



NWE-THF-4238

Kimberly D. Bose
Secretary
Federal Energy Regulatory Commission
888 First Street, NE
Washington, D.C. 20426

March 20, 2023

Re: NorthWestern Energy Files 2022 Annual Activity, Fish Passage, and Bull Trout Take Report for Thompson Falls Hydroelectric Project (1869)

Dear Secretary Bose:

Herein attached, per Item D of Commission Order dated February 12, 2009, is NorthWestern Energy's 2022 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, and Confederated Salish and Kootenai Tribes. 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.

Sincerely,

Mary Gail Sullivan

Director, Environmental and Lands

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The U.S. Fish and Wildlife Service has reviewed and by signature below, approves this Thompson Falls Project 2022 Annual Activity, Fish Passage and Bull Trout Take Report filing with the Commission.

By:  _

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Date: 03/16/2023

2022 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 2023

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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
°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

Acronyms

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 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 2022 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 2022 fish ladder operational season began March 11 and ended October 26. The ladder was closed June 13 due to high streamflow and reopened on July 1 once streamflow declined. The ladder operated in orifice mode and was checked 157 days during the season. The peak discharge in the Clark Fork River, was approximately 86,100 cubic feet per second (cfs) June 13-14, 2021, as measured by the United States Geological Survey (USGS) gage at Plains, Montana Station #12389000.

In 2022, water temperature in the ladder (pool 48) was recorded as a single measurement coinciding with each ladder check. A cool and wet spring in western Montana resulted in cooler water temperatures through June. July provided a drier and warmer weather pattern and facilitated warming water temperatures. Water temperatures at the ladder were equal to or exceeded 21 degrees for 34 days between July 18 and September 7. The warmest water temperature recorded was 23.9 °C on August 1 and August 22. The mean daily streamflow (USGS station #12389000) and daily recorded water temperature in the ladder during the 2022 season is presented in Figure 1.

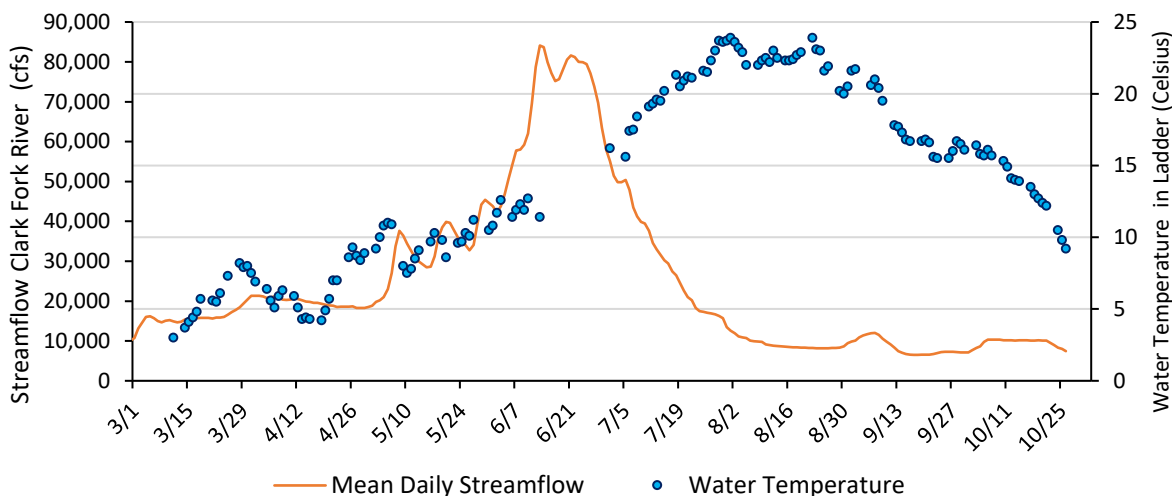


Figure 1. Mean daily streamflow in the Clark Fork River (USGS station#12389000) and water temperature recorded during each ladder check, March – October 2022.

Section 2.2 – Upstream Fish Passage Results

Between March 13 and October 26, a total of 2,026 fish ascended the ladder (Figure 2) and 1,022 individual fish were released upstream (Table 1). The fish released upstream included 211 salmonids and 811 non-salmonids. Fish not released upstream this year included 953 Smallmouth Bass and 1 Lake Trout. Additionally, there were five mortalities (2 RB, 1 LL, 1 LSSU, 1 WCT) and 39 fish radio tagged at the ladder (27 RB, 12 LL) and transported downstream as part of a fish behavior telemetry study.

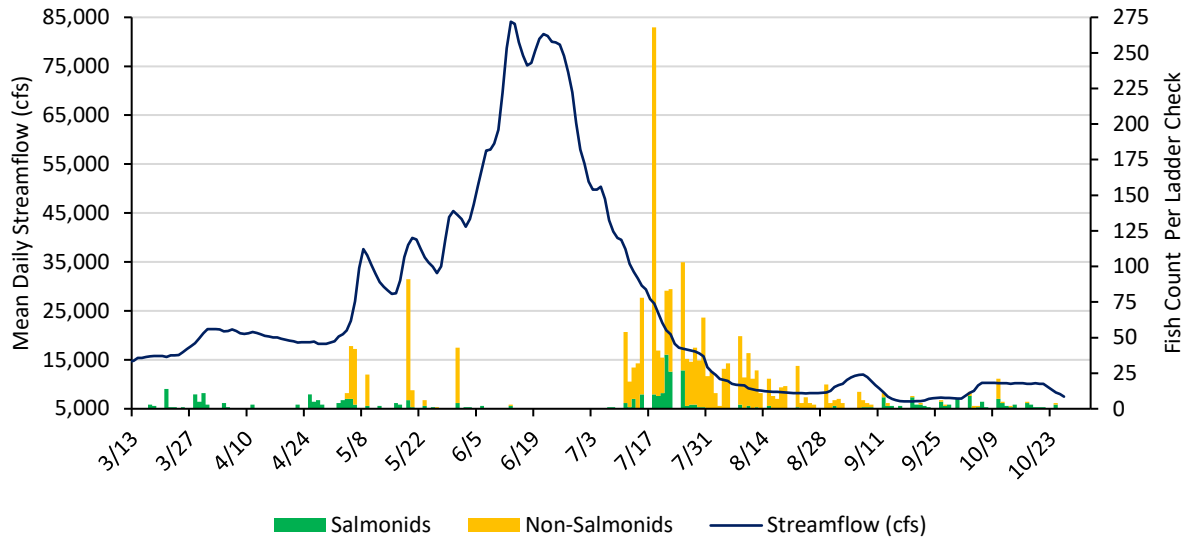


Figure 2. Number of salmonids and non-salmonids recorded at the workstation each ladder check and the mean daily streamflow in the Clark Fork River (USGS station#12389000), March 13 through October 26, 2022.

Table 1. Total number of fish (salmonids and non-salmonids) released upstream of Thompson Falls Dam each year, 2011-2022.

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
Total	4,806	31,407	36,213

Since the ladder opened in 2011, nearly 39,000 fish representing 15 species and three hybrids have ascended the ladder (Table 2). Cumulatively, most fish recorded at the ladder are Largescale Sucker followed by Northern Pikeminnow. However, the annual totals for these species have declined substantially since 2015 while overall salmonid totals remain relatively consistent over the years.

Table 2. Total fish count, by species, for each year the ladder operated, 2011-2022.
 “-” 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	Grand Total
Largescale Sucker	418	1403	3041	2802	6327	2270	34	6	1018	805	823	631	19,578
Northern Pikeminnow	1000	926	387	1003	3356	707	66	10	180	41	150	35	7,861
Smallmouth Bass	135	34	8	1356	1244	1007	123	5	339	347*	856*	953*	6,407
Rainbow Trout	164	208	213	187	281	366	181	124	186	222	213	191	2,536
Brown Trout	28	42	111	81	184	204	108	63	210	123	248	195	1,597
Mountain Whitefish	17	24	2	254	54	8	-	4	4	11	3	6	387
Westslope Cutthroat Trout	21	21	48	36	37	36	14	14	21	33	20	9	310
Peamouth	-	-	-	-	122	2	-	-	-	-	-	-	124
Rainbow x Cutthroat hybrid	9	7	13	12	4	5	1	1	1	2	8	3	66
Longnose Sucker	10	-	2	1	26	6	-	-	-	-	-	-	45
Peamouth x Northern Pikeminnow hybrid	-	-	-	-	-	13	2	-	-	-	-	-	15
Bull Trout	2	2	5	1	2	3	1	-	1	1	1	2	21
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	-	1
Salmonids	242	305	392	573	570	624	305	206	425	394	497	407	4,940
Non-Salmonids	1,563	2,363	3,438	5,162	11,077	4,006	225	21	1,538	1,193	1,830	1,619	34,036
Grand Total	1,805	2,668	3,830	5,735	11,647	4,630	530	227	1,963	1,587	2,327	2,026	38,975

Section 2.3 – Bull Trout Collections

Since the ladder opened in 2011, a minimum of one Bull Trout (maximum of 5), except in 2018, has ascended the ladder annually. In total, during the 12 years of operation, 21 Bull Trout averaging 516 mm in length (range 320-620mm) have ascended the ladder. Approximately 70 percent of the Bull Trout ascending the ladder were genetically assigned to the Thompson River drainage (Fishtrap Creek or West Fork Thompson River) and many were subsequently detected in the Thompson River drainage via remote PIT tag array systems located in the mainstem and tributaries. These Bull Trout ascended the ladder under various river conditions with flows ranging from 8,100 to 56,100 cfs (measured in the Clark Fork River upstream of the dam) and stream temperatures from 6.6 to 22.3 °C.

In 2022, Northwestern captured two Bull Trout at the fish ladder, both were released upstream and later detected in the Thompson River. The first Bull Trout was returning to the ladder for a second consecutive year (#982126050371207) and the second Bull Trout (#982126050371156) was entering and ascending the ladder for the first time (Table 3). In Table 3, the mean daily streamflow represents the mean daily streamflow of the Clark Fork River (USGS gage at Plains) and the Thompson River (USGS at Thompson River). The water temperature measurement is taken at the ladder, pool 48. Ladder ascent time represents the time elapsed from the first detection in the holding pool (Pool 45) and the last detection from the ladder entrance. Bull Trout (#982126050371156) was initially detected at the fish ladder entrance on May 30th, 2022 but did not ascend. Only one detection occurred this day and it is likely the Bull Trout did not fully enter the ladder entrance, as no other detections were recorded until the fish returned to the ladder on June 3rd, 2022.

Table 3. Summary of the two Bull Trout recorded at the ladder in 2022, including ladder details from 2021 of the returning Bull Trout. Each Bull Trout (BULL) ID begins with 98212605037.

BULL ID	Length (mm)	Date Ascended Ladder	Water Temp (°C)	Mean Daily Streamflow (cfs)	Ladder Ascent Time (hrs)	First Detected in Thompson River
1207	530	4/26/2022	8.6	19,078	2.97	5/1/2022
1207	519	5/25/2021	9.3	35,600	3.28	5/30/2021
1156	528	6/3/2022	12.6	45,270	2.00	6/25/2022

Both Bull Trout were initially captured by Avista downstream of Cabinet Gorge Dam, transported upstream, and released into the Thompson River drainage in a previous year. After each Bull Trout ascended the ladder and was released upstream of the dam, both Bull Trout migrated upstream about 6 miles to the Thompson River and into their respective tributaries, Fishtrap Creek and West Fork Thompson River. Both Bull Trout remained in the tributaries until mid-September when each fish was detected leaving the tributary and Thompson River. Histories for each Bull Trout are provided in Tables 4 and 5, respectively.

Table 4. History of known detections of the Bull Trout (#982126050371207).

Year	Date	Location/Detection	
2020	4/14	Female Bull Trout (504mm, 1126g) captured below Cabinet Gorge Dam, genetically assigned to Fishtrap Creek	
	4/27	Avista transports Bull Trout and releases in Thompson River (Thompson River array not working until end of August 2020)	
	6/27 9/6	Fishtrap Creek PIT tag array detection	
	9/10	Thompson River PIT Tag array detection	
9/10/2020 - 5/25/2021		No detections. During this 8-month period, this Bull Trout migrated downstream of Thompson Falls Dam to the Noxon Reservoir.	
2021	5/25	Bull Trout enters and ascends Thompson Falls fish ladder (12:48pm-4:05pm)	
	5/26	Bull Trout recorded at ladder workstation (519mm, 1062g) and released upstream	
	5/30	Thompson River PIT Tag array detection	
	6/18 6/24 6/28 7/19 8/16 9/13	Fishtrap Creek PIT Tag array detection	
	9/20	Thompson River PIT Tag array detection	
	9/10/2021 - 4/25/2022		No detections. During this 7-month period, this Bull Trout migrated downstream of Thompson Falls Dam to the Noxon Reservoir.
	2022	4/25	Bull Trout enters Thompson Falls fish ladder (11:20pm)
		4/26	Bull Trout ascends ladder (4:09am-7:07am), recorded at workstation (530mm) and released upstream
5/1		Thompson River PIT Tag array detection	
6/27 9/13		Fishtrap Creek PIT Tag array detection	
9/16-18		Thompson River PIT Tag array detection	

Table 5. History of known detections of the Bull Trout (#982126050371156).

Year	Date	Location/Detection
2021	5/6	Female Bull Trout (448mm, 876g) captured below Cabinet Gorge Dam, genetically assigned to West Fork Thompson River
	5/12	Avista transports Bull Trout and releases in Thompson River (ACM Bridge) Thompson River PIT Tag array detection
	9/2	West Fork Thompson River PIT Tag array detection
	9/3	Thompson River PIT Tag array detection
9/10/2021 – 5/30/2022		No detections. During this 8-month period, this Bull Trout migrated downstream of Thompson Falls Dam to the Noxon Reservoir.
2022	5/30	Bull Trout enters Thompson Falls fish ladder (3:49pm)
	6/3	Bull Trout enters (1:08pm) and ascends ladder (1:29-3:29pm)
	6/6	Bull Trout recorded at workstation (528mm, 1216g), and released upstream
	6/25	Thompson River PIT Tag array detection
	7/3 9/15	West Fork Thompson River PIT Tag array detection
	9/17	Thompson River PIT Tag array detection

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 2022, five fish (4 LL, 1 RB) were detected downstream of Thompson Falls Dam and back in the ladder within 14 days of their initial ascent and release upstream of the ladder (Table 6). No fish were detected within the 15- to 30-day interval and 10 fish (5 LL, 5 RB) were detected downstream of the dam and in the ladder 34 to 151 days (mean detection was 90 days) after their initial ladder ascent and release upstream.

Table 6. Summary of 2022 fallback fish and the number of days between initial release upstream of the dam and subsequent detection downstream of the dam in the ladder entrance.

2022 Fallback Species	# of Days Between Release and Detection Downstream			Total
	≤14 days	15 to 30 days	> 30 days	
RB	1	-	5	6
LL	4	-	5	9
Total	5	-	10	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 2022, streamflow exceeded 23,000 cfs from May 5 through July 19 (~76 consecutive days). Based on the detection dates of the 15 fish detected downstream and, in the ladder, following their initial release upstream of the dam; it is unknown if these fish moved downstream through the turbines or 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. Efficiency of these remote arrays is not 100 percent but is assumed to be very high. The majority of 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 the Project (e.g., 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 and 2022.

In total, 216 individual PIT-tagged fish were released upstream of the dam in 2022 (Table 7). A summary of the number of PIT-tagged and non-tagged fish released upstream of the dam in 2022 is provided in Table 7.

Table 7. Summary of 2022 fallback fish and the number of days between initial release upstream of the dam and subsequent detection downstream of the dam in the ladder entrance.

Species	PIT Tagged at Ladder in 2022	Tagged in Previous Year at Ladder or Other Location	Total # PIT-Tagged Fish Released Upstream	Total # Non-tagged Fish Released Upstream	Total # of Fish Released Upstream
BULL	-	2	2	-	2
LL	95	8	103	76	179
RB	79	16	95	63	158
RBxWCT	3	-	3	-	3
WCT	3	-	3	5	8
MWF	5	-	5	1	6
Salmonids	185	26	211	145	356
N PMN	-	4	4	31	35
LS SU	-	1	1	629	630
Non-Salmonids	0	5	5	660	665
TOTAL	185	31	216	805	1,021

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 provide 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).

In 2022, the ladder operated in orifice mode for the entire season. Remote arrays in the ladder detected a total of 114 individual fish with the majority represented by Rainbow and Brown trout. Some fish made multiple ladder ascents; thus Table 8 represents total number of fish ascent attempts.

Since 2011, nearly 3,500 salmonids have been tagged at the ladder with annual activities resulting in 188 to 525 tagged at the ladder per season (NorthWestern, 2022). Northern Pikeminnow and Largescale Sucker have only recently been tagged at the ladder in 2017, 2018, and 2019, with the majority tagged in 2019 (NorthWestern, 2022). Thus, the proportion of non-salmonids with PIT tags ascending the ladder on an annual basis is much lower than for salmonids and these data should be interpreted with caution.

Internal efficiency values in Table 8 are measured in two ways. The first method evaluates the percentage of fish detected at the entrance that ascended to the HP. For example, 69 percent of tagged salmonids entering the ladder in 2022, ascended to the HP. The second method evaluates the percentage of fish detected in the LP that ascended to the HP (method used prior to 2021 when PIT tag arrays were only present in lower pools). For example, 92 percent of the salmonids detected in the LP ascended to the HP in 2022. The latter provides a value that can be compared to calculations made prior to 2021. Salmonid internal passage efficiency (orifice mode operations) calculated from the percentage of fish detected at the LP reaching the HP has varied in the past from 72 percent to 93 percent (NorthWestern, 2022).

Based on 2021 and 2022 data, the previous method likely overestimates ladder efficiency for fish with a disproportionately higher overestimation for non-salmonids. Regardless of the internal efficiency calculation method, salmonids continue to display a higher level of internal passage efficiency compared to non-salmonids. However, overall numbers of non-salmonids ascending the ladder annually are three to nine times greater (during orifice mode operations) than the number of salmonids.

Results from 2021 and 2022 were similar in that 85 percent and 75 percent of the salmonids in 2021 and 2022, respectively that entered the ladder reached the LP in contrast to 23 percent and 36 percent, respectively for non-salmonids. The first seven pools in the ladder operate continuously in notch mode in contrast to the rest of the ladder that operates in orifice mode. With additional information collected in the coming years, this data may help identify potential areas warranting further investigation for potential methods to improve internal fish passage. As observed in the past, each year presents unique river conditions and fish do not always respond the same. Additional data are needed to observe internal fish passage behavior and variation over time.

Table 8. Summary of fish entering the ladder attempts to ascend including the number of fish recorded in the entrance, LP, top 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	Calculation with Detection of Fish at Entrance (since 2021)		Calculation used pre-2022
				% Fish in LP	% Fish in HP	% Fish in LP to HP
Salmonids	101	76	70	75%	69%	92%
Non-salmonids	22	8	6	36%	27%	75%
Species	# Fish @ Entrance	# Fish in LP	# Fish in HP	% Fish in LP	% Fish in HP	% Fish in LP to HP
BULL	2	2	2	100%	100%	100%
LL	37	23	19	62%	51%	83%
RB	57	50	48	88%	84%	96%
RBxWCT	2	-	-	-	-	-
WCT	2	1	1	50%	50%	100%
MWF	1	-	-	-	-	-
NPMN	11	6	5	55%	45%	83%
LSSU	9	2	1	22%	11%	50%
LNSU	2	-	-	-	-	-

Section 2.5.2 – Ascent Times in Ladder

In 2022, a total of 76 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 9). There were a few fish that were not detected by the entrance array; thus, no data were available for the calculation. The median ascent times observed and recorded in 2022 (calculated from the entrance to the holding pool) were nearly the same as in 2021. In 2021, there were 49 salmonids with a median ascent time of 2.3 hours, and nine non-salmonids with a median ascent time of 3.3 hours. The median ascent time for salmonids ascending the ladder when operating in orifice mode has ranged from 1.6 to 4.5 hours. These historic calculations (2011-2020) evaluate the time duration between the remote tag array detection in the LP and HP.

Table 9. Summary ascent information for 75 fish, calculating the minimum, maximum, median, average time between the last entrance detection until the first holding pool detection by species, 2022.

Species	Number of Fish	Ascent Time (hours)			
		Min	Max	Median	Average
BULL	2	2.0	3.0	2.2	2.5
LL	20	1.0	419.5	2.4	24.0
RB	47	1.1	50.0	3.3	6.4
WCT	1	-	-	1.6	1.6
Salmonids	70	1.0	419.5	2.6	11.2
NPMN	5	1.4	3.5	3.0	2.7
LSSU	1	-	-	13.4	13.4
Non-Salmonids	6	1.4	13.4	3.2	4.5

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. The periods of operation and data collection were between September 26 and December 22, 2014; between February and December 2015; year-round from 2016 through 2018. In 2019, the array continued to collect information until the end of August. There is nearly a 1-year data-gap (August 30, 2019 - August 18, 2020) of detection information from the mainstem Thompson River. In 2021, the array operated throughout most of the year with an exception for when a 20-foot antenna section was replaced on June 13, 2021. 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 2022, there were 145 individual fish detections with 95 percent having ascended the ladder either in 2022 or a previous year(s). There were seven fish tagged as part of other studies, including five Bull Trout and two Westslope Cutthroat Trout. All but one Bull Trout was captured

and transported by Avista from below Cabinet Gorge Dam upstream into the Thompson River in 2021 or 2022. One Bull Trout was initially captured in West Fork Thompson River (and released) as a juvenile in August 2020. The two Westslope Cutthroat Trout were initially captured and tagged in Chippy Creek in September 2020, transported to Bear Creek and released above the waterfall. These two Westslope Cutthroat Trout were subsequently detected 2 years later in the mainstem Thompson River in mid-July 2022. The total number of fish detected in the Thompson River in 2022 by species with a ladder history and without a ladder history is summarized in Table 10.

Table 10. Summary of 2022 Thompson River individual fish detections.

Individual Fish Detected (2022)		
Fish Species	# With Ladder History	# Without Ladder History
BULL	2	5
WCT	1	2
RB	70	-
LL	65	-
Total	138	7

There were 354 daily detections at the mainstem Thompson River array representing the 138 unique ladder fish. Approximately one-third of the PIT-tagged Brown Trout and one-third of the PIT-tagged Rainbow Trout released upstream of the dam in 2022, were detected by the mainstem array in the Thompson River. A summary of the daily detections (of ladder fish) and mean daily streamflow in the Thompson River (USGS gage #12389500) is provided in Figure 3. Peak daily detections for Rainbow Trout occurred on March 3 and peak daily detections for Brown Trout occurred on July 12. The two Bull Trout were detected at the array on May 1, June 25, and mid-September. The Westslope Cutthroat Trout was detected in early and late August. The river was iced over in December; thus flow readings (USGS #12389500) were not available.

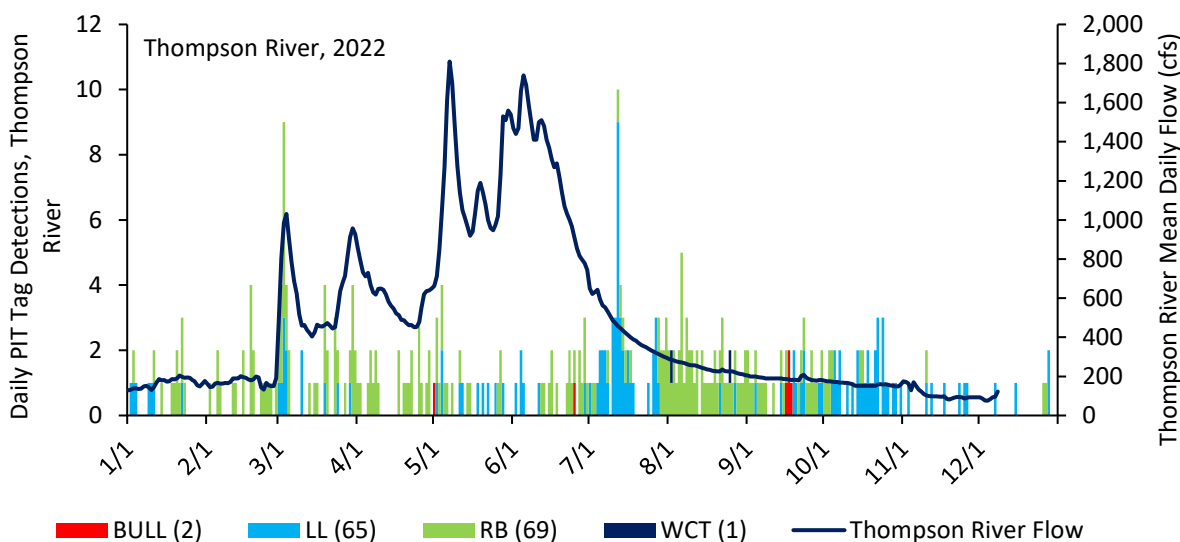


Figure 3. Summary of daily PIT tag array detections representing 138 individual ladder fish and the mean daily streamflow in Thompson River, 2022.

The most recent ladder ascent records for the 138 unique ladder fish detected in the Thompson River in 2022 is summarized in Table 11. The majority of fish ascended the ladder in the last 3 years (2020, 2021, 2022). One-quarter of the 138 individuals ascended the ladder two or more times, this included 1 Bull Trout, 12 Brown Trout, and 21 Rainbow Trout. The greatest number of ladder ascents by an individual fish was documented this year by a Brown Trout that ascended the ladder annually from 2014 to 2017 and was detected entering the Thompson River annually each July and leaving the Thompson River each October between 2014 and 2022.

Table 11. Summary of the most recent year a fish was recorded at the ladder for 138 individual fish detected in the Thompson River in 2022.

Fish Species	2017	2018	2019	2020	2021	2022
BULL	-	-	-	-	-	2
WCT	-	-	-	-	1	-
RB	-	1	3	13	25	29
LL	1	1	4	7	16	36
Total	1	2	7	20	42	67

The most interesting detection in the Thompson River in 2022 was from a PIT tag that was initially implanted in a hatchery spring Chinook in January 2022 at the Dworshak National Fish Hatchery in Idaho. The Dworshak National Fish Hatchery is approximately 90 miles directly northwest of the Thompson River. The smolt was released in the North Fork Clear Water River on March 31, 2022 and was subsequently detected by the array in the mainstem Thompson River 10 days later, April 9, 2022. It is assumed that the tag was ingested by a predator, likely an avian predator that swam over the tag array.

Section 2.6.1 – West Fork Thompson River and Fishtrap Creek

FWP also operated one PIT-tag array in Fishtrap Creek and 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 was more continuous for the 2022 calendar year. The number of ladder fish detected in the tributaries remains relatively low, one to eight salmonids a year (Table 12), compared to the number of PIT-tagged fish released upstream annually, 175 to 525 salmonids a year.

In 2022, there were seven individual ladder fish detected in the tributaries, six in Fishtrap Creek and one in West Fork Thompson River. In Fishtrap Creek, these fish included three Rainbow Trout, two Bull Trout, one Westslope Cutthroat Trout, and one Brown Trout. One Bull Trout and one Brown Trout ascended the ladder in 2022, while the other five fish were last recorded at the ladder in 2018, 2020 or 2021. In West Fork Thompson River, one Bull Trout that ascended the ladder in 2022 was later detected in the tributary.

Table 12. Summary of ladder fish, by species detected in Fishtrap Creek and West Fork Thompson River, 2014 – 2022.

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

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 2021, equipment issues resulted in no data collected between May 28 and June 24, 2021. Since replacing a faulty power source in June 2021, there has been considerably less array interference and presumably better detection capabilities at this location.

In 2022, 43 individual fish (29 WCT, 2 LL, 10 RB, 2 BULL) were detected by the Prospect Creek array. The daily detections of these fish with the mean daily streamflow for Prospect (USGS gage #12390700) is provided in Figure 4.

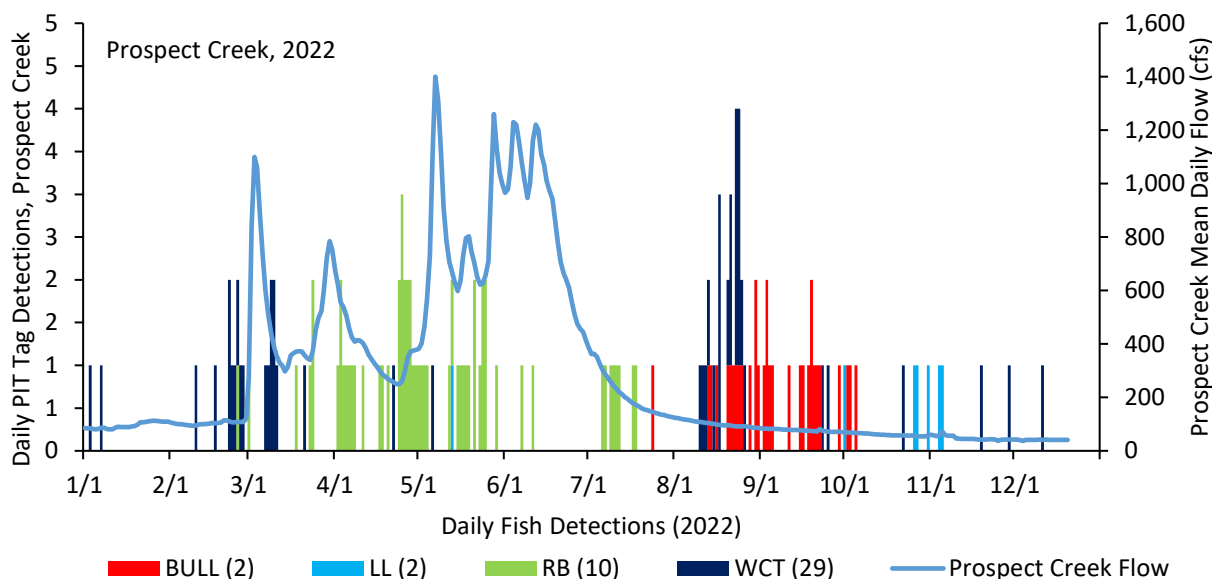


Figure 4. Summary of daily PIT tag array detections representing 42 individual fish in Prospect Creek and mean daily streamflow, 2022.

Most of the Westslope Cutthroat Trout (28) were initially sampled and tagged in Prospect Creek. The two Bull Trout were initially captured by Avista; one in Graves Creek weir trap in 2015 and the other captured below Cabinet Gorge Dam in September 2021 and transported to South Fork Jocko River (located upstream of Thompson Falls Dam).

The remaining 13 fish (10 RB, 2 LL, 1 WCT) have a history of ascending the ladder once since 2019. Half of these ladder-fish ascended the ladder or entered the ladder in 2022. This included one Rainbow Trout radio-tagged in spring 2021, four Rainbow Trout radio tagged at the ladder in spring 2022 and later detected in Prospect Creek, one Brown Trout that entered the ladder in mid-October before returning downstream and entering Prospect Creek 10 days later, and one Rainbow Trout that left Prospect Creek March 1 and ascended the ladder and was released upstream on April 22, 2022. The other six fish ladder history included ascents in previous years, 2019, 2020 or 2021.

Section 2.8 – Ladder Fish Detections by Angler Reports

Since 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 80 salmonids that have ascended the fish ladder at Thompson Falls Dam. In 2022, anglers reported to FWP capturing 23 salmonids with Floy tags and one Smallmouth Bass with a floy tag. The majority of the salmonids (18) were captured upstream of Thompson Falls Dam with the greatest number of angler reports from the Thompson River. The Smallmouth Bass and other salmonids were captured downstream of Thompson Falls Dam, in the Noxon reach.

Table 13. 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	Total
LL		1	3	6	5	7	22
RB	1		9	12	15	15	52
WCT		1	1	2	1	1	6
Total	1	2	13	20	21	23	80

Angler report data continue to show the large geographical area fish are utilizing, both upstream and downstream of Thompson Falls Dam (Figure 5). In 2022, the longest distance report upstream was at the confluence of Nine Mile Creek with the Clark Fork River about 20 miles west of Missoula. 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.

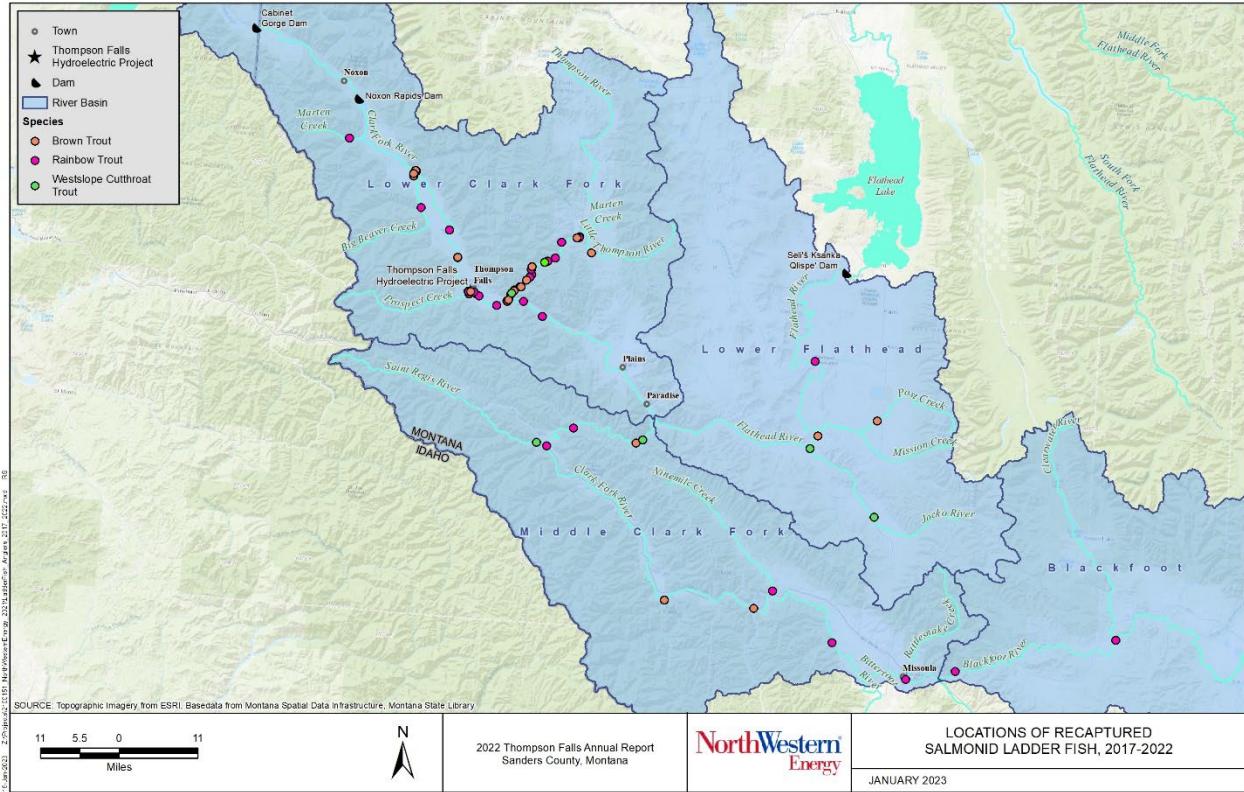


Figure 5. Summary of angler reports of recaptured salmonid ladder fish, 2017-2022.

The majority of angler reports are from upstream of Thompson Falls Dam and near the Project area, 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, as well as below Cabinet Gorge Dam.

Section 3.0 – Baseline Fisheries Monitoring

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 36,000 fish since 2011 (*refer to* Table 1).

Baseline fisheries data collection includes electrofishing the Thompson Falls Reservoir (upper and lower sections) in the spring, and 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 14. This section provides a summary of the 2022 spring and fall electrofishing and fall gillnetting survey.

Table 14. Baseline fisheries monitoring schedule 2022 through 2024.

Year	A	B	C
2022	X	X	X
2023			X
2024	X	X	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 2022, a total of 36 ladder fish have been recorded during the baseline surveys, including 27 Rainbow Trout, seven Brown Trout, and two Westslope Cutthroat Trout. The 36 fish represent 14 fish captured in the Clark Fork River above the islands complex reach, 11 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 about one percent of the 3,495 salmonids PIT-tagged at the ladder between 2011 and 2022. Further TAC discussions should occur to determine the continued frequency of these activities.

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 2022 sampling occurred on April 20 and 21, similar to the sampling dates from previous years. Table 9 summarizes sampling events since 2009, water temperature in Celsius (°C), duration of electrofishing (hours), and mean daily streamflow (cfs) at the USGS gage #12389000 during the sampling period.

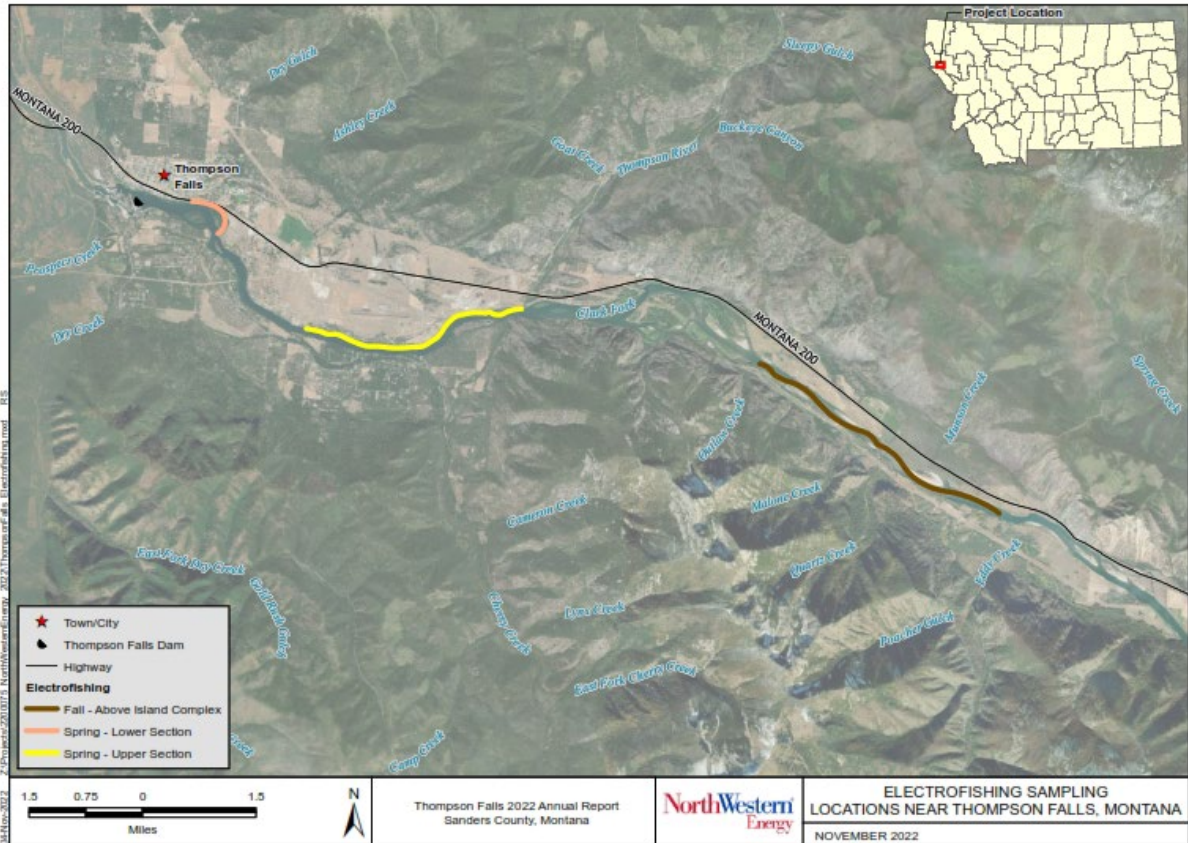


Figure 6. Electrofishing sampling locations near Thompson Falls, Montana.

Table 15. 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 2009-2022.

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

The total catch per unit effort, fish per hour in the lower and upper sections from April 2022 are provided in Table 16.

Table 16. Summary of 2022 catch per unit effort by species in the lower and upper section of the Thompson Falls Reservoir.

Species	April 2022 Fish Per Hour	
	Lower Section	Upper Section
BBH	3.9	-
LL	-	5.6
LMB	1.0	-
LSSU	1.9	0.4
MWF	-	0.4
NP	5.8	2.2
NPMN	1.0	-
RB	2.9	2.6
RBxWCT	1.0	-
SMB	-	0.4
YP	29.9	-
Salmonids	3.9	8.7
Non-Salmonids	43.4	3.0
Total	47.3	11.7

Section 3.1.1 – Lower Section

In 2022, spring electrofishing in the lower section captured 49 fish representing seven species plus one hybrid. The most common species observed in 2022 was Yellow Perch (n=31). Other species recorded in 2022 include Northern Pike (n=6), Black Bullhead (n=4), Largescale Sucker (n=2), Northern Pikeminnow (n=1), Largemouth Bass (n=1), Rainbow Trout (n=3), and Rainbow hybrid (n=1). Over 90 percent of fish sampled were represented by non-salmonids (Table 16).

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).

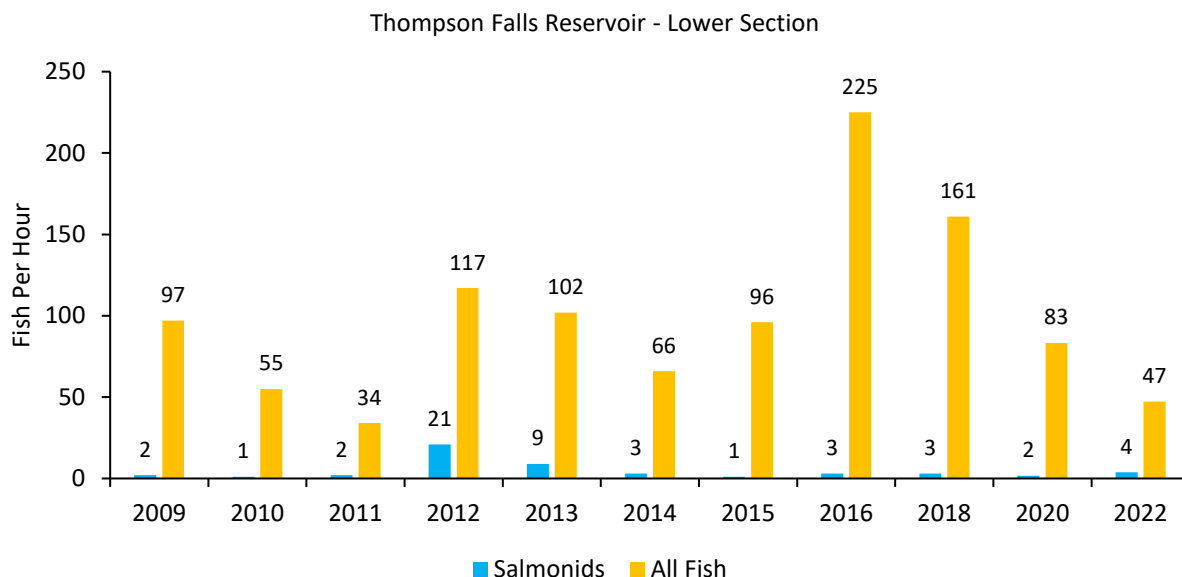


Figure 7. Summary of the 2009-2022 annual catch rate for salmonids and all fish species captured during spring electrofishing efforts in the lower section of the Thompson Reservoir.

Section 3.1.2 – Upper Section

The 2022 sampling of the upper section resulted in 27 fish captured, representing three non-salmonid species and three salmonid species. The most common species observed in 2022 were Brown Trout (n=13), Rainbow Trout (n=6) and Northern Pike (n=5). Other species documented included Largescale Sucker (n=1), Mountain Whitefish (n=1), and Smallmouth Bass (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. Even with the 2022 spring survey for the upper section resulting in the lowest total catch on record to date, salmonids continue to be more common in the upper section of the reservoir. Nearly three-quarters of the upper section was represented by salmonids while the average proportion of salmonids from total catch between 2009 to 2020 was 32 percent. Fish per hour for salmonids and all fish species varies annually as shown in Figure 8.

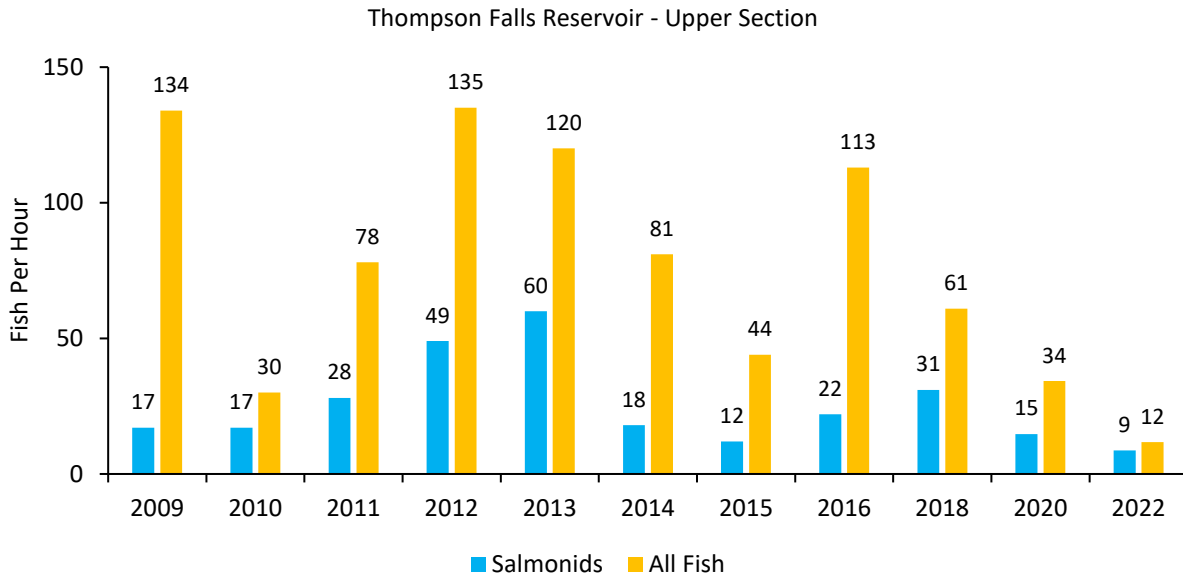


Figure 8. Summary of the 2009-2022 annual catch rate for salmonids and all fish species captured during spring electrofishing efforts in the upper section of the Thompson Reservoir.

Section 3.1.3 – Ladder Fish Captured Spring Electrofishing

Since baseline surveys began in 2011, five uniquely tagged ladder fish (4 RB, 1 WCT) were recorded in the lower section with one detected in 2022, two fish detected in 2016 and two fish in 2013. The Rainbow Trout (#989001033211833) detected during the 2022 survey was initially tagged at the fish ladder May 13, 2021, and later detected several times between July 10 and August 11, 2021, and February 6, 2022 in the Thompson River before being captured April 20 via electrofishing in the lower section. This Rainbow Trout returned downstream of Thompson Falls Dam and entered the fish ladder on July 23 and was released upstream of the dam on July 25. The Rainbow Trout continued to move upstream and was detected in the mainstem Thompson River on August 8.

In the upper section, 11 ladder fish (5 LL, 5 RB, 1 WCT) were detected since the ladder began operations in 2011, including four fish in 2016, three in 2018, three in 2020, and one in 2022. The Rainbow Trout (#989001033212702) captured on April 21, 2022, was initially tagged during its first ladder ascent October 18, 2021. This Rainbow was last detected in the mainstem Thompson River on July 10.

Section 3.2 – Fall Electrofishing Clark Fork River

During the autumn of 2022, NorthWestern and FWP 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 17.

Table 17. Summary of autumn electrofishing efforts in the Above Islands reach and Paradise-to-Plains reach 2009-2022, 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

Section 3.2.1 – Above the Island Complex

In 2022, 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 2022 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 2022, river left was sampled the night of October 18 and river right was sampled the night of October 19. Stream temperatures were approximately 13.3°C. The sampling efforts resulted in 233 fish recorded (100 fish from the right bank, 133 fish from the left bank representing nine species). There were 152 salmonids represented by four species (126 MWF, 13 LL, 11 RB, 1 WCT).

The catch per unit effort (fish per hour) by species in the above island complex was dominated by Mountain Whitefish (29.0 fish per hour) followed by Largescale Sucker (10.6 fish per hour). Most species (LL, NPMN, NP, RB, SMB) catch rate ranged between 1.4 to 4.6 fish per hour with a couple species such as Westslope Cutthroat Trout and Yellow Perch catch rate less than 1 fish per hour (Figure 9).

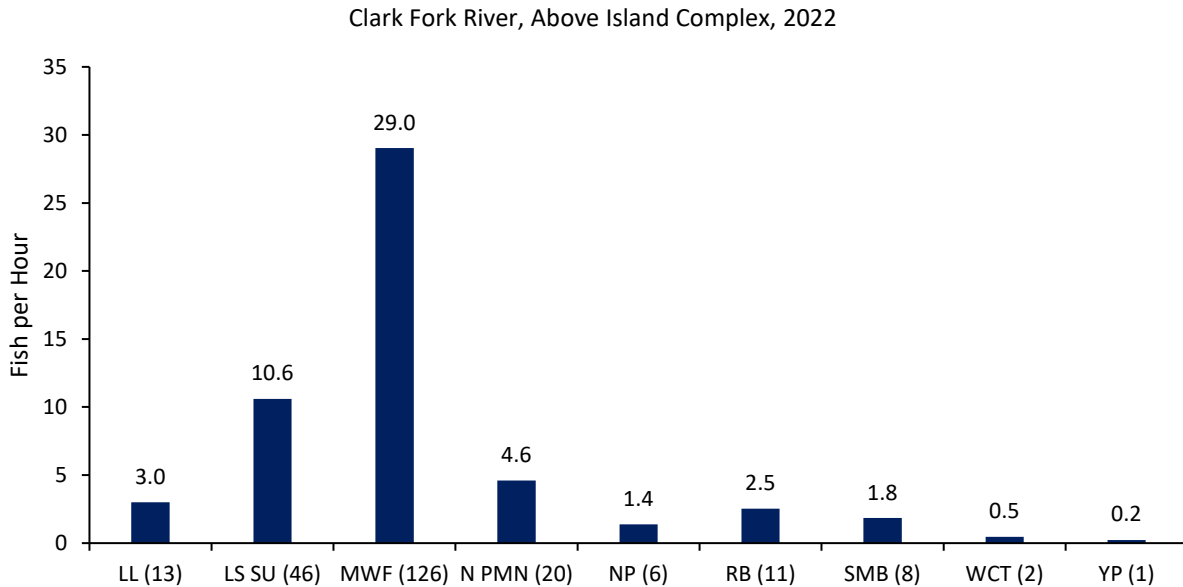


Figure 9. Summary of the catch rate (fish per hour) annually in the Clark Fork River – Above the Island Complex, October 2022.

In 2022, the overall catch rate was 53.7 fish per hour, which was similar to 2021 and remained relatively low previous years. However, the salmonid catch per unit effort (35.0 salmonids per hour) was representative of the last 6 years. Catch rate (total fish per hour and salmonids per hour) for all years is shown in Figure 10.

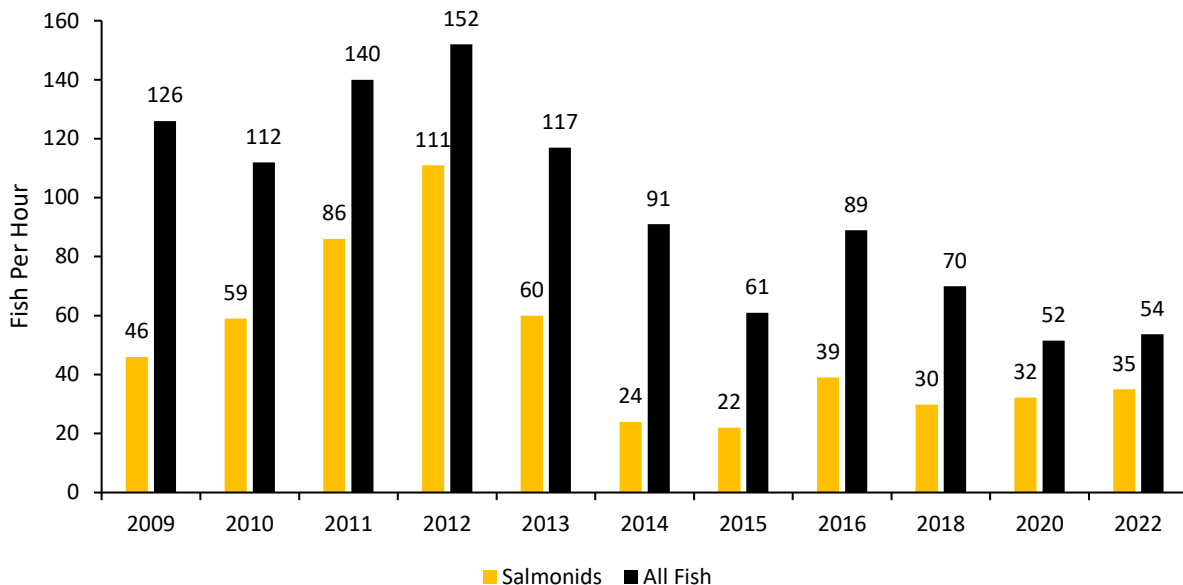


Figure 10. Summary of the 2009-2022 annual catch rate for all salmonids and all fish captured in the Clark Fork River – Above the Island Complex.

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 again in 2011, 2012, 2014, 2016, 2018, 2020, and 2022. 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).

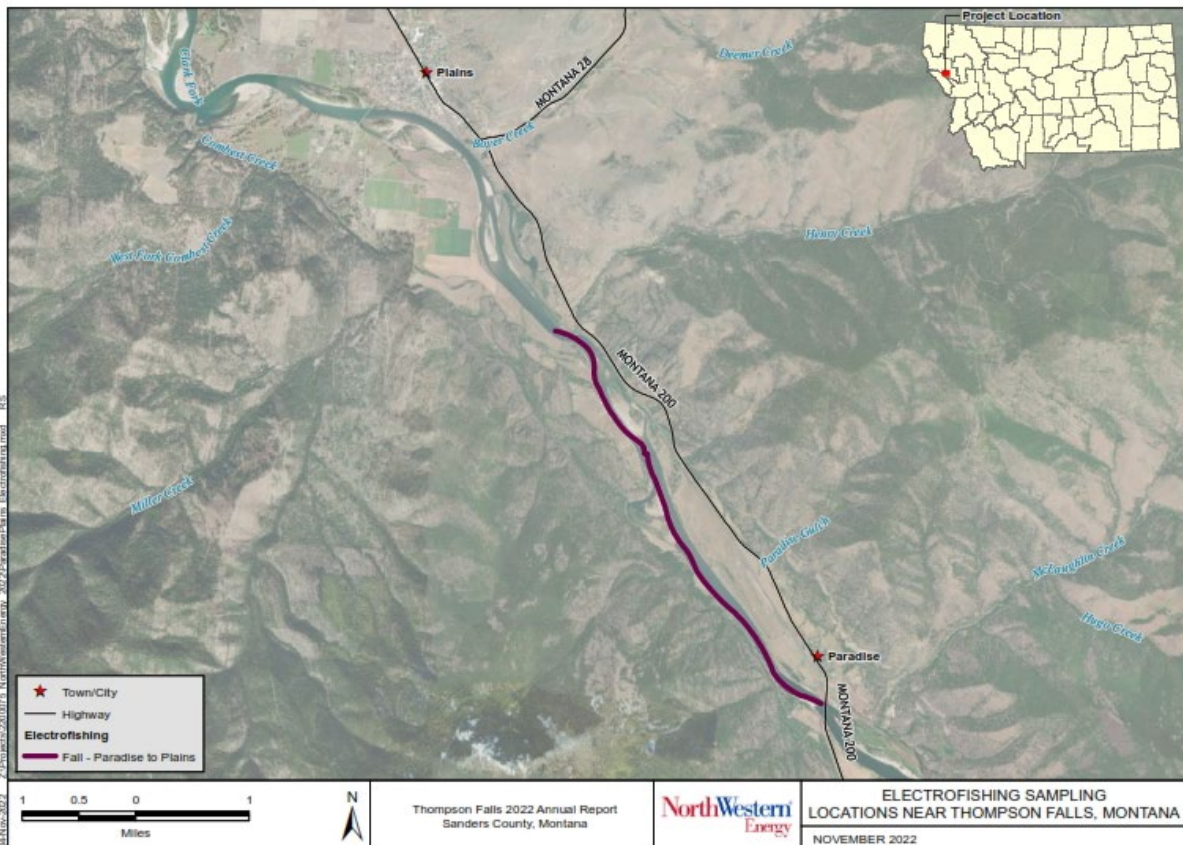


Figure 11. Electrofishing Reach between Paradise and Plains, Montana.

In 2022, river left was sampled the night of October 25 and river right was sampled the night of October 26. Stream temperatures were approximately 9.5°C. The sampling efforts resulted in 469 fish recorded (125 fish from the right bank, 344 fish from the left bank). There were 391 salmonids and 78 non-salmonids representing eight species plus one hybrid. The catch rate for all fish was 100 fish per hour; salmonids rebounded from a low of 23 salmonids per hour in 2020 to 83 salmonids per hour in 2022 (Figure 12). Mountain Whitefish represented nearly 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). In 2022, these two species represented about 15 percent (nearly evenly split) of the total fish catch. Other non-salmonids species such as Northern Pike and Smallmouth Bass maintain low catch rates in 2022. The 2022 catch rates by species are illustrated in Figure 13.

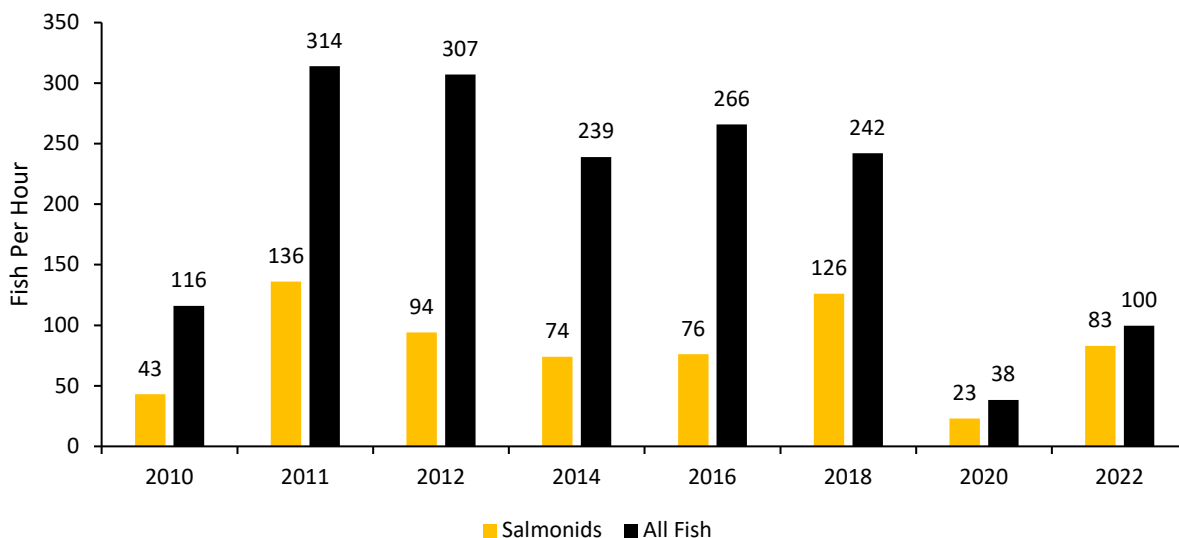


Figure 12. Summary of the annual catch rate for all salmonids and all fish captured in the Clark Fork River between Paradise and Plains, 2010-2022.

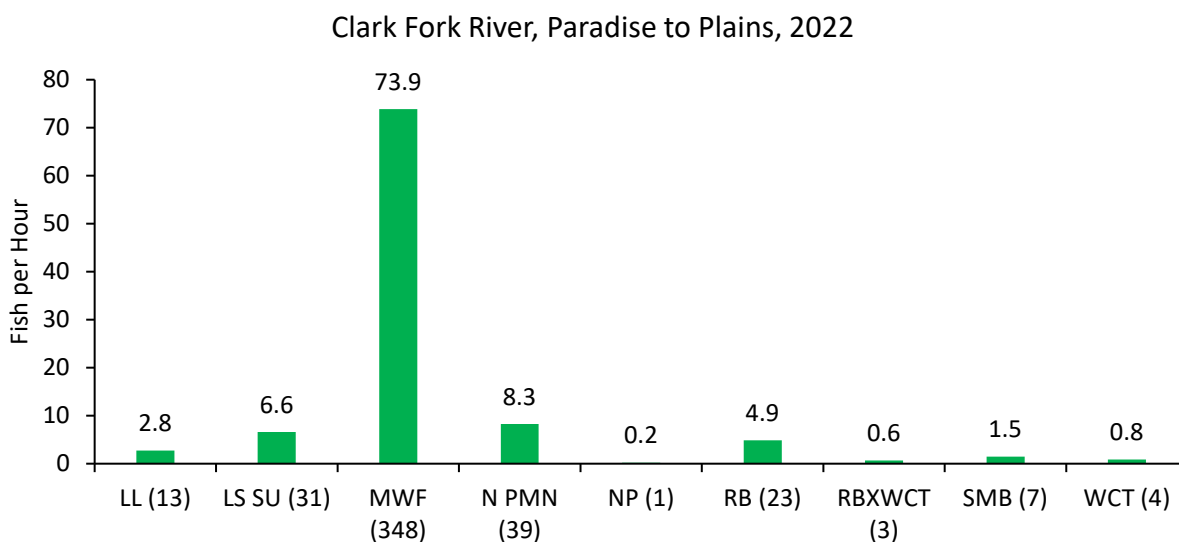


Figure 13. Summary of annual CPUE for each species during the Clark Fork River autumn electrofishing between Paradise and Plains, 2022.

Section 3.2.3 – Ladder Fish Captured Fall Electrofishing

Surveys in the above island reach have documented 14 ladder fish (13 RB, 1 LL) since 2011. The Brown Trout was captured in 2015. 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, and one fish in 2020. 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, or 2022.

Section 3.3 – Fall Gillnetting Thompson Falls Reservoir

The established gillnet sampling sites in the Thompson Falls Reservoir are shown in Figure 14.

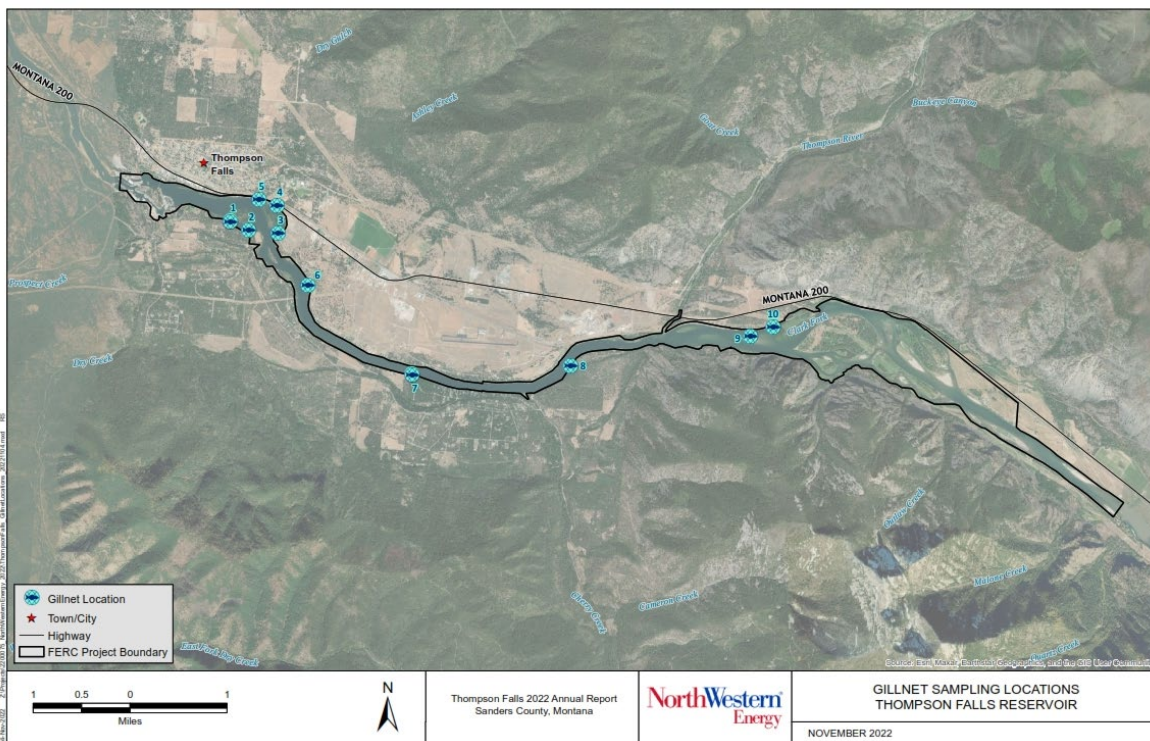


Figure 14. Gillnetting sampling locations near Thompson Falls, Montana.

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. Except for 2004, 10 nets are deployed annually in October with results varying between 33 to 231 fish representing six to nine species. The catch per net, by species from 2022 compared to the average, minimum and maximum catch per net between 2004 and 2021 is shown in Table 18.

Table 18. Catch per net, by species, during annual October gillnetting series on Thompson Falls Reservoir in 2022 and the 2004-2021 average, minimum, and maximum catch per net. A dash indicates no (zero) fish of that species was captured.

Species	2022 Catch per Net	2004-2021 Catch Per Net		
		Avg	Min	Max
BL BH	0.5	3.1	-	14.1
LL	-	-	-	0.2
LMB	0.1	0.1	-	0.3
LN SU	-	-	-	0.5
LS SU	0.1	0.7	0.1	1.3
LWF	-	-	-	0.1
MWF	0.1	-	-	-
NP	3.7	2.7	1.0	4.9
NPMN	0.7	0.4	-	1.0
PEA	-	-	-	0.1
PUMP	0.9	0.3	-	1.8
RB	-	0.1	-	0.4
SMB	0.6	0.2	-	0.5
WCT	-	-	-	0.2
YP	1.1	0.7	0.1	1.8
YL BL	-	-	-	0.1
Total	7.8	8.2	3.3	23.1

In 2022, nets were set on October 12 and pulled approximately 22.5 hours later on October 13. There were 78 fish captured representing nine species (BL BH, LMB, LS SU, MWF, NPMN, NP, PUMP, SMB, YP). The total catch per net (7.8) was below average (8.4 fish per net) but above the median value (6.2 fish per net) for the period of record (Figure 15).

In general, salmonids are rarely observed in Thompson Falls Reservoir gillnet catches. The most common species in Thompson Falls Reservoir is Black Bullhead, with Northern Pike being the second-most common species (Table 18). In 2022, the most common species recorded in the reservoir was Northern Pike followed by Yellow Perch, Pumpkinseed, Northern Pikeminnow, Smallmouth Bass, and Black Bullhead. There was only one Mountain Whitefish (first one recorded in gillnet samples), Largemouth Bass, and Largemouth Sucker collected in 2022. No tagged fish were collected during the gillnet surveys. 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).

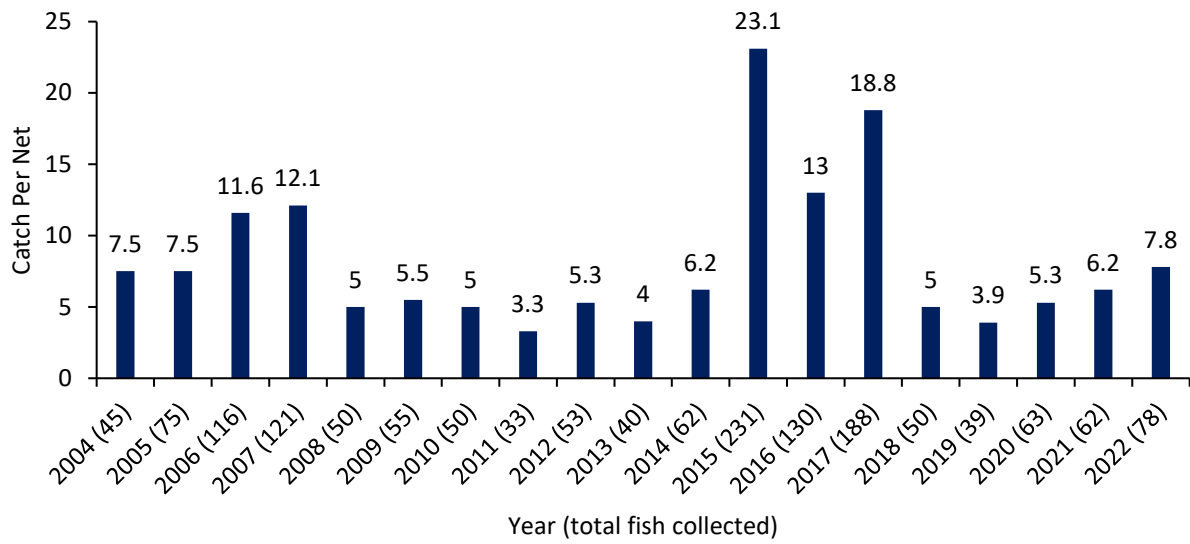


Figure 15. Summary of catch per net during annual gillnetting efforts in Thompson Falls Reservoir, 2004-2022.

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 2022 were the same as previous years (NorthWestern, 2019a; New Wave and GEI, 2020; NorthWestern, 2021; NorthWestern, 2022).

The TDG monitoring sites in 2022 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.

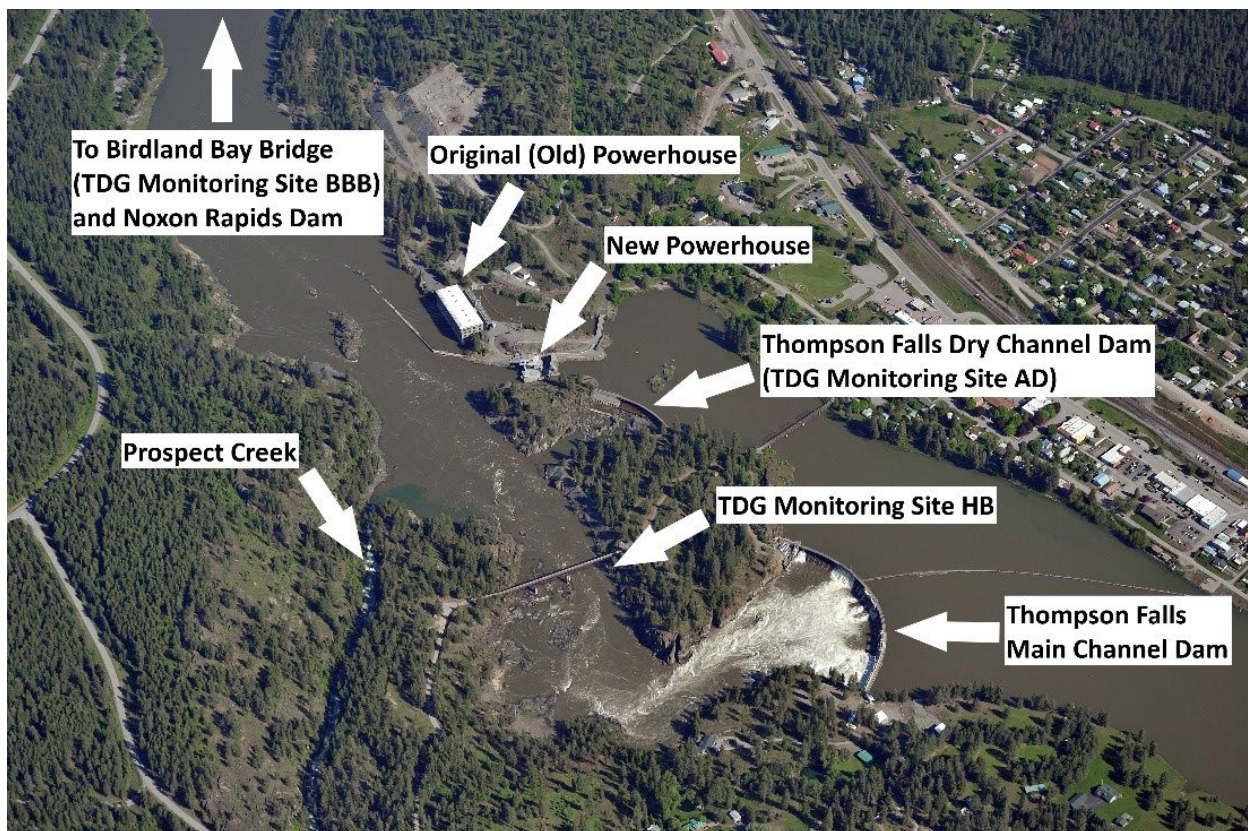


Figure 16. Monitoring locations for total dissolved gas at the Thompson Falls Hydroelectric Project site.

In 2022, TDG was monitored from mid-April through July, during the high flow season, with exact dates varying slightly for each station (Figure 17). Birdland Bay Bridge presented the largest data gaps due to probe failure during peak flows in June equipment damage later in the season in July.

Peak discharge in the Clark Fork River in the Project area was 96,567 cfs on June 13, 2022 (total flow measured at Thompson Falls Dam) representative of an above average year. As in previous years of data collection, TDG in 2022 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).

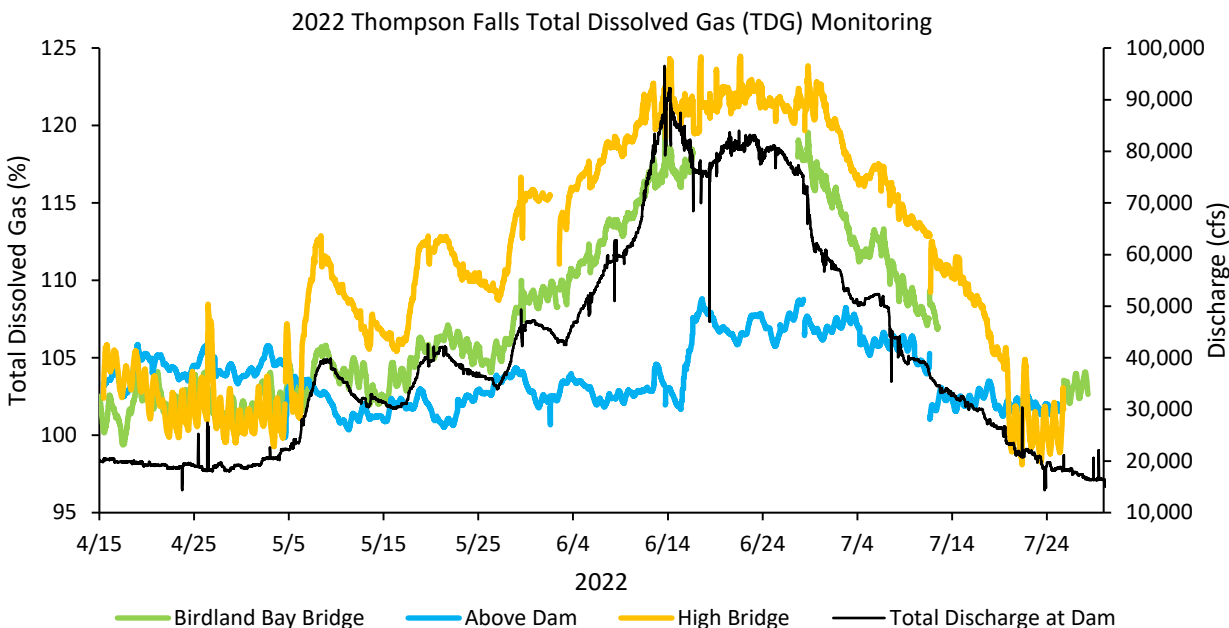


Figure 17. Total Dissolved Gas (% of saturation) upstream and downstream of the Project and streamflow (cfs) as measured at Thompson Falls Dam, mid-April through July 2022.

TDG upstream of the Project peaked at approximately 108 percent of saturation during 2022. TDG levels at the High Bridge peaked at 124 percent of saturation for a few hours on three days in June. The mean daily saturation levels exceeding 120 percent of saturation from June 11 through July 1. Further downstream, the maximum TDG level recorded was 119 percent saturation at Birdland Bay Bridge, which included the ascending limb of the hydrograph and peak flows through June 16. 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 originally signed by each party and implemented in 2008, was renewed in 2013 and 2020, and will expire on December 31, 2025.

Section 5.1 – 2022 Project Updates

Projects approved for funding by the TAC in 2022 are identified in Table 19. Refer to the December 2022 meeting summary available on the Project website for additional details and status of each proposed project.

Table 19. Project proposals approved by the TAC for 2022 implementation.

Agency/Entity	Project Proposal for 2022	TAC Funding Requested
Trust for Public Land (TPL) and FWP	01-2022 Upper Thompson Connectivity Project	\$170,000
NorthWestern	02-2022 Misc. Emergency	\$10,000
FWP, FWS, NorthWestern	03-2022 Juvenile Bull Trout Downstream Transport Study	\$15,000
MFWP	Big Rock Creek Barrier Design and Public Scoping	\$34,000
Total		\$229,000

Section 5.2 – 2023 TAC Funded Projects

During the 2022 Annual Thompson Falls TAC Meeting on December 7, there were two proposals presented. The two projects were approved by the voting TAC members [Confederated Salish and Kootenai Tribes (CSKT), FWP, FWS, and NorthWestern]. The following table (Table 20) provides a summary of the approved funding for the two projects proposed for the 2023 calendar year. Refer to the 2022 meeting summary available on the Project website for additional project details.

Table 20. Summary of projects proposed and approved for funding in 2023.

Agency/Entity	Project Proposal for 2023	TAC Vote	TAC Funding Requested
Trust for Public Land (TPL) and FWP	Phase 2 – Thompson River Conservation Easement	Unanimous Yes	\$100,000
Trout Unlimited/Lower Clark Fork Watershed Group	Thompson River Road Consolidation Coordination	3 Yes (FWS, CSKT, NorthWestern), 1 No (FWP)	\$5,000
TOTAL Approved			\$105,000

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 21. 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 21. 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	
	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).
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)	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. 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).

Terms and Conditions Requirements from Biological Opinion (FWS 2008)	Compliance Status by Licensee
TC 1(h)	<p>Last activity pending – updated fishway operations plan due December 31, 2023. Other activities complete.</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 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>
TC 3 (c)	<p>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, 2019-2022 have not shown any external symptoms of GBT.</p>

Terms and Conditions Requirements from Biological Opinion (FWS 2008)	Compliance Status by Licensee
TC 4 – MOU and TAC	
TC 4	<p>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).</p>
TC 5 - Thompson Falls Reservoir	
TC 5 (a)	<p>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 (Glaid, 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.</p>
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. 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>

Terms and Conditions Requirements from Biological Opinion (FWS 2008)	Compliance Status by Licensee
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/existing 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.
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 the 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 2022
TC 7(e)	No incidents to report in 2022

Section 6.1 – Bull Trout Incidental Take Summary 2009-2022

In compliance with FWS's BiOp TC 7a, this section provides a summary of the documented cumulative incidental take from previous years' activities (2009-2022) in support of the upstream fish passage at the Project. Between 2009 and 2022, the Licensee sampled 42 Bull Trout representing 39 individuals (Table 22).

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, 21 Bull Trout, representing 19 individual fish were recorded at the Thompson Falls fish ladder. 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 22. 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
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
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

Date	Method of Capture	Location	Action	Personnel	L (mm)	Wt (g)	Genetic Assignment	Condition at time of release
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
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

Date	Method of Capture	Location	Action	Personnel	L (mm)	Wt (g)	Genetic Assignment	Condition at time of release
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
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 – 2023 Proposed Activities and Reporting

In 2023, NorthWestern will continue to collect baseline fisheries data (gillnetting and electrofishing), will continue to operate the upstream fish passage facility, and collect species, length and weight data (salmonids only), and will continue to collaborate with TAC members to implement proposals approved for 2023.

In 2023, the ladder operations will remain in orifice mode for the duration of the season. Ladder operators will continue the sampling protocol established in 2020 for when water temperatures exceed 20°C. Salmonids 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 condition of the fish at that time. As in past years, daily checks (including weekends) will be completed at the ladder when water temperatures are equal to or greater than 23°C. Additionally, lengths and weights shall not be measured for Largescale Sucker, Northern Pikeminnow, and Smallmouth Bass per TAC discussion and decision from 2021. These species will however continue to be identified and counted.

Genetic samples will be taken for Bull Trout. For the 2023 season, 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. The following table (Table 23) summarizes the tagging protocol for the 2023 season.

Table 23. Tagging protocol for fish species recorded at the ladder in 2023 (same since 2020).

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		
MWF	X	X			

NorthWestern will prepare a summary report for 2023 activities that will be submitted to FWS and the TAC, as well as filed with the Commission by April 1, 2024.

Section 8.0 – References

- Federal Energy Regulatory Commission (FERC). 2015. Modifications of reporting requirements of Commission's February 12, 2009 Order Approving Construction and Operation of Fish Passage Facilities. Letter to Jon Jourdonnais, dated February 25, 2015. From FERC, Joy Kurtz.
- FERC. 2019. Order Amending Reporting Schedule Under Order Approving Construction and Operation of Fish Passage Facilities. October 7, 2019. 169 FERC 62, 010.
- Glad, J. 2017. Subadult Bull Trout Out-Migration in the Thompson River Drainage, Montana. MS Thesis. Montana State University, July 2017.
- NorthWestern. 2017. 2016 Annual Report Fish Passage Project Thompson Falls Hydroelectric Project, FERC Project Number 1869.
- NorthWestern. 2019a. 2018 Annual Report Fish Passage Project Thompson Falls Hydroelectric Project, FERC Project Number 1869.
- NorthWestern. 2019b. Thompson Falls Hydroelectric Project FERC Project No. 1869, Comprehensive Phase 2 Final Fish Passage Report. Electronically filed with the Commission on December 23, 2019.
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- New Wave Environmental Consulting and GEI Consultants (New Wave and GEI). 2020. 2019 Annual Report Fish Passage Project Thompson Falls Hydroelectric Project, FERC Project Number 1869.
- PPL Montana. 2010a. Total Dissolved Gas Control Plan. Thompson Falls Hydroelectric Project FERC Project Number 1869. Submitted to Montana Department of Environmental Quality, Helena, Montana.
- PPL Montana. 2010b. Thompson Falls Hydropower Project FERC Number 1869, Passage Evaluation Plan, Phase 2 Action Plan, 2011-2020, October 2010. Public. Submitted to FERC, Washington D.C.
- U.S. Fish and Wildlife Service (FWS). 2008. Biological Opinion for Thompson Falls Hydroelectric Project Bull Trout Consultation. Federal Energy Regulatory Commission Docket No. 1869-048-Montana. PPL Montana, LLC, Licenses. Prepared by FWS Montana Ecological Services Field Office, Helena.