



NWE-THF-4407

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

April 1, 2024

Re: NorthWestern Energy Files 2023 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 2023 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,

Sarah "Sady"
Babcock

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The U.S. Fish and Wildlife Service has reviewed and by signature below, approves this Thompson Falls Project 2023 Annual Activity, Fish Passage and Bull Trout Take Report filing with the Commission.

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Montana Ecological Services

2023 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 2024

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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, 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 2023 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 2023 fish ladder operational season began March 23 and ended October 4. Operations closed earlier than a typical season due to the replacement of flashboards on the Main Channel Dam. 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 146 days during the season. The peak discharge in the Clark Fork River, was approximately 55,900 cubic feet per second (cfs) on May 19, as measured by the United States Geological Survey (USGS) gage at Plains, Montana station #12389000.

In 2023, 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 24.0 degrees Celsius (°C) on July 24. The mean daily streamflow (USGS station #12389000) and daily recorded water temperature in the ladder during the 2023 season is presented in Figure 1.

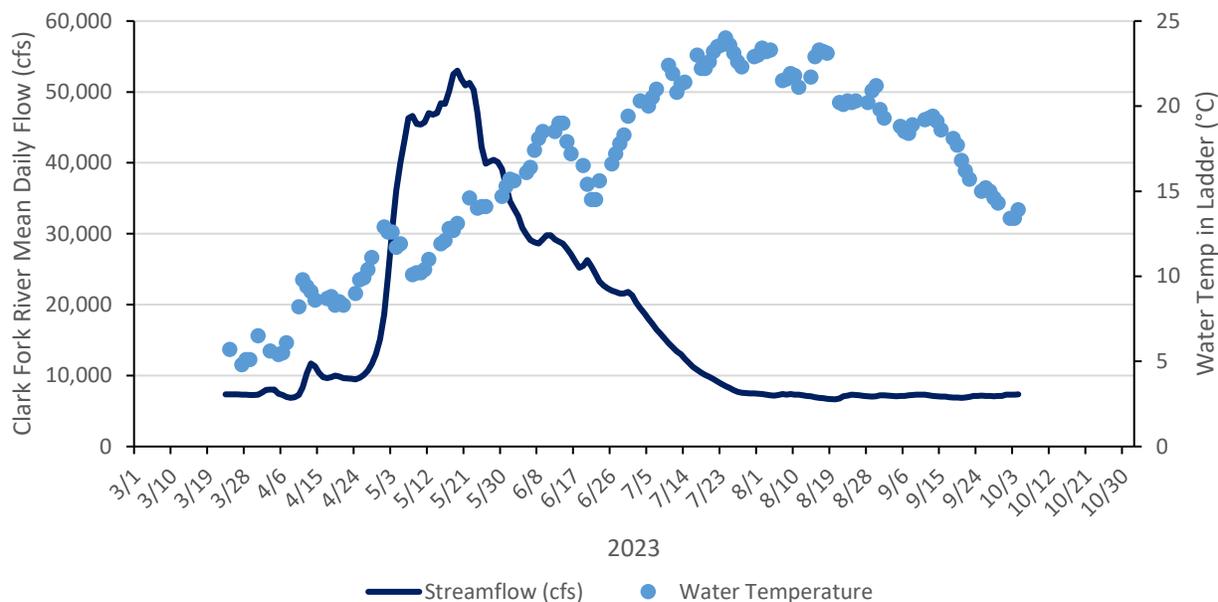


Figure 1. Mean daily streamflow in the Clark Fork River (USGS station#12389000) and water temperature recorded during each ladder check, March – October 2023.

Section 2.2 – Upstream Fish Passage Results

Since the ladder opened in 2011, over 40,700 fish representing 16 species and three hybrids have ascended the ladder (Table 1) and just over 37,000 fish have been released upstream (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 1. Total fish count, by species, for each year the ladder operated, 2011-2023.
 “-” 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	Grand Total
Largescale Sucker	418	1403	3041	2802	6327	2270	34	6	1018	805	823	631	441	20,019
Northern Pikeminnow	1000	926	387	1003	3356	707	66	10	180	41	150	35	24	7,885
Smallmouth Bass	135	34	8	1356	1244	1007	123	5	339	347*	856*	953*	839*	7,246
Rainbow Trout	164	208	213	187	281	366	181	124	186	222	213	191	221	2,757
Brown Trout	28	42	111	81	184	204	108	63	210	123	249	195	236	1,834
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	15	325
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	-	-	-	-	-	-	-	45
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	-	-	1
Northern Pike	-	-	-	-	-	-	-	-	-	-	-	-	1	1
Salmonids	242	305	392	573	570	624	305	206	425	394	498	407	477	5,418
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	35,340
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	40,758

A total of 920 fish were released upstream of Thompson Falls Dam in 2023. The fish released upstream included 456 salmonids, including four fish (2 RB, 2 LL) that ascended the ladder twice in 2023, and 464 non-salmonids (Table 2). Fish not released upstream this year included 839 Smallmouth Bass, 1 Northern Pike, 1 Largescale Sucker (mortality), and 21 Rainbow Trout (19 individuals were radio-tagged and transported downstream, 2 individual mortalities). Details regarding the radio-tagged Rainbow Trout are available in the Final Fish Behavior Study (NorthWestern 2023a).

Table 2. Total number of fish (salmonids and non-salmonids) released upstream of Thompson Falls Dam each year, 2011-2023.

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
Total	5,262	31,871	37,133

Between March 23 and October 4, a total of 1,782 fish ascended the ladder representing 407 salmonids and 1,619 non-salmonids (Figure 2). There were few fish recorded at the ladder during most of May when flow exceeded 30,000 cfs.

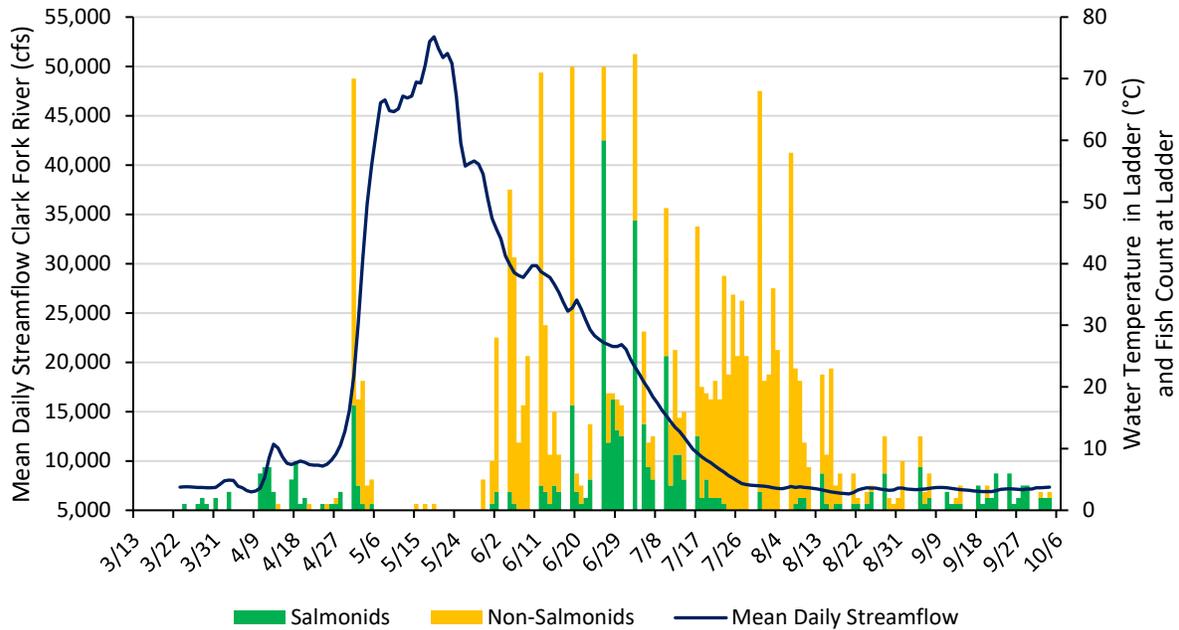


Figure 2. Number of salmonids and non-salmonids recorded at the workstation each ladder check, daily water temperature in the ladder (Pool 45), and the mean daily streamflow in the Clark Fork River (USGS station#12389000), March 23 through October 4, 2023.

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 13 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.

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. Approximately 70 percent of the Bull Trout ascended the ladder when spill was greater than 23,000 cfs, at the Main Dam.

In 2023, NorthWestern captured and passed two Bull Trout at the fish ladder. Neither fish had a previous tag and were considered “new” fish. The fish were PIT tagged prior to release upstream. Both Bull Trout were detected entering the Thompson River, and one was detected in the West Fork Thompson River in June and September (Table 3). A third Bull Trout was detected entering the ladder on two separate occasions with no ascent (Table 3).

Table 3. Summary of the Bull Trout recorded at the ladder in 2023, including two fish ascending to the top and released upstream and one entering the ladder twice.

BULL ID Sex	Most Likely Population of Origin (R4)	Length (mm)	Date Ascended/ Entered Ladder	Water Temp (°C)	Mean Daily Streamflow (cfs)	Dates Detected in Thompson River	Detected in Tributary
989001033212472 Female	West Fork Thompson River	582	Ascended 5/1/2023	12.9	18,600	5/14, 9/17-18, 9/24	West Fork Thompson River 6/8, 9/16
989001033212260 Female	North Fork Fish Creek	285	Ascended 6/29/2023	18.3	21,600	6/29, 7/21	NA
982126050371177 Male	South Fork Jocko River	655	Entered Only 6/26/2023 & 9/15/2023	16.6 18.1	22,000 7,050	-	-

The two Bull Trout recorded ascending the ladder were female and genetically assigned to Region 4 (upstream of Thompson Falls Dam), West Fork Thompson River and North Fork Fish Creek. The fish genetically assigned to West Fork Thompson River was detected entering the Thompson River in mid-May about 14 days after its ascent and release. It was subsequently detected entering and leaving the West Fork Thompson River June 8 and September 16, respectively. The last record of this individual was in the mainstem Thompson River (PIT tag array system) September 17, 18, and 24. The Bull Trout assigned to North Fork Fish Creek was detected in the Thompson River June 29 and July 21, but was not detected in the tributaries.

In 2023, there was a third Bull Trout (genetically assigned to Region 4, South Fork Jocko River) that entered the ladder June 26 and September 15. This Bull Trout was initially PIT-tagged in 2021 by Avista below Cabinet Gorge Dam September 13 and transported upstream to South Fork Jocko River (per genetic assignment) on September 21. In 2022, this Bull Trout was detected in Prospect Creek (via PIT tag array system) July 24 through September 2. In 2023, the same individual was detected in Prospect Creek between July 17 and September 14, 2023.

In other sampling efforts in 2023, FWP captured one adult Bull Trout (ID# 989001033212382) on March 27 while electrofishing the Clark Fork River near the confluence of the Thompson River (in support of the Final Fish Behavior Study). This individual measured 501 mm and 1,556 grams and was released alive on site (mainstem Clark Fork River). This fish was detected entering the Thompson River on May 3, and in West Fork Thompson River July 17 and August 20 via the remote PIT tag array.

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 2023, four fish (3 RB, 1 LL) 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 4). Three fish (2 RB, 1 LL) were detected within the 15- to 30-day interval and three fish (1 RB, 2 LL) were detected between 32 and 71 days (mean detection was 49 days) downstream of the dam after their initial ladder ascent and release upstream.

Table 4. Summary of 2023 fallback fish and the number of days between initial release upstream of the dam and subsequent detection downstream of the dam.

2023 Fallback Species	# of Days Between Release and Detection Downstream			Total
	≤14 days	15 to 30 days	> 30 days	
RB	3	2	1	6
LL	1	1	2	4
Total	4	3	3	10

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 2023, streamflow exceeded 23,000 cfs from May 2 through June 23 (~53 consecutive days). Based on the detection dates of the 10 fish in the ladder, following their initial release upstream of the dam, and detection entering the ladder again; it is most likely four fish (2 RB, 2 LL) moved downstream through the turbines while the other six fish (3 RB, 3 LL) 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.

In 2023, there were 247 fish newly PIT-tagged at the ladder and 34 fish previously tagged recorded ascending the ladder. In total, 277 PIT-tagged fish were released upstream of the dam in 2023 (Table 5). The fish total includes two Rainbow and two Brown trout that returned to the ladder and ascended a second time in 2023. A summary of the number of PIT-tagged and non-tagged fish released upstream of the dam in 2023 is provided in Table 5.

Table 5. Summary of PIT-tagged fish at the Ladder in 2023, new individuals tagged at the ladder, returning fish to the ladder, and un-tagged fish released upstream.

Species	PIT Tagged at Ladder in 2023	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	142	13	153	81	236*
RB	94	21	113	85	200*
RBxWCT	2	-	2	1	3
WCT	7	-	7	8	15
Salmonids	247	34	277	175	456
N PMN	-	1	1	23	24
LS SU	-	-	-	440	440
Non-Salmonids	-	1	1	463	464
TOTAL	247	35	278	638	920

Notes: * Two of the Rainbow Trout and Brown Trout ascended the ladder twice in 2023.

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 continuously in notch mode in contrast to the rest of the ladder that operates in orifice mode.

In 2023, the ladder operated in orifice mode for the entire season. Remote arrays in the ladder detected a total of 90 individual fish with the majority represented by Rainbow and Brown trout. Some fish made multiple ladder ascents; thus Table 6 represents the total number of fish ascent attempts.

Salmonids are PIT-tagged at the ladder workstation annually. A total of 3,743 fish have been tagged since 2011, with 175 to 525 tagged at the ladder per season. Non-salmonids were tagged at a lower frequency with a total of 281 fish tagged (NPMN, LSSU, LNSU) during four seasons (2011, 2017, 2018, 2019). In 2023, all the Northern Pikeminnow detected entering the ladder were

tagged in 2019. Four of the Largescale suckers detected entering the ladder in 2023 were tagged electrofishing below Thompson Falls Dam in 2011 and 2012 and two individuals were tagged at the ladder workstation in 2019. The low sample size of PIT tagged non-salmonids limits the confidence in interpreting the data.

Internal efficiency values in Table 6 are measured in two ways. The first method evaluates the percentage of fish detected at the entrance that ascended to the HP. For example, 72 percent of tagged salmonids entering the ladder in 2023, 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, 95 percent of the salmonids detected in the LP ascended to the HP in 2023. 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, 2022, and 2023 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.

Additionally, there were two “new” Bull Trout without PIT-tags that entered and ascended the ladder that are not accounted for in Table 6. Table 6 only accounts for fish that have received a PIT tag. The unknown species in Table 6, represents an individual detected by the remote array at the fish entrance and holding pool that had no tagging history in the database and was not recorded at the workstation. This unknown species is not included in the salmonid or non-salmonid summary in Table 6.

Table 6. Summary of fish entering the ladder attempts to ascend 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	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	82	62	59	76%	72%	95%
Non-salmonids	16	1	1	6%	6%	6%
Species	# Fish @ Entrance	# Fish in LP	# Fish in HP	% Fish in LP	% Fish in HP	% Fish in LP to HP
BULL	1	0	0	0%	0%	0%
LL	31	23	20	74%	74%	87%
RB	48	39	39	81%	81%	100%
RBxWCT	1	0	0	0%	0%	0%
LT	1	0	0	0%	0%	0%
NPMN	10	1	1	10%	10%	10%
LSSU	6	0	0	0%	0%	0%
Unknown	1	1	1	100%	100%	100%

Section 2.5.2 – Ascent Times in Ladder

In 2023, a total of 59 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 2023, the median ascent times for 58 salmonids was 2.9 hours, which is very similar to data from 2022 (2.6 hours for 70 salmonids) and 2021 (3.2 hours for 49 salmonids). The historic (2011-2020) median ascent time for salmonids ascending the ladder when operating in orifice mode has ranged between 1.6 and 4.5 hours. These historic calculations (2011-2020) evaluate the time duration between the remote tag array detection in the lower pools and holding pool.

Table 7. Summary ascent information for 59 fish, calculating the minimum, maximum, median, average time between the last entrance detection until the first holding pool detection by species, 2023.

Species	Number of Fish	Ascent Time (hours)			
		Min	Max	Median	Average
LL	20	0.97	75.7	2.2	9.5
RB	38	1.1	35.2	3.1	5.8
Salmonids	58	0.97	75.7	2.9	7.1
NPMN	1	7.1	7.1	7.1	7.1
Non-Salmonids	1	7.1	7.1	7.1	7.1

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. Due to equipment malfunction, 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. In 2023, NorthWestern replaced a node on the antenna resulting in a few hours when the array was offline on November 20. 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 2023, there were 202 unique individual fish detections in the Thompson River. The majority (97%) of these fish ascended the ladder in 2023 or previous years, while six individuals had no ladder history (Table 8). The unknown species (1 fish) had no tagging history recorded. Its PIT tag identification is part of the series utilized at the ladder workstation in 2023, thus, it is assumed this fish was handled at the workstation and released upstream in 2023 (Table 8). The fish with no ladder history were either tagged upstream of Thompson Falls Dam (1 BULL, 2 WCT, 2 RB)

or transported by Avista upstream of Thompson Falls Dam from downstream of Cabinet Gorge Dam (1 BULL). Brown and Rainbow trout represent the majority of ladder-fish detected in the Thompson River (61% LL, 36% RB) as shown in Table 8; which is expected because the majority of salmonids recorded and PIT-tagged at the ladder comprise these two species. Of the 196 ladder-fish detected in the Thompson River in 2023, over half (67%) ascended the ladder in 2023, 18 percent last ascended the ladder in 2022, 9 percent last ascended in 2021, and 8 percent last ascended between 2017 and 2020 (Table 9).

Table 8. Summary of 2023 Thompson River individual fish detections.
Note: * indicate species with unknown tagging history most likely tagged at ladder in 2023.

Individual Fish Detected (2023)		
Fish Species	# With Ladder History	# Without Ladder History
BULL	2	2
LL	119	-
RB	71	2
RBxWCT	2	-
WCT	1	2
Unknown*	1	-
Total	196	6

Table 9. Summary of the most recent year a fish was recorded at the ladder for 196 individual fish detected in the Thompson River in 2023. Unknown individual most likely ascended ladder in 2023 based on tag series identification.

Fish Species	2017	2018	2019	2020	2021	2022	2023
BULL	-	-	-	-	-	1	2
WCT	-	-	-	-	-	-	1
RB	-	-	1	1	11	16	42
LL	1	1	3	6	6	18	84
Unknown	-	-	-	-	-	-	1
Total	1	1	4	7	17	35	130

There were 606 daily detections at the mainstem Thompson River array representing the 196 unique ladder fish. The majority of the detections are from tagged Brown and Rainbow trout. In 2023, a total of 278-tagged fish were released upstream of Thompson Falls Dam and 153-tagged fish were Brown Trout and 113-tagged fish were Rainbow Trout. Approximately 53 percent of the tagged-Brown Trout and 36 percent of Rainbow Trout released upstream of Thompson Falls Dam in 2023 were later detected in the Thompson River the same year. Both Bull Trout that ascended the ladder in 2023 were later detected in the Thompson River.

A summary of the daily detections representing the 196-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 7 at approximately 1,870 cfs. Daily detections for Rainbow Trout and Brown Trout occurred following the decline of the hydrograph, late June for Brown Trout and August for Rainbow Trout. The two Bull Trout were detected at the array on May 14, June 29, July 21, and September. The Westslope Cutthroat Trout was detected June 29 and October 6. The river was iced over in late November; thus flow readings (USGS #12389500) were not available.

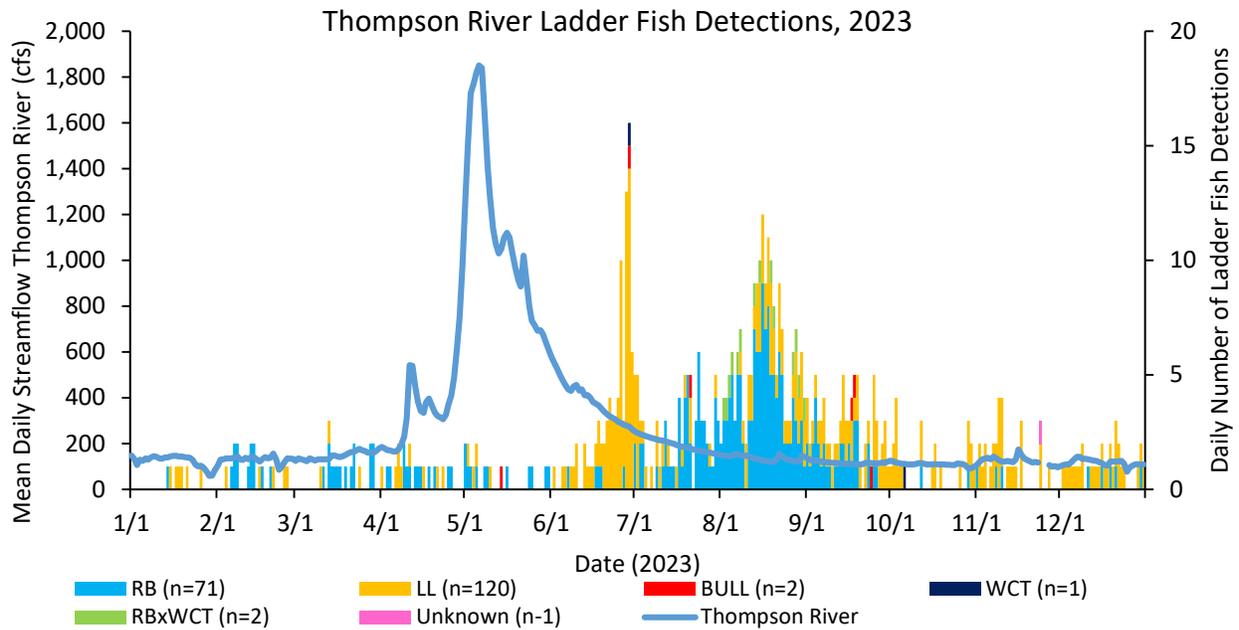


Figure 3. Summary of daily PIT tag array detections representing 196 individual ladder fish and the mean daily streamflow in Thompson River, 2023.

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.

Table 10. Summary of ladder fish, by species detected in Fishtrap Creek and West Fork Thompson River, 2014 – 2023.

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

In 2023, there were five individual ladder fish detected in the tributaries, one Brown and one Rainbow trout in Fishtrap Creek and three fish (1 BULL, 2 LL) in West Fork Thompson River. All fish except for the Rainbow Trout, ascended the ladder in 2023. The Rainbow Trout ascended the ladder in 2020, 2021, and 2022.

There were 12 additional fish detected in the tributaries, three fish in Fishtrap and nine fish in West Fork Thompson River. All but one fish was initially tagged upstream of Thompson Falls Dam. The exception was one Bull Trout transported by Avista from below Cabinet Gorge Dam to the Thomson River drainage in July 2023. The Bull Trout was detected in West Fork Thompson River about 11 days after its release in the Thompson River, July 12. The 11 fish initially tagged upstream of Thompson Falls Dam included five Rainbow Trout, three Brown Trout, two Bull Trout, and one Westslope Cutthroat Trout.

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. There has been considerably less array interference and presumably better detection capabilities at this location after replacing a faulty power source in June 2021.

In 2023, the Prospect Creek array recorded 104 daily detections representing 41 individual fish (26 WCT, 12 RB, 2 BULL, 1 RBxWCT). The daily detections of these fish with the mean daily stream flow for Prospect Creek (USGS gage #12390700) is provided in Figure 4.

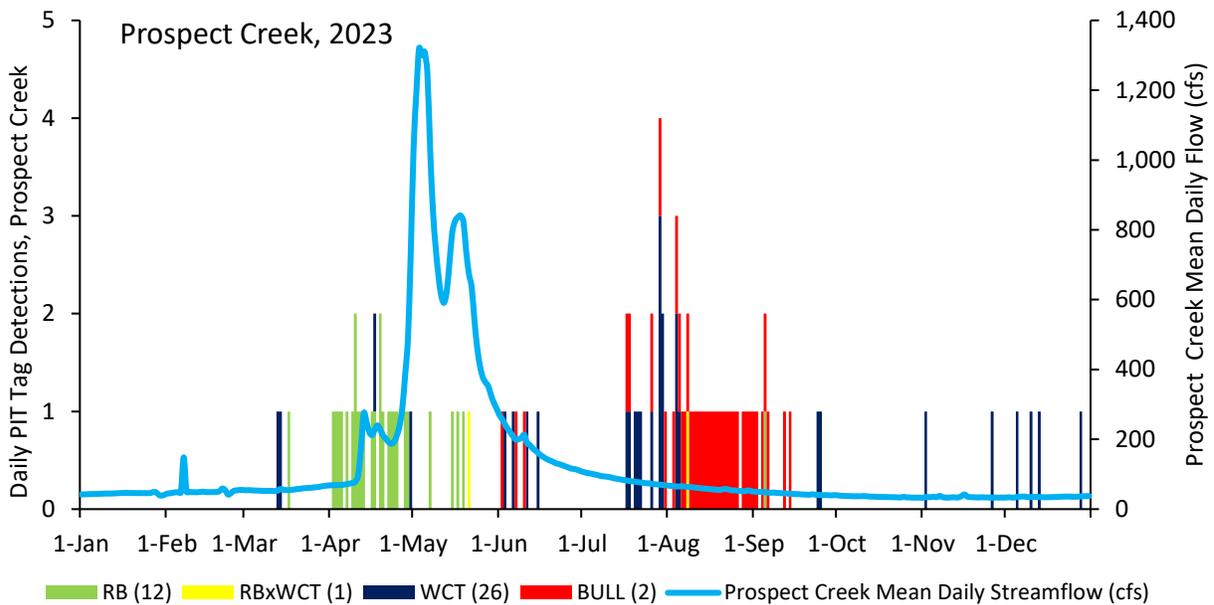


Figure 4. Summary of daily PIT tag array detections for fish in Prospect Creek and mean daily streamflow, 2023.

All of the Westslope Cutthroat Trout (26) were initially sampled and tagged in Prospect Creek in 2022 or 2023. The Rainbow and Rainbow hybrid trout (n=13) represent fish that ascended the ladder most recently in 2020 (2 RB), 2021 (3 RB, 1 RBxWCT), 2022 (5 RB), and 2023 (2 RB). The two 2023 ladder-fish included one radio-tagged Rainbow Trout that ascended the ladder in March 2023 and was transported downstream to Flatiron FAS prior to returning and entering Prospect Creek in early April. A second Rainbow Trout that initially ascended the ladder in June 2023 returned downstream of Thompson Falls Dam (after upstream release) and entered Prospect Creek in September 2023.

The two Bull Trout detected in Prospect Creek were initially captured by Avista downstream of Cabinet Gorge Dam where both fish were tagged and transported to Region 4, upstream of Thompson Falls Dam. One Bull Trout was transported to Thompson River in June 2022 and the second was transported to the South Fork Jocko River, a tributary to the lower Flathead River, September 2021. The Bull Trout transported to South Fork Jocko River in 2021 was also detected in Prospect Creek between July and September in 2022 (NorthWestern 2023). This individual made two movements to the Thompson Falls fish ladder in 2023, once in June and once in mid-September with detections in Prospect Creek between July and September. Neither Bull Trout ascended Thompson Falls fish passage facility in 2023.

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 95 salmonids that have ascended the fish ladder at Thompson Falls Dam. In 2023, anglers reported capturing 15 salmonids with Floy tags (Table 11) and one Smallmouth Bass. The Smallmouth Bass was harvested downstream approximately 12 miles in Noxon Reservoir near Finley Flats and was initially recorded at the ladder in August 2015 (released upstream of the dam).

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	Total
LL		1	3	6	5	7	5	27
RB	1		9	12	15	15	9	61
WCT		1	1	2	1	1		6
RBxWCT							1	1
Total	1	2	13	20	21	23	15	95

In 2023, most fish were captured upstream of Thompson Falls Dam (12 fish), including eight fish in the Thompson River drainage, one fish at the confluence of Cherry Creek, one fish near the town of Plains, one fish near the town of Paradise, and one fish at the bridge accessing Island Park (at Thompson Falls Dam). Three fish were captured downstream of Thompson Falls Dam, two fish at the mouth of Prospect Creek and one fish at Marten Creek.

Angler report 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.

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 37,000 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 12. This section provides a summary of the 2024 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 2023, 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 less than one percent of the 3,743 salmonids PIT-tagged at the ladder (and released upstream) between 2011 and 2023.

3.1 – 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. Except for 2004, 10 nets are deployed annually in October with results varying between 33 to 231 fish representing six to nine species. The established gillnet sampling sites in the Thompson Falls Reservoir are shown in Figure 6.

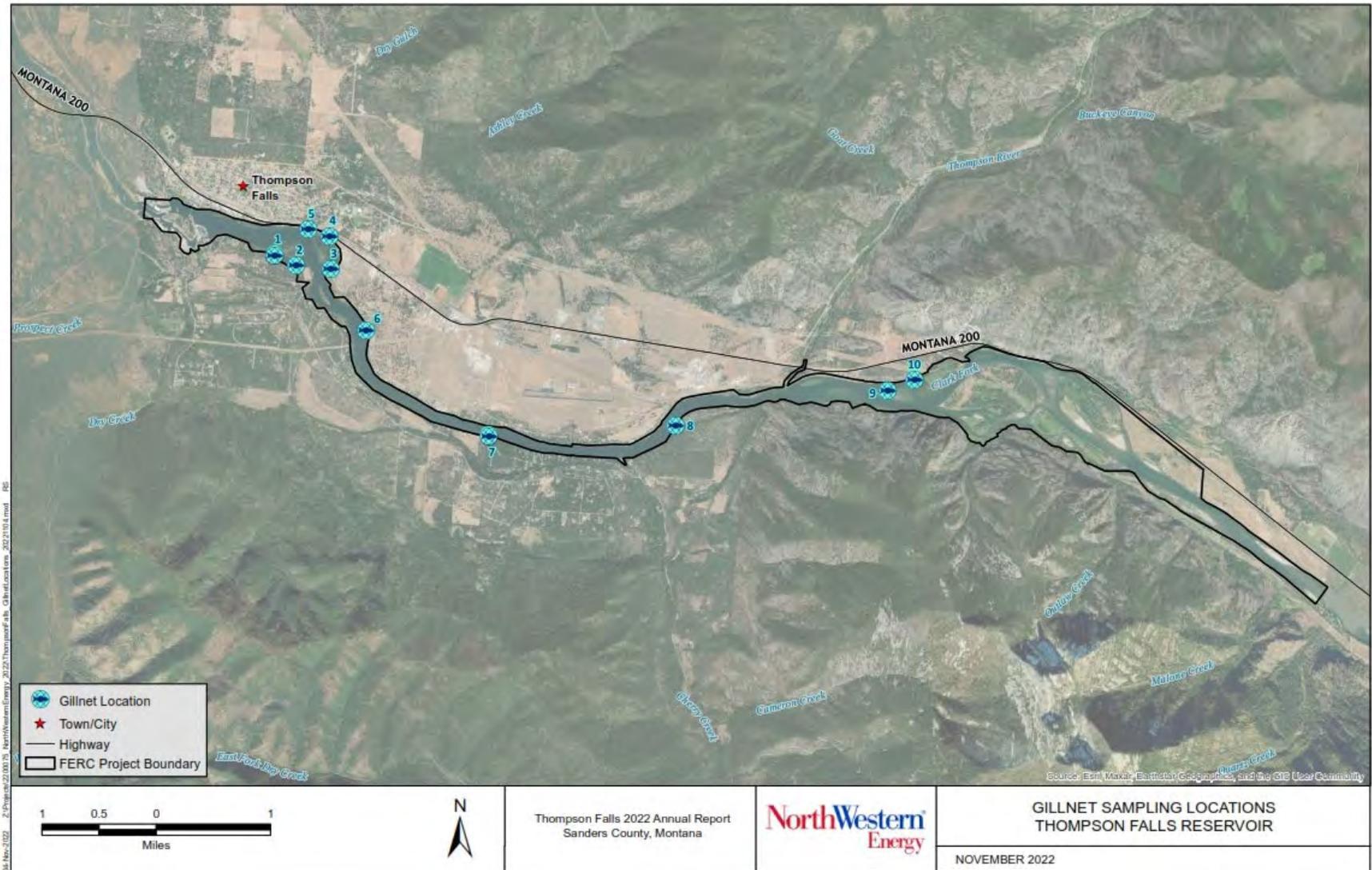


Figure 6. Gillnetting sampling locations near Thompson Falls, Montana.

The catch per net, by species from 2023 compared to the average, minimum and maximum catch per net between 2004 and 2022 is shown in Table 13.

Table 13. Catch per net, by species, during annual October gillnetting series on Thompson Falls Reservoir in 2023 and the 2004-2022 average, minimum, and maximum catch per net. A dash indicates no (zero) fish of that species was captured.

Species	2023 Catch per Net	2004-2022 Catch Per Net		
		Avg	Min	Max
BL BH	0.1	2.9	-	14.1
LL	-	-	-	0.2
LMB	-	0.1	-	0.3
LN SU	-	-	-	0.5
LS SU	0.6	0.7	0.1	1.3
LWF	0.1	0.01	-	0.1
MWF	-	-	-	-
NP	5.1	2.7	1.0	4.9
NPMN	0.5	0.4	-	1.0
PEA	-	-	-	0.1
PUMP	2.5	0.3	-	1.8
RB	-	0.1	-	0.4
SMB	0.2	0.2	-	0.5
WCT	-	-	-	0.2
YP	5.1	0.7	0.1	1.8
YL BH	0.1	-	-	0.1
Total	14.3	8.2	3.3	23.1

In 2023, nets were set October 4 and pulled approximately 23.5 hours later October 5. There were 143 fish captured representing nine species (BL BH, LWF, LS SU, NPMN, NP, PUMP, SMB, YP, YLBH). The total catch per net (14.3) was above average (8.2 fish per net) and above the median value (6.2 fish per net) for the period of record (Figure 7).

In 2023, the most common species recorded in the reservoir was Northern Pike and Yellow Perch followed by Pumpkinseed (Table 13). No salmonids and no tagged fish were collected during the gillnet surveys in 2023. 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 5.1 fish caught per net in 2023 and an average 2.7 fish per net between 2004 and 2022 (Table 13). 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 2023, Black Bullhead numbers were low, 0.1 fish per net.

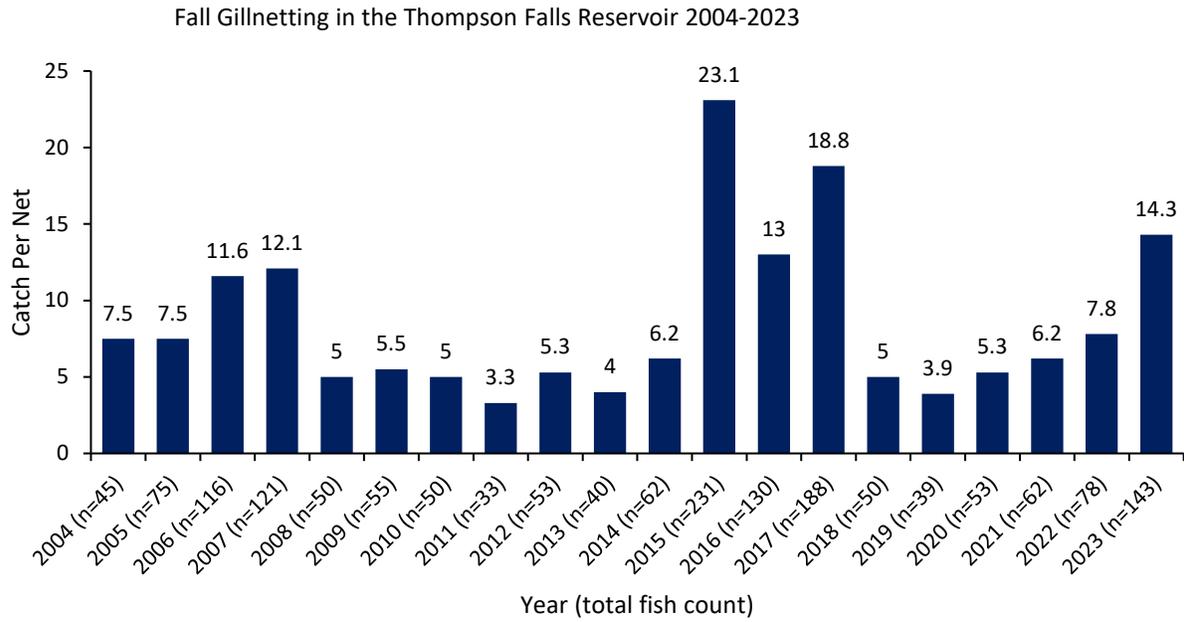


Figure 7. Summary of catch per net during annual gillnetting efforts in Thompson Falls Reservoir, 2004-2023.

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 2023 were the same as previous years (NorthWestern, 2019a; New Wave and GEI 2020; NorthWestern, 2021; NorthWestern, 2022; NorthWestern, 2023).

The TDG monitoring sites in 2023 were 1) Above Dam, 2) High Bridge, and 3) Birdland Bay Bridge (Figure 8). 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.

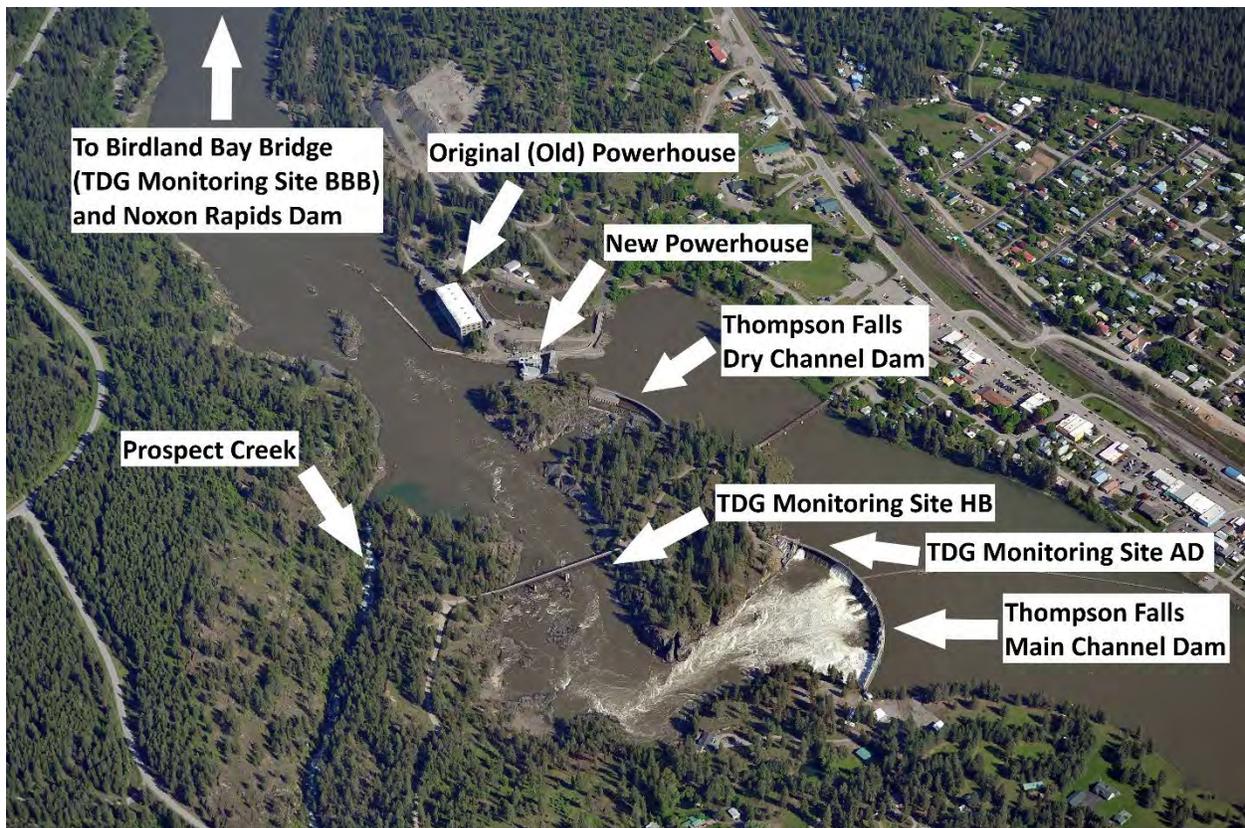


Figure 8. Monitoring locations for total dissolved gas at the Thompson Falls Hydroelectric Project site.

In 2023, TDG was monitored from May through July, during the high flow season, with exact dates varying slightly for each station (Figure 9). There were some data gaps at the Birdland Bay Bridge and Above Dam sites due to instrument failure, which likely occurred from either an electronic failure of the instrument or physical damage to the TDG membrane from debris impact.

Peak discharge in the Clark Fork River recorded was 54,175 cfs on May 19, 2023 (total flow measured at Thompson Falls Dam) representative of a below average year. As in previous years of data collection, TDG in 2023 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 9).

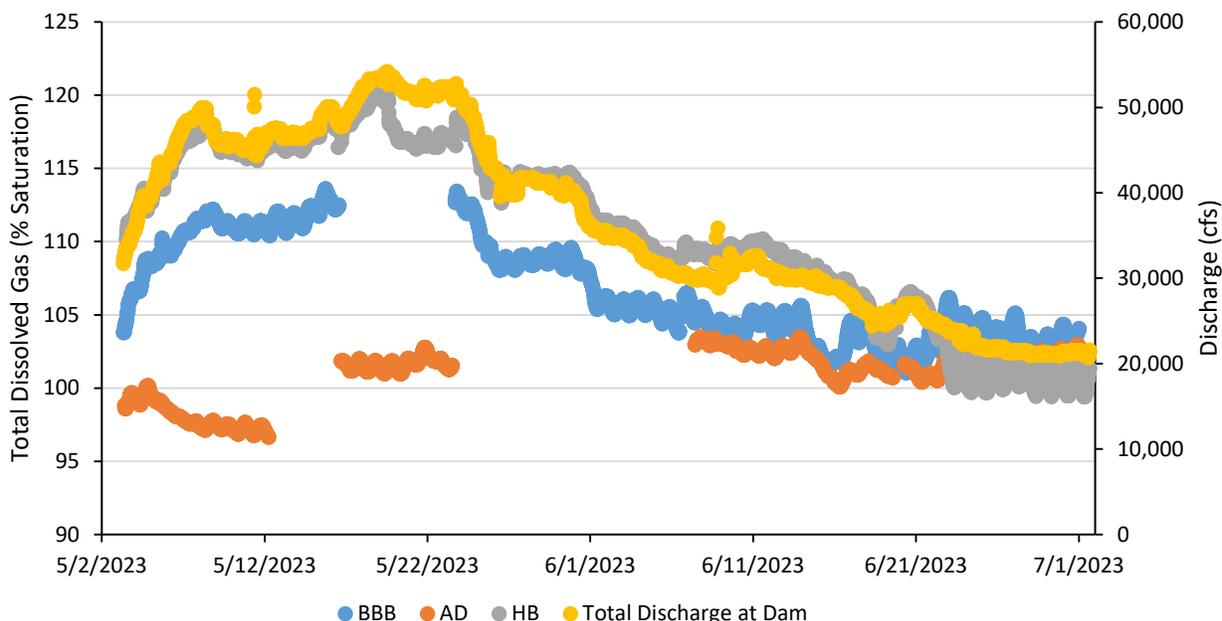


Figure 9. Total Dissolved Gas (% of saturation) upstream and downstream of the Project and streamflow (cfs) as measured at Thompson Falls Dam, May through July 2023.

TDG upstream of the Project peaked at approximately 103 percent of saturation during 2023. TDG levels at the High Bridge peaked at 120 percent of saturation for a few hours on May 18. Further downstream, the maximum TDG level recorded was 113 percent saturation at Birdland Bay Bridge, however at the time of peak streamflow, the Birdland Bay Bridge instrument failed to record data for an unknown reason for approximately 7 days. 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 – 2023 Project Updates

Projects approved for funding by the TAC in 2023 are identified in Table 14. Refer to the December 2022 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 2023 with the 2021 approved funding.

Table 14. Project proposals approved by the TAC for 2023 implementation.

Agency/Entity	Project Proposal for 2023	TAC Funding Requested
Trust for Public Land (TPL) and FWP	Phase 2 – Thompson River Conservation Easement	\$100,000
Trout Unlimited/Lower Clark Fork Watershed Group	Thompson River Road Consolidation Coordination	\$5,000
Total 2023		\$105,000
MFWP	Big Rock Creek Barrier Design and Public Scoping (Funding Approved in 2021)	\$34,000

Section 5.2 – 2024 TAC Funded Projects

During the 2023 Annual Thompson Falls TAC Meeting on December 14, there were three project proposals presented. Another project was proposed after the annual meeting. The four project proposals were unanimously approved by the voting TAC members [Confederated Salish and Kootenai Tribes (CSKT), FWP, FWS, and NorthWestern]. The following table (Table 15) provides a summary of the project proposals and approved funding for the 2024 calendar year. Refer to the 2023 meeting summary available on the Project website for additional project details.

Table 15. Summary of projects proposed and approved for funding in 2024.

Agency/Entity	Project Proposal for 2023	TAC Vote	TAC Funding Requested
CSKT	Jocko Bull Trout genetics update - North and South Fork Jocko rivers	Yes	\$3,575
Trout Unlimited/ Lower Clark Fork Watershed Group	Thompson River Road Consolidation Coordination	Yes	\$5,000
MFWP	Pathogen Survey – Costs for West Fork Thompson River and Fish Trap	Yes	\$5,000
Northwestern	Evaluating Fine-Scale Fish Movements Using Submersible PIT Antennas	Yes	\$50,100
TOTAL Approved			\$63,675

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 16. 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 16. 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 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, 2019-2023 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 5-Year (2011-2015) <i>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 2009-2023

In compliance with FWS's BiOp TC 7a, this section provides a summary of the documented cumulative incidental take from previous years' activities (2009-2023) in support of the upstream fish passage at the Project. Between 2009 and 2023, the Licensee sampled 45 Bull Trout representing 42 individuals (Table 17).

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. 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 17. 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
6/29/23	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 (detected 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

Date	Method of Capture	Location	Action	Personnel	L (mm)	Wt (g)	Genetic Assignment	Condition at time of release
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
6/7/13	Ladder	TFalls Dam	Fish Passage Studies	Licensee FWP	596	1926	Fishtrap Creek (R4)	Alive

Date	Method of Capture	Location	Action	Personnel	L (mm)	Wt (g)	Genetic Assignment	Condition at time of release
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	Ladder	TFalls Dam	Fish Passage Studies	Licensee FWP	563	1404	Fishtrap Creek (R4)	Mortality (2012)
4/26/11					547	1438		Alive (2011)
5/15/12	Ladder	TFalls Dam	Fish Passage Studies	Licensee FWP	510	1172	Meadow Creek (R4)	Alive 2012
5/31/11	EFISH	Below TFalls			482	966		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

Date	Method of Capture	Location	Action	Personnel	L (mm)	Wt (g)	Genetic Assignment	Condition at time of release
5/1/09	Gillnet	TFalls Reservoir	Long-term Population Monitoring	Licensee	271	174	Fishtrap Creek (R4)	Alive

Section 7.0 – 2024 Proposed Activities and Reporting

In 2024, 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 and PIT-tagged fish only), and will continue to collaborate with TAC members to implement proposals approved for 2024.

Fish tagging protocol is summarized in Table 18. 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 2024 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 18. 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		
MWF	X	X			
LS SU	X				(2024: Goal for the season is to tag a maximum of 100 LSSU and 100 NPMN)
NPMN	X				

NorthWestern will prepare a summary report for 2024 activities that will be submitted to FWS and the TAC, as well as filed with the Commission by April 1, 2025.

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.
- Glaid, J. 2017. Subadult Bull Trout Out-Migration in the Thompson River Drainage, Montana. MS Thesis. Montana State University, July 2017.
- 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.
- NorthWestern. 2021. 2020 Annual Report Fish Passage Project. Thompson Falls Hydroelectric Project, FERC Project Number 1869.
- NorthWestern. 2022. 2021 Annual Report Fish Passage Project Thompson Falls Hydroelectric Project, FERC Project Number 1869.
- NorthWestern. 2023. 2022 Annual Report Fish Passage Project Thompson Falls Hydroelectric Project, FERC Project Number 1869.
- NorthWestern. 2023a. Thompson Falls Hydroelectric Project FERC Project No. 1869 - Final Study Report – Fish Behavior Study 2023.
- 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.