NorthWestern Energy, 40 East Broadway, Butte, Montana 59701

NorthWestern Energy
Delivering a Bright Future

NWE-TFalls-3254

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

March 30, 2015

RE: NorthWestern Energy filing 2014 Annual Activity, Fish Passage and Bull Trout Take Report for Thompson Falls Hydro Project (1869)

Dear Secretary Bose:

Herein attached, per Item D of Commission Order dated February 12, 2009, is NorthWestern Energy's 2014 Annual Activity, Fish Passage and Bull Trout Take Report (Report) for the Thompson Falls Hydro Project, completed in consultation with the U.S. Fish and Wildlife Service (USFWS), Montana Fish, Wildlife and Parks, Montana Department of Environmental Quality and Confederated Salish and Kootenai Tribes. The USFWS signature of approval (under their Section 7 Terms and Conditions Authority) for this Commission filing and Report is included on page 2.

Sincerely,

Jon Jourdonnais,
Leader, Hydropower License Compliance

cc: Wade Fredenberg, USFWS
Craig Barfoot, CSKT
Eric Urban, MDEQ
Randy Apfelbeck, MDEQ
Don Skaar, MFWP
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Mary Gail Sullivan, NWE
Ginger Gillin, GEI Consultants, Inc.
Kristi Webb, NewWave

The USFWS has reviewed, and by signature below, approves this Thompson Falls Project 2014 Annual Activity, Fish Passage and Bull Trout Take Report filing with the Commission.

Name

Brent Esmoil, Deputy Field Supervisor

USFWS Position

3/26/2015

Date

2014 Annual Report
Fish Passage Project
Thompson Falls Hydroelectric Project
FERC Project Number 1869

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

Submitted by:
NorthWestern Energy Corporation
Butte, Montana

In Collaboration With:
Montana Fish Wildlife and Parks
Thompson Falls, Montana

U.S. Fish and Wildlife Service
Kalispell, Montana

Montana Department of Environmental Quality
Helena, Montana

Confederated Salish and Kootenai Tribes of the Flathead Nation
Pablo, Montana

With Assistance From:
GEI Consultants, Inc.
Portland, Oregon

New Wave Environmental Consulting, LLC
Missoula, Montana

March 2015

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Acronyms

Adaptive management funding account	AMFA
Auxiliary water system	AWS
Avista Corporation	Avista
Biological Opinion	BO
Brook trout	EB
Brown trout	LL
Bull trout	BULL
Black Bullhead	BL BH
Catch per unit effort	CPUE
Celsius	C
Confederated Salish and Kootenai Tribes of the Flathead Nation	CSKT
Cubic feet per second	cfs
Degree	°
Electrofishing	Efish or EF
Federal Energy Regulatory Commission	FERC or Commission
Feet	ft
Full-duplex	FDX
Gas Bubble Trauma	GBT
Gram	g
Half-duplex	HDX
High-velocity jet	HVJ
Hours	hrs
Kilogram	kg
Lake trout	LT
Lake whitefish	L WF
Largemouth bass	LMB
Largescale sucker	LS SU
Length	L
Longnose dace	LN DC
Longnose sucker	LN SU
Memorandum of Understanding	MOU
Millibar	mbar
Millimeter	mm
Millimeter of mercury	mmHg
Montana Department of Environmental Quality	MDEQ
Montana Fish, Wildlife and Parks	FWP
Mountain whitefish	MWF
Mean Sea Level	msl
Northern pike	NP
Northern pikeminnow	N PMN
NorthWestern Energy Corporation	NorthWestern or Licensee

Number	n
Passive integrated transponder	PIT
Peamouth	PEA
Percent	%
Post meridiem	PM
PPL Montana, LLC	PPL Montana
Pumpkinseed	PUMP
Rainbow trout	RB
Rainbow x Westslope cutthroat trout hybrid	RBxWCT
Redside shiner	RS SH
Smallmouth bass	SMB
Technical Advisory Committee	TAC
Terms and Conditions	TCs
Thompson Falls	TFalls
Thompson Falls Hydroelectric Project	Project
Thompson Falls Upstream Fish Passage Facility	ladder
Total Dissolved Gas	TDG
U.S. Fish and Wildlife Service	FWS or Service
U.S. Geological Survey	USGS
Walleye	WE
Weight	Wt
Westslope cutthroat trout	WCT
Yellow perch	YP

Plan Abbreviations

Fish Passage Facility Evaluation Plan, Phase 2 Action Plan, 2011-2020	Fish Passage Evaluation Plan
Final Thompson Falls Fish Ladder – Fishway Operations Manual 1.0	SOP
Thompson River Bull Trout Enhancement and Recovery Plan	Plan
Total Dissolved Gas Control Plan	TDG Control Plan

Executive Summary

NorthWestern Energy Corporation (NorthWestern) is owner and operator of the Thompson Falls Hydroelectric Project (No. 1869) (Project), located on the Clark Fork River near Thompson Falls, Montana. The current Federal Energy Regulatory Commission (FERC or Commission) License was issued to the Montana Power Company (purchased by PPL Montana in 1998 and subsequently purchased by NorthWestern in 2014) in 1979 and is scheduled to expire on December 31, 2025.

In 1998, the bull trout (*Salvelinus confluentus*) was federally-listed under the Endangered Species Act as a threatened species (Federal Register, 1998). Critical habitat was designated in 2005 and revised in 2010 (Federal Register 2005, 2010). The Licensee for Project 1869 conducted 5 years of studies and filed a Biological Evaluation with the Commission on April 7, 2008 discussing the effects of the Project on bull trout and proposed conservation measures.

The 2008 Biological Evaluation was adopted as the Commission's Final Biological Assessment and submitted to the U.S. Fish and Wildlife Service (FWS or Service) on May 1, 2008. On November 4, 2008 the FWS filed with the Commission a Biological Opinion (BO) (FWS, 2008) and an associated Incidental Take Statement, which includes reasonable and prudent measures, and Terms and Conditions (TCs) to minimize incidental take of bull trout. On February 12, 2009 the Commission issued an Order Approving Construction and Operation of Fish Passage Facilities for the Project (FERC, 2009). This Order included the reasonable and prudent measures, TCs, and conservation recommendations from the BO. The FERC agreed with the FWS's conclusion that the Project is currently adversely affecting bull trout and Licensee's proposed conservation measures will reduce, but not totally eliminate, adverse impacts of the Project.

The Order requires the Licensee to file with the Commission, by April 1 of each year through the remainder of the License, the annual report referenced in Term 7a of the FWS's TCs. In addition to the requirements stipulated in Term 7a, the annual report shall also address the Licensee's compliance with the FWS's TCs.

This report is intended to fulfill the annual reporting requirement, as specified in Term 7a of the BO and the requirements of the FERC Order. This report summarizes the Licensee's 2014 activities (Sections 2.0 through 8.0); compliance with the FWS's TCs of the BO (Section 9.0); and proposed activities in 2015 (Section 10.0).

Baseline Fisheries Studies

In 2014, the Licensee (NorthWestern Energy as of November 18, 2014) with assistance from Montana Fish, Wildlife and Parks (FWP) continued collecting baseline fisheries data as presented in Section 2.0 of this report. Baseline fisheries data includes spring electrofishing the Thompson Falls Reservoir; fall electrofishing in Clark Fork River above the island complex; fall

electrofishing in Clark Fork River between the towns of Paradise and Plains; and fall gillnetting in Thompson Falls Reservoir. The resulting catch per unit effort (fish per hour or fish per net) in 2014 for all survey reaches and locations were within the general range observed in previous sample years.

Since 2011, four fish (three rainbow trout; one brown trout) that ascended the ladder and released upstream have been recaptured during the baseline fisheries surveys, including one rainbow trout that ascended the ladder in 2014 (recaptured in the Paradise to Plains reach 4 days after being released upstream of Thompson Falls Dam). More details of these fish are provided in Section 3.2.10 Fish Movement Upstream of Ladder.

Upstream Fish Passage (10-Year Fish Passage Evaluation Plan)

In 2011, FERC issued two Orders, one on June 9, 2011 approving the Licensee's 10-year *Fish Passage Facility Evaluation Plan, Phase 2 Action Plan, 2011-2020* (PPL Montana, 2010c) (Fish Passage Evaluation Plan) and the second on June 17, 2011 approving the Licensee's *Final Thompson Falls Fish Ladder – Fishway Operations Manual 1.0* (PPL Montana, 2010a). The Thompson Falls Upstream Fish Passage Facility (ladder) became operational in 2011. The Licensee implemented the fourth year of studies as outlined in the Fish Passage Evaluation Plan and the 2014 data are presented in Section 3.0.

In 2014, the ladder commenced operation on March 25 and was winterized on October 21. There were 16 consecutive days between May 24 and June 8 when the ladder was not operational due to high spring flows and associated sediment and debris. During ladder operations in 2014, the ladder operated in orifice mode for the entire season. Approximately 5,735 fish representing 11 species and one hybrid, including one bull trout, ascended the ladder. There were two fish mortalities (one smallmouth bass; one lake trout euthanized onsite) at the ladder. As in previous years, lake trout and walleye were not authorized by FWP for release upstream if captured in the ladder.

Over the last 4 years, 13,933 fish have been passed upstream of the Thompson Falls Dam through the ladder. Non-salmonids represent approximately 90 percent of the fish recorded at the ladder annually and cumulatively over the last 4 years (2011-2014). Although the percentage of salmonids recorded at the ladder has remained around 10 percent annually and cumulatively over the last 4 years, the number of salmonids ascending the ladder has increased from 242 in 2011 to 573 in 2014. The cumulative total number of live fish passed upstream since 2011 includes 1,499 salmonids, representing 768 rainbow trout, 258 brown trout, 126 westslope cutthroat trout, 297 mountain whitefish, 41 rainbow x westslope cutthroat trout hybrid, and 9 bull trout.

In total, there have been nine individual bull trout that ascended the ladder between 2011 and 2014. Four of the nine were subsequently detected. Two bull trout were detected downstream of Thompson Falls Dam in the tributary, Prospect Creek. Two bull trout were known mortalities, one returned to the ladder and jumped out of a pool and the second was captured via gillnet

during the annual monitoring activities led by FWP in Noxon Reservoir. Five bull trout were released upstream and have not been detected since.

Additional details summarizing the number fish and species, timing of fish ascending the ladder, recaptures, fallback, movement patterns, etc., are provided in Section 3.0.

Bull Trout Incidental "Take"

In 2014, the Licensee collected six bull trout (three via electrofishing below the dam; one via electrofishing in the Paradise to Plains section in the Clark Fork River; one in the upper section of the Thompson Falls Reservoir; one at the Thompson Falls fish ladder), all of which were released live. Although the bull trout that ascended the ladder in 2014 was released alive upstream of Thompson Falls Dam, this bull trout was later captured downstream of Thompson Falls Dam during the 2014 annual reservoir monitoring activities led by FWP in Noxon Reservoir. The bull trout was captured in Noxon Reservoir via gillnet resulting in a mortality. The table below provides details of bull trout sampling by the Licensee in 2014.

Date	# of Bull Trout	PIT Tag	Length (mm)	Location	Status (Alive/ Dead)	Genetic Assignment
4/7/2014	1	No PIT Tag	520	Below TFalls Dam	Released Alive	No Genetic Sample
4/15/2104	1	900226000035846	577	Upper Section TFalls Reservoir	Released Alive	Fishtrap Creek (R4)
5/16/2014	1	982000357016169	523	TFalls Fish Ladder	Released Alive*	Fish Creek (R4)
5/28/2014	1	985121021203256 /982000357016106	567	Below TFalls Dam	Released Alive	Fishtrap Creek (R4)
6/3/2014	1	982000357016241	509	Below TFalls Dam	Released Alive	Fishtrap Creek (R4)
10/28/2014	1	982000357016111	315	Clark Fork River – Paradise to Plains	Released Alive	Results Pending

*Recaptured by FWP on 10-13-2014 via gillnetting in Noxon Reservoir – mortality

Since operations at the fish ladder began (2011-2014), 24 individual bull trout have been sampled by the Licensee in the Project area with approximately five to seven individual bull trout sampled annually. Sampling has included collecting bull trout via electrofishing efforts above and below Thompson Falls Dam as well as bull trout recorded at the Thompson Falls fish ladder. Of the 24 bull trout, 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 occurrence in the Project area and subsequently, a cover was placed over the holding pool to mitigate the potential for this to occur again. Additional details regarding bull trout sampled by the Licensee are provided in Section 4.0.

Avista Bull Trout Passage and Monitoring

In 2014 Avista captured 75 unique bull trout below Cabinet Gorge Hydroelectric Project and transported 63 of the bull trout upstream in either the Cabinet Gorge Reservoir (number [n]=25); Noxon Reservoir (n=26); or upstream of Thompson Falls Dam (n=12). The 12 bull trout transported upstream of the Project were passive integrated transponder (PIT) tagged (not radio tagged) and released in the Thompson River drainage (n=10), the Clark Fork River near the town of Paradise (n=1), and in the St. Regis River (n=1). Details of the Avista bull trout passage program are presented in Section 5.0.

Total Dissolved Gas Monitoring

TDG upstream of the Thompson Falls Hydroelectric Project peaked at approximately 108 percent of saturation during 2014. TDG levels at the High Bridge approached 125 percent of saturation, and TDG at the Birdland Bay Bridge site was approximately 119 percent of saturation in 2014. These readings were not as high as in some previous years, such as 2011, when peak discharge exceeded 100,000 cfs and peak TDG was correspondingly higher. Mean TDG at discharge was within the range observed in previous years.

Gas Bubble Trauma Monitoring

In 2012, the Thompson Falls Fisheries Technical Advisory Committee (TAC) agreed to initiate total dissolved gas (TDG) and gas bubble trauma (GBT) monitoring when and if streamflows reached or exceeded 75,000 cubic feet per second (cfs). In 2014, mean daily streamflows taken from the U.S. Geological Survey (USGS) gage station (#12389000) in the Clark Fork River near Plains, Montana peaked at approximately 82,300 cfs on May 29. GBT monitoring was completed below Thompson Falls Dam on May 28, 2014 (81,800 cfs) and on June 3, 2014 (74,400 cfs).

In 2014, 340 fish were examined, none were noted to have symptoms of GBT during the May 28 sampling, but eight fish were noted as having symptoms of GBT during the June 3 sampling. An additional 23 fish (all on May 28) were noted as having “possible” symptoms of GBT, with frayed caudal fins, but no noticeable bubbles.

Thompson Falls Reservoir Monitoring Plan

In 2010, the Licensee developed and submitted the *5-Year Reservoir Monitoring Plan, 2011-2015* to the Commission in compliance with Term 5a of the FWS’s BO TCs. The Commission issued an Order on February 9, 2011 approving the 5-Year Reservoir Monitoring Plan, and the Licensee began implementation in 2011.

The overall goal of the 5-Year Reservoir Monitoring Plan is to gather information that will assist in developing recommendations to *maximize survival of out-migrant juvenile and adult bull trout through Thompson Falls Reservoir and Dam*. Activities that have been completed since 2010

and that are proposed in 2015 in support of the 5-Year Reservoir Monitoring Plan include the following:

- A fish survey was completed in West Fork Thompson River in 2010 (PPL Montana, 2012)
- A fish survey was completed in Fishtrap Creek in 2011 (PPL Montana, 2012)
- A Thompson River Drainage database documenting available records from 1973 through 2011 was completed in 2012 (PPL Montana, 2012)
- *Thompson River Bull Trout Enhancement and Recovery Plan* (GEI Consultants, Inc. and Steigers Corporation, 2013) was prepared in 2012 (PPL Montana, 2013)
- Fish surveys were completed in four tributaries in the Thompson River, including Lazier Creek, Indian Creek, Twin Lakes Creek, and Big Rock Creek in 2013. These surveys were funded by the TAC (PPL Montana, 2013)
- Fish surveys in Murr Creek, a tributary to Thompson River were completed in 2014 (*see* Section 6.1 of this report, and PPL Montana, 2014)
- A juvenile bull trout out-migration study commenced in 2014 and is scheduled to be completed in 2016 in Thompson Falls Reservoir (*see* Section 6.2 in this report)

TAC-Funded Projects

In 2013, the Licensee renewed the Memorandum of Understanding (MOU, 2013) for a 7-year term (January 1, 2014 through December 31, 2020). The MOU was approved and signed by FWS, FWP, Confederated Salish and Kootenai Tribes of the Flathead Nation (CSKT), and the Licensee.

The terms of the renewed 2014-2020 MOU are similar to the first term of the 2009-2013 MOU (MOU 2008). The adaptive management funding account (AMFA) started with $150,000 on January 1, 2014. The Licensee will provide $100,000 annually for 7 years and allow a maximum of $250,000 to accrue in the account from unspent or transferred annual TAC funds. The AMFA is designated for implementation of downstream passage minimization measures in addition to Project License required studies, monitoring activities, reports, upstream fish passage minimization measures, gas abatement monitoring, predator control measures, and other means to reducing impacts on bull trout caused by operation of the Project.

In 2014, the Licensee, through the TAC, allocated funds for bull trout protection, mitigation, or enhancement either in whole or in partnership to the following projects (*refer to* Section 8.0 for more details):

- Funding provided for improvement of the bull trout genetic baseline database for the North and South Fork of the Jocko River and Fish Creek.
- Funding provided for the first year of the 3-year (2014-2016) Thompson Falls Reservoir study of juvenile bull trout out-migration and purchase of supporting equipment (e.g., transmitters, receivers, mobile tracking data logger and hydrophone).

- Funding provided for a portion of the costs for FWP to acquire property in the Fish Creek drainage.

During the 2014 annual meeting, the TAC authorized funding for the following: 1) process bull trout samples from Little Joe Creek (North and South forks) to improve the bull trout genetic baseline database and 2) fund a portion of the costs for FWP to acquire the Rehbein-property in the West Fork Fish Creek drainage. Collectively, approximately $94,000 will be allocated to projects in 2015 that were approved by the TAC (Appendix A). A progress report on the second year of the Thompson Falls Reservoir study of juvenile bull trout out-migration will be provided in the 2015 Annual Report.

1.0 Introduction

1.1 Background

NorthWestern Energy Corporation (NorthWestern) is owner and operator of the Thompson Falls Hydroelectric Project (No. 1869) (Project), located on the Clark Fork River near Thompson Falls, Montana. The current Federal Energy Regulatory Commission (FERC or Commission) License was issued to Montana Power Company (purchased by PPL Montana in 1998 and subsequently purchased by NorthWestern in 2014) in 1979 and is scheduled to expire on December 31, 2025.

In 1998, the bull trout (*Salvelinus confluentus*) was federally-listed under the Endangered Species Act as a threatened species (Federal Register, 1998). Critical habitat was designated in 2005 and revised in 2010 (Federal Register, 2005, 2010). The U.S. Fish and Wildlife Service (FWS or Service) proposed a revision to the Critical Habitat Designation on January 13, 2010. The Final Critical Habitat Designation Rule for bull trout was submitted by FWS on September 30, 2010 and was effective as of November 17, 2010. The Project area is within the designated critical habitat for bull trout. Because bull trout are present within the Project area, a draft Biological Evaluation was prepared for the Project and submitted to FWS and FERC in 2003.

After 5 years of studies, the Licensee filed a new Biological Evaluation with the Commission, discussing the effects of the Project on bull trout and proposed conservation measures with the Commission on April 7, 2008. The Biological Evaluation identified several factors directly related to Project operation that negatively impact bull trout in the Clark Fork River. Inhibition of upstream migration and subsequent access to spawning habitat by the Project was identified as a major concern. Consequently, the Licensee proposed to install a full-height fishway at the Project and filed 90-percent drawings for the structure on April 7, 2008. The filing also contained a Memorandum of Understanding (MOU) signed by the Licensee, the Confederated Salish and Kootenai Tribes of the Flathead Nation (CSKT), Montana Fish, Wildlife and Parks (FWP), and FWS (MOU, 2008). In 2013, the Licensee filed the renewed MOU with the Commission on November 11, 2013. The renewed MOU was developed in consultation with CSKT, FWP, and FWS and is effective from January 1, 2014 through December 31, 2020 (MOU, 2013).[1]

In 2008, the Commission concluded that the Project is adversely affecting bull trout and the proposed conservation measures will reduce, but not totally eliminate, the Project's adverse effects on bull trout. The 2008 Biological Evaluation was adopted as the Commission's Final Biological Assessment and submitted to FWS on May 1, 2008.

[1] The MOU provides Terms and Conditions regarding the collaboration between the Licensee and the FWS, FWP, and CSKT and the implementation of minimization measures for bull trout.

On November 4, 2008 the FWS filed with the Commission a Biological Opinion (BO) and associated Incidental Take Statement, which includes reasonable and prudent measures and Terms and Conditions (TCs) to minimize incidental take of bull trout. The FWS concluded in its BO that the Project is currently adversely affecting bull trout and the Licensee's proposed conservation measures will reduce, but not totally eliminate, adverse impacts of the Project (FWS, 2008).

On February 12, 2009 the Commission issued an Order Approving Construction and Operation of Fish Passage Facilities for the Thompson Falls Project (FERC, 2009). This Order included the reasonable and prudent measures, TCs, and conservation recommendations from the FWS's BO.

1.2 Compliance with the FERC Order

The 2009 FERC Order required the Licensee to file with the Commission for approval, study and operational plans referenced in the FWS's TCs 1 through 7, after development and approval by the FWS and the Thompson Falls Technical Advisory Committee (TAC). In order for the Commission to ensure compliance with the FWS's TCs, the Licensee is required to file with the Commission, by April 1 of each year through the remainder of the License, the annual report referenced in Term 7a of the FWS's TCs (*see* Section 9.7.1 for details).

The 2009 FERC Order also specifies, in Term 7b (*see* Section 9.7.1 for details), the Licensee will prepare a comprehensive summary of the first 5 years of upstream fish passage operations by December 31, 2015. The purpose of the report is to gather and assess fish passage efficacy in order to assess the potential need to modify operations at the facility in support of bull trout passage. In 2014, the Licensee and FWS consulted on the requirements of Term 7b and concurred there was no need for a comprehensive 5-year report due to the extensive and thorough summary of information provided in the existing annual reports. NorthWestern filed a letter to the Commission documenting this consultation and proposed modification to Term 7b on December 17, 2014.

This annual report is intended to fulfill the annual reporting requirement, as specified in Term 7a of the BO and the requirements of the FERC Order. This report summarizes the Licensee's 2014 activities in Sections 2.0 through 8.0; NorthWestern's compliance with the FWS's TCs of the BO (Section 9.0); and NorthWestern's proposed activities in 2015 (Section 10.0).

2.0 Baseline Fisheries Studies

Fisheries monitoring of the Thompson Falls Reservoir using gillnets and electrofishing has been conducted annually, within the same general time frame, since 2004. The locations for fall and spring electrofishing and fall gillnetting completed in 2014 are displayed in Figures 2-1 and 2-2.

In 2010, the Licensee added a new upstream electrofishing site in the Clark Fork River upstream of the Thompson Falls Hydroelectric Project (Project) between the towns of Plains and Paradise, Montana. This site was electrofished in the fall of 2010, 2011, 2012, and 2014. The next survey is scheduled for fall 2016.

Fish recorded through the baseline fisheries data and fish passage are listed in Table 2-1 along with each species abbreviation, common name, and scientific name. Tables and figures in this report refer to the species abbreviation provided in Table 2-1.

Table 2-1: Summary of abbreviations for fish identification, species common name, and scientific name.

Fish Abbreviation	Common Name	Scientific Name
BL BH	Black bullhead	*Ameiurus melas*
BULL	Bull trout	*Salvelinus confluentus*
EB	Brook Trout	*Salvelinus fontinalis*
LL	Brown trout	*Salmo trutta*
LMB	Largemouth bass	*Micropterus salmoides*
LN DC	Longnose dace	*Rhinichthys cataractae*
LN SU	Longnose sucker	*Catostomus*
LS SU	Largescale sucker	*Catostomus macrocheilus*
LT	Lake trout	*Salvelinus namaycush*
L WF	Lake whitefish	*Coregonus clupeaformis*
MWF	Mountain whitefish	*Prosopium williamsoni*
NP	Northern pike	*Esox lucius*
N PMN	Northern pikeminnow	*Ptychocheilus oregonensis*
PEA	Peamouth	*Mylocheilus caurinus*
PUMP	Pumpkinseed	*Lepomis gibbosus*
RB	Rainbow trout	*Oncorhynchus mykiss*
RBxWCT	Rainbow x Westslope cutthroat trout hybrid	*Oncorhynchus clarkii lewisi x Oncorhynchus mykiss*
RS SH	Redside shiner	*Richardsonius balteatus*
SMB	Smallmouth bass	*Micropterus dolomieu*
WCT	Westslope cutthroat trout	*Oncorhynchus clarkii lewisi*
WE	Walleye	*Sander vitreus*
YP	Yellow perch	*Perca flavescens*

The main objective for these sampling efforts is to establish baseline information on species composition and relative abundance within the Thompson Falls Reservoir and upstream of the Thompson Falls Reservoir. This information will help track changes to the fish community

annually and over a long period of time. This is especially important with the newly constructed full-height fish ladder at the Project that commenced operations in spring 2011. This is one monitoring tool that gives managers the ability to track potential system-wide changes with fish passing into the Thompson Falls Reservoir from downstream.

2.1 Spring Electrofishing

Spring electrofishing in the Thompson Falls Reservoir consists of two locations, the lower section located immediately upstream of Project and the upper section located immediately downstream of the confluence with the Thompson River (Figure 2-1). Spring electrofishing is conducted using boat-mounted electrofishing equipment. The boat is navigated slowly along the shoreline after daylight hours. The downstream section is parallel with Highway 200 from the Wild Goose Landing boat launch, upstream to a location approximately 750 feet above the pump house. The upstream 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 upstream site has riverine characteristics, with noticeable flowing water, average widths around 459 feet, little to no aquatic vegetation, and some recreational docks. The downstream site has substantially lower water velocity, mean widths near 1,673 feet, abundant aquatic vegetation, and is off the main river channel.

In 2014 sampling occurred on April 14 and 15, which was similar to the sampling dates from previous years as shown in Table 2-2. The water temperature and duration of electrofishing in the lower and upper sections each year from 2009 to 2014 is also summarized in Table 2-2.

Table 2-2: Summary of electrofishing efforts completed in the lower and upper sections of the Thompson Falls Reservoir 2009-2014.

Lower Section			Upper Section		
Date	Water Temperature ºC	Duration of Electrofishing (hrs)	Date	Water Temperature ºC	Duration of Electrofishing (hrs)
April 20, 2009	10.0	0.6	April 21, 2009	10.5	0.6
April 28, 2010	9.0	0.9	April 29, 2010	7.5	2.1
April 13, 2011	5.8	1.0	April 14, 2011	5.1	1.9
April 16, 2012	7.4	0.8	April 17, 2012	7.2	1.9
April 11, 2013	7.0	0.9	April 10, 2013	7.0	1.9
April 14, 2014	7.0	1.0	April 15, 2014	7.0	2.1

Summaries from 2009 to 2014 catch per unit effort (CPUE, fish per hour) are provided in Tables 2-3 and 2-4 for the lower and upper sections, respectively.

Figure 2-1: Baseline Fisheries Sampling Locations.

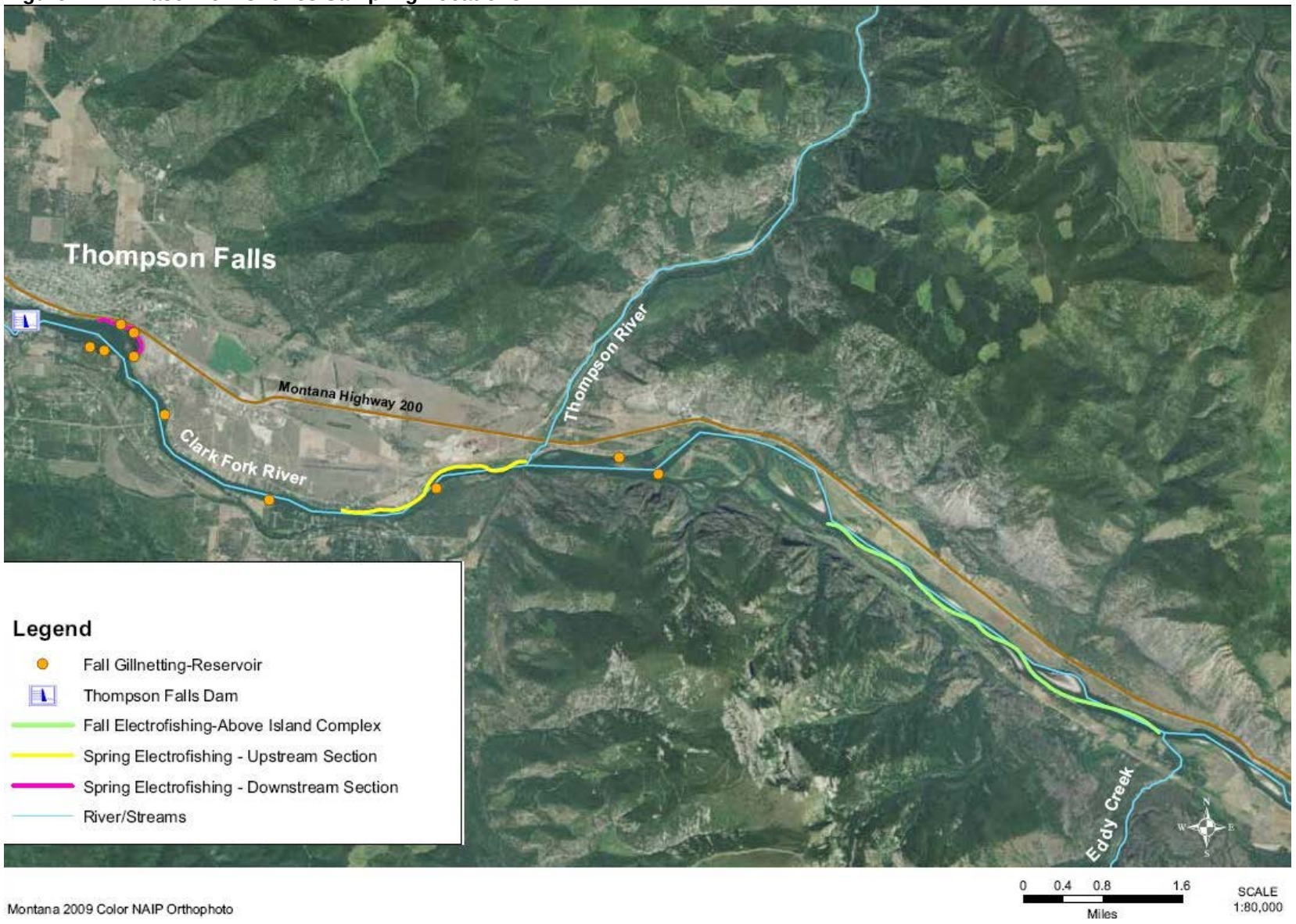
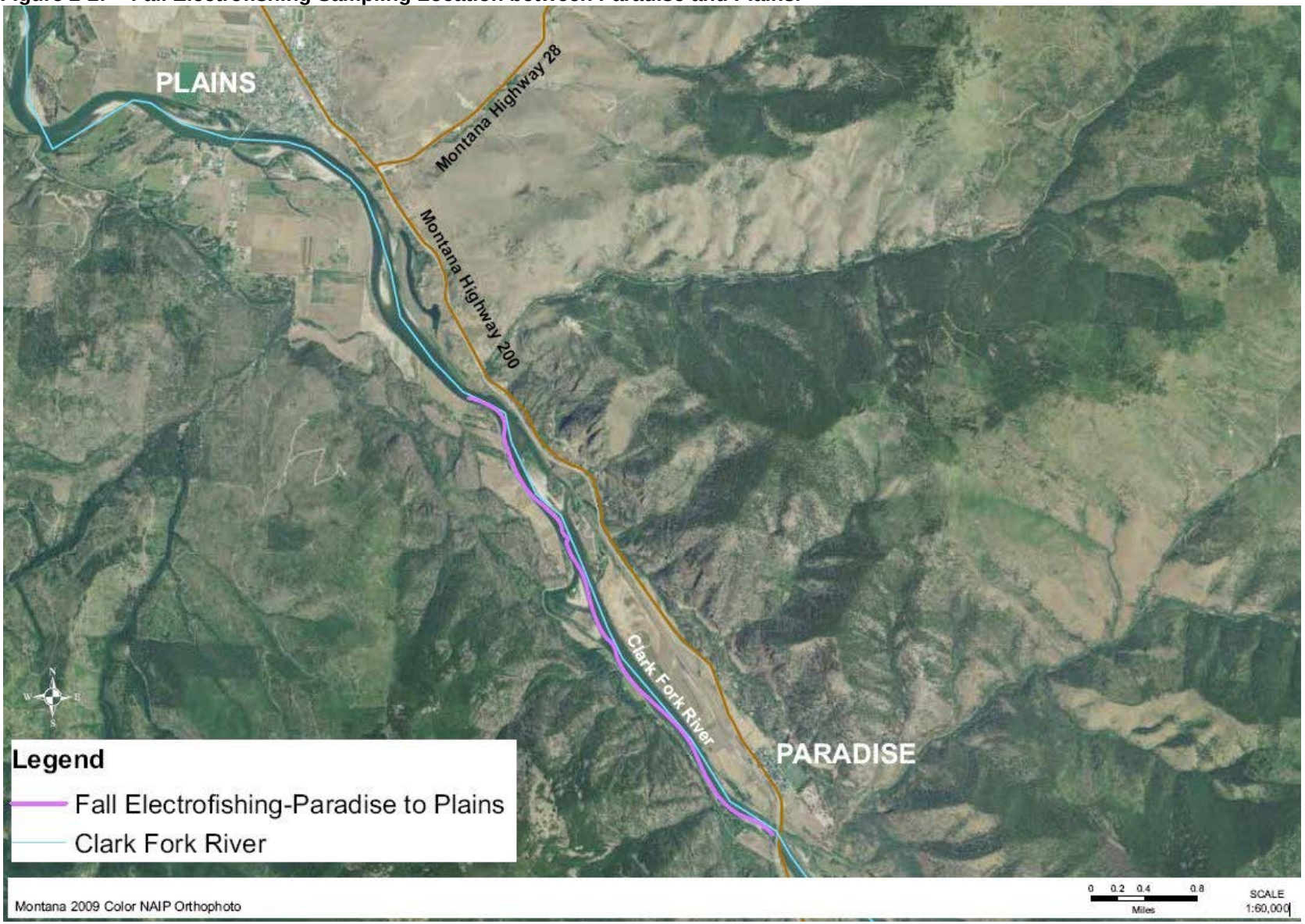


Figure 2-2: Fall Electrofishing Sampling Location between Paradise and Plains.



2.1.1 Lower Section

In 2014, spring electrofishing in the lower section captured 64 fish representing 10 species of which, there were three salmonid species. The species included 28 yellow perch, 21 northern pike, five largemouth bass, three black bullhead, two northern pikeminnow, one pumpkinseed, one largescale sucker, one rainbow trout, one brown trout, and one westslope cutthroat trout (Table 2-3).

Between 34 and 97 individual fish representing seven to 15 species were recorded during each annual spring electrofishing survey completed between 2009 and 2014 in the lower section. Species composition was relatively consistent between 2009 and 2014 (7 to 10 species) with the exception of spring 2012 when there were 15 species. In 2014, salmonids of three different species were observed, which was consistent with observations from 2009 to 2013. In 2012, the largest number of salmonid species (n=5) and largest grand total of individual salmonids (n=17) were recorded in the lower section.

In 2014, yellow perch and northern pike were the most abundant species in the lower section. CPUE for other fish species such as black bullhead, brown trout, largemouth bass, northern pikeminnow, pumpkinseed, rainbow trout, and westslope cutthroat trout remained relatively low. In contrast to previous years, smallmouth bass, redside shiner, peamouth, mountain whitefish, longnose sucker, and bull trout were not observed during the sampling in the lower section in 2014.

2.1.2 Upper Section

The 2014 sampling of the upper section resulted in 174 fish captured representing 13 species, including five species of salmonid and one salmonid hybrid (Table 2-4). These species included 66 largescale sucker, 41 northern pikeminnow, 18 rainbow trout, 17 northern pike, eight brown trout, six westslope cutthroat trout, five smallmouth bass, four mountain whitefish, four yellow perch, one rainbow x westslope cutthroat hybrid, one redside shiner, one pumpkinseed, one black bullhead, and one bull trout (577 millimeters [mm] and 1,446 grams [g]) that was released live. A passive integrated transponder (PIT) tag (#900226000035846) was detected in the bull trout. This bull trout was initially tagged by Avista Corporation (Avista) downstream of Cabinet Gorge Dam on June 9, 2013 measuring 567 mm in length and weighing 1,211 g. The bull trout was genetically assigned to Fishtrap Creek and released in the Thompson River on June 12, 2013 (PPL Montana, 2013). It was recaptured electrofishing in the upper section of the Thompson Reservoir on April 15, 2014, some 307 days after relocation by Avista to the Thompson River, indicating it had overwintered in the Thompson River or Clark Fork River system upstream of Thompson Falls Dam.

Between 66 and 253 individual fish representing nine to 13 species were recorded during each annual spring electrofishing survey from 2009 to 2014 in the upper section. The representation of species has been relatively consistent through the years with nine to 11 species observed annually between 2009 and 2013 and a high of 15 species observed in 2014. Overall, the total

number of fish recorded in 2014 (n=174) was less than the previous 2 years (n=253 in 2012; n=229 in 2013), but greater than the total number of fish recorded in 2009 (n=79), 2010 (n=63), 2011 (n=148). The overall CPUE in 2014 was 81.4 fish per hour, lower than 2009, 2012, and 2013. The CPUE for salmonids in 2014 (17.8 fish per hour) was similar to 2009 (16.9 fish per hour) and 2010 (17.0 fish per hour), but lower than 2011, 2012, and 2013 (CPUE ranged between 28.4 and 60.4 fish per hour). The total number of individual salmonids also declined in 2014 compared to previous years (2011-2013) but was comparable to 2010.

In 2014, CPUE in the upper section was within the range of values observed in previous years for most species with the exception of pumpkinseed and northern pikeminnow. This was the first year pumpkinseed was recorded in the spring electrofishing in the upper section and CPUE for northern pikeminnow in 2014 was slightly higher than previous years.

2.1.3 Summary

In 2014, a total of 174 fish were observed in the upper section compared to a total of 64 fish in the lower section. Species composition varied greatly between sections in 2014 as well as in previous years (Figures 2-3 and 2-4). Northern pike and yellow perch dominated the species composition in the lower section while several species, including largescale suckers, northern pikeminnow, rainbow trout, and northern pike, dominated the species composition in the upper section. In 2014, salmonids were more abundant in the upper section (n=38) *versus* the lower section (n=3) and several species such as bull trout, mountain whitefish, rainbow x westslope cutthroat hybrids, redside shiner, and smallmouth bass were observed in the upper section but not in the lower section.

Collectively between 2009 and 2014, there were 16 species detected in the lower section compared to 15 species plus one hybrid in the upper section. Although a similar number of species was detected in both sections, total CPUE has generally been greater in the upper section *versus* the lower section (with the exception of the 2010 spring survey) (Figure 2-4).

In 2014, species diversity and the number of salmonids were greater in the upper section than the lower section. Similar results were also observed in 2009, 2010, 2011, and 2013. The only exception was in 2012 when species diversity was greater in the lower section *versus* the upper section. The difference in species composition and abundance of salmonids is likely related to habitat conditions. The upper sampling section is more of a riverine environment compared to the lower sampling section, which is closer to the dam.

Table 2-3: Summary of spring electrofishing results in the Thompson Falls Reservoir lower section, including number of species and CPUE (catch per hour) from 2009 through 2014.

Species	Lower Section 2009		Lower Section 2010		Lower Section 2011		Lower Section 2012		Lower Section 2013		Lower Section 2014	
	Number	CPUE	Number	CPUE	Number	CPUE	Number	CPUE	Number	CPUE	Number	CPUE
BL BH	2	3.4	1	1.1	0	0	1	1.2	0	0	**3**	**3.1**
BULL	0	0	0	0	0	0	1	1.2	0	0	**0**	**0**
LL	0	0	0	0	0	0	9	10.9	2	2.2	**1**	**1**
LMB	20	34	3	3.3	7	6.9	8	9.7	2	2.2	**5**	**5.1**
LN SU	0	0	0	0	0	0	6	7.3	0	0	**0**	**0**
LS SU	11	18.7	3	3.3	1	1	23	27.9	2	2.2	**1**	**1**
MWF	0	0	0	0	0	0	1	1.2	0	0	**0**	**0**
NP	10	17	14	15.2	17	16.8	10	12.1	30	33.6	**21**	**21.6**
N PMN	7	12	1	1.1	1	1	17	20.6	3	3.4	**2**	**2.1**
PEA	0	0	0	0	0	0	1	1.2	0	0	**0**	**0**
PUMP	2	3.4	2	2.2	5	4.9	2	2.4	0	0	**1**	**1**
RB	0	0	0	0	1	1	4	4.8	6	6.7	**1**	**1**
RS SH	1	1.7	0	0	0	0	0	0	0	0	**0**	**0**
SMB	0	0	0	0	0	0	1	1.2	0	0	**0**	**0**
WCT	1	1.7	1	1.1	1	1	2	2.4	0	0	**1**	**1**
YP	3	5.1	25	27.2	1	1	11	13.3	46	51.6	**28**	**28.8**
Subtotal Salmonids	1	1.7	1	1.1	2	2	17	33.9	8	9.0	**3**	**3.1**
TOTAL FISH	**57**	**97**	**50**	**54.5**	**34**	**33.6**	**97**	**117.4**	**91**	**102.1**	**64**	**65.8**

Table 2-4: Summary of spring electrofishing results in the Thompson Falls Reservoir upper section (Clark Fork River downstream of the confluence of the Thompson River), including number of species and CPUE (catch per hour) from 2009 through 2014.

Species	Upper Section 2009		Upper Section 2010		Upper Section 2011		Upper Section 2012		Upper Section 2013		Upper Section 2014	
	Number	CPUE	Number	CPUE	Number	CPUE	Number	CPUE	Number	CPUE	Number	CPUE
BL BH	2	3.4	0	0	0	0	0	0	0	0	**1**	**0.5**
BULL	0	0	0	0	0	0	1	0.5	1	0.5	**1**	**0.5**
LL	2	3.4	5	2.4	8	4.2	21	11.2	27	14.2	**8**	**3.7**
LN SU	0	0	1	0.5	0	0	0	0	0	0	**0**	**0**
LS SU	51	86.2	15	7.2	61	32.1	119	63.6	72	37.8	**66**	**30.9**
LT	1	1.7	0	0	0	0	0	0	0	0	**0**	**0**
MWF	1	1.7	1	0.5	12	6.3	19	10.1	21	11.0	**4**	**1.9**
NP	6	10.1	8	3.9	8	4.2	4	2.1	11	5.8	**17**	**8.0**
N PMN	6	10.1	3	1.4	17	8.9	35	18.7	29	15.2	**41**	**19.2**
PUMP	0	0	0	0	0	0	0	0	0	0	**1**	**0.5**
RB	6	10.1	26	12.6	31	16.3	47	26.1	44	23.1	**18**	**8.4**
RBxWCT	0	0	0	0	0	0	2	1.1	1	0.5	**1**	**0.5**
RS SH	2	3.4	0	0	0	0	1	0.5	1	0.5	**1**	**0.5**
SMB	2	3.4	0	0	1	0.5	2	1.1	1	0.5	**5**	**2.3**
WCT	0	0	3	1.4	3	1.6	2	1.1	21	11.0	**6**	**2.8**
YP	0	0	1	0.5	7	3.7	0	0	0	0	**4**	**1.9**
Subtotal Salmonids	10	16.9	35	17.0	54	28.4	92	49.1	115	60.4	**38**	**17.8**
TOTAL FISH	**79**	**133.5**	**63**	**30.4**	**148**	**77.8**	**253**	**135.1**	**229**	**120.4**	**174**	**81.4**

Figure 2-3: Summary of the average CPUE for 2009 through 2013 compared to the CPUE in 2014 by species during spring electrofishing in the lower (top graph) and upper (bottom graph) sections of the Thompson Falls Reservoir.

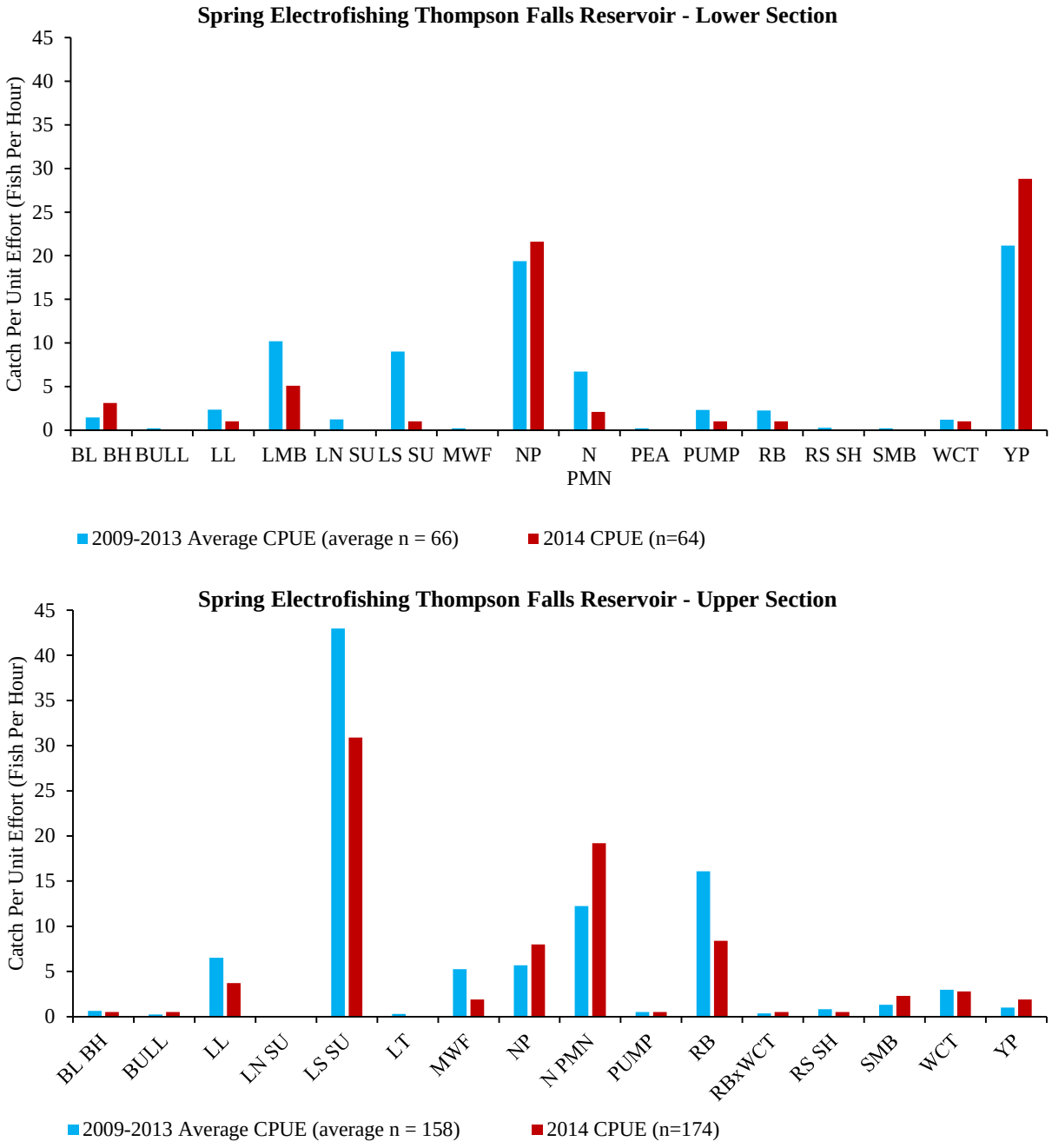
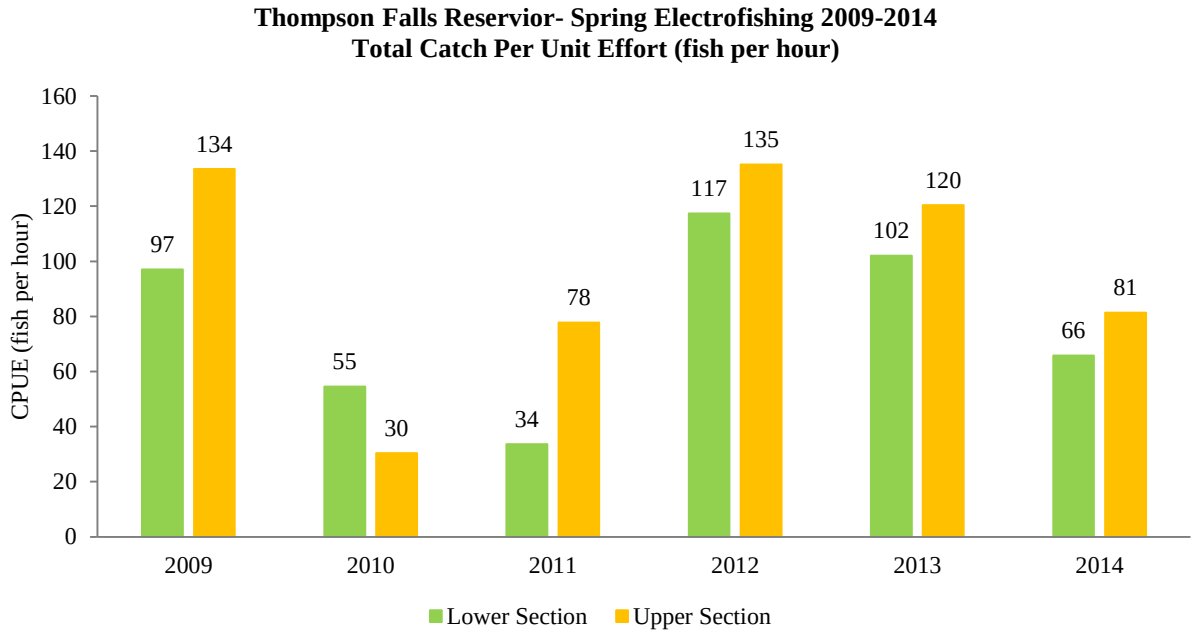


Figure 2-4: Summary of total CPUE during spring electrofishing in the lower and upper sections of the Thompson Falls Reservoir between 2009 and 2014.



2.2 Fall Electrofishing

2.2.1 Electrofishing above the Island Complex

In 2014 electrofishing efforts in the Clark Fork River were completed from the confluence with Eddy Creek downstream to the Island Complex (*refer to* Figure 2-1). The fall electrofishing section (Eddy Creek to the Island Complex) is characterized as riverine habitat. The 2014 survey covered the same length of reach surveyed annually since 2010. In 2009, electrofishing efforts started at the confluence with Eddy Creek and extended further downstream to the confluence of the Thompson River. Approximately 2 miles of the 5-mile section were not sampled in 2010 due to poor habitat and few captures from the downstream end of the Island Complex to the Thompson River in 2009.

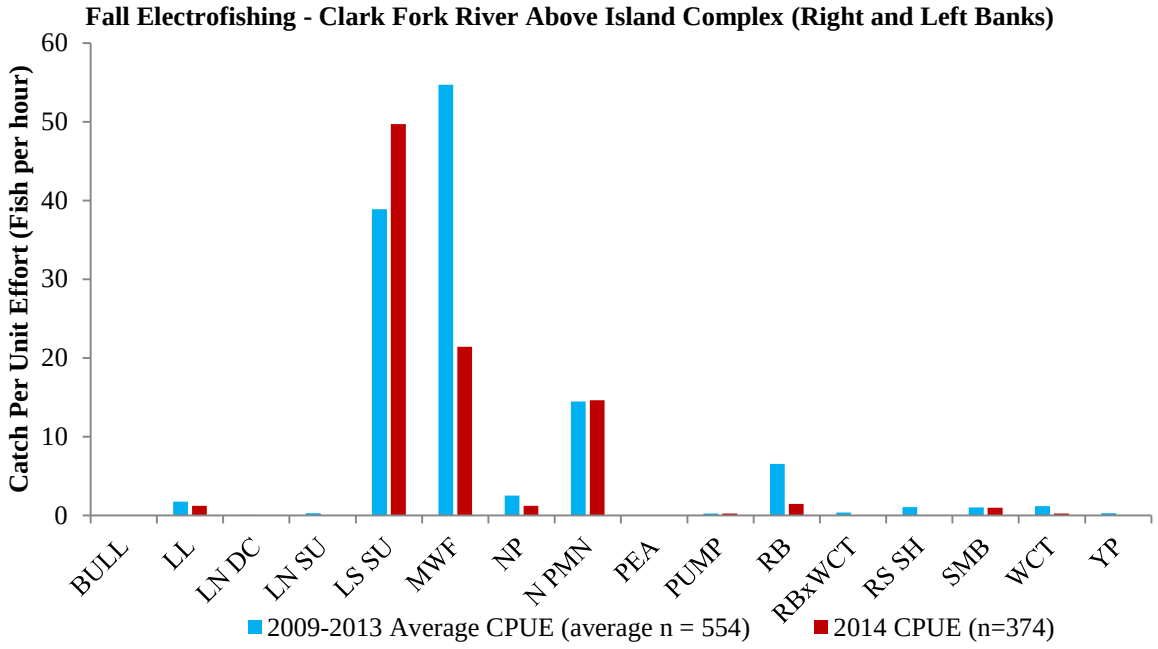
In 2014, river right was electrofished the night of September 25 and river left was electrofished the night of September 29. The sampling effort in 2014 occurred a few weeks earlier than previous years, when electrofishing efforts were typically completed between mid to late October. A summary of the CPUE by species (river left and right combined) is provided for each year of sampling from 2009 through 2014 in Table 2-5. The duration of the electrofishing has been consistent through the years and was approximately 5.6 hours in 2009; 4.3 hours in 2010; 4.6 hours in 2011; 4.1 hours in 2012; 4.4 hours in 2013; and 4.1 hours in 2014.

Table 2-5: Fall electrofishing CPUE in the Clark Fork River Above the Island Complex from 2009 to 2014. CPUE represents river right and river left combined.

Species	2009		2010		2011		2012		2013		2014	
	Number	CPUE	Number	CPUE	Number	CPUE	Number	CPUE	Number	CPUE	Number	CPUE
BULL	0	0	1	0.2	0	0.0	0	0.0	0	0.0	0	0
LL	5	0.9	5	1.2	7	1.5	16	3.9	8	1.8	5	1.2
LN DC	0	0.0	1	0.2	0	0.0	0	0.0	1	0.2	0	0
LN SU	0	0.0	1	0.2	2	0.4	1	0.2	2	0.5	0	0
LS SU	338	60.8	133	31.0	150	33.0	101	24.7	150	34.2	204	49.7
MWF	196	35.3	215	50.1	336	73.8	397	97.3	221	50.4	88	21.4
NP	11	2.0	8	1.9	11	2.4	12	2.9	20	4.6	5	1.2
N PMN	88	15.8	71	16.5	70	15.4	49	12.0	55	12.5	60	14.6
PEA	1	0.2	0	0.0	0	0.0	0	0.0	0	0.0	0	0
PUMP	0	0	0	0	0	0	0	0	0	0	1	0.2
RB	44	7.9	29	6.8	39	8.6	37	9.1	24	5.5	6	1.5
RBxWCT	4	0.7	0	0.0	2	0.4	1	0.2	2	0.5	0	0
RS SH	0	0.0	5	1.2	9	2.0	2	0.5	7	1.6	0	0
SMB	1	0.2	4	0.9	6	1.3	2	0.5	9	2.1	4	1.0
WCT	9	1.6	5	1.2	6	1.3	2	0.5	10	2.3	1	0.2
YP	2	0.4	1	0.2	1	0.2	0	0.0	2	0.5	0	0
Subtotal Salmonids	258	46.4	255	59.4	390	85.7	453	111.0	265	60.4	99	24.1
TOTAL FISH	**699**	**125.8**	**479**	**111.6**	**639**	**140.4**	**620**	**151.9**	**511**	**116.5**	**374**	**91.1**

The 2014 electrofishing efforts collected 374 fish (right and left banks combined) representing nine species, of which four species were salmonids (brown trout, mountain whitefish, rainbow trout, and westslope cutthroat trout). The results from 2014, including species composition and CPUE (fish per hour) were similar to previous years with the majority of fish represented by largescale suckers, mountain whitefish, and northern pikeminnow (Figure 2-5).

Figure 2-5: Summary of the average CPUE for 2009 through 2013 compared to the CPUE in 2014 by species during fall electrofishing in the above Island Complex in the Clark Fork River.



Between 2009 and 2014, the total number of fish collected has varied from 374 fish in 2014 to 699 fish in 2009 with approximately nine to 12 species represented each sample year. CPUE for all fish has varied from 91.1 fish per hour in 2014 to 151.9 fish per hour in 2012. Mountain whitefish appear to show the greatest variability in CPUE over the years with the highest CPUE in 2012 (97.3 fish per hour) and the lowest CPUE in 2014 (21.4 fish per hour). The number (and CPUE) of salmonids has varied between 99 salmonids in 2014 (24.1 salmonids per hour) to 453 salmonids in 2012 (111 salmonids per hour). Mountain whitefish and rainbow trout are generally the predominant salmonid species observed during electrofishing efforts. In 2014, the number (and CPUE) of rainbow trout and mountain whitefish were fewer (1.5 rainbow trout per hour; 21.4 mountain whitefish per hour) compared to previous years when rainbow trout CPUE ranged between 5.5 and 9.1 fish per hour and mountain whitefish CPUE ranged between 35.3 to 97.3 fish per hour. Although the number of fish and CPUE has varied over time, the species composition observed has been relatively consistent from year to year (Figure 2-5).

2.2.2 Electrofishing from Paradise to Plains

In 2010, a new electrofishing sampling section between the towns of Paradise and Plains was added in order 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, and 2014. Electrofishing began at the town of Paradise (at the Paradise Crossing river access site), approximately 1.5 miles downstream of the Clark Fork/Flathead River confluence, and ended at the U.S. Geological Survey (USGS) gage station #12389000 located near the town of Plains, approximately 4 miles downstream (*see* Figure 2-2). The duration of the electrofishing effort remained consistent among years (3.6 hours in 2010, 3.5 hours in 2011, 3.9 hours in 2012, and 4.1 hours in 2014). The left and right banks were electrofished the nights of October 22 and 28, 2014, respectively (Table 2-6).

In 2014, a total of 976 fish, representing 13 species and one hybrid, including five salmonid species and one salmonid hybrid, were captured during the fall sampling effort. The salmonids collected included bull trout, rainbow trout, westslope cutthroat trout, brown trout, mountain whitefish, and rainbow x westslope cutthroat trout hybrid (Table 2-6).

Table 2-6: Summary of CPUE (fish per hour) during 2010, 2011, 2012, and 2014 fall electrofishing in the Clark Fork River, including river left and river right, from Paradise to Plains. No sampling was scheduled for 2013.

Species	2010		2011		2012		2014	
	Number	CPUE	Number	CPUE	Number	CPUE	Number	CPUE
BULL	0	-	0	-	2	0.5	1	0.2
LL	10	2.7	21	6.1	25	6.4	17	4.2
LN SU	0	-	1	0.3	1	0.3	1	0.2
LS SU	94	25.8	306	88.4	523	134.6	310	75.8
MWF	85	23.3	274	79.2	265	68.2	181	44.3
NP	0	-	2	0.6	1	0.3	1	0.2
N PMN	164	45.0	251	72.5	266	68.5	333	81.5
PEA	0	-	1	0.3	5	1.3	2	0.5
RB	45	12.3	151	43.6	53	13.6	65	15.9
RBxWCT	0	-	2	0.6	3	0.8	5	1.2
RS SH	3	0.8	42	12.1	29	7.5	1	0.2
SMB	2	0.5	7	2.0	1	0.3	25	6.1
WCT	17	4.7	24	6.9	1	4.6	33	8.1
YP	1	0.3	6	1.7	0	-	1	0.2
Subtotal Salmonids	157	43.1	472	136.4	366	94.2	302	73.9
TOTAL FISH	**421**	**115.5**	**1,088**	**314.4**	**1,192**	**306.8**	**976**	**238.7**

Since the fall surveys began in 2010, three bull trout (one in 2014; two in 2012) have been recorded in this survey section. A summary of these bull trout are provided in Table 2-7.

Table 2-7: Summary of bull trout recorded during electrofishing in the Clark Fork River from Paradise to Plains in 2010, 2011, 2012, and 2014.

Sample Date	Length (mm)	Weight (g)	PIT ID	Comments
10-30-2012	444	678	982000357016066	Released Live
10-30-2012	472	800	982000357016135	Released Live
10-28-2012	315	260	982000357016111	Released Live

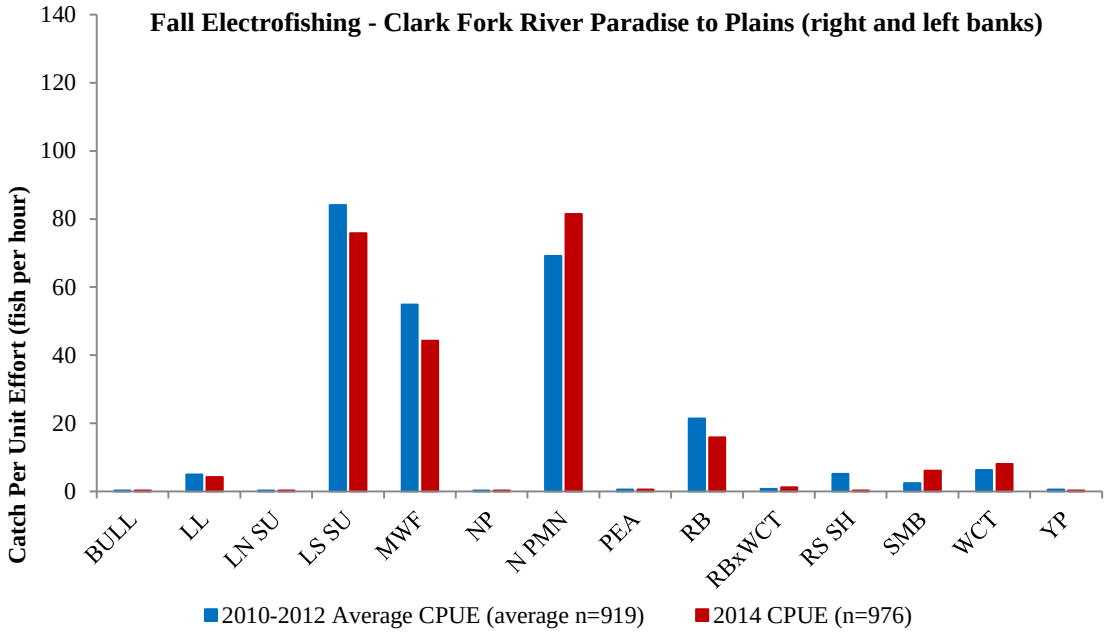
In addition, a rainbow trout (PIT #985121010687782) that had been released upstream of the Thompson Falls fish ladder on October 16, 2014 (492 mm, 1120 g) was recorded 5 days later on October 21 approximately 34 river miles upstream. Previously, only one other fish, a rainbow trout, that had been released upstream of Thompson Falls Dam had been recaptured during the fall electrofishing efforts between Paradise and Plains. This rainbow trout (PIT #985121027357883) ascended the ladder and was released upstream on August 26, 2012. It was recaptured 65 days later approximately 34 river miles upstream during the electrofishing survey on October 30, 2012.

In 2014, the predominant species captured was northern pikeminnow (n=333) followed by largescale sucker (n=310), mountain whitefish (n=181), rainbow trout (n=65), westslope cutthroat trout (n=33), smallmouth bass (n=25), and brown trout (n=17). Smallmouth bass displayed the largest increase from one to seven fish observed in previous years to 25 individuals observed in 2014 (Table 2-6). It is possible that the increase in smallmouth bass numbers is related to the electrofishing survey being completed earlier in the fall (compared to previous years) and prior to when smallmouth bass seek deeper pools to overwinter. It is also possible, probably likely, that the increase in smallmouth bass reflects a strong year class, including some fish that may have been passed upstream of the Thompson Falls fish ladder in 2014 (*see* Section 3.0). Species less commonly observed ($n \leq 6$) in the Paradise to Plains section include, bull trout, longnose sucker, northern pike, peamouth, rainbow x westslope cutthroat trout hybrid, redside shiner, and yellow perch.

The average CPUE (fish per hour), by species, for the fall electrofishing from 2010 to 2012 compared to CPUE in 2014 is displayed in Figure 2-6. Fish species composition from 2010 to 2012 compared to 2014 remained similar over time with the most predominant species represented by largescale suckers, northern pikeminnow, mountain whitefish, and rainbow trout. Some species, such as northern pikeminnow, smallmouth bass, and westslope cutthroat showed an increase in CPUE in 2014 compared to previous year (Figure 2-6 and Table 2-6). The CPUE for westslope cutthroat trout and brown trout remained stable over time and ranged between 2.7 and 8.1 fish per hour depending on the sampling year. Other, less common species, with the exception of smallmouth bass, remained consistently below 5 fish per hour between 2010 and 2014. These less common species include bull trout, longnose suckers, northern pike, peamouth, rainbow x westslope cutthroat trout hybrids, redside shiner, and yellow perch. CPUE for smallmouth bass was below 2.0 fish per hour in 2010, 2011, and 2012, but increased to 6.1 fish

per hour in 2014. As previously mentioned, this may be a reflection of fish passage at Thompson Falls fish ladder and/or the timing of the fish survey.

Figure 2-6: Summary of the average CPUE (2010, 2011, and 2012) compared to CPUE in 2014 during the Clark Fork River fall electrofishing between Paradise and Plains.



2.3 Fall Gillnetting

Fall (October) gillnetting in the Thompson Falls Reservoir has been performed in designated locations since 2004 (Figure 2-1). Every year, 10 gillnets are set, except in 2004 when six nets were set (Table 2-8).

Table 2-8: Summary of gillnetting in Thompson Falls Reservoir from 2004-2014.

Year	# Gillnets	Date Net Set	Date Net Pulled	Total # of Fish Captured	# of Species
2004	6	10/13	10/14	48	8
2005	10	10/13	10/14	79	7
2006	10	10/12	10/13	116	7
2007	10	10/11	10/12	122	9
2008	10	10/8	10/9	59	7
2009	10	10/19	10/20	55	6
2010	10	10/14	10/15	50	9
2011	10	10/5	10/6	33	9
2012	10	10/12	10/13	53	7
2013	10	10/22	10/23	40	6
2014	**10**	**10/15**	**10/16**	**62**	**8**

Nylon multifilament experimental sinking gillnets were used at 10 established locations in the Thompson Falls Reservoir (*see* Figure 2-1). These nets are 38 m (125 ft) long and 1.8 m (6 ft)

deep with five separate 7.6 m (25-ft) panels consisting of 1.9-cm (0.75-inch), 2.5-cm (1-inch), 3.2-cm (1.25-inch), 3.8-cm (1.5-inch), and 5.1-cm (2-inch) square mesh. Nets were set on October 15, 2014 between 12:50 and 14:09 and pulled approximately 20 hours later between 8:45 and 10:07 on October 16, 2014. The mean catch per net from 2009 to 2014 is displayed in Table 2-9.

Table 2-9: Mean catch per net, by species, during annual October gillnetting series on Thompson Falls Reservoir from 2004 to 2014. A dash indicates no (zero) fish of that species was captured during that year's gillnetting sampling effort.

Species	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
BL BH	2.8	3.4	8.3	6	0.6	-	-	-	-	0.1	1.3
LL	-	-	-	-	-	-	-	-	0.2	-	-
LMB	0.2	-	-	0.3	-	-	-	0.1	-	-	0.1
LN SU	0	-	-	-	-	-	0.1	0.5	-	-	0.1
LS SU	0.7	1.3	0.7	1	0.8	1.2	0.8	0.6	1.3	0.6	0.8
NP	1.3	1.8	1.7	2	1.3	3.1	2.4	1.0	2.4	2.1	2.4
N PMN	0.2	0	0.5	0.5	0.2	0.8	0.3	0.3	0.3	0.6	0.5
PEA	0.0	0.1	0.1	0.1	-	-	0.1	0.1	-	-	-
PUMP	0.3	0.1	0.2	0.5	1.8	0.1	0.1	-	-	-	-
RB	-	-	-	-	-	0.2	0.2	-	0.4	-	-
SMB	0.3	0.1	-	0.5	0.1	-	0.1	0.1	0.3	0.1	0.4
WCT	-	-	-	-	-	-	-	0.2	-	-	-
YP	1.7	0.7	0.1	1.2	0.2	0.1	0.9	0.4	0.4	0.5	0.6

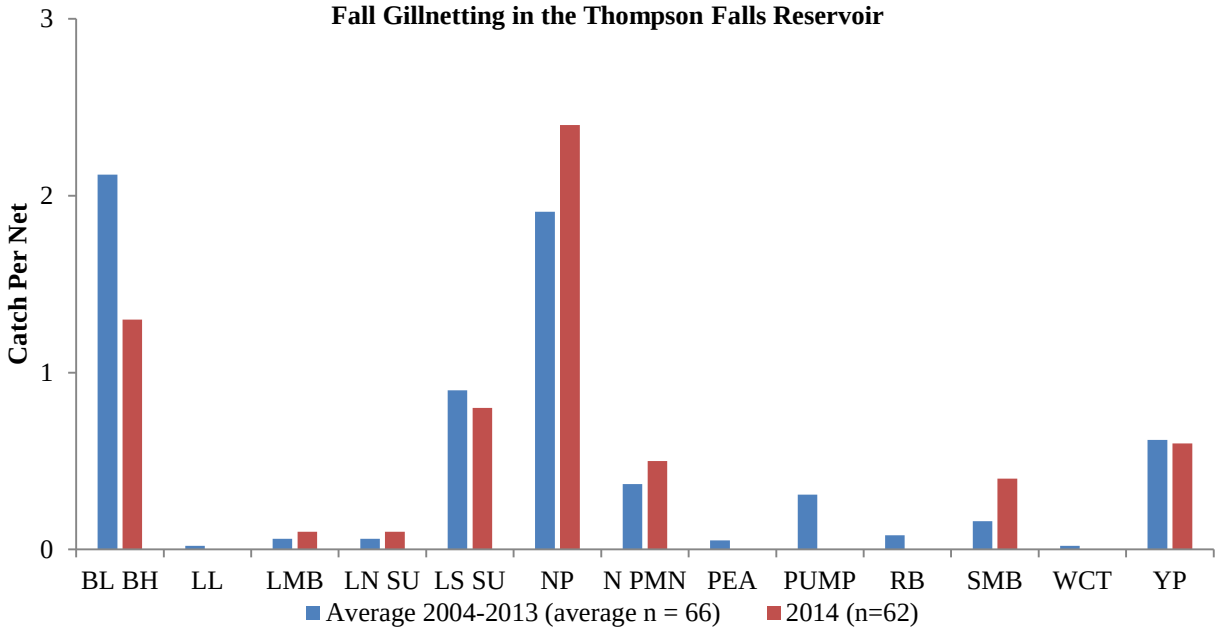
In 2014, a total of 62 fish representing eight species were captured during gillnetting efforts. Northern pike was the dominant species (n=24), followed by black bullhead (n=13), largescale suckers (n=8), yellow perch (n=6), northern pikeminnow (n=5), smallmouth bass (n=4), largemouth bass (n=1), and longnose sucker (n=1). The average catch per net between 2004 and 2013 compared to the catch per net in 2014 is illustrated in Figure 2-7.

Since 2004, the number of species represented in the annual gillnetting efforts has ranged from six species in 2009 to nine species in 2007, 2010, and 2011. The total number of fish captured has varied between 33 fish in 2011 to 122 fish in 2007.

Between 2004 and 2007, black bullheads were the most abundant fish caught gillnetting. Although black bullheads were still present in 2008, the most abundant species were pumpkinseed, followed by northern pike and largescale suckers. Between 2009 and 2013 only one black bullhead (in 2013) was recorded via gillnetting in the Thompson Falls Reservoir. In 2014, black bullhead increased to 13 fish. From 2009 to 2014, northern pike have been the most abundant species caught gillnetting. In addition between 2009 and 2012, three salmonid species (rainbow, westslope cutthroat, and brown trout) were recorded gillnetting. Two of the three salmonids (one rainbow trout and one brown trout) captured in 2012 had ascended the fish ladder at Thompson Falls Dam in 2011 (PPL Montana, 2012). Variability in the annual number of fish

captured and species composition may have been influenced by drawdown activities that occurred in fall 2008 and summer 2011. The drawdown of the Thompson Falls Reservoir often results in a short-term reduction in the lacustrine habitat typically available at full pool.

Figure 2-7: Summary of species captured via fall gillnetting in the Thompson Falls Reservoir, comparing the average number of fish caught per net between 2004 and 2013 to the number captured per net in 2014.



3.0 Upstream Fish Passage

3.1 2014 Upstream Fish Passage Facility Evaluation

FERC issued an Order on June 9, 2011 approving the Licensee's *10-year Fish Passage Facility Evaluation Plan, Phase 2 Action Plan, 2011-2020* (PPL Montana, 2010c) (Fish Passage Evaluation Plan). The Thompson Falls Upstream Fish Passage Facility (ladder) became operational in 2011 and has operated for four full seasons (2011, 2012, 2013, and 2014). The Licensee has implemented the first 4 years of studies outlined in the Fish Passage Evaluation Plan.

3.2 Effectiveness of Fish Passage

The following sections summarize the results from the ladder from 2014. The data were collected to evaluate the effectiveness of the ladder. The ladder results provided in this report include the following:

- Total number of days the ladder was in operation
- Clark Fork River hydrology
- Total number of fish and species ascending the ladder
- Total number of fish and species passed to the Thompson Falls Reservoir
- Number of fish recaptures at the Thompson Falls Dam
- Number of fish which fallback after passing the Thompson Falls Dam
- Time it took for fish to ascend the ladder
- Most active period(s) for fish ascending the ladder
- Results from the weir mode (notch *vs.* orifice) study and attraction flow studies

A summary of bull trout sampled in the Project area (above the dam, below the dam, and at the ladder) between 2011 and 2014 as well as genetic assignments is provided in Section 4.0.

3.2.1 Ladder Operations

Since the upstream fish passage (ladder) commenced operations in 2011, the operational season has generally started in mid-March and ended in mid-October. In 2014, the ladder was operational slightly later than previous years due to cool water temperatures and freezing conditions and opened on March 25, 2014. The ladder was closed for the year and winterized on October 21, 2014. During the 2014 season, the ladder was shut down once for 16 consecutive days between May 24 and June 8, as a result of high spring flows. The ladder operated in orifice mode for the entire 2014 season. The holding pool at the top of the ladder was typically checked once a day (in the morning) for fish, for 133 ladder checks in 2014. A total of 5,735 fish were recorded at the ladder in 2014.

Since 2011, the number of days the ladder has been closed has been minimized to a 2- to 3-week period during peak runoff. In addition, the transition from alternating weir modes (notch and orifice) to only orifice mode at the ladder appears to have improved efficacy of upstream fish passage. This is exemplified by the declining percentage of days there were no fish in the holding pool (Table 3-1). Below is a table summarizing periods of time the ladder was in operation each year between 2011 and 2014, the number of ladder checks per year, the number of days the ladder was closed, the percentage of ladder checks with no fish present in the holding pool, and annual weir operations (Table 3-1). Additional details of the annual operations since 2011 are provided in the 2011, 2012, and 2013 Annual Reports, respectively (PPL Montana, 2012, 2013, and 2014).

Table 3-1: Summary of when the ladder was in operation, 2011-2014.

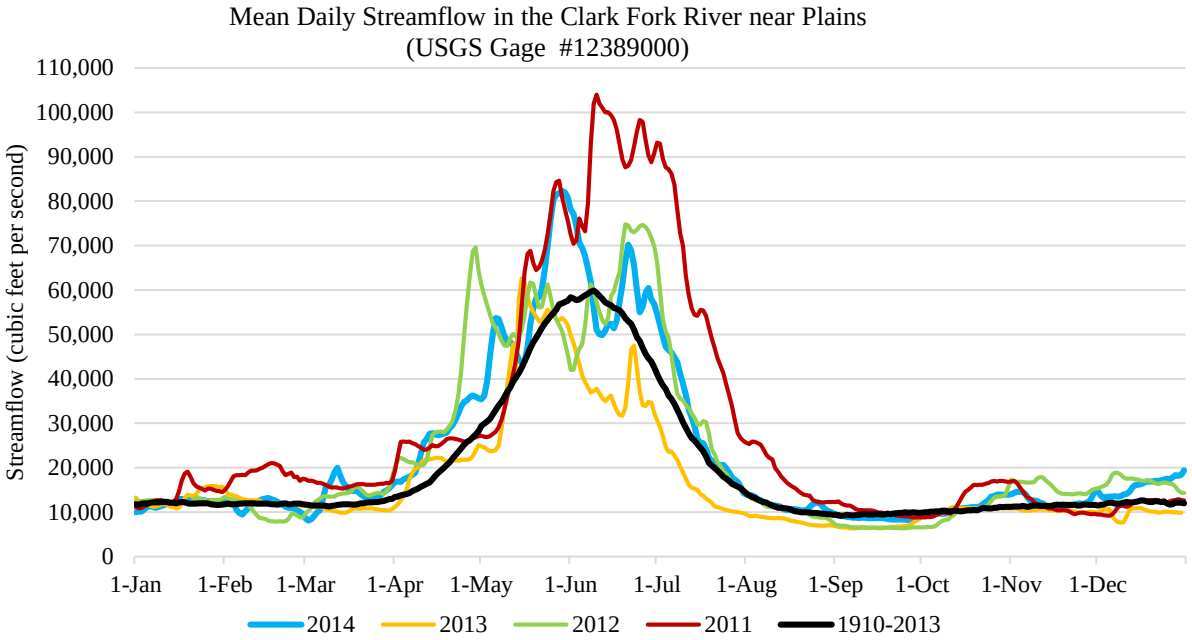
Year	Dates Ladder Open and Closed	Total # of Times Ladder Checked*	# of Days Ladder Closed During Season	% of Ladder Checks with No Fish	Weir Mode (notch and/or orifice)
2011	Mar 17 – Oct 17	160	84	44.4%	Alternating Notch and Orifice Mode
2012	Mar 13 – Oct 15	168	22	41.7%	
2013	Mar 13 – Oct 15	147	14	27.2%	Orifice Mode Only
2014	Mar 25 – Oct 21	133	16	26.3%	
*Some days the ladder is checked twice a day					

3.2.2 Clark Fork River Hydrograph and Water Temperatures

Mean daily streamflow data is collected by the USGS gage station #12390000 on the Clark Fork River near Plains, Montana (approximately 30 miles upstream of Thompson Falls Dam). The hydrographs shown in Figure 3-1 represent the mean daily streamflows for 2011, 2012, 2013, and 2014, as well as the mean daily streamflows for the period from 1910 through 2013.

The hydrograph for each year of ladder operations has varied greatly (Figure 3-1). During the first year of ladder operations (2011), the peak mean daily streamflow at the USGS gaging station was approximately 104,000 cubic feet per second (cfs) on June 10, 2011, which was significantly higher than an average year, of approximately 60,000 cfs. In 2012, the hydrograph depicted a bimodal peak with peak streamflows of 75,300 cfs occurring on June 20, 2012. In 2013, the peak streamflow was the lowest at approximately 63,700 cfs on May 15. As in 2012, the 2014 hydrograph depicted a bimodal peak with peak streamflows of 82,800 cfs on May 29, 2014. Flows were similar on the descending limb of the hydrograph in 2014 as in 2012.

Figure 3-1: Hydrograph for the Clark Fork River near Plains, Montana from USGS gage 12389000. Hydrographs represent daily mean streamflows for the first 4 years of ladder operation (2011, 2012, 2013, and 2014) and the average between 1910 and 2013.



During each ladder operating season (approximately mid-March through mid-October), water temperatures in the ladder were recorded through a combination of a single measurement (coinciding with each ladder check) and continuously recording thermographs. Each year water temperatures (in degrees Celsius [°C]) are recorded in the holding pool (Pool 48) in the ladder and air temperatures are recorded at the work station located at the ladder. Thermographs are set to record air and water temperature in 15-minute intervals. Due to some operational interruptions and maintenance activities resulting in periods of ladder closure in 2011 (May 25 through August 22) and 2014 (May 23 and June 8), water temperature data were not available during these periods when water was not flowing in the ladder. In 2012, there was a technical issue with the continuous recording thermographs and only air and water temperature readings taken during each ladder check were available. The air and water temperatures collected via the continuous thermographs between March 21 and October 21, 2014 are presented in Figure 3-2.

Figure 3-2: Continuous ambient air and water temperatures (Pool 48) at the fish ladder in 2014. Water temperature measurements (Pool 48) from March 21 to October 21, 2014.

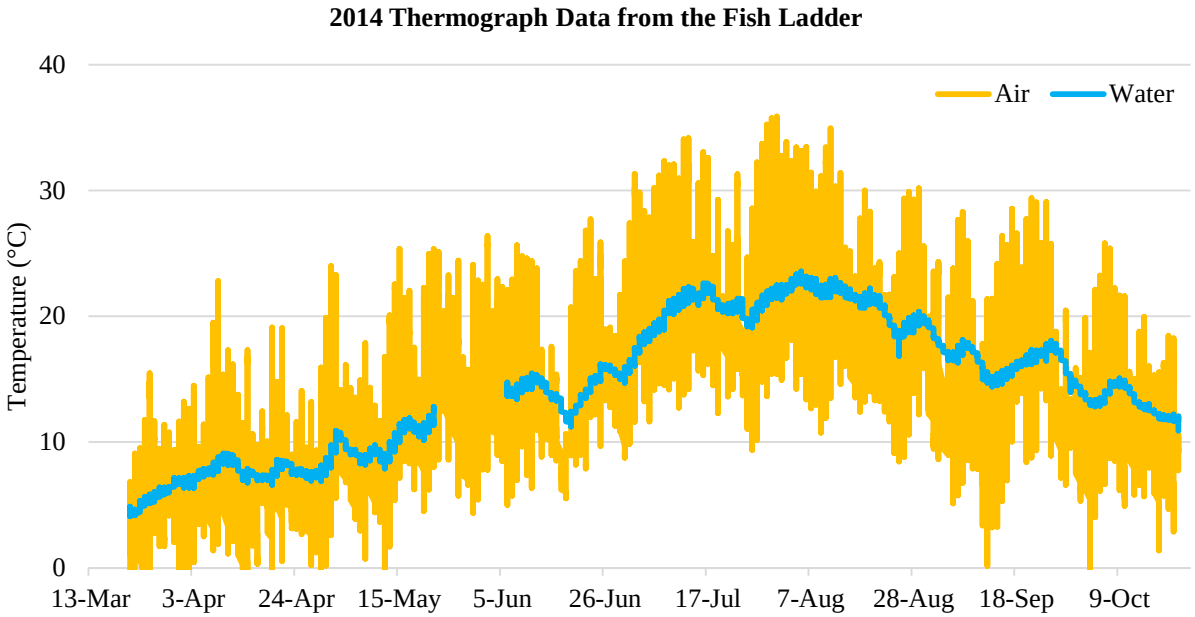
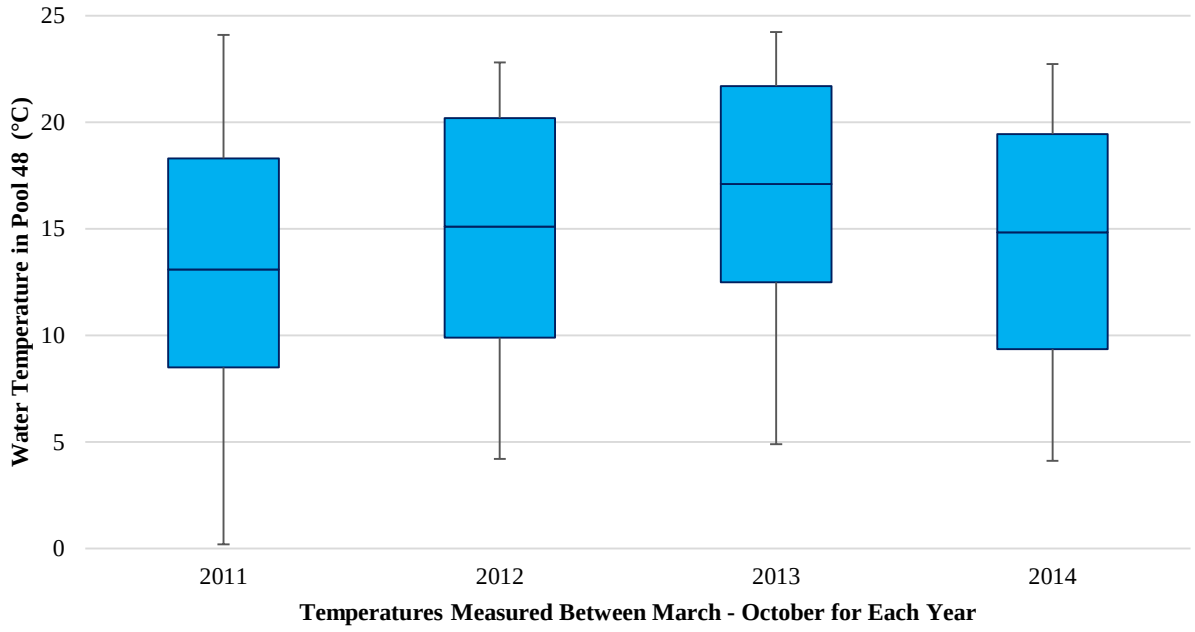


Figure 3-3: Summary of water temperature data between March and October in the Thompson Falls fish ladder (pool 48) in 2011, 2012, 2013, and 2014. In 2012, only daily water temperature data were available, other years represent a summary of the thermograph data. The box plot depicts the median, first and third quartiles, and maximum and minimum water temperatures.



A summary of the water temperatures collected from 2011-2014 are illustrated as box plots in Figure 3-3. The box plots display the median, first and third quartiles, as well as the minimum and maximum water temperatures recorded annually between March and October. The box plots for 2011, 2013, and 2014 summarize the thermograph data, while the 2012 data represent a summary of the daily temperature readings (coinciding with each ladder check). The water temperature data collected for the past 4 years during ladder operations indicate the median water temperature was warmest in 2013 and coolest in 2011, while median water temperatures in 2012 and 2014 were very similar (Figure 3-3). Air temperature data collected by the Licensee during the same period corresponds with this trend (unpublished data, NorthWestern).

A summary of the peak streamflows and mean annual streamflows in the Clark Fork River (USGS Gage #12389000) near Plains as well as the maximum and mean water temperatures recorded in the ladder during each season in 2011, 2012, 2013, and 2014 are presented in Table 3-2. The summary information provided in Table 3-2 illustrates the annual variability in streamflows and temperatures in the lower Clark Fork River. Between 2011 and 2014, the highest annual streamflow and lowest mean water temperature occurred in 2011, while the lowest annual streamflow and highest mean water temperature occurred in 2013. Mean annual streamflow and mean water temperatures at the ladder were similar in 2012 and 2014 and less extreme than observed in 2011 or 2013.

Table 3-2: Summary of mean and maximum streamflows (USGS Gage #12389000) and water temperatures from Pool 48 at the fish ladder from 2011-2014.

Year	Peak Streamflow (cfs)	Mean Annual Streamflow (cfs)	Maximum Water Temperature (°C) in Ladder	Mean Water Temperature (°C) in Ladder
2011	104,000	28,472	24.8	12.0
2012	75,300	23,020	22.8	14.4
2013	63,700	16,846	24.7	16.1
2014	82,800	22,741	23.6	14.6

3.2.3 Ladder Operations, Hydrology, and Daily Fish Count

Daily fish counts at the ladder have varied annually from 2011 through 2014 (Figure 3-4). The variability is likely a result of ladder operations (e.g., weir mode, attractant flows, and ladder closures, etc.) and river conditions such as streamflows and water temperatures.

The daily fish count (including both salmonids and non-salmonids) at the ladder, as well as periods of ladder closures are shown in Figures 3-5 through 3-8 for each year, 2011 through 2014, respectively. The periods of ladder closures are provided to demonstrate the variability in the individual days of operation from year to year. The ladder closures have primarily been a result of maintenance issues associated with damage incurred during the spring freshet as observed in 2011, 2012, and 2014. In 2013, maintenance issues were unrelated to streamflows and required the ladder to be closed periodically prior to peak spring streamflows. Over the last 4 years, the longest shut down at the ladder was in 2011, which coincided with higher than

average spring streamflows (Figure 3-5). In comparison, ladder closures in 2012, 2013, and 2014 were less frequent and much shorter in duration (Figures 3-6 through 3-8).

Figure 3-4: Summary of the daily fish count at the ladder between mid-March and mid-October in 2011, 2012, 2013, and 2014.

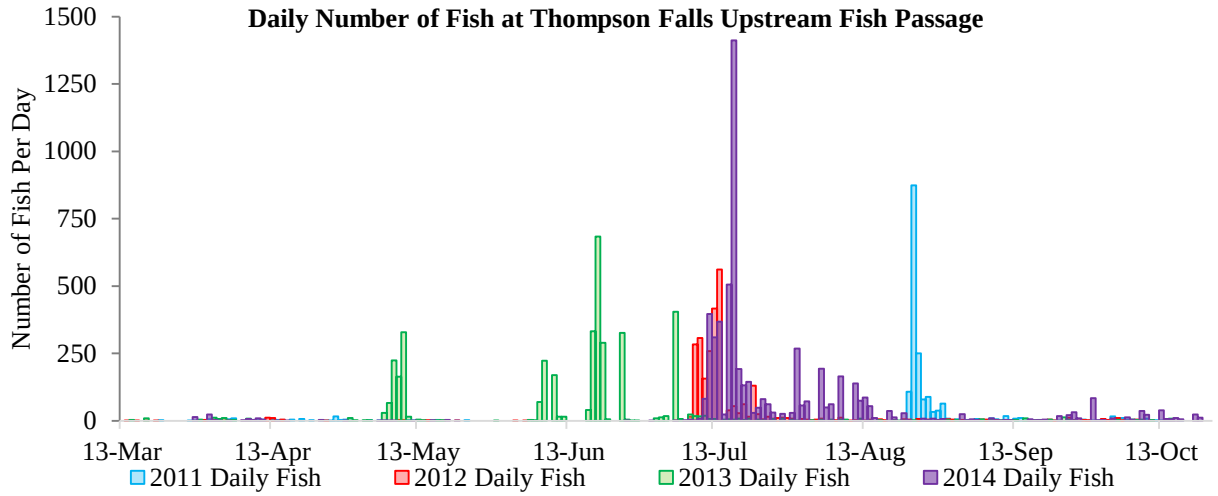


Figure 3-5: Summary of the daily fish count at the ladder, mean daily streamflow, and ladder closures between mid-March and mid-October in 2011.

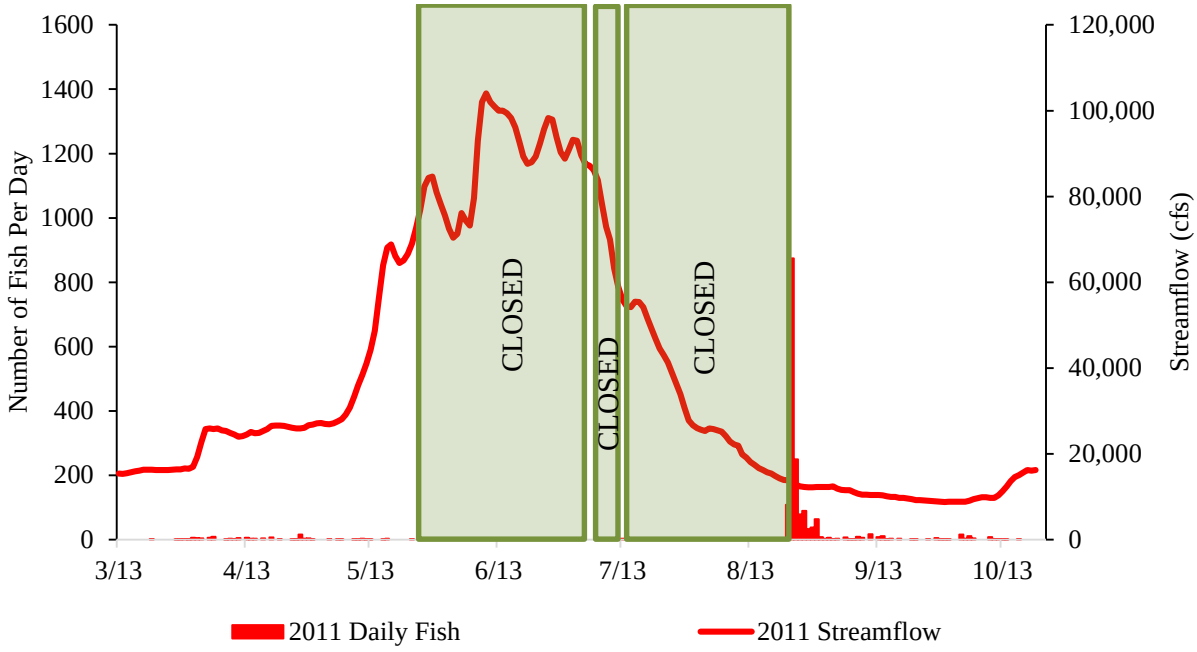


Figure 3-6: Summary of the daily fish count at the ladder, mean daily streamflow, and ladder closures between mid-March and mid-October in 2012.

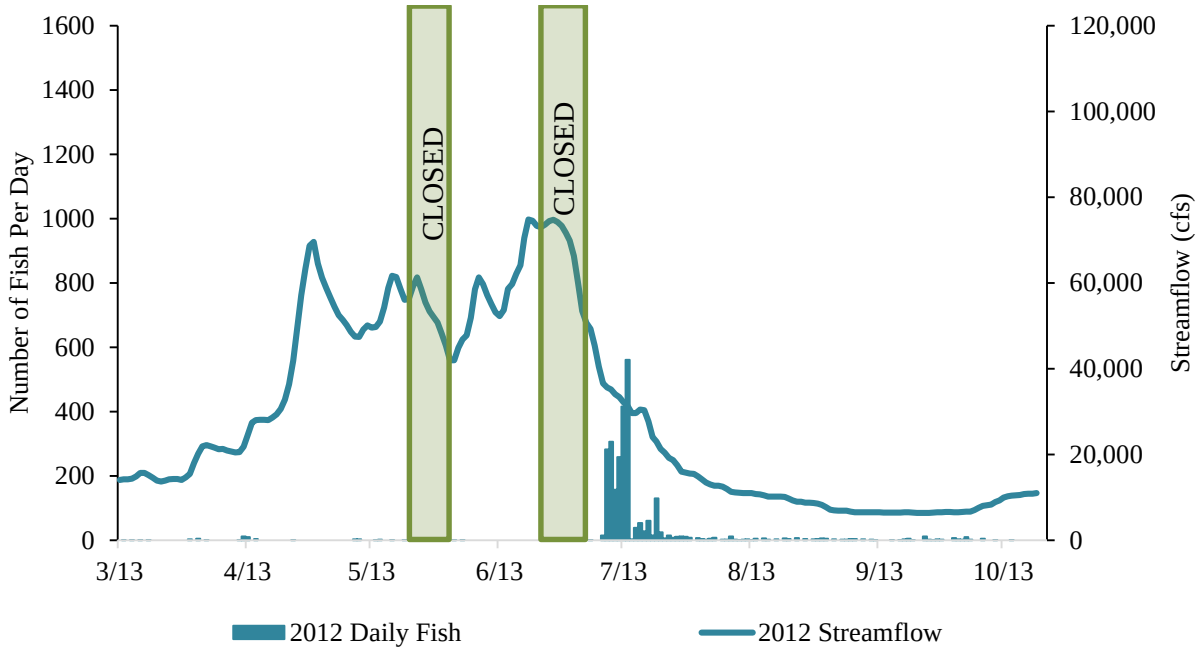


Figure 3-7: Summary of the daily fish count at the ladder, mean daily streamflow, and ladder closures between mid-March and mid-October in 2013.

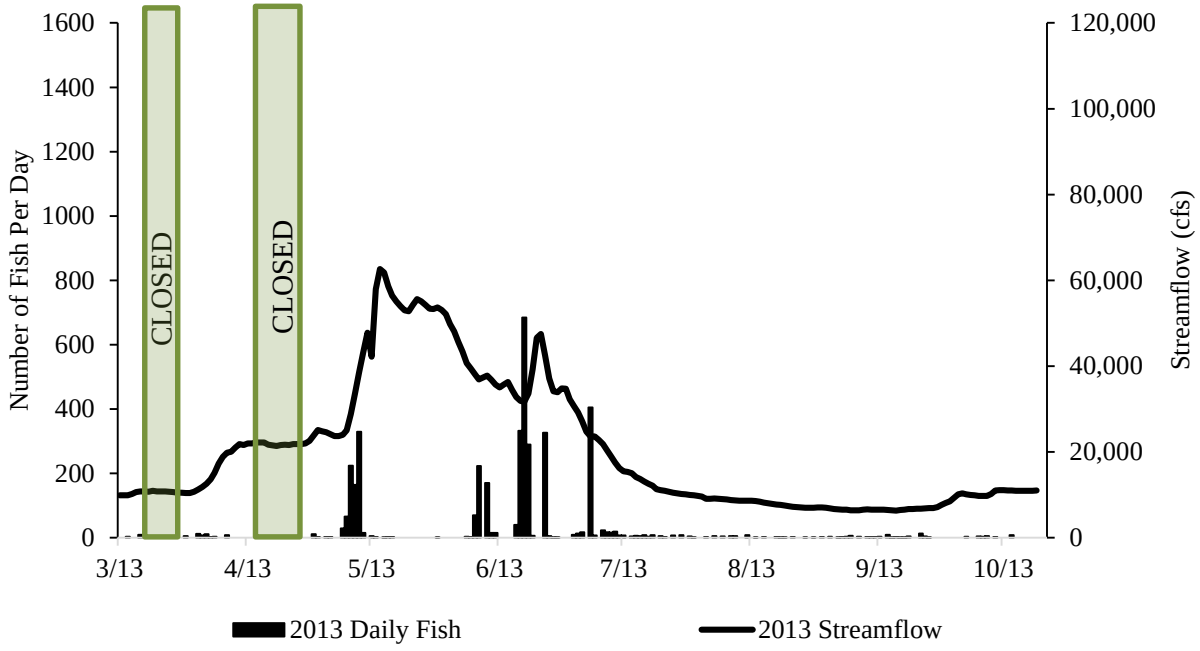
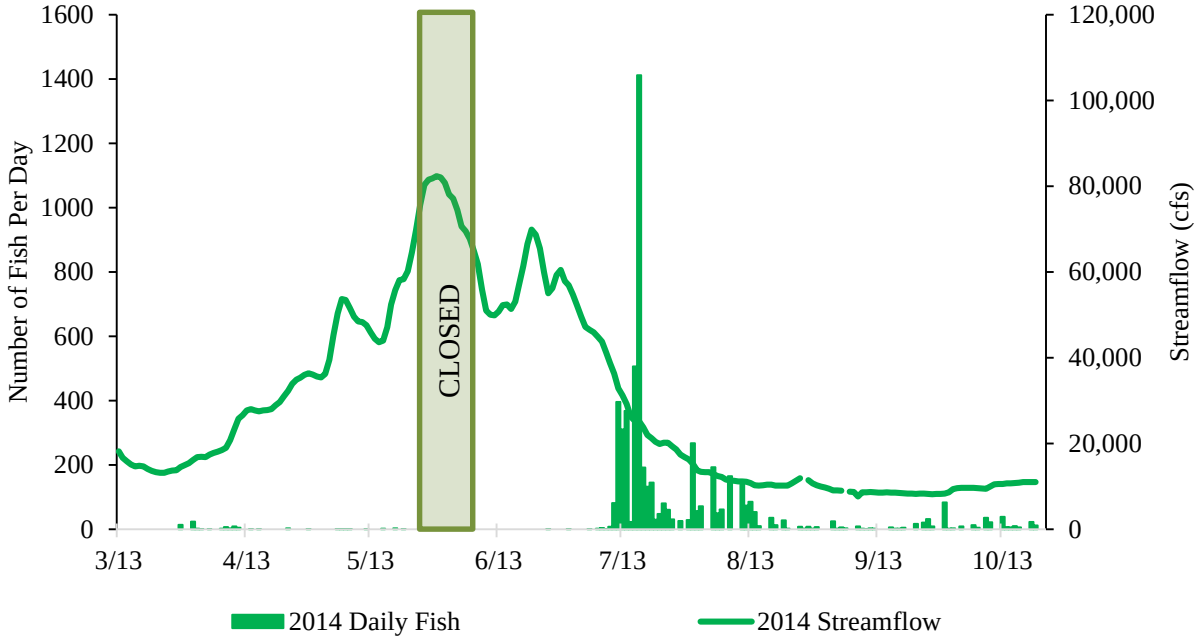


Figure 3-8: Summary of the daily fish count at the ladder, mean daily streamflow, and ladder closures between mid-March and mid-October in 2014.



3.2.4 Fish Ascending the Ladder

In 2014, approximately 5,735 fish representing 11 species and one hybrid, including one bull trout ascended the ladder. For the first time in the history of ladder operations, one brook trout was recorded at the ladder and passed upstream. There were two fish mortalities (one smallmouth bass; one lake trout euthanized onsite) recorded at the ladder in 2014.

The total number of fish recorded ascending the ladder has increased every year, from 1,805 in 2011 to 5,735 in 2014 (Table 3-3). The increase in the number of fish is likely related to several factors, including, but not limited to, the total number of days the ladder is open each year, the transition from alternating weir modes in 2011and 2012 to operating continuously in orifice mode in 2013 and 2014, adjustments/manipulations of flows near the ladder entrance (e.g., removal of panels on the main dam, stilling basin, etc.), as well as variability in the peak and duration of spring streamflows.

As in previous years, FWP authorized the release of all species upstream into the Thompson Falls Reservoir with the exception of lake trout and walleye. During the last 4 years of operations (2011-2014), no walleye have ascended the ladder and only three lake trout have been recorded at the ladder (one in 2011, 2012, and 2014), but were not passed upstream. All other salmonids ascending the ladder were released upstream and most were measured for total length and weight, marked via fin clip, and implanted with a passive integrated transponder (PIT) tag.

A summary of the total number of fish by species that ascended the ladder, the number of mortalities at the ladder, the number of fish passed upstream (total number of fish minus the

number of mortalities), the number of recaptures (fish initially tagged at the ladder and recorded returning to the ladder), and the number of fallback fish (fish detected at the ladder or downstream of the ladder in the same year that it ascended the ladder) recorded annually between 2011-2014, as well as cumulative total is provided in Table 3-3.

Table 3-3: Summary of the number of fish and species observed at the Thompson Falls Dam, recorded at the ladder, and number of "fallback" recorded annually, 2011-2014.

Species	Total Number of Fish (# of Mortalities at the Ladder)				
	2011	2012	2013	2014	Total
BULL	2	2 (1)	5	1	10 (1)
EB	-	-	-	1	1
RB	164 (2)	208 (1)	214 (2)	187	773 (5)
RBxWCT	9	7	12	12	40
WCT	21	21	48	36	126
LL	28	42	111 (4)	81	262 (4)
MWF	17	24	2	254	297
LN SU	10 (1)	-	2	1	13 (1)
LS SU	418 (1)	1,403 (4)	3,041 (5)	2,802	7,664 (10)
N PMN	1,000 (73)	926 (1)	387 (1)	1,003	3,316 (75)
SMB	135 (4)	34	8	1,356 (1)	1,533 (5)
LT	1 (1)	1 (1)	-	1 (1)	3 (3)
Total Salmonids	**242 (3)**	**305 (3)**	**392 (6)**	**573 (1)**	**1,512 (13)**
Total Non-Salmonids	**1,563 (79)**	**2,363 (5)**	**3,438 (6)**	**5,162 (1)**	**12,526 (91)**
Total # of Fish at the Ladder	**1,805 (82)**	**2,668 (8)**	**3,830 (12)**	**5,735 (2)**	**14,038 (104)**
Total # of Fish Passed Upstream	**1,723**	**2,660**	**3,818**	**5,733**	**13,934**
Recaptured	**13**	**12**	**31**	**59***	**NA**
Fallback	**13**	**2**	**4**	**12**	**NA**

Recaptured - fish initially tagged at ladder and returns to ladder (*2014 includes 3 SMB that had a lower caudal punch)
Fallback - detected at ladder or downstream of ladder in same year that it ascended ladder

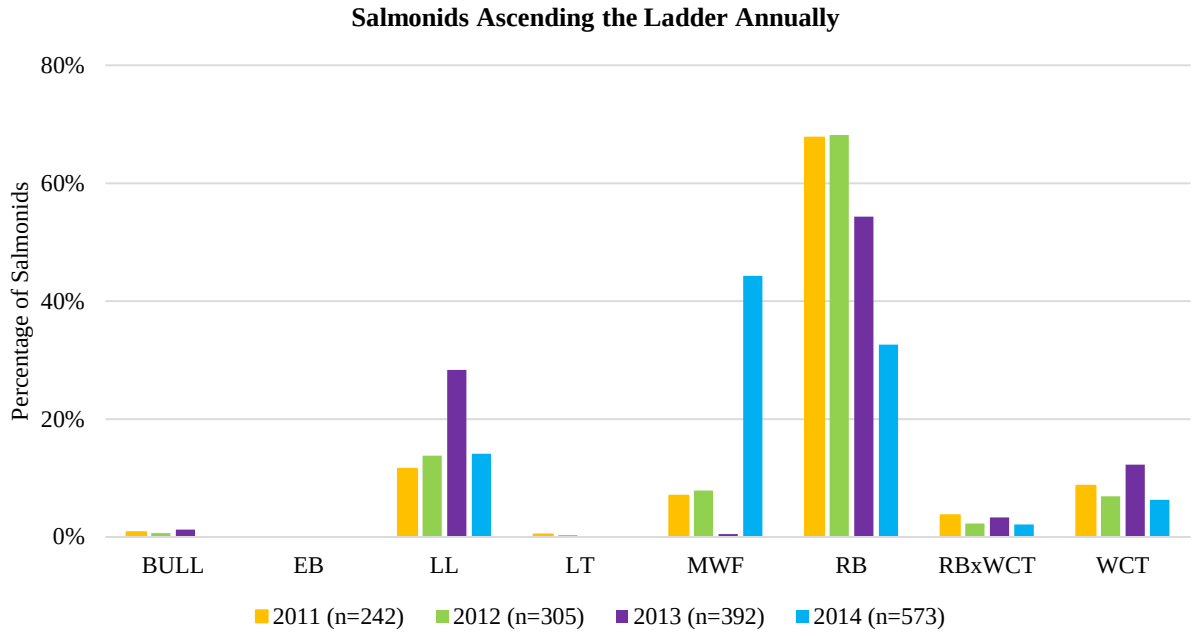
3.2.4.1 Species Composition

Over the last 4 years (2011-2014) 13,934 fish have been passed upstream of the Thompson Falls Dam (*see* Table 3-3). Non-salmonids represent approximately 90 percent of the fish recorded at the ladder annually and cumulatively over the last 4 years. Although the percentage of salmonids recorded at the ladder has remained around 10 percent annually and cumulatively over the last 4 years, the number of salmonids ascending the ladder has increased from 242 in 2011 to 573 in 2014. The cumulative total number of live fish passed upstream between 2011 and 2014 includes 1,499 salmonids, represented by 768 rainbow trout, 258 brown trout, 126 westslope cutthroat

trout, 297 mountain whitefish, 40 rainbow x westslope cutthroat trout hybrids, nine bull trout, and one brook trout.

Although the overall proportion of salmonids has remained consistent annually between 2011 and 2014, the composition of the salmonids species has shown some variability (Figure 3-4). The overall composition of salmonids species remained very similar between 2011 and 2012 with more notable variability observed in 2013 and 2014 (Figure 3-9). In 2013, there was an increase in percentage of brown trout and westslope cutthroat trout and an overall decline in mountain whitefish compared to 2011 and 2012. In 2014, the percentage of mountain whitefish increased substantially compared to previous years. The cause of the increase in mountain whitefish is unclear, but may be related to minor changes in the removal of panels on the dam to address issues related to the accumulation of macrophyte/vegetative masses that consequently resulted in changing flow conditions near the entrance of the ladder. NorthWestern proposes to attempt to replicate these operation conditions of the panels in 2015, as conditions permit. Additionally, the percentage of rainbow trout declined in 2014 compared to previous years (although the number of rainbow trout was within the range observed in previous years) while other salmonid species (e.g., bull trout, westslope cutthroat trout, brown trout, and rainbow x westslope cutthroat trout hybrids) remained similar to 2011 and 2012 proportions.

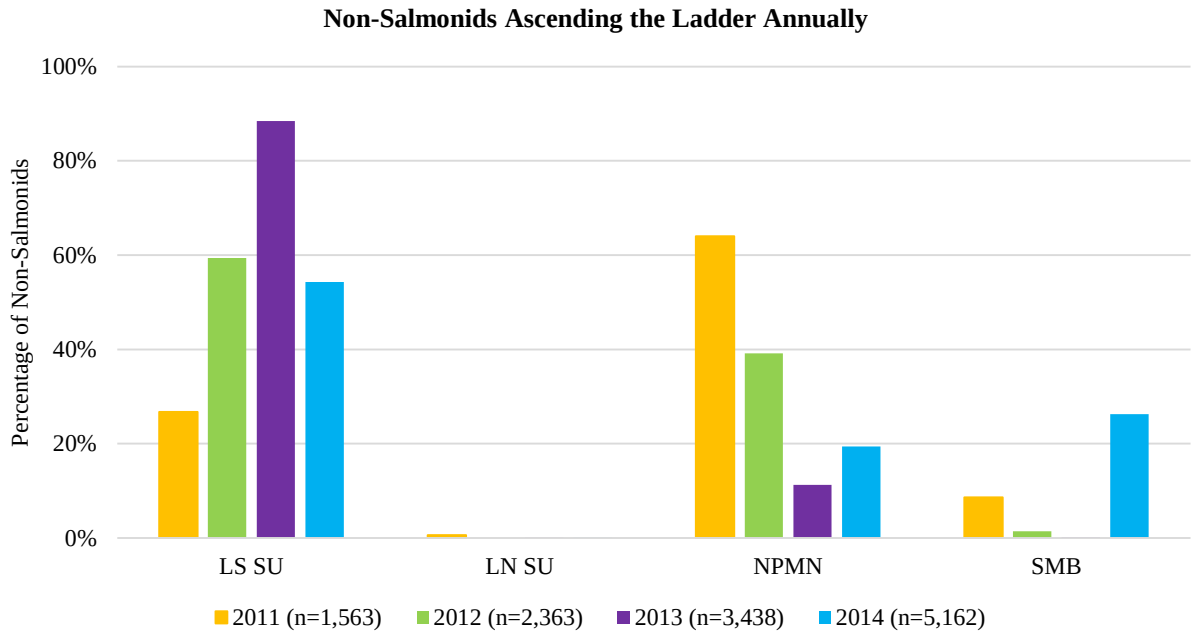
Figure 3-9: Percent composition of salmonid species that ascended the ladder in 2011, 2012, 2013, and 2014.



Non-salmonids frequenting the ladder are represented by four species, including largescale suckers, longnose suckers, northern pikeminnow, and smallmouth bass. Non-salmonids consistently comprise approximately 90 percent of the fish ascending the ladder annually, but the overall composition of non-salmonids has varied annually (Figure 3-10). In 2011, northern pikeminnow were the most common species representing 64 percent of the non-salmonids

ascending the ladder. From 2012 to 2014, the most common non-salmonid species was largescale suckers (range 54-88%). In 2011, ladder operations were closed during most of July and August, which in subsequent years has been observed to be the peak period for largescale suckers to ascend the ladder and may be the reason there were proportionately fewer largescale suckers in the ladder in 2011. In 2013, largescale suckers were the most prevalent (88%) compared to all years while northern pikeminnow were the least prevalent (11%) compared to all years (Figure 3-10). In 2014, there was a substantial increase in proportion (and number) of smallmouth bass recorded at the ladder increasing from zero in 2013 to 1,355 fish (26% of non-salmonids) in 2014. The cause for the increased proportion and number of smallmouth bass at the ladder in 2014 is unclear and could be related to several factors, such as physical stream conditions (e.g., streamflows, temperature, etc.) or population dynamics (e.g., strong year classes) downstream/upstream of Thompson Falls Dam. Longnose suckers are not commonly recorded ascending the ladder and represent less than 1 percent annually. Due to the large quantities of largescale suckers that tend to ascend the ladder at the same time, it is possible that one or more longnose sucker has been mistakenly identified as a largescale sucker.

Figure 3-10: Percent composition of non-salmonid species that ascended the ladder in 2011, 2012, 2013, and 2014.



3.2.4.2 Fish Metrics

A summary of the length and weight measurements collected for each fish species recorded at the ladder in 2014 is provided in Table 3-4. In 2014, the largest fish to ascend the ladder was a lake trout (685 mm, 2,190 g), but the largest fish to ascend the ladder and be passed upstream of the dam was a rainbow trout measuring 575 mm and weighing 1,990 g. Since 2011, the largest fish to ascend the ladder was a brown trout (2013) measuring 675 mm in length and weighing 3,832 g. The smallest fish to ascend the ladder in 2014 was a brown trout measuring 107 mm and

weighing 14 g. The smallest fish to ascend the ladder since 2011 was a northern pikeminnow (2011) measuring 82 mm and weighing 2 g.

Table 3-4: Summary of mean and range of lengths (mm) and weights (g) for each fish species that ascended the ladder and was moved upstream in 2014.

Species	Count	Mean Length (mm)	Length (mm) Range	Mean Weight (g)	Weight (g) Range
BULL	1	523		1,264	
EB	1	382		574	
RB	187	397	195 - 575	664	66 – 1,990
RBxWCT	12	410	281 - 555	693	220 – 1,398
WCT	36	336	180 - 467	422	50 – 982
LL	81	423	107 - 457	749	14 – 1,844
MWF	254	347	295 - 428	394	256 – 686
LN SU	1	422		800	
LS SU	384	421	245 - 519	744	168 – 1,354
N PMN	370	326	200 - 532	337	4 – 1,396
SMB	1315	213	109 - 430	144	30 – 1,156

The total biomass, in kilograms (kg), of the fish that were passed upstream of Thompson Falls Dam, is summarized by species and year in Table 3-5. The table does not include fish mortalities in the biomass calculations. In the event that a subsample of a species was taken and the weight(s) of the individual fish were not measured (e.g., non-salmonid species), the average weight for that species was used in the calculation for biomass.

The total volume of fish biomass that was passed upstream of Thompson Falls Dam has steadily increased from 801 kg in 2011 to 2,840 kg in 2014. Since ladder operations began in 2011, approximately 8,052 kg of biomass has been released upstream of Thompson Falls Dam. As mentioned previously, for the past 4 years, non-salmonid and salmonid species have represented approximately 90 percent and 10 percent, respectively, of the fish ascending the ladder and being moved upstream. This has translated to a similar percentage breakdown in biomass. Annually, non-salmonid species represent the majority of the fish biomass (80-92%) while salmonids represent between 8 and 20 percent of the fish biomass moved upstream of Thompson Falls Dam.

Although there was a significant increase in the total number of fish ascending the ladder and released upstream between 2013 (n=3,818) and 2014 (n=5,733), the increase in total volume of biomass was minimal, approximately 79 kg between years. The cause for this minimal increase in biomass is related to the change in species composition (and size) in 2014 compared to 2013. In 2014, there was a shift in composition for both non-salmonid and salmonid species that resulted in fewer of the larger and on average heavier species (i.e., largescale suckers, brown trout, and rainbow trout) and an increase in some of the, on average, smaller species (e.g., smallmouth bass, northern pikeminnow, and mountain whitefish). The differences in average biomass for these species are illustrated in the information summarized in Table 3-5.

Table 3-5: Summary of the estimated total biomass in kilograms (kg) for each fish species that ascended the ladder and was passed upstream of Thompson Falls Dam annually between 2011 and 2014.

Species	Approximate Total Biomass (kg) Passed Upstream				
	2011	2012	2013	2014	Total
BULL	2	1	8.0	**1**	12
EB	-	-	-	**1**	1
RB	119	102	116	**124**	461
RBxWCT	5	4	8	**8**	25
WCT	11	10	25	**15**	61
LL	18	28	69	**61**	176
MWF	6	8	1	**100**	114
LS SU	268	1,041	2,414	**2,037**	5,760
LN SU	5	-	1	**1**	7
N PMN	344	445	115	**320**	1,225
SMB	24	12	3	**172**	210
Salmonid Biomass	**161**	**153**	**227**	**310**	**850**
Non-Salmonid Biomass	**641**	**1,498**	**2,533**	**2,530**	**7,202**
TOTAL	**801**	**1,650**	**2,761**	**2,840**	**8,052**

3.2.4.3 Fish Growth

Growth data were evaluated for 117 fish, including 84 rainbow trout, 22 brown trout, six westslope cutthroat trout, three bull trout, and two mountain whitefish. These fish were either initially captured during electrofishing efforts downstream of Thompson Falls Dam or at the ladder between 2011 and 2014. Table 3-6 summarizes the average fish growth rate for length and weight by species. In general, the variation in growth is likely related to age of the fish. Younger fish are generally smaller and have faster growth rate than older (larger) fish.

Table 3-6: Growth rate summary for 117 fish, including the fish species, the number of fish, the duration between the initial capture and second capture dates, and the mean growth rate for length (mm/year) and weight (g/year), 2011 - 2014.

Species	Number of Fish	Mean Duration (days)	Mean Size at Initial Capture	Estimated Mean Growth	
				mm/year	g/year
BULL	3	671	513 mm, 1179 g	20	135
LL	22	875	379 mm, 549 g	59	101
RB	84	375	391 mm, 162 g	61	162
WCT	6	398	348 mm, 455 g	53	211
MWF	2	471	238 mm, 118 g	62	139
Total/Mean	**117**	**467**	**374 mm, 590 g**	**51**	**149**

3.2.4.4 Bull Trout Ascending the Ladder

On May 16, 2014, a bull trout that ascended the ladder and was released upstream of the dam. The bull trout was 523 mm in length and 1,264 g in weight. At the time of the ascent, the water temperature and streamflow in the river were approximately 10.8 °C and 44,000 cfs, respectively. The bull trout was released upstream of the dam alive. On October 13, 2014, the same bull trout was recaptured by FWP during their annual gillnet survey (mortality) in the Noxon Reservoir, downstream of the Thompson Falls Dam. The bull trout was notably in poor condition and appeared gravid. It is unknown when the bull trout moved downstream of Thompson Falls Dam or whether it moved downstream of the dam via the spillway or turbines.

During the past 4 years of ladder operations, the majority of the bull trout have ascended the ladder between April and June with the exception of one bull trout that ascended the ladder in August of 2013. In total, there have been nine individual bull trout that have ascended the ladder between 2011 and 2014. Five bull trout were released upstream and have not been detected since. Two bull trout have died, one returned to the ladder and jumped out of a pool and the second was captured via gillnetting downstream in the Noxon Reservoir. Two bull trout have been detected downstream of Thompson Falls Dam, in Prospect Creek.

A summary of the bull trout that have ascended the ladder in 2011, 2012, 2013, and 2014 is provided in Table 3-7. *Refer to* Section 4.0 for results of the bull trout genetics analysis.

Table 3-7: Summary of bull trout that ascended the ladder, 2011-2014. Note: The 2014 fish is listed in bold and shaded in blue.

Date	Length (mm)	Weight (g)	PIT Tag	Water Temp (°C)	USGS Mean Daily Streamflow (cfs)	Last Detection of Bull Trout
4/13/2011	365	364	985121023302169	6.6	24,500	Released live upstream of TFalls Dam
4/26/2011	547	1438	985121023464730	7.8	25,900	*See Comments on 5/21/2012*
5/15/2012	510	1172	985121021877906/ 982000357016269	11.3	51,000	First observed below TFalls Dam on 5/31/2011; ascended TFalls Ladder on 5/15/2012; released live upstream of TFalls Dam; detected Downstream of TFalls Dam by Avista in Prospect Creek 7/7/2013 – 8/13/2013
5/21/2012	563	1404	985121023464730	11.1	56,100	Returned to TFalls Ladder, Mortality (jumped out of pool)
4/30/2013	598	2306	982000357016065	8.9	25,100	Released live upstream of TFalls Dam
5/6/2013	576	1694	982000357016109	10.6	24,000	Released live upstream of TFalls Dam; detected downstream of TFalls Dam by Avista in Prospect Creek on 9/21/2014
5/7/2013	478	978	982000357016155	11.3	25,000	Released live upstream of TFalls Dam
6/7/2013	596	1926	Half-duplex (HDX) tag not recorded (Genetics 118-073)	15.5	38,100	Released live upstream of TFalls Dam
8/9/2013	482	1058	982000357016151	22.3	8,680	Released live upstream of TFalls Dam
5/16/2014	**523**	**1264**	**982000357016169**	**10.8**	**44,000**	Released live upstream of TFalls Dam; recaptured during 2014 annual reservoir monitoring led by FWP in Noxon Reservoir on 10/13/2014 via gillnet **(Mortality)**

3.2.5 Length of Time to Ascend the Ladder

Three remote antennas (non-directional) were installed in the lower (Pools 7 and 8) and upper (Pool 45) pools of the ladder for detecting the presence of PIT-tagged fish. PIT tag fish records from the remote antennas were used to calculate the length of time it took an individual fish to ascend the ladder between Pools 7/8 and Pool 45 in 2011, 2012, 2013, and 2014. Some of the fish that entered the ladder were initially PIT-tagged via electrofishing downstream of Thompson Falls Dam while others were PIT-tagged initially at the ladder, went downstream through the turbines or spillway, and returned once again to ascend the ladder. A summary of the fish detected via the remote antennas each year (2011-2014) in the ladder is presented in Table 3-8. However, in 2014, there was a period of time in mid-July through late-August when the remote antennas were not recording data; therefore, no data on fish that entered and ascended the ladder in the summer months is available for 2014. The data gap in 2014 likely explains the lack of largescale suckers detected in 2014, because largescale suckers generally enter the ladder during mid-summer.

In 2011, 17 fish representing three species (rainbow trout, largescale sucker, and brown trout) with PIT tags were detected via the remote antennas. The majority of fish detected were rainbow trout. Although the time to ascend the ladder ranged from 0.9 to 19.8 hours, the median time for all species to ascend the ladder was approximately 3 hours (Table 3-8).

In 2012, 30 fish representing six species (bull trout, brown trout, rainbow trout, mountain whitefish, westslope cutthroat trout, and largescale sucker) were detected via the remote antennas. These fish took between 0.7 to 8.3 hours to ascend the ladder with a median time of 2.3 hours (Table 3-8).

In 2013, 52 fish representing four species and one hybrid (brown trout, rainbow trout, westslope cutthroat trout, rainbow x westslope cutthroat trout hybrid, and largescale sucker) were detected via the remote antennas. Overall fish spent between 1 hour and 40.8 hours ascending the ladder. The majority of the fish ascended the ladder within a couple of hours. The median time for salmonids to ascend the ladder (excluding the rainbow x westslope cutthroat trout hybrid because of the outlier of the one fish that spent 19.1 hours to ascend the ladder) was between 1.8 and 2.0 hours. The median time for largescale suckers was 8.2 hours. The median time for all 52 fish to ascend the ladder was 2.0 hours and the average time for all 52 fish to ascend the ladder was 6.3 hours (Table 3-8).

In 2014, 33 fish representing four species and one hybrid (rainbow trout, brown trout, mountain whitefish, westslope cutthroat trout, and rainbow x westslope cutthroat trout hybrid) were detected via the remote antennas. Thirty-two fish spent between 0.7 to 6.4 hours to ascend the ladder with a median time of 1.6 hours (Table 3-8). One rainbow trout, not included in Table 3-8, took approximately 5 days, 2 hours, and 38 minutes to ascend the ladder. This rainbow trout had initially ascended the ladder on March 31, 2014 measuring 400 mm and 592 g and approximately 190 days later the fish entered the ladder and was recorded approximately 200 g lighter,

measuring 396 mm and 384 g. Records indicate the fish appeared to be in poor condition. It is assumed that the poor condition of the fish is likely the primarily contributing factor to the 5-day period it spent ascending the ladder. Due to the unusual poor condition and circumstances of this fish, it was considered an outlier and the time spent by this rainbow trout to ascend the ladder was not included in the summary presented in Table 3-8.

Table 3-8: Summary of the species, number of species detected via remote antennas in the ladder, and the median, average, and range of time (hours) spent ascending the ladder in 2011, 2012, 2013, and 2014.

2011				
Species	**Number**	**Median Time (Hours)**	**Average Time (Hours)**	**Range of Time (Hours)**
RB	15	3.0	4.7	0.9 - 19.8
LS SU	1	3.6	3.0	3.6
LL	1	10.8	10.8	10.8
TOTAL	**17**	**3.0**	**6.4**	**0.9 - 19.8**
2012				
Species	**Number**	**Median Time (Hours)**	**Average Time (Hours)**	**Range of Time (Hours)**
BULL	2	2.6	2.6	2.4-2.8
LL	1	1.1	1.1	1.1
RB	18	2	2.2	0.7-4.4
MWF	1	2.1	2.1	2.1
WCT	1	1.7	1.7	1.7
LS SU	7	3.2	4.6	2.3-8.3
TOTAL	**30**	**2.3**	**2.7**	**0.7 - 8.3**
2013				
Species	**Number**	**Median Time (Hours)**	**Average Time (Hours)**	**Range of Time (Hours)**
LL	14	1.8	2.0	1.0-3.3
RB	24	1.8	6.7	1.0-40.8
RBxWCT	1	19.1	19.1	19.1
WCT	3	2.0	2.0	1.4-2.5
LS SU	10	8.2	11.6	1.7-31
TOTAL	**52**	**2.0**	**6.3**	**1.0 - 40.8**
2014				
Species	**Number**	**Median Time (Hours)**	**Average Time (Hours)**	**Range of Time (Hours)**
RB	18	1.6	1.7	0.8 – 2.6
LL	10	1.2	1.6	0.7 – 4.2
MWF	1	1.7	1.7	1.7
RBxWCT	1	2.0	2.0	2.0
WCT	2	5.1	5.1	3.8 – 6.4
TOTAL	**32**	**1.6**	**1.9**	**0.7 – 6.4**

In general, salmonids appear to ascend more quickly than largescale suckers. However, in 2012 and 2013, the largescale suckers were all detected in mid-July when hundreds of fish were present in the ladder. Therefore, the volume of fish in the ladder may also influence the amount of time an individual fish spends ascending the ladder.

3.2.6 Most Active Periods for Fish Ascending the Ladder

Fish entry to the ladder and timing of ascent was evaluated on two spatial scales, daily timing of ladder entry and seasonal movement. Several factors likely contribute to fish movement and timing observed between 2011 and 2014, including, but not limited to, water temperature, streamflow in the ladder, photoperiod, and ladder operations. However, the interaction of these factors and potential influence on when fish enter the ladder is unknown. In 2013 and 2014, the ladder operated in orifice mode for the entire season in contrast to 2011 and 2012, when the ladder operated in alternating weir modes (orifice and notch). It is possible that the operating mode, or the weekly alteration from orifice to weir mode in 2011 and 2012, influenced the movement and behavior of fish in the ladder. However, other variables, such as water temperatures and streamflows in the river may also be contributing factors. The following subsection summarizes the daily movements of fish detected (via remote antenna) in the ladder in 2012, 2013, and 2014 and seasonal movement patterns observed between 2011 and 2014.

3.2.6.1 Daily Movements

Data collected from the three remote antennas in the ladder (described in Section 3.2.5) were utilized to evaluate the time of day fish entered the ladder. Since 2012, 204 fish representing seven species and one hybrid were analyzed for time of entry into the ladder (Table 3-9). The species information for six individual fish detected via remote antenna in 2012 was not available. Consequently, these fish were identified as unknown (as shown in Table 3-9).

Table 3-9: Summary of the number of fish species detected in the ladder via remote antennas in 2012 and 2013.

Species	2012	2013	2014	Total
BULL	2	0	0	2
LL	3	15	25	43
LS SU	30	22	9	61
MWF	2	2	1	5
NPMN	1	1	0	2
RB	18	28	31	77
RBxWCT	0	1	1	2
WCT	1	3	2	6
Unknown	6	0	0	6
TOTAL	**63**	**72**	**69**	**204**

The timing of fish entry into the ladder was depicted by dividing a 24-hour period into 3-hour increments. The number of fish was tallied for each time interval. In contrast to 2012 and 2013,

the majority of fish evaluated in 2014 were salmonid species, representing approximately 87 percent of the fish evaluated. This is likely a result of the remote antennas not recording data in most of July and August when non-salmonid species are most commonly observed in the ladder. The times of day that salmonids and non-salmonids were detected in the ladder for each year are shown in Figures 3-11 and 3-12, respectively.

Figure 3-11: Time of day that salmonids were detected in the ladder in 2012-2014.

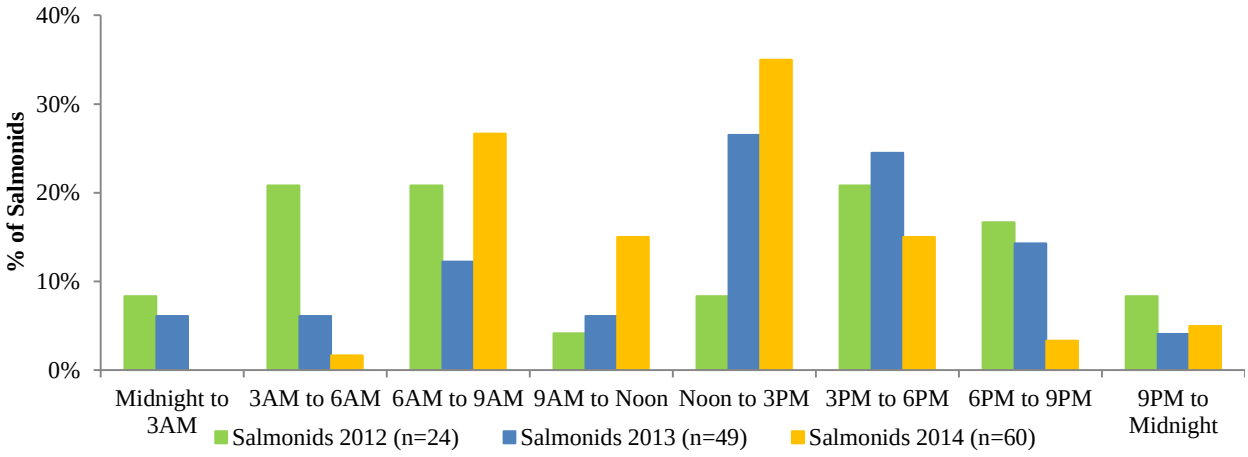
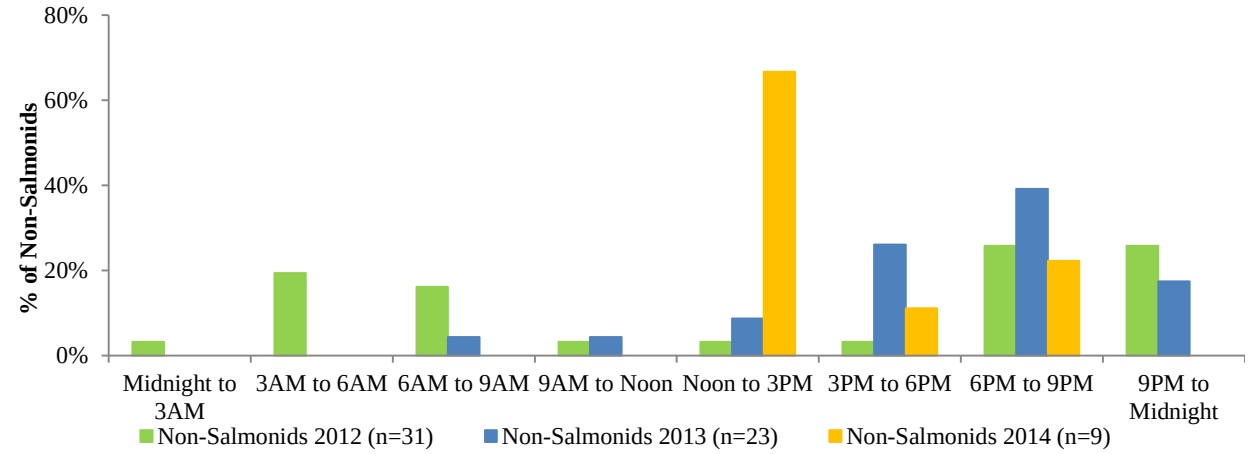


Figure 3-12: Time of day that non-salmonids were detected in the ladder in 2012-2014.



3.2.6.2 Seasonal Movements

Salmonids and non-salmonids recorded at the ladder between 2011 and 2014 display distinct and different movement strategies. In previous annual reports, daily counts of salmonids and non-salmonids were discussed and graphed (PPL Montana, 2012, 2013, 2014). In this report, salmonids and non-salmonids are evaluated on a monthly scale. Figures 3-13 and 3-14 compare the percentage of all salmonids and non-salmonids recorded at the ladder each month between 2011 and 2014, as well as illustrate the corresponding monthly mean streamflow (USGS gage #12389000) and water temperature (in °C) in the ladder for the same period of time. Salmonids are observed throughout the year with larger percentages present during the ascending limb of

the hydrograph, descending limb of the hydrograph, and the fall (before the ladder is closed). Non-salmonids are more abundant at the ladder during the summer months.

Figure 3-13: Percentage of all salmonids and non-salmonids recorded at the ladder per month between 2011 and 2014 along with the corresponding monthly mean streamflow in the Clark Fork River (USGS gage station near Plains).

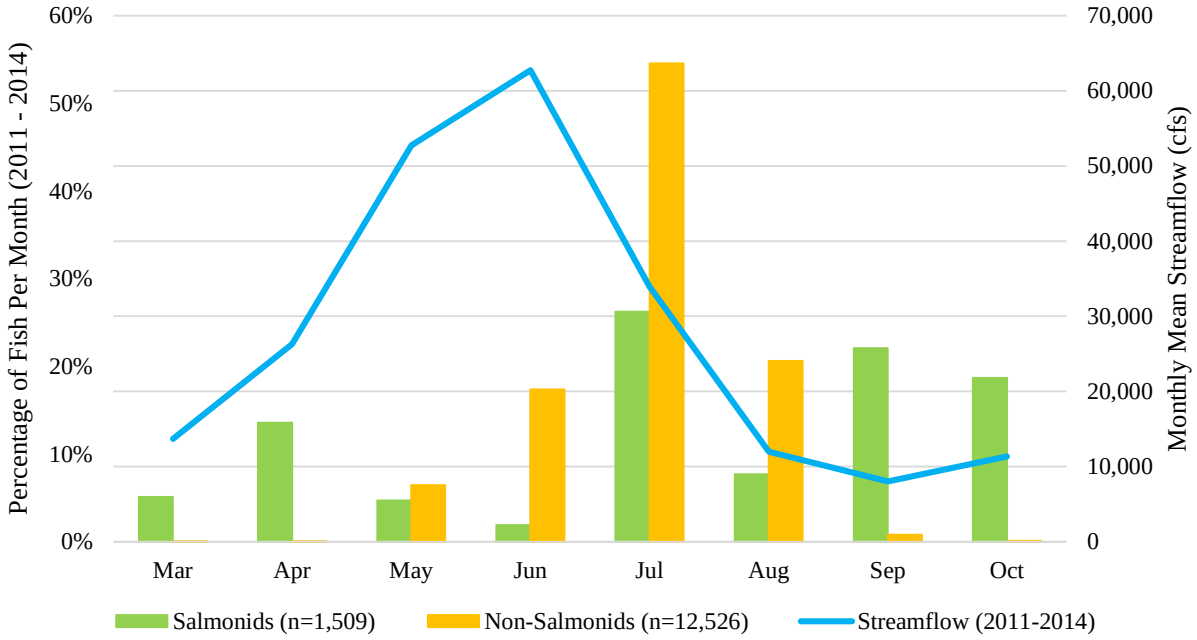
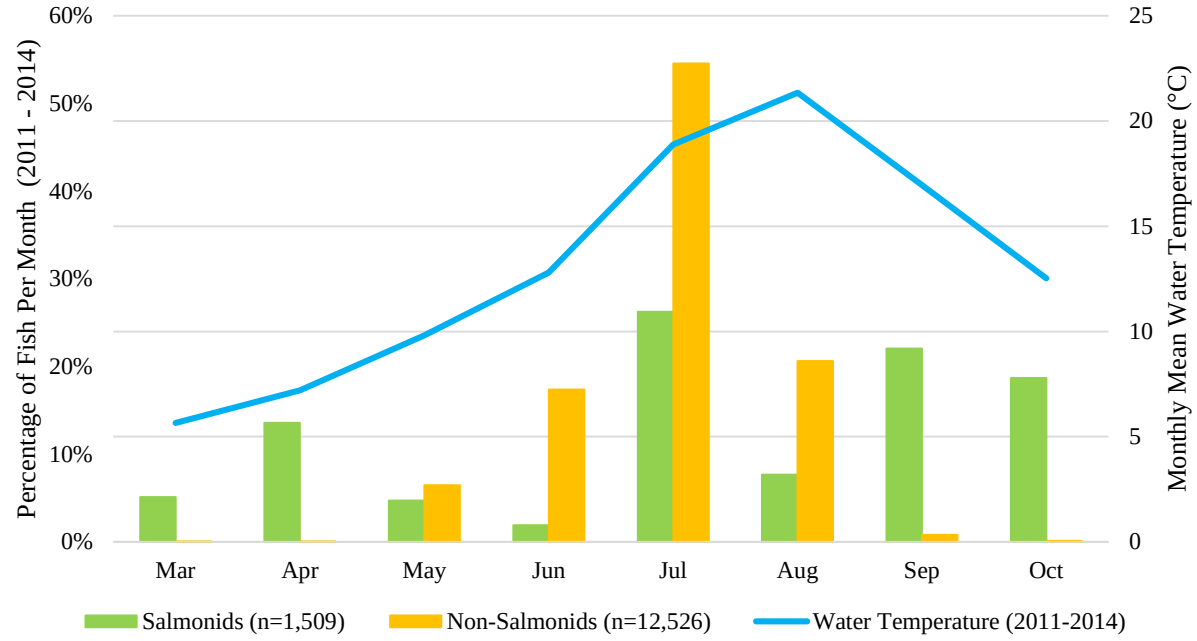


Figure 3-14: Percentage of all salmonids and non-salmonids recorded at the ladder per month between 2011 and 2014 along with the corresponding monthly mean water temperature in the ladder (Pool 48).



In this report, only hydrology and water temperature are evaluated in concert with when salmonids and non-salmonids are recorded at the ladder. However, as previously mentioned, fish movement behavior and patterns are likely influenced by a myriad of elements such as, but not limited to, thermal regimes, hydrologic regime, life history cycle, attractant flow at the ladder, ladder operations (e.g., closures), and/or other physical or biological factors. The following text provides more detail and analysis of when salmonid and non-salmonids ascend the Thompson Falls fish ladder based on data collected between 2011 and 2014.

3.2.6.3 Salmonids Seasonal Movement

Salmonids recorded at the ladder represent several species, including bull trout, rainbow trout, westslope cutthroat trout, rainbow x westslope cutthroat trout hybrid, brown trout, brook trout, and mountain whitefish (*refer to* Figure 3-9 in Section 3.2.4.1). A summary of the percentage of salmonids recorded at the ladder monthly each year is provided in Tables 3-10.

Table 3-10: Summary of the percentage of salmonids ascending the ladder per month each year.

Month	% of Salmonids Per Month			
	2011	**2012**	**2013**	**2014**
March	5.0%	2.3%	4.3%	7.2%
April	**34.4%**	10.9%	14.3%	5.8%
May	3.7%	3.3%	11.0%	1.6%
June	-	0.7%	6.9%	-
July	0.4%	**40.8%**	**38.0%**	21.3%
August	10.8%	15.5%	5.9%	3.5%
September	26.1%	16.4%	13.3%	29.4%
October	19.5%	10.2%	6.4%	**31.3%**
Total Number of Salmonids	241	304	392	572

Salmonids recorded at the ladder represent both spring and fall spawners. Spring spawners include rainbow trout, westslope cutthroat trout, and rainbow x westslope cutthroat trout hybrids. Fall spawners include bull trout, brook trout, brown trout, and mountain whitefish. Movement patterns and timing of salmonids at the ladder is likely a combination of spawning and non-spawning fish. The following discussion provides an overview of when salmonids (both spring and fall spawners) are observed at the ladder. To illustrate seasonal movements, the percentage of all salmonids (delineated as spring or fall spawners) recorded at the ladder per month between 2011 and 2014 and the monthly mean streamflow and water temperature are graphed in Figures 3-15 and 3-16, respectively.

Salmonids have been observed in the ladder each month (when the ladder is open) with daily counts ranging from zero to 78 fish over the last 4 years. In general, there are approximately three times a year when the number of salmonids per day at the ladder is greatest. Salmonids appear to move and ascend the ladder in the spring prior to the ascending limb of the

hydrograph; then again following the peak spring flows during the descending the limb of the hydrograph; and lastly in the fall, once stream temperatures start to decline below 20 °C (Figures 3-15 and 3-16).

Figure 3-15: Percentage of salmonids, spring and fall spawners, ascending the Thompson Falls fish ladder each month and the monthly mean streamflow between 2011 and 2014.

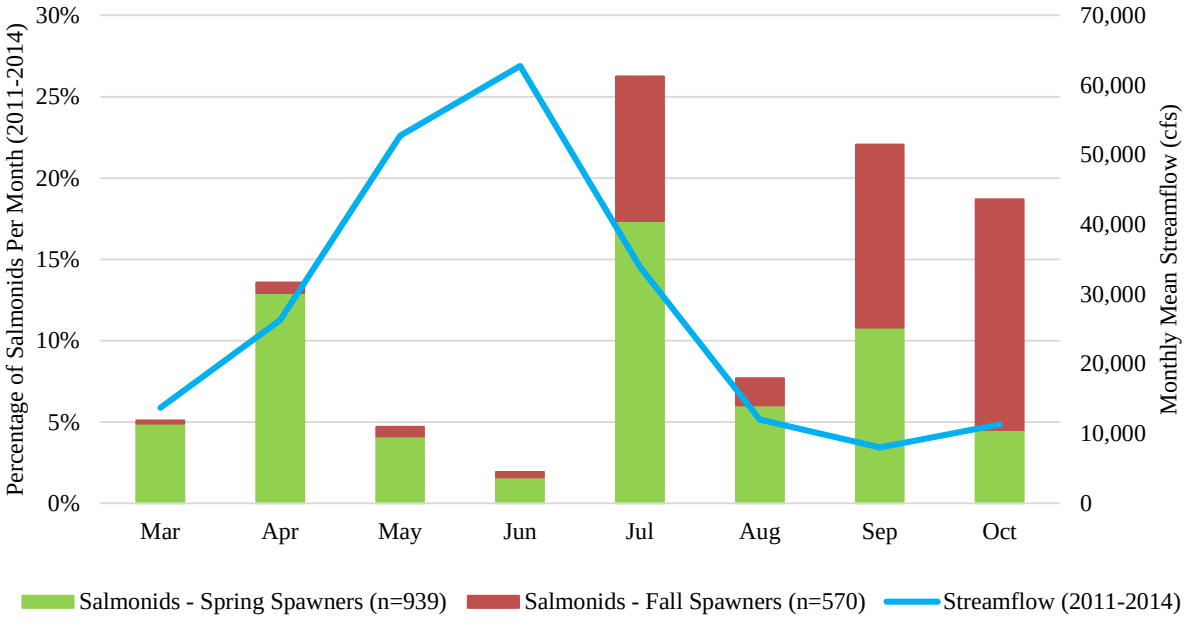
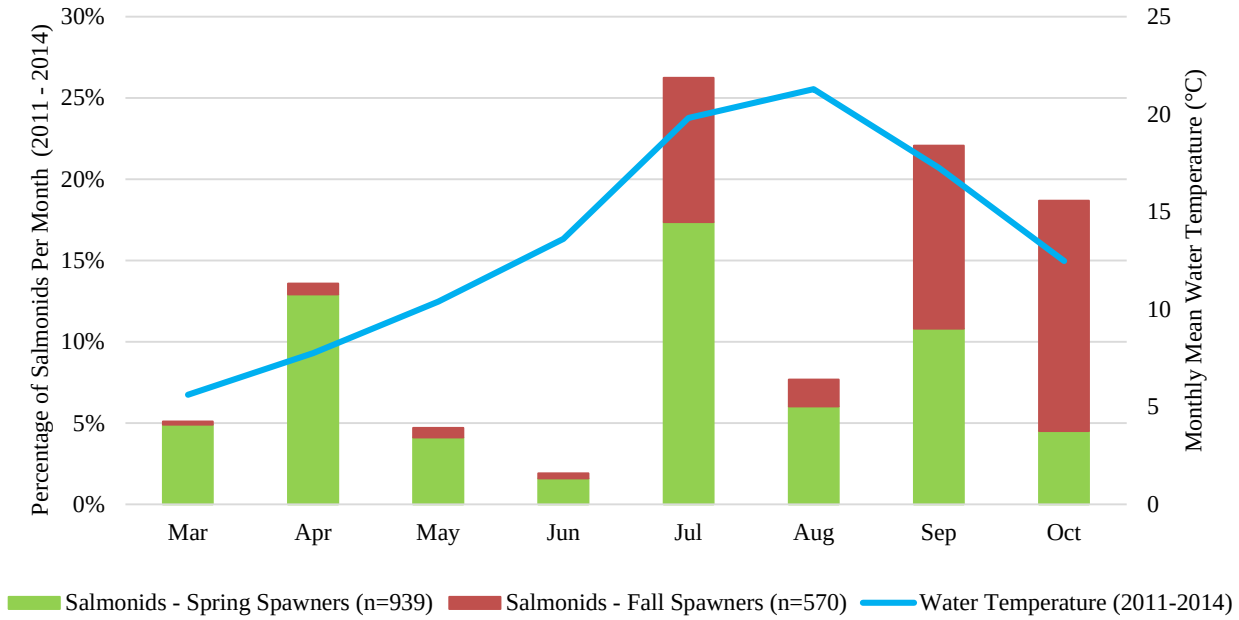


Figure 3-16: Percentage of salmonids, spring and fall spawners, ascending the Thompson Falls fish ladder each month and the monthly mean water temperature between 2011 and 2014.



As expected, spring spawners represent a large proportion of salmonids in the spring as the converse is true for fall spawners in the fall. However, both spring and fall spawners are present year-round indicating movement patterns are not just related to spawning. In addition, July is a peak month when a large percentage of salmonids (17% spring and 9% fall spawners) are ascending the ladder.

At the ladder, approximately 15 to 43 percent of salmonids ascending the ladder each year and arrive between March and May 31. Unlike non-salmonids that are often recorded in large numbers (100's to 1000^{+} per day), salmonids do not ascend the ladder on this scale. The difference in scale of salmonids and non-salmonids ascending the ladder may represent each group's relative presence in the system. The maximum daily count of salmonids recorded at the ladder over the last 4 years has been 13 fish in 2011; 12 fish in 2012; 25 fish in 2013; and 78 fish in 2014.

Although some salmonids have ascended the ladder during peak spring flows, in general, there is minimal activity of salmonids ascending the ladder at this time (*see* Figure 3-15) or the ladder has been closed. It is unclear if the minimal presence of salmonids at the ladder during peak flows is related to river conditions (e.g., turbidity, flows, temperature, debris, etc.) or ladder operations (e.g., ladder closures, attractant flow). Peak flows generally occur between May and June, but the timing varies annually and depends on snowpack and precipitation events.

In 2012, 2013, and 2014, salmonid movement to the ladder appears to be greatest in July during the descending limb of the hydrograph and prior to peak and sustained warmer water temperatures that are typical in August. This trend was not observed in 2011, primarily because the ladder was not operating most of July. In 2012 and 2013, approximately 41 and 43 percent of the salmonids ascended the ladder in July, respectively. In 2014, approximately 21 percent of salmonids ascended the ladder in July; however, this number was skewed by a larger number of mountain whitefish (n=253) ascending the ladder in September and October, which had not been observed in previous years. Mountain whitefish represented approximately 44 percent of salmonids in 2014, whereas in previous years, mountain whitefish represented between 1 and 8 percent of salmonids recorded at the ladder.

In the fall (September and October), stream temperatures decline from the summer highs and the number of salmonids increase compared to the late summer (August). The increase in salmonids in the fall is generally associated with the presence of brown trout and/or mountain whitefish once water temperatures declined below 20 °C. In 2014, unlike previous, there was a large influx of mountain whitefish in the ladder in September and October. It is unclear if the increase was related to water temperatures, river streamflows, or potentially some modifications in the panel openings on the dam that modified the hydrology near the ladder entrance. For the past 4 years, the ladder has been closed and winterized between October 15 and 21, so it is likely that the data collected at the ladder does not fully capture potential fall movement of salmonids in all years (specifically for mountain whitefish).

3.2.6.4 Non-Salmonid Seasonal Movements

Non-salmonids represent between 87 and 90 percent of the total numbers of fish ascending the ladder annually (*refer to* Table 3-3). The percentage of non-salmonids ascending the ladder per month each year (2011-2014) is summarized in Table 3-11. The majority of non-salmonids recorded at the ladder ascend in the summer months of June, July, and August. In 2011, the ladder was closed during the majority of July and most of August, and likely delayed the timing of when fish ascended the ladder that year. The hydrologic and thermal regime for 2012 and 2014 were similar and the movement patterns of non-salmonids were also similar with the majority of non-salmonids recorded in July. In 2013, water temperatures were warmer for the year and the duration of spring flows was shorter as well as the amplitude than in 2011, 2012, and 2014; which may explain flux of non-salmonids observed during the spring months (May and June) in 2013 compared to the other years.

Table 3-11: Summary of the percentage of non-salmonids ascending the ladder per month each year (2011-2014).

Month	% of Non-Salmonids Per Month			
	2011	2012	2013	2014
March	0.1%	-	-	-
April	0.1%	-	-	-
May	0.5%	-	23.3%	-
June	-	<0.1%	**63.3%**	<0.1%
July	0.1%	**97.7%**	12.6%	**79.3%**
August	**97.4%**	2.2%	0.6%	19.2%
September	1.5%	0.1%	0.3%	1.2%
October	0.2%	-	-	0.2%
Total Number of Non-salmonids	1,563	2,363	3,438	5,162

The percentage of all non-salmonids ascending the ladder per month between 2011 and 2014 along with the corresponding monthly mean streamflow and water temperature are shown in Figures 3-17 and 3-18, respectively. It is worth noting that the ladder closure during the summer months (majority of June, July, and August) in 2011 may have altered the pattern of seasonal fish movement that year.

The majority of non-salmonids species are represented, in descending order, by largescale suckers, northern pikeminnow, and smallmouth bass (*refer to* Figure 3-10 in Section 3.2.4.1). Longnose suckers have also been documented at the ladder, but their presence comprises less than one percent of non-salmonids annually. In most years, northern pikeminnow were more abundant than smallmouth bass. However, in 2014 there were substantially more smallmouth bass (n=1,355) ascending the ladder compared to northern pikeminnow (n=1,003) even though the number of northern pikeminnow more than tripled in 2014 compared to 2013 (*refer to* Table 3-3 in Section 3.2.4). The cause for the significant influx of smallmouth bass in 2014 is

unknown and may be related to one or more factors such as downstream/upstream population dynamics, hydrologic or temperature regime, or ladder operations.

Figure 3-17: Percentage of non-salmonids ascending the Thompson Falls fish ladder each month and the monthly mean streamflow between 2011 and 2014.

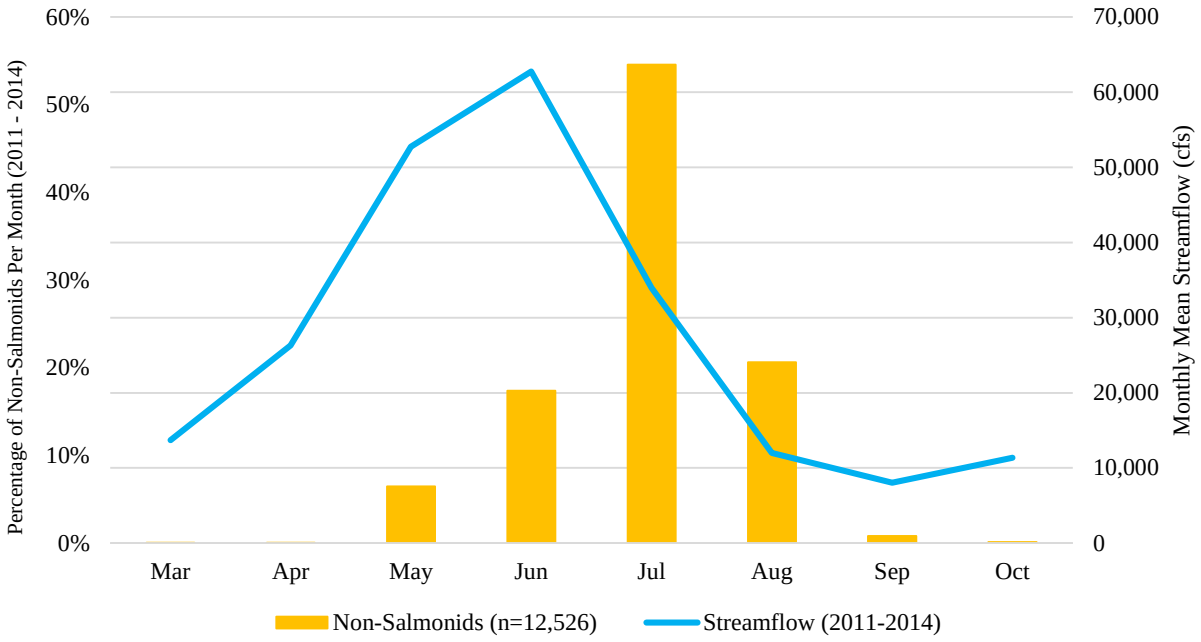
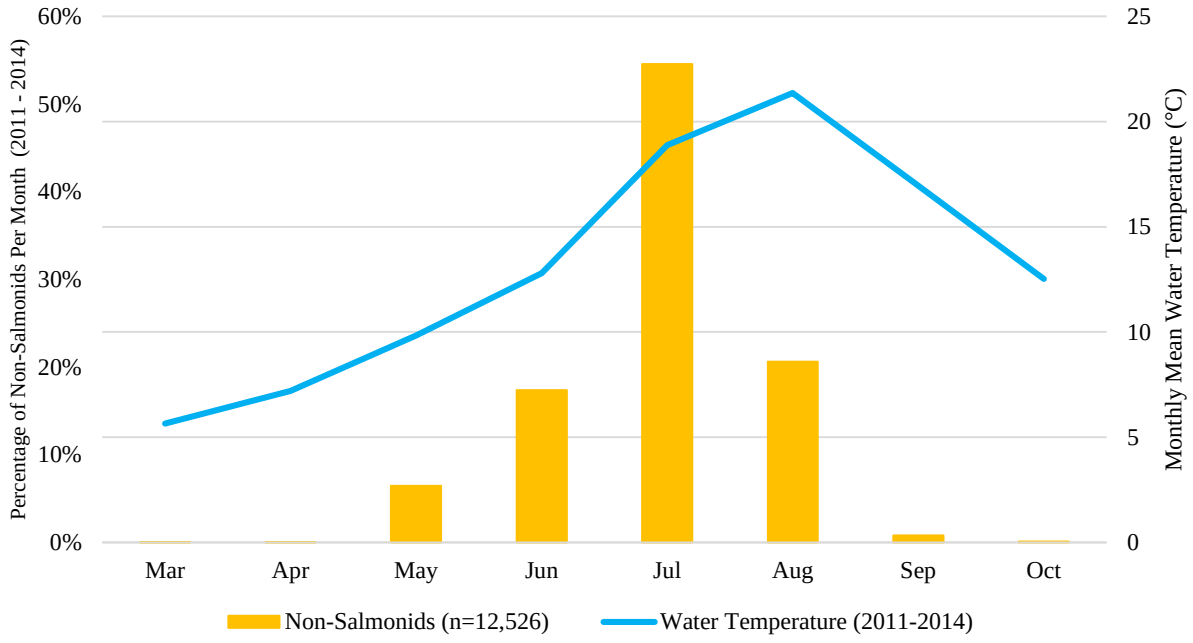


Figure 3-18: Percentage of non-salmonids ascending the Thompson Falls fish ladder monthly and the monthly mean water temperature between 2011 and 2014.



In the past 4 years, the abundance of non-salmonids at the fish ladder has peaked in the summer on the descending limb of the hydrograph and during warmer stream temperatures. Considering

these non-salmonid species are spring spawners (April – early July), their movements and timing at the ladder do not appear to be related to spawning, but rather seem highly related to the declining streamflow conditions and warmer water temperatures.

In 2011, the ladder was closed for the summer months until August 22 and approximately 97 percent of the non-salmonids ascended the ladder in August (Table 3-11). The peak daily count was 872 non-salmonids on August 23. In August, stream temperatures were above 20 °C and streamflows were approximately 13,000 cfs.

In 2012, non-salmonids were most common in the ladder in July with a peak daily count of 560 fish on July 14. Streamflows were approximately 30,000 cfs and water temperatures approached, and on some days exceeded 20 °C during the peak movement of non-salmonids. In July, the majority of non-salmonids were largescale suckers and northern pikeminnow. Smallmouth bass ascended the ladder from late July through August in much lower numbers (< 5 per day).

In 2013, unlike 2011 and 2012, where non-salmonids displayed a large movement in July and August following the declining limb of the hydrograph and warmer stream temperatures, non-salmonids daily counts exceeded 300 fish in May, June, and July. The larger daily counts of non-salmonids were predominantly largescale suckers and in the spring the largescale suckers were observed to be in spawning condition (L. Mabbott, NorthWestern, personal communication, 2014). In May 2013, non-salmonids were not observed in large numbers until stream temperatures exceeded 11 °C. Daily counts of non-salmonids were greatest on June 19 with 684 non-salmonids, streamflows approximately 30,000 cfs, and the water temperature 17.5 °C. As observed in 2012, smallmouth bass were in the ladder in late July and August when temperatures exceeded 20 °C.

In 2014, movement patterns of non-salmonids in the ladder were most similar to 2012 with the peak activity in July. The total number of non-salmonids (n=5,162) was greatest in 2014 compared to previous years, as was the peak daily count recording 1,408 fish on July 17, of which the majority were largescale suckers (n=1,293). On July 17, streamflows were approximately 25,500 cfs and water temperatures were above 20 °C. As in previous years, the larger daily counts of fish were predominantly largescale suckers. The maximum daily count for northern pikeminnow was 230 fish on July 12 and the maximum daily count for smallmouth bass was 150 fish on August 4. The presence of northern pikeminnow and largescale suckers peaked in July, while the presence of smallmouth bass peaked in August (n=808 fish). As observed in previous years, smallmouth bass ascended the ladder in July and August when temperatures ranged from 18 °C and 23 °C.

3.2.7 Tagged Fish Returning to the Ladder

Since 2011, 1,821 fish have been uniquely tagged (1,668 PIT; 153 Floy tags) either at the ladder or immediately downstream of Thompson Falls Dam. A summary of the number of fish tagged at the ladder and returning to the ladder in following year(s), as well as a summary of the fish

tagged downstream of Thompson Falls Dam and navigating their way up the ladder between 2011 and 2014 is provided in the following subsection.

3.2.7.1 Fish Tagged at the Ladder

Approximately 1,217 fish representing 11 species and one salmonid hybrid have been uniquely tagged (PIT or Floy) at the Thompson Falls fish ladder prior to being released upstream of Thompson Falls Dam (Table 3-12). Approximately 10 percent of the 1,217 tagged fish at the ladder have returned to the ladder through the years. The number of fish, by species, returning to the ladder is summarized in Table 3-12. The table includes "fallback" fish with PIT/Floy tags that are discussed in more detail in Section 3.2.9.

Table 3-12: Summary of the number of fish, by species, with unique PIT or Floy tag implanted in fish at the Thompson Falls Ladder prior to release upstream annually between 2011 and 2014. Fish returning to the ladder are provided in parentheses (#).

Species	Tag Type	2011	2012	2013	2014	Totals
BULL	PIT	2	(1)	4	**1**	7 (1)
EB	PIT				**1**	1
LL	PIT	27	40 (1)	97 (6)	**67 (11)**	231 (18)
RB	PIT	141 (12)	189 (10)	186 (23)	**144 (37)**	660 (82)
RBxWCT	PIT	9	7	12 (1)	**11 (1)**	39 (2)
WCT	PIT	20 (1)	20	45 (1)	**34 (2)**	119 (4)
MWF	PIT	17			**(1)**	17 (1)
N PMN	PIT	2				2
NPMN	FLOY	1				1
LN SU	PIT	1				1
LS SU	PIT	6				6
SMB	FLOY	73	30 (2)	7	**23 (4)**	133 (6)
	PIT	**225 (13)**	**256 (12)**	**344 (31)**	**258 (52)**	**1,083 (108)**
	FLOY	**74**	**30 (2)**	**7**	**23 (4)**	**134 (6)**
	Totals	**299 (13)**	**286 (14)**	**351 (31)**	**281 (56)**	**1,217 (114)**

Salmonids represent the majority of the fish species tagged at the ladder and also the majority of fish recorded returning to the ladder in subsequent years(s) (Table 3-12). In 2014, there were 572 salmonids (value excludes lake trout) that ascended the fish ladder. Of the 572 salmonids, 52 were returning fish that were identified by a unique PIT tag. These data indicate approximately 9 percent of all salmonids recorded at the ladder in 2014 had already ascended the ladder one or more times (Table 3-13). When evaluating this statistic by species, the results were greatest for rainbow trout and brown trout. Nearly 20 percent of all rainbow trout and 14 percent of all brown trout recorded at the ladder in 2014 were returning fish.

Table 3-13: Summary of the number of salmonids ascending the ladder in 2014 and the percentage of those salmonids that were returning to the ladder from previous year(s). Lake trout excluded form calculations.

Species	# of Fish at Ladder in 2014	# of Fish Return to Ladder in 2014	% of 2014 Fish that were Returning to Ladder
BULL	1	-	-
EB	1	-	-
LL	81	11	13.6%
RB	187	37	19.8%
RBxWCT	12	1	8.3%
WCT	36	2	5.6%
MWF	254	1	<0.5%
Total Salmonids	**572**	**52**	**9.1%**

The timing of the fish returning to the ladder also indicates these are likely intentional upstream migrations (*see* Table 3-15) and not a result of "fallback." These data indicate fish are making movements upstream and downstream of Thompson Falls Dam. Currently, there is limited data evaluating where fish move to after being released upstream; however, initial indications are some fish may move upstream into the Thompson River drainage for some period of time before migrating downstream below Thompson Falls Dam, while other fish remain in the Thompson River drainage for multiple years. For more details on upstream movement of fish after being released upstream of Thompson Falls Dam, *see* Section 3.2.10.

3.2.7.2 Fish Tagged Below the Dam

Approximately 604 fish representing 12 species and one hybrid were uniquely PIT or Floy tagged during spring electrofishing efforts downstream of Thompson Falls Dam in 2011, 2012, and 2014 (Table 3-14). There was no electrofishing effort downstream of the dam in 2013. Of the total 604 fish tagged downstream of Thompson Falls Dam, approximately 5 percent have been recorded at the ladder and passed upstream of the dam. Details of the number of fish, by species, tagged downstream of the dam and recorded at the ladder are provided in Table 3-14.

Table 3-14: Summary of the number of fish, by species, implanted with a unique PIT or Floy tag during spring electrofishing efforts below Thompson Falls Dam and the number of the tagged fish detected at the ladder between 2011 and 2014.

Species	Tag Type	# of Fish Tagged Below Dam in 2011, 2012, 2014	# of Tagged Fish Below Dam Recorded at the Ladder
BULL	PIT	5	1
EB	PIT	1	
LL	PIT	33	4
RB	PIT	169	16
RBxWCT	PIT	4	
WCT	PIT	28	3
MWF	PIT	83	1

Species	Tag Type	# of Fish Tagged Below Dam in 2011, 2012, 2014	# of Tagged Fish Below Dam Recorded at the Ladder
L WF	PIT	1	
N PMN	PIT	7	
NP	Floy	15	
LN SU	PIT	11	
LS SU	PIT	242	5
SMB	PIT	1	
SMB	FLOY	4	
	PIT	**585**	**30**
	FLOY	**19**	**-**
	Totals	**604**	**30**

Out of the 12 species and one hybrid uniquely tagged downstream of the Thompson Falls Dam in 2011, 2012, and 2014, only six species have been recorded at the ladder. The species recorded at the ladder include one bull trout, four brown trout, 16 rainbow trout, three westslope cutthroat trout, one mountain whitefish, and five largescale suckers. Approximately 5 percent of the tagged species below the dam have been recorded at the ladder with the majority (53%) represented by rainbow trout. Of the 604 uniquely tagged fish, largescale suckers represent approximately 40 percent of the tagged fish. Largescale suckers generally migrate up the ladder in groups of hundreds and, at times, over 1,000 in a single day. During these large pulses of largescale suckers, it is not feasible to scan each individual fish for a PIT tag. This inefficiency is likely one contributing factor to the low percentage of fish tagged below the dam recorded at the ladder.

3.2.8 Frequency of Ladder Visits

Several fish are recorded returning to the fish ladder at Thompson Falls Dam year after year. A summary of the number of fish, by species, with multiple trips to the ladder and the average duration these fish have taken to return to the ladder, excluding fallback fish, is presented in Table 3-15. Fallback fish are addressed in more detail in the next subsection.

Table 3-15: Summary of 77 individual fish with two or more trips to the fish ladder between 2011 and 2014.

Species	Number of Fish	Average Duration (days)
RB	51	443
RBXWCT	1	375
WCT	3	390
LL	15	427
SMB	5	683
BULL	1	391
MWF	1	1099

Each year, the number of individual fish frequenting the ladder in one or more years has steadily increased, from 10 individual fish in 2012 to 20 individual fish in 2013 to 47 individual fish in 2014. The majority of the fish returning to the ladder multiple times are represented by rainbow trout followed by brown trout, smallmouth bass, westslope cutthroat trout, bull trout, rainbow x westslope cutthroat trout hybrid, and mountain whitefish.

Fish have displayed various patterns of returning to the ladder, including annual, biennial, and triennial intervals. Approximately 79 percent of the 77 fish evaluated returned to the ladder on an annual interval, while nearly 17 percent (13 fish) returned on a biennial schedule and 4 percent returned on a triennial schedule. The fish returning to the ladder annually return on average 365 days later (range 189-566 days). The biennial fish (2011-2013; 2012-2014) returned to the ladder between 533 and 769 days after their initial ascent. The triennial fish (2011-2014) were recorded at the ladder between 1,053 and 1,099 days after their initial ascent of the ladder.

Annual stream temperature and hydrograph data between 2011 and 2014 (*refer to* Section 3.2.2) show the annual variability that has occurred in the lower Clark Fork River. Although 2012 and 2014 conditions were more similar than 2011 and 2013, these 2 years were still not identical. The timing of these fish returning to the ladder on the exact date or within a week of the exact date 1, 2, and/or even 3 years later, supports the concept that fish movement is biological and a function of their circadian rhythm (Quinn 2005; Davie et al. 2009; O'Malley et al. 2010). For instance, one rainbow trout ascended the fish ladder at Thompson Falls annually in April for all 4 years of operation. Not only has this individual rainbow trout returned to the ladder for 4 consecutive years, it has returned within the same week each year (April 13, April 12, April 8, and April 10) for an average duration of 364 days between trips to the ladder. This trend was also observed in rainbow trout that entered the ladder in the summer and fall months. For example, one rainbow trout entered the ladder on July 19, 2012; again on July 11, 2013; and a third time on July 20, 2014. An example of annual fall movement was detected by a rainbow trout entering the ladder on September 15, 2013 and again on October 3, 2014. Examples of similar movement patterns by other species include a brown trout initially recorded a the ladder on October 8, 2013 and on October 9, 2014; and by a mountain whitefish recorded at the ladder on October 3, 2011 and returning to the ladder 3 years later (October 6, 2014). Similar observations of fish traveling annually, biennially, or triennially to the ladder were made for other fish species, including smallmouth bass and other rainbow trout and brown trout. Although not all fish follow an annual, biennial, or triennial cycle, these movement patterns have been commonly observed among species at the ladder.

3.2.9 Fallback

Fallback is defined as a fish that ascends the ladder, receives a PIT, Floy, or other unique identification tag, is released upstream, and then is later recaptured either below the Thompson Falls Dam or at the ladder again that same year. The objective of evaluating "fallback" is to assess whether these fish are moving through the turbines or over the spillway and if there are

operational modifications that could improve fish movement upstream after released into the Thompson Falls Reservoir.

The combined flow-thru capacity of the generating units at the Project is approximately 23,000 cfs. When river inflows exceed this capacity or there is a generating load rejection, spill is initiated at the Main Dam spillway. Therefore, when streamflows are less than 23,000 cfs, it is assumed fish fall back through the turbines. When streamflows are above 23,000 cfs, fish can fall back via turbines or over the spillway.

Over the past 4 years (2011, 2012, 2013, and 2014), the majority of the fallback fish ascend the ladder in the spring before the ascending limb of the hydrograph and either returned to the ladder later in the summer/fall following the peak of the hydrograph or were detected downstream of the Project area. During this period the range of streamflows often exceed 23,000 cfs, therefore it is unknown as to whether the fish are moving downstream via turbines or over the spillway.

In 2011, 13 fish (11 rainbow trout; two westslope cutthroat trout) were defined as fallback. The majority of these fish (10 of the 13 fish) ascended the ladder in April and May and then returned to the ladder between 1 and 161 days later, while three fish (two rainbow trout and one westslope cutthroat trout) were detected by Avista downstream in Graves Creek in May/June 2011 and did not ascend the ladder again (PPL Montana, 2012).

In 2012, two rainbow trout were defined as fallback. Both rainbow trout ascended the ladder in April or May of 2012 and returned to the ladder 57 and 100 days later.

In 2013, four fish (three rainbow trout; one rainbow x westslope cutthroat trout hybrid) were defined as fallback. All four fish were initially observed at the ladder between March 18 and April 29, 2013 and returned between 36 and 127 days later.

In 2014, 12 fish (five rainbow trout; four smallmouth bass; two brown trout; one bull trout) were defined as fallback, of which eight had PIT tags; three had a lower caudal fin clip; and one had a Floy tag. These fish returned to the ladder or were detected downstream of the Thompson Falls Dam between 3 and 192 days later. Of the 12 fish, it is estimated that at least five (three smallmouth bass, one brown trout, and one rainbow trout) passed through the turbines based on streamflows (USGS gage station #12389000) measuring less than 23,000 cfs during the period between the initial and second detection for each fish at the ladder. As for the other fish, streamflows exceeded 23,000 cfs in between detections; thus it is unknown as to whether these fish moved downstream through the turbines or over the spillway.

A summary of fallback fish for the 2011, 2012, 2013, and 2014 seasons is provided in Table 3-16. Fallback fish have represented approximately 0.7 to 4.8 percent of fish PIT/Floy tagged at the ladder each year.

Table 3-16: Summary of the number of "fallback" by fish in 2011-2014 either detected at the ladder or downstream of the Thompson Falls Dam.

Fish Species	Tagged in 2011 - Fallback in 2011	Tagged in 2012 - Fallback in 2012	Tagged in 2013 - Fallback in 2013	Tagged in 2014 - Fallback in 2014
BULL	-	-	-	1
RB	11	2	3	5
RBxWCT	-	-	1	-
WCT	2	-	-	
LL	-	-	-	2
MWF	-	-	-	-
LN SU	-	-	-	-
LS SU	-	-	-	-
N PMN	-	-	-	-
SMB – Floy Tag	-	-	-	1
SMB – Lower Caudal (LC) Punch				3
Total Number of Fallback	**13**	**2**	**4**	**12**
Total Number of SMB LC Punch in 2014 (% fallback)				471 (0.6%)
Total PIT/Floy Tagged Each Year	299	286	351	281
Percentage of Fish PIT/Floy Tagged Annually at the Ladder	**4.8%**	**0.7%**	**1.1%**	**4.3%**

3.2.10 Fish Movement Upstream of Ladder

Between 2011 and 2014, a total of 13,934 fish were passed upstream of Thompson Falls Dam via the fish ladder at Thompson Falls (Table 3-3). Of the 13,934 fish, 1,246 were released upstream with a unique PIT or Floy tag that was either inserted at the ladder (n=1,217) or during sampling below the dam (n=29).

A total of 48 fish, including 28 brown trout, 18 rainbow trout, one westslope cutthroat trout, and one smallmouth bass have been documented upstream in the Clark Fork River (n=4), in the Lower Flathead River (n=1), or Thompson River drainage (n=43). Details of these upstream movements and detections are described in the following subsections.

3.2.10.1 Clark Fork River

Between 2011 and 2014 detections of the PIT/Floy tagged fish upstream of the Thompson Falls Dam in the Clark Fork River occurs through the baselines fisheries studies (*see* Section 2.0 of this report) that extend from the Thompson Falls Reservoir upstream to the town of Paradise, or via reports by other entities (e.g., CSKT, FWP, anglers) from studies completed upstream of the Project area.

Between 2011 and 2014, five fish including three rainbow trout, one brown trout, and one smallmouth bass have been documented upstream of the Thompson Falls Dam and in the Clark Fork River. Four of the fish were detected upstream during the 2012 surveys and one fish was detected during the 2014 surveys. No fish were detected during baseline fish surveys completed in 2011 or 2013. Two rainbow trout were detected during fall electrofishing efforts approximately 34 miles upstream in the Paradise to Plains reach (*refer to* Figure 2-2) in 2012 and 2014, respectively. Two fish, one rainbow and one brown trout were caught in fall gillnets set in the Thompson Falls Reservoir in 2012. Both of these fish had ascended the ladder in 2011. One smallmouth bass that ascended the ladder in July 2012 was detected 75 days later approximately 100 miles upstream in the lower Flathead River. Details of these fish are summarized in the table below (Table 3-17), including the species and tag identification, the date the fish ascended the ladder, the date it was recorded upstream, and the upstream location.

Table 3-17: Summary of fish identified upstream of Thompson Falls Dam in the Clark Fork River between 2011 and 2014.

Species	PIT/FLOY Tag ID	Date Ascended Ladder	Date Located Upstream	Upstream Location
LL	985121021902518	14-Apr-11	12-Oct-12	Thompson Falls Reservoir (gillnet)
RB	985121010687782	16-Oct-14	21-Oct-14	Clark Fork River (Plains-Paradise)
RB	985121027357883	26-Aug-12	30-Oct-12	Clark Fork River (Plains-Paradise)
RB	985121021876549	11-Sep-11	12-Oct-12	Thompson Falls Reservoir (gillnet)
SMB	Y-16055	14-Jul-12	27-Sep-12	Lower Flathead River (near Buffalo Rapids Bridge)

3.2.10.2 Thompson River Drainage

In late September 2014, a PIT tag antenna array was installed in the mainstem of the Thompson River as well as one of its tributaries, the West Fork Thompson River. Although the array cannot detect directionality of fish, the entry of fish into the drainage can be assumed by cross-referencing the release date upstream of the Thompson Falls ladder and the first detection recorded in the Thompson River/West Fork Thompson River. Between September 26 and December 22, 2014 a total of 43 fish recorded at the Thompson Falls fish ladder were detected in the Thompson River. One of the 43 fish, a brown trout was also detected in the West Fork Thompson River. The detection system was closed for the winter and resumed operation in the February, 2015. Data collected in 2015 will be presented in the next 2015 annual report.

The 43 individual fish detected in the Thompson River in the fall of 2014 represent three species, including 27 brown trout; 15 rainbow trout; and one westslope cutthroat trout. The history of each fish and its ascent(s) and passage over the Thompson Falls fish ladder are summarized in Table 3-18. Four of the fish (three rainbow trout; one brown trout) ascended the fish ladder in 2012 or 2013 and have remained upstream of the dam for 1 or more years (Table 3-18).

Eight fish (four rainbow trout; four brown trout) have ascended the fish ladder in 2 or more years.

Table 3-18: Summary of the number of individual fish that ascended the fish ladder and were released upstream and later detected in the Thompson River between September 26 and December 22, 2014. Last detection was on December 21, 2014.

Fish Species	Number of Individual Fish Detected in the Thompson River	Year(s) that Fish Ascended Thompson Falls Ladder and Passed Upstream	Months Recorded At Ladder	Month Detected in Thompson River in 2014
RB (n=15)	1	2012	Jul	Nov
	2	2013	May, Jul	Oct, Nov
	1	2012, 2014	Jul, Aug	Dec
	1	2012, 2013, 2014	Jul	Nov
	2	2013, 2014	Apr, Jul, Aug	Oct
	8	2014	Mar, Jul, Sep, Oct	Oct, Nov, Dec
LL (n=27)	1	2012	Jul	Nov
	4	2013, 2014	Jul, Aug, Oct	Oct, Nov
	22	2014	Apr, Jul, Aug, Sep, Oct	Oct, Nov, Dec
WCT (n =1)	1	2014	Jul	Nov
TOTAL	**43**			

Although the dataset and analyses are limited, it is worth pointing out that 26 of the 27 brown trout detected in the Thompson River ascended the ladder in 2014. These 26 fish represent approximately 32 percent of the total 81 brown trout that were passed upstream in 2014. The 12 rainbow trout passed upstream of Thompson Falls Dam and detected in the Thompson River in 2014 represent approximately 6.4 percent of the 187 rainbow trout passed upstream in 2014. The one westslope cutthroat trout detected in the Thompson River represents approximately 2.8 percent of the 36 westslope cutthroat trout passed upstream in 2014. With brown trout spawning in the fall, a higher number and proportion of brown trout observed in the Thompson River is expected given that the sampling was limited to the fall season. Rainbow and westslope cutthroat trout are spring spawners and it is anticipated that the presence of these species may be greater during the spawning period.

During the period of time when the PIT tag array in the Thompson River was in operation (September 26 through December 22, 2014), there were 48 PIT-tagged fish that ascended the fish ladder and were passed upstream. The 48 fish included 18 brown trout, 16 rainbow trout, 12 westslope cutthroat trout, and two rainbow x westslope trout hybrids. During the period of

time when the remote PIT tag array in the Thompson River was operating, approximately 25 percent of the fish (12 of 48 fish) passed upstream at the dam were detected in the Thompson River, including 10 brown trout and two rainbow trout. In other words, approximately 56 percent of the brown trout and 13 percent of the rainbow trout passed upstream of Thompson Falls Dam after September 26 entered the Thompson River. These initial findings indicate a considerable portion of salmonids being passed upstream of Thompson Falls Dam are moving upstream and into the Thompson River. Further investigation into other seasons (e.g., spring, summer) will be help better understand upstream movements of salmonids after being released upstream of Thompson Falls Dam.

Based on the brief time when the remote PIT tag antenna array was collecting data in the Thompson River, results show that some fish have stayed upstream of Thompson Falls Dam for 1 or more years following the release upstream of the fish ladder while others repeat the cycle of ascending the fish ladder annually and potentially return to the Thompson River annually as well.

Travel time data for these fishes (movement from upstream of the ladder to the Thompson River) was limited because several fish were passed upstream during the spring/summer months when the detection capabilities in the Thompson River were not available. Although detections of fish in the Thompson River drainage are limited to a short duration in the fall of 2014, information from fish that were passed upstream of the Thompson Falls Dam after September 26 was used to evaluate travel time for fish between Thompson Falls Reservoir and the Thompson River. With the timing constraints for this evaluation, data were available for 10 brown trout and two rainbow trout. No travel time data was available for the westslope cutthroat trout because the one westslope cutthroat trout detected in the Thompson River was released upstream of the dam before the detection equipment was set up in the Thompson River.

Travel time varied greatly for when brown trout were detected in the Thompson River after being released upstream of the Thompson Falls Dam in 2014. The shortest time interval recorded for brown trout was approximately 5.5 hours and the longest time interval was 48 days. The two rainbow trout were detected in the Thompson River approximately 8 and 67 days, respectively, after being released upstream of the Thompson Falls Dam. These time intervals should be evaluated with caution as the data do not assess the movements of the individual fish in the Clark Fork River prior to their entry and detection in the Thompson River.

3.2.11 Weir Modes: Notch vs. Orifice

During the annual TAC meeting held on December 5, 2012, the Licensee recommended that the ladder be set in orifice mode for the entire 2013 season. The TAC voting members (FWS, CSKT, and FWP) supported this recommendation. The ladder operated in the orifice mode for the entirety of the 2013 season. Following the 2013 season, the fish passage data indicated the orifice mode was more effective because of the overall increase in the total number of fish and the increase in number of individual bull trout, albeit a small sample size, passed in 2013.

Therefore, the Licensee continued to operate the ladder in orifice mode for the entire 2014 season. The total number of fish, including the total number of salmonids, recorded at the ladder continued to increase in 2014 compared to previous years. NorthWestern proposes to continue to operate the ladder in orifice mode for the entire 2015 season.

3.2.12 Attractant Flow

The auxiliary water system (AWS) routes water from the forebay to augment the ladder pool-to-pool flow and provides the majority of flow at the ladder entrance and into the tailrace to attract fish. The AWS system can add up to about 63 cfs (60 cfs through the stilling basin flows and 3 cfs through the holding pool) of additional water to the ladder to attract fish into the ladder entrance. The total discharge from Pool 1 of the ladder can be about 69 cfs.

Additionally, another 20 cfs can be discharged directly into the tailrace in the form of a high-velocity jet (also referred to as the HVJ or attractant flow). Its purpose is to improve fish attraction to the ladder, as needed. The HVJ is designed to discharge 20 cfs through control valve CV-1. The jet discharges through a 14-inch-diameter orifice, which produces a discharge jet velocity of approximately 19 feet per second into the tailrace. The HVJ is designed to operate during spill (occurs when streamflow exceeds 23,000 cfs), but can also be operated during non-spill periods. Other attraction alternatives during non-spill include partially opening an adjacent spillway lift gate near to the ladder entrance.

Observations of tailrace conditions downstream of the Thompson Falls Dam indicate that, during non-spill periods, additional flow is needed to allow fish to migrate upstream through the natural falls which are present downstream of the Main Channel Dam (L. Mabbott, NorthWestern, personal communication, 2014). For this reason, both the AWS and the HVJ were operated throughout the non-spill season in 2014 (as was done during the 2013 and 2012 seasons) to allow fish to reach the entrance to the ladder. NorthWestern proposes to continue to operate the attractant flow system in this manner in 2015 to ensure that there is sufficient flow downstream of the Project to allow fish to successfully transit the falls.

4.0 Bull Trout Sampling in Project Area

Between 2011 and 2014, a total of 24 individual bull trout were sampled by the Licensee in the Project area with approximately five to seven individuals sampled annually. Sampling has included collecting bull trout via electrofishing efforts above and below Thompson Falls Dam as well as bull trout recorded at the Thompson Falls fish ladder. Of the 24 bull trout, 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 (Table 4-1). This mortality has been the only occurrence in the Project area and subsequently, a cover was placed over the holding pool to mitigate the potential for this to occur again. The following is a summary of the annual bull trout sampling between 2011 and 2014.

In 2014, there were six bull trout sampled by the Licensee in the Project area, including three bull trout below the Thompson Falls Dam during spring electrofishing; one bull trout at Thompson Falls fish ladder; one bull trout in the upper section of the Thompson Falls Reservoir (Clark Fork River upstream of dam) during spring electrofishing; and one bull trout in the Clark Fork River between the towns of Paradise and Plains during fall electrofishing.

In 2013, there were six bull trout sampled, including one bull trout in the upper section of the Thompson Falls Reservoir reach and five bull trout at the ladder. All the bull trout sampled in 2013 were genetically assigned to Region 4, upstream of the Thompson Falls Dam (five bull trout to Fishtrap Creek; one bull trout to Fish Creek). In addition, FWP collected juvenile bull trout samples in 2013 from four tributaries in the middle of Clark Fork River, discussed in more detail in Section 7.1.2 of the 2013 Annual Report (PPL Montana, 2014).

In 2012, there were seven bull trout sampled, including two bull trout at the ladder; one bull trout below the Thompson Falls Dam; two bull trout in the Thompson Falls Reservoir electrofishing reach (one bull trout in the lower section; one bull trout in the upper section); and two bull trout in the Paradise to Plains electrofishing reach. Six of the seven fish were genetically assigned to Region 4 and one fish was genetically assigned to a Region 3 tributary to Noxon Reservoir (Table 4-1).

In 2011, there were five bull trout genetically tested, including two bull trout that ascended the ladder and three bull trout collected via electrofishing below the Thompson Falls Dam. All five bull trout were genetically assigned to Region 4.

Genetic samples of bull trout collected from 2011 to 2014 in association with the Project, were submitted to Abernathy Fish Technology Center Conservation Genetics Laboratory for analysis. A summary of the bull trout sampling location, length, weight, PIT tag identification, and genetic assignment is provided in Table 4-1.

Table 4-1: Summary of genetics from the 23 bull trout captured during Project activities in 2011, 2012, 2013, and 2014. Note: EF = electrofishing; 2014 fish are listed in bold and highlighted in blue. Source: DeHaan et al. 2015 in prep; Bernall and Duffy 2015, in prep.

Date Captured	Length (mm)	Weight (g)	PIT Tag #	Method & Location	Most Likely Population of Origin	Second Most Likely Population of Origin	Confidence
4/13/2011	365	364	985121023302169	TFalls Ladder	Thompson River (R4)	Upper Rock Creek (R4)	1,770
4/26/2011 5/21/2012	547 563	1438 1404	985121023464730	TFalls Ladder	Fishtrap Creek (R4)	Monture Creek (R4)	500,000
5/31/2011	482	966	985121021877906	Spring EF Below TFalls Dam	Meadow Creek (R4)**	Fishtrap Creek (R4)	1.3
5/31/2011	180	50	985121021907887	Spring EF Below TFalls Dam	Fishtrap Creek (R4)	Upper Rock Creek (R4)	11,040,300
5/31/2011	247	130	985121021914545	Spring EF Below TFalls Dam	Fishtrap Creek (R4)	Cooper Gulch (R3)	10,424,600
4/10/2012	272	150	985121027393272	Spring EF Below TFalls Dam	Graves Creek (R3)	Rock Creek (R2)	10,698,400
4/16/2012	222	76	985121027360192	Spring EF Lower Section – TFalls Reservoir	Fishtrap Creek (R4)	Upper Rock Creek (R4)	1,000,000
4/17/2012	260	140	985121027402995	Spring EF Upper Section – TFalls Reservoir	Fishtrap Creek (R4)	Upper Rock Creek (R4)	17,920,300
5/15/2012	510	1172	985121021877906/ 982000357016269	TFalls Ladder	Meadow Creek (R4)**	Fishtrap Creek (R4)	1.3
10/30/2012	472	800	982000357016135	Fall EF Paradise – Plains	Monture Creek (R4)	Fish Creek (R4)	1.07
10/30/2012	444	678	982000357016066	Fall EF Paradise – Plains	Fish Creek (R4)	Cooper Gulch (R3)	21.35
4/10/2013	260	108	982000357016097	Spring EF Upper Section – TFalls Reservoir	Fishtrap Creek (R4)	Upper Rock Creek (R4)	200,000

Date Captured	Length (mm)	Weight (g)	PIT Tag #	Method & Location	Most Likely Population of Origin	Second Most Likely Population of Origin	Confidence
4/30/2013	598	2306	982000357016065	TFalls Ladder	Fish Creek (R4)	Cooper Gulch (R3)	6.87
5/6/2013	576	1694	982000357016109	TFalls Ladder	Fishtrap Creek (R4)	EF Bull River (R2)	500,000
5/7/2013	478	978	982000357016155	TFalls Ladder	Fishtrap Creek (R4)	EF Bull River (R2)	3,000,000
6/7/2013	596	1926	HDX PIT tag not recorded (Genetics 118-073)	TFalls Ladder	Fishtrap Creek (R4)	Rock Creek (R2)	147,622,000
8/9/2013	482	1058	982000357016151	TFalls Ladder	Fishtrap Creek (R4)	Cooper Gulch (R3)	46,247,900
4/7/2014	**520**	**1500**	**No PIT Tag (no genetics)**	**Spring EF Below TFalls Dam**	**NA**	**NA**	**NA**
4/15/2014	**577**	**1446**	**900226000035846 (118-060)**	**Spring EF Upper Section – TFalls Reservoir**	**Fishtrap Creek (R4)**	**Monture Creek (R4)**	**2,000,000**
5/16/2014	**523**	**1264**	**982000357016169 (118-051)**	**TFalls Ladder**	**Fish Creek (R4)**	**Rattlesnake Creek (R4)**	**343.3**
5/28/2014	**567**	**1640**	**985121021203256/ 982000357016106**	**Spring EF Below TFalls Dam**	**Fishtrap Creek (R4)**	**Upper Rock Creek (R4)**	**200,000**
6/3/2014	**509**	**1224**	**982000357016241 (118-32)**	**Spring EF Below TFalls Dam**	**Fishtrap Creek (R4)**	**Upper Rock Creek (R4)**	**26,000**
10/29/2014	**315**	**260**	**982000357016111 (TR Bull E2)**	**Fall EF Paradise – Plains**	**Results Pending**		

**Note: Meadow Creek is a tributary to the Bitterroot River

5.0 Bull Trout Passage from Downstream Facilities

Avista continued their trap and haul upstream fish passage program in 2014. Bull trout captured downstream of Cabinet Gorge Hydroelectric Project were genetically tested using rapid response genetic identification methodology (DeHaan et al., 2014). The rapid response genetic testing provides population assignment within 24 hours after receipt of fish tissue samples. The analysis predicts, with varying degrees of confidence, the natal stream of origin of each bull trout. Bull trout are then either transported to their genetically assigned region of origin, or released downstream of Cabinet Gorge Dam. Bull trout with a genetic assignment of the Thompson Falls Project are referred to as "Region 4" fish.

Avista captured 75 unique adult bull trout (including 2 mortalities) below Cabinet Gorge Hydroelectric Project (in 2014). Of the 75 bull trout, 63 were released upstream of Cabinet Gorge Dam in either Region 2, Cabinet Gorge Reservoir (n=25); upstream to Region 3, Noxon Reservoir (n=26); or upstream to Region 4 (n=12). The 12 bull trout transported upstream of the Thompson Falls Dam (Region 4) were genetically assigned to the Thompson River drainage (n=10), South Fork Jocko River (n=1), or Little Joe Creek (n=1). Release locations were based on the genetic assignment: one bull trout was released near St. Regis (assigned to Little Joe Creek); one bull trout was released in the Clark Fork River near the town of Paradise (assigned to South Fork Jocko River); and of the 10 bull trout assigned to the Thompson River drainage, seven were released in the lower West Fork Thompson River and three were released at the confluence of Fishtrap Creek. Table 4-1 summarizes the 12 bull trout captured in 2014 by Avista below Cabinet Gorge Hydroelectric Project that were assigned and transported to Region 4. A summary of Avista's Upstream Fish Passage Program for 2014 is available in Bernall and Duffy (2015, in prep.).

Table 5-1: Summary of the 12 bull trout captured below Cabinet Gorge Dam in 2014, assigned to Region 4 and released in Region 4. Note: EF = electrofishing. Source: Bernall and Duffy, in prep.

Capture Date	Capture Method	PIT Tag Number	Length (mm)	Weight (g)	Release Date	Release Site	Most Likely Pop. of Origin	Second Most Likely Pop. of Origin	Confidence
4/20/2014	LCFR – ID Night EF	900226000501515	528	1304	4/23/2104	WF Thompson River	Thompson River	Cooper Gulch (R3)	1,060,820,000
4/22/2014	LCFR – ID Night EF	900226000113597	572	2126	4/25/2014	St. Regis	Little Joe Creek	MF East River (R1)	300,000
4/29/2014	LCFR – ID Night EF	900226000501522	525	1247	5/2/2014	WF Thompson River	Thompson River	Cooper Gulch (R3)	11,877,400,000
5/11/2104	LCFR – ID Night EF	900226000035849	718	3629	5/14/2014	Clark Fork River near Paradise	South Fork Jocko River	NF Jocko River (R4)	1.8
6/15/2014	LCFR – ID Night EF	900226000501561	540	1360	6/18/2014	WF Thompson River	Thompson River	Upper Rock Creek (R4)	2,000,000
7/2/2014*	LCFR – ID Night EF	985121011605005/ 900226000501514	648	2523	7/3/2014	WF Thompson River	Thompson River	Upper Rock Creek (R4)	248,402,000
7/13/2014	LCFR – ID Night EF	900226000592716	614	2211	7/16/2104	WF Thompson River	Thompson River	Fishtrap Creek (R4)	129,901,000,000
7/17/2014	LCFR – ID Night EF	900226000570596	532	1304	7/23/2014	WF Thompson River	Thompson River	Rock Creek (R2)	4,000,000
7/24/2014	LCFR – ID Night EF	900226000570799	566	1644	7/30/2014	Fishtrap Creek	Fishtrap Creek	WF Thompson River (R4)	6,393,510,000
9/6/2014	LCFR – ID Ladder	900226000570258	684	2721	9/10/2016	Fishtrap Creek	Fishtrap Creek	Upper Rock Creek (R4)	10,639,100

Capture Date	Capture Method	PIT Tag Number	Length (mm)	Weight (g)	Release Date	Release Site	Most Likely Pop. of Origin	Second Most Likely Pop. of Origin	Confidence
9/24/2014	LCFR – ID Ladder	900226000626007	614	2324	9/26/2014	Fishtrap Creek	Fishtrap Creek	Fish Creek (R4)	48,000
10/3/2014	LCFR – ID Twin Weir	900226000570921	570	1531	10/6/2014	WF Thompson River	West Fork Thompson River	Upper Rock Creek (R4)	41,000

*Initial capture in the West Fork Thompson River electrofishing on 7-28-2010 measuring 162 mm, 34 g (unpublished data, NorthWestern)

6.0 Thompson Falls Reservoir Monitoring Plan

In 2010, the Licensee developed and submitted the *5-Year Reservoir Monitoring Plan, 2011-2015* (PPL Montana, 2010b) to the Commission in compliance with Term 5a of the FWS's BO TCs (*refer to* Section 9.5.1 for details). The Commission issued an Order on February 9, 2011 approving the 5-Year Reservoir Monitoring Plan, and the Licensee began implementation in 2011.

Due to the geographic proximity of the Thompson Falls Dam to the Thompson River and the duration that the Thompson Falls Dam has served as a fish barrier, the Thompson Falls Dam has likely had the greatest impact on bull trout in the Thompson River drainage. Therefore, the TAC has identified the Thompson River as a critical drainage to concentrate bull trout protection and enhancement measures and allocation of funding.

The overall goal of the 5-Year Reservoir Monitoring Plan is to gather information that will assist in developing recommendations to *maximize survival of out-migrant juvenile and adult bull trout through Thompson Falls Reservoir and Dam*. In order to address this goal, two objectives were identified:

1. Characterization of bull trout in the Thompson River drainage
2. Characterization of the effects of Thompson Falls Reservoir on bull trout emigrating from the Thompson River drainage and migrating downstream in the Clark Fork River

Activities that have been completed since 2010 and are proposed in 2015 in support of the 5-Year Reservoir Plan include the following:

- A fish survey was completed in West Fork Thompson River in 2010 (PPL Montana, 2012)
- A fish survey was completed in Fishtrap Creek in 2011 (PPL Montana, 2012)
- A Thompson River Drainage database documenting available records from 1973 through 2011 was completed in 2012 (PPL Montana, 2012)
- *Thompson River Bull Trout Enhancement and Recovery Plan* (GEI Consultants, Inc. and Steigers Corporation, 2013) was prepared in 2012 (PPL Montana, 2013)
- Fish surveys were completed in four tributaries in the Thompson River, including Lazier Creek, Indian Creek, Twin Lakes Creek, and Big Rock Creek in 2013. These surveys were funded by the TAC (PPL Montana, 2013)
- Fish surveys in Murr Creek, a tributary to Thompson River were completed in 2014 (*see* Section 6.1 in this report and PPL Montana, 2014)
- A juvenile bull trout out-migration study commenced in 2014 and is scheduled to be completed in 2016 in Thompson Falls Reservoir (*see* Section 6.2 of this report)

In addition to the activities and milestones listed above, the Licensee was scheduled to submit a comprehensive report to FWS in 2015 to summarize data collected between 2010 and 2015, as well as provide recommendations for improving emigrating juvenile bull trout survivorship and evaluate the site specific need for a nonnative species control program in the Thompson Falls Reservoir per the TCs 5a and 5b in the BO. However, the schedule for the summary report in 2015 and recommendations for any additional programs and/or efforts has been modified. In 2014, the Licensee consulted with FWS and proposed to modify filing requirements specified in the FWS' BO TCs 5a, 5b, and 7b. A letter of concurrence from FWS along with the proposed changes, were filed with the Commission on December 17, 2014. The modifications include removing the comprehensive summary of activities associated with the 5-Year Reservoir Monitoring Plan (due at the end of 2015) because this requirement has been achieved through the annual reports since 2011 and postponing the development of any recommendations "*for a nonnative species control program in the Thompson Falls Reservoir*" from the end of 2015 until December 31, 2020 (formal filing to the Commission) to allow for the completion and full review of the results from an ongoing study to assess juvenile bull trout out-migration in the reservoir.

6.1 Thompson River Tributaries – Fish Surveys

The *Thompson River Bull Trout Enhancement and Recovery Plan* (Plan) identified potential bull trout habitat patches in the Thompson River drainage (GEI Consultants, Inc. and Steigers Corporation, 2013). Based on the results of the Plan, several watersheds in the drainage appear to have suitable habitat for bull trout based on available water temperature data and geomorphology characteristics, but biological information of some tributaries was limited. The watersheds with minimal biological information included Mudd Creek, Alder Creek, Murr Creek, Lazier Creek, Twin Lakes Creek, and Indian Creek. In addition, bull trout presence was documented in Big Rock Creek, but the presence of the migratory component in the drainage is currently unknown. In order to determine whether the watersheds provide potential migratory bull trout habitat, additional fish surveys were proposed and completed in 2013 and 2014.

The USFS, FWP, and the Licensee received funding from the TAC to complete additional fish surveys in several tributaries (Big Rock, Mudd, Alder, Murr, Lazier, Twin Lakes, and Indian creeks) in the Thompson River drainage in order to assess the current status of fish populations and complete an on-the-ground habitat review for bull trout. The primary objective for these surveys was to identify the fish populations in the streams, identify whether bull trout are present and/or whether the tributary had potential to provide bull trout habitat.

In August and September 2013, FWP, with assistance from the Licensee, completed the fish surveys in Big Rock Creek, Lazier Creek, Indian Creek, and Twin Lakes Creek. A summary of these surveys is provided in the 2013 Annual Report (PPL Montana, 2014). During the 2013 tributary surveys, bull trout were only detected in Big Rock Creek. Preliminary genetic analyses indicate bull trout from Big Rock Creek are genetically different from bull trout in other Thompson River tributaries, such as Fishtrap Creek or West Fork Thompson River (P. DeHaan,

FWS, email correspondence, August 13, 2014). The results of these samples will be available in 2015 and presented by Abernathy's annual report for "Genetic Analysis of Native Salmonids from the Lake Pend Oreille and Clark Fork River System, Idaho and Montana" (DeHaan et al. in prep). Based on the size distribution of bull trout recorded in Big Rock Creek in 2010 and 2013 (PPL Montana, 2011 and 2014), warm thermal conditions of the mainstem Thompson River (GEI Consultants, Inc. and Steigers Corporation, 2013), and preliminary genetic analyses (DeHaan et al. in prep); it is likely that the bull trout population in Big Rock Creek is primarily resident at this point in time (R. Kreiner, FWP, personal communication, 2014).

In 2014, Murr Creek was surveyed (Figure 6-1). Two sections were electrofished, one section below the confluence with the North Fork and one section in the upper mainstem. Only brook trout were observed in the tributary and only below the confluence of the North Fork (Table 6-1). No fish were observed in the upper mainstem and no bull trout were observed in Murr Creek (Table 6-1). Fish surveys were not implemented in Mudd or Alder creeks in 2014.

Figure 6-1: Location of area surveyed in Murr Creek, a tributary to the Thompson River, in 2014.

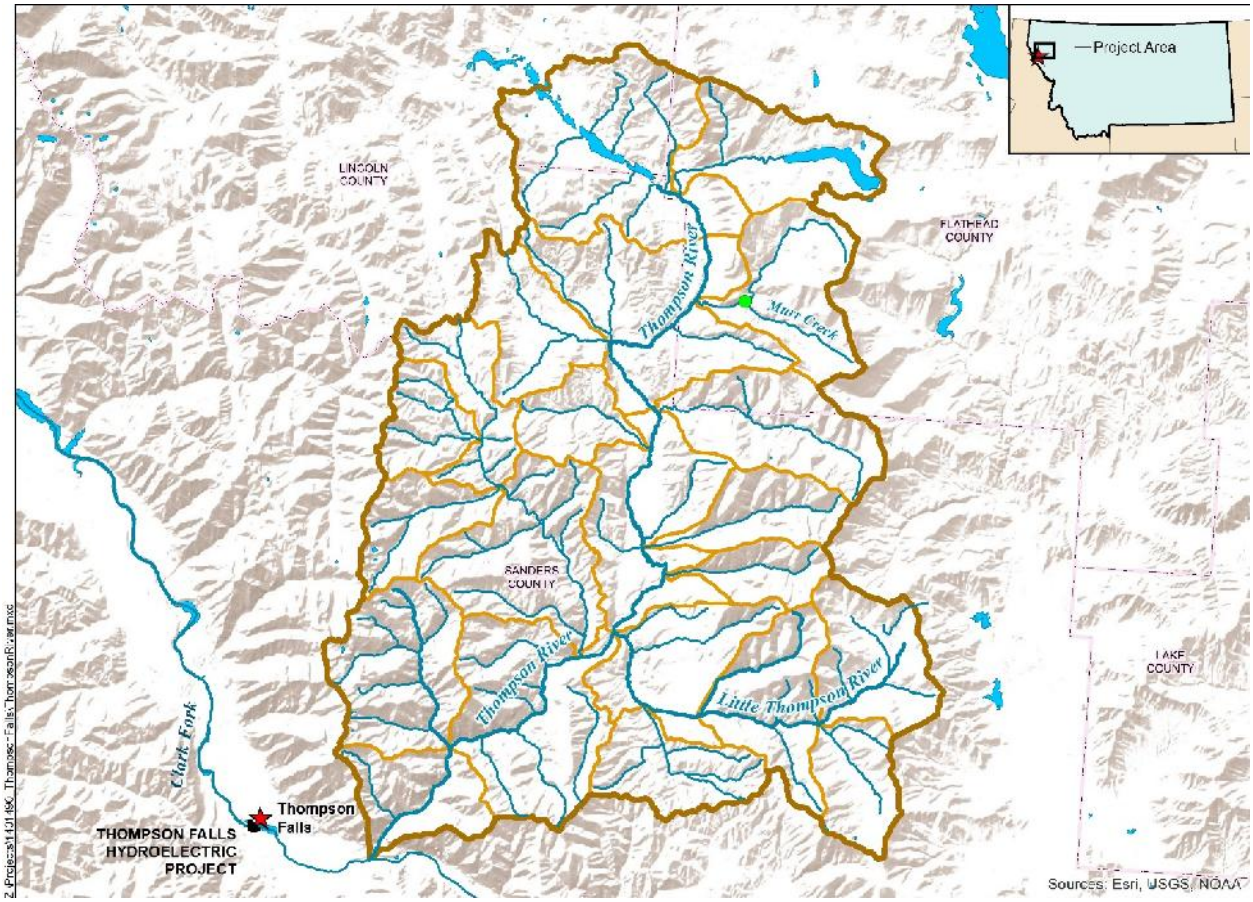


Table 6-1: Summary of the 2014 fish data collected during the electrofishing efforts in the Thompson River tributaries of Murr Creek.

Sampling Date	Tributary & Reach	Fish Species	Total Fish	Fish per hour	Fish per meter
8/12/2014	Murr Creek – Below confluence with North Fork	Brook Trout	118	73.5	1.3
8/14/2014	Murr Creek – Upper Mainstem	No Fish	-	-	-

6.2 Juvenile Bull Trout Out-Migration Study

In 2014, a graduate student from Montana State University started the multi-year (2014-2016) study to evaluate the impact of Thompson Falls Reservoir on the out-migration habits of juvenile bull trout. During the first year of the study, the initial primary research objectives included the following:

- What time of year do subadult bull trout leave natal headwaters (West Fork Thompson River)?
- How quickly to bull trout move through the Thompson River drainage?
- What is the estimated survival rate of subadult bull trout that transition into Thompson Falls Reservoir?

In September 2014, two PIT tag antenna arrays and four stationary acoustic data-loggers were deployed in the study area. One single unit PIT antenna was assembled near the mouth of the West Fork Thompson River and one multi-antenna PIT array was built near the Thompson River's confluence with Thompson Falls Reservoir. Both arrays read half-duplex (HDX) and full-duplex (FDX) PIT tags. The four acoustic data-loggers were deployed roughly equidistant from each other throughout the length of the reservoir; the uppermost receiver being located approximately 1,300 m upstream of the Thompson River confluence and the lowermost receiver being placed just upstream of the dam. Range detection testing showed that all stationary receivers operated at, or near, 100 percent detection efficiency.

Between October 3 and 17, 2014 a total of 29 subadult bull trout were sampled via electrofishing in the West Fork Thompson River. These fish were surgically implanted with Lotek MAP coded acoustic transmitters and both HDX and FDX injectable PIT tags. Additionally, 25 bull trout that were too small to receive an acoustic tag (between 100-170 mm) received only an HDX PIT tag courtesy of the FWP.

Results from 2014 indicate that six of the 29 acoustically-tagged bull trout moved out of the West Fork Thompson River but not into Thompson Falls Reservoir. Nine acoustically-implanted bull trout were incidentally recaptured and found to be healing well; increasing the likelihood that surgery-induced mortality was not a factor. One of the 25 bull trout that received only an HDX PIT tag moved out of the West Fork Thompson River and Thompson River into Thompson

Falls Reservoir in 16 days. The limited movement of acoustically-tagged bull trout out of the West Fork Thompson River in the fall of 2014 prompted the decision to operate both PIT antennas throughout the winter of 2014 and spring 2015. This additional monitoring time will be used to inform whether the timing or methods of future sampling for this Project should be adjusted.

Additional information will be collected in 2015 and the results will be summarized and included in the 2015 Annual Report.

7.0 Total Dissolved Gas and Gas Bubble Trauma

7.1 TDG Monitoring

7.1.1 Methods

The licensee has monitored total dissolved gases (TDG) in the Clark Fork River in the Thompson Falls Hydroelectric Project (Project) area between 2003 and 2012 and in 2014. All field work and data gathering is conducted by the Licensee's personnel.

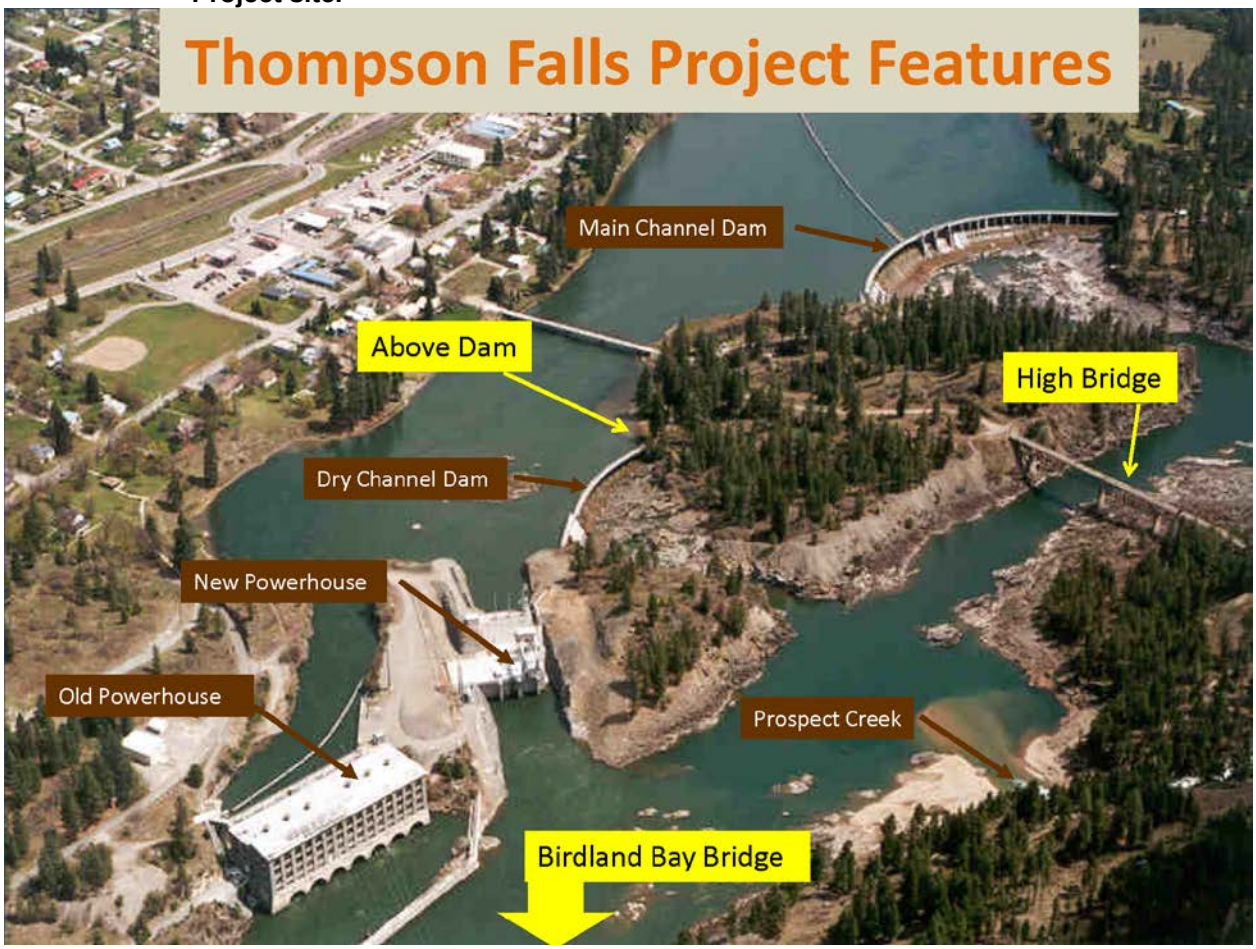
Hydrolab Series 4 and 5 DataSondes fitted with TDG sensors and are used to collect TDG data. DataSonde TDG sensors are calibrated by the manufacturer, Hydrolab, every 2 to 3 years. At the beginning of the year, TDG sensors are compared to each other for accuracy and calibrated within 1 millimeter of mercury (mmHg) of each other, if necessary. Sensor membranes are pressure tested to approximately 1,000 mmHg at the beginning of the spill season. Each membrane is used once during the spill season. The instruments are cleaned, batteries changed, and a new membrane installed every 2 to 2.5 weeks during the monitoring season. The instruments are then calibrated on site and then re-deployed.

TDG is monitored during the high flow season, typically from April until July, with exact dates varying slightly every year. In 2014, TDG was monitored from April 15 to July 15. Deployment periods for the DataSonde units were 3 to 4 weeks. Biological and sediment fowling is not a problem at the water temperatures found at the Project site over this length of time. All parameters including pH, specific conductivity, DO and turbidity are calibrated at the beginning of each 4-week deployment period. During calibrations, sensors are cleaned and batteries replaced. Time and date are checked. The stated accuracy of the TDG sensor is +/- 1.5 mmHg over a range of 400 to 1,400 mmHg.

Barometric pressure (BP) is measured by an Onset Computer Corp HOBO Microstation Barometric Pressure Smart Sensor with a stated error of +/- 1.5 millibar (mbar) = 1.1 mmHg at 25 ^{o}C and a maximum error of +/- 2.5 mbar = 0.9 mmHg over the temperature range $^{-}$10 ^{o}C to $^{+}$60 ^{o}C. The barometer is mounted approximately 2 m above the floor of the Control Room in the old powerhouse. The elevation of the barometer is approximately 2,381.2 ft msl.

Monitoring sites have varied in some years, but in 2014 the sites monitored were 1) above dam, 2) High Bridge, and 3) Birdland Bay Bridge (Figure 7-1). 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. All three sensors suffered failures during some periods during the 2014 monitoring season. However, the data recovery is sufficiently complete to draw conclusions on TDG in the Clark Fork River during 2014.

Figure 7-1: Monitoring locations for total dissolved gas at the Thompson Falls Hydroelectric Project site.

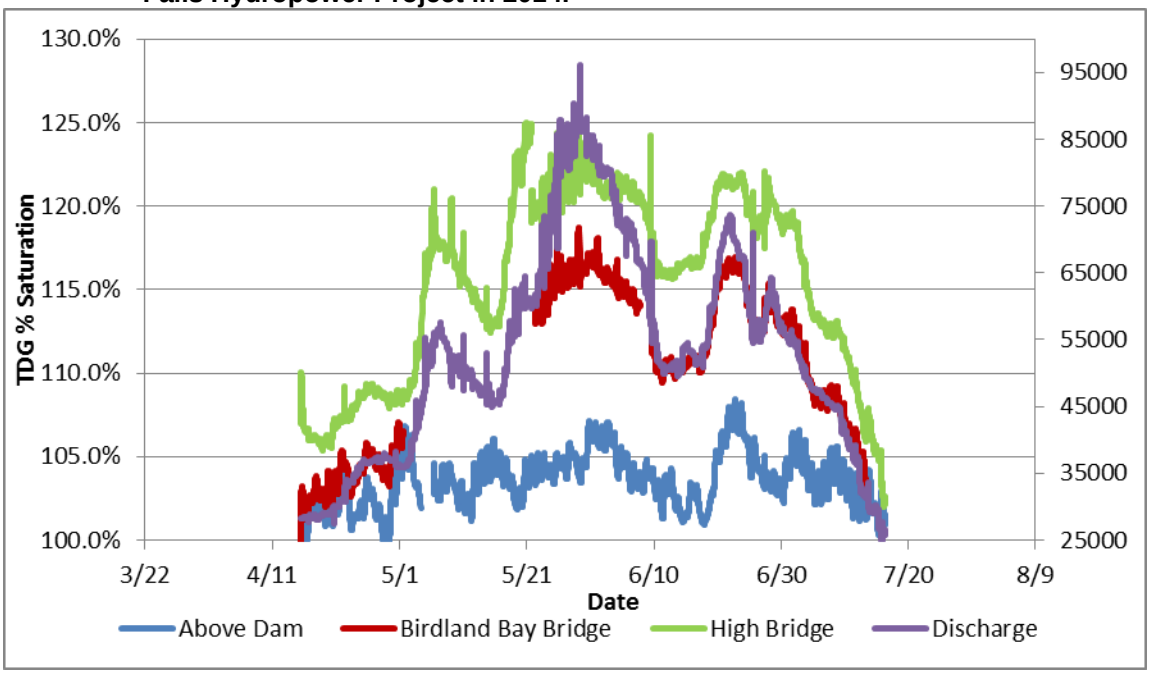


7.1.2 TDG Results

Peak discharge in the Clark Fork River in the Project area in 2014 was higher than the long-term average of 60,000 cfs (refer to Figure 3-1), reaching approximately 96,000 cfs on May 29, 2014, as measured by the licensee at the powerhouse (peak flow measured by the USGS at Plains, Montana was 82,800 cfs on that same day). Similar to past years, TDG in 2014 was lowest above the Project, highest at the first measurement site below the Project (at the High Bridge), and intermediate at the most downstream site at the Birdland Bay Bridge (Figure 7-2). 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.

TDG upstream of the Project peaked at approximately 108 percent of saturation during 2014. TDG levels at the High Bridge approached 125 percent of saturation, and TDG at the Birdland Bay Bridge site was approximately 119 percent of saturation in 2014. These readings were not as high as in some previous years, such as 2011, when peak discharge exceeded 100,000 cfs and peak TDG was correspondingly higher.

Figure 7-2: **Total Dissolved Gas (% of saturation) and discharge (cfs) as measured at the powerhouse in the Clark Fork River upstream and downstream of the Thompson Falls Hydropower Project in 2014.**



In 2014, the mean TDG at discharge was within the range observed in previous years. Tables 7-1 and 7-2 describe maximum and mean TDG over a range of discharge for each year of the study. Maximum and mean TDG at the Birdland Bay Bridge was comparable to previous years.

Table 7-1: **Maximum TDG recorded over a range of discharge at the Birdland Bay Bridge on the Clark Fork River, Montana. 2003-2014.**

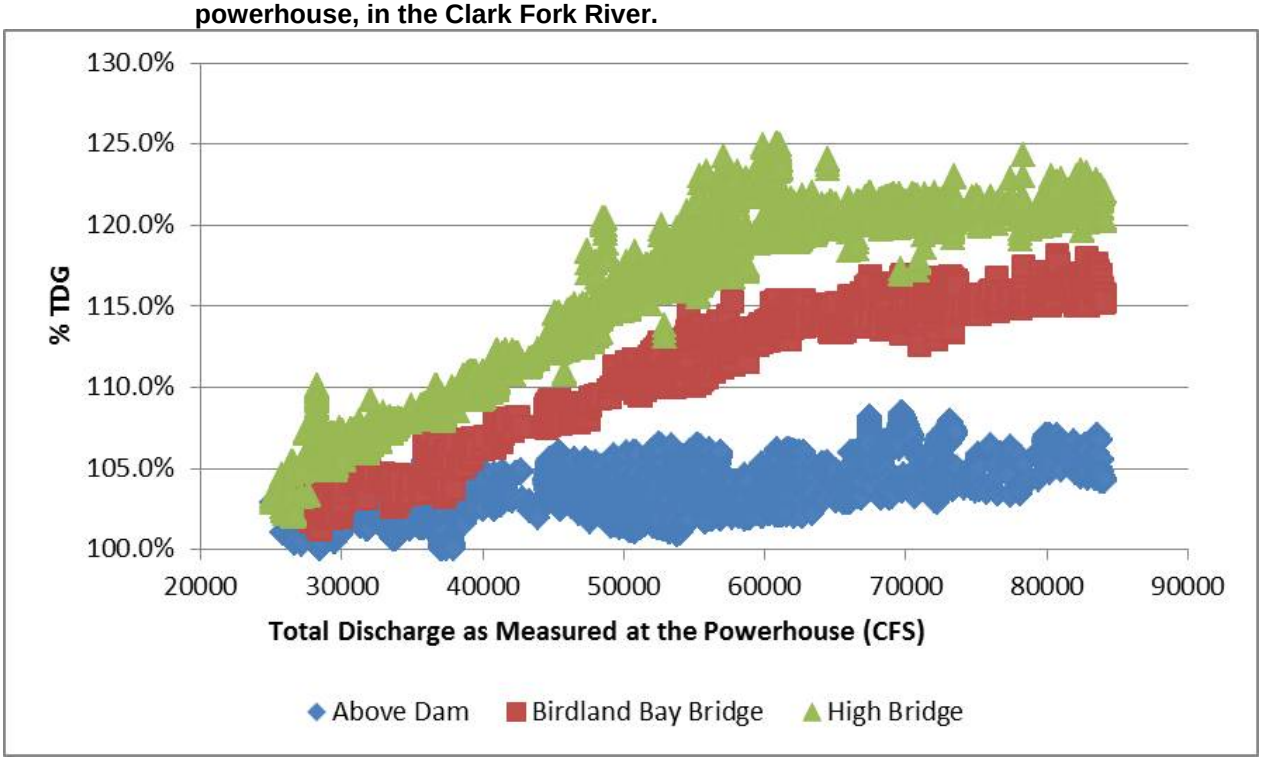
Total Flow (thousand cfs)	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2014
>23, <30	111.5	109.6	107.6	106.7	105.6	113.1	109.5	106.0	107.6	103.6	104.1
>30, <40	112.6	109.2	112.7	111.1	108.3	114.8	108.9	111.3	108.3	107.7	107.0
>40, <50	111.1	108.9	113.3	115.0	112.8	115.3	112.9	113.8	109.0	111.3	111.3
>50, <60	113.9	N/A	114.4	116.7	N/A	119.5	114.6	113.2	112.4	116.3	115.3
>60, <70	114.0	N/A	115.1	117.0	N/A	118.2	113.1	N/A	116.4	116.0	116.9
>70, <80	114.1	N/A	114.0	117.0	N/A	116.6	N/A	N/A	116.9	115.8	117.4
>80, <90	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	120.8	112.6	118.7
>90, <100	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	122.3	N/A	N/A
>100, <110	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	121.8	N/A	N/A
>110, <120	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	121.7	N/A	N/A

Table 7-2: **Mean TDG recorded over a range of discharge at the Birdland Bay Bridge on the Clark Fork River, Montana, 2003-2014.**

Total Flow (thousand cfs)	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2014
>23, <30	102.1	103.5	103.6	103.6	102.5	102.2	102.6	102.0	102.9	102.3	102.7
>30, <40	104.7	105.0	107.1	106.7	105.2	105.6	105.2	106.6	105.8	104.4	104.7
>40, <50	109.5	107.5	110.4	110.6	109.0	110.6	109.2	110.9	108.1	108.8	108.6
>50, <60	111.0	N/A	112.7	114.3	N/A	114.9	113.0	111.6	111.0	111.2	111.5
>60, <70	112.9	N/A	114.1	115.7	N/A	116.0	113.1	N/A	113.5	113.0	114.8
>70, <80	113.2	N/A	114.0	115.7	N/A	115.9	N/A	N/A	116.0	112.7	115.4
>80, <90	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	116.8	112.5	116.2
>90, <100	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	119.7	N/A	N/A
>100, <110	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	120.6	N/A	N/A
>110, <120	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	119.9	N/A	N/A

TDG downstream of the Project increases with increasing flow, up to about 60,000 cfs. At flows higher than 60,000 cfs, TDG downstream of the Project continues to increase, but a lower rate (Figure 7-3).

Figure 7-3: **Total Dissolved Gas (% of saturation) and discharge (cfs), as measured at the powerhouse, in the Clark Fork River.**



7.2 Spillway Panel Operations

Photos 7-1 and 7-2 show the Main Dam spillway, with the spill bays numbered. Each spill bay contains six spill panels. When opened, the panels release 235 cfs at full pool. In 2006, the Licensee implemented a specialized spillway operation schedule in an effort to determine if fish can be attracted to the right bank of the Main Dam. This "fish" spillway schedule was implemented during spill operations in 2006, 2007, and 2008. Data collected on TDG during this period indicated that TDG levels may have been slightly higher during the years when the "fish" spill schedule was implemented than during previous years when the "non-fish" schedule was in place. A visual comparison of the "fish" *versus* the "non-fish" operating schedule indicated that TDG levels were higher by approximately 2 to 3 percent under the "fish" operating schedule, when total flow is in excess of approximately 45,000 cfs.

A TDG Control Plan was prepared in 2010, which recommended a spillway opening schedule for the Main Dam Spillway that would be a "dual mode" plan. That is, it was a combination of the "fish" and the "non-fish" spillway opening schedule. This schedule was developed in consultation with operators at the Thompson Falls Hydroelectric Project to enhance fish attraction to the Main Dam to promote adult upstream fish passage, while minimizing potential impacts to TDG.

The "Dual Mode" operating schedule for the Main Dam Spillway has been implemented since 2011, with minor modifications, in order to attract the greatest number of migrating adult fish as possible. Some modifications to the schedule were made as an experiment to enhance hydraulic conditions for fish passage in the tailrace of the Main Dam Spillway. These experiments were conducted to determine which of the right bank bays should be opened first to attract migrating fish.

The spillway opening schedule calls for Bays 4, 8, and 12 to be opened first, but this may not be the optimal pattern to attract fish to the fish ladder. In 2014, one panel in Bays 2, 3, and 4 were opened first in the spring, to enhance fish attraction to the fish ladder. After runoff, one panel in Bay 2 and six panels in Bay 6 were left open to attract fish to the fish ladder. These tests had no impact on TDG, as they were conducted during low flow periods.

The Licensee reviewed spillway operations during high flow periods in 2014 to assess if operations had any impact on TDG. No connection between spillway operations and TDG was found. TDG was similar to previous years over the range of flows observed at all three measurement locations.

Photo 7-1: The right and center of the Main Dam, with bays numbered.

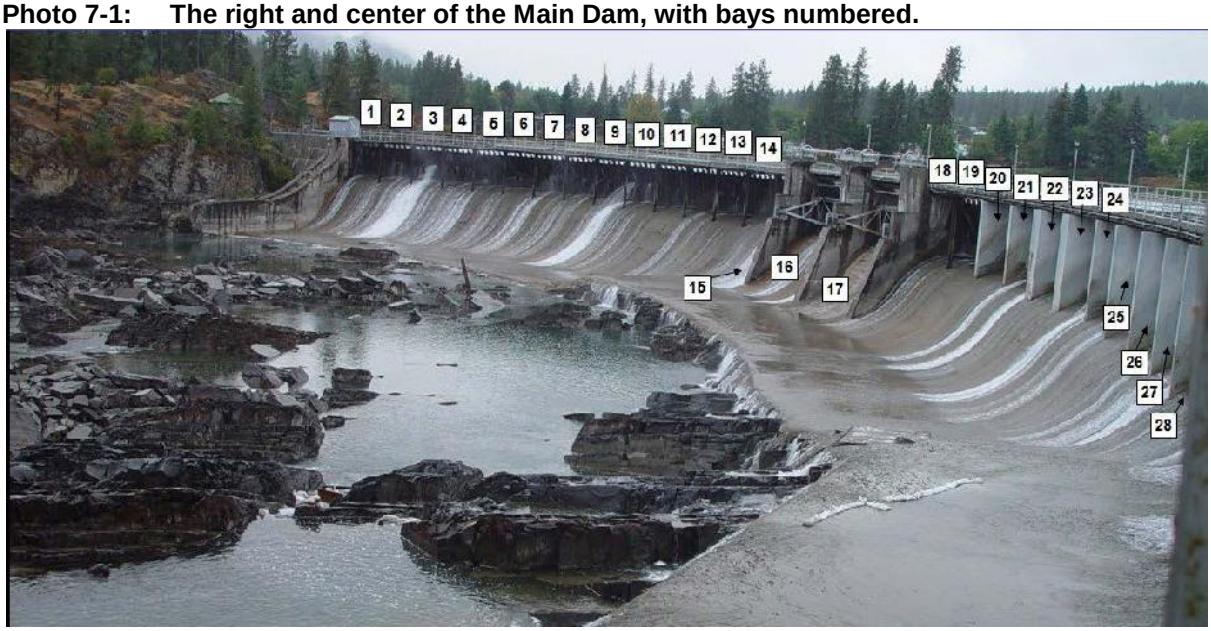


Photo 7-2: The left bank of the Main Dam at the Thompson Falls Project, with the spillway bays numbered.

Table 7-3: Operational Plan for the Main Dam Spillway applied in 2014.

Thompson Falls Main Dam Spillway - 2014 Actual Spill Schedule

BAY NUMBER																																				**Lift Gates**	**Total Flow (cfs)**
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15			16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34		
	1	1	1																																	3	23,705
	1	1	1																											6	6	6	6	6	6	39	32,165
	1	1	1																									6	6	6	6	6	6	6	6	51	34,985
	1	1	1																								3	5	5	5	5	6	6	6	6	50	34,750
	1	2					6	6	6																	6	6	5	5	5	5	6	6	6	6	77	41,095
	1	2			6	6	6	6	6															6	6	6	6	5	5	5	5	6	6	6	6	101	46,735
	1	2	5	6	6	6	6	6	6											2	6	6	6	6	6	6	6	5	5	5	5	6	6	6	6	132	54,020
	1	6	6	6	6	6	6	6	6	6										6	6	6	6	6	6	6	6	5	5	5	5	6	6	6	6	147	57,545
6	6	6	6	6	6	6	6	6	6	6							4	6	6	6	6	6	6	6	6	6	6	5	5	5	5	6	6	6	6	174	63,890
DRY CHANNEL SPILLWAY (12 Bays)																																					
6	6	6	6	6	2	6																														38	72,820
Radial Gates (Bays 16 and 17)																																					
												Both - Full-Open - 11,000 cfs per bay																									94,820

Notes: Numbers under each bay represent the six lift gates in each spill bay.
Radial gates are in red, Bays 13-15 do not open.

7.3 GBT Monitoring

In 2012, the Thompson Falls Fisheries TAC agreed to initiate TDG and gas bubble trauma (GBT) monitoring when and if streamflows reached or exceeded 75,000 cfs. In 2014, streamflows (USGS gage station near Plains, Montana) in the Clark Fork River exceeded 75,000 cfs between May 25 and June 3, 2014 with peak flows at approximately 82,300 cfs on May 29, 2014.

In 2014, the Licensee electrofished downstream of Thompson Falls Dam between the Main Dam and the Highway 200 bridge on May 28 when streamflows (measured at Thompson Falls' Powerhouse) were approximately 85,454 cfs and on June 3 when streamflows were approximately 77,705 cfs. This area was chosen for crew safety and because fish in this reach of river have the highest possibilities of showing symptoms of GBT. Summary of the streamflow measurements at the powerhouse and USGS gage station near Plains, water temperature, and the number of fish examined for GBT is provided in Table 7-4.

Table 7-4: Summary of sampling dates in 2014, including mean daily streamflow (cfs) measures at the powerhouse and at USGS gage station near Plains, water temperature, and the number of fish sampled.

Date of sampling	Mean Daily Streamflow at the Powerhouse (cfs)	Mean Daily Streamflow at USGS gage (cfs)	Water Temperature °C	# Fish Examined
5/28/2014	85,454	81,800	11	206
6/3/2014	77,705	74,400	12	134

Electrofishing was conducted with an 18.5-foot, aluminum hull Wooldridge boat (with a gasoline generator and a Smith-Root VVP 15A rectifier using 120-160 volts with 4-6 amps). The waveform setting varied and was dependent on conductivity in the river system, which varies seasonally. Two booms were attached to the hull extending 1.2 m (4 ft) past the bow with four dangling electrodes per boom. Shocking crews consisted of the boat driver and two netters. Captured fish were put in a 100-gallon holding tank before being measured (total length). All electrofishing was done during daylight hours. Most fish sampled were within 1 m (3 ft) of the surface, where potential effects from TDG are greatest.

Examination of fishes (all species) included gills, lateral line, and fins. Fish were examined for bubbles, which can be very fine, off–coloring, fraying, or unhealthy changes from normal morphology.

A summary of the number of fish recorded and CPUE (fish per hour) during the 2014 electrofishing efforts is provided in Tables 7-5. The results of the fish impact evaluation done in 2008, 2009, 2011, 2012, and 2014 are shown in Table 7-6. No GBT sampling was done in 2010 due to the short duration of flows in excess of 50,000 cfs and no GBT sampling was done in 2013 because high flows did not exceed the threshold of 75,000 cfs established in 2012.

Table 7-5: Summary of the number of fish and CPUE (fish per hour) recorded during electrofishing efforts on May 28 and June 3, 2014 to evaluate GBT in fish below Thompson Falls Dam.

Species	May 28 # of Fish	May 28 CPUE (fish/hr)	June 3 # of Fish	June 3 CPUE (fish/hr)	Total # of Fish
BULL	1	**0.9**	1	**0.9**	2
LL	3	**2.6**	2	**1.8**	5
LN SU	20	**17.3**	5	**4.5**	25
LS SU	60	**51.9**	44	**39.9**	104
LWF	76	**65.8**	37	**33.5**	113
MWF	7	**6.1**	4	**3.6**	11
N PMN	1	**0.9**	1	**0.9**	2
NP	13	**11.3**	25	**22.6**	38
PEA	4	**3.5**	6	**5.4**	10
RB	3	**2.6**	6	**5.4**	9
SMB	16	**13.8**	2	**1.8**	18
WCT	1	**0.9**	1	**0.9**	2
WE	1	**0.9**	0	**0.0**	1
TOTAL	**206**	**178.3**	**134**	**121.4**	**340**

In past years with lower river discharge and lower TDG, fish showing external symptoms of GBT were rare, with only one fish out of 496 fish examined (both 2008 and 2009 combined) showing external symptoms. In 2011, higher TDG resulted in a higher number of fish detected with external GBT symptoms. Of the 67 fish with symptoms, seven were noted to have bubbles and one rainbow trout was noted to have exophthalmia ('pop-eye'). All the other external symptoms noted were minor. In 2012, three fish (one largescale sucker, one rainbow trout, and one smallmouth bass) of the 295 fish examined were identified as having 1 to 5 percent of the fins covered in bubbles.

In 2014, a total of 340 fish were examined; none were noted to have symptoms of GBT during the May 28 sampling, however, 23 fish were noted as having "possible" symptoms of GBT, with frayed caudal fins, but no noticeable bubbles. During the June 3 sampling, eight fish were noted as having symptoms of GBT.

Table 7-6: Gas bubble trauma (GBT) in fish collected downstream of Thompson Falls Hydroelectric Project 2008 through 2014.

Year	Peak Flow (cfs)	# of Fish	# of Species	# of Fish with GBT Symptoms (% of fish sampled)	Species with Symptoms
2008	75,600	220	16	1 (0.4%)	L WF
2009	57,700	276	14	0	None
2010	58,000	No Sampling	-	-	-
2011	104,000	949	15	67 (7%)	RB, L WF, LS SU, PUMP, N PMN, LL
2012	75,300	295	11	3 (1%)	LS SU, SMB, RB
2013	63,700	No Sampling	-	-	-
2014	82,800	340	13	8 (2%)[2]	RB, LL, L WF, MWF, SMB

An example of a lake whitefish noted to have symptoms of GBT is provided in the photograph 7-3. This fish was collected June 3, 2014.

Photo 7-3: Lake whitefish collected on June 3, 2014.

[2] An additional 23 fish (21 L WF, 1 MWF, 1 SMB) were noted as having a frayed caudal fin, but no bubbles.

8.0 TAC-Funded Projects in 2014

8.1 2014 TAC-Funded Projects

In 2013 there were several projects that received funding from the TAC that were still in progress in 2014. Status updates from these projects are provided below and include information on the Thompson River tributary fish surveys, the strategic prioritization of native trout restoration actions in the Lower Clark Fork River (using spatially explicit decision support modeling), bull trout sex identification marker, and Prospect Creek's HDX remote reader.

In 2014, the Thompson Falls Fisheries TAC-funded three additional projects, including genetic analyses of bull trout samples in three tributaries of the Clark Fork River tributaries; the first year of effort in support of the 3-year Thompson Falls Reservoir study of juvenile bull trout out-migration; and land acquisition in the Fish Creek drainage. A progress report for each project is also provided below.

8.1.1 Thompson River Tributaries – Fish Surveys

In 2012, the TAC funded approximately $23,933 for survey work in the Thompson River drainage in support of the 5-Year Reservoir Monitoring Plan. The work was completed in 2013 and 2014. In summer 2013, the Licensee and FWP completed fisheries surveys in four tributaries in the Thompson River drainage, including Big Rock Creek, Twin Lakes, Indian Creek, and Lazier Creek. In 2014, fish were surveyed in Murr Creek. A summary of the 2014 survey efforts is provided in Section 6.1 and a detailed summary of the 2013 survey efforts are provided in Section 5.1 of the 2013 Annual Report (PPL Montana, 2014). No additional surveys are scheduled for 2015.

8.1.2 Strategic Prioritization of Native Trout Restoration Actions in the Lower Clark Fork River Using Spatially Explicit Decision Support Modeling

In 2013, the TAC funded approximately $6,704 in support of the Strategic Prioritization of Native Trout Restoration Actions in the Lower Clark Fork Using Spatially Explicit Decision Support Modeling. The model is being designed to use a combination of existing data and expert input to identify and prioritize conservation actions in the lower Clark Fork River that will be most likely to benefit bull trout within the next 15 years. Details of the proposed model are available in the 2012 Annual Report (PPL Montana, 2013).

Over the last year, a Bayesian model was developed for bull trout using known parameters for the Lower Clark Fork local populations. It is still being evaluated, but has been tested and it is anticipated to be useful going forward in determining what the important habitat and population elements are that interact on bull trout populations. There is a report currently in preparation and the Thompson Falls TAC will be notified when it is available for review.

8.1.3 Bull Trout Sex Identification Marker

In 2012, the TAC funded approximately $2,000 for Avista's proposal to support the development of a bull trout sex identification genetic marker. Funding for this project came from a cost-share between Avista, Kalispel Tribe, FWP and the Licensee. The work and funds began in 2013. That same year, researchers at the Flathead Lake Biological Station (lab), associated with the University of Montana, began working on the development of a bull trout sex identification genetic marker that could be used in a number of Avista projects to determine if fish are male or female. This genetic marker would complement the current bull trout passage program by verifying the gender of transport fish and be useful for other studies in the Project area. The lab was successful in identifying one marker that was 95 percent accurate in matching the field call for known sex bull trout. The Abernathy Fish Technology Center has acquired the sequence for this marker and is planning on incorporating this marker into their normal rapid response bull trout analysis starting in 2015.

8.1.4 Prospect Creek – HDX Remote Reader

In 2012, the TAC funded approximately $2,507 for Avista to install a remote HDX PIT tag array in lower Prospect Creek. Since the HDX PIT tag array was installed, seven fish (six bull trout and one unknown species) have been detected (Table 8-1). Four of the seven fish were also detected by the Licensee of Thompson Falls Dam, either ascending the fish ladder or via electrofishing surveys below Thompson Falls Dam. The table summarizes the bull trout detected in Prospect Creek and known dates and locations of previous detections.

Table 8-1: Summary of bull trout detected via the remote HDX PIT tag array in lower Prospect Creek. Note: EF = electrofishing.

Date Detected in Prospect Creek	PIT TAG ID	Date, Location, Size of Previous Detections
4/26/2013 – 7/11/2013	900226000034484	7/16/2012 - Stream EF Crow Creek, tributary to Prospect (261 mm)
7/7/2013 – 8/13/2013	985121021877906/ 982000357016269	5/31/2011 - EF Below T Falls Dam (482 mm, 966 g) 5/15/2012 - TFalls ladder (510 mm, 1172 g)
8/5 – 13/2013 and 9/14/2014	900226000035613	8/28/2012 - Prospect Creek weir (585 mm) moving upstream
9/12/2014	982000357016105	Species Not Entered (Unknown), but fish likely recorded at TFalls fish ladder
9/18/2014	900226000570368	7/5/2013 and 9/8/2013 - Prospect Creek weir trap (560 mm)
9/18/2014	982000357016106/ 985121021203256	6/2/2011 - LCFR ID Night EF (500 mm, 1049 g) 5/28/2014 - EF Below TFalls Dam (567 mm, 1049 g)
9/21/2014	982000357016109	5/6/2013 - TFalls ladder (576 mm, 1694 g)

8.1.5 Bull Trout Genetic Sampling

In 2014, the TAC funded approximately $10,000 in support of genetic analysis from samples collected in the Clark Fork River drainage. In 2014, bull trout samples collected between 2012 and 2013 from Cedar Creek (n=37), Fish Creek (n=50), North Fork Jocko River (n=44), and South Fork Jocko River (n=37) were submitted to and analyzed by Abernathy Fish Technology Center Conservation Genetics Laboratory (DeHann et al. 2014). These samples were added to the baseline dataset used for population analysis.

8.1.6 Evaluation of Juvenile Bull Trout Out-Migration in the Thompson Falls Reservoir

In 2013, the TAC approved funding for a multi-year (2014-2016) study that will evaluate juvenile bull trout out-migration through Thompson Falls Reservoir. The study will be completed by a Montana State University graduate student. The research objectives are specific to juvenile bull trout out-migrating from the Thompson River drainage through Thompson Falls Reservoir and include the following:

- Estimate travel time
- Describe travel route
- Describe habitat use
- Estimate survival rate

This study is expected to partially answer the following tasks that are outlined in the 5-Year Reservoir Monitoring Plan:

- Estimate the proportion of juvenile bull trout that migrate upstream or downstream (in the Clark Fork River) once they have left the Thompson River drainage
- Utilize out-migration data to design a sampling protocol, if feasible, to monitor juvenile out-migration movement through the Thompson Falls Reservoir
- Evaluate out-migration movement in the Thompson Falls Reservoir to determine if the reservoir is influencing bull trout migrating life history stages
- If feasible to evaluate juvenile bull trout movement through the Thompson Falls Reservoir, also consider the evaluation of habitat use in the Thompson Falls Reservoir and determining if there is potential overall for competition with other species or predation losses
- Evaluate movement patterns of juvenile bull trout out-migrating into, through and out of the Thompson Falls Reservoir
- Estimate residence time of juvenile bull trout out-migrating downstream through the Thompson Falls Reservoir

In 2013, the TAC allocated $37,932 for purchasing equipment (e.g., transmitters, receive, mobile tracking data logger, and hydrophone) and $50,405 for the first year (2014) of the study. The

TAC also approved funding for subsequent years, allocating approximately $50,966 for 2015 and approximately $30,023 for 2016. Avista is cooperating in additional tracking of these fish if the fish pass downstream of Thompson Falls Dam. The graduate student will provide the TAC an annual update on the progress of the study and results. A final report (Master's thesis) is schedule to be submitted to NorthWestern by December 30, 2016.

A progress report summarizing activities and results from 2014 is presented in Section 6.2 of this report.

8.1.7 Fish Creek Land Acquisition – Hulme Property

In August 2014, the TAC voted and unanimously approved the allocation of $120,000 in support of purchasing a 148-acre parcel located on the Fish Creek, immediately downstream of the confluence with the South and West forks (*see* Appendix A for proposal details). The project would permanently protect a significant reach of the mainstem of Fish Creek from habitat degradation and facilitate future enhancement activities. This stream system supports the largest fluvial bull trout population in the middle Clark Fork River drainage and typically contains more redds than the rest of the tributaries in this region combined. An intact migratory corridor and rearing area in the mainstem is vital to the Fish Creek bull trout population.

9.0 Compliance with the Terms and Conditions of the Biological Opinion

The sections below provide the seven TCs from the FWS's Biological Opinion (BO) followed by a statement describing the Licensee's (NorthWestern) actions of compliance. The language in the BO refers to PPL Montana, the Licensee at the time the BO was prepared. All references to PPL Montana and compliance requirements in the BO apply to NorthWestern. As of November 18, 2014, NorthWestern is the Licensee of the Thompson Falls Project (FERC No. 1869) and is responsible for compliance with the TCs in the BO as outlined below.

9.1 Term and Condition TC1 – Upstream Passage

9.1.1 Requirement

The Biological Opinion states that:

> a. During 2009 and 2010, PPL Montana will construct a fish passage facility (permanent fishway) to provide timely and efficient upstream passage at the right abutment of the main dam, as agreed to by the Service and through oversight of the TAC (as provided for in the interagency Thompson Falls MOU).
>
> b. During construction and cleanup, PPL Montana will follow permit procedures as required by the Service, the State of Montana, and U.S. Army Corps of Engineers so that minimal impacts to downstream aquatic resources occur during construction.
>
> c. PPL Montana will determine operational procedures for the passage facility and develop a written operation and procedure manual (SOP) by the end of 2010, with input from the TAC and approval by the Service, updated as needed.
>
> d. For the remaining term of the license (expiring December 31, 2025), PPL Montana will ensure that operation of the fish passage facility is adequately funded and conducted in compliance with the approved SOP; including activities such as biological studies, transport of bull trout (as needed), and assessment of ladder efficiency.
>
> e. During the Phase 2 evaluation period (2010 through 2020), PPL Montana will provide adequate funding for genetic testing to determine the likely natal tributary of origin of all adult bull trout which ascend the fishway and enter the sample loop, as well as those otherwise captured at the base of Thompson Falls Hydroelectric Project. In order to positively

identify natal origin of bull trout at the project, PPL Montana will institute a permanent fish tagging system for all bull trout handled during monitoring and for other fisheries investigation activities in the Project area.

f. During the Phase 2 evaluation period (2010 through 2020), PPL Montana will make a fish transport vehicle available, and provide staff to transport any adult bull trout that is captured at Thompson Falls Hydroelectric Project and determined by the SOP to require transport to upstream waters.

g. In consultation with the TAC, PPL Montana will prepare by January 1, 2011, for Service approval, an action plan for Phase 2 of the evaluation period (2010 through 2020) to evaluate efficiency of the upstream passage facility. The goal will be to assess how effective the ladder is at passing bull trout, the potential length of any delay, the amount of fallback, and the optimal operational procedures to achieve the highest efficiency. During this Phase 2 evaluation period (2010 through 2020) a routine feedback loop will be established and used, as agreed to by the Service, to fine tune operations and will be combined with a variety of experimental and evaluative studies. It may be necessary to conduct research on surrogate species (e.g., rainbow trout) at the discretion of the TAC, in order to facilitate certain of these evaluations. At a minimum, for the remaining term of the license (through 2025), PPL Montana will support a sampling method to annually estimate the total numbers of all species passing through the ladder and adequately characterize the timing of such movements.

h. During the entire Phase 2 evaluation period (2010-2020), the TAC, subject to approval of the Service and with PPL Montana support, will provide adequate oversight of scientific aspects, surveys, studies, and protocols associated with the fish passage aspects of the Project. At the end of the Phase 2 evaluation period (2010-2020), and upon completion and adequate distribution and consideration of a comprehensive ten-year report (due December 31, 2020), PPL Montana will convene a structured scientific review of the project, guided by the TAC. This scientific review will be completed by April 1, 2021 and will develop a set of recommendations to be submitted to the Service for evaluation, modification, and approval; including specific conclusions as to whether the fishway is functioning as intended and whether major operational or structural modifications of the fishway are needed. The review process will culminate, by December 31, 2021, in a revised operating plan for the

> fishway during the remainder of the existing term of the FERC license (2022 through 2025).

9.1.2 Compliance

The Licensee has completed Project activities in compliance with TC1 (a, b, c). The Licensee obtained the necessary permits for construction of the ladder and completed construction of the Thompson Falls Upstream Fish Passage Facility (ladder) by fall 2010 (TC1 [a, b]). The FERC approved the Licensee's *Thompson Falls Fish Ladder – Fishway Operations Manual 1.0* (SOP) in an Order issued on June 17, 2011.

NorthWestern will continue to stay in compliance with TC1d for the term of the License. NorthWestern will continue funding for the ladder and operate the facility in conformance with the approved SOP.

The Licensee developed and submitted the FWS-approved *Fish Passage Evaluation Plan, Phase 2 Action Plan, 2011-2020* (PPL Montana, 2010c) (Fish Passage Evaluation Plan) to the FERC on October 14, 2010. The FERC issued an Order approving the Fish Passage Evaluation Plan on June 9, 2011. Between 2011 and 2014, the Licensee implemented the Fish Passage Evaluation Plan, which complies with TC1 (e, f, g, and h). NorthWestern will continue to implement the Fish Passage Evaluation Plan through 2020.

9.2 TC2 – Downstream Passage

9.2.1 Requirement

The Biological Opinion states that:

> PPL Montana will provide annual funding to the TAC, as approved by the Service and specified in the Thompson Falls MOU, to conduct offsite habitat restoration or acquisition in important upstream bull trout spawning and rearing tributaries. The purpose is to boost recruitment of juvenile bull trout. This funding is provided to partially mitigate for incidental take of bull trout caused by downstream passage through the turbines and spillways. The annual $100,000 contribution specified for the first term of the MOU (2009-2013) is subject to renegotiation during succeeding terms of the MOU to run from 2014-2020.

9.2.2 Compliance

On November 11, 2013, the Licensee electronically filed the renewed 7-year (effective January 1, 2014 through December 31, 2020) MOU, dated September 20, 2013, for the Project to the Commission. The renewed MOU received approval from FWS, FWP, CSKT, and the Licensee and was filed in compliance with the FWS BO TC2 and FERC Order issued on February 12, 2009.

The terms of the renewed MOU (2014-2020) are similar to the first term of the MOU (2009-2013). The AMFA started with $150,000 on January 1, 2014. The Licensee will provide $100,000 annually for 7 years and allow a maximum of $250,000 to accrue in the account from unspent or transferred annual TAC funds. The AMFA is designated for implementation of downstream passage minimization measures in addition to License-required studies, monitoring activities, reports, upstream fish passage minimization measures, gas abatement monitoring, predator control measures, and other means to reducing impacts on bull trout caused by operation of the Project.

During the annual TAC meeting, held on December 4, 2014, NorthWestern approved two proposals requesting funding for 2015. The details of the proposals are provided in Section 10.0 and Appendix A of this report. NorthWestern will continue to collaborate and coordinate with agencies and other entities to support projects in compliance with Term 2a. As proposals are submitted, NorthWestern will distribute the information to the TAC for review and approval.

9.3 TC3 – Gas Supersaturation

9.3.1 Requirement

The Biological Opinion states that:

> a. For the remainder of the license (through 2025), in consultation with the TAC and subject to Service approval, PPL Montana will develop and implement operational procedures to reduce or minimize the total dissolved gas production at Thompson Falls Dams during periods of spill. Future modifications to prescribed operations may be determined from ongoing evaluations, as necessary and determined appropriate by Montana Department of Environmental Quality (MDEQ).
>
> b. For the remainder of the license (through 2025), in consultation with the TAC and subject to Service approval, PPL Montana will continue to collaborate with MDEQ, Avista, FWP, and other entities toward reducing the overall systemic gas supersaturation levels in the Clark Fork River, occurring from a point downstream of Thompson Falls Dam to below Albeni Falls Dam.
>
> c. For the remainder of the license (through 2025), all bull trout detained through the sampling loop at the Thompson Falls Fish Ladder will routinely be examined for signs of gas bubble trauma; with results of such observations permanently recorded. Should GBT symptoms be discovered, then PPL Montana will consult the TAC on the need for immediate corrective actions and subsequently implement any new studies or potential operational changes (to the ladder or the dam) which may be required by the Service and MDEQ, in order to mitigate GBT concerns.

9.3.2 Compliance

PPL Montana prepared a *Total Dissolved Gas Control Plan* (PPL Montana, 2010d) (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.

In 2012, the TAC agreed to initiate TDG and GBT monitoring when and if streamflows reached or exceeded 75,000 cfs. In 2014, mean daily streamflows taken from the USGS gage station near Plains, Montana in the Clark Fork River peaked at approximately 82,300 cfs on May 29. GBT sampling was completed on May 28 and June 3 with streamflows ranging between 74,400 and 81,800 cfs. GBT monitoring was also completed in 2011 and 2012, but not in 2013 since streamflows did not reach or exceed 75,000 cfs. Results from the 2014 monitoring is presented in Section 7.2 and results from 2011 and 2012 are provided in the 2011 and 2012 Annual Report, respectively (PPL Montana, 2012 and 2013). Bull trout recorded at the ladder or downstream of the Thompson Falls Dam annually between 2011 and 2014 have not shown any external symptoms of GBT.

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.

9.4 TC4 – MOU and TAC

9.4.1 Requirement

The Biological Opinion states that:

> a. Upon completion of construction of the Thompson Falls Fish Ladder (currently scheduled for 2010) and concurrent with initiation of the Phase 2 review period (mid-2010 through 2020) PPL Montana will review the Thompson Falls MOU and collaborate with the signatory agencies as to the need to revise and restructure the MOU. Any such revision should be developed around the 2010-2020 Phase 2 evaluation period and may include appropriate changes to the TAC and its operation. Subsequent revision may occur again in 2021, or as needed based on adaptive principles and subject to approval of the Service and PPL Montana.

9.4.2 Compliance

The current MOU expires on December 31, 2020 (Section 9.2.2). NorthWestern will coordinate with the TAC and FWS to revisit the terms of the MOU in 2020, prior to the expiration of the current agreement.

9.5 TC5 – Thompson Falls Reservoir

9.5.1 Requirement

The Biological Opinion states that:

> a. During the first five years of the Phase 2 evaluation (2010 through 2015) PPL Montana, with TAC involvement and Service approval, will conduct a prioritized 5-year evaluation of factors contributing to the potential loss or enhancement of migratory bull trout passage through Thompson Falls Reservoir. Goals and objectives for this assessment and scientifically-based methodology will be developed through the TAC and approved by the Service no later than the end of 2010 and will focus at a minimum on better understanding temperature and water current gradients through the reservoir; travel time, residence time, and pathways that juvenile and subadult bull trout select in moving through the reservoir; and an assessment of impacts of predatory nonnative fish species on juvenile and subadult bull trout residing in or passing through the reservoir. The initial findings will be summarized and supported with scientifically based conclusions, no later than the end of 2015, with a goal of adaptively improving survival of juvenile bull trout in Thompson Falls Reservoir as they pass downstream or reside in the system. A second, more comprehensive summary of conclusions and recommendations regarding reservoir impacts will be submitted as part of the scientific review package by the end of 2020 (*see* TC1h).
>
> b. Based on the interim Thompson Falls Reservoir Assessment (a., above), a timely evaluation of the site specific need for a nonnative species control program in Thompson Falls Reservoir will be conducted by PPL Montana, in collaboration with the TAC agencies (*see* TC7b., below), no later than the end of 2015, with final recommendations to be approved by the Service.

9.5.2 Compliance

In compliance with TC 5a, PPL Montana collaborated with TAC members and prepared the 5-Year Reservoir Monitoring Plan, which was approved by FWS and submitted to the FERC on June 17, 2010. FERC issued an Order approving the 5-Year Reservoir Monitoring Plan on February 9, 2011. The objectives identified in the 5-Year Reservoir Monitoring Plan for the next 5 years (2010-2015) include:

1. Characterization of bull trout in the Thompson River drainage

2. Characterization of the affect that Thompson Falls Reservoir has on bull trout emigrating from the Thompson River drainage (or elsewhere upstream, as these are not necessarily separable) and migrating downstream in the Clark Fork River

The following activities have been completed or are in progress in support of the 5-Year Reservoir Monitoring Plan:

- A fish survey was completed in West Fork Thompson River in 2010 (PPL Montana, 2012)
- A fish survey was completed in Fishtrap Creek in 2011 (PPL Montana, 2012)
- A Thompson River Drainage database documenting available records from 1973 through 2011 was completed in 2012 (PPL Montana, 2012)
- *Thompson River Bull Trout Enhancement and Recovery Plan* (GEI Consultants, Inc. and Steigers Corporation, 2013) was prepared in 2012 (PPL Montana, 2013)
- Fish surveys in several tributaries in the Thompson River, including Lazier Creek, Indian Creek, Twin Lakes, and Big Rock Creek in 2013 (PPL Montana, 2014) and Murr Creek in 2014 (*see* Section 6.1); the survey efforts were funded by the TAC in 2013
- A juvenile bull trout out-migration study commenced in 2014 and is scheduled to be completed in 2016 in Thompson Falls Reservoir (*see* Sections 6.2 and 8.1.6)

In 2015, the Licensee was originally scheduled to submit a comprehensive report to FWS by December 31, 2015 to summarize data collected between 2010 and 2015, as well as provide recommendations for improving emigrating juvenile bull trout survivorship and evaluate the site specific need for a nonnative species control program in the Thompson Falls Reservoir per the TCs 5a and 5b in the BO. However, the schedule for the summary report in 2015 and recommendations for any additional programs and/or efforts has been modified. In 2014, the Licensee consulted with FWS and proposed to modify filing requirements specified in the FWS' BO 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. The modifications include removing the comprehensive summary of activities associated with the 5-Year Reservoir Monitoring Plan (due at the end of 2015) because this requirement has been achieved through the annual reports since 2011 and postponing the development of any recommendations "*for a nonnative species control program in the Thompson Falls Reservoir*" from the end of 2015 until December 31, 2020 (formal filing to the Commission) to allow for the completion and full review of the results from an ongoing study to assess juvenile bull trout out-migration in the reservoir.

NorthWestern will provide an annual update in the 2015 annual report on the juvenile bull trout out-migration study, which scheduled to be complete by December 2016. Upon the conclusion of the juvenile bull trout out-migration study, NorthWestern will complete an evaluation of the site specific need for a nonnative species control program in the Thompson Falls Reservoir in compliance with TC 5b and submit a formal filling to the Commission by December 31, 2020.

9.6 TC6 – System-wide Monitoring

9.6.1 Requirement

The Biological Opinion states that:

> a. For the remainder of the license (through 2025), PPL Montana will ensure that actions at the Thompson Falls Fish Ladder, including tagging, transport, and any tracking of fish movement, are adequately funded and fully coordinated with the Avista project and the management agencies FWP, CSKT, and the Service. This coordination will include routine communications through the TAC and may require participation in special meetings or discussions to ensure that there is a single seamless fish passage effort for the lower Clark Fork projects.
>
> b. For the remainder of the license (through 2025) PPL Montana will contribute a proportional amount of funding to ensure that fish sampled at the Thompson Falls Fish Passage Facility are processed, analyzed, and integrated into annual updates of the system wide Clark Fork River genetic database.
>
> c. In consultation with the TAC and with approval of the Service, for the remainder of the license (through 2025), PPL Montana will fund the technology required to track transmittered fish that pass the project as they move through the system. This may include an integrated PIT-Tag scanner at the fishway, mobile PIT-Tag scanning capabilities (wand(s) for use in the field), and radio implantation and tracking of bull trout that move through the sample loop in the ladder. Obligations for tracking transmittered fish by PPL Montana will include at a minimum the portions of the Lower Clark Fork Core Area upstream of Thompson Falls Dam (i.e., mainstem Clark Fork River from Thompson Falls Dam to the confluence of the Flathead River, including tributaries such as the Thompson River) Note: in the lower Flathead River, Jocko River, and other Flathead Reservation waters primary responsibility for tracking is assumed by the CSKT, but close coordination with the Tribes will be maintained by PPL Montana. Broader tracking needs upstream will be determined through cooperation with other entities in the basin (as in TC6a, above).

9.6.2 Compliance

The Licensee will comply with these requirements by holding necessary TAC meetings (and sub-committee meetings) in 2015 to ensure compliance and to aggressively address the adaptive needs of the operations of the ladder. With the construction of the fish ladder, three remote

antennas were installed on the weirs that detect HDX and FDX PIT-tagged fish. These remote antennas detect PIT tags as fish move through the ladder. NorthWestern will also continue to collaborate and coordinate with local biologists regarding the need to conduct radio telemetry studies. NorthWestern continues to support bull trout genetic sampling efforts in the Clark Fork River drainage with funding approved by the TAC during the 2014 annual meeting in support of genetic analysis of bull trout samples from Little Joe Creek (Appendix A).

9.7 TC7 – Reporting

9.7.1 Requirement

The Biological Opinion states that:

> a. Annually, by April 1 of each year for the remainder of the license (expires 2025), PPL Montana will prepare and submit to the Service for approval a report of the previous year's activities, fish passage totals, and next year's proposed activities and other fisheries monitoring that may result in intentional as well as incidental take of bull trout. The report will quantify the number of bull trout proposed to be incidentally taken by each activity and summarize the cumulative extent of incidental take from all previous year activities.
>
> b. By December 31, 2015, after the first five years of the Phase 2 evaluation period (as described per TC1g., above), PPL Montana will present to the TAC and the Service a comprehensive written assessment of the first five years of fishway operation. This report is partially for the purpose of assessing the need for major mid-Phase 2 modifications to the facility and its operations as well as for consideration of the need for supporting additional bull trout passage or transport above the dam.
>
> c. Annually, by April 1 of each year beginning in 2010 and for the remainder of the license (expires 2025), PPL Montana will archive electronic versions of all biological progress reports (described in TC 1 through TC 7 and dating back to 2005) generated through the Thompson Falls Project. PPL Montana will provide to TAC agencies at no cost, upon request, updated CDs or web-based access to those reports.
>
> d. For the remainder of the license (expires 2025), upon locating dead, injured, or sick bull trout, or upon observing destruction of redds, notification must be made within 24 hours to the Service's Division of Law Enforcement Special Agent (Richard Branzell, P.O. Box 7488, Missoula, MT, 59807-7488; (406) 329-3000). Instructions for proper handling and disposition of such specimens will be issued by the Division

of Law Enforcement. Dead, injured, or sick bull trout should also be reported to the Service's Kalispell Field Office (406-758-6882).

e. For the remainder of the license (expires 2025), during project implementation the FERC or applicant shall promptly notify the Service of any emergency or unanticipated situations arising that may be detrimental for bull trout relative to the proposed activity.

9.7.2 Compliance

NorthWestern complied with TC 7a requirements by preparing this annual report for the work completed in 2014. NorthWestern will continue to submit annual reports of the previous year's activities, fish passage totals, next year's proposed activities, and other fisheries monitoring that may result in intentional as well as incidental take of bull trout. The annual reports will be approved by the TAC and submitted to the FERC by April 1 of each year for the remainder of the License.

NorthWestern proposes to continue to provide the following information in future annual reports. PPL Montana will summarize annual activities associated with the evaluation of the ladder, including, as available, the following information:

- Total number of fish and species ascending the ladder
- Total number of fish and species passed to Thompson Falls Reservoir
- Most active period(s) for fish and various species ascending the ladder
- Bull trout genetic sampling and tributary assignment

In 2014, NorthWestern consulted with FWS to review the needs of a 5-year comprehensive report of the ladder's performance. FWS and NorthWestern concurred that the annual reports have provided sufficient and on-going comprehensive summaries that negate the need for a separate 5-year report. NorthWestern filed a letter, with FWS's support, to the Commission on December 17, 2014 proposing TC 7b no longer be required because the comprehensive reporting that has been continually provided in the annual reports.

In compliance with TC 7c, NorthWestern will archive electronic versions of all biological progress reports (dating back to 2005) annually by April 1. Sections d and e will be addressed as these situations occur.

9.7.3 Bull Trout Incidental Take Summary 2011-2014

In compliance with TC 7a, this section provides a summary of the cumulative extent of incidental take from all previous year activities (2009-2014) in support of the upstream fish passage at the Project (Table 9-1).

In 2014, the Licensee collected six bull trout (three via electrofishing below the dam; one via electrofishing in the Paradise to Plains section in the Clark Fork River; one in the upper section

of the Thompson Falls Reservoir; and one at the Thompson Falls fish ladder), all of which were released live. However, the bull trout that ascended the ladder in 2014 and released alive upstream of the dam was later captured downstream of Thompson Falls Dam 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.

Between 2011 and 2014, 24 individual bull trout have been sampled by the Licensee in the Project area with approximately five to seven individual bull trout sampled annually. Sampling has included collecting bull trout via electrofishing efforts above and below Thompson Falls Dam as well as bull trout recorded at the Thompson Falls fish ladder. Of the 24 bull trout, 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 occurrence in the Project area and subsequently, a cover was placed over the holding pool to mitigate the potential for this to occur again. Additional details regarding bull trout sampled by the Licensee between 2011 and 2014 are provided in Section 4.0.

Table 9-1: Cumulative incidental "take" of bull trout for the Project, since January 1, 2009. Note: 2014 fish are listed in bold; EF = electrofishing; L = length; Wt = weight.

Date	Method of Capture	Drainage	Location	Action	Personnel	L (mm)	Wt (g)	PIT tag	Genetic Assignment	Condition at time of release
5/1/09	Gillnet	Clark Fork (Lower)	TFalls Reservoir	Long-term Population Monitoring	Licensee	271	174	98512009494278	Fishtrap Creek	Alive
10/12/10	EF	Clark Fork (Lower)	Clark Fork River, upstream of Island Complex	Long-term Population Monitoring	Licensee	325	240	N/A	118-005 Awaiting lab results	Alive
4/13/11	TFalls Ladder	Clark Fork (Lower)	TFalls Ladder	Fish Passage Studies	Licensee FWP	365	364	985121023302169	Thompson River (R4)	Alive
4/26/11	TFalls Ladder	Clark Fork (Lower)	TFalls Ladder	Fish Passage Studies	Licensee FWP	547	1438	985121023464730	Fishtrap Creek (R4)	Alive
5/31/11	EF	Clark Fork (Lower)	Below TFalls Ladder	Fish Passage Studies	Licensee FWP	482	966	985121021877906	Meadow Creek (R4)	Alive
5/31/11	EF	Clark Fork (Lower)	Below TFalls Ladder	Fish Passage Studies	Licensee FWP	180	50	985121021907887	Fishtrap Creek (R4)	Alive
5/31/11	EF	Clark Fork (Lower)	Below TFalls Ladder	Fish Passage Studies	Licensee FWP	247	130	985121021914545	Fishtrap Creek (R4)	Alive
4/10/12	EF	Clark Fork (Lower)	Below TFalls Ladder	Fish Passage Studies	Licensee FWP	272	150	985121027393272	Graves Creek (R3)	Alive
4/16/12	EF	Clark Fork (Lower)	TFalls Reservoir (Lower Section)	Fish Passage Studies	Licensee FWP	222	76	985121027360192	Fishtrap Creek (R4)	Alive
4/17/12	EF	Clark Fork (Lower)	TFalls Reservoir (Upper Section)	Fish Passage Studies	Licensee FWP	260	140	985121027402995	Fishtrap Creek (R4)	Alive
5/15/12	TFalls Ladder	Clark Fork (Lower)	TFalls Ladder	Fish Passage Studies	Licensee FWP	510	1172	985121021877906 (FDX) 982000357016269 (HDX)	Meadow Creek (R4)	Alive
5/21/12	TFalls Ladder	Clark Fork (Lower)	TFalls Ladder	Fish Passage Studies	Licensee FWP	563	1404	985121023464730	Fishtrap Creek (R4)	**Mortality** – Jumped out of Pool at Ladder
10/30/12	EF	Clark Fork (Lower)	Paradise-Plains	Fish Passage Studies	Licensee FWP	472	800	982000357016135	Monture Creek (R4)	Alive

Date	Method of Capture	Drainage	Location	Action	Personnel	L (mm)	Wt (g)	PIT tag	Genetic Assignment	Condition at time of release
10/30/12	EF	Clark Fork (Lower)	Paradise-Plains	Fish Passage Studies	Licensee FWP	444	678	982000357016066	Fish Creek (R4)	Alive
4/10/2013	EF	Clark Fork (Lower)	Upper TFalls Reservoir (CFR)	Fish Passage Studies	Licensee FWP	260	108	982000357016097	Fishtrap Creek (R4)	Alive
4/30/2013	TFalls Ladder	Clark Fork (Lower)	TFalls Ladder	Fish Passage Studies	Licensee FWP	598	2306	982000357016065	Fish Creek (R4)	Alive
5/6/2013	TFalls Ladder	Clark Fork (Lower)	TFalls Ladder	Fish Passage Studies	Licensee FWP	576	1694	982000357016109	Fishtrap Creek (R4)	Alive
5/7/2013	TFalls Ladder	Clark Fork (Lower)	TFalls Ladder	Fish Passage Studies	Licensee FWP	478	978	982000357016155	Fishtrap Creek (R4)	Alive
6/7/2013	TFalls Ladder	Clark Fork (Lower)	TFalls Ladder	Fish Passage Studies	Licensee FWP	596	1926	HDX tag not recorded (Genetics 118-073)	Fishtrap Creek (R4)	Alive
8/9/2013	TFalls Ladder	Clark Fork (Lower)	TFalls Ladder	Fish Passage Studies	Licensee FWP	482	1058	982000357016151	Fishtrap Creek (R4)	Alive
4/7/2014	**EF**	**Clark Fork (Lower)**	**Below TFalls Dam**	**Fish Passage Studies**	**Licensee FWP**	**520**	**1500**	**No tag implanted/ no genetic sample taken**	**NA**	**Alive**
4/15/2014	**EF**	**Clark Fork (Lower)**	**Upper TFalls Reservoir (CFR)**	**Fish Passage Studies**	**Licensee FWP**	**577**	**1446**	**900226000035846**	**Fishtrap Creek (R4)**	**Alive**
5/16/2014	**TFalls Ladder**	**Clark Fork (Lower)**	**TFalls Ladder**	**Fish Passage Studies**	**Licensee FWP**	**523**	**1264**	**982000357016169**	**Fish Creek (R4)**	**Alive (later captured via gillnet in Noxon Reservoir resulting in a mortality)**
5/28/2014	**EF**	**Clark Fork (Lower)**	**Below TFalls Dam**	**Fish Passage Studies**	**Licensee FWP**	**567**	**1640**	**985121021203256/ 982000357016106**	**Fishtrap Creek (R4)**	**Alive**
6/3/2014	**EF**	**Clark Fork (Lower)**	**Below TFalls Dam**	**Fish Passage Studies**	**Licensee FWP**	**509**	**1224**	**982000357016241**	**Fishtrap Creek (R4)**	**Alive**

Date	Method of Capture	Drainage	Location	Action	Personnel	L (mm)	Wt (g)	PIT tag	Genetic Assignment	Condition at time of release
10/28/2014	EF	Clark Fork (Lower)	Paradise-Plains	Fish Passage Studies	Licensee FWP	315	260	982000357016111	TR BULL E2, results pending	Alive

10.0 Proposed Activities for 2015

10.1 Baseline Fisheries Data Collection

In 2015, NorthWestern will continue to collect annual baseline fisheries data as presented in Section 2.0 of this report with the exception of the Paradise to Plains fall electrofishing reach, which is scheduled to be completed every other year (next survey in 2016). Baseline fisheries data will include spring and fall electrofishing and fall gillnetting at the designated sites. Data collected in 2015 will be summarized and presented in next year's annual report. Based on prior year's sampling in the Clark Fork River and Thompson Falls Reservoir it is conservatively estimated that incidental take of bull trout during 2015 baseline fisheries studies will be no more than 10 bull trout. Any fish evaluations in the Thompson River drainage will be managed by FWP, thus any incidental take of bull trout will be reported by FWP.

10.2 Upstream Adult Fish Passage Studies

In 2015, NorthWestern will continue to implement 10-year *Fish Passage Facility Evaluation Plan, Phase 2 Action Plan, 2011-2020* (PPL Montana, 2010c) (Fish Passage Evaluation Plan) that was developed and submitted to the FERC on October 18, 2010 and approved on June 9, 2011. NorthWestern will collect biological and operational data during ladder operations in 2015. NorthWestern will summarize the following information, as available, for next year's annual report:

- Total number of fish and species ascending the ladder
- Total number of fish and species passed to Thompson Falls Reservoir
- Most active period(s) for fish and various species ascending the ladder
- Number of bull trout that fallback after passing the Thompson Falls Dam
- Bull trout genetic sampling and tributary assignment

NorthWestern will operate the ladder in orifice mode full-time during the 2015 season (as was done during the 2013 and 2014 seasons). The fisheries data collected in 2015 will be evaluated and presented during the annual TAC meeting to determine whether additional weir mode studies may be beneficial or continuing operations in orifice mode is most beneficial for facilitating upstream fish passage.

Several studies outlined in the Fish Passage Evaluation Plan will occur over multiple years (2011-2020). A list of the studies and their respective schedule is provided in Table 10-1. Based on prior year's sampling in the Thompson Falls tailrace it is conservatively estimated that incidental take of bull trout during 2015 upstream adult fish passage studies will be no more than 10 bull trout.

Table 10-1: Summary of the objectives, studies, and reporting requirements for the Fish Passage Evaluation Plan (2011-2020). Annual activities are indicated by an "x." A dash (-) indicates no action will be taken for the year. TBD = "to be determined." (Table was modified from the *Fish Passage Evaluation Plan*, 2010.)

Objective	Study	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Effectiveness of the Ladder	Annual Fish Passage	x	x	x	x	x	x	x	x	x	x
	Annual Movement Patterns (timing)	x	x	x	x	x	x	x	x	x	x
	Bull Trout Genetic Testing	x	x	x	x	x	x	x	x	x	x
Operational Procedures for Effectiveness	Weir Modes Notch *vs.* Orifice	x	x	Orifice Mode Only	Orifice Mode – No additional study	Orifice Mode	-	-	-	-	-
	Attractant Flow (AF) & Radio Telemetry (RT)	x (no RT)	x (no RT)	x (max AF, no RT)	x (max AF, no RT)	x (max AF, no RT)	x	x	TBD	TBD	TBD
Length of Delay	Upstream Movement Patterns, Timing & Behavior (Delay)	x	x	x	x	x	x	x	x	x	x
Fallback	Fallback	x	x	x	x	x	x	x	x	x	x
Reporting Requirements	Annual Reporting (April 1 – FERC Submittal)	x	x	x	x	x	x	x	x	x	x
	5-year Fish Passage Evaluation Plan Report (December 31, 2015 – TAC/FWS Submittal)	Accomplished through Annual Reports – No Longer a Separate Requirement for 2015[3]					-	-	-	-	-
	10-year Fish Passage Evaluation Plan Report (Dec 31, 2020 – TAC/FWS Submittal)	-	-	-	-	-	-	-	-	-	x

[3] NorthWestern and FWS concur that the 5-year Fish Passage Evaluation Plan, per TC 7b and scheduled for submittal in 2015, was not necessary due to the comprehensive annual reporting. NorthWestern filed a letter to the Commission on December 17, 2014 summarizing the modifications that FWS and NorthWestern discussed and agreed to implement with regards to the upstream fish passage terms and conditions described in the BO.

10.2.1 Effectiveness of the Ladder and Operations

Effectiveness of the ladder will continue to be evaluated based on annual fish passage. The biological data collected at the ladder's work station will be used to summarize overall upstream fish passage, including enumeration of fish using the facility; the species using the facility; range, average size, and weight of species using the facility; and the timing of movement and passage by each species.

The ladder was initially designed to operate with flows up to 48,000 cfs. Subsequently the ladder has operated annually recording fish at the ladder when flows often exceed the 48,000 cfs threshold. The ladder has even operated with streamflows as high as 75,000 cfs. However, efficacy to attract fish appears to decline when streamflows exceed 50,000 to 60,000 cfs. Ladder operation during spring flows is primarily dependent on debris and sediment loading. As in previous years, the ladder will be operated in 2015 during the spill season for as long as operationally practicable, and data collected on fish movements into the ladder through this range of flow.

Effectiveness of the operational procedures of the ladder to pass fish upstream has been evaluated based on studies of notch *versus* orifice mode and optimal attractant flow. The notch *versus* orifice study was implemented in 2011 and 2012. The results from 2011 and 2012 (PPL Montana 2012, 2013) indicate fish ascend the ladder in both modes, but more fish and a greater variety of species are likely to pass more efficiently during orifice mode. Since the start of the 2013 season, the ladder has operated in orifice mode with a greater number of fish ascending the year annually, including more salmonids. NorthWestern proposes to continue to operate the entire 2015 season in orifice mode and analyze the 2015 data and determine if any additional studies regarding weir mode operations at the ladder are recommended.

The attractant flow study began in 2011. The Licensee originally proposed to use the first 3 years of ladder operations (2011-2013) to test variable attraction flows and learn operations. Based on observations in the first 2 years of study, the Licensee has concluded that during non-spill time periods, the HVJ and AWS should be operated at maximum capacity (50 cfs to stilling basin) in order to provide sufficient flow to allow fish to migrate upstream through the natural falls which is present downstream of the Main Channel Dam (Section 3.2.12). As was done in 2013 and 2014, NorthWestern proposes to continue to use near maximum attractant flow during 2015 operations.

10.2.2 Evaluation of Fish Movement Patterns, Timing, and Behavior

Fish movement patterns, timing, and behavior are evaluated through biological data collected at the ladder and radio telemetry data, when available. Bull trout captured in 2015 downstream of Avista's Cabinet Gorge and Noxon Rapids dams that are genetically tested and assigned to Region 4 (upstream of Thompson Falls Hydroelectric Project) will be PIT-tagged (but will not be radio tagged) and released in Region 4; Region 3 fish will be released in Region 3, accordingly.

In 2014, there was a substantial influx of smallmouth bass and mountain whitefish recorded at the Thompson Falls fish ladder. During the annual TAC meeting, the TAC agreed that NorthWestern will PIT tag mountain whitefish and Floy tag smallmouth bass (equal or greater than 275 mm) recorded at the ladder in 2015.

The TAC has concluded that no radio telemetry studies will be conducted by NorthWestern in 2015. Therefore, assessment of fish movement patterns, timing, and behavior will be conducted by monitoring fish tagged with PIT tags and Floy tags. These studies will allow for an assessment of the length of time for bull trout to ascend the ladder, and upstream and downstream migration patterns. In addition, no electrofishing or tagging of fish below Thompson Falls Dam is proposed for 2015.

10.2.3 Evaluation of Fallback

The potential fallback of bull trout after ascending the ladder and moving into the Thompson Falls Reservoir will be evaluated on an annual basis. Bull trout will be monitored for fallback using PIT tags (HDX tags beginning in 2012) to monitor the movement of bull trout studies.

10.3 5-Year Reservoir Monitoring Plan

In 2015, NorthWestern will continue to implement the *5-Year Reservoir Monitoring Plan, 2011-2015* that was submitted to the FERC in June 2010 and approved by the FERC in an Order issued on February 9, 2011. The goal of the 5-Year Reservoir Plan is to gather information that will assist in developing recommendations to *maximize survival of out-migrant juvenile and adult bull trout through Thompson Falls Reservoir and Dam*. Efforts to implement the 5-Year Reservoir Plan will extend over the next 5 years and beyond. Each year, NorthWestern will prepare a summary for the annual report. In 2013, a study plan was developed for the Thompson River drainage to evaluate juvenile bull trout out-migration in the Thompson Falls Reservoir. This study commenced in 2014 and is scheduled to conclude in 2016 and will be implemented by the USGS through Montana State University.

Any fish evaluations in the Thompson River drainage will be managed by FWP, thus any incidental take of bull trout will be reported by FWP.

10.4 Total Dissolved Gas Control Plan and Gas Bubble Trauma Monitoring

10.4.1 TDG Control Plan

In 2010, the *Total Dissolved Gas Control Plan* (PPL Montana, 2010d) (TDG Control Plan) for the Project was submitted to the MDEQ. With the TDG Control Plan, 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.

In 2015, the Licensee will implement the following protocol for TDG monitoring:

- Will consult with the TAC agencies regarding monitoring TDG depending on the snowpack report on April 1.
- If the April 1 forecast is for runoff at or above 125% of normal, the Licensee will monitor for TDG.
- If the April 1 forecast is for runoff below the 125% of normal, the Licensee will not monitor for TDG.
- The final decision to be made by the FWS and MDEQ in consultation with the Licensee.

In 2015, NorthWestern will monitor TDG, if appropriate, based on the above protocol. GBT monitoring is not proposed for 2015 (refer to next section for details). In addition, NorthWestern will operate the spillways in accordance with the TDG Control Plan. Minor modifications of the spillway operating schedule may be made to enhance fish attraction to the fish ladder during the low flow season.

10.4.2 Gas Bubble Trauma (GBT) Monitoring

Monitoring efforts for signs of GBT in fish below Thompson Falls Dam have been implemented during variable flow conditions (57,700-104,000 cfs) that cover a wide range of TDG levels, including the higher TDG levels, recorded in the Project area. In addition, TDG levels appear to level off once flows exceed 60,000 cfs. Past GBT monitoring in the Project area has resulted in limited findings of fish with symptoms indicating GBT. Therefore, the TAC agreed that continuing GBT monitoring provided minimal gains and the existing dataset (2008-2014) was adequate and no additional GBT monitoring was proposed for 2015. Therefore, no GBT monitoring in fish downstream of Thompson Falls Hydroelectric Project is proposed for 2015.

10.5 TAC Proposals for 2015 Funding

On December 4, 2014, NorthWestern hosted the annual TAC meeting in Missoula, Montana. During the meeting, the TAC authorized two new projects for funding, including the genetic analysis of bull trout samples (approximately $3,000) already collected from Little Joe Creek and financial support for land acquisition (approximately $40,000) in the West Fork Fish Creek drainage. In addition, funding for the second year of the 3-year (2014-2016) study on juvenile bull trout out-migration in the Thompson Falls Reservoir will also be allocated (estimated $51,000). The total authorization for the allocation of funds in 2015 was approximately $94,000.

The proposals for the two new projects that were approved for funding during the 2014 annual TAC meeting are presented in Appendix A. A brief summary of both projects is provided below. A summary of the multi-year juvenile bull trout outmigration in the Thompson Falls Reservoir is available in Sections 6.2 and 8.1.6.

10.5.1 West Fork Fish Creek Land Acquisition – Rehbein Property

The TAC has approved $40,000 in support of the acquisition of a 320-acre parcel on the West Fork of Fish Creek. The land acquisition will permanently protect a significant reach of the West Fork of Fish Creek and the lower portions of two tributaries from habitat degradation. The acquisition will also facilitate enhancement activities along the stream corridor, which is all considered bull trout critical habitat. This stream system supports the largest fluvial bull trout population in the middle Clark Fork River drainage and typically contains more redds than the rest of the tributaries in this region combined. An intact migratory corridor, juvenile rearing habitat and connected nodal areas are vital to these bull trout and westslope cutthroat trout populations.

FWP proposes to purchase the Rehbein property on the West Fork of Fish Creek and then incorporate the property into the existing Wildlife Management Area. Funds for the acquisition would be a mix of private, state, and federal dollars. The landowner has verbally agreed to accept the appraised value for the property and has been sent the purchase agreement for signature. Anticipated closing for the transaction is spring of 2015.

10.5.2 Bull Trout Genetic Sampling and Analysis

During the annual TAC meeting in December 2014, the TAC approved $3,000 to support the analysis of 50 bull trout samples collected from Little Joe Creek. DNA data is needed to continue or update bull trout mapping in the Clark Fork River. This funding will be used to generate or update that bull trout DNA database.

11.0 Acknowledgements

This report was prepared by Kristi Webb, New Wave Environmental Consulting, and Ginger Gillin, GEI Consultants for NorthWestern Energy. The report was developed in coordination with stakeholder groups representing NorthWestern Energy, FWP, FWS, CSKT, USFS, MDEQ, Avista Corporation, and Plum Creek Timber Company. We would like to thank everyone and their organizations for their time and dedication with regards to their collaborative efforts in monitoring and reporting findings 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 on the Thompson Falls Project website at http://thompsonfallsfishpassage.com/. Please contact NorthWestern Energy in Butte, Montana for any data requests.

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Appendix A – Proposals Submitted in 2014

Main Stem Fish Creek Land Acquisition – Hulme Property

Proposal Submitted by: Five Valleys Land Trust (Applicant) - Pelah Hoyt
Montana Fish, Wildlife & Parks (Co-Applicant) – Ladd Knotek

Location of Proposed Project: Property located on main stem of Fish Creek, just downstream of confluence of South and West Forks (*see* attached maps).

Legal: T14N, R24W, Section 31, NW1/4 (148 acre)

Total Project Cost: $358,100
* Does not include in-kind staff costs of Five Valleys & FWP
* See expanded budget sheet for itemized summary of costs

TAC Funds (Cost-Share) Requested: $120,000

All proposals must include the following information:

I. Introduction. A brief statement of project to be implemented with pertinent background information.

Fish Creek is the most intact tributary watershed in the middle Clark Fork region and is considered the most valuable stronghold for bull trout and other native fish. The upper drainage is primarily comprised of public lands, most of which are roadless, proposed Wilderness managed by the U.S. Forest Service. Lower elevation tributaries and main stem tracts have traditionally been in mixed ownership, including private corporate timberlands (Plum Creek Timber Company), public lands (DNRC School Trust), and a limited number of small, private in-holdings.

In 2010, Montana Fish, Wildlife & Parks (FWP) acquired ~ 28,000 acres of the lower Fish Creek drainage from The Nature Conservancy to form the Fish Creek Wildlife Management Area (WMA) and State Park. These lands represented a portion of the Montana Legacy Project, where The Nature Conservancy purchased all available Plum Creek Timber Company (PCT) holdings within the drainage to conserve fish & wildlife values.

At the time of purchase, several small PCT tracts (in-holdings) along the main stem of Fish Creek were on the open market and were not included in the FWP lands acquisition. These properties were subsequently sold to private buyers. One of these parcels, which lies on the lower main stem of Fish Creek, is now being advertised for sale. This parcel contains approximately 30 acres of riparian area and more than 2,700 feet of Fish Creek channel on a portion of the key migratory corridor and sub-adult rearing area for fluvial bull trout in Fish Creek. The property currently contains no man-made structures or infrastructure.

The property proposed for acquisition has high development potential, particularly along riparian areas on the north side of Fish Creek. Land management activities on similar in-holdings within the WMA indicate that private ownership carries large risk of further subdivision, riparian and channel encroachment, illegal water withdrawal, and general habitat degradation (e.g., recently sold and developed neighboring property). Less stringent subdivision regulations in Mineral County also make incorporation of natural resource protection and mitigation measures difficult.

The project would permanently protect a significant reach of the main stem of Fish Creek from habitat degradation and facilitate future enhancement activities. This stream system supports the largest fluvial bull trout population in the middle Clark Fork River drainage and typically contains more redds than the rest of the tributaries in this region combined. An intact migratory corridor and rearing area in the main stem is vital to this bull trout population.

II. Objectives. Explicit statement(s) of what is intended to be accomplished.

Acquire key in-holding property on Fish Creek within the Fish Creek WMA in order to protect it from subdivision and development in perpetuity. Property would be converted to public ownership through incorporation into the WMA. Longer term objectives are to protect and improve habitat conditions for bull trout and other aquatic species using this corridor.

This application proposes purchase of 148 acres bare ground currently owned by the Hulme family (*see* site maps).

III. Methods. Description of how the objectives will be accomplished.

Five Valleys Land Trust (Five Valleys) would purchase the Fork-Hulme in-holding on the main stem of Fish Creek and then transfer the property to FWP. A buy-sell agreement between the property owners and Five Valleys has already been signed.

IV. Schedule. When the project work will begin and end. Include seasonal variations in work schedule.

Five Valleys negotiated and signed a buy-sell agreement with the owners of the Forks-Hulme property in July 2014. Once all necessary due diligence and public review and approval are in place, the property would be purchased by Five Valleys using bridge-funding and transferred to FWP as soon as possible thereafter. The purchase by Five Valleys and transfer to FWP would take place in the fall of 2014 or in the first quarter of 2015. Five Valleys requests that funds be dispersed upon transfer to FWP.

V. Personnel. Who will do the work. Identify the project leader or principal investigator.

Pelah Hoyt, Five Valleys' Lands Director, will manage this project and transaction. Once the land is purchased by Five Valleys, it would be transferred to FWP for inclusion in the Fish Creek WMA. The WMA is managed by Region 2 of FWP under the direction of Mike Thompson (Regional Wildlife Manager) and Randy Arnold (Regional Supervisor).

VI. Budget. Must include amounts for the following items:

The following table shows the budget for the Forks -Hulme Acquisition:

Main Stem Fish Creek Land Acquisition Phase I Budget		
Forks-Hulme Appraised Value & Purchase Price	$350,000	
Transaction Costs	$8,100	
Total Costs	$358,100	
Proposed Funding Sources		
Thompson Falls TAC (requested)	$120,000	33%
MT FWP - Wildlife (secured)	$232,100	65%
Westslope Chapter Trout Unlimited (requested)	$6,000	2%
Total Proposed Funds	$358,100	100%

Costs related to direct labor, overhead, travel, living and materials would be covered separately by Five Valleys and FWP, so they are not included in this proposal.

VII. Deliverables. Describe work product (reports, habitat restoration, etc.) which will result from this project. How will "success" for this project be monitored or demonstrated?

The application proposes to purchase real estate in order to protect and enhance current natural resource values. Direct success of this project would be measured by the degree of disturbance and general natural integrity of the property through time as it is enhanced and allowed to naturally recover from light forestry activity. Enhancements would include tree planting and riparian protection, and potentially instream habitat enhancement (e.g., increased complexity through LWD addition).

Indirect indications of success would be continued expansion and resilience of the Fish Creek bull trout population. Bull trout are monitored through established redd count surveys and population estimate sections.

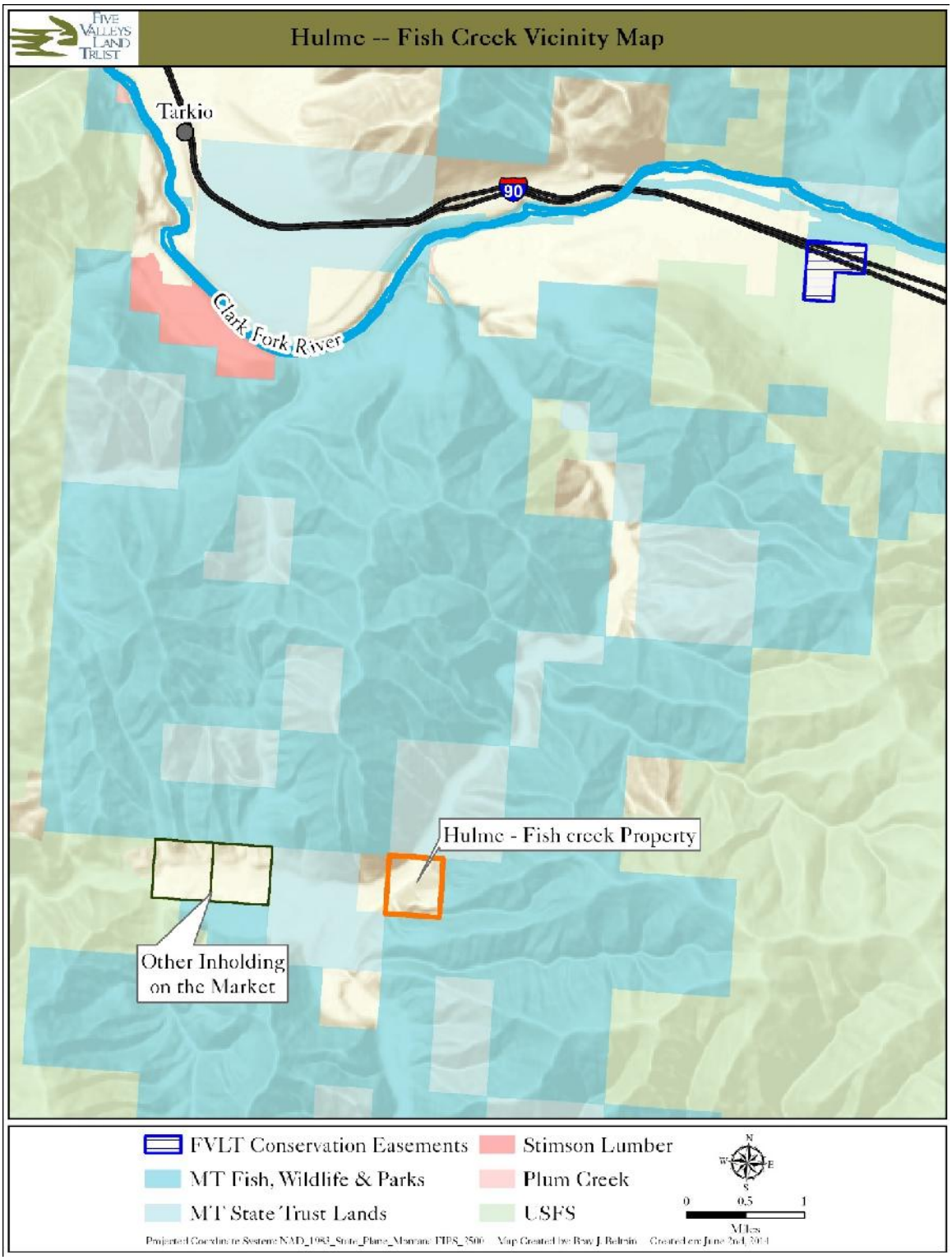
VIII. Cultural Resources. Cultural Resource Management (CRM) requirements for any activity related to this proposal must be completed and documented to NorthWestern as a condition of any TAC grant. TAC funds may not be used for any land-disturbing activity, or the modification, renovation, or removal of any buildings or structures until the CRM consultation process has been completed. Agency applicants must submit a copy of the proposed project to a designated Cultural Resource Specialist for their agency. Private parties or non-governmental organizations are encouraged to submit a copy of their proposed project to a CRM consultant they may have employed. Private parties and non-governmental organizations may also contact the PPL Montana representative for further information or assistance. Applications submitted without this section completed, will be held by the TAC, without any action, until the information has been submitted. Summarize below how you will complete requirements for Cultural Resource Management:

A cultural resource survey has not been completed on the property proposed for purchase. However, surveys were completed in 2009 at a larger scale on ~ 28,000 acres of surrounding lands acquired by FWP to form the Fish Creek WMA and State Park. Although no ground disturbing activities are currently proposed, a cultural resource survey would be completed by FWP at the time of acquisition.

Budget Overview

Fish Creek Inholding (Hulme-148 Acres) Budget		
		Listed for $400,000
Fish Creek-Hulme Purchase Price	$350,000	
Restricted Appraisal	$3,000	
Phase 1 Environmental Assessment	$3,000	
Title Guarantee	$1,000	
Recording & Closing Fees	$500	
Minerals Remoteness Test	$600	
Total Expenses	$358,100	
Proposed Funding Sources		
MT Fish, Wildlife and Parks-Wildlife (secured)	$232,100	
Thompson Falls Mitigation Funds (requested)	$120,000	
Westslope Trout Unlimited (requested)	$6,000	
Total Proposed Funds	$358,100	

Transaction Costs:	
Restricted Appraisal	$3,000
Phase 1 Environmental Assessment	$3,000
Title Guarantee	$1,000
Recording & Closing Fees	$500
Minerals Remoteness Test	$600
Total	$8,100


Five Valleys Land Trust
Hulme -- Fish Creek Vicinity Map
Tarkio
90
Clark Fork River
Hulme - Fish creek Property
Other Inholding on the Market
FVLT Conservation Easements
MT Fish, Wildlife & Parks
MT State Trust Lands
Stimson Lumber
Plum Creek
USFS
N
W
E
S
0
0.5
1
Miles
Projected Coordinate System: NAD_1983_State_Plane_Montana_FIPS_2500
Map Created by: Ben J. Beltrain
Created on: June 2nd, 2014


Five Valleys Land Trust
Hulme -- Fish Creek Aerial Map (147 ac)
Hulme - Fish Creek
N
W
E
S
0
50
100
Yards

West Fork Fish Creek Land Acquisition – Rehbein Property

Proposal Submitted by: Montana Fish, Wildlife & Parks – Ladd Knotek

Location of Proposed Project: Property located on lower West Fork Fish Creek, just upstream of confluence of South and West Forks (*see* attached maps).

Legal: T14N, R25W, Section 35, NW1/4, NE1/4 (320 acres)

Total Project Cost: $1,400,000
* Does not include in-kind staff costs or transaction costs for FWP
* See expanded budget sheet for itemized summary of costs

TAC Funds (Cost-Share) Requested: $40,000

West Fork Fish Creek looking downstream through Rehbein Property

I. Introduction. A brief statement of project to be implemented with pertinent background information.

Fish Creek is the most intact tributary watershed in the middle Clark Fork region and is considered this region's most valuable stronghold for bull trout and other native fish. The upper drainage is primarily comprised of public lands, most of which are roadless, proposed Wilderness managed by the U.S. Forest Service. Lower elevation tributaries and main stem tracts have traditionally been in mixed ownership, including private corporate timberlands (Plum Creek Timber Company), public lands (DNRC School Trust), and a limited number of small, private in-holdings.

In 2010, Montana Fish, Wildlife & Parks (FWP) acquired ~ 28,000 acres of the lower Fish Creek drainage from The Nature Conservancy to form the Fish Creek Wildlife Management Area (WMA) and State Park. These lands represented a portion of the Montana Legacy Project, where The Nature Conservancy purchased all available Plum Creek Timber Company (PCT) holdings within the drainage to conserve fish & wildlife values.

At the time of purchase, several small PCT tracts (in-holdings) along the main stem and forks of Fish Creek were on the open market and were not included in the FWP lands acquisition. These properties were subsequently sold to private buyers. One of these parcels, which lies on the lower West Fork of Fish Creek, is now available for purchase. This parcel contains approximately 60 acres of riparian area and more than 10,000 feet of perennial stream channel (bull trout *critical habitat*), including West Fork Fish Creek, lower Bear Creek and lower Trail Creek. The West Fork Fish represents the migratory corridor for the two major bull trout spawning and rearing areas in Fish Creek (upper North and West Forks) and the two smaller tributaries that support viable westslope cutthroat trout populations. The property currently contains no man-made structures or infrastructure, other than access roads and fencing (both of which will be removed when this property is acquired).

The property proposed for acquisition has extremely high development potential, particularly along riparian areas on both sides of the West Fork of Fish Creek. This parcel is almost completely surrounded by public lands. Land management activities on similar in-holdings within the WMA indicate that private ownership carries large risk of further subdivision, riparian and channel encroachment, illegal water withdrawal, and general habitat degradation (e.g., recently sold and developed property just downstream). Less stringent subdivision regulations in Mineral County also make incorporation of natural resource protection and mitigation measures difficult.

The project would permanently protect a significant reach of the West Fork of Fish Creek and the lower portions of two tributaries from habitat degradation. Acquisition would also facilitate enhancement activities along the stream corridor, which is *all considered bull trout critical habitat*. This stream system supports the largest fluvial bull trout population in the middle Clark Fork River drainage and typically contains more redds than the rest of the tributaries in this region combined. An intact migratory corridor, juvenile rearing habitat and connected nodal areas are vital to these bull trout and westslope cutthroat trout populations.

II. Objectives. Explicit statement(s) of what is intended to be accomplished.

Acquire key in-holding property on West Fork Fish Creek within the Fish Creek WMA in order to protect it (in perpetuity) from subdivision and development. Property would be converted to public ownership through incorporation into the WMA. Longer term objectives are to protect and improve habitat conditions for bull trout and other aquatic species using this corridor.

This application proposes purchase of 320 acres of bare ground currently owned by the Rehbein family (*see* site maps). Access roads and fencing have already been installed suggesting imminent threat of subdivision and development in an un-zoned portion of Mineral County.

III. Methods. Description of how the objectives will be accomplished.

FWP would purchase the Rehbein in-holding on the West Fork of Fish Creek and then incorporate the property into the existing Wildlife Management Area. Funds for the acquisition would be a mix of private, state and federal dollars. The landowner has verbally agreed to accept the appraised value for the property and has been sent the purchase agreement for signature. Anticipated closing for the transaction is spring of 2015.

IV. Schedule. When the project work will begin and end. Include seasonal variations in work schedule.

FWP has negotiated a purchase price and has submitted a draft purchase agreement to the landowner. Once all necessary due diligence and public review and approval are in place, the property would be purchased directly by FWP or through Five Valleys Land Trust using bridge-funding and transferred to FWP as soon as possible thereafter. In either case, the final transfer to public ownership is anticipated in 2015.

V. Personnel. Who will do the work. Identify the project leader or principal investigator.

Team of staff from FWP will complete the acquisition, including: Darlene Edge (Land Conservation Specialist), Mike Thompson (Regional Wildlife Manager), Ladd Knotek (Fisheries Management Biologist). Pelah Hoyt, Five Valleys' Lands Director, will assist with the project and transaction.

Once the land is purchased, it will be transferred to FWP for inclusion in the Fish Creek WMA. The WMA is managed by Region 2 of FWP under the direction of Mike Thompson (Regional Wildlife Manager) and Randy Arnold (Regional Supervisor).

VI. Budget. Must include amounts for the following items:

Direct Labor, Overhead, Travel and Living Materials, other Direct Expenses.
List all other funding (cost-share and partners) sources and amounts for this project

The following table shows the proposed budget for the Rehbein Acquisition:

West Fork Fish Creek Land Acquisition Phase I Budget		
Appraised Value & Proposed Purchase Price	$1,400,000	
Transaction Costs (FWP In-Kind)	0	
Total Costs	$1,400,000	
Proposed Funding Sources		
Thompson Falls TAC (requested)	$40,000	3%
MT FWP - Wildlife P-R Funding (secured)	$1,050,000	75%
Westslope Chapter Trout Unlimited (to be requested)	$10,000	1%
Other Private/Non-Federal Sources (to be requested)	$300,000	21%
Total Proposed Funds	$1,400,000	100%

Costs related to direct labor, overhead, travel, and materials will be covered separately by FWP (in-kind), and are not included in this proposal for simplification. Similarly, closing costs, appraisal fees, preparation of environmental assessment, and other transaction expenses will be absorbed by FWP.

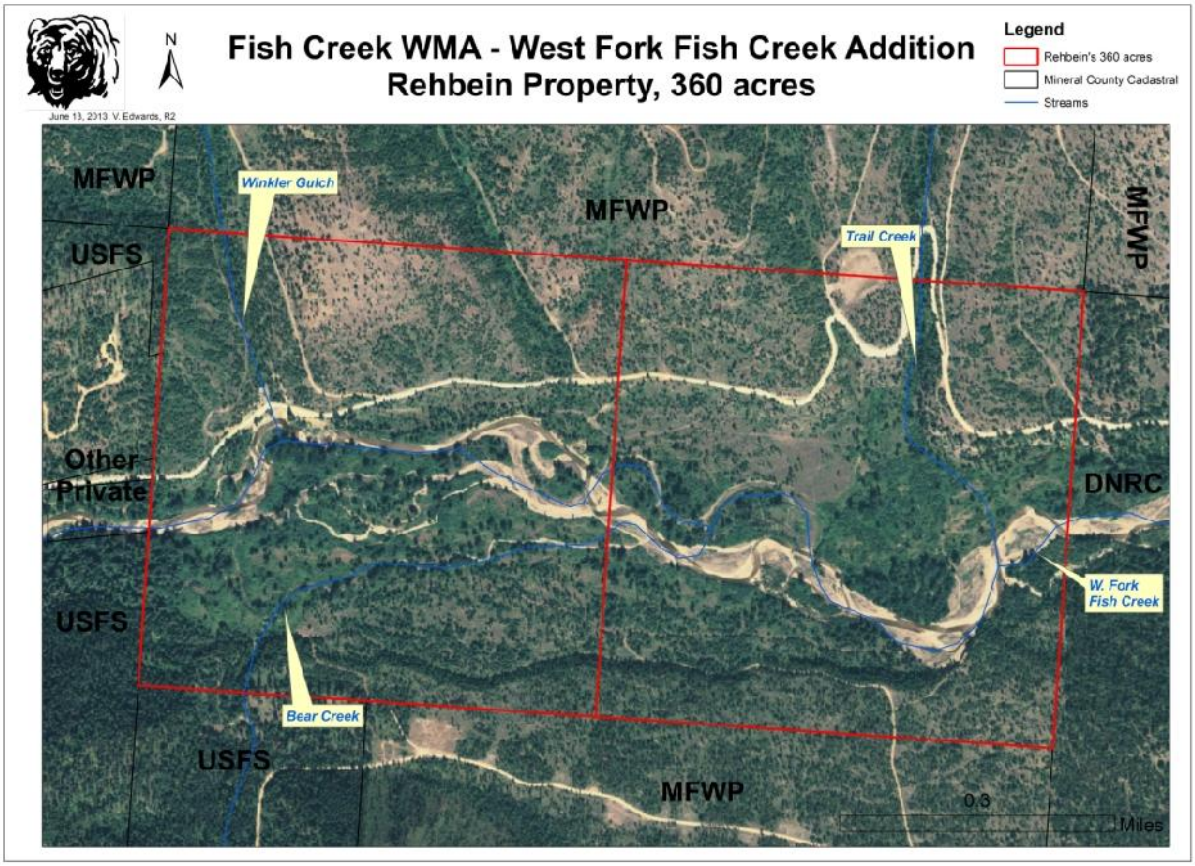
VII. Deliverables. Describe work product (reports, habitat restoration, etc.) which will result from this project. How will "success" for this project be monitored or demonstrated?

The application proposes to purchase real estate in order to protect and enhance current natural resource values. Direct success of this project would be measured by the degree of disturbance and general natural integrity of the property through time as it is enhanced and allowed to naturally recover from light forestry activity and access enhancement. Enhancements would include removal of perimeter fencing, reclamation of several interior roads, and riparian protection.

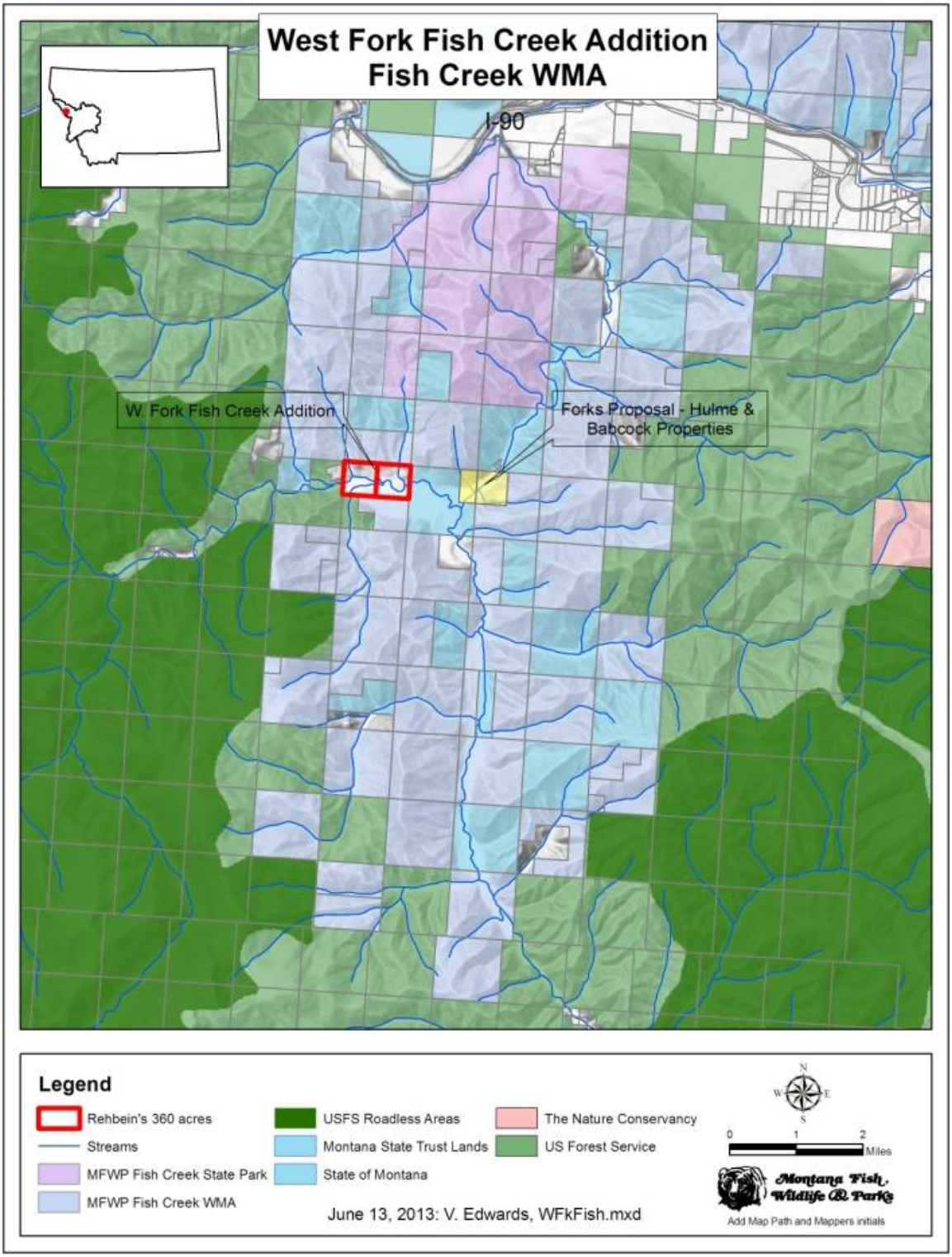
Indirect indications of success would be continued expansion and resilience of the Fish Creek bull trout population. Bull trout are monitored through established redd count surveys and population estimate sections.

VIII. Cultural Resources. Cultural Resource Management (CRM) requirements for any activity related to this proposal must be completed and documented to PPL Montana as a condition of any TAC grant. TAC funds may not be used for any land-disturbing activity, or the modification, renovation, or removal of any buildings or structures until the CRM consultation process has been completed. Agency applicants must submit a copy of the proposed project to a designated Cultural Resource Specialist for their agency. Private parties or non-governmental organizations are encouraged to submit a copy of their proposed project to a CRM consultant they may have employed. Private parties and non-governmental organizations may also contact the PPL Montana representative for further information or assistance. Applications submitted without this section completed, will be held by the TAC, without any action, until the information has been submitted. Summarize below how you will complete requirements for Cultural Resource Management:

A cultural resource survey has not been completed on the property proposed for purchase. However, surveys were completed in 2009 at a larger scale on ~ 28,000 acres of surrounding lands acquired by FWP to form the Fish Creek WMA and State Park. Although no ground disturbing activities are currently proposed, a cultural resource survey would be completed by FWP at the time of acquisition.



Air photo of proposed Rehbein acquisition along West Fork Fish Creek



Location of proposed Rehbein acquisition in lower Fish creek (highlighted in red)

Update of Bull Trout Genetic Assignment Baseline – Little Joe Creek

Proposal Submitted by: Ladd Knotek, FWP

Location of Proposed Project: USFWS Genetics Lab - Abernathy

Total Project Cost: $3,350

TAC Funds (Cost-Share) Requested: $3,000 (Lab costs only)

All proposals must include the following information:

I. Introduction. A brief statement of project to be implemented with pertinent background information.

Funds are requested to process bull trout genetic samples from Little Joe Creek to accomplish routine updates to the lower Clark Fork genetic assignment database.

II. Objectives. Explicit statement(s) of what is intended to be accomplished.

How does this project meet the intent of the Interagency Memorandum of Understanding to implement conservation measures for bull trout in and upstream of the Thompson Falls Hydroelectric Project area?

Correct genetic assignment of bull trout individuals is key to directly mitigating impacts of hydroelectric facilities on the lower Clark Fork. It is a key component in increasing spawning populations affected by the dams.

III. Methods. Description of how the objectives will be accomplished.

Representative bull trout samples that have been previously collected from spawning and rearing stream are processes in the lab and results are integrated into the existing database.

IV. Schedule. When the project work will begin and end. Include seasonal variations in work schedule.

Samples collected in 2013. Lab will process and report results in early 2015.

V. Personnel. Who will do the work. Identify the project leader or principal investigator.
Field collection of samples – Ladd Knotek, FWP
Laboratory Analysis of samples – Pat DeHaan, USFWS

VI. Budget. Must include amounts for the following items: Cost is solely for genetic analysis of fish, which includes USFWS labor, supplies and direct overhead (50 fish x $60/fish = $3,000).