Fork River between Paradise and Plains, 2010-2024.

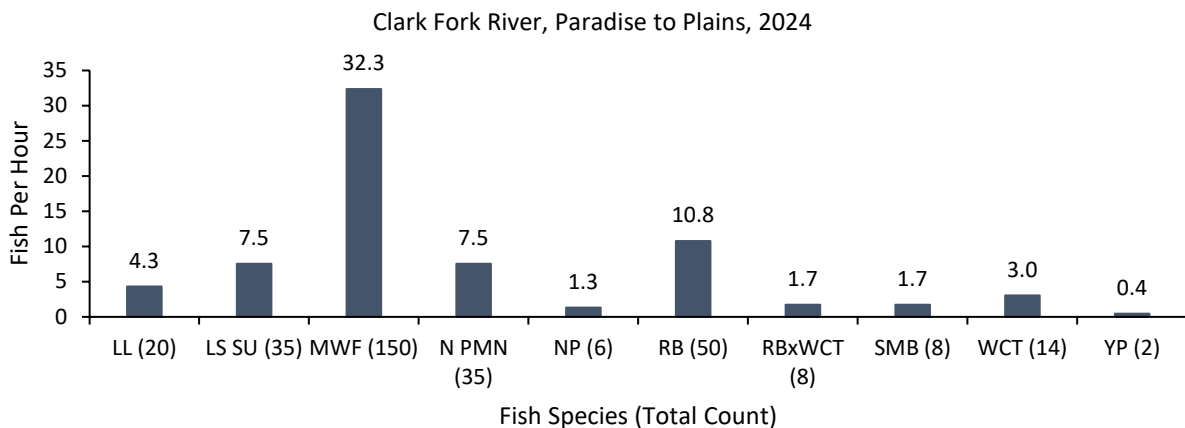


Figure 13. Summary of annual CPUE for each species during the Clark Fork River autumn electrofishing between Paradise and Plains, 2024.

Section 3.2.3 – Ladder Fish Captured Fall Electrofishing

Surveys in the above island reach have documented 16 ladder fish (14 RB, 2 LL) since 2011. Of the 146 fish captured in the above islands reach in 2024, two fish had PIT-tags (1 RB, 1 LL) and had a ladder history. The Rainbow Trout (#68012) ascended the ladder about a month early, September 3. The Brown Trout (#12128) had ascended the ladder the year before, September 29, 2023 with no additional detections in the database.

In the above islands reach, Rainbow Trout were captured in seven sample events since 2011, and a single Brown Trout was captured in 2015 and in 2024. The number of Rainbow Trout observed each survey included three fish in 2012, two fish in 2013, one fish in 2015, four fish in 2016, two fish in 2018, one fish in 2020, and one fish in 2024. No tagged fish with a ladder history was collected in 2022.

Since 2011, fish capture in the Paradise to Plains reach that had previously ascended the ladder total three Rainbow Trout (1 in 2012; 1 in 2014; 1 in 2016). No ladder fish was detected in this reach in 2018, 2020, 2022, or 2024.

Section 3.3 – Thompson Falls Reservoir Gillnetting

NorthWestern deploys nylon multifilament experimental sinking gillnets, 125 feet long and 6 feet deep, with five separate 25-foot panels consisting of 0.75-inch, 1-inch, 1.25-inch, 1.5-inch, and 2-inch bar-measure square mesh. Most years 10 nets are deployed annually in October with results varying between 33 to 231 fish representing six to nine species. In 2024, nine nets were deployed (net sites 1-6, 8-10). The site for net #7 was not used in 2024 (and will be removed from future sample events). The location for net #7 has been unproductive in catching fish and has proven to be less than optimal location for fishing and often difficult to recover. The 2024 gillnet sampling sites in the Thompson Falls Reservoir are shown in Figure 14.

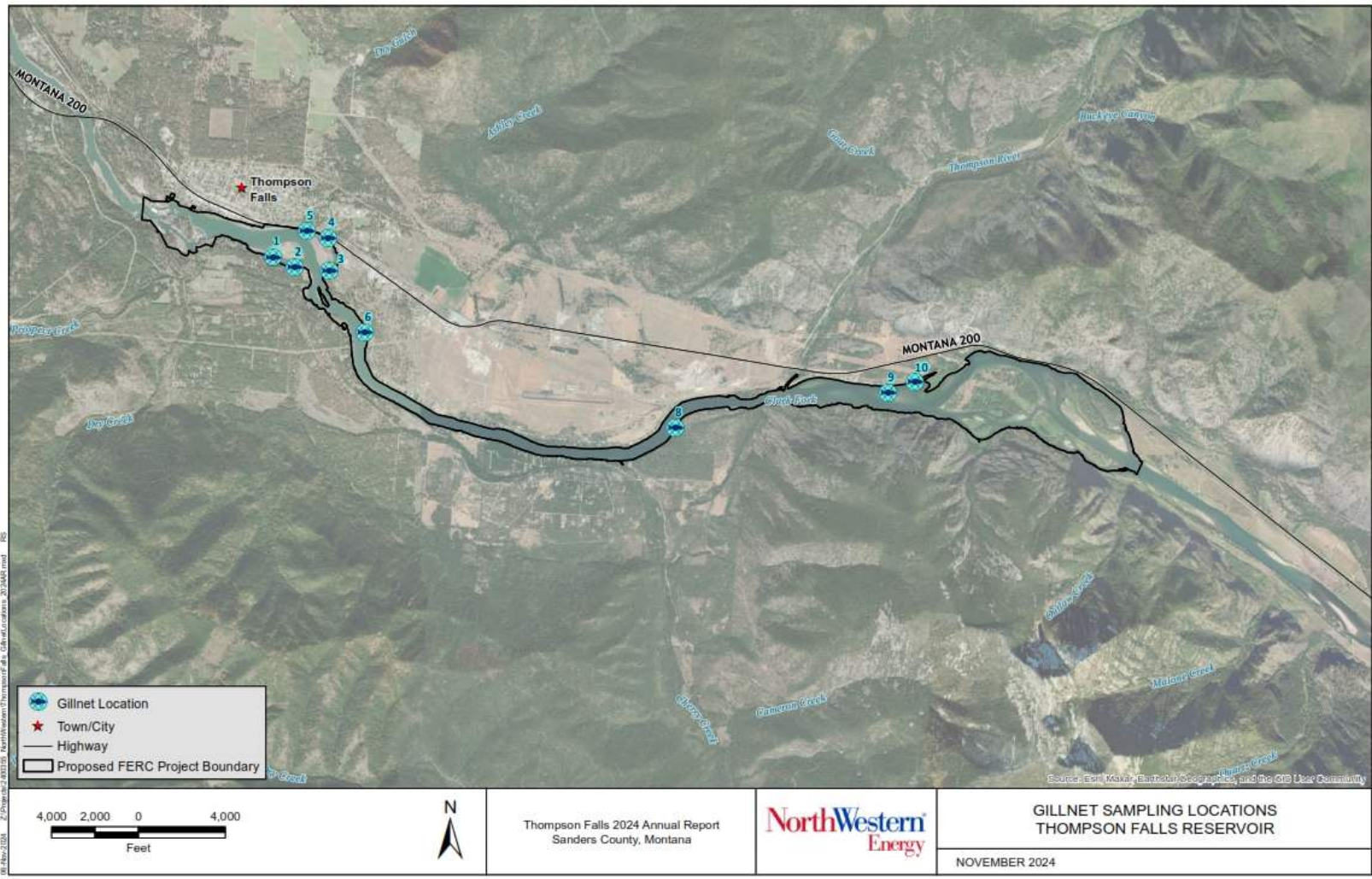


Figure 14. Gillnetting sampling locations near Thompson Falls, Montana.

The catch per net, by species from 2024 compared to the average, minimum and maximum catch per net between 2004 and 2023 is shown in Table 16.

Table 16. Catch per net, by species, during annual October gillnetting series on Thompson Falls Reservoir in 2024 and the 2004-2023 average, minimum, and maximum catch per net. A dash indicates no (zero) fish of that species was captured.

Species	2024 Catch per Net	2004-2023 Catch Per Net		
		Avg	Min	Max
BL BH	0.1	2.8	-	14.1
BL CR	0.1	-	-	0.1
LL	-	-	-	0.2
LMB	-	0.1	-	0.3
LN SU	-	-	-	0.5
LS SU	0.1	0.7	0.1	1.3
LWF	-	0.01	-	0.1
MWF	-	-	-	-
NP	2.8	2.9	1.0	5.1
NPMN	0.9	0.4	-	1.0
PEA	-	-	-	0.1
PUMP	0.2	0.4	-	2.5
RB	-	0.1	-	0.4
SMB	0.2	0.2	-	0.6
WCT	-	-	-	0.2
YL BH	0.1	-	-	0.1
YP	3.7	0.9	0.1	5.1
Total	8.2	8.5	3.3	23.1

In 2024, nets were set October 9 and pulled approximately 20.8 hours later October 10. There were 74 fish captured representing nine species (BL BH, BL CR, LS SU, NPMN, NP, PUMP, SMB, YL BH, YP). The total catch per net (8.2 fish/net) was average for the period of record (Figure 15).

In 2024, the most common species recorded in the reservoir was Yellow Perch and Northern Pike (Table 16). One black crappie was captured in net 3, which was the first record of a black crappie since monitoring began in 2004. No salmonids and no tagged fish were collected during the gillnet surveys in 2024. Since ladder operations commenced in 2011, three tagged ladder fish have been collected (1 RB in 2021; 1 RB in 2012; 1 LL in 2012).

In general, salmonids are rarely observed in Thompson Falls Reservoir gillnet catches. The most common species consistently observed in Thompson Falls Reservoir is Northern Pike with 2.8 fish caught per net in 2024 and an average 2.9 fish per net between 2004 and 2023 (Table 16). Black Bullhead presence was greater during surveys completed between 2004 and 2007 and

between 2015 and 2017, with catch per net ranging from 2.8 to 14.1 fish per net. In 2024 (as in 2023), Black Bullhead numbers were low, 0.1 fish per net.

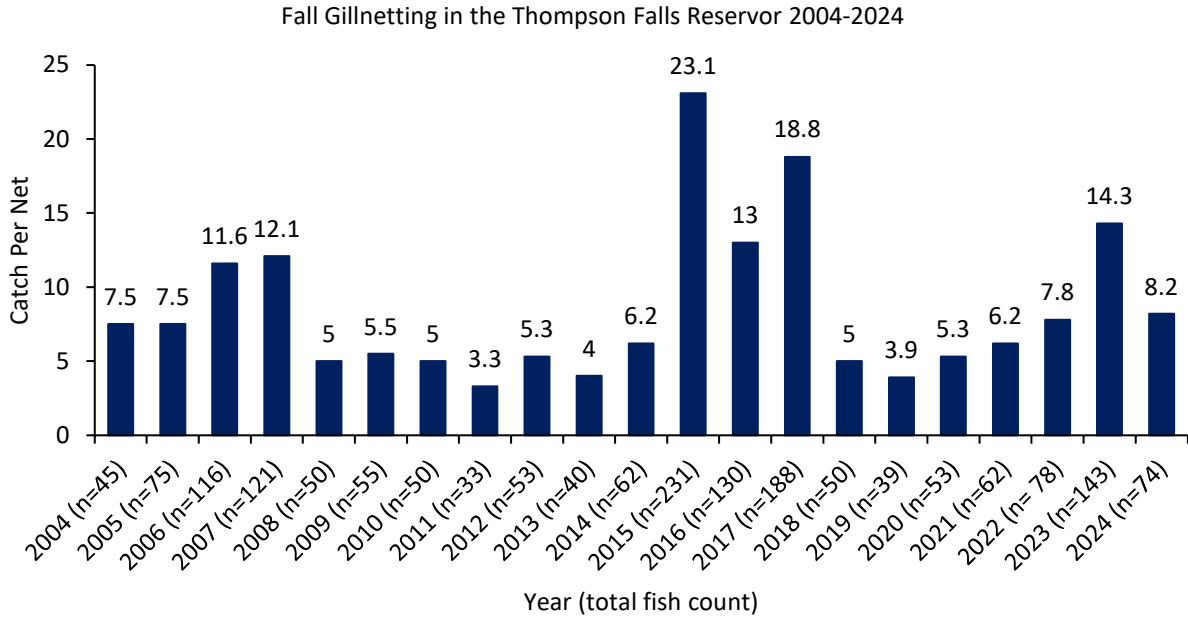


Figure 15. Summary of catch per net during annual gillnetting efforts in Thompson Falls Reservoir, 2004-2024.

Section 4.0 – Total Dissolved Gas (TDG) Monitoring

In 2010, the Total Dissolved Gas Control Plan (TDG Control Plan) (PPL Montana, 2010a) for the Project was submitted to the Montana Department of Environmental Quality (MDEQ). NorthWestern proposes to continue to collaborate with the MDEQ, Avista, FWP, and other entities with a long-term goal of reducing the overall systemic gas supersaturation levels in the Clark Fork River, occurring from a point downstream of the Project to below Albeni Falls Dam per the TDG Control Plan.

The Licensee has monitored TDG in the Clark Fork River in the Project area for 20 years starting in 2003. All field work and data gathering are conducted by the Licensee’s personnel. The methods for TDG data collection in 2024 were the same as previous years (NorthWestern 2019a; New Wave and GEI 2020; NorthWestern 2021; NorthWestern 2022; NorthWestern 2023; NorthWestern 2024).

The TDG monitoring sites in 2024 were 1) Above Dam, 2) High Bridge, and 3) Birdland Bay Bridge (Figure 16). The High Bridge monitoring site captures information on TDG at a location that is downstream of the Main Dam spillway and the falls but is upstream where the Dry Channel Dam spill enters the river channel. The Birdland Bay Bridge monitoring site captures information on the level of TDG entering Noxon Rapids Reservoir.

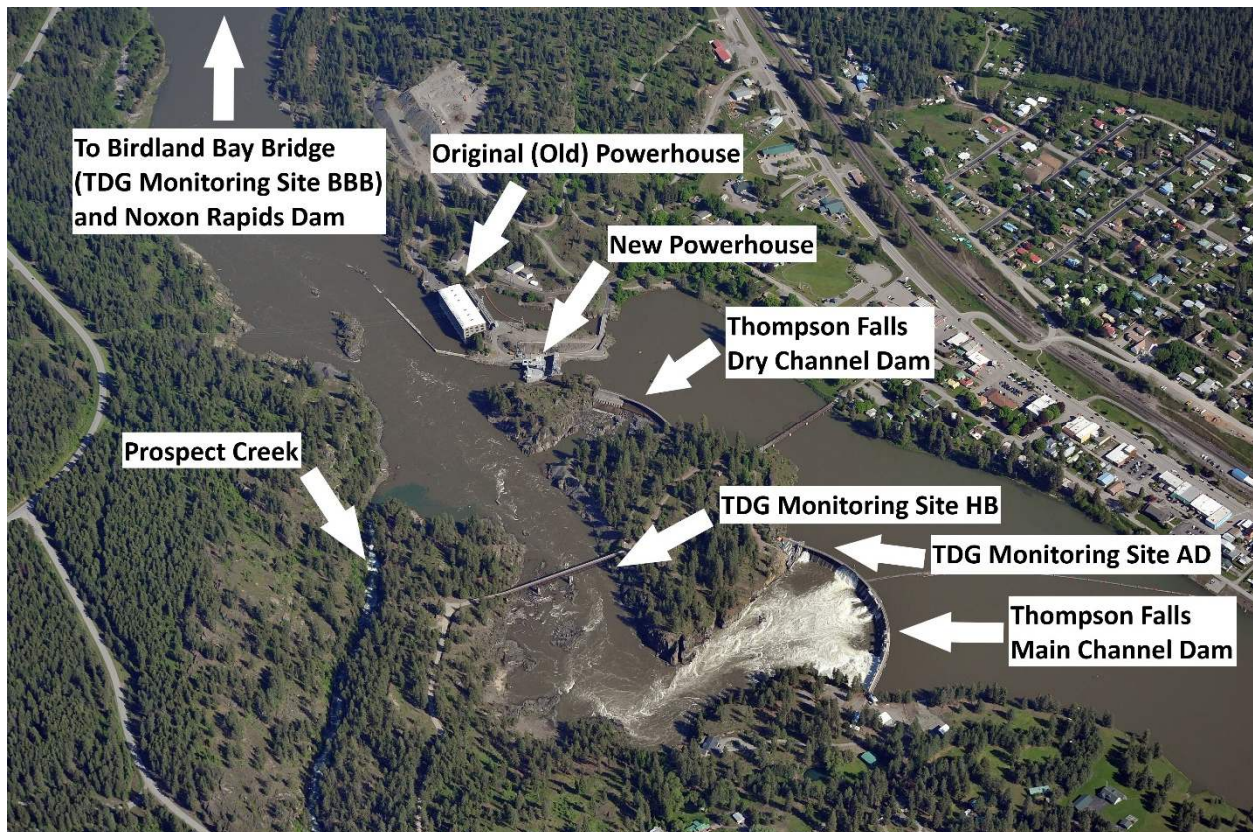


Figure 16. Monitoring locations for total dissolved gas at the Thompson Falls Hydroelectric Project site.

In 2024, TDG was monitored from April through July, during the high flow season, with exact dates varying slightly for each station (Figure 9). There were some data gaps at the High Bridge site due to instrument failure. Water intrusion into the body of the datasonde on June 13 caused the instrument to fail and was inoperable for the remainder of the monitoring season.

Peak discharge in the Clark Fork River recorded was 42,020 cfs on June 11, 2024 (total flow measured at Thompson Falls Dam) representative of a below average year. As in previous years of data collection, TDG in 2024 was lowest above the dam, highest at the first measurement site downstream of the Project (at the High Bridge), and intermediate at the most downstream site at the Birdland Bay Bridge (Figure 17).

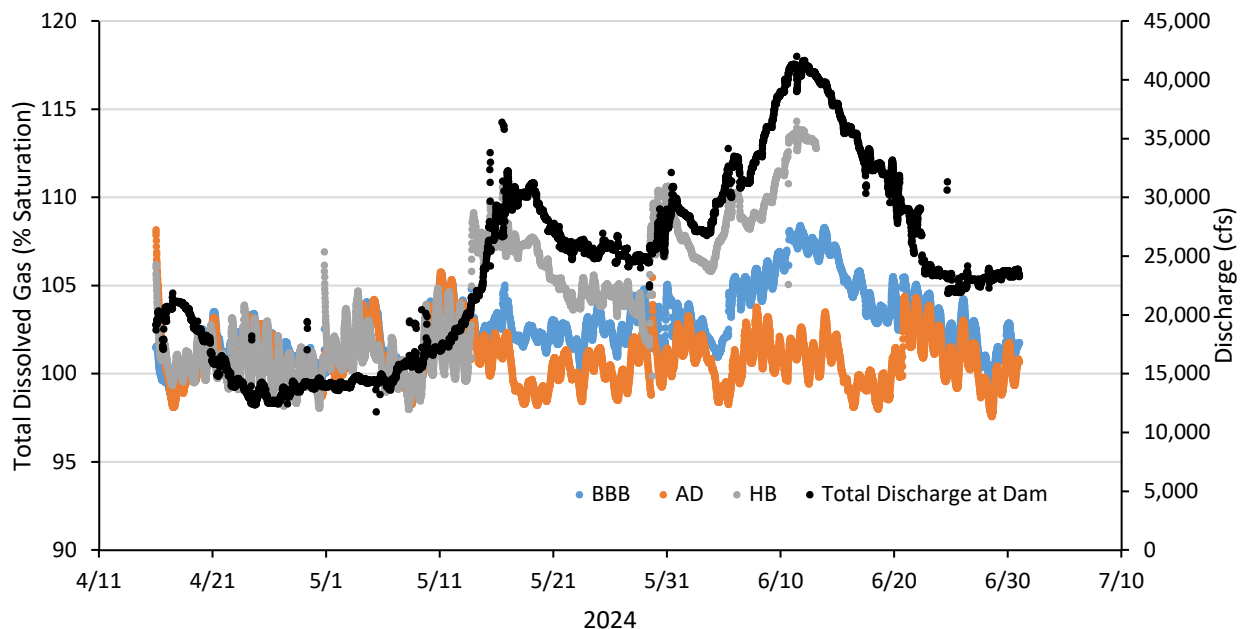


Figure 17. Total Dissolved Gas (% of saturation) upstream and downstream of the Project and streamflow (cfs) as measured at Thompson Falls Dam, May through July 2023.

TDG upstream of the Project peaked at approximately 105 percent of saturation during 2024. TDG levels at the High Bridge peaked at 114 percent of saturation on June 11. Further downstream, the maximum TDG level recorded was 108 percent saturation at Birdland Bay Bridge. TDG levels declined downstream of the High Bridge because of mixing with river flow coming through the powerhouse and, potentially, some degassing as the river moves downstream.

Section 5.0 – Adaptive Management Funding Account Funded Projects

In 2008, a Memorandum of Understanding (MOU) was established between NorthWestern, the FWS, FWP, and CSKT (voting TAC members), which established the terms and conditions for collaboration between the Licensee and the TAC agencies for the implementation of Bull Trout conservation measures at the Project. The MOU also specifies how funding by NorthWestern is allocated annually to the TAC for the purpose of downstream Bull Trout mitigation measures. The MOU, which was initially signed by each party and implemented in 2008, was renewed in 2013 and 2020, and will expire on December 31, 2025.

Section 5.1 – 2024 Project Updates

Projects approved for funding by the TAC in 2024 are identified in Table 17. Refer to the December 2023 meeting summary available on the Project website for additional details and status of each proposed project. The Big Rock Creek Barrier Design project approved by the TAC in 2021 continued into 2024 with the 2021 approved funding.

Table 17. Project proposals approved by the TAC for 2024 implementation.

Agency/Entity	Project Proposal for 2023	TAC Funding Requested
CSKT	Jocko Bull Trout genetics update - North and South Fork Jocko rivers	\$3,575
Trout Unlimited/ Lower Clark Fork Watershed Group	Thompson River Road Consolidation Coordination	\$5,000
MFWP	Pathogen Survey – Costs for West Fork Thompson River and Fish Trap	\$6,090
Northwestern	Evaluating Fine-Scale Fish Movements Using Submersible PIT Antennas	\$50,100
TOTAL		\$64,764
MFWP	Big Rock Creek Barrier Design and Feasibility Study	Funded in 2021

Section 5.2 – 2025 TAC Funded Projects

During the 2024 Annual Thompson Falls TAC Meeting on December 11, there were three project proposals presented. The three project proposals were unanimously approved by the voting TAC members. The following table (Table 18) provides a summary of the project proposals and approved funding for the 2025 calendar year. Refer to the 2024 meeting summary available on the Project website for additional project details.

Table 18. Summary of projects proposed and approved for funding in 2025.

Agency/Entity	Project Proposal for 2025	TAC Vote	TAC Funding Requested
MFWP	Update of genetic baseline for Thompson River Bull Trout	Yes	\$10,600
Northwestern	Evaluating Fine-Scale Fish Movements Using Submersible PIT Antennas – Data Management and Analysis Component	Yes	\$15,400
NorthWestern	Emergency/contingency fund	Yes	\$10,000
TOTAL Approved			\$35,400

Section 6.0 – Compliance with Terms and Conditions of the Biological Opinion

A summary of the FWS's BiOp Terms and Conditions (TCs) 1 through 7 is provided in Table 19. The table includes the BiOp's TC followed by a statement describing the Licensee's actions of compliance. The language in the BiOp (FWS, 2008) refers to PPL Montana, the Licensee at the time the BiOp was prepared. All references to PPL Montana and compliance requirements in the BiOp apply to NorthWestern. As of November 18, 2014, NorthWestern is the Licensee of the Thompson Falls Hydroelectric Project (FERC No. 1869) and is responsible for compliance with the TCs in the BiOp.

Table 19. Summary of FWS’s Biological Opinion (2008) Terms and Conditions 1 through 7 and compliance status by the Licensee.

Terms and Conditions Requirements from Biological Opinion (FWS 2008)	Compliance Status by Licensee
TC 1 - Upstream Passage	
	<p>On April 1, 2019, NorthWestern submitted a request to FERC to modify reporting requirements associated with the Thompson Falls Upstream Fish Passage Facility. In consultation with and approved by the FWS, NorthWestern proposed the following reporting schedule modifications: a) filing the comprehensive report required under Terms and Conditions (TC) 1h by December 31, 2019b; b) filing the structured scientific review of the project under TC 1h by April 1, 2020; c) filing the revised fishway operations plan under TC 1h by December 31, 2023; and d) eliminating the 2019 annual fish passage reporting requirement under TC 7a. The Commission approved the request in an Order dated October 7, 2019 (FERC, 2019).</p>
TC 1(a)	Activity is Complete - Construction Fishway
TC 1(b)	Activity is Complete - Comply with Construction Permits
TC 1(c)	Activity is Complete -The FERC approved the Licensee’s Thompson Falls Fish Ladder – Fishway Operations Manual 1.0 (SOP) in an Order issued on June 17, 2011.
TC 1(d)	Ongoing - NorthWestern will continue funding for the ladder and operate the facility in conformance with the approved SOP.
TC 1(e)	Ongoing - The Licensee provides annual funding in support of genetic testing for Bull Trout in the vicinity of the Project.
TC 1(f)	To date, fish transport via vehicle has not been requested or identified as a need. The Licensee will continue to evaluate this need and provide support as appropriate annually.
TC 1(g)	<p>The Licensee developed and submitted the FWS-approved <i>Fish Passage Evaluation Plan, Phase 2 Action Plan, 2011-2020</i> (PPL Montana, 2010b) to FERC on October 14, 2010. FERC issued an Order approving the Evaluation Plan on June 9, 2011.</p> <p>Ongoing - Data collected annually at the ladder is summarized and reporting in the Annual Report that is approved by FWS prior to filing with the Commission each year (through the term of the license).</p>

Terms and Conditions Requirements from Biological Opinion (FWS 2008)	Compliance Status by Licensee
TC 1(h)	<p>Activity is Complete -Last activity of filing the Operations Assessment Plan in compliance with TC 1h was electronically submitted to the Commission on December 17, 2024.</p> <p>On April 1, 2019, NorthWestern submitted a request to FERC to modify reporting requirements associated with the Thompson Falls Upstream Fish Passage Facility. In consultation with and approved by the FWS, NorthWestern proposed the following reporting schedule modifications: a) filing the comprehensive report required under TC 1h by December 31, 2019 (instead of 12/31/2020); b) filing the structured scientific review of the project under TC 1h by April 1, 2020 (instead of 2021); c) filing the revised fishway operations plan under TC 1h by December 31, 2023 (instead of 12/31/2021) and request to the Commission with FWS concurrence in letter dated December 22, 2023 to extend the filing deadline until December 31, 2024; and d) eliminating the 2019 annual fish passage reporting requirement under TC 7a. The Commission approved the request in an Order dated October 7, 2019. Recommendations from the Scientific Review Panel were electronically filed with the Commission on April 1, 2020.</p>
TC 2 - Downstream Passage	
TC 2	<p>The MOU was extended through 2025 through Amendment No. 1 to the MOU Thompson Falls Hydroelectric Project. The Amendment was signed by NorthWestern, FWP, FWS, and CKST. NorthWestern renewed the MOU for the term of the license (effective 1/1/2021 – 12/31/2025). The Licensee will provide \$100,000 annually through 2025 and allow a maximum of \$250,000 to accrue in the Reserve account from unspent or transferred annual TAC funds.</p>
TC 3 - Gas Supersaturation	
TC 3 (a)	<p>Ongoing - The Licensee prepared a <i>Total Dissolved Gas Control Plan</i> (PPL Montana, 2010a) (TDG Control Plan) in collaboration with the TAC in October 2010 and submitted the TDG Control Plan to the MDEQ. The TDG Control Plan recommends continued monitoring of TDG at the Project, and also recommends a spillway operating plan for the Main Dam Spillway. The recommended spillway operating plan for the Main Dam Spillway has been implemented annually since 2011.</p>
TC 3 (b)	<p>Ongoing - NorthWestern will continue to collaborate with the MDEQ, Avista, FWP, and other entities toward reducing the overall systemic gas supersaturation levels in the Clark Fork River.</p>

Terms and Conditions Requirements from Biological Opinion (FWS 2008)	Compliance Status by Licensee
TC 3 (c)	Ongoing - Past GBT monitoring (2008-2014) below Thompson Falls Dam has resulted in limited findings of fish with symptoms indicating GBT. Bull trout recorded at the ladder or downstream of the Thompson Falls Dam annually between 2011 and 2017, 2019-2024 have not shown any external symptoms of GBT.
TC 4 – MOU and TAC	
TC 4	Activity is Complete. The MOU expired on December 31, 2020. NorthWestern coordinated with the FWP, CSKT, and FWS to revisit the terms of the MOU in 2020, prior to the expiration of the agreement. NorthWestern renewed the MOU for the term of the license (effective 1/1/2021 – 12/31/2025).
TC 5 - Thompson Falls Reservoir	
TC 5 (a)	Activity is complete. In compliance with TC 5a, the Licensee collaborated with TAC members and prepared the <i>5-Year (2011-2015) Reservoir Monitoring Plan</i> , which was approved by FWS and submitted to the FERC on June 17, 2010. FERC issued an Order approving the <i>5-Year Reservoir Monitoring Plan</i> on February 9, 2011. NorthWestern implemented the reservoir monitoring plan and because of an ongoing study in 2014 and 2015 requested modifications to the initial filing requirements outlined in FWS' BiOp. Summary of 2014 and 2015 study has been posted on the Project website (Glad, 2017). FERC authorized request to postpone recommendations until 2020 (FERC, 2015). Recommendations from the Scientific Review Panel were electronically filed with the Commission on April 1, 2020.

Terms and Conditions Requirements from Biological Opinion (FWS 2008)	Compliance Status by Licensee
TC 5 (b)	<p>Activity is Complete. In 2014, the Licensee consulted with FWS and proposed to modify filing requirements specified in the FWS' BiOp TCs 5a, 5b, and 7b. A letter of concurrence from FWS, along with the proposed changes, was filed with the Commission on December 17, 2014. FERC issued a letter approving the proposed modifications on February 25, 2015. The approved modifications include: 1) removing the 5-year comprehensive summary of activities associated with the <i>Reservoir Monitoring Plan</i> and combining the final report (due in 2020) required by TC 5a with reporting requirements in TCs 5b; 2) postponing the reporting deadline for the nonnative species (in the Thompson Falls Reservoir) control recommendations in TC 5b to December 31, 2020; and 3) waive the 5-year interim reporting requirement under TC 7b while continuing annual reporting required by TC 7a until 2019. After the 2019 ladder season is complete, NorthWestern will be responsible for compiling conclusions and recommendations per TCs 5a and 5b reporting requirements and compiling the findings from the annual reports (2011-2019) into one comprehensive report that will be filed with FWS and the Commission by December 31, 2020.</p> <p>NorthWestern proposed to expedite the schedule to December 13, 2019, which was approved by the Commission on October 7, 2019). A 9-year comprehensive report (2011-July 1, 2019) was filed with the Commission on December 23, 2019.</p>
TC 6 - System-wide Monitoring	
TC 6(a)	Ongoing. The Licensee collaborates with TAC members to proactively address the adaptive needs of the operations of the ladder each season, as well as holding annual TAC meetings where the Licensee provided an overview of findings at the ladder for the year and an open forum for the TAC and FWS to discuss any needs for changes in operations.
TC 6(b)	Ongoing. The Licensee continues to provide annual funding available for Bull Trout genetic analysis.
TC 6(c)	Ongoing. With the construction of the fish ladder, three remote antennas were installed on the weirs (pools) that detect HDX and FDX PIT-tagged fish. Additionally, a remote antenna was installed in the lower and upper entrances of the fish ladder prior to the 2021 operational season. These remote antennas detect PIT tags as fish move through the ladder. A remote PIT-tag array was also installed on the mainstem of the Thompson River in 2014 and continues to be utilized to track PIT-tagged fish released upstream of Thompson Falls Dam. A remote PIT-tag array was installed (in collaboration with Avista) in Prospect Creek in August 2018 and continues to be utilized to track PIT-tagged fish entering/exiting the drainage. These data are compiled annually and summarized in the respective annual report. NorthWestern will continue to collaborate and coordinate with local biologists regarding the need to track fish movement.

Terms and Conditions Requirements from Biological Opinion (FWS 2008)	Compliance Status by Licensee
TC 7 - Reporting	
TC 7(a)	Ongoing. The Licensee has filed annually (since 2011) by April 1, a report summarizing previous year's activities, fish passage totals, and proposed activities for the following year. Following the December 23, 2019, submittal of the Comprehensive Report, NorthWestern is not required to file the 2019 annual report with the Commission. NorthWestern will prepare a summary report for FWS and TAC members of 2019 upstream fish passage results. Annual filing will commence again for the 2020 season with a report due April 1, 2021 (through the term of the existing license). A summary of cumulative incidental take of Bull Trout since 2009 by the Licensee is provided in Table 22 in this report.
TC 7(b)	Activity is complete. NorthWestern filed a letter, with FWS's support, to FERC on December 17, 2014, proposing TC 7b no longer be required because comprehensive reporting has been continually provided in the annual reports. FERC approved this proposal on February 25, 2015 (FERC, 2015). No major modifications to the facility were identified or proposed.
TC 7(c)	The Licensee has archived report (dating back to 2005) annually on the Project website: http://www.northwesternenergy.com/environment/thompson-falls-project
TC 7(d)	No incidents to report in 2023
TC 7(e)	No incidents to report in 2023

Section 6.1 – Bull Trout Incidental Take Summary 2009-2024

In compliance with FWS's BiOp TC 7a, this section provides a summary of the documented cumulative incidental take from previous years' activities (2009-2024) in support of the upstream fish passage at the Project. Between 2009 and 2024, the Licensee sampled 46 Bull Trout representing 43 individuals (Table 20).

Since 2009, sampling has included collecting Bull Trout via electrofishing efforts upstream and downstream of Thompson Falls Dam as well as Bull Trout recorded at the Thompson Falls fish ladder. Since 2011, 23 Bull Trout, representing 21 individual fish were recorded at the Thompson Falls fish ladder workstation. One Bull Trout ascended the ladder twice and during the second ascent in 2012, the Bull Trout jumped out of one of the pools and died. This mortality has been the only documented occurrence of direct take in the Project area and subsequently, a cover was placed over the holding pool to mitigate the potential for this to occur again. In 2014, the Bull Trout that ascended the ladder was released alive upstream of the dam; it was later captured downstream of Thompson Falls Dam and the Project area during the annual reservoir monitoring activities led by FWP in Noxon Reservoir. The Bull Trout was captured via gillnet on October 13, 2014, resulting in a mortality.

Table 20. Cumulative incidental “take” of Bull Trout for the Project area located in the Lower Clark Fork River drainage, since January 1, 2009. Note: No Bull Trout sampled in 2018; EF = electrofishing; L = length; Wt = weight

Date	Method of Capture	Location	Action	Personnel	L (mm)	Wt (g)	Genetic Assignment	Condition at time of release
4/15/24	EFISH	Upper TFalls Reservoir (CFR)	Long-term Population Monitoring	Licensee FWP	178	42	WF Thompson River (R4)	Alive (no additional detections)
6/29/23	Ladder	TFalls Dam	Fish Passage Studies	Licensee FWP	285	180	North Fork Fish Creek (R4)	Alive (detected in Thompson River 6/29, 7/21)
5/1/23	Ladder	TFalls Dam	Fish Passage Studies	Licensee FWP	582	1660	West Fork Thompson River (R4)	Alive (detected in Thompson River 5/14, 9/17-24 WF Thompson River 6/8, 9/16)
3/27/23	EFISH	Clark Fork River near confluence with Thompson River	2023 Fish Behavior Study	Licensee FWP	501	1556	NA	Alive (released on site CFR and detected in Thompson River 5/3, WF Thompson River 7/17, 8/20)
6/4/22	Ladder	TFalls Dam	Fish Passage Studies	Licensee FWP	528	1262	WF Thompson River (R4)	Alive (detected in Thompson River and WF Thompson River 2021 and 2022)
4/26/22 5/26/21	Ladder	TFalls Dam	Fish Passage Studies	Licensee FWP	530 519	1062	Fishtrap Creek (R4)	Alive (detecting in Thompson River and Fishtrap in 2021 and 2022)
10/21/20	EFISH	Clark Fork River, upstream of Island Complex	Long-term Population Monitoring	Licensee FWP	~480	-	No sample collected	Alive (released prior to collecting L, Wt, and genetic sample)
7/17/20	Ladder	TFalls Dam	Fish Passage Studies	Licensee FWP	320	262	WF Thompson River (R4)	Alive
6/26/19	Ladder	TFalls Dam	Fish Passage Studies	Licensee FWP	620	1608	WF Fish Creek (R4)	Alive
<i>No Bull Trout Samples in 2018</i>								
9/18/17	Ladder	TFalls Dam	Fish Passage Studies	Licensee FWP	408	522	WF Thompson River (R4)	Alive

Date	Method of Capture	Location	Action	Personnel	L (mm)	Wt (g)	Genetic Assignment	Condition at time of release
6/6/16	Ladder	TFalls Dam	Fish Passage Studies	Licensee FWP	618	1950	NF Fish Creek (R4)	Alive
5/18/16	Ladder	TFalls Dam	Fish Passage Studies	Licensee FWP	615	1934	NF Fish Creek (R4)	Alive
4/18/16	Ladder	TFalls Dam	Fish Passage Studies	Licensee FWP	413	602	Fishtrap (R4)	Alive
4/11/16	EFISH	Upper TFalls Reservoir (CFR)	Long-term Population Monitoring	Licensee FWP	247	124	Prospect Ck (R3)	Alive
10/20/15	EFISH	Clark Fork River, upstream of Island Complex	Long-term Population Monitoring	Licensee FWP	651	1966	Fishtrap Creek (R4)	Alive
6/3/15	Ladder	TFalls Dam	Fish Passage Studies	Licensee FWP	520	1112	Fishtrap Creek (R4)	Alive
5/17/15	Ladder	TFalls Dam	Fish Passage Studies	Licensee FWP	519	1334	Fishtrap Creek (R4)	Alive
4/13/15	EFISH	Upper TFalls Reservoir (CFR)	Long-term Population Monitoring	Licensee FWP	219	88	Fishtrap Creek (R4)	Alive
10/28/14	EFISH	Paradise-Plains	Long-term Population Monitoring	Licensee FWP	315	260	NF Jocko (R4)	Alive
6/3/14	EFISH	Below TFalls Dam	Fish Passage Studies	Licensee FWP	509	1224	Fishtrap Creek (R4)	Alive
5/28/14	EFISH	Below TFalls Dam	Fish Passage Studies	Licensee FWP	567	1640	Fishtrap Creek (R4)	Alive
5/16/14	Ladder	TFalls Dam	Fish Passage Studies	Licensee FWP	523	1264	Fish Creek (R4)	Alive (later captured via gillnet in Noxon Reservoir resulting in a mortality)
4/15/14	EFISH	Upper TFalls Reservoir (CFR)	Long-term Population Monitoring	Licensee FWP	577	1446	Fishtrap Creek (R4)	Alive
4/7/14	EFISH	Below TFalls Dam	Fish Passage Studies	Licensee FWP	520	1500	NA	Alive
8/9/13	Ladder	TFalls Dam	Fish Passage Studies	Licensee FWP	482	1058	Fishtrap Creek (R4)	Alive

Date	Method of Capture	Location	Action	Personnel	L (mm)	Wt (g)	Genetic Assignment	Condition at time of release
6/7/13	Ladder	TFalls Dam	Fish Passage Studies	Licensee FWP	596	1926	Fishtrap Creek (R4)	Alive
5/7/13	Ladder	TFalls Dam	Fish Passage Studies	Licensee FWP	478	978	Fishtrap Creek (R4)	Alive
5/6/13	Ladder	TFalls Dam	Fish Passage Studies	Licensee FWP	576	1694	Fishtrap Creek (R4)	Alive
4/30/13	Ladder	TFalls Dam	Fish Passage Studies	Licensee FWP	598	2306	Fish Creek (R4)	Alive
4/10/13	EFISH	Upper TFalls Reservoir (CFR)	Long-term Population Monitoring	Licensee FWP	260	108	Fishtrap Creek (R4)	Alive
10/30/12	EFISH	Paradise-Plains	Long-term Population Monitoring	Licensee FWP	472	800	Monture Creek (R4)	Alive
10/30/12	EFISH	Paradise-Plains	Long-term Population Monitoring	Licensee FWP	444	678	Fish Creek (R4)	Alive
5/21/12 4/26/11	Ladder	TFalls Dam	Fish Passage Studies	Licensee FWP	563 547	1404 1438	Fishtrap Creek (R4)	Mortality (2012) Alive (2011)
5/15/12 5/31/11	Ladder EFISH	TFalls Dam Below TFalls	Fish Passage Studies	Licensee FWP	510 482	1172 966	Meadow Creek (R4)	Alive 2012 Alive 2011
4/17/12	EFISH	TFalls Reservoir (Upper Section)	Long-term Population Monitoring	Licensee FWP	260	140	Fishtrap Creek (R4)	Alive
4/16/12	EFISH	TFalls Reservoir (Lower Section)	Long-term Population Monitoring	Licensee FWP	222	76	Fishtrap Creek (R4)	Alive
4/10/12	EFISH	Below TFalls	Fish Passage Studies	Licensee FWP	272	150	Graves Creek (R3)	Alive
5/31/11	EFISH	Below TFalls	Fish Passage Studies	Licensee FWP	482	966	Meadow Creek (R4)	Alive
5/31/11	EFISH	Below TFalls	Fish Passage Studies	Licensee FWP	180	50	Fishtrap Creek (R4)	Alive
5/31/11	EFISH	Below TFalls	Fish Passage Studies	Licensee FWP	247	130	Fishtrap Creek (R4)	Alive
4/13/11	Ladder	TFalls Dam	Fish Passage Studies	Licensee FWP	365	364	Thompson River (R4)	Alive

Date	Method of Capture	Location	Action	Personnel	L (mm)	Wt (g)	Genetic Assignment	Condition at time of release
10/12/10	EFISH	Clark Fork River, upstream of Island Complex	Long-term Population Monitoring	Licensee	325	240	SF Jocko River (R4)	Alive
5/1/09	Gillnet	TFalls Reservoir	Long-term Population Monitoring	Licensee	271	174	Fishtrap Creek (R4)	Alive

Section 7.0 – 2025 Proposed Activities and Reporting

In 2025, NorthWestern will continue to collect baseline fisheries data (gillnetting), will continue to operate the upstream fish passage facility, and collect species, length and weight data (salmonids and PIT-tagged fish only), and will continue to collaborate with TAC members to implement proposals approved for 2025.

Fish tagging protocol is summarized in Table 21. The primary changes from recent years are the addition of species to receive PIT Tags (LS SU and NPMN) and not checking the ladder on weekends when water temperatures equal or exceed 23 °C. The goal for 2025 is to PIT-tag up to 100 Largescale and 100 Northern Pikeminnow at the ladder (and release upstream).

As in recent years, ladder operations will remain in orifice mode for the duration of the season. The sampling protocol established in 2020 for when water temperatures exceed 20°C will remain unchanged. Fish will not be anesthetized or tagged (PIT or Floy) when water temperature exceeds 20°C except for Bull Trout. NorthWestern plans to tag and anesthetize Bull Trout when water temperatures exceed 20°C, but the determination can be made at the ladder by the operators depending on the condition of the fish at that time. When water temperatures are equal to or greater than 23°C, the ladder will be checked daily, excluding weekends. Genetic samples will be taken for Bull Trout.

The following species will not be released upstream: Walleye, Lake Trout, Brook Trout, Brook x Bull trout hybrid, or Smallmouth Bass. Smallmouth Bass was officially added to this list by FWP in December 2019 during the annual TAC meeting.

Table 21. Tagging protocol for fish species recorded at the ladder in 2024.

Species	PIT	Ad clip	Floy	Genetic sample	Comments
BULL	X			X	Continue tagging when temperatures > 20°C
LL	X	X	X		
RB	X	X	X		Discontinue anesthetizing, tagging, and measuring when temperatures > 20°C
WCT	X	X	X	X*	
MWF	X	X			
LS SU	X				(2024: Goal for the season is to tag a maximum of 100 LSSU and 100 NPMN)
NPMN	X				

*MFWP requested genetic sample of WCT in 2025 for their database. MFWP will fund genetic analysis

NorthWestern will prepare a summary report for 2025 activities that will be submitted to FWS and the TAC, as well as filed with the Commission by April 1, 2026.

Section 8.0 – Submersible Antenna Study

Section 8.1 – Study Introduction

In 2024, NorthWestern initiated a study to assess fine-scale fish movements through the utilization of submersible PIT antennas within the designated study area, as illustrated in Figure 18. The study area lies below the main dam in Thompson Falls, Montana. The primary objective of this study, as outlined in the plan titled “Evaluating Fine-Scale Fish Movements Using Submersible PIT Antennas” (submersible antenna study plan), was to enhance the findings of the fish behavior radio telemetry study completed in 2023. This will be achieved by further investigating fine-scale fish movements to improve the efficiency of the Thompson Falls fish ladder. The 2024 submersible antenna study served as a preparatory initiative preceding the commencement of the official five-year study scheduled to begin in 2026. This study enabled the initiation of passive monitoring of Bull Trout and Westslope Cutthroat Trout alongside native species and non-native salmonids, including Rainbow Trout and Brown Trout, below the main dam in Thompson Falls. Furthermore, the 2024 study provided a valuable opportunity to refine and understand operational protocols for upcoming research.

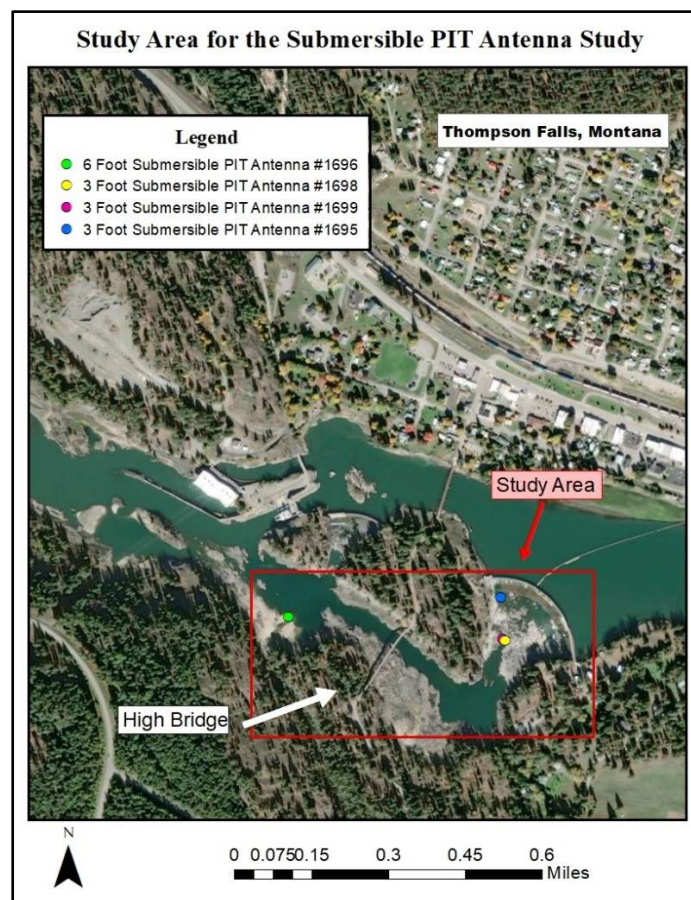


Figure 18. A distant perspective of the study area below the main dam in Thompson Falls, Montana, with the corresponding 2024 submersible antenna locations.

Section 8.2 – Study Implementation

In January 2024, Northwestern distributed the submersible antenna study proposal to the Thompson Falls TAC for review and suggested allocating TAC funds for the acquisition of four submersible antennas. Following the TAC's authorization in January, Northwestern purchased one six-foot collapsible antenna and three three-foot rigid antennas to fulfill the objectives outlined in the study plan for 2024.

Implementation commenced in March 2024, beginning with the assemblage of antennas and the construction of PVC, sand-filled weights, which served as a mechanism to stabilize the antennas during elevated flows. After equipment installation, staff began deploying antennas and actively monitored their performance over the subsequent seven months.

Section 8.2.1 – Fish Collection and Tagging

An objective outlined in the submersible antenna study plan is to prioritize tagging additional fish with PIT tags to enhance and diversify the study sample. In 2024, personnel undertook measures to increase the sample size of PIT-tagged fish within the project area through tagging efforts conducted both at the fish ladder and in areas away from the ladder. Fish identified as suitable under the ladder tagging protocol, which successfully ascended the ladder, continued to receive PIT tags, thereby augmenting the current population of tagged fish from the ladder. Additionally, further collection and tagging below the Thompson Falls facility was implemented to broaden and diversify the study population. Collaborative efforts between NorthWestern and Montana FWP resulted in tagging of fish downstream of the primary dam at Thompson Falls. In 2024, 107 individual fish across nine distinct electrofishing outings were tagged. These species primarily consisted of non-native salmonids and native Catostomidae species.

Section 8.3 – Monitoring and Data Archiving

Section 8.3.1 – Monitoring Timeframe

The 2024 study season spanned seven months, from March 21 to October 22. Staff aimed to retrieve antennas, download detection data, replace batteries, and redeploy antennas every three weeks to optimize data collection efforts. Although the objective was to ensure the continuous operation of the antennas, various challenges arose that limited the duration of the monitoring period. Spring runoff, prevalent throughout April, May, and June, hindered antenna deployment. Elevated water flows in the Clark Fork River rendered effective utilization of the four antennas impractical for approximately 70 days.

Additionally, technical difficulties concerning the antenna software arose during the study season, resulting in 14 days of inactivity for the antenna located outside the fish ladder entrance. A software update altered the Unique Detection Delay setting, ultimately affecting battery retention during deployment.

Moreover, on July 24, a severe storm impacted the region, disrupting electrical grid operations. This led to a curtailment of plant operations at the Thompson Falls hydroelectric facility, resulting in an increase in flow through the spill gates of the main dam, adding an additional 1,000 to 2,000 cubic feet per second (CFS) downstream. This surge in flow permanently damaged the two antennas positioned in the falls, resulting in 92 days of antenna inactivity.

Section 8.3.2 – Antenna Placement and Operational Procedures

The four antennas were strategically located in distinct areas, specifically designed to address the objectives outlined in the study plan. The placement of antennas was systematically investigated to optimize deployment locations for enhanced fish detection capabilities. Detection data was regularly analyzed to inform decisions regarding the deployment of antennas. Throughout the 7-month study period, only one antenna was repositioned from its original deployment location due to low detection rates. The remaining three antenna locations were maintained as outlined in the submersible antenna study plan. Figure 19 and Figure 20 illustrate the four antenna locations that comprised much of the study duration, excluding the initial 27-day deployment of the previously mentioned antenna that was relocated due to low detection quantity. During the 2024 study season, a 6-foot ridged submersible antenna, designated as 1696, was strategically positioned in Prospect Bay at the confluence of Prospect Creek and the Clark Fork River. Additionally, three 3-foot ridged submersible antennas were positioned upstream of Prospect Creek throughout the 2024 season. Antennas 1699 and 1698 were positioned directly downstream of the natural falls, while antenna 1695 was located near the entrance of the fish ladder.

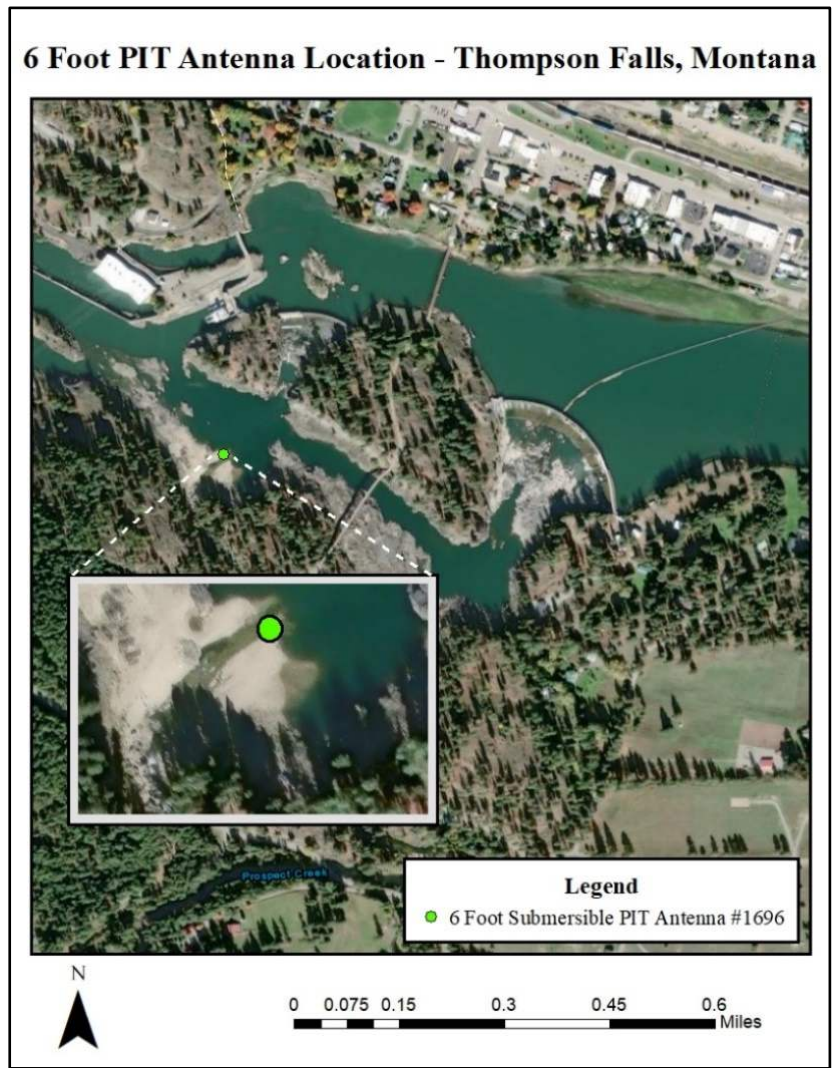


Figure 19. The placement location for the 6-foot ridged submersible antenna during the 2024 study season.

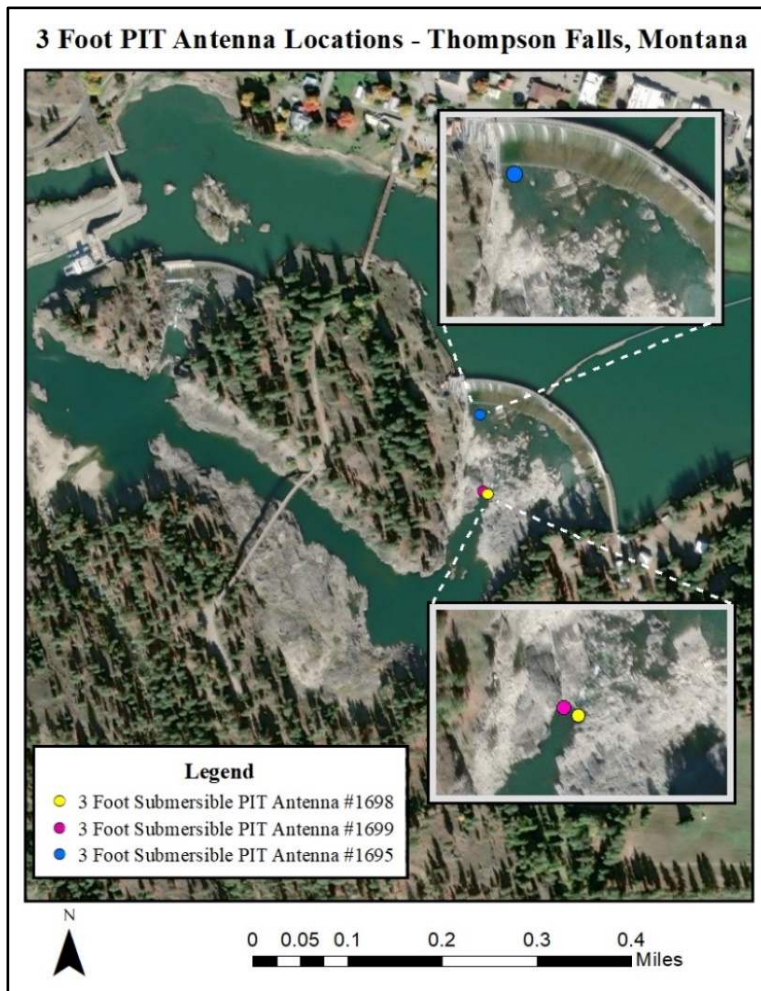


Figure 20. The placement location for three 3-foot ridged submersible antennas during the 2024 study season.

Each submersible antenna warranted a distinct deployment and retrieval procedure. Three of the antennas necessitated the use of a jetboat to enable adequate access to perform the operational tasks aligned with the study objectives. In contrast, the remaining antenna was accessible via the fish ladder.

The six-foot rigid antenna, located in Prospect Bay, could only be reached by boat. Staff would navigate to Prospect Bay and locate the buoy tethered to the antenna. Upon securing the buoy, staff would haul the antenna to the anchor point situated on the shore near the confluence of Prospect Creek and the Clark Fork River. After towing the antenna to shore, staff would download the detection data, swap out the batteries, and redeploy the antenna for another three-week monitoring period.

Similarly, the two antennas positioned at the toe of the falls below the main dam were best accessed by jetboat. Staff would navigate to the falls, locate the anchor tether, and carefully extract each antenna from its monitoring location. After completing the data download and battery exchange, staff would find the anchor tether line, secure the antenna to it using stainless-steel clips, and redeploy the antenna.

The antenna situated outside the ladder entrance required a different retrieval method, bypassing the need for a boat. Staff walked to the bottom of the fish ladder and lowered the antenna directly outside the entrance, within the attraction plume of the ladder. During retrieval, project staff manually pulled the antenna up the side of the ladder and performed the data download and battery swap.

Section 8.3.3 – Data Archiving

Following retrieval of antennas, staff utilized the Biomark Device Manager Software to download detection data directly from the antennas. This data was subsequently uploaded into a master Excel sheet. Once the upload was completed, a quality control check was conducted. The annual report analysis and corresponding graphs were then created within the Excel master sheet.

A primary objective outlined in the study plan for the 2024 study season is to "develop an effective method for processing, managing, and analyzing detection data." While the traditional Excel approach effectively met the goals of the first study season, the project team acknowledges the necessity for a more robust data management and analysis method. Given the anticipated significant increase in detection data throughout the study, there are concerns regarding the future management and analytical goals that will be addressed later in the report.

Section 8.4 – Results

The results section will examine three questions delineated in the proposal for the submersible antenna study. This analysis will leverage detection data obtained from both the submersible antennas and the internal PIT tag array of the fish ladder.

Section 8.4.1 – Prospect Bay Submersible Antenna (1696) Results

The first question specified in the submersible antenna study plan is to evaluate the proportion of eligible PIT-tagged fish detected at the submersible antenna positioned in Prospect Bay that subsequently advanced upstream into the study area or entered the fish ladder. This investigation aims to assess fish movement into the study area by comparing the detection data from the submersible antennas in Prospect Bay, at the Falls, outside the ladder entrance, and data from the internal fish ladder PIT array.

In 2024, the Prospect Bay 1696 submersible antenna operated for 144 days, during which 58 unique fish, including three Bull Trout, were detected. Table 22 presents an overview of the detection data, categorized by fish species and the corresponding number of individuals. It is important to understand that if a fish detected in Prospect Bay was not later detected at an upstream antenna, it does not necessarily imply that the fish failed to navigate upstream. Instead, the fish may have evaded detection by the upstream antennas.

Table 22. Detection data from the Prospect Bay submersible antenna, categorized by fish species and their respective quantities. It also includes the proportion of fish

detected solely at the Prospect Bay submersible antenna, those detected at both the Prospect Bay and an upstream antenna/s, and the corresponding proportion of those fish that successfully entered the ladder.

Species	Detection at Prospect Only	Detections at Prospect and upstream	Detections at Prospect and on the Internal Ladder PIT Array	Total Individuals
LS SU	7	17	13	24
BULL		3	3	3
RB	4	10	8	14
LL	3	4	3	7
WE	8			0
N PMN	2			2
	24	34	27	58

An analysis of the data indicates that out of the 58 fish recorded on the submersible antenna in Prospect Bay, 34 exhibited upstream movement into the Project area, representing 58.6 percent of all fish detected at Prospect Bay. Additional detections at upstream antennas within the study vicinity further corroborate this upstream movement. Figure 21 visually represents the proportion of fish detected on the Prospect Bay submersible antenna that also exhibited upstream movement during the study period.

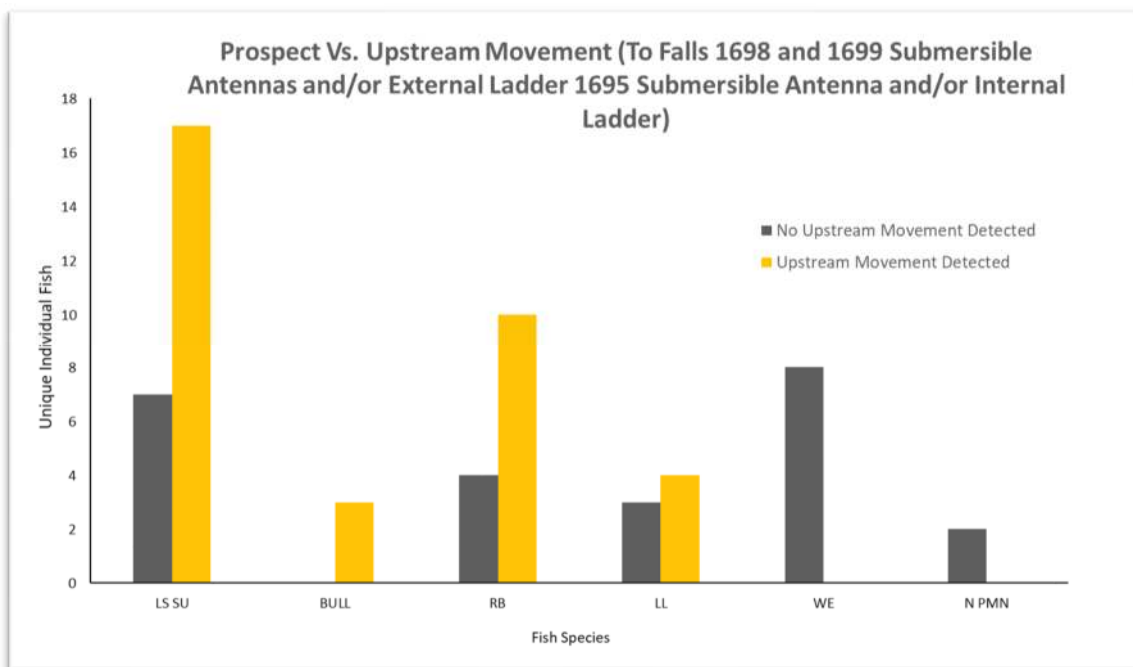


Figure 21. Proportion of fish detected by the Prospect Bay submersible antenna that were also detected by an upstream antenna, thereby demonstrating the proportion of fish that moved upstream from Prospect Bay.

Prospect Bay detection data shows that among the 34 fish that exhibited upstream movement from Prospect Bay in 2024, 27 fish were detected inside the ladder on the internal fish ladder PIT array system. This indicates that 46.6 percent of the fish documented moving upstream

from Prospect Bay proceeded to enter the ladder. Subsequent detections confirmed this upstream movement within the internal fish ladder array system. Figure 22 illustrates the proportion of fish exhibiting upstream movement from Prospect Bay that entered the fish ladder. Among these fish, a portion were detected on the internal fish ladder, indicating the fish successfully entered the ladder. Conversely, some fish were not detected on the internal ladder PIT array, suggesting the fish demonstrated upstream movement but did not enter the ladder.

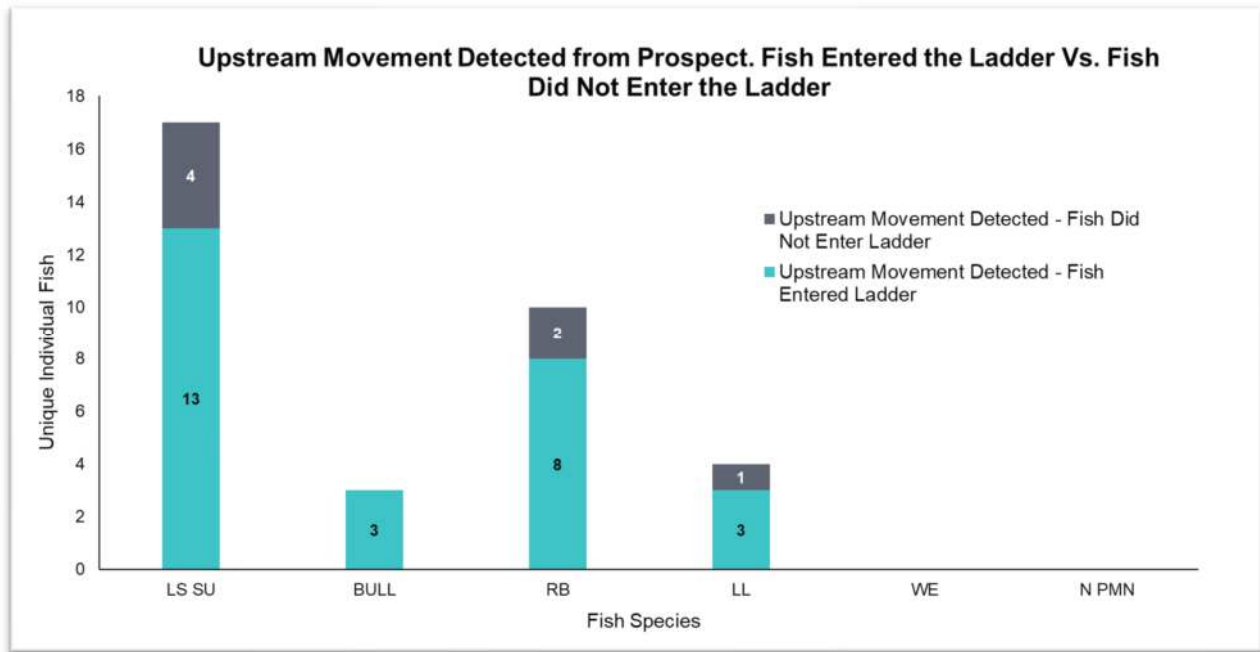


Figure 22. Proportion of fish exhibiting upstream movement from Prospect Bay that entered the fish ladder.

Section 8.4.2 – Falls Submersible Antennas (1698 and 1699) Results

The second question outlined in the submersible antenna study plan aims to evaluate the proportion of eligible PIT-tagged fish detected at the two submersible antennas located at the Falls that subsequently swam upstream into the study area and/or entered the fish ladder. This investigation evaluates fish movement into the study area by comparing detection data from the two submersible antennas positioned at the Falls with the antennas positioned outside the ladder entrance and the internal fish ladder PIT array.

In 2024, two submersible antennas (1698 and 1699) positioned at the Falls operated for a duration of 41 days, during which a total of 56 unique fish, including one Bull Trout, were detected. Table 23 presents an overview of the detection data, categorized by fish species and their respective quantities. The table includes the proportion of fish detected solely at the Falls submersible antennas (1698 and 1699), those detected at both the Falls antennas and upstream antenna/s (1695 and Internal Ladder Pit Array), and the corresponding proportion of those fish that successfully entered the ladder. It is important to understand that if a fish detected at the Falls was not later detected at an upstream antenna, it does not necessarily imply that the

fish failed to navigate upstream. Instead, the fish may have evaded detection by the upstream antennas.

Table 23. Summarizes the detection data from the two Falls submersible antennas, categorized by fish species and their respective quantities. The table also includes the proportion of fish detected solely at the Falls submersible antennas, those detected at both the Falls antennas and upstream antenna/s, and the corresponding proportion of those fish that successfully entered the ladder.

Species	Detection at Falls Only	Detections at Falls and detection upstream	Detections at Falls and on the Internal Ladder PIT Array	Total Individuals
LS SU	16	28	26	44
LN SU	3			0
BULL		1	1	1
RB	2	1	1	3
LL	1	2	2	3
WCT	1			0
NPN	1			1
	24	32	30	56

An analysis of the data reveals that of the 56 fish recorded on the two submersible antennas positioned at the base of the Falls, 32 fish displayed an upstream movement above the Falls, representing 57.1 percent of all fish detected at these two antennas. Additional detections at upstream antennas within the study area confirmed this upstream movement. Figure 23 illustrates the proportion of fish detected at the two submersible antennas positioned at the Falls that were also detected by an upstream antenna, thereby demonstrating the proportion of fish that moved upstream beyond the Falls.

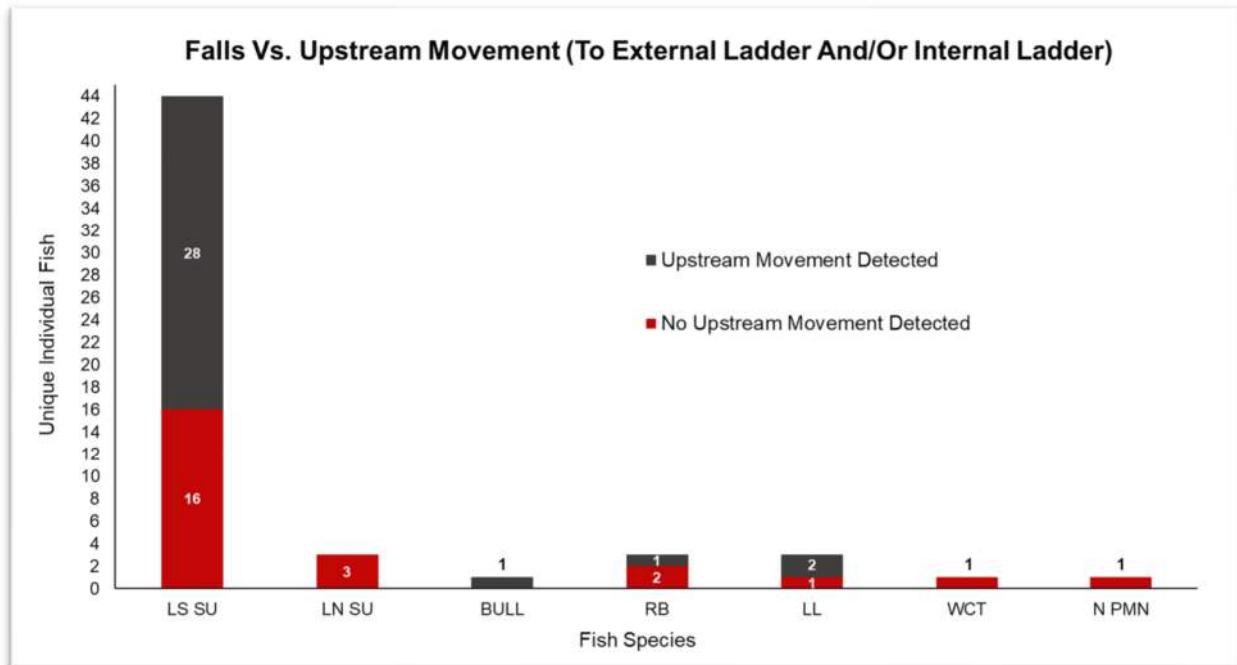


Figure 23. Proportion of fish detected at the two submersible antennas positioned at the Falls that were also detected by an upstream antenna.

Falls detection data reveals that of the 32 fish that demonstrated upstream movement beyond the Falls in 2024, 30 were detected in the ladder on the internal fish ladder PIT array system. This indicates that 93.8 percent of the fish documented moving upstream beyond the Falls proceeded to enter the ladder. Subsequent detections confirmed this upstream movement within the internal fish ladder array system. Figure 24 depicts the proportion of fish displaying upstream movement beyond the Falls that entered the fish ladder. Among these fish, a sample of fish was detected on the internal fish ladder, indicating they successfully entered the ladder. Conversely, some fish were not detected on the ladder, suggesting the fish demonstrated upstream movement without entering the ladder.

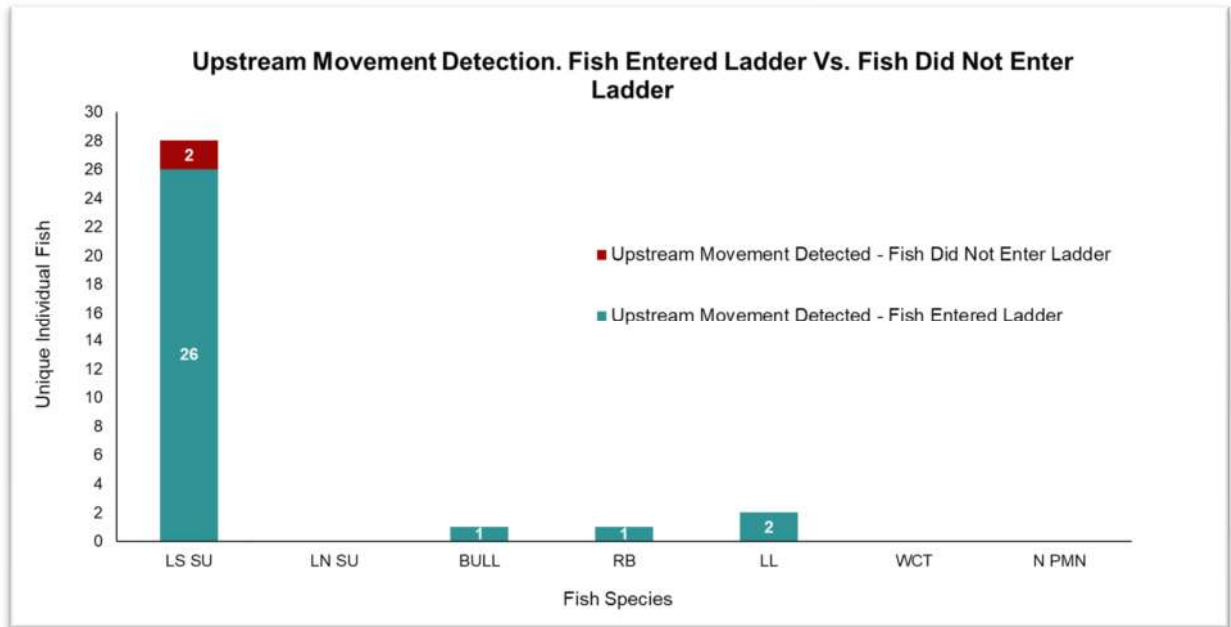


Figure 24. Proportion of fish displaying upstream movement beyond the Falls that entered the fish ladder.

Section 8.4.3 – External Fish Ladder Submersible Antenna (1695) Results

The third question raised in the submersible antenna study plan aims to evaluate the proportion of eligible PIT-tagged fish detected by the external submersible antenna (1695) located at the entrance of the fish ladder that subsequently enter the fish ladder. This investigation examines fish movement into the ladder by comparing detection data from the external submersible antenna with data from the internal PIT array system within the fish ladder.

In 2024, the external fish ladder submersible antenna (1695) positioned outside the ladder entrance in the attraction plume operated for 131 days, during which 59 unique fish, including one Bull Trout, were detected. Table 24 summarizes detection data gathered from the external fish ladder submersible antenna, categorized by fish species and their respective quantities. The table delineates the proportion of fish detected exclusively at the external fish ladder submersible antenna. In contrast, the table also includes detections of fish observed at both the

external fish ladder submersible antenna and the internal fish ladder PIT array. Lastly, the table highlights fish detected solely on the internal fish ladder antenna, not the external submersible antenna.

Table 24. Detection data gathered from the external fish ladder submersible antenna, categorized by fish species and their respective quantities.

Species	Detection at External Fish Ladder (1695) submersible antenna Only	Detection at External Fish Ladder (1695) submersible antenna and detection at Internal Fish Ladder PIT Array	Detections at Internal Fish Ladder PIT Array Only	Total Individuals
LS SU	2	19		21
BULL		1		1
RB	2	12		16
LL	1	21	2	22
N PMN		1		1
	5	54	2	61

An analysis of the data reveals that of the 59 fish detected by the external fish ladder's submersible antenna positioned at the entrance, 54 fish proceeded to enter the ladder, which accounts for 91.5 percent of all fish recorded at this antenna. Detections on the internal fish ladder PIT array corroborated the proportion of fish that accessed the ladder. Figure 25 illustrates the proportion of fish detected at the external fish ladder submersible antenna positioned outside the ladder entrance that were detected inside the ladder on the internal ladder PIT array, thereby demonstrating the proportion of fish that either entered the ladder or did not enter the ladder.

It is important to consider the tagging history of the fish detected on the external fish ladder submersible antenna to gain insights into the percentage of detected fish that were initially PIT tagged at the ladder. This analysis may indicate a bias toward the ladder compared to those PIT-tagged at other locations, suggesting a potentially unbiased preference. Of the 59 fish detected on the external submersible antenna, 62.3 percent had their PIT tags implanted at the ladder, while 37.7 percent were tagged at various locations away from the ladder.

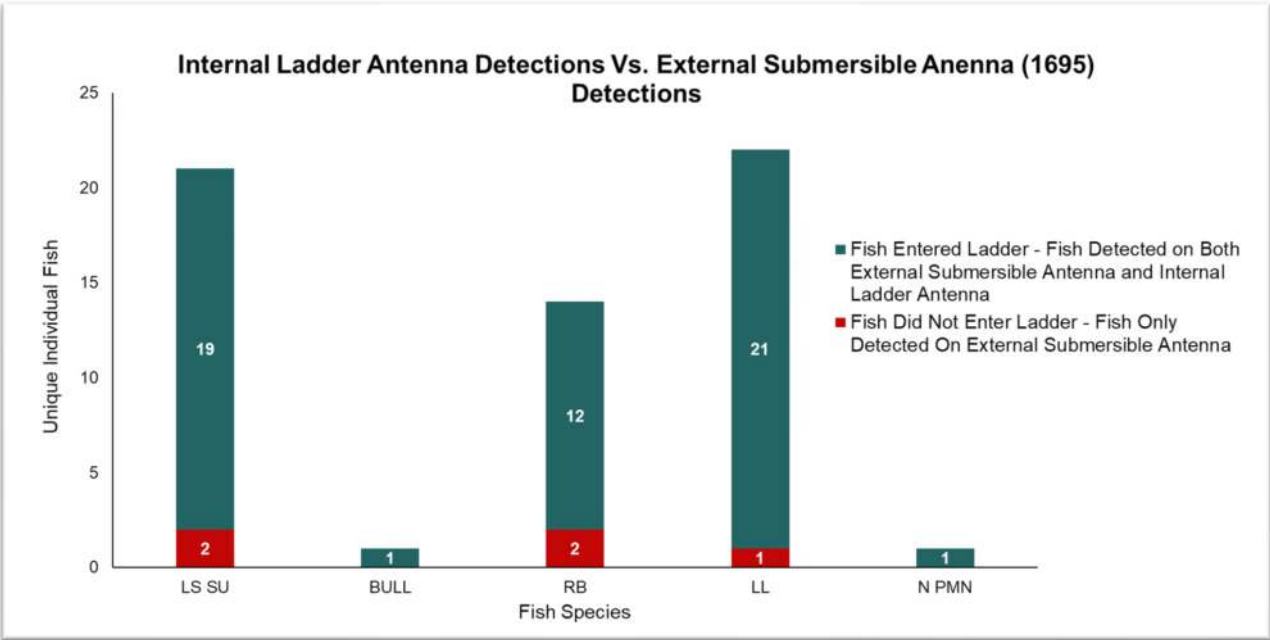


Figure 25. Proportion of fish detected at the external fish ladder submersible antenna positioned outside the ladder entrance that were detected inside the ladder on the internal ladder PIT array.

Section 8.4.4 Bull Trout Overview

During the 7-month study period, three individual Bull Trout were detected by the submersible antennas in the Clark Fork River, downstream from the main dam in Thompson Falls. The following paragraphs present a detailed account of the movement patterns for each unique fish, identified by their PIT tag numbers. This account is based on detection data from the submersible antennas and existing PIT tag arrays positioned within the fish ladder and tributaries of the Clark Fork River. Each synopsis includes references to antennas by their descriptive location and antenna ID.

The first of the three Bull Trout under review retains the Decimal Tag ID of 989.001030299617. On April 17, 2024, the Bull Trout was initially detected once at the Falls 1968 submersible antenna located at the base of the falls. Subsequently, on May 4, 2024, the fish was detected upstream at the External Submersible Ladder Entrance Antenna 1695, where it remained for several days just outside the ladder entrance. The fish spent approximately eight days in this area, registering 280 detections, with many occurring early in the morning and late at night.

At 16:02 on May 12, 2024, the Bull Trout entered the ladder and was intermittently detected 11 times as far up as Pool 8. The Bull Trout exited the ladder on May 15, 2024. On June 22, 2024, the Bull Trout was detected twice in the ladder entrance in Pool 1 and likely exited the ladder. Finally, the Bull Trout was detected six times in Prospect Bay from July 12, 2024, to August 1, 2024, at the Prospect 1696 submersible antenna positioned in Prospect Bay. Additionally, the fish was detected multiple times in Prospect Creek from July 29, 2024, through September 14, 2024.

For context, the Bull Trout was initially tagged in Lake Pend Oreille on December 6, 2021. It was subsequently recaptured during night electrofishing below Cabinet Gorge Dam on May 24, 2022, and was then transported and released into the Thompson River on May 27, 2022. Detection in Fishtrap Creek followed on June 20, 2022. The movements of this fish, as captured by the submersible antennas and the internal fish ladder PIT tag array system, are illustrated in Figure 26. A graph illustrating the movement patterns of the Bull Trout with the Decimal Tag ID of 989.001030299617 has been included, as the data for this individual was also effectively represented visually as opposed to the other two Bull Trout with limited detection data.

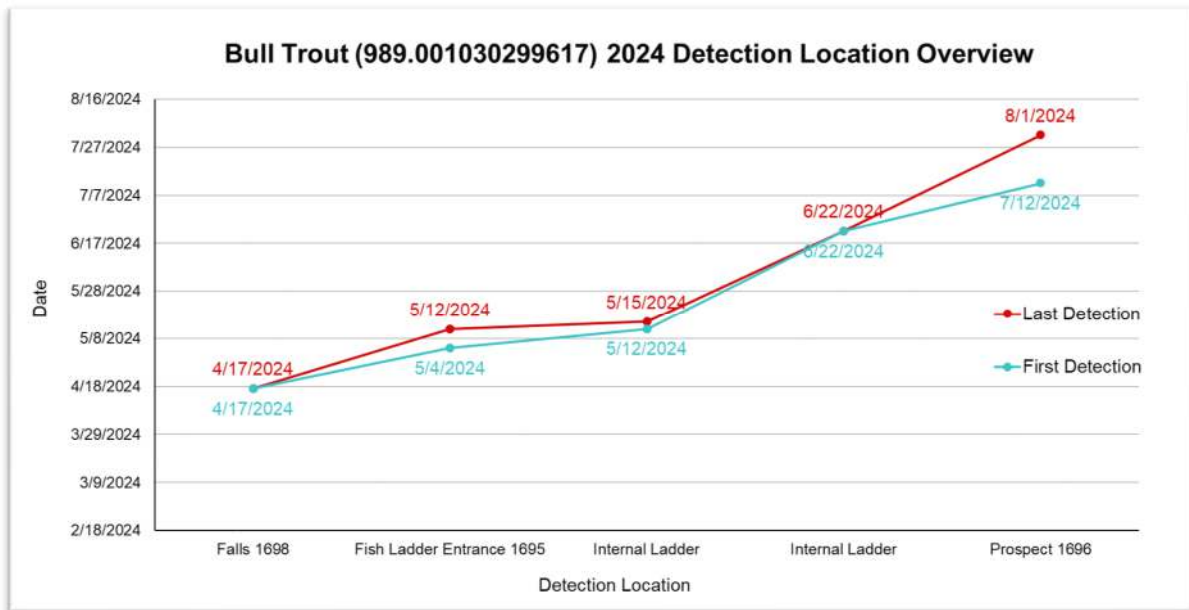


Figure 26. Depicts the movement history of Bull Trout (Decimal Tag ID: 989.001030299617) during the 2024 study period. The y-axis represents the detection date. The x-axis represents the detection location based on the corresponding antenna. In the graph, the first and last detection of the Bull Trout was included to represent the timeframe the Bull Trout occupied an area.

The second Bull Trout under review retains the Decimal Tag ID of 982.126050371177. On May 30, 2024, the Bull Trout was detected in Pool 1 at the ladder entrance and remained in and around the ladder until the final detection on June 5, 2024. Subsequent detections in Pool 1 at the ladder entrance occurred on June 16, 2024, June 17, 2024, and June 23, 2024. The Bull Trout departed the ladder and was recorded at the Prospect 1696 submersible antenna in Prospect Bay on August 21, 2024, with its last detection occurring on September 10, 2024, at the same antenna. Between July 19, 2024, and September 1, 2024, the Bull Trout was also detected within Prospect Creek on the Prospect Creek PIT array. It is important to note that the submersible antenna 1695 outside the ladder entrance was removed until the completion of runoff, resulting in no data being collected for this fish outside the ladder entrance. The Bull Trout was initially tagged during angling surveys conducted below Cabinet Gorge Dam on September 13, 2021, and was later transported and released in the South Fork Jocko River on September 21, 2021.

The final Bull Trout under review retains the Decimal TAG ID of 982.126050371142. On May 13, 2024, this Bull Trout was briefly detected at the Prospect 1696 submersible antenna. The fish then advanced upstream, where it was detected in pool 1 at the fish ladder entrance four times on June 14, 2024. The Bull Trout was again detected in pool 1 within the ladder entrance approximately eight days later, from June 22 to June 23, 2024. This Bull Trout was initially tagged during electrofishing below Cabinet Gorge Dam on June 16, 2022. Following this, the fish was transported and released into the Thompson River on June 22, 2022. The Bull Trout was subsequently detected in the West Fork Thompson River on July 6, 2022.

Section 8.5 – Study Conclusions

The 2024 study season provided a valuable opportunity to understand and refine the study's operational protocols while also enabling nearly 34,000 detections across the four submersible antennas. As stated in the submersible antenna study plan, the primary goal of the 2024 study season was to begin evaluating fine-scale movements of salmonids and native fishes within the near field of the study area and establish an effective and practical operating protocol for the antennas. Project staff were able to address study objectives in 2024 and attain important knowledge pertinent to the future success of the study. In conclusion, data and information obtained in 2024 will apply to future study efforts, ultimately transpiring into informative and instructive outcomes to enhance fish ladder efficiency in Thompson Falls. Data collected during this study season will help inform future monitoring efforts and help identify effective operational procedures for submersible PIT antennas in the Project area.

Section 8.5.1 – Study Challenges

The 2024 study season served as an opportunity to encounter, address, and resolve various challenges during the year. The goal was to identify the trials of the first study season and strengthen and enhance the study moving forward.

Among many challenges endured, complications impeding effective antenna deployment and retrieval, linked to the spring runoff season in 2024, limited the ability for tag detection. As was expected, the elevated spring flows inhibited staff from deploying the antennas. The antennas could not record fish movements for approximately 70 days due to spilling during spring runoff. Project staff were able to determine through cross-referencing data from the internal fish ladder PIT tag array that the fish movements of 72 fish were potentially missed on the submersible antennas during the spill period, including two Bull Trout and two Westslope Cutthroat Trout. High flows are likely to damage the expensive equipment and may impact the reliability of data collection. Antennas are unlikely to remain stationary within the substrate of the river during elevated flows, reducing placement consistency. The inability of the antennas to be deployed during spill is a limitation of the study and important to address given the history of fish migration and ladder usage during periods when spill begins to occur, and as spill tapers off with the spring freshet. In the future, staff will continue to have the antennas deployed for as long as possible if favorable conditions are present. The challenge is anticipating when spill will begin at the project and balancing the need to remove antennas to avoid damage to the equipment. Future removal and placement of antenna will need to be more conservative to reduce the likelihood of damage.

A significant challenge that arose during the study was the unintentional manipulation or damage to the submersible antennas. Events such as the increased flow release below the main dam during the storm on July 24th caused considerable damage to two antennas. This surge in flow led to permanent damage to the two antennas located in the falls, resulting in 92 days of inactivity. Although this incident was beyond the control of the project staff, it underscored the necessity for heightened caution when placing antennas in areas below the main dam that compromise the reliability and protection of the antennas. Looking ahead, staff intend to position antennas in safer and more resilient locations capable of withstanding abnormal events, such as flow surges, within the study area.

Data management and data analysis is another challenge that prevailed throughout 2024. One of the primary goals outlined in the submersible antenna study plan states, "Develop an effective method to process, manage, and analyze detection data." During the 2024 study season, detection data was stored in a traditional Excel document, and data analysis was also performed using Excel. While this approach sufficed to achieve the objectives of the first study season, the project team recognized the need for a more robust data management and analysis method. In 2024, over 30,000 unique detections were captured by the antennas, all of which had to be manually uploaded into an Excel file for storage. Although adjustments to the Unique Detection Delay setting in the Biomark Management software can effectively reduce the volume of detections, the inherent nature of the study led to substantial data accumulation. Given that detection data is expected to increase significantly over the study's duration, there are concerns regarding future data management and analytical objectives. Considering the experiences from the 2024 study season, staff recognized the necessity of exploring various options to enhance data management and analysis processes. Relying on traditional methods such as Excel could result in unintentional data management and analysis errors, potentially skewing study outcomes. Moreover, the time investment required for staff to utilize conventional data management software like Excel for a study with such a large volume of data may be prohibitively demanding. To address the data management and analysis challenges endured during the pilot study season of 2024, NorthWestern Energy explored data management and analysis tools developed by Kleinschmidt. Kleinschmidt plans to utilize specialized software tailored to process and analyze fish movement data. NorthWestern aims to leverage this software for its data collection efforts in 2024 and 2025 to maximize efficiency and effectively meet the established study objectives and questions.

Section 9.0 – References

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