



NWE-THF-3890

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

March 23, 2021

Re: NorthWestern Energy Files 2020 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 2020 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 2.

Sincerely,

Mary Gail Sullivan
Director, Environmental and Lands

CC:

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The USFWS has reviewed and by signature below, approves this Thompson Falls Project 2020 Annual Activity, Fish Passage and Bull Trout Take Report filing with the Commission.



Ben Conard

Deputy Office Supervisor, Montana
Ecological Services Office.

U.S. Fish and Wildlife Service (position)

03/17/2021

Date

2020 Annual Report
Fish Passage Project

Thompson Falls Hydroelectric Project
FERC Project Number 1869



March 2021

NorthWestern[®]
Energy
Delivering a Bright Future

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

Submitted by:
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March 2021

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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://www.northwesternenergy.com/environment/thompson-falls-project/thompson-falls-public-reference-file>.

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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
Evaluation Plan	10-Yr Fish Passage Facility Evaluation Plan, Phase 2 Action Plan, 2011-2020
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
kg	kilogram
km	kilometer
L	length
fish ladder or ladder	Thompson Falls Upstream Fish Passage Facility
Licensee	NorthWestern Energy Corporation
LL	Brown Trout
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 Project	PPL Montana, LLC 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 2020 operational season at the fish ladder, baseline fisheries monitoring, total dissolved gas (TDG) 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 <https://www.northwesternenergy.com/environment/thompson-falls-project> and distributed to FWS and Thompson Falls Advisory Committee (TAC) members. Previous annual reports are available on the Project website. 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 2020 fish ladder operational season began on March 20 and ended on October 19 (214 days) with the ladder closed for a total of 20 days from May 27 through June 16 due to high water. The ladder operated in orifice mode and was checked 135 days during the season. The peak streamflows in the Clark Fork River, was approximately 79,100 cubic feet per second (cfs) on June 2, 2020 (as measured by the United States Geological Survey (USGS) gage at Plains, Montana Station #12389000) (Figure 1).

The annual hydrograph in the lower Clark Fork River has varied greatly since ladder operations commenced in 2011 (NorthWestern, 2019b). The long-term (1911-2014) average peak streamflow is about 60,000 cfs and occurs between the end of May and early June. Spring streamflows observed in 2020 were above the long-term average with the daily mean greater than 60,000 cfs for 20 consecutive days, May 21 through June 10.

In 2020, water temperature in the ladder (pool 48) was recorded as a single measurement coinciding with each ladder check. Water temperature data in the ladder during the 2020 season was consistent with trends from past years. Temperatures remained cool (6°C-11°C) in the spring, from March through May (Figure 2). Water temperature increased through June and July and peaked in early August at about 23°C, before declining to about 10°C in late October (Figure 2).

Section 2.2 – Upstream Fish Passage Results

A total of 1,587 fish ascended the ladder with 1,217 fish released upstream in 2020. The fish released upstream included 377 salmonids and 840 non-salmonids. There were 310 uniquely PIT-tagged individual salmonids released upstream. On July 17, 2020, one Bull Trout was recorded at the ladder (measuring 320 mm in length and 262 g in weight) and released upstream of the dam with a new PIT tag. A genetic analysis was completed and identified the most likely population of origin was the West Fork Thompson River. Fish collected at the ladder but not released upstream of the dam included 347 Smallmouth Bass, 21 mortalities (5 RB, 8 LL, 2 WCT, 6 LS SU), one Brook Trout, and one Lake Trout.

Since 2019, fish-handling protocols were modified such that fish were no longer anesthetized once water temperatures exceeded 20 degrees Celsius (°C) with the exception of Bull Trout. Instead, fish were identified by species and enumerated prior to release upstream. This change in handling of fish was implemented to address past observations of fish stress and mortality following their upstream release.

As in 2019, Montana Fish, Wildlife and Parks (FWP) continued the directive to not release Smallmouth Bass upstream of the dam. In 2020, there were 283 individual Smallmouth Bass recorded at the ladder and 64 Smallmouth Bass ascended the ladder two or more times (n=347). All Smallmouth Bass received a lower caudal clip upon their first ascent and an upper caudal clip following their second ascent.

A summary of the fish count (by species) at the ladder during the 2020 season along with mean daily streamflow in the Clark Fork River (Figure 1) and corresponding water temperature in the ladder (pool 48) concurrent with each ladder check (Figure 2) are illustrated in the following figures.

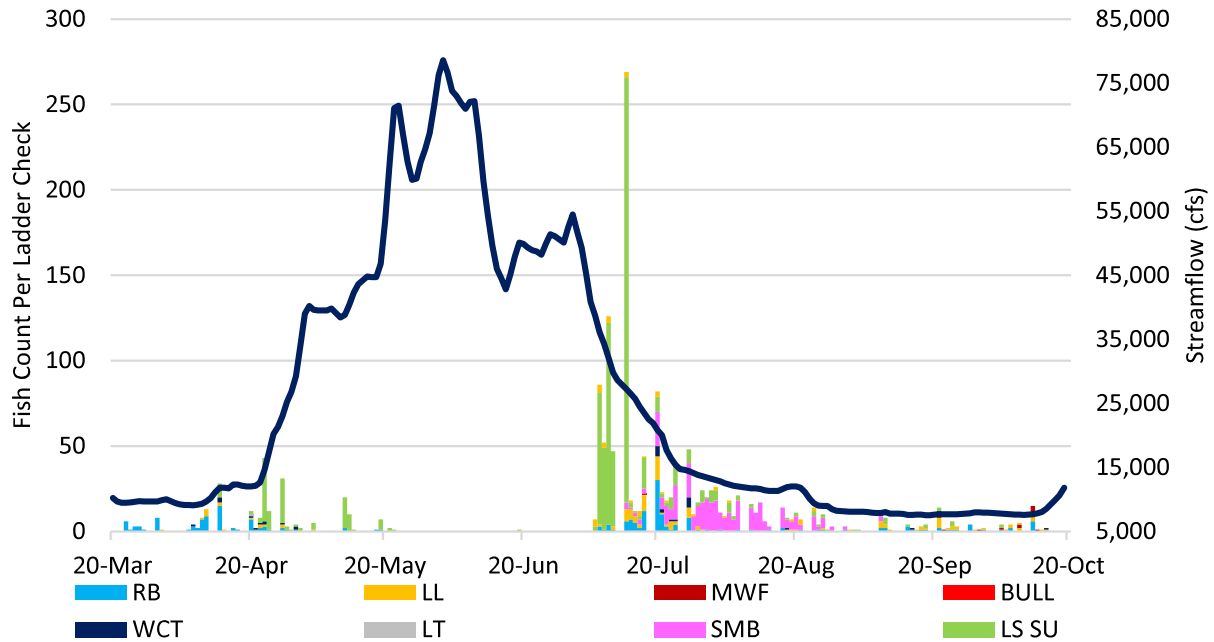


Figure 1. Fish, by species recorded at the ladder in 2020, including mean daily stream flow in the Clark Fork River (USGS gage near Plains, MT).

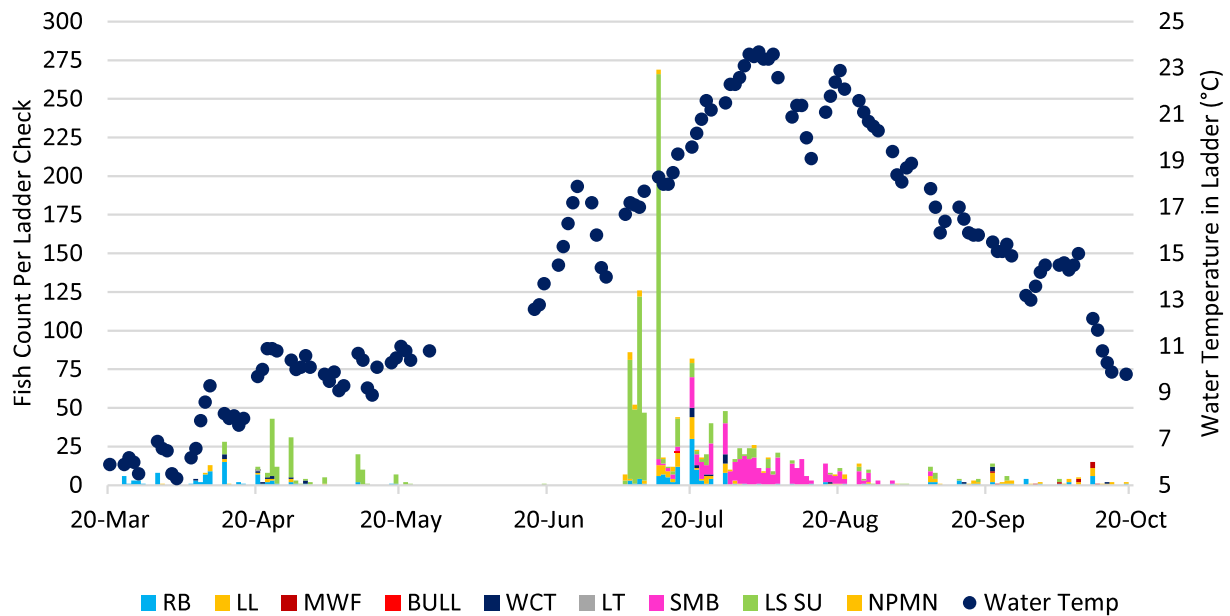


Figure 2. Fish, by species recorded at the ladder in 2020, including water temperature in the ladder (pool 48) coinciding with ladder checks.

Section 2.3 – Evaluation of Supplemental Spillover at the Main Dam

In 2020, NorthWestern, in cooperation with FWP, tested the impact of adding additional attraction flow on fish collections at the ladder. The additional attraction flow was provided at the Main Dam spillway by removing half of the boards in one spillway panel (Photograph 1). The hypothesis that additional attraction flow would increase fish ladder catches was tested.



Photograph 1. Panel with boards removed for attraction flow.

A full-length board in each panel is approximately 8 feet tall (Photograph 1). During non-spill periods the fishway operation and attraction flows produce 26 cfs through the entrance of the fishway and another 20 cfs through the high velocity jet. There is also some leakage from the Main Channel Dam providing downstream flows. The removal of a half panel is estimated to provide an additional 125 cfs of attraction flow. The half panel removal has been variably located from gate 4 (closer to the ladder entrance) to gate 16 (further away).

This study tested whether there is significant benefit (resulting in additional fish ascending the ladder) from operating with a half panel of attraction flow in addition to the 26 cfs at the ladder, 20 cfs via the high velocity jet, and dam leakage during non-spill operations. Non-spill operations are defined as incoming streamflows less than 23,000 cfs.

Section 2.3.1 – Methods for Analysis

NorthWestern and FWP tested the additional attraction flow weekly during non-spill periods in April, August, and September for a total of 10 weeks (Table 1). There were 5 weeks in each setting, with 4 consecutive weeks in the spring and 6 consecutive weeks in the summer/early fall. The weekly interval of data collection began with a Tuesday morning ladder check and ended after the Monday morning ladder check.

Table 1. Schedule for attraction flow test, 7-day total fish count, and average water temperature at the ladder.

Date (2020)	Additional Attraction Flow?	Spillway Bay Releasing Attraction Flow	7-day Total Fish Count	Average Temp (°C) During the Week
31-Mar	No		2 (1 RB, 1 LL)	6.0
7-Apr	Yes	10	55 (36 RB, 7 LL, 4 WCT, 8 LS SU)	8.1
14-Apr	No		16 (10 RB, 2 LL, 1 WCT, 1 LT, 2 LS SU)	8.2
21-Apr	Yes	10	96 (9 RB, 5 LL, 5 WCT, 77 LS SU)	10.6
4-Aug	Yes	8	73 (2 RB, 56 SMB, 13 LS SU, 2 NPMN)	22.8
11-Aug	No		51 (3 RB, 48 SMB)	20.6
18-Aug	Yes	8	47 (1 RB, 1 LL, 1 WCT, 30 SMB, 6 LS SU, 6 NPMN)	22.2
25-Aug	No		21 (3 RB, 1 LL, 13 SMB, 4 LS SU)	20.4
1-Sep	Yes	8	3 (1 LL, 2 LS SU)	18.5
8-Sep	No		25 (7 RB, 7 LL, 3 SMB, 8 LS SU)	16.8

With the alternating weekly schedule, the water temperature and streamflow profiles are anticipated to be similar during each operational mode (presence or absence of the half panel). The data were evaluated using two-sample mean or rank comparisons depending on data structure. The difference in species-specific abundance between the two operational modes were evaluated using two-sample comparisons or generalized regression models.

Section 2.3.2 – Results

Two-sample rank comparisons for abiotic variables streamflow and water temperature indicate significant differences in streamflow between the attraction flow periods, with higher streamflows occurring during periods of attraction flow.

The two-sample t-test comparisons for each species with adequate sample sizes (RB, LL, LS SU, SMB, WCT) indicate significant differences between modes for Largescale Sucker and Westslope Cutthroat Trout. Significantly more Largescale Sucker and Westslope Cutthroat Trout were sampled with additional attraction flow than without, with 106 of 120 Largescale Sucker and 10 of 11 Westslope Cutthroat Trout sampled when additional attraction flow was provided. Total 7-day fish counts at the ladder for each week are provided in Table 1.

The Largescale Sucker results were influenced by the patchiness of the counts. Most Largescale Suckers (64 percent) entered the ladder during the week of April 21, a week when the additional attraction flow was provided. The result for Westslope Cutthroat Trout was not mirrored with the other salmonid species. There was no significant difference in the number of Rainbow or Brown trout at the ladder with the additional attraction flow.

Count regression models indicated some previously noted trends with higher Rainbow Trout catches when water temperatures are colder and higher Smallmouth Bass catches when water temperatures are warmer (NorthWestern, 2018). The 7-day species count, and average stream temperature show this trend and are provided in Table 1. These results are in line with previous modelling results looking at fish abundance at the ladder from 2011 through 2018 and the influence of abiotic conditions (FWP, unpublished data).

Section 2.3.3 – Discussion

The evaluation of providing additional attraction flow is inconclusive for all species. There were significant differences in streamflow between panel settings and a significant increase in the capture of two species (WCT, LS SU) with additional attraction flow.

The data indicate the addition of attraction flow via the installation of the half panel along the right bank does not provide a significant increase in fish captured at the ladder during non-spill period (streamflow less than 23,000 cfs). The data also show fish movement into the ladder and up the ladder continue with the presence or absence of the half-panel. The data do not indicate there is an adverse impact from providing attraction flow.

From an operational standpoint, the greatest benefit to having the half-panel comes later in the season (late summer/early fall) as a mechanism to help flush aquatic vegetation that floats downstream and clogs the ladder intakes. There is some evidence of increased catches of Westslope Cutthroat Trout and Largescale Sucker with the additional attraction flow. With the limited testing that occurred in 2020 it is recommended to continue collecting information during this non-spill period and evaluate fish ladder catches and fish movement that may be impacted by this attraction flow.

Section 2.4 – Fish Counts

Over 34,600 fish have ascended the ladder between 2011 and 2020. The majority of fish recorded at the ladder were Largescale Sucker followed by Northern Pikeminnow (Table 2). Fish not released upstream (883 since 2011) included Lake Trout, Walleye, Brook Trout, Brook x Bull Trout hybrids, and Smallmouth Bass (starting in 2019), in addition to mortalities observed at the ladder. Over the last 10 years, the annual number of fish released upstream has ranged from 226 fish in 2018 to 11,620 fish in 2015. The number of non-salmonids and salmonids released upstream annually since 2011 is provided in Table 3.

Table 2. Total fish count, by species, for each year the ladder operated, 2011-2020. “-“ indicate zero fish recorded for that year.

Species by Year	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Grand Total
Largescale Sucker	418	1403	3041	2802	6327	2270	34	6	1018	805	18,124
Northern Pikeminnow	1000	926	387	1003	3356	707	66	10	180	41	7,676
Smallmouth Bass	135	34	8	1356	1244	1007	123	5	339	347	4,598
Rainbow Trout	164	208	213	187	281	366	181	124	186	223	2,133
Brown Trout	28	42	111	81	184	204	108	63	210	123	1,154
Mountain Whitefish	17	24	2	254	54	8	-	4	4	11	378
Westslope Cutthroat Trout	21	21	48	36	37	36	14	14	21	34	282
Peamouth	-	-	-	-	122	2	-	-	-	-	124
Rainbow x Cutthroat hybrid	9	7	13	12	4	5	1	1	1	-	53
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	18
Lake Trout	1	1	-	1	6	-	-	-	2	1	12
Eastern Brook Trout	-	-	-	1	2	1	-	-	-	1	4
Walleye	-	-	-	-	2	-	-	-	1	-	3
Largemouth Bass	-	-	-	-	-	1	-	-	-	-	1
Brook Trout x Bull Trout hybrid	-	-	-	-	-	1	-	-	-	-	1
Grand Total	1,805	2,668	3,830	5,735	11,647	4,630	530	227	1,963	1,587	34,622

Table 3. Total number of fish (non-salmonids and salmonids) released upstream of Thompson Falls Dam each year, 2011-2020.

Year	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Grand Total
Non-Salmonids Upstream	1,484	2,358	3,432	5,161	11,062	4,000	225	21	1,188	840	29,771
Salmonids Upstream	239	302	386	572	558	611	297	205	414	377	3,961
Total Fish Upstream	1,723	2,660	3,818	5,733	11,620	4,611	522	226	1,602	1,217	33,732

Section 2.5 – Bull Trout Collections

In 2020, NorthWestern handled a total of two Bull Trout (one at the ladder and one electrofishing the lower Clark Fork River). Both fish were released alive.

One Bull Trout measuring 320 mm and weighing 262 g (ID#300828) ascended the ladder and was captured at the workstation on July 17 and released upstream of the dam. The Bull Trout was PIT tagged and a genetic sample was taken for analysis with results indicating the most likely population of origin is West Fork Thompson River (Region 4). On the same day (July 17) the Bull Trout was recorded in the ladder, there were 43 other fish in the holding pool, including 21 salmonids (12 RB, 9 LL) and 22 non-salmonids (18 LS SU, 3 SMB, 1 NPMN). Two mortalities were documented, one Rainbow and one Brown trout. The water temperature in pool 48 during the ladder check was approximately 19.3°C and streamflows were around 23,500 cfs (spill at the dam was occurring).

Since the ladder was opened in 2011, 18 Bull Trout have ascended the ladder. An additional eight Bull Trout were detected entering the ladder (5 in 2015 and 3 in 2016). Details of these eight fish are provided in Section 5.1.2 in the 2018 Annual Report (NorthWestern, 2019) and in Section 4.1 in the 2016 Annual Report (NorthWestern, 2017).

The length of Bull Trout that have ascended the ladder has ranged from 320 to 620 mm (average 515 mm), with this year’s Bull Trout being the smallest recorded at the ladder. Bull Trout have been recorded at the ladder during non-spill and spill conditions at the dam with streamflows ranging from 8,100 to 56,100 cfs and stream temperatures ranging from 6.6 to 22.3°C (Figure 3).

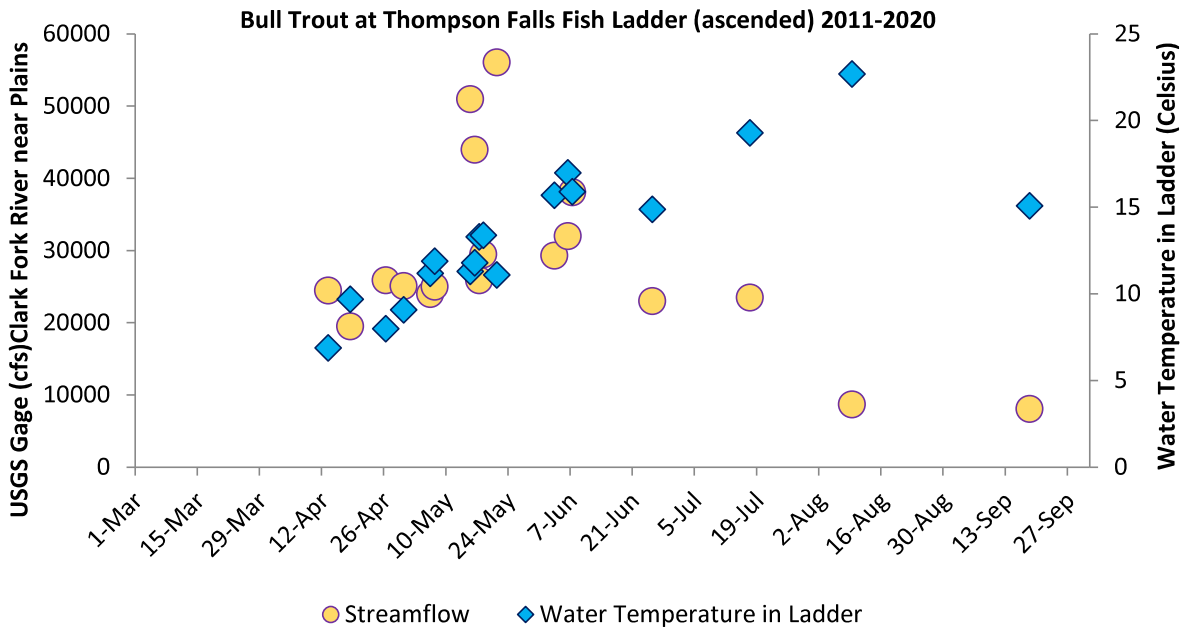


Figure 3. Summary of mean daily streamflow in the Clark Fork River and water temperature in the ladder (Pool 48) for each Bull Trout (n=18) recorded at the workstation, 2011-2020.

The second Bull Trout was sampled electrofishing in the Clark Fork River, upstream of the Island Complex on October 21. Stream temperature was about 8.4°C and streamflow was approximately 14,800 cfs. This Bull Trout was estimated to be about 480 mm (19 inches). No additional information was collected before the Bull Trout escaped and swam off (at the sampling site).

Section 2.6 – 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 2 weeks or 1 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 2020, two salmonids out of 277 PIT-tagged salmonids were detected downstream of Thompson Falls Dam within 30 days of their initial ascent and release upstream of the ladder, one Rainbow and one Brown trout. The Brown Trout initially ascended the ladder on April 20 and was detected entering the lower pools of the ladder 27 days later on May 6 and August 6, but did not ascend the ladder. The Rainbow Trout initially ascended the ladder on July 15 and was detected entering the lower pools of the ladder and ascending to the top on July 17 within 1 hour (recorded at the workstation on July 22).

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 streamflows are less than 23,000 cfs, it is probable that downstream fish passage is through the turbines. When streamflows are above 23,000 cfs, fish can pass downstream through the turbines or over the spillway. In 2020, streamflows exceeded 23,000 cfs from April 27 through July 17 (82 consecutive days). Based on the detection dates of the two fish (1 LL, 1 RB) detected at the ladder within 30 days of their initial release, it is unknown if these fish moved downstream through the turbines or spillway. One Rainbow Trout that ascended the ladder on July 17 and returned to the ladder on September 25 (ascending again) likely traveled downstream through the turbines in 2020.

Section 2.7 – Fish Tagging and Detections in the Ladder

NorthWestern PIT-tagged a total of 3,389 individual fish (3,108 salmonids and 281 non-salmonids) between 2011 and 2020 (Table 4). The majority of fish PIT-tagged at the ladder are salmonids, specifically Rainbow (52%) and Brown Trout (28%). Each fish implanted with a PIT tag must enter the ladder and ascend the 45 pools, where it is recorded at the workstation prior to release upstream of the dam. Subsequent ladder detections of these fish require the fish to move downstream of the dam (over the spillway or through the turbines) and re-enter the ladder where the PIT tag is detected by the remote arrays located between pools in the ladder.

Remote PIT arrays installed in the lower pools (pools 7, 8) and the top of the ladder or holding pool (pool 45) detect PIT-tagged fish that 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 Bull Trout in the system originate from Avista's tagging efforts downstream of the Project (e.g., downstream of Cabinet Gorge Dam), from Glaid's (2017) study of juvenile Bull Trout in the Thompson River, upstream of the Project, or FWP PIT tagging activities in tributaries (upstream and downstream of the Project).

Table 4. Summary of annual PIT-tagging at the Thompson Falls upstream fish passage facility by species, 2011-2020.

Species	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
BULL	2	-	4	1	2	3	1	-	-	1	14
EB	-	-	-	1	2	1	-	-	-	-	4
LL	27	40	97	67	153	169	86	56	171	78	944
RB	141	189	186	144	238	310	171	103	110	167	1,759
RBxWCT	9	7	12	11	1	4	1	-	1	-	46
WCT	20	20	45	34	33	32	11	13	19	22	249
MWF	17	-	-	-	54	6	-	3	3	9	92
Salmonids	216	256	344	258	483	525	270	175	304	277	3,108
N PMN	2	-	-	-	-	-	53	7	97	-	159
LN SU	1	-	-	-	-	-	-	-	-	-	1
LS SU	6	-	-	-	-	-	8	6	101	-	121
Non-Salmonids	9	0	0	0	0	0	61	13	198	0	281
TOTAL	299	286	351	281	1,457	525	331	188	502	277	4,497

In 2020, NorthWestern PIT-tagged 277 salmonids following their first ascent up the ladder. With previously tagged fish ascending the ladder and new fish ascending the ladder, NorthWestern released a total of 311 PIT-tagged salmonids and 10 PIT-tagged non-salmonids upstream of Thompson Falls Dam in 2020. Approximately 10.8 percent of the PIT-tagged fish (salmonids and non-salmonids) returning and ascending the ladder in 2020 previously ascended the ladder in 2019. Annual evaluations also show about 3 to 13 percent of salmonids PIT-tagged in a given year return and ascend the ladder the following year (NorthWestern, 2019b).

Section 2.7.1 – Internal Fishway Efficiency

The Licensee has monitored movement of PIT-tagged-fish entering and ascending the ladder since 2011. One limitation of the system is that the first detection of a fish requires the fish to enter the ladder and swim through seven pools. Thus, it is probable for some fish to enter (up to pool 6) and leave the ladder entrance and never be detected. Additionally, if a fish does not have an existing PIT-tag, no detection information is obtainable.

In 2020, the ladder operated in orifice mode for the entire season. Remote arrays in the lower pools and the holding pool (the top of the ladder) detected a total of 62 fish representing 46 salmonids and 14 non-salmonids.

A total of 53 PIT-tagged fish (85%) ascended the ladder, representing 93 percent of the salmonids and 71 percent of the non-salmonids. Details of fishway efficiency for each species, all 62 fish, 46 salmonids, and 14 non-salmonids are shown in Figure 4.

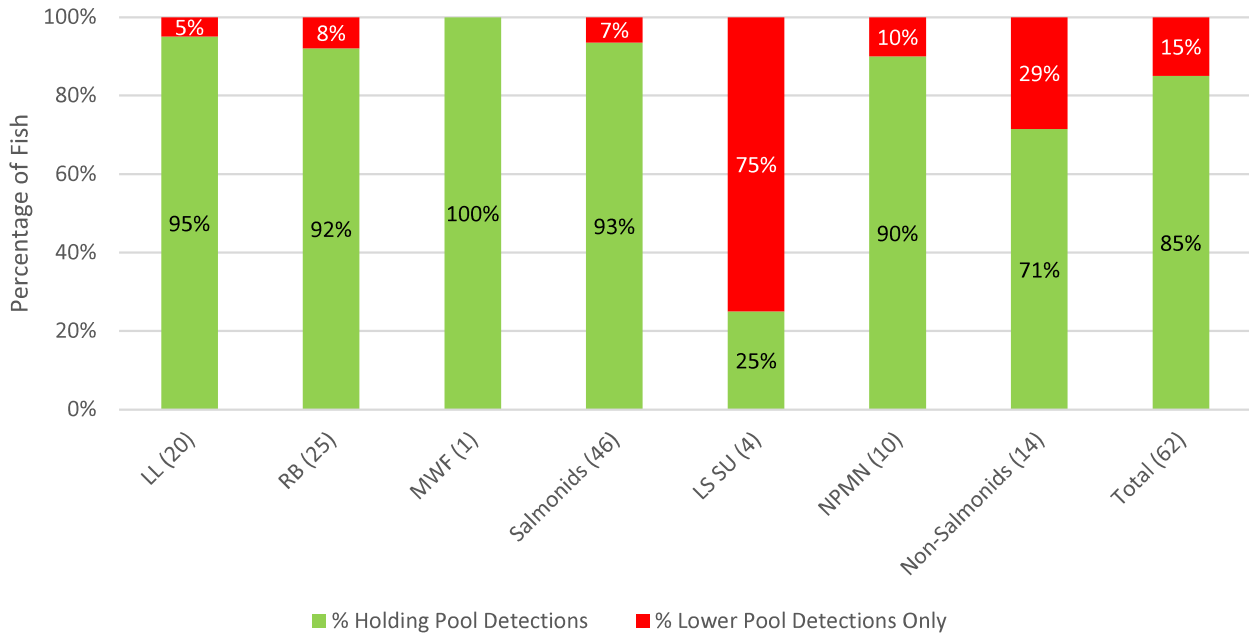


Figure 4. Percentage of fish, by species detected in the holding pool (ascending the ladder) and in the lower pools of the ladder (not ascending) in 2020.

Section 2.7.2 – Ascent Times in Ladder

In 2020, a total of 53 ascent times were recorded via the remote tag arrays in the fish ladder (pools 7 or 8 and pool 45). The ascent time is calculated by calculating the time between when a fish is detected in pool 7 or 8 and when it enters the holding pool (pool 45). The results from 2020 are within the range of values observed in past years when operating in orifice mode (NorthWestern, 2019a). The salmonid data include 13 Rainbow Trout, 19 Brown Trout, and one Mountain Whitefish. The non-salmonid data include one Largescale Sucker and nine Northern Pikeminnow (Table 5).

Table 5. Summary ascent information (minimum, maximum, median, average time) by species for 53 fish with recorded ascent times in 2020.

Species	Number of Fish	Ascent Time (hours)			
		Min	Max	Median	Average
RB	13	0.95	18.8	2.5	4.8
LL	19	0.9	7.5	1.3	2.1
MWF	1	-	-	6.4	6.4
NPMN	9	1.6	12.9	3.7	4.5
LS SU	1	-	-	1.3	1.3

Section 2.8 – 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 of detection information from the mainstem Thompson River (data gap: August 30, 2019 through August 18, 2020).

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.

Fish detections from the mainstem Thompson River from August 19 through December 31, 2020 are summarized in Table 6. During this period a total of 77 unique fish (403 detections) with a ladder history were detected and 14 unique fish (52 detections) with no-ladder history were detected.

Table 6. Summary of 2020 Thompson River fish detections.

Individual Fish Detected (August 19 - December 31, 2020)		
Fish Species	# with Ladder History	# without Ladder History
BULL	-	6
WCT	3	3
RB	27	2
LL	46	1
MWF	1	-
Unknown	-	2
Total	77	14

The 77-individual fish with a ladder history included 46 Brown Trout, 27 Rainbow Trout, three Westslope Cutthroat Trout, and one Mountain Whitefish. The majority of these fish (57 individuals representing 277 detections) ascended the Thompson Falls fish ladder and were released upstream in 2020. Table 7 provides an account of the ladder history of the 77-individual fish. Several of these fish ascended the ladder multiple years, thus the sum of fish in Table 7 is greater than the number of individuals (77).

Table 7. Summary of the most recent year a fish was recorded at the ladder and released upstream of Thompson Falls Dam for 77 individual fish detected in the Thompson River in 2020.

Ladder History (some fish ascended the ladder multiple times)							
Fish Species	2014	2015	2016	2017	2018	2019	2020
WCT	-	-	-	-	-	-	3
RB	1	-	1	1	1	7	18
LL	2	1	2	2	6	9	36
MWF	-	-	-	-	1	-	-
Total	3	1	3	3	8	16	57

The 14 fish with no ladder history (Table 6) include four fish (2 RB, 1 BULL, 1 WCT) initially tagged in Fishtrap Creek (WCT in 2019 and others in 2020); two Bull Trout initially tagged in West Fork Thompson River (July 2019 and August 2020); two fish (1 LL, 1 WCT) initially tagged in Thompson River - Big Hole section in June 2020; three Bull Trout initially captured below Cabinet Gorge Dam and transported upstream of Thompson Falls Dam (two in 2020 and one in 2018) as part of the Avista's Upstream Fish Passage Program; and one Westslope Cutthroat Trout initially tagged downstream in Prospect Creek. It is unclear how the Westslope Cutthroat Trout moved upstream into the Thompson River, but avian predation is one possibility. In 2019, a PIT tag from a Chinook hatchery fish from Idaho (90 miles away) was detected in the Thompson River, potentially transported via an avian predator. The remaining two fish detected in the Thompson River have no known initial tagging history but are assumed to have been initially tagged in the Thompson River in 2020.

FWP also monitored 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 technical challenges. Data collection was not continuous for the 2020 calendar year. This report only summarizes ladder fish detections in the two tributaries.

In 2020, four individual ladder fish (3 RB, 1 WCT) were detected in Fishtrap Creek in April, May, and September. The Westslope Cutthroat Trout was last recorded at Thompson Falls fish ladder in 2018 and has remained upstream of the dam for the last 2 years. One Rainbow Trout was last recorded at the fish ladder in 2019, while the other two Rainbow Trout ascended the ladder in 2020 and were detected in Fishtrap between 19 and 25 days following their release at the dam. There were no ladder fish detected by the array in West Fork Thompson River for the 2020 season.

Section 2.9 – 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 are some technical challenges with the array system, and it is unclear how efficient the system is at detecting PIT-tagged fish.

In 2020 (January through November), 52 individual fish (40 WCT, 6 RB, 3 LL, 3 BULL) were detected by the Prospect Creek array. Over 80 percent of the fish (43 of 52) detected in Prospect Creek were initially sampled in Prospect Creek, including 40 Westslope Cutthroat Trout, and three Bull Trout. The 40 Westslope Cutthroat Trout were initially tagged in Prospect Creek (28 fish in 2020 and 12 fish in 2019) during FWP's Prospect Creek salvage program.

All three Bull Trout detected in 2020 were initially tagged in Prospect Creek. One Bull Trout (ID#982126050371198) was initially tagged in Cooper Gulch in July 2014 prior to be transported downstream below Cabinet Gorge Dam. This Bull Trout was later captured in June 2019 below Cabinet Gorge Dam and transported upstream to Prospect Creek where it was most recently detected via the tag array on November 23, 2020. The second Bull Trout was initially captured in a weir trap and tagged in Prospect Creek July 2013 (ID#900226000570368), with subsequent tag array detections in Prospect Creek in September 2018, August 2019, and June and July 2020. The third Bull Trout (ID#900226000872763) was initially captured and tagged in August 2017 and later detected via the tag array on April 3, 2020.

The remaining nine fish detected in Prospect Creek in 2020 have all ascended the ladder and include six Rainbow Trout and three Brown Trout. Of the nine-ladder fish, their ladder histories varied with one or more ascents recorded in 2018, 2019, and 2020. One fish (Brown Trout) ascended the ladder in July 2019, was detected in the Thompson River 1-day later and was detected downstream of the dam in Prospect Creek on December 28, 2020. (Note the Thompson River array was not operating between late August 2019 and 2020.)

Since the Prospect Creek tag array was installed in August 2018, a total of 15 individual fish with a history of ascending the Thompson Falls ladder have been detected in Prospect Creek. To provide some perspective, this is 15 fish out of 756 (2%) salmonids PIT-tagged (2018-2020) at the ladder. The 15 fish include nine Rainbow Trout, five Brown Trout, and one Westslope Cutthroat Trout. Interestingly, five (2 RB, 2 LL, 1 WCT) of the 15 fish have ascended the ladder more than one time while two fish (1 RB, 1 LL) returned to the lower pools of the ladder but did not ascend. One Rainbow and Brown Trout recorded ascending the fish ladder in two separate years along with detections in the Thompson River and Prospect Creek. One Brown Trout ascended the ladder in 2017, migrated downstream 2 months later into Graves Creek, returned to the ladder 1-year later and ascended the ladder a second time before being detected in Prospect Creek in October and November 2018.

Section 2.10 – Ladder Fish Detections by Angler Reports

Since 2017, salmonids receive a Floy tag (Photograph 2) that is easily visible to anglers. FWP contact information is provided on the Floy tag. Other species have also received Floy tags in the past (e.g., SMB in 2015), but the primary focus in the last few years has been salmonids.



Photograph 2. Westslope Cutthroat Trout recorded at the ladder on April 13, 2020 (PIT TAG #989001030300636) and released upstream. Angler captured and reported fish on April 22, 2020 about 39 miles upstream in the lower Flathead River near Dixon, Montana (9 days later).

In 2020, anglers reported capturing 21 ladder fish, 15 upstream and six downstream of the Thompson Falls Dam to FWP (FWP, unpublished). These fish included 11 Rainbow Trout, six Brown Trout, two Westslope Cutthroat Trout, and two Smallmouth Bass. The ladder history for these fish included ascents in 2015, 2017, 2019, and 2020. A summary of Floy-tagged Smallmouth Bass (all tagged in 2015) and salmonids (tagged since 2017) were released upstream of the ladder and subsequently reported by anglers to FWP is summarized in Table 8.

Table 8. Summary of ladder fish, including Floy-tag Smallmouth Bass reported by anglers since 2015 and Floy-tagged salmonids reported by anglers since 2017 (FWP, unpublished). Angler reports include fish caught upstream and downstream of Thompson Falls Dam.

Species	2015	2016	2017	2018	2019	2020	Total
LL				1	3	6	10
RB			1		9	11	21
WCT				1	1	2	4
SMB	10	18	5	1	2	2	38
Total	10	18	6	3	15	21	73

The data show the large geographical area, both upstream and downstream of Thompson Falls Dam, fish are utilizing (Figure 5). Since 2017 when salmonids began receiving a Floy tag at the ladder prior to their release upstream, 36 salmonids have been recaptured (Figure 5). The majority of the fish (26) were recaptured upstream, including the Thompson River, mainstem Clark Fork River, Flathead River, Post Creek (tributary to the Flathead River), St. Regis River, Petty Creek, near the Rattlesnake River, and in Johnson Creek (Blackfoot River tributary). The remaining 10 salmonids were reported downstream of the dam in White Pine Creek, Vermilion Bay, the mouth of Prospect Creek, and downstream of the Main Dam. In 2020, FWP reported a 533 mm Rainbow Trout about 158 miles upstream of the dam in Johnson Creek during April fish surveys (FWP, unpublished) that ascended the Thompson Falls fish ladder 32 days prior. This fish moved an average of 4.9 miles a day. White Pine Creek (28 miles downstream) and McKay Flat in the Noxon Reservoir (31 miles downstream) were the furthest downstream reports of recaptured ladder fish.

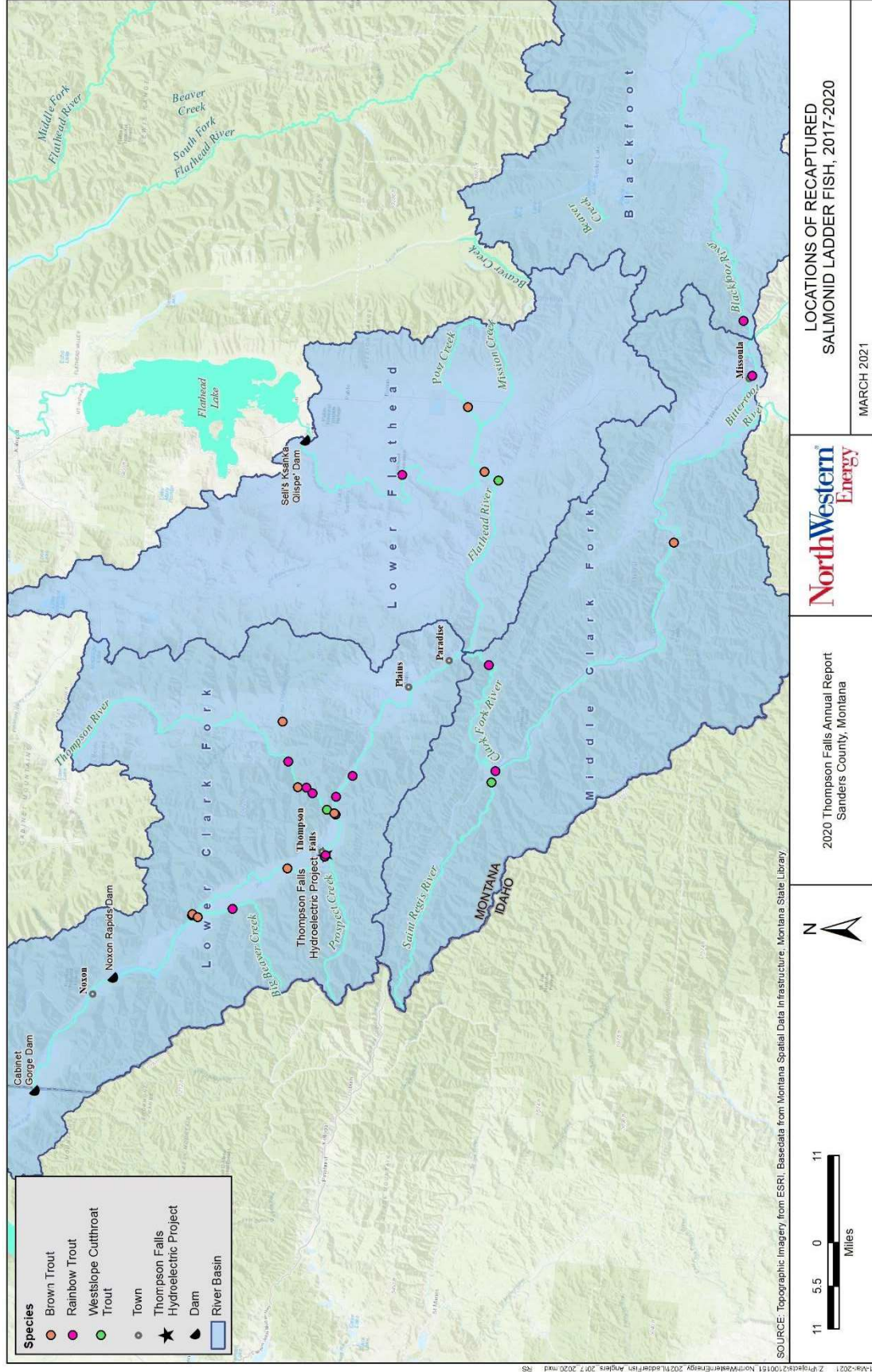


Figure 5. Locations of recaptured salmonid ladder fish, 2017-2020 (FWP, unpublished)

Section 3.0 – Baseline Fisheries Monitoring

Baseline fisheries data collection includes fall gillnetting in the Thompson Falls Reservoir, 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. The location of each reach is shown in Figures 6 and 7. Gillnetting in the Thompson Falls Reservoir has occurred annually each October, since 2004. Monitoring via electrofishing began in 2009 in the Thompson Falls Reservoir and in 2010 in the Clark Fork River. In 2016 the TAC agreed to modify the frequency of the baseline surveys starting in 2017. Gillnet sampling continues to be annual, but electrofishing occurs every other year. This section provides a summary of the 2020 electrofishing surveys and gillnetting survey.

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 33,700 fish since 2011.

In 2020, four ladder fish were captured during the baseline surveys, three fish (1 LL, 1 RB, 1 WCT) in the spring and one fish (1 RB) in the fall. Between 2011 and 2020 a total of 33 ladder fish have been recorded during the baseline surveys, including 24 Rainbow Trout, seven Brown Trout, and two Westslope Cutthroat Trout. The 33 fish represent 14 fish captured in the Clark Fork River above the islands complex reach, 10 fish captured in the upper section and four fish captured in the lower section of the Reservoir, three fish captured in the Paradise to Plains reach, and two fish captured gillnetting in the Reservoir. The baseline surveys have captured about 1 percent of the 3,108 salmonids PIT-tagged at the ladder between 2011 and 2020 (*refer to Table 4*). The 2020 results from the fisheries surveys for each reach are provided in the following sections.

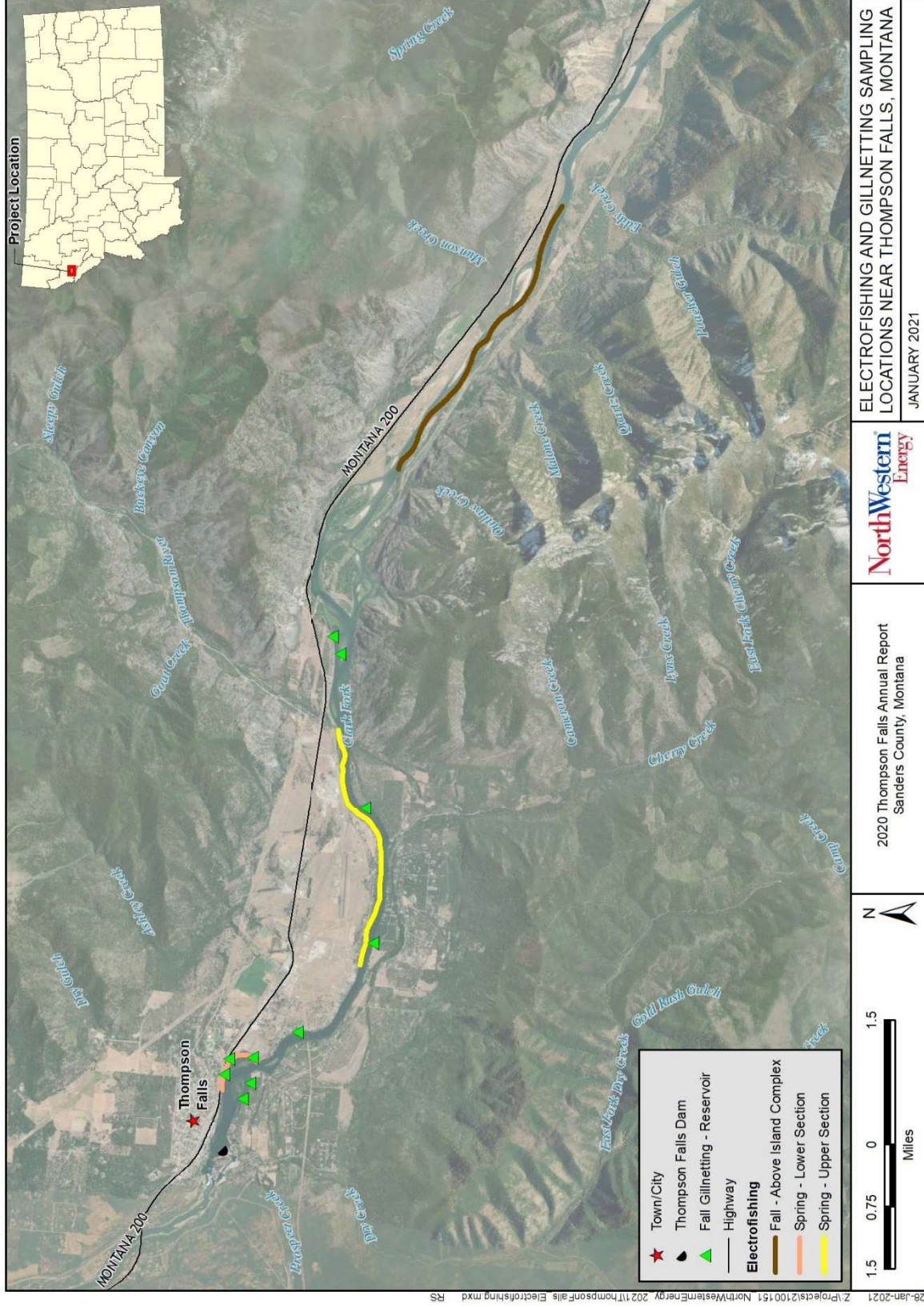


Figure 6. Electrofishing and gillnetting sampling locations near Thompson Falls, Montana.

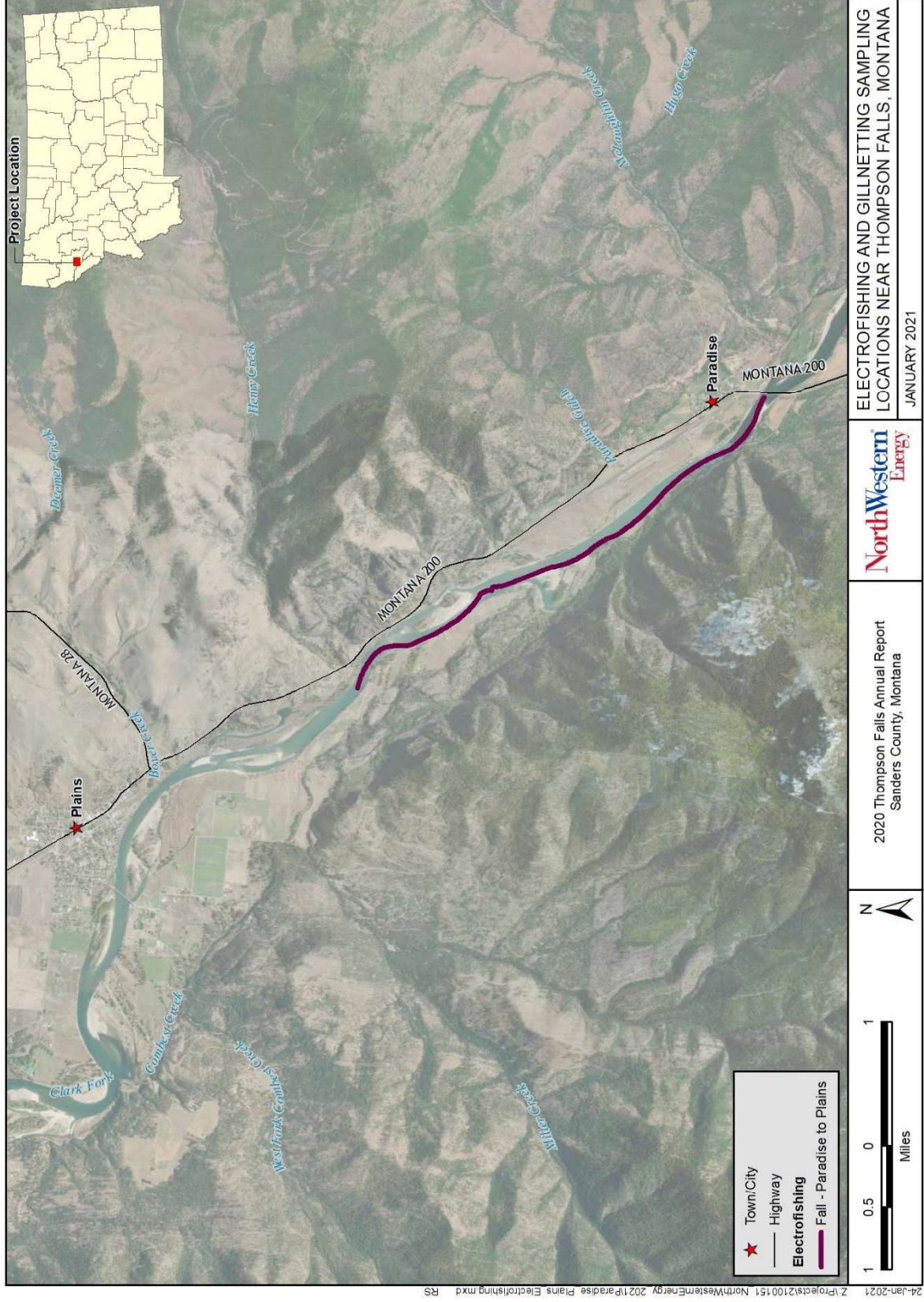


Figure 7. Electrofishing reach between Paradise and Plains, Montana.

Section 3.1 – Spring Electrofishing

Spring electrofishing in the Thompson 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 2020 sampling occurred on April 16 and 23, similar to the sampling dates from previous years. Table 9 summarizes sampling events since 2009, water temperature in Celsius (°C), and streamflow (cfs) at the USGS gage #12389000.

Table 9. Summary of the sample dates, water temperature, duration of electrofishing efforts, and streamflows (USGS gage #12389000) completed in the lower and upper sections of the Thompson Reservoir 2009-2020.

Lower Section			Upper Section			USGS Gage
Date	Water Temperature °C	Duration of Electrofishing (hrs)	Date	Water Temperature °C	Duration of Electrofishing (hrs)	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	1.15	4-16-20	8.8	2.7	12,700 - 14,900

Section 3.1.1 – Lower Section

In 2020, spring electrofishing in the lower section captured 96 fish representing nine species, including two salmonid species (LL, RB). The most common species observed in 2020 were Yellow Perch (n=52), Largemouth Bass (n=16), Northern Pike (n=11), and Pumpkinseed (n=8). Other species recorded in 2020 include Largescale Sucker, Northern Pikeminnow, Smallmouth Bass, Rainbow Trout, and Brown Trout. Overall catch per unit effort was approximately 83 fish per hour, with the majority of these fish non-salmonids (81.6 non-salmonids per hour).

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 are more common in the lower section than salmonids (Figure 8).

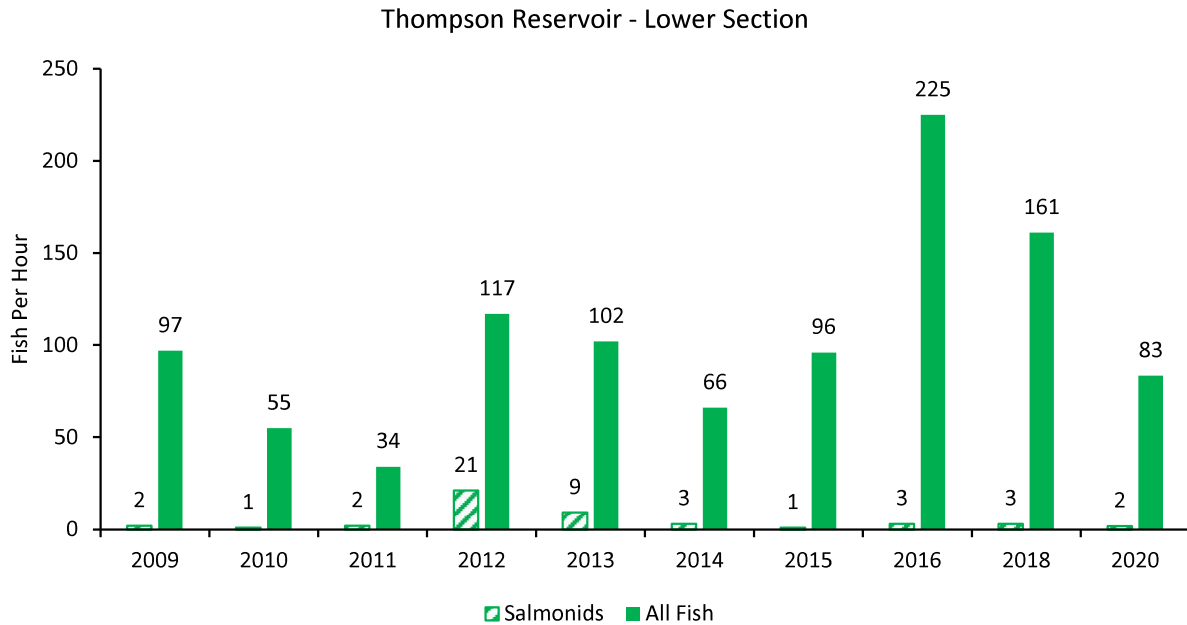


Figure 8. Summary of the annual catch rate for salmonids and all fish species captured during spring electrofishing efforts in the lower section of the Thompson Reservoir, 2020.

Since baseline surveys began in 2011, four uniquely tagged ladder fish (3 RB, 1 WCT) were recorded in the lower section with two fish detected in 2016 and two fish in 2013. No tagged ladder fish was recorded in 2018 or 2020.

Section 3.1.2 – Upper Section

The 2020 sampling of the upper section resulted in 93 fish captured representing five non-salmonid species, four salmonid species, and one salmonid hybrid. The most common species observed in 2020 were Largemouth Sucker (n=22), Northern Pikeminnow (n=15), Brown Trout (n=11), Rainbow Trout (n=10), and Smallmouth Bass (n=10). Other species documented included Westslope Cutthroat Trout (n=7), Mountain Whitefish (n=6), Northern Pike (n=5), Rainbow hybrid (n=2), and Yellow Perch (n=1). Spring sampling resulted in about 34.2 fish per hour (14.8 salmonids per hour).

Since spring surveys began in 2009, the number of fish captured per sample event has ranged from 63 to 253 individual fish representing nine to 13 species. Salmonids are more common in the upper section, varying from a low of 10 salmonids in 2009 to a high of 115 salmonids in 2013. Catch per unit effort for salmonids and all fish species has varied annually as shown in Figure 9. The salmonid catch rate in the upper section in 2020 was 43 percent of the total catch rate. The average salmonid catch rate from 2009 to 2018 was about 35 percent of the total catch rate.

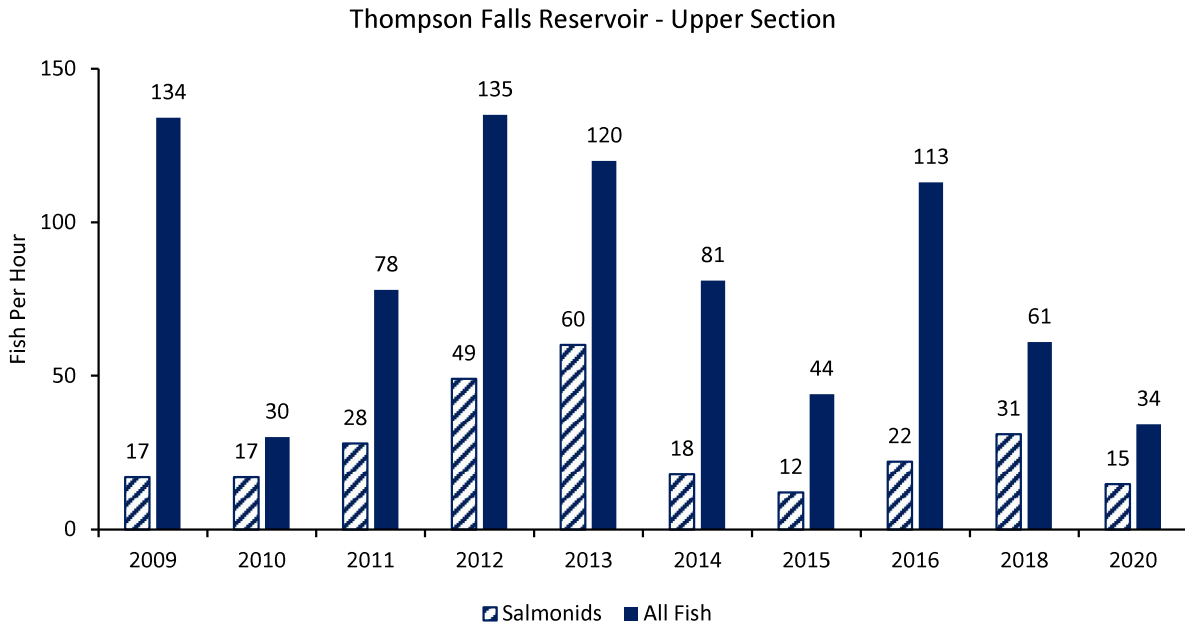


Figure 9. Summary of the 2009-2020 annual catch rate for salmonids and all fish species captured during spring electrofishing efforts in the upper section of the Thompson Reservoir.

In 2020 there were three uniquely tagged ladder fish (WCT, LL, RB) captured in the upper section. The Westslope Cutthroat Trout (ID#30300681) ascended the ladder April 13, 2020 measuring 457 mm and was captured electrofishing 3 days later. The Rainbow Trout (ID#30300712) was first recorded at the ladder 3 weeks earlier on March 26 measuring 321 mm before being captured electrofishing. The Brown Trout (ID#6029517) ascended the ladder April 22, 2019 measuring 312 mm and was subsequently detected in the Thompson River via the remote array station on June 12, 2019 before the most recent record during electrofishing on April 16, 2020 (measuring 384 mm).

Since the ladder began operations in 2011, 10 fish (5 LL, 4 RB, 1 WCT) recorded ascending the ladder (receiving a unique tag and released upstream) were subsequently detected during spring electrofishing in the upper section (4 fish in 2016, 3 in 2018, 3 in 2020).

Section 3.1.3 – Spring Electrofishing Summary

The catch per unit effort of salmonids remains greatest in the upper section, averaging 27 salmonids per hour (2009-2020). The lower section averages 4.7 salmonids per hour (2009-2020). Non-salmonids such as Largemouth Bass, Northern Pike, Pumpkinseed, and Yellow Perch are on average the most common species captured in the lower section; whereas species such as Largescale Suckers, Northern Pikeminnow, and Rainbow Trout are on average the most common species captured in the upper section as was observed in 2020 (Figure 10). The differences in species composition and abundance of salmonids are likely related to habitat conditions in each survey section. The upper section is more of a riverine environment. The lower section, which is closer to Thompson Falls Dam, is more lacustrine.

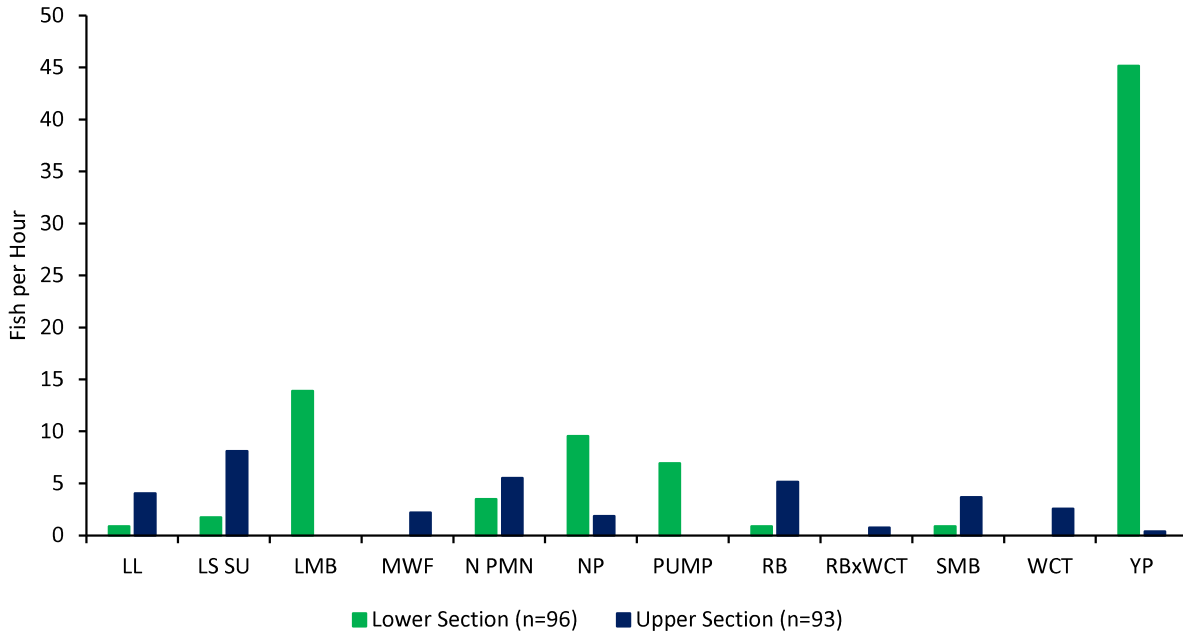


Figure 10. Summary of the 2020 catch rate for all fish species captured during spring electrofishing efforts in the lower and upper section of the Thompson Reservoir.

Section 3.2 – Autumn Electrofishing

During the autumn of 2020, 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 10.

Table 10. Summary of autumn electrofishing efforts in the Above Islands reach and Paradise-to-Plains reach 2009-2020, including the year, date(s), duration of sample in hours (hrs), approximately 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

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)
2018	10/16-17	3.5	10,300-10,900	10/15	3.3	10,900
2020	10/21-22	4.25	11,700-13,000	10/28 & 11/2	4.1	12,500

Section 3.2.1 – Electrofishing Above the Island Complex

In 2020 electrofishing efforts in the Clark Fork River were completed from the confluence with Eddy Creek downstream to the island complex (approximately 3-mile section), also known as the above the island complex reach (*refer to* Figure 6). The above island complex reach is characterized as riverine habitat. The 2020 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 2020, river left was sampled the night of October 21 and river right was sampled the night of October 22. Stream temperatures were approximately 8.5°C. The sampling efforts resulted in 219 fish recorded (88 fish from the right bank, 131 fish from the left bank) representing 10 species. There were 137 salmonids represented by four species (82 MWF, 30 LL, 24 RB, 1 BULL).

The catch per unit effort (fish per hour) by species in the above island complex was dominated by Mountain Whitefish (19.3 fish per hour) followed by a relatively even catch rate (5.6 to 7.1 fish per hour) for Brown Trout, Largescale Sucker, Northern Pikeminnow, Rainbow Trout, and Northern Pike (Figure 11).

In 2020, the overall fish per hour was the lowest compared to previous years, 52 fish per hour. However, the salmonid catch per unit effort (32 salmonids per hour) was representative of the last 5-years. Catch rate (total fish per hour and salmonids per hour) for all years is shown in Figure 12.

The variability in catch rates among the sampling years (Figure 12) 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.

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.

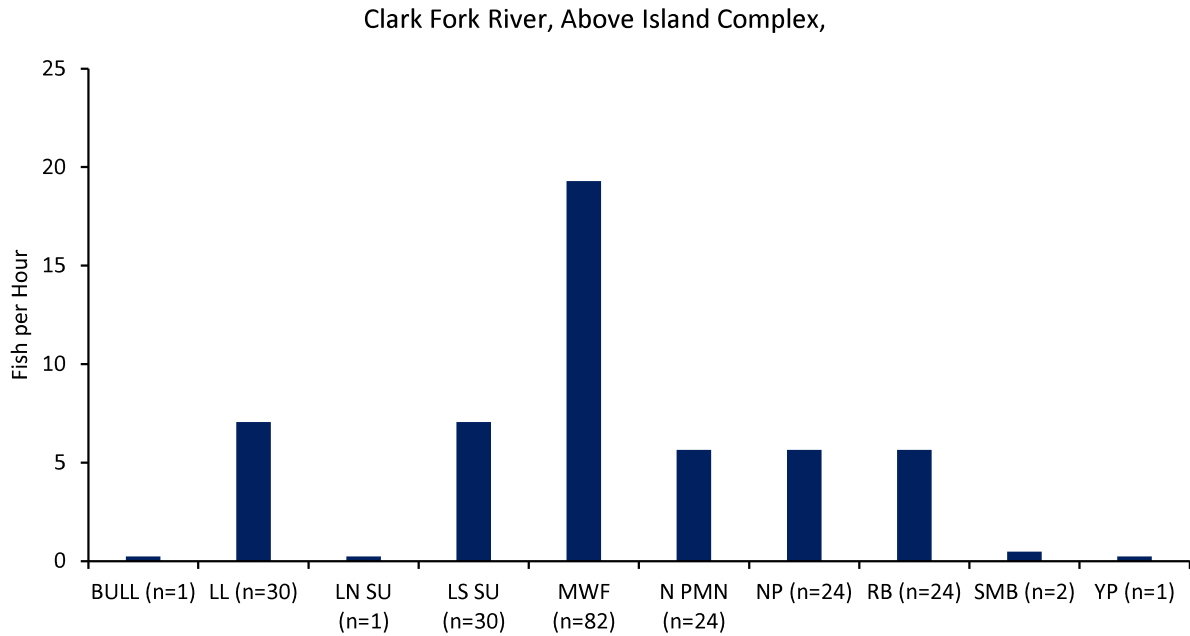


Figure 11. Summary of the catch rate (fish per hour) annually in the Clark Fork River – Above the Island Complex, October 2020.

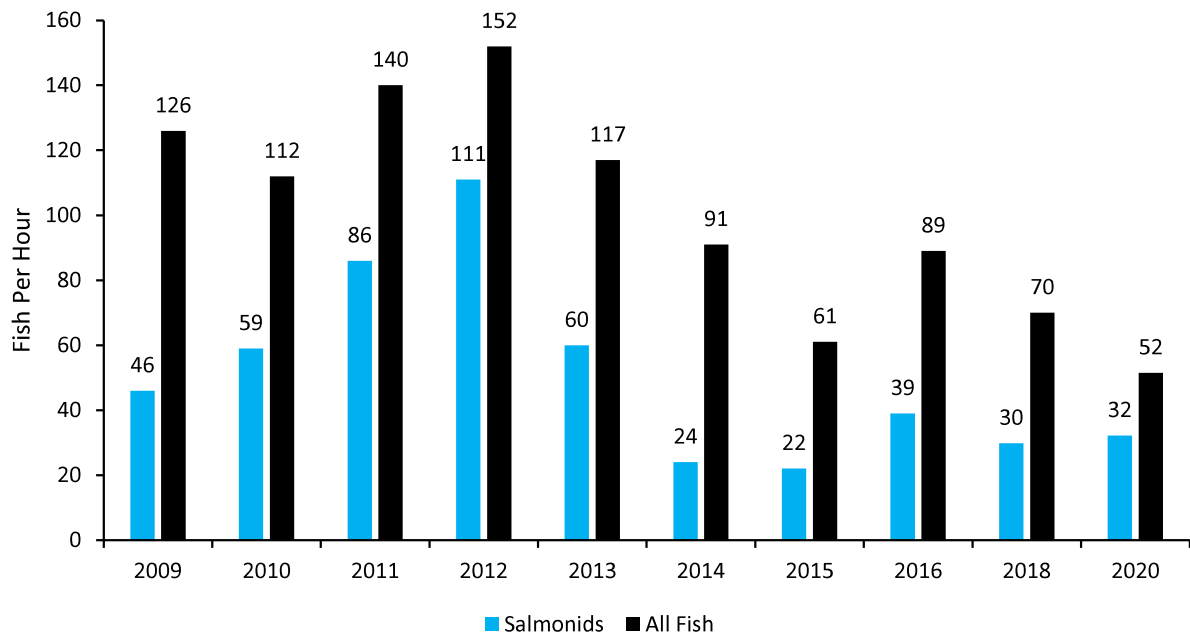


Figure 12. Summary of the 2009-2020 annual catch rate for all salmonids and all fish captured in the Clark Fork River – Above the Island Complex.

Section 3.2.2 – Electrofishing 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, and 2020. Electrofishing began approximately 1.5 miles downstream of the Clark Fork/Flathead River confluence, immediately downstream of Montana Highway 200 bridge at the town Paradise and ended at the USGS gage station #12389000 located near the town of Plains, approximately 4 miles downstream (see Figure 7).

There were 156 fish, representing three non-salmonid species (LS SU, NPMN, SMB) and four salmonid species (LL, MWF, RB, WCT), sampled in the Paradise-to-Plains reach in 2020. There were no PIT-tagged fish recorded during the survey. The total number of fish captured in 2020 was the lowest since surveys began in 2010. The predominant species recorded in 2020 was Rainbow Trout (53) followed by Northern Pikeminnow (n=36), Mountain Whitefish (n=28) and Largescale Sucker (n=25), Brown Trout (n=11). Species less commonly observed (n≤ 2) included Westslope Cutthroat Trout and Smallmouth Bass. The 2020 catch rates by species are illustrated in Figure 13.

The 2020 catch rate results (38 fish per hour, 23 salmonids per hour) from the Paradise to Plains reach were significantly lower than previous years, ranging from 116 to 314 fish per hour or 43 to 136 salmonids per hour (Figure 14). In previous surveys (2010-2018), salmonids represent approximately 28 to 52 percent of the fish recorded in the reach (Figure 14). The 2020 sample had the highest proportion of salmonids (60%) of all sampling events but the lowest catch rate per hour.

Since 2011, a total of three Rainbow Trout (1 in 2012; 1 in 2014; 1 in 2016) that had previously ascended the ladder were captured in the Paradise to Plains reach (NorthWestern, 2017). No ladder fish was detected in this reach in 2018 or 2020.

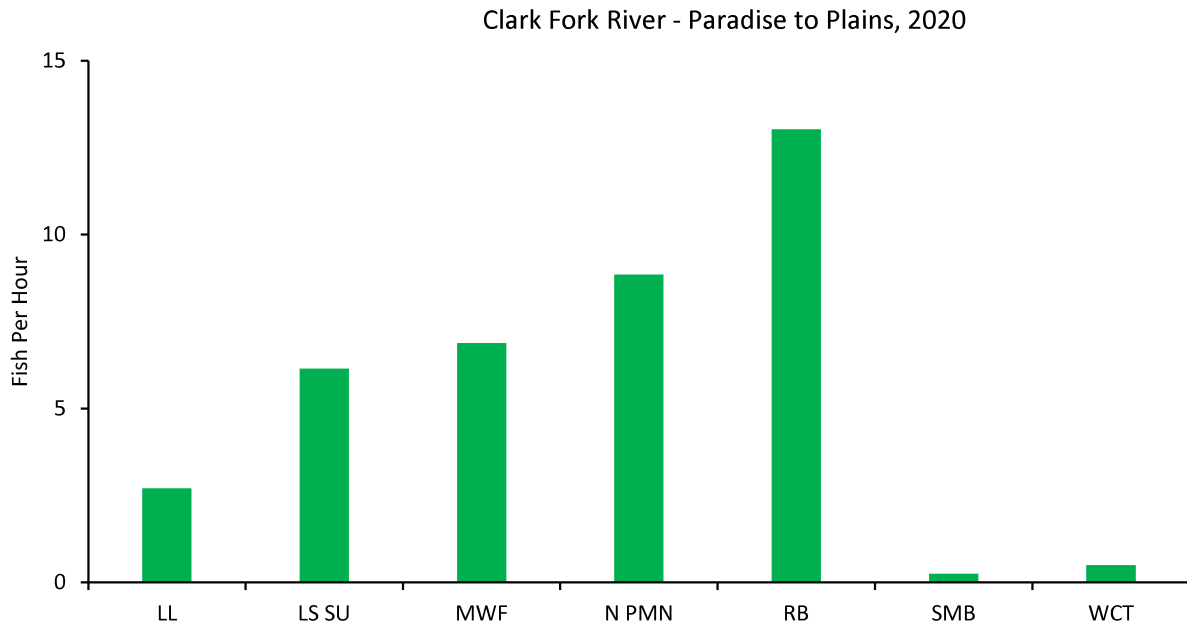


Figure 13. Summary of annual CPUE for each species during the Clark Fork River autumn electrofishing between Paradise and Plains, 2020.

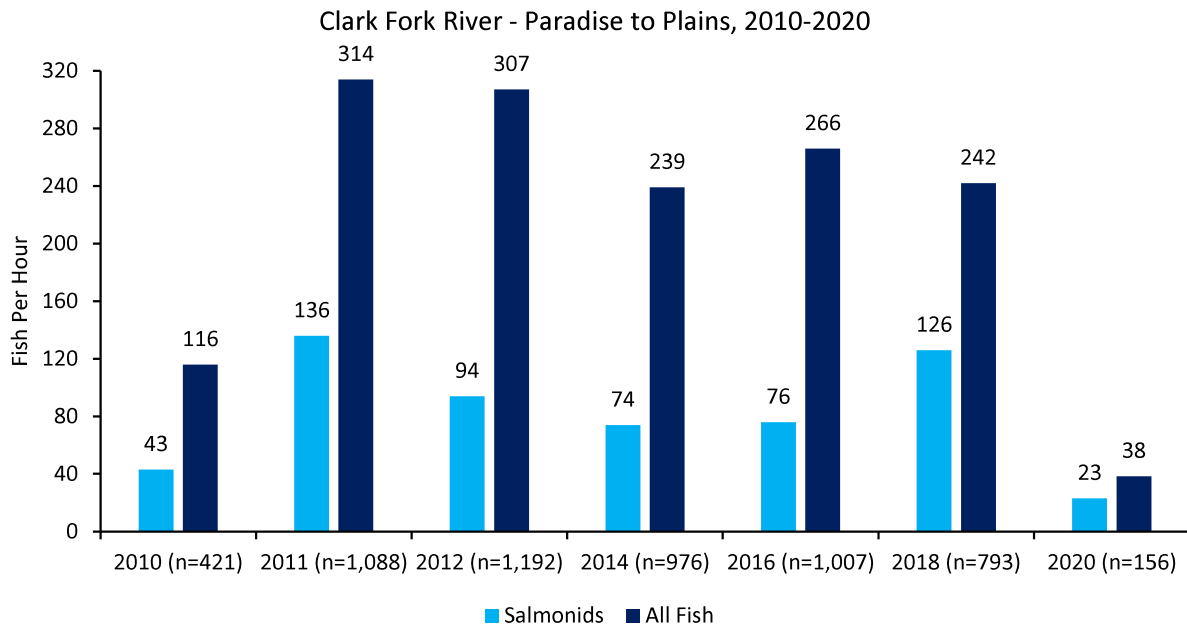


Figure 14. Summary of the annual catch rate for all salmonids and all fish captured in the Clark Fork River Paradise and Plains, 2010-2020.

Section 3.2.3 – Autumn Electrofishing Summary

Salmonids consistently represent a larger portion of fish recorded in the Clark Fork River above the island complex and the Paradise to Plains reaches in contrast to the Thompson Reservoir upper and lower sections. Salmonid catch rates in the above island complex were within the values of previous years, but the salmonid catch rates in Paradise to Plains were substantially lower. The total catch rates for fish in the above island complex and Paradise to Plains reaches were lower in 2020 than previous years. The most notable difference in species composition in the above islands complex reach was the reduction in Largescale Sucker and Northern Pikeminnow. In the Paradise to Plains reach, the species composition was similar to previous years but with much lower numbers across the board.

Section 3.3 – Thompson Falls Reservoir – Fall Gillnetting

The established gillnet sampling sites in the Thompson Falls Reservoir are shown in Figure 6. FWP 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 2020 compared to the average, minimum and maximum catch per net between 2004 and 2020 is shown in Table 11.

Table 11. Catch per net, by species, during annual October gillnetting series on Thompson Falls Reservoir in 2020 and the 2004-2019 average, minimum, and maximum catch per net. A dash indicates no (zero) fish of that species was captured.

Species	2020	2004-2019		
		Avg	Min	Max
BL BH	-	3.4	-	14.1
LL	-	0	-	0.2
LMB	-	0.1	-	0.3
LN SU	-	0.1	-	0.5
LS SU	0.2	0.8	0.2	1.3
NP	4.5	2.5	1.0	4.9
N PMN	0.2	0.4	-	1.0
PEA	-	0	-	0.1
PUMP	0.1	0.3	-	1.8
RB	0.1	0.1	-	0.4
SMB	-	0.2	-	0.5
WCT	-	0	-	0.2
YP	0.2	0.7	0.1	1.8
YL BL	-	0	-	0.1
Total	5.3	8.6	3.3	23.1

In 2020, nets were set on October 15 and pulled approximately 22.5 hours later on October 16. There were 53 fish captured representing six species (LS SU, NP, NPMN, PUMP, RB, YP). No Black Bullhead was recorded in 2020. The total catch per net (5.3) was below average (8.6 fish per net) but close to the median value (5.5 fish per net) for the period of record (Figure 15).

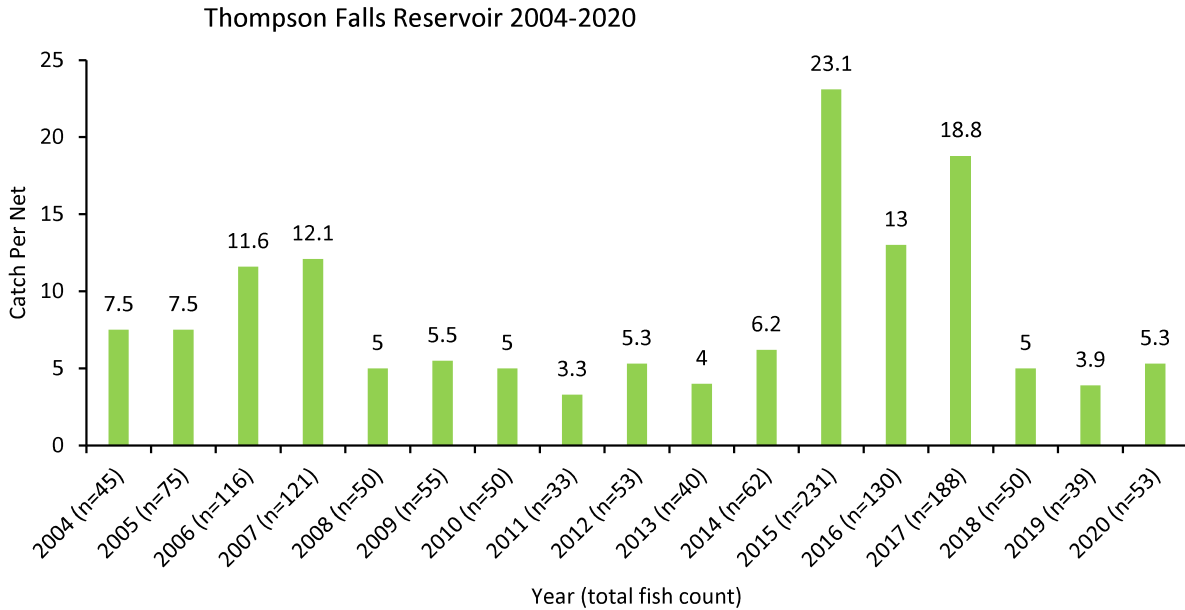


Figure 15. Summary of catch per net during annual gillnetting efforts in Thompson Falls Reservoir, 2004-2020.

In general, salmonids are rarely observed in Thompson Falls Reservoir gill net catches. The most common species in Thompson Falls Reservoir is Black Bullhead, with Northern Pike being the second-most common species (see Table 11).

Section 4.0 – Total Dissolved Gas 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.

Section 4.1 – TDG Monitoring

The Licensee has monitored TDG in the Clark Fork River in the Project area for 15 years between 2003 and 2020. All field work and data gathering are conducted by the Licensee's personnel. The methods for TDG data collection in 2020 were the same as previous years (NorthWestern, 2019a; New Wave and GEI, 2020).

The TDG monitoring sites in 2020 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.

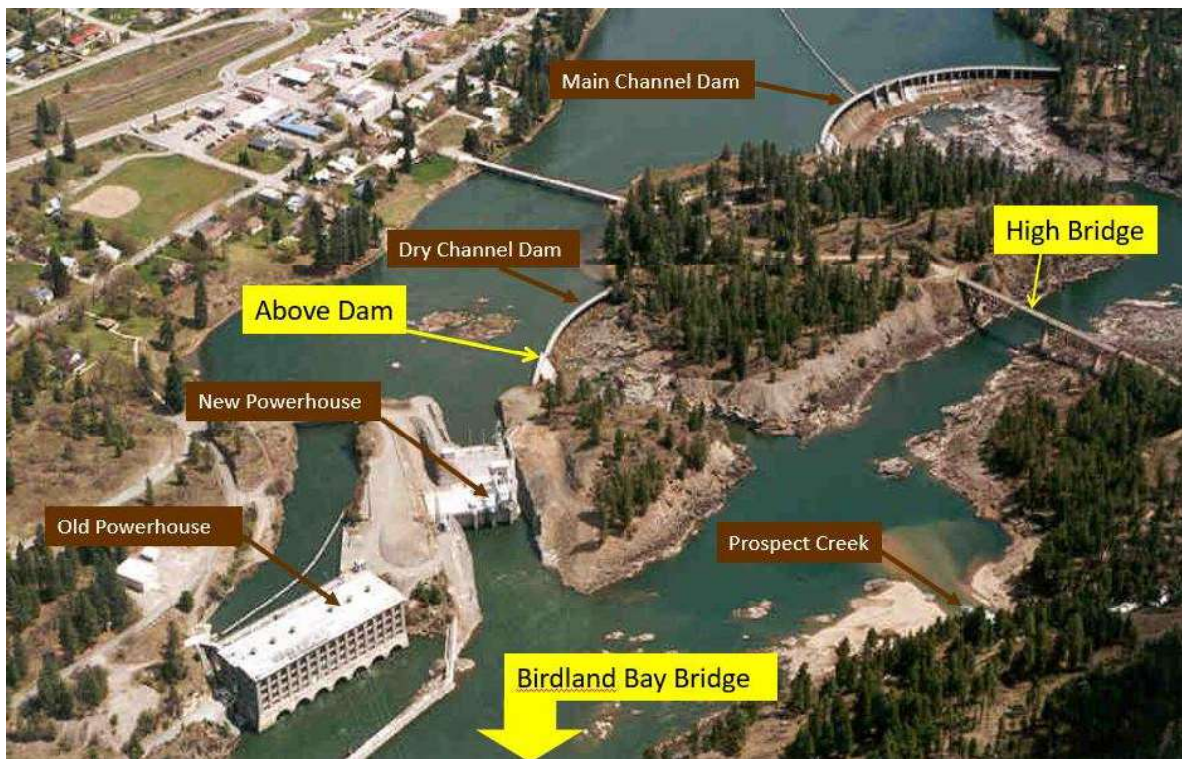


Figure 16. Monitoring locations for total dissolved gas at the Thompson Falls Hydroelectric Project site.

TDG is monitored during the high flow season, typically from April until July, with exact dates varying slightly every year. In 2020, TDG data were evaluated from April 28 through June 25 at High Bridge, from April 22 to July 15 at Birdland Bay Bridge, and from May 22 through July 9 at Above Dam (Figure 17).

Section 4.1.1 – 2020 TDG Monitoring Results

Peak discharge in the Clark Fork River in the Project area in 2020 was higher than the long-term average of 60,000 cfs, reaching approximately 80,260 cfs on June 2, 2020 (as measured by the sum of the Clark Fork River streamflow measured at Plains USGS Station #12389000 and in the Thompson River at Thompson Falls USGS Station #12389500).

Similar to past years, TDG in 2020 was lowest upstream of the Project, 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).

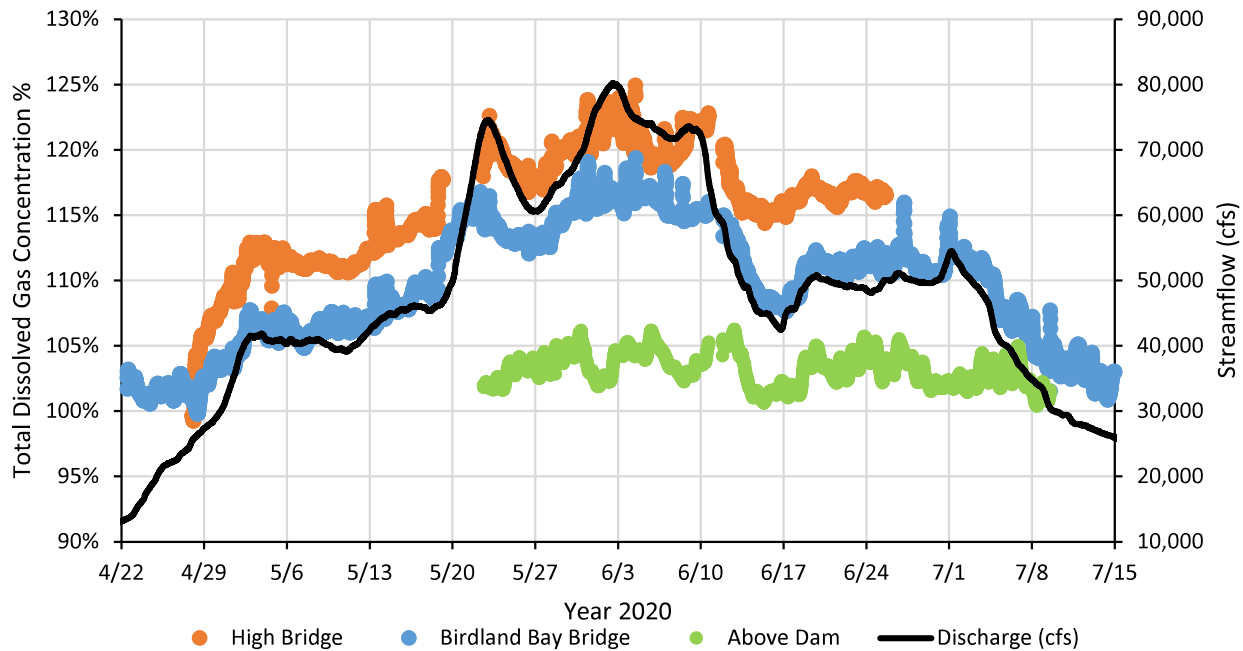


Figure 17. Total Dissolved Gas (% of saturation) upstream and downstream of the Project and streamflow (cfs) as measured by the USGS gage #12389500 and 12389000, April 22 through July 15, 2020.

TDG upstream of the Project peaked at approximately 106 percent of saturation during 2020. TDG levels at the High Bridge approached 125 percent of saturation. Further downstream, TDG levels declined slightly to 119 percent saturation at Birdland Bay Bridge. TDG levels declined downstream of the High Bridge as a result 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

Section 5.1 – 2020 Project Updates

Three projects were approved for funding by the TAC and implemented in 2020. These projects included:

- Thompson River Property Acquisition
- Fishtrap Creek Habitat Enhancement
- Misc. Emergency Fund

Refer to the December 8, 2020 meeting summary available on the Project website for additional details.

Section 5.2 – 2021 TAC Approved Projects

During the virtual 2020 Annual Thompson Falls TAC Meeting on December 8, there were four proposals presented. Refer to the December 8, 2020 meeting summary available on the Project website for additional details.

Four projects were approved unanimously by the voting TAC members [Confederated Salish and Kootenai Tribes (CSKT), FWP, FWS, and NorthWestern]. The following table (Table 12) provides a summary of the approved funding for each of the four projects proposed for the 2021 calendar year.

Table 12. Project proposals approved by the TAC for 2021 implementation.

Agency/Entity	Project Proposal for 2021	TAC Funding Requested
The Conservation Fund	Thompson River Land Interest Acquisition Investigation	\$15,000
MFWP	Big Rock Creek Barrier Design and Public Scoping	\$34,000
NorthWestern	Habitat Project Assistance	\$5,000
NorthWestern	Emergency Funding	\$10,000
TOTAL Approved		\$64,000

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

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

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. 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, and 2020 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 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 (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 FDH PIT-tagged fish. 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 14 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. 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 2020
TC 7(e)	No incidents to report in 2020

Section 6.1 – Bull Trout Incidental Take Summary 2009-2020

In compliance with FWS's BiOp TC 7a, this section provides a summary of the documented cumulative incidental take from previous years' activities (2009-2020) in support of the upstream fish passage at the Project. Between 2009 and 2020, the Licensee sampled 39 Bull Trout representing 37 individuals (Table 14).

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, 18 Bull Trout, representing 17 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 14. 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; EF = electrofishing; L = length; Wt = weight

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

Date	Method of Capture	Location	Action	Personnel	L (mm)	Wt (g)	Genetic Assignment	Condition at time of release
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
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	Ladder	TFalls Dam	Fish Passage Studies	Licensee FWP	547	1438	Fishtrap Creek (R4)	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	Fish Passage Studies	Licensee FWP	482	966	Meadow Creek (R4)	Alive 2011
4/17/12	EFISH	TFalls Reservoir (Upper Section)	Long-term Population Monitoring	Licensee FWP	260	140	Fishtrap Creek (R4)	Alive

Date	Method of Capture	Location	Action	Personnel	L (mm)	Wt (g)	Genetic Assignment	Condition at time of release
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 – 2021 Proposed Activities and Reporting

In 2021, NorthWestern will continue to collect baseline fisheries data (gillnetting), will continue to operate the upstream fish passage facility, and collect species, length and weight data, will continue to monitor total dissolved gas, and will continue to collaborate with TAC members to implement proposals approved for 2021.

In 2021, 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 with the exception of 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 ladder 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. Genetic samples will be taken for Bull Trout and Westslope Cutthroat Trout. For the 2021 season and future seasons, 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 15) summarizes the tagging protocol for the 2021 season.

Table 15. Tagging protocol for fish species recorded at the ladder in 2021 (same as 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	X	
MWF	X	X			
SMB					Do not release upstream. 1st capture lower caudal clip. Upon recapture upper caudal clip.

NorthWestern will continue to monitor TDG in the Project area in 2021. However, no gas bubble trauma monitoring is scheduled for 2021. NorthWestern will also continue to monitor the remote array stations in the Thompson River and Prospect Creek in 2021.

NorthWestern will prepare a summary report for 2021 activities that will be submitted to FWS and the TAC, as well as filed with the Commission by April 1, 2022.

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 Energy (NorthWestern). 2017. 2016 Annual Report Fish Passage Project Thompson Falls Hydroelectric Project, FERC Project Number 1869.
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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.