PPL Montana, 45 Basin Creek Road, Butte, Montana 59701

PPLM-TFalls-3038

PPL MONTANA, LLC

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

March 28, 2013

RE: Filing 2012 Annual Activity, Fish Passage and Bull Trout Take Report for the Thompson Falls Hydroelectric Project (1869)

Dear Secretary Bose:

Attached herein, per Item D of the February 12, 2009 Commission Order, is the 2012 Annual Activity, Fish Passage and Bull Trout Take Report for the Thompson Falls Project which PPL Montana has completed in consultation with the U.S. Fish and Wildlife Service (USFWS), Montana Fish, Wildlife and Parks, and Montana Department of Environmental Quality and Confederated Salish and Kootenai Tribes. USFWS signature of approval (under their Section 7 Terms and Conditions Authority) for this report and this filing with the Commission is included on page 2.

Sincerely,

Jon Jourdonnais
Manager Hydro Regulatory and Environmental Compliance

cc: Wade Fredenberg, USFWS
Tim Bodurtha, USFWS
Craig Barfoot, CSKT
Randy Apfelbeck, MDEQ
Kenneth Breidinger, MFWP
Jim Darling, MFWP
Brent Mabbott, PPLM
Andrew Welch, PPLM
Gordon Criswell, PPLM
Dave Kinnard, PPLM
Carrie Harris, PPLM
Ginger Gillin, GEI Consultants, Inc.
Kristi Webb, Steigers Corporation
Erich Gaedeke, FERC Portland

The USFWS has reviewed, and by signature below, approves this Thompson Falls Project 2012 Annual Activity, Fish Passage and Bull Trout Take Report filing with the Commission.

Timothy A. Bodurtha
Name

Supervisor
USFWS Position

March 27, 2013
Date

2012 Annual Report
Fish Passage Project
Thompson Falls Hydroelectric Project
FERC Project Number 1869

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

Submitted by:
PPL Montana, LLC
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
Pablo, Montana

With Assistance from:
GEI Consultants, Inc.
Lake Oswego, Oregon

Steigers Corporation
Missoula, Montana

March 2013

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Executive Summary

PPL Montana, LCC is owner and operator of the Thompson Falls Hydroelectric Project (No. 1869), 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 (now PPL Montana) 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. Critical habitat was designated in 2005 and revised in 2010. PPL Montana conducted 5 years of studies and filed a Biological Evaluation with the Commission on April 7, 2008 discussing the effects of the Thompson Falls Project (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) on May 1, 2008. On November 4, 2008 the FWS filed with the Commission a Biological Opinion and an associated Incidental Take Statement, which includes reasonable and prudent measures, and Terms and Conditions 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, Terms and Conditions, and conservation recommendations from the Biological Opinion. The FERC agreed with the FWS's conclusion that the Thompson Falls Project is currently adversely affecting bull trout and PPL Montana's proposed conservation measures will reduce, but not totally eliminate, adverse impacts of the Project.

The FERC Order required PPL Montana 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 Terms and Conditions. In addition to the requirements stipulated in Term 7a, the annual report shall also address the Licensee's compliance with the FWS's Terms and Conditions.

This report is intended to fulfill the annual reporting requirement, as specified in Term 7a of the Biological Opinion and the requirements of the FERC Order. This report summarizes PPL Montana's 2012 activities (Sections 2.0 through 7.0), PPL Montana's compliance with the FWS's Terms and Conditions of the Biological Opinion (Section 8.0), and PPL Montana's proposed actions in 2012 (Section 9.0).

Baseline Fisheries Studies

In 2012, PPL Montana continued to collect baseline fisheries data as presented in Section 2.0 of this report. Baseline fisheries data includes spring electrofishing in Thompson Falls Reservoir, fall electrofishing in Thompson Falls Reservoir above the Island Complex, fall electrofishing between the towns of Paradise and Plains in the Clark Fork River, and fall gillnetting in

Thompson Falls Reservoir. For the first time, bull trout were observed during the spring electrofishing efforts in the Thompson Falls Reservoir (one bull trout in the upper section and one bull trout in the lower section) and two bull trout were observed in the Paradise to Plains reach that was electrofished in October 2012.

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

In 2011, the FERC issued two Orders, one on June 9, 2011 approving PPL Montana'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 PPL Montana'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. PPL Montana implemented the second year of studies outlined in the Fish Passage Evaluation Plan and the 2012 data are presented in Section 3.0.

In 2012, the ladder commenced operation on March 13, 2012 (first check for fish was completed on March 14) and was winterized on October 15, 2012. During ladder operations, approximately 2,688 fish (representing 9 species and one hybrid), including two bull trout, ascended the ladder. However, one of the bull trout jumped out the holding pool and died. Fish that ascended the ladder and were released upstream were marked via fin clip, Floy tag, or Passive Integrated Transponder (PIT) tag. Of the 2,688 fish that ascended the ladder, a total of 2,661 fish were released upstream into the Thompson Falls Reservoir. A total of seven fish (four largescale suckers, one northern pikeminnow, one lake trout, and one bull trout) were not released upstream, primarily due to mortality at the ladder. Additionally, one rainbow trout was identified deceased in the reservoir the day after its release upstream for a total of eight known mortalities ascending or shortly after release upstream. Lake trout and walleye were not authorized by Montana Fish, Wildlife and Parks (FWP) for release upstream if captured in the ladder. In 2012, one lake trout and no walleye were captured at the ladder. Additional details summarizing the number and size of fish and species, timing of fish ascending the ladder, recaptures, fallback, etc., are provided in Section 3.0.

Avista Bull Trout Passage and Monitoring

In 2012 Avista transported 30 bull trout from downstream of Cabinet Gorge Hydroelectric Project to Cabinet Gorge Reservoir (n = 15), Noxon Reservoir (n = 7), or upstream of the Project (n = 8). The eight bull trout transported upstream of the Project were PIT tagged but not radio tagged. One of the eight fish was released at the St. Regis boat ramp on the Clark Fork River, six fish were released in Fishtrap Creek and the last fish was released in the Thompson River.

Total Dissolved Gas

PPL Montana monitored Total Dissolved Gas (TDG) in the project area during the spring freshet of 2012. Similar to past years, TDG 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. Peak TDG levels were approximately 109 percent of saturation above the Project, 121 percent of saturation at the High Bridge, and 116 percent of saturation at the Birdland Bay Bridge. Historically, TDG increases with increasing river discharge up to about 50,000 cfs, and then levels off above that discharge. TDG levels in 2012 compared favorably with previous years, and there is no indication that the fish ladder operations are having any effect on TDG, either positive or detrimental, in the Clark Fork River. The report includes recommendations for TDG management in the project area, in Section 6.

Gas Bubble Trauma Monitoring

PPL Montana continued to monitor for gas bubble trauma (GBT) in fish sampled below the Project in 2012. Fish sampling was completed downstream of Thompson Falls Dam on May 21 and June 25, 2012. Stream flows were approximately 57,490 and 74,400 cubic feet per second (cfs) at the time of sampling, respectively. A total of 295 fish were evaluated representing 11 species. A total of three fish (one rainbow trout, one largescale sucker, and one smallmouth bass), all captured on June 25, 2012, were observed showing external symptoms of GBT during the sampling effort.

Thompson River Drainage (5-Year Reservoir Plan)

In 2010, PPL Montana developed and submitted the *5-Year Reservoir Monitoring Plan* (2011-2015) to the FERC. The FERC issued an Order on February 9, 2011 approving the plan. PPL Montana started to implement the plan in 2011.

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

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

PPL Montana has coordinated with the Thompson Falls Technical Advisory Committee (TAC), FWS, Plum Creek Timber Company (Plum Creek), Avista, and U.S. Forest Service (USFS) and reviewed available historic data, available literature, identify data gaps and develop a plan for future data collection/studies/projects in the Thompson River drainage. As a result of the data collected, PPL Montana developed a Thompson River database to assist in evaluating available information and assessing data gaps (presented in the 2011 Annual Report, *see* PPL Montana, 2012).

Following the review of the Thompson River database, PPL Montana coordinated with the TAC to develop the draft *Thompson River Bull Trout Enhancement and Recovery Plan*. The objective

of the document is to identify projects that focus on the recovery and enhancement of migratory bull trout in the Thompson River drainage. In order to evaluate opportunities to enhance migratory bull trout in the Thompson River drainage, PPL Montana completed an analysis identifying potential bull trout habitat patches and critical limiting factors. The results of this analysis will be used to:

1. Identify and prioritize potential bull trout habitat enhancement projects that focus on the recovery of bull trout
2. Identify subwatersheds that would benefit from additional studies or sampling
3. Identify subwatersheds that do not meet the criteria to support bull trout and should not be included on the priority list for further bull trout sampling or habitat improvement

Identifying potential bull trout habitat patches and critical limiting factors will assist in the process of identifying prospective projects to enhance bull trout habitat and recovery. The draft document was presented to the TAC in 2012 and was finalized in early 2013. PPL Montana will continue to coordinate with the TAC to identify and implement potential bull trout enhancement projects in the Thompson River drainage.

Bull Trout Incidental "Take"

In 2012, PPL Montana collected a total of seven bull trout, of which six individuals were released live and one bull trout died. In 2011, PPL Montana collected a total of 5 bull trout (three via electrofishing below the dam and two at the ladder), all of which were released live. A summary of bull trout collected by PPL Montana in 2012 is provided in the table below.

Date	# of Bull Trout	Length (mm)	Location	Status (Alive/Dead)	Comments
4/10/2012	1	272	EFishing Below Dam (CFR)	Alive	Released Below Dam
4/16/2012	1	222	EFishing Lower Section Thompson Reservoir (CFR)	Alive	Released at Survey Location
4/17/2012	1	260	EFishing Upper Section Thompson Reservoir (CFR)	Alive	Released at Survey Location
5/15/2012	1	510	Ladder	Alive	Initially captured electrofishing on 5/31/2011. Released Upstream of Dam
5/21/2012	1	563	Ladder	Dead	Initially captured at ladder on 4/26/2011
10/30/2012	1	472	EFishing Paradise to Plains (CFR)	Alive	Fish was implanted with a HDX PIT tag and released

Date	# of Bull Trout	Length (mm)	Location	Status (Alive/Dead)	Comments
10/30/2012	1	444	EFishing Paradise to Plains (CFR)	Alive	Fish was implanted with a HDX PIT tag and released

Of the seven bull trout collected in 2012, one bull trout was collected via electrofishing below the dam in April (*refer to* Section 3.2.4 for more details), two bull trout were collected via electrofishing in the upper and lower section of the Thompson Reservoir (*refer to* Section 2.4 for more details) in April, two bull trout ascended the ladder in May (*refer to* Section 3.2.3.2 for more details), and two bull trout were observed electrofishing between Paradise and Plains in October (*refer to* Section 2.3.2 for more details).

In 2012, a total of two bull trout ascended the ladder. One was released live upstream while one bull trout jumped out of the holding pool and was found dead. The bull trout that was found out of the holding pool was detected (via Biomark remote antennas) entering the ladder on May 16, 2012. The remote antennas did not detect this bull trout moving out of the ladder and it was not until May 21, 2012 when FWP and PPL Montana personnel checking the ladder found the bull trout dead outside of the holding pool. PPL Montana contacted Wade Fredenberg, FWS and reported the mortality. PPL Montana has since placed a fence and a cover around and over the holding pool to prevent any fish from jumping out of the pool in the future.

2012 TAC Funded Projects

In 2012, PPL Montana, through the Thompson Falls Fisheries Technical Advisory Committee (TAC), allocated funds for bull trout protection, mitigation or enhancement either in whole or in partnership to the following projects:

1. Improvement of the genetic baseline database.
2. Development of a Thompson River bull trout habitat enhancement and recovery plan that included deploying thermographs in the drainage for the 2012 summer season.
3. Habitat improvement project in Fish Creek.
4. Passive integrated transponder (PIT) tag array reader for deployment in Prospect Creek to monitor bull trout movement.
5. Genetics study to identify a bull trout sex identification marker.

1.0 Introduction

1.1 Background

PPL Montana 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 (now PPL Montana) 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 (ESA) as a threatened species (Federal Register, 1998). Critical habitat was designated in 2005 (Federal Register, 2005) and revised in 2010 (Federal Register, 2010). U.S. Fish and Wildlife Service (FWS) 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 the FWS and FERC in 2003.

After 5 years of studies, PPL Montana filed a new Biological Evaluation discussing the effects of the Project on bull trout and proposed conservation measures with the Commission on April 7, 2008. PPL Montana's 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 access to spawning habitat by the Project was identified as a major concern. Consequently, PPL Montana 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 PPL Montana, the Confederated Salish and Kootenai Tribes of the Flathead Nation (CSKT), Montana Fish, Wildlife and Parks (FWP), and FWS (MOU, 2008).[1]

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 the FWS on May 1, 2008.

On November 4, 2008 the FWS filed with the Commission a Biological Opinion 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 Biological Opinion that the Project is currently adversely affecting bull trout and PPL Montana's proposed conservation measures will reduce, but not totally eliminate, adverse impacts of the Project.

[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 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, Terms and Conditions, and conservation recommendations from the FWS Biological Opinion.

1.2 Compliance with the FERC Order

The FERC Order required PPL Montana to file with the Commission for approval, study and operational plans referenced in the FWS's TCs numbers 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, PPL Montana 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[2] of the FWS's TCs. In addition to the requirements stipulated in Term 7a the report should 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 Biological Opinion and the requirements of the FERC Order. This report summarizes PPL Montana's 2012 activities in Sections 2.0 through 7.0, PPL Montana's compliance with the FWS's TCs of the Biological Opinion (Section 8.0), and PPL Montana's proposed actions in 2012 (Section 9.0).

[2] Term 7a states, "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."

2.0 Baseline Fisheries Studies

Fisheries monitoring of the Thompson Falls Reservoir (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 are displayed in Figures 2-1 and 2-2. In 2010, PPL Montana 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, and 2012. PPL Montana proposes to continue sampling this reach of the Clark Fork River through 2014 (5 years of sampling).

The main objective for these annual sampling efforts is to establish baseline information on species composition and relative abundance within the reservoir and upstream of the 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 Reservoir from downstream.

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*
LL	Brown trout	*Salmo trutta*
LMB	Largemouth bass	*Micropterus salmoides*
LN DC	Longnose dace	*Rhinichthys cataractae*
LN SU	Longnose sucker	*Catostomus 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 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*

Figure 2-1: Baseline Fisheries Sampling Locations.

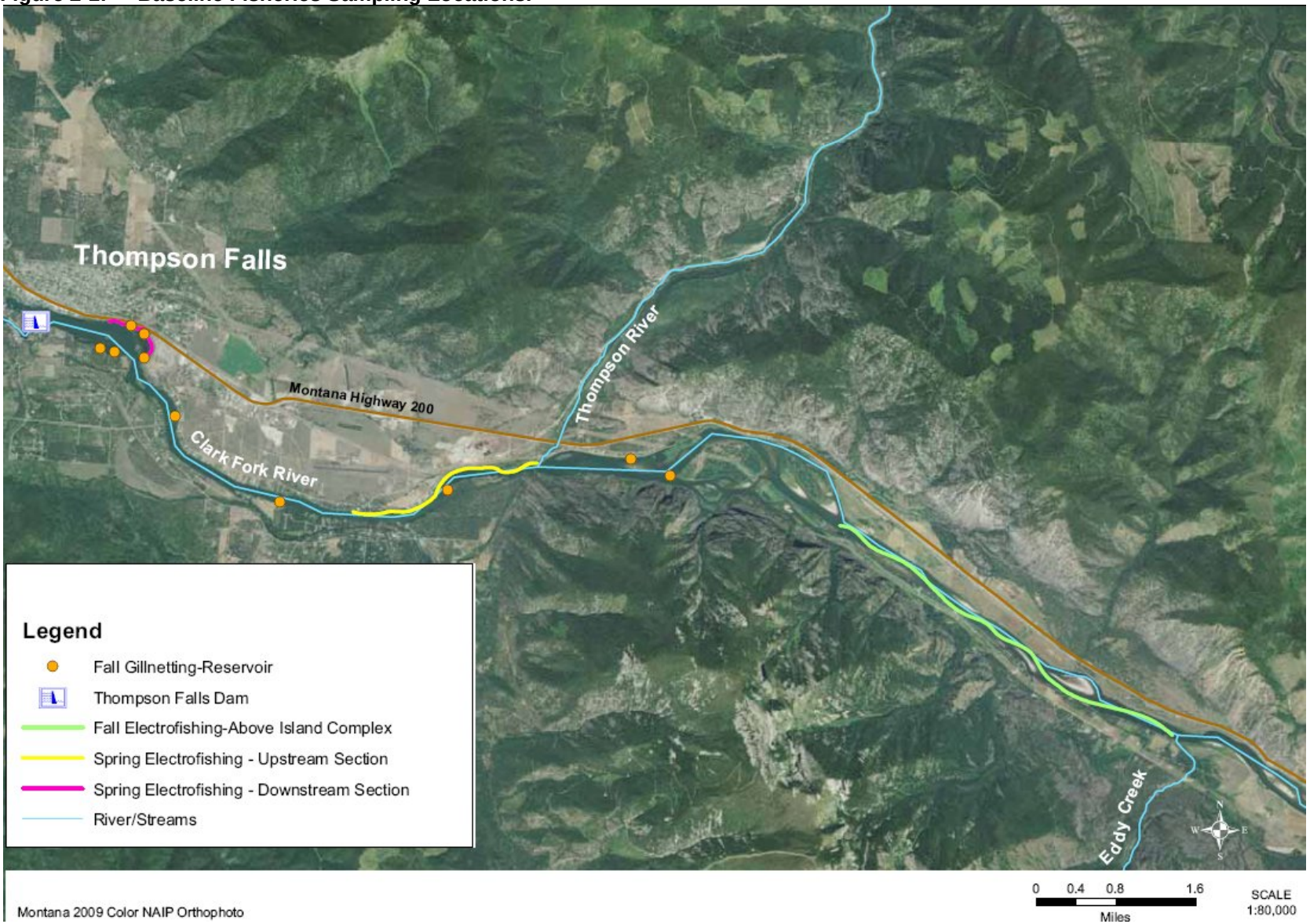
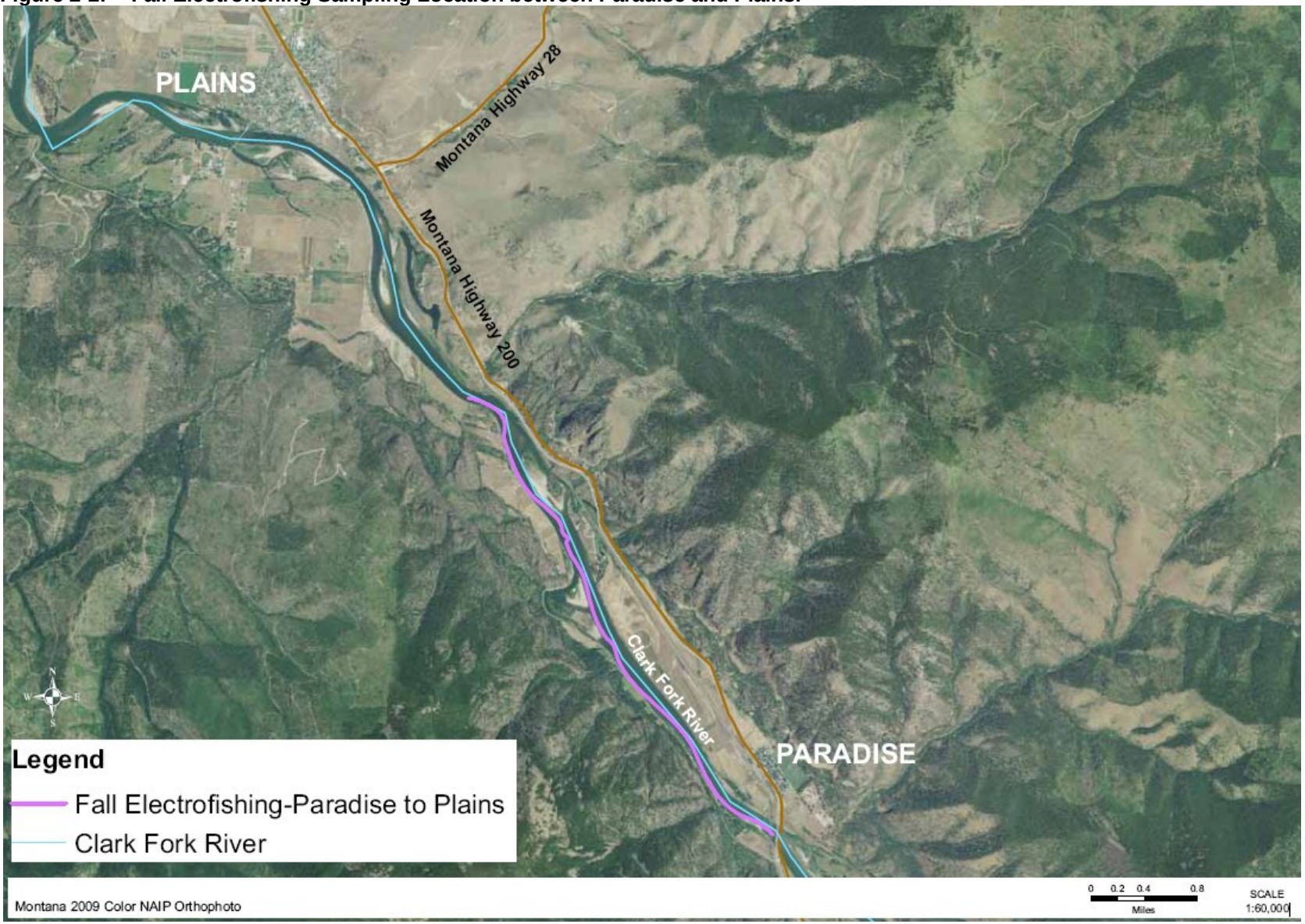


Figure 2-2: Fall Electrofishing Sampling Location between Paradise and Plains.



2.1 Fall Gillnetting

Fall gillnetting in the Reservoir has been performed in designated locations since (*see* Figure 2-1) 2004. Fall gillnetting occurs each year in October, in which 10 gillnets are set (with the exception of the 2004 sampling year where only six nets were set) (*see* Table 2-2).

Table 2-2: Summary of gillnetting dates, number of nets set, total number of fish captured, and total number of species represented during gillnetting activities in Thompson Falls Reservoir from 2004 to 2012.

Year	# Gillnets	Date set	Date pulled	Total Fish Captured	# of Species	# Black Bullhead	# of Other Species
2004	6	10/13	10/14	48	8	17	31
2005	10	10/13	10/14	79	7	34	45
2006	10	10/12	10/13	116	7	83	33
2007	10	10/11	10/12	122	9	60	62
2008	10	10/8	10/9	59	7	6	53
2009	10	10/19	10/20	55	6	0	55
2010	10	10/14	10/15	50	9	0	50
2011	10	10/5	10/6	33	9	0	33
2012	**10**	**10/12**	**10/13**	**53**	**7**	**0**	**53**

The 2012 annual fall gillnet monitoring of the Reservoir began on October 12 by setting a 125-foot-long by 6-foot-wide variable mesh net at each of the 10 established locations in the Reservoir (*see* Figure 2-1). Nets were set for approximately 21 to 22 hours and pulled on October 13. The mean catch per net has varied widely by species and between years (*see* Table 2-3, Figure 2-3). Lengths and weights were recorded for all fish captured via gillnetting in 2012 and the data are provided in Appendix A.

A total of 53 fish representing seven species were captured during the 2012 gillnetting efforts. This was similar to efforts in 2008, 2009, and 2010. There was no drawdown of the Reservoir in 2012. In 2011, the Reservoir was drawn down (up to 13 feet below full pool) in August, which may have contributed to the lower number of fish captured during the fall 2011 gillnetting efforts. Black bullheads have not been captured during gillnetting efforts since 2008. Black bullheads were the predominant fish caught between 2004 and 2008.

In 2012 northern pike was the most abundant species with 24 individuals captured. Other species captured in 2012 included largescale sucker (n=13), yellow perch (n=4), rainbow trout (n=4), northern pikeminnow (n=3), smallmouth bass (n=3), and brown trout (n=2) (*see* Figure 2-3).

Table 2-3: Mean catch per net, by species, during annual October gillnetting series on Thompson Falls Reservoir from 2004 to 2012. A dash indicates zero fish of that species was captured during that year's gillnetting sampling effort.

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

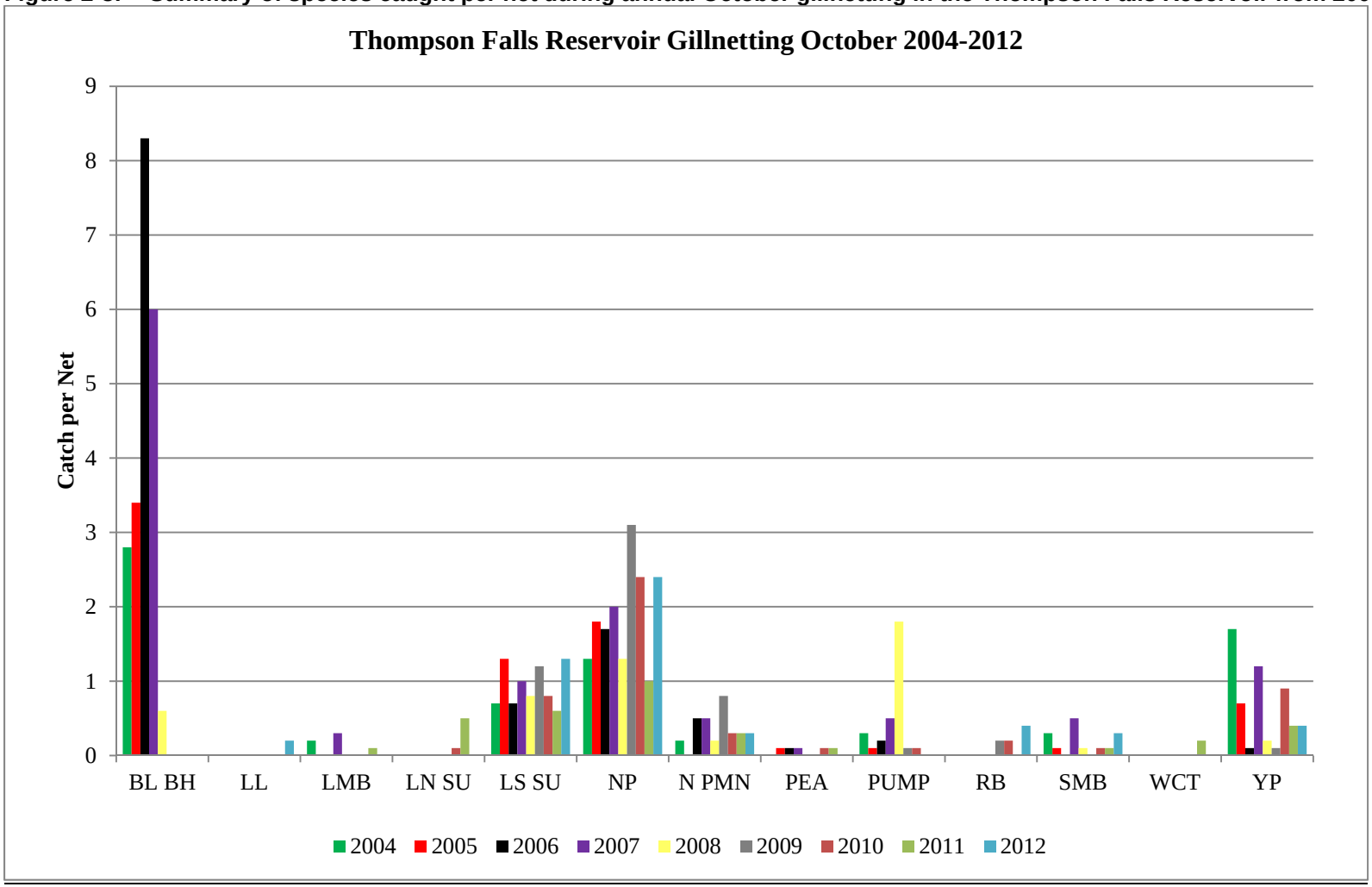
This was the first year that two salmonids (one rainbow and one brown trout) that had ascended the Thompson Falls Upstream Fish Passage Facility (ladder) were recaptured during gillnetting efforts. Both fish had been implanted with PIT tags at the ladder in 2011. The brown trout (#985121021902518) ascended the ladder on April 14, 2011 and was released upstream of the dam measuring 366 mm and weighing 424 g. This fish was recaptured 547 days later measuring 438 mm and weighing 734 g for an average growth rate of 208 g and 48 mm per year (Table 2-4). The rainbow trout (#985121021876549) ascended the ladder on September 11, 2011 measuring 451 mm and weighing 846 g. This fish was recaptured 397 days later measuring 485 mm and weighing 1,102 g for an average growth rate of 338 g and 31 mm per year (Table 2-4).

The October 2012 sampling was the first year that brown trout were collected during gillnetting. There were no black bullheads, largemouth bass, longnose suckers, peamouth, pumpkinseed, or westslope cutthroat trout collected in 2012. These species have been collected in the past. This was the second concurrent year and fourth concurrent year where pumpkinseeds and black bullheads, respectively were absent from the sample.

Table 2-4: Growth rate of fish collected in the ladder and recaptured in gillnets in Thompson Falls Reservoir.

Species	PIT Tag	Date Captured	Date Recaptured	Growth/Day	Growth/Year
LL	985121021902518	4/14/2011	10/14/2012	0.57 g/day 0.13 mm/day	208 g/yr 48 mm/yr
RB	985121021876549	9/11/2011	10/14/2012	0.93 g/day 0.08 mm/day	338 g/yr 31 mm/yr

Figure 2-3: Summary of species caught per net during annual October gillnetting in the Thompson Falls Reservoir from 2004-2012.



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2.2 Spring Electrofishing

Spring electrofishing in the Reservoir consists of two locations, including the lower section (also referred to as the "pond") located immediately upstream of Project and the upper section located immediately downstream of the confluence with the Thompson River (*see* 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 a 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 2012 sampling occurred on April 16 and 17, which was similar to the sampling dates from previous years as shown in Table 2-5.

Table 2-5: Summary of water temperatures measured in Thompson Falls Reservoir during spring electrofishing between 2007 and 2012.

Date	Temperature, Lower Section	Duration of Electrofishing (hrs)	Date	Temperature, Upper Section	Duration of Electrofishing (hrs)
April 16, 2012	7.4 ºC	0.8	April 17, 2012	7.2 ºC	1.9
April 13, 2011	5.8 ºC	1.0	April 14, 2011	5.1 ºC	1.9
April 28, 2010	9 ºC	0.9	April 29, 2010	7.5 ºC	2.0
April 20, 2009	10 ºC	0.6	April 21, 2009	10.5 ºC	0.6

Summaries of 2009, 2010, 2011, and 2012 catch per unit effort (CPUE, fish per hour) are provided in Tables 2-6 and 2-7 for the lower and upper sections, respectively. The CPUE (fish per hour), by species, for the spring electrofishing in 2009 through 2012 are displayed for the lower section and upper section in Figure 2-4 and Figure 2-5, respectively. Data for all fish collected and measurements taken in the lower and upper sections in 2012 are available in Appendix A.

2.2.1 Lower Section

In 2012, spring electrofishing in the lower section captured a total of 97 fish representing 15 species of which there were five salmonid species. The species included 23 largescale suckers, 17 northern pikeminnow, 11 yellow perch, 10 northern pike, nine brown trout, eight largemouth bass, six longnose suckers, four rainbow trout, two westslope cutthroat trout, two pumpkinseed, one black bullhead, one bull trout (222 mm and 76 g), one mountain whitefish, one peamouth, and one smallmouth bass (*see* Table 2-6). The 2012 electrofishing efforts in the lower section resulted in the highest total number of fish captured and highest number of trout, as

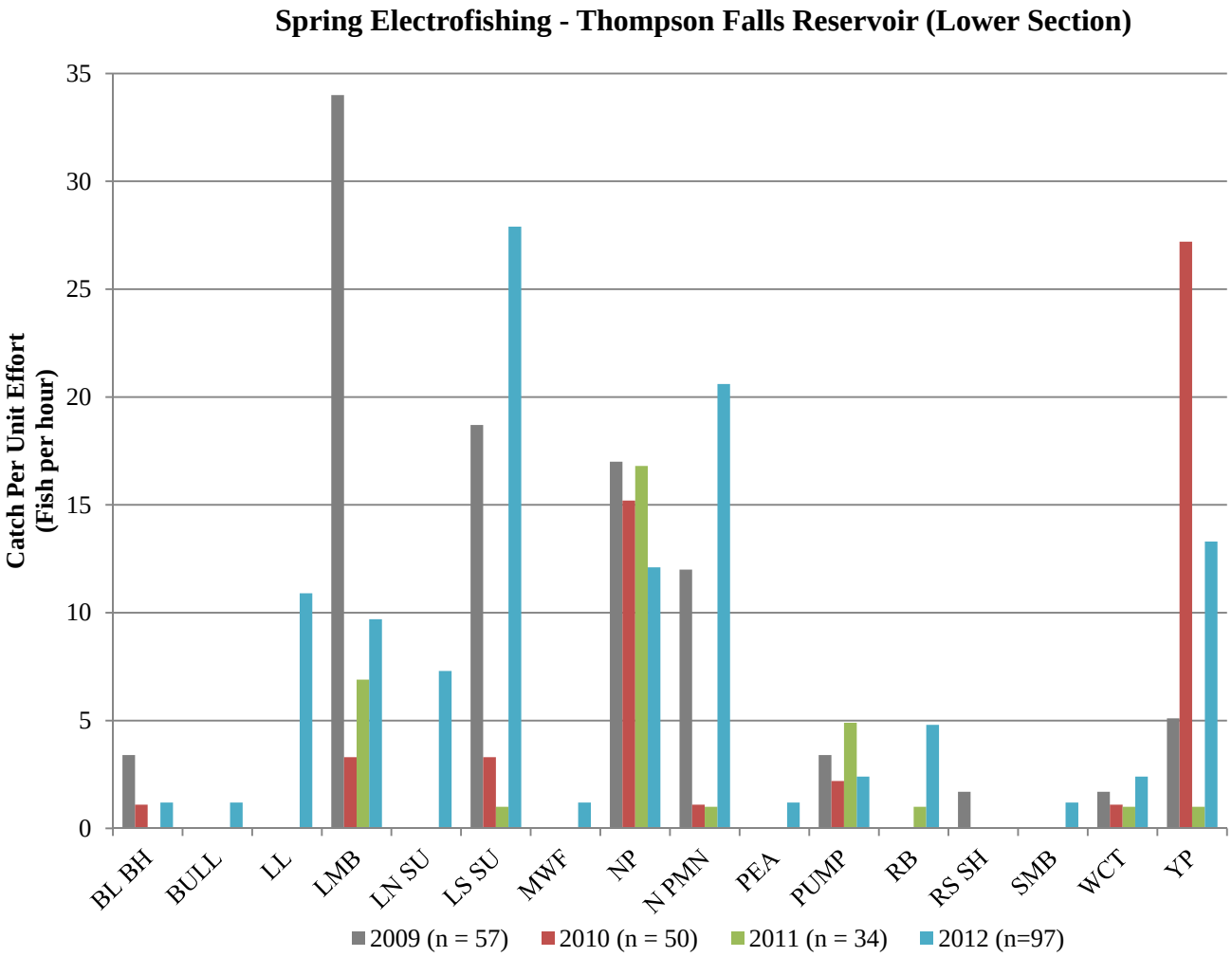
well as number of salmonid species, captured since annual surveying began in 2009. For the first time since annual spring electrofishing efforts began in 2009, bull trout, brown trout, longnose sucker, mountain whitefish, peamouth, and smallmouth bass were recorded in the lower section.

Table 2-6: Summary of 2009-2012 spring electrofishing results in the Thompson Falls Reservoir lower section, including number of species and CPUE (catch per hour).

Species	Lower Section 2009		Lower Section 2010		Lower Section 2011		Lower Section 2012	
	Number	CPUE	Number	CPUE	Number	CPUE	Number	CPUE
BL BH	2	3.4	1	1.1	0	0	1	1.2
BULL	0	0	0	0	0	0	1	1.2
LL	0	0	0	0	0	0	9	10.9
LMB	20	34.0	3	3.3	7	6.9	8	9.7
LN SU	0	0	0	0	0	0	6	7.3
LS SU	11	18.7	3	3.3	1	1.0	23	27.9
MWF	0	0	0	0	0	0	1	1.2
NP	10	17.0	14	15.2	17	16.8	10	12.1
N PMN	7	12.0	1	1.1	1	1.0	17	20.6
PEA	0	0	0	0	0	0	1	1.2
PUMP	2	3.4	2	2.2	5	4.9	2	2.4
RB	0	0	0	0	1	1.0	4	4.8
RS SH	1	1.7	0	0	0	0	0	0
SMB	0	0	0	0	0	0	1	1.2
WCT	1	1.7	1	1.1	1	1.0	2	2.4
YP	3	5.1	25	27.2	1	1.0	11	13.3
Subtotal Salmonids	1	1.7	1	1.1	2	2.0	17	20.6
TOTAL FISH	**57**	**97**	**50**	**54.5**	**34**	**33.6**	**97**	**117.4**

CPUE (fish per hour) in the lower section appeared to decline in 2012 for northern pike and black bullheads compared to previous years. The presence of pumpkinseed has remained relatively consistent since 2009. Overall, CPUE for all species combined, including salmonid species, increased in 2012 compared to previous years (*see* Figure 2-4).

Figure 2-4: Summary of CPUE (fish per hour) during electrofishing in the Clark Fork River/Thompson Falls Reservoir (lower section) in the spring 2009, 2010, 2011, 2012.



2.2.2 Upper Section

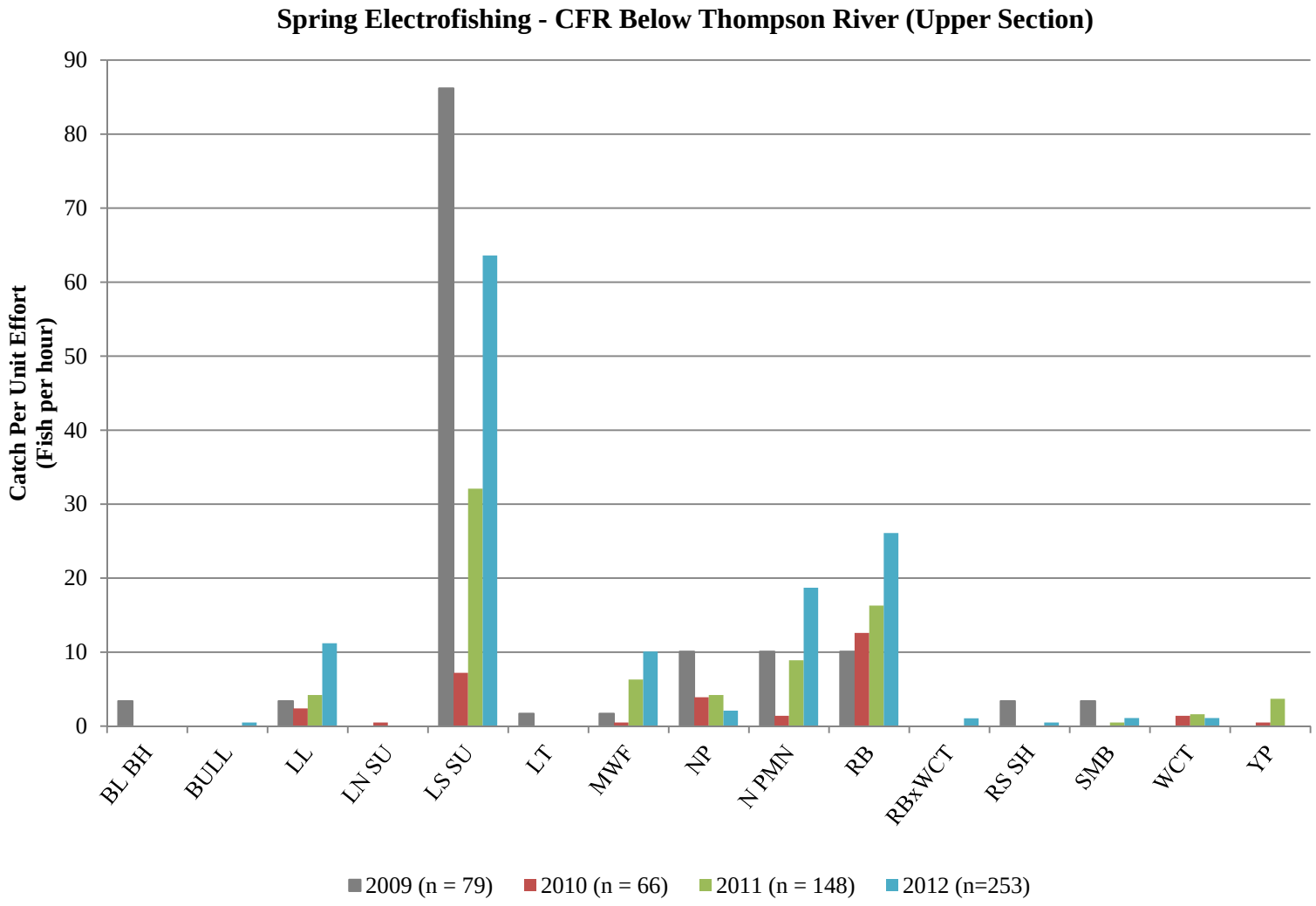
The spring 2012 sampling efforts in the upper section resulted in the highest number of total fish captured and trout captured since sampling efforts began in 2009 (Table 2-7). For the first time since annual spring electrofishing started in 2009, a bull trout was recorded. The 2012 sampling of the upper section resulted in 253 fish captured representing 10 species and one hybrid. These species included 119 largescale sucker, 47 rainbow trout (two rainbow x westslope cutthroat hybrids), 35 northern pikeminnow, 21 brown trout, 19 mountain whitefish, four northern pike, two smallmouth bass, two westslope cutthroat trout, one redside shiner, and one bull trout (260 mm and 140 g). No black bullhead, yellow perch, or lake trout was observed in 2012.

Table 2-7: Summary of 2009-2012 spring electrofishing CPUE (fish per hour) in the Clark Fork River downstream of the confluence of the Thompson River (upper section).

Species	Upper Section 2009		Upper Section 2010		Upper Section 2011		Upper Section 2012	
	Number	CPUE	Number	CPUE	Number	CPUE	Number	CPUE
BL BH	2	3.4	0	0	0	0	**0**	**0**
BULL	0	0	0	0	0	0	**1**	**0.5**
LL	2	3.4	5	2.4	8	4.2	**21**	**11.2**
LN SU	0	0	1	0.5	0	0	**0**	**0**
LC SU	51	86.2	15	7.2	61	32.1	**119**	**63.6**
LT	1	1.7	0	0	0	0	**0**	**0**
MWF	1	1.7	1	0.5	12	6.3	**19**	**10.1**
NP	6	10.1	8	3.9	8	4.2	**4**	**2.1**
N PMN	6	10.1	3	1.4	17	8.9	**35**	**18.7**
RB	6	10.1	26	12.6	31	16.3	**47**	**26.1**
Hybrid: RBxWCT	0	0	0	0	0	0	**2**	**1.1**
RS SH	2	3.4	0	0	0	0	**1**	**0.5**
SMB	2	3.4	0	0	1	0.5	**2**	**1.1**
WCT	0	0	3	1.4	3	1.6	**2**	**1.1**
YP	0	0	1	0.5	7	3.7	**0**	**0**
Subtotal Salmonids	10	16.9	35	17.0	54	28.4	92	49.1
TOTAL FISH	**79**	**133.5**	**63**	**30.4**	**148**	**77.8**	**253**	**135.1**

CPUE (fish per hour) continues to increase from 2010 to 2012 for brown trout, largescale suckers, mountain whitefish, northern pikeminnow, rainbow trout, as well as for all salmonids species and all species combined. The CPUE (fish per hour) for northern pike continued to decline since 2009 (*see* Figure 2-5). The number of salmonids collected, and the CPUE for salmonids, in this section has increased each year since 2010 sampling.

Figure 2-5: Summary of catch per unit effort (fish per hour) during electrofishing in the Clark Fork River (CFR) downstream of the confluence with the Thompson River (upper section) in the spring 2009-2012.



2.2.3 Summary

In 2012, species diversity was greater in the lower section compared to the upper section, while the number of salmonids was greater in the upper section compared to the lower section. Collectively between 2009 and 2012, there were 15 species recorded in the upper section compared to 16 species observed in the lower section. In the lower section, there were five species captured in 2012 that had not been observed during the previous years of sampling (2009-2011). The number of salmonids continued to increase from previous surveys with 17 salmonids captured in the lower section and 92 salmonids captured in the upper section. Additionally, for the first time, one bull trout was observed in each section.

2.3 Fall Electrofishing

2.3.1 Electrofishing above the Island Complex

In 2012 electrofishing efforts in the Clark Fork River were completed from the confluence with Eddy Creek downstream to the Island Complex (Figure 2-1). The fall electrofishing section (Eddy Creek to the Island Complex) is characterized as riverine habitat. The 2012 survey covered the same length of reach survey in 2011 and 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 eliminated in 2010 due to poor habitat and few captures from the downstream end of the Island Complex to the Thompson River in 2009. The duration of the electrofishing was 5.6 hours in 2009; 4.3 hours in 2010; 4.6 hours in 2011; and 4.1 hours in 2012.

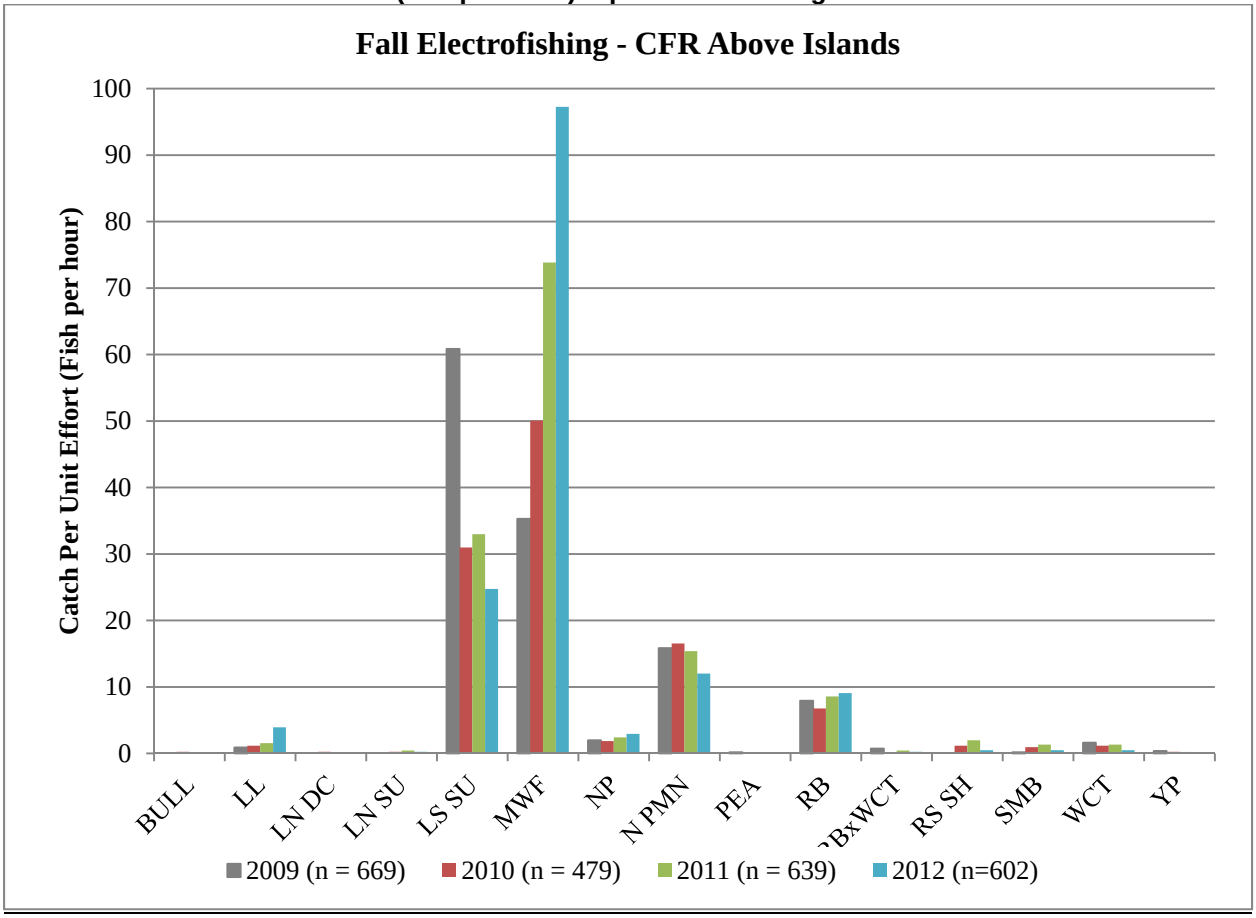
In 2012, river left was electrofished the night of October 22 and river right was electrofished the night of October 23. The CPUE (fish per hour) is provided in Table 2-8. Data collected from fish sampled during electrofishing efforts in 2012, including length and weight measurements, are provided in Appendix A. The CPUE (fish per hour) data are displayed by species for 2012, 2011, 2010, and 2009 in Figure 2-6.

The 2012 electrofishing collected 620 fish representing 11 species and one hybrid, of which four species and the hybrid were salmonids (brown trout, mountain whitefish, rainbow trout, rainbow x westslope cutthroat hybrid, and westslope cutthroat trout). The 2012 electrofishing results were very similar to last year where 639 fish were collected representing the same 11 species and hybrid. Electrofishing efforts in 2010 and 2009 captured 479 fish representing 12 species and 699 fish representing 10 species and one hybrid, respectively. Since annual fall sampling started in 2009, only one bull trout has been captured. This bull trout was captured along the river left in 2010. In all years (2009 through 2012) mountain whitefish and largescale suckers were the predominant species captured followed by northern pikeminnow and rainbow trout. While the overall CPUE for all species has not shown a significant trend over the 4 years of sampling, the CPUE for salmonids has been increasing each year, due to increases in mountain whitefish.

Table 2-8: Fall electrofishing CPUE (fish per hour) in the Clark Fork River Above the Island Complex 2009-2012. CPUE represents river right and river left combined.

Species	2009	2009	2010	2010	2011	2011	2012	2012
	Number	CPUE	Number	CPUE	Number	CPUE	Number	CPUE
BULL	0	0	1	0.2	0	0.0	0	0.0
LL	5	0.9	5	1.2	7	1.5	16	3.9
LN DC	0	0.0	1	0.2	0	0.0	0	0.0
LN SU	0	0.0	1	0.2	2	0.4	1	0.2
LS SU	338	60.8	133	31.0	150	33.0	101	24.7
MWF	196	35.3	215	50.1	336	73.8	397	97.3
NP	11	2.0	8	1.9	11	2.4	12	2.9
N PMN	88	15.8	71	16.5	70	15.4	49	12.0
PEA	1	0.2	0	0.0	0	0.0	0	0.0
RB	44	7.9	29	6.8	39	8.6	37	9.1
RBxWCT	4	0.7	0	0.0	2	0.4	1	0.2
RS SH	0	0.0	5	1.2	9	2.0	2	0.5
SMB	1	0.2	4	0.9	6	1.3	2	0.5
WCT	9	1.6	5	1.2	6	1.3	2	0.5
YP	2	0.4	1	0.2	1	0.2	0	0.0
Subtotal Salmonids	258	46.4	255	59.4	390	85.7	453	111.0
TOTAL FISH	**699**	**125.8**	**479**	**111.6**	**639**	**140.4**	**620**	**151.9**

Figure 2-6: Summary of fall electrofishing in the Clark Fork River Above the Island Complex 2009-2012. CPUE (fish per hour) represents river right and river left combined.



2.3.2 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 and 2012. Electrofishing began at the town of Paradise (at the Pair-a-Dice river access site), approximately 1.5 miles downstream of the Clark Fork/Flathead River confluence, and ended at the 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 (3.7 hours in 2010, 3.5 hours in 2011, and 3.9 hours in 2012). The right and left banks were electrofished the night of October 30, 2012 (Table 2-9). Measurements for each fish captured during the 2012 fall electrofishing are provided in Appendix A.

In 2012, a total of 1,192 fish representing 12 species and one hybrid, including five species and one hybrid of salmonids, were captured during the fall sampling effort. The five salmonid species and hybrid included bull trout, rainbow trout, westslope cutthroat trout, brown trout, mountain whitefish, and rainbow x westslope cutthroat hybrids (Table 2-9). In 2011, a total of

1,088 fish representing 12 species and one hybrid, including four species and one hybrid of salmonids were electrofished. In 2010, a total of 421 fish representing nine species, including the same four species of salmonids were captured in 2010 (Table 2-9). Peamouth, longnose sucker, northern pike, and rainbow x westslope cutthroat hybrid were observed in 2012 and in 2011 but not in 2010.

Table 2-9: Summary of CPUE (fish per hour) during 2010, 2011, and 2012 fall electrofishing in the Clark Fork River, including river left and river right, from Paradise to Plains.

Species	2010		2011		2012	
	Number	CPUE	Number	CPUE	Number	CPUE
BULL	0	-	0	-	2	0.5
LL	10	2.7	21	6.1	25	6.4
LN SU	0	-	1	0.3	1	0.3
LC SU	94	25.6	306	88.4	523	134.6
MWF	85	23.1	274	79.2	265	68.2
NP	0	-	2	0.6	1	0.3
N PMN	166	45.1	251	72.5	266	68.5
PEA	0	-	1	0.3	5	1.3
RB	43	11.7	151	43.6	53	13.6
RBxWCT	0	-	2	0.6	3	0.8
RS SH	3	0.8	42	12.1	29	7.5
SMB	2	0.5	7	2.0	1	0.3
WCT	17	4.6	24	6.9	1	4.6
YP	1	0.3	6	1.7	0	-
Subtotal Salmonids	155	42.1	472	136.4	366	94.2
TOTAL FISH	**421**	**114.4**	**1,088**	**314.4**	**1,192**	**306.8**

This was the first year bull trout (n=2) were captured since fall surveys began in 2010. One bull trout was captured along the right bank, measuring 444 mm and 678 g. A half-duplex (HDX) PIT tag was implanted (#982000357016066) into this bull trout prior to its release. The second bull trout was captured along the left bank, measuring 472 mm and 800 g. A HDX PIT tag was also implanted (#982000357016135) in this bull trout prior to its release. Both bull trout were released alive. Genetic samples were also taken from each bull trout, the results are presented in Section 3.2.10.

This was also the first year that a fish, one rainbow trout, released upstream of Thompson Falls Dam (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 miles upstream during the electrofishing survey on October 30, 2012. The rainbow trout measured 450 mm and 772 g on August 26 and 467 mm and 888 g on October 30.

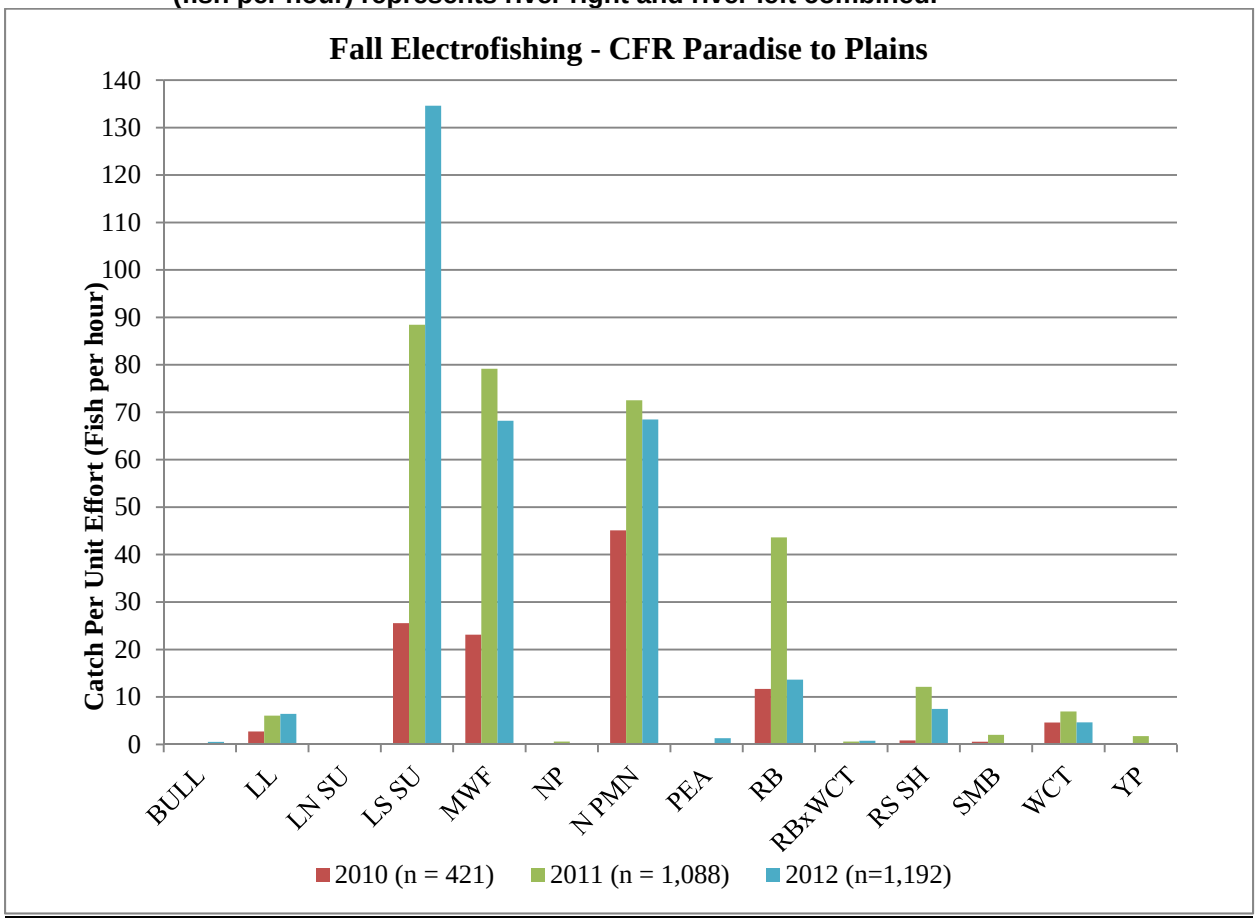
In 2012, the predominant species captured was largescale sucker (n=523) followed by northern pikeminnow (n=266), mountain whitefish (n=265), rainbow trout (n=53), redside shiner (n=29) and brown trout (n=25). There were substantially more largescale suckers captured in 2012 than

the previous 2 years. The number (and catch per hour) of rainbow trout in 2012 declined to levels observed in 2010.

The CPUE (fish per hour), by species for the fall electrofishing in 2010, 2011, and 2012 (right and left bank combined) are displayed in Figure 2-7. CPUE (fish per hour) show a dramatic increase from 2010 to 2012 for largescale suckers. CPUE (fish per hour) for rainbow trout declined from 2011 to similar values observed in 2010. No yellow perch was observed in 2012.

PPL Montana recommended surveys of the Paradise to Plains reach in the Clark Fork River be conducted every other year. The next survey is scheduled for 2014. The FWP and TAC indicated support for this recommendation.

Figure 2-7: Thompson River fall electrofishing between Paradise and Plains in 2010-2012. CPUE (fish per hour) represents river right and river left combined.



3.0 Upstream Fish Passage

3.1 2012 Upstream Fish Passage Facility Evaluation

The FERC issued an Order on June 9, 2011 approving PPL Montana's 10-year *Fish Passage Facility Evaluation Plan Phase 2 Action Plan* (2011-2020) (Fish Passage Evaluation Plan). The upstream fish passage facility became operational in 2011 and has operated for two full seasons (2011 and 2012). PPL Montana has now implemented the first 2 years of studies outlined in the Fish Passage Evaluation Plan.

3.2 Effectiveness of Fish Passage

The following sections summarize the results from the first year of ladder operations. The data were collected to evaluate the effectiveness of the ladder. In 2012 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 (dam)
- Number of fish which fallback after passing the dam
- Most active period(s) for fish and various species ascending the ladder
- Time it took for fish to ascend the ladder
- Results from the weir mode (notch vs. orifice) study and attraction flow studies
- Bull trout genetic sampling and tributary assignment

3.2.1 2012 Ladder Operations

For the second year of operation, the ladder was opened on March 13, 2012 and closed for the year (winterized) on October 15, 2012. During the 2012 season, the holding pool at the top of the ladder was typically checked once a day (morning) for fish. The frequency of checks varied slightly from once a day to multiple times a day depending on fish activity and water temperature. Below is a table summarizing periods of time the ladder was in operation (*see* Table 3-1). In 2011, the ladder was in operation for 132 days between March 17 and October 17 and the ladder was checked 160 times. Details of the 2011 operations are provided in the 2011 Annual Report (PPL Montana, 2012).

Table 3-1: Summary of when the Thompson Falls Upstream Fish Ladder Facility was in operation and the number of days the ladder was checked for fish in 2012.

Date Open	Date Closed	# of Days Ladder In Operation	# Times the Ladder Checked for Fish
March 13, 2012	April 28, 2012	46	37
May 7, 2012	June 19, 2012	43	35
July 2, 2012	October 15, 2012	105	96
Total		**194**	**168**

The ladder was closed twice in 2012 for a period of 9 to 13 days due to high spring flows. The first closure occurred between April 28 and May 7, 2012 (9 days) as a result of a large accumulation of sediment and debris in the ladder interfering with operations. During the closure, the debris and sediment were cleared out to allow for operations to safely resume. A second closure occurred between June 19 and July 2, 2012 (13 days) when increasing streamflows prevented safe and practical operation of the ladder.

After the 2011 season, PPL Montana proposed to operate the ladder when streamflows were equal or less than 50,000 cfs. Although ladder operations were not practicable during the initial spring freshet (end of April 2012) when streamflows exceeded 70,000 cfs, ladder operations were able to continue when streamflows exceeded 60,000 cfs. However, few fish were ascending the ladder during this time period.

3.2.2 2012 Clark Fork River Conditions

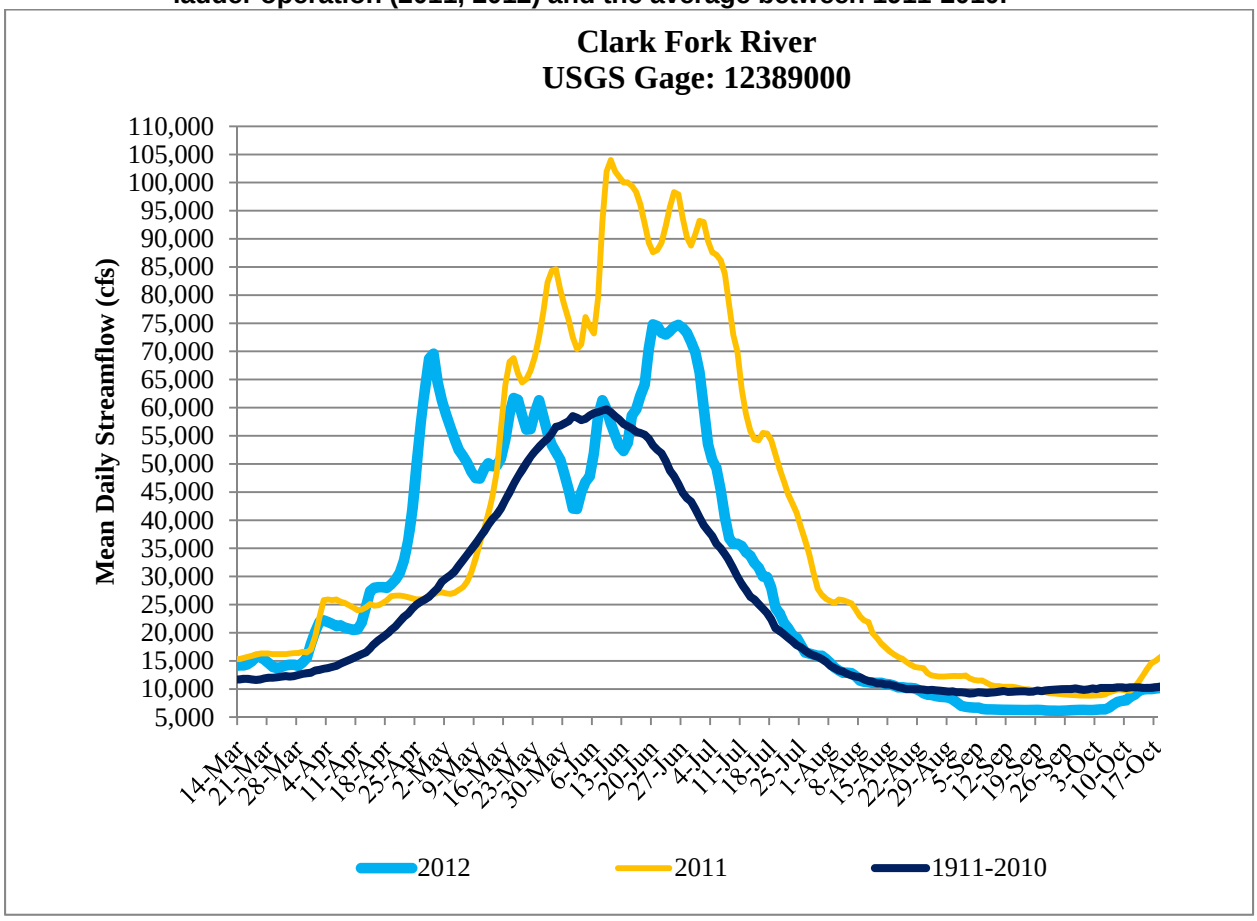
The hydrograph for 2012 show a bimodal peak, based on the data collected by the USGS gage (#12390000) near Plains, Montana (Figure 3-1). USGS records indicate that on April 28 and 29, streamflows at Plains reached 68,700 cfs and 69,600 cfs, respectively. PPL Montana maintains streamflow records at the Project. Their data indicate that streamflow at the Project on those dates were 81,978 and 82,695 cfs, respectively. (Streamflows at the Project are typically higher than are recorded at the USGS gage in Plains because the Project site is downstream of several tributaries which increase the Clark Fork River flow downstream of Plains.) The second peak was observed between June 20 and June 27, with flows around 73,000 - 74,800 as measured by the USGS at Plains, (80,500 – 85,976 cfs as measured by PPL Montana at the Project).

In 2011, the peak streamflow was recorded by the USGS at Plains was 104,000 cfs on June 10, 2011. This is the highest peak streamflow in the Clark Fork River since the Thompson Falls Fish Passage Project began in 2002.

Peak flows measured between 1911 and 2010 occur as early as May 11 and as late as July 2. Historically, the majority of peak streamflows occurred between late May and late June. The long term average peak streamflow in the Clark Fork River at Plains is about 60,000 cfs (Figure 3-1).

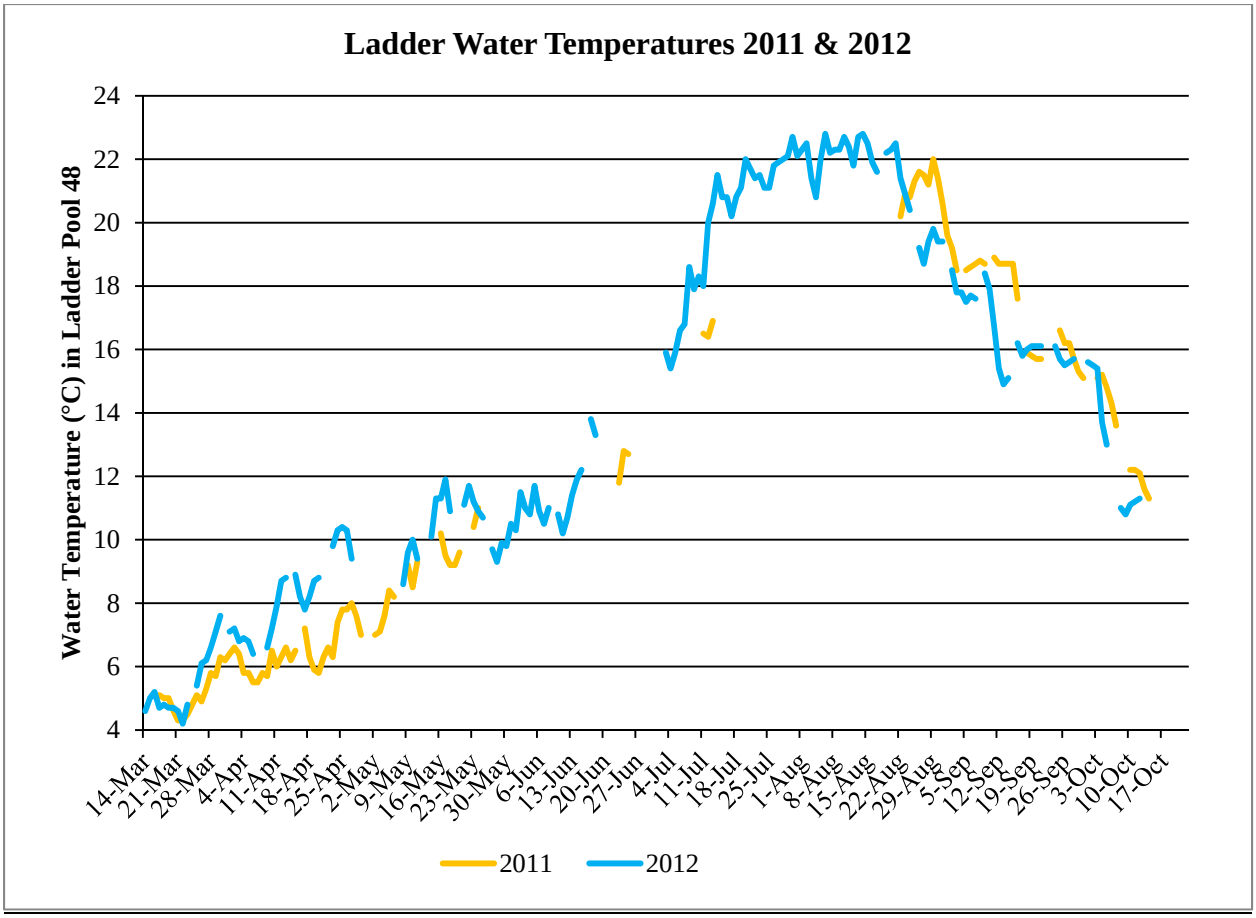
High spring flows began earlier in 2012 than in 2011 and spring flows were sustained for a longer duration in 2012 (April 25 through July 4) than in 2011. The declining limb of the hydrograph occurred later in 2011 than in 2012 and overall summer flows were greater in 2011 than in 2012. September 2012 streamflows were low compared to the 100-year average, likely related to the lack of precipitation in August and September.

Figure 3-1: Hydrograph for the Clark Fork River near Plains, Montana from USGS gage 12389000. Hydrographs represent daily mean streamflows for the first 2 years of ladder operation (2011, 2012) and the average between 1911-2010.



In 2012, there was a technical issue with the continuous recording thermographs and only temperature readings taken during each ladder check were available. Figure 3-2 depicts water temperatures taken during each ladder check in 2011 and 2012. Overall, water temperatures in 2012 provided a similar seasonal trend as observed in 2011 (*see* Figure 3-2).

Figure 3-2: Water temperature measurements taken in Pool 48 (fish ladder) in 2011 and 2012. Data from 2011 and 2012 represent a single measurement coinciding with each ladder check.



3.2.3 Summary of Fish and Species

During the second year of ladder operations, approximately 2,668 fish representing nine species and one hybrid, including two bull trout ascended the ladder. A summary of fish that ascended the ladder in 2011 and in 2012 is provided in Table 3-2. As in 2011, the FWP authorized the release of all species upstream into the Thompson Falls Reservoir with the exception of lake trout and walleye. Most fish that ascended the ladder and released upstream were measured for total length and weight, as well as marked via fin clip and implanted with a passive integrated transponder (PIT) tag or Floy tag.

Table 3-2: Summary of the number of fish and species observed at the fish ladder and recaptured at the fish ladder in 2011 and 2012. The recaptures include fish that were initially tagged downstream of the dam and do not indicate fallback.

Species	2011		2012	
	Total Number (# Mortalities)	Previously Marked Fish Recaptured at the Ladder	Total Number (# Mortalities)	Previously Marked Fish Recaptured at the Ladder
BULL	2	0	2 (1)	2
RB	164 (2)	22	208 (1)	17
RBxWCT	9	0	7	0
WCT	21	1	21	1
LL	28	0	42	1
MWF	17	0	24	1
LN SU	10 (2)	0	0	0
LS SU	418 (1)	4	1,403 (4)	15
N PMN	1,000 (73)	1	926 (1)	1
SMB	135 (4)	2	34	2
LT	1 (1)	0	1 (1)	0
Total	**1,805 (83)**	**30**	**2,668 (8)**	**40**
Total Passed Upstream	**1,722**		**2,660**	

Within 24 hours of opening the ladder for the 2012 season, the first fish, a rainbow trout, ascended on March 14. There were a total of 40 fish recaptured at the ladder. These fish had either been initially tagged or fin clipped at the ladder or during electrofishing efforts downstream of dam in 2011 and/or 2012. Of the 40 recaptured fish, 32 had been implanted with a PIT or Floy tags. The other recaptured fish were identified through a fin clip/punch. Because the fin clip/punch does not provide a unique identification, it is unknown as to whether the fish were returning to the ladder or had been marked during electrofishing efforts downstream.

Of the 2,668 fish that ascended the ladder, all but eight were released upstream into the Thompson Falls Reservoir. These eight fish were recorded as mortalities and included one bull trout, one rainbow trout, four largescale suckers, one northern pikeminnow, and one lake trout. The mortality rate in 2012 (less than a half percent) was significantly lower than in 2011 (4.6 percent). Mortalities that occurred in 2011 were primarily attributed to mechanical issues at the ladder that were subsequently corrected.

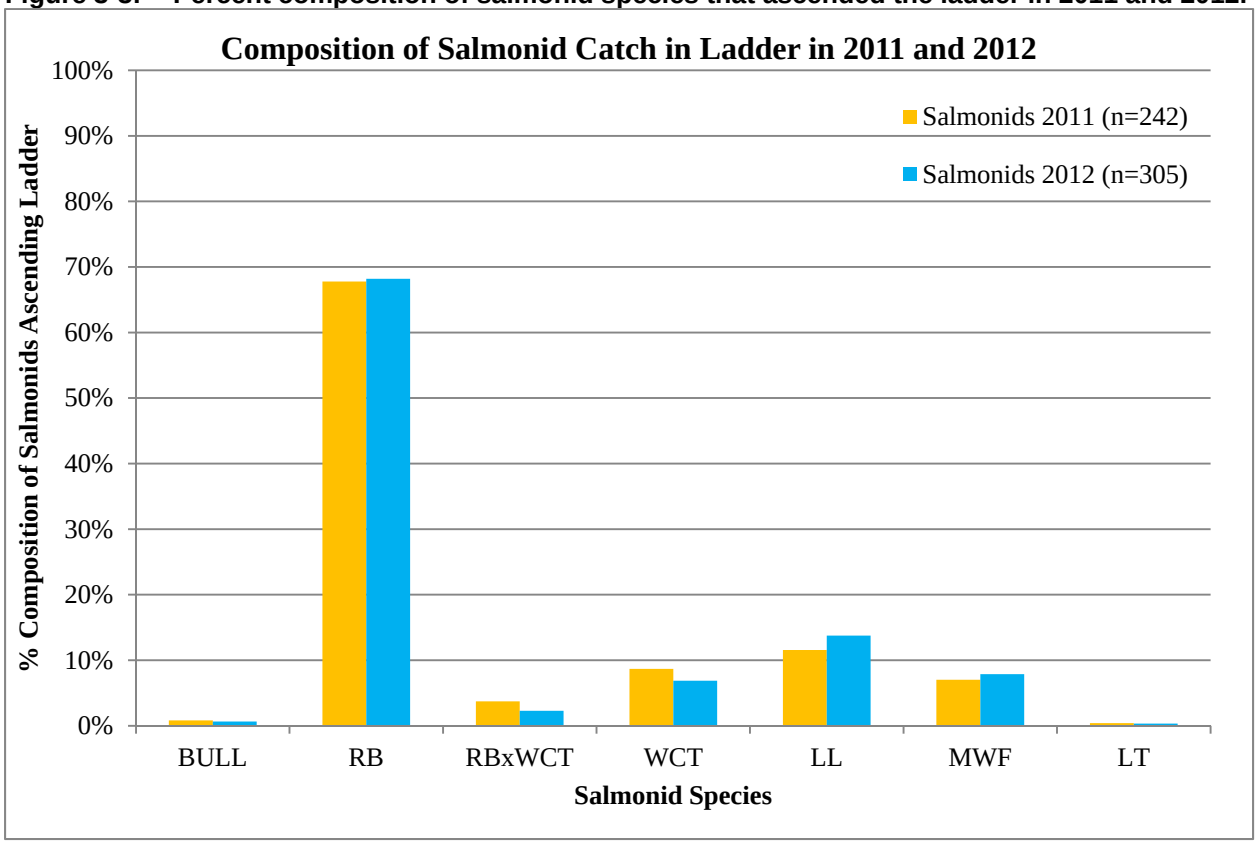
3.2.3.1 Species Composition

There were more fish that ascended the ladder in 2012 (n=2,668) compared to 2011 (n=1,805). However, there were also more operational days in 2012 (194 days) compared to 2011 (132 days), which likely explains the increased number of total fish during the season. Although

there were nearly 60 additional operational days in 2012 compared to 2011, the overall percentage of salmonids (13% in 2011; 11% in 2012) compared to non-salmonids (87% in 2011; 89% in 2012) that ascended the ladder in both years remained similar.

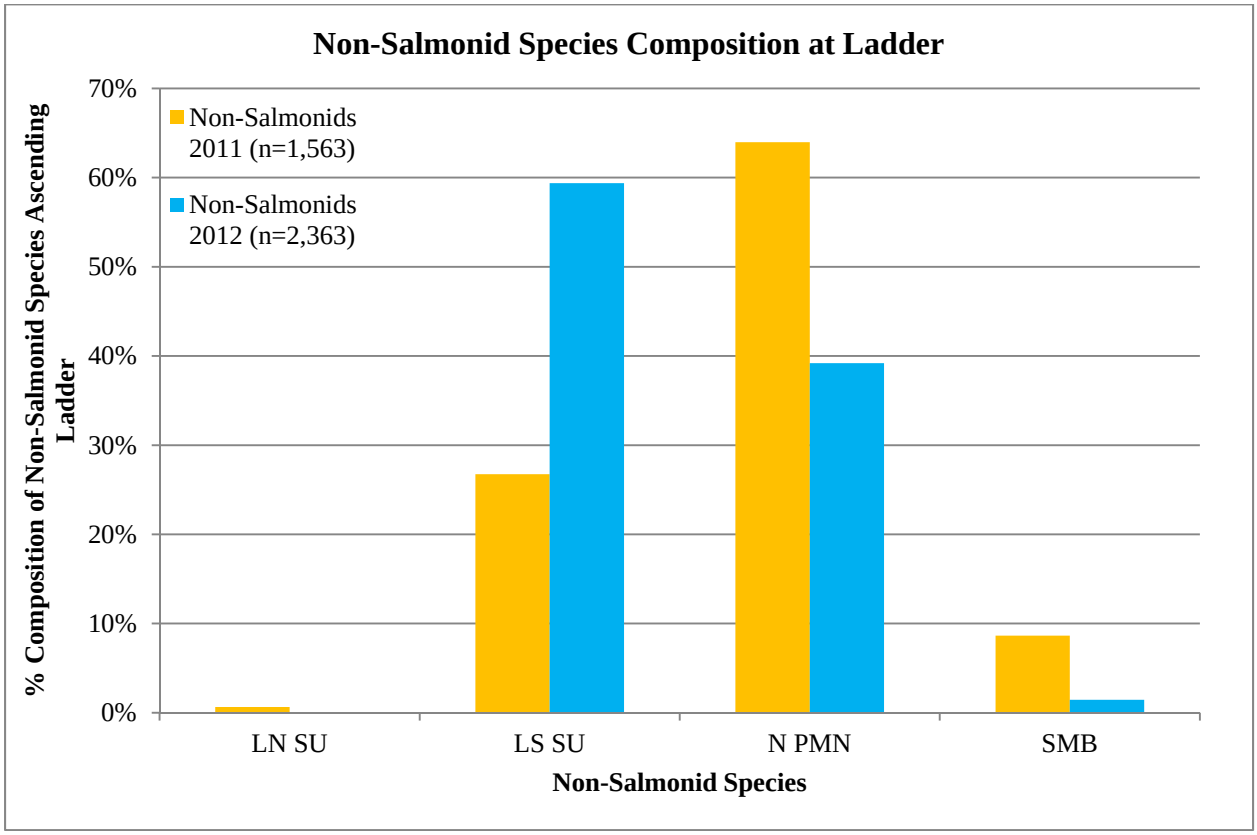
The overall composition of salmonid species remained similar between years (*see* Figure 3-3). Rainbow trout was the dominant salmonid species (68%) in both years. Brown trout, mountain whitefish, and westslope cutthroat trout represented between 7 and 14 percent of salmonids in both years, while the rainbow x westslope hybrid only represented between 2 and 4 percent of salmonids. Bull trout were the least common salmonid species, comprising of only 1 percent of salmonids each year.

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



In 2012, there was a notable shift in percent composition of non-salmonids (*see* Figure 3-4). In 2011, northern pikeminnow was the dominant species (and non-salmonid) followed by largescale suckers. In 2012, this dominance switched and the largescale sucker was the dominant species (and non-salmonid) followed by northern pikeminnow. There were also fewer smallmouth bass (34 fish in 2012 compared to 135 fish in 2011) that ascended the ladder, thus the percent composition in declined in 2012. Additionally, there were no longnose suckers identified at the ladder in 2012. Because 97 percent of the suckers (all identified as largescale suckers) ascended the ladder in large quantities during a 2-week period in July, it is possible that one or more longnose sucker was mistakenly identified as a largescale sucker.

Figure 3-4: Percent composition of non-salmonid species that ascended the ladder in 2011 and 2012.



3.2.3.2 Bull Trout Ascending the Ladder

The two bull trout recorded at the ladder ascended the ladder in May 2012. The first bull trout (510 mm and 1,172 g) ascended the ladder on May 15, 2012 when the ladder was in orifice mode, water temperature was approximately 11.3 ºC, and streamflows were approximately 51,000 cfs (USGS gage near Plains). This bull trout had been previously captured during electrofishing efforts below the dam in the previous year on May 31, 2011. In 2011, a full-duplex (FDX) PIT tag was implanted (#985121021877906) and a genetics sample was taken for analysis. The genetic results indicate this bull trout most likely originated from Region 4 Meadow Creek (tributary to the Bitterroot River). In 2011, this bull trout measured 482 mm and weighed 966 g. Over the course of approximately 1 year, the bull trout increased in length by 28 mm and 206 g. In 2012, when the bull trout was recorded at the ladder a second tag, HDX PIT tag, was implanted (#982000357016269). In 2012, this bull trout was released live and has two PIT tags and an adipose fin clip.

The second individual bull trout ascended the ladder between May 16 and May 21, 2012. During this period, streamflows were increasing and ranged between 54,300 and 61,700 cfs (USGS gage near Plains) and water temperature remained around 11 ºC. This bull trout had previously ascended the ladder in 2011 where it had received a PIT tag (#985121023464730). On May 16, 2012, the bull trout was detected entering the ladder via the remote antennas, but never detected

leaving. On May 21, 2012, this bull trout was discovered outside of the holding pool (top pool of the ladder). The fish had jumped out of the holding pool (estimated clearance out of pool was more than 4 vertical feet) and died. As a result, PPL Montana installed a 4-foot fence along both sides of the holding pool as well as a cover to prevent fish from jumping out of the holding pool. Over the course of approximately 1 year (April 26, 2011 to May 16-21, 2012), this bull trout remained approximately the same size. The 2011 measurements were 563 mm and 1,404 g and the approximate 2012 measurements (post-mortem) were 547 mm and 1,438 g.

3.2.3.3 Fish Length and Weight

A summary of the length and weight measurements collected in 2012 are provided in Table 3-3. The longest fish to ascend the ladder was a lake trout, which was not released upstream, measuring 620 mm long and weighing 2,098 g. The heaviest fish (and second longest) to ascend the ladder was a brown trout measuring 615 mm long and weighing 2,164 g. The brown trout ascended the ladder on September 16 during notch weir mode. The smallest fish to ascend the ladder was a rainbow trout measuring 197 mm long and weighing 70 g. This rainbow trout ascended the ladder on July 27, 2012 during orifice weir mode when streamflows were approximately 16,023 cfs (as measured by PPL Montana at the Project) and water temperature was near 22 ºC in the ladder.

Table 3-3: Summary of the average and range of lengths (mm) and weights (g) for all species measured (n= represents number measured) at the fish ladder in 2012.

Fish Species	Sample (n) for Length	Avg. Length (mm) (range)	Sample (n) for Weight	Avg. Weight (g) (range)
BULL	2	510 and 563	2	1,172 and 1,404
RB	208	355 (197-542)	207	493 (70-1,588)
RBxWCT	7	378 (297-451)	7	546 (244-840)
WCT	21	348 (224-421)	20	459 (102-800)
LL	42	395 (222-615)	42	668 (94-2,164)
MWF	24	325 (288-398)	24	323 (200-588)
LN SU	0		0	
LS SU	320	424 (247-567)	320	743 (310-1,722)
N PMN	210	372 (211-563)	210	481 (76-1,492)
SMB	34	284 (422-215)	34	338 (132-1,272)
LT	1	620	1	2,098
TOTAL	**869**		**867**	

A comparison of the average length and weight of fish that ascended the ladder (excluding the lake trout) in 2011 and 2012 are presented in Figures 3-5 and 3-6. The average size (length and weight) of all species was similar between years.

Figure 3-5: Average length with the standard deviation for each species (excluding lake trout) recorded at the ladder in 2011 and 2012.

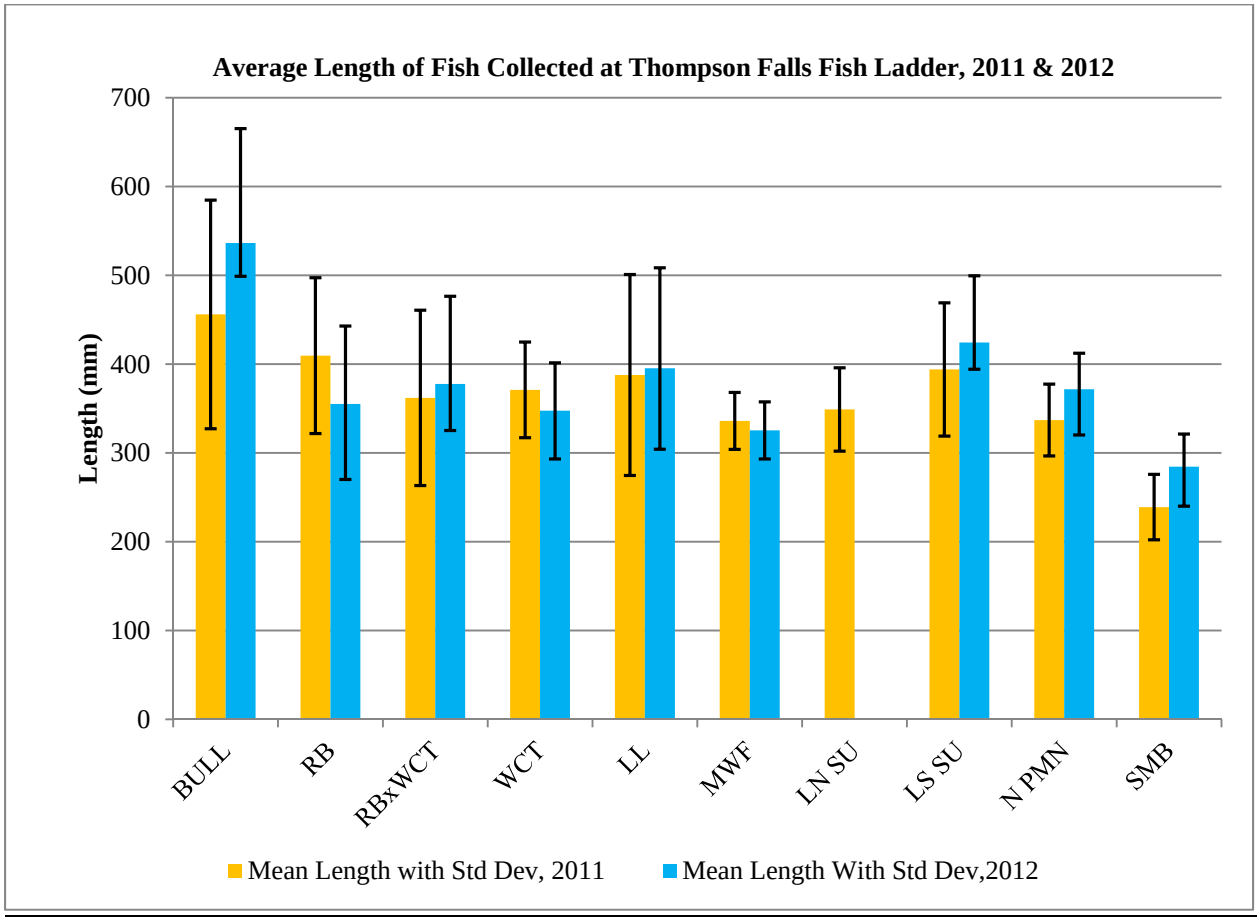
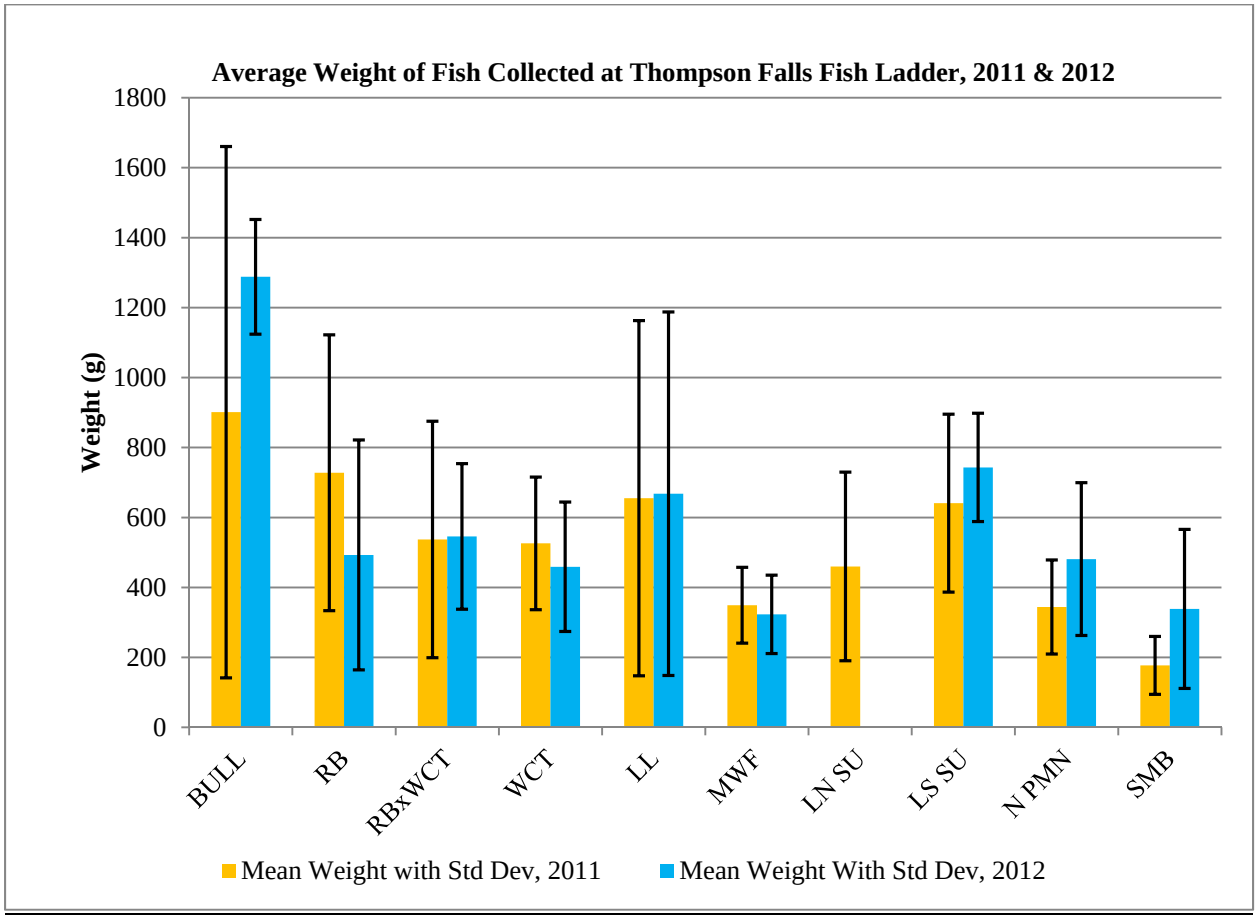


Figure 3-6: Average weight with the standard deviation for each species (excluding lake trout) recorded at the ladder in 2011 and 2012.



3.2.4 Recaptured Fish in 2012

In 2011 there was a total of 505 fish uniquely tagged either at the ladder (225 PIT tags and 74 Floy tags) or electrofishing below the dam (206 PIT tags). In 2012, there was a total of 664 fish uniquely tagged either at the ladder (256 PIT tags, 30 Floy tags) or electrofishing downstream of the dam (365 PIT tags and 13 Floy tags). Of the 1,169 uniquely tagged fish from 2011 and 2012 combined, a total of 51 individual fish were recaptured in 2012.

This section summarizes the 51 individual fish recorded as a "recapture" at the fish ladder, during electrofishing efforts immediately downstream of the dam, or during annual fisheries surveys upstream of the dam in 2012. A comprehensive list of the 51 individual fish, including length and weight measurements, recaptured in 2012 is provided in Appendix B.

The 51 recaptured fish represent seven species (25 rainbow trout, seven largescale suckers, seven mountain whitefish, four brown trout, three westslope cutthroat trout, three smallmouth bass, and two bull trout) and can be categorized into the following groups:

- Fish that were initially tagged at the ladder in 2011 or 2012 and later recorded upstream of the dam during annual fisheries surveys in 2012;
- Fish that were initially tagged at the ladder in 2012 and re-ascended the ladder in 2012 (also referred to as "fallback") (Table 3-4)
- Fish that were initially tagged at the ladder in 2011 and returned to the ladder in 2012 (Tables 3-5)
- Fish that were initially tagged at the ladder in 2011 and 2012 and were recaptured downstream of the dam (Table 3-6)
- Fish that were initially tagged downstream of the dam during electrofishing efforts in 2011 or 2012 and observed at the ladder in 2012 (Tables 3-7 through 3-9)
- Fish that were tagged, but initial tagging date and location is unknown, and were recaptured at the ladder or electrofishing downstream of the dam in 2012 (Table 3-10)
- Fish that were initially tagged below the dam during electrofishing efforts in 2011 that have been recaptured below the dam in 2012 and not ascended the ladder (Table 3-11)

The following sections provide a more detailed summary of the bulleted list above.

3.2.4.1 Fish Initially Tagged at Ladder and Recorded Upstream of Dam

There were four individual fish representing one smallmouth bass, two rainbow trout, and one brown trout recorded upstream of the dam in 2012 that had previously been tagged after ascending the ladder in 2011 or 2012.

The smallmouth bass (Floy #Y-16055) ascended the fish ladder on July 14, 2012 and was recaptured 75 days later approximately 100 miles upstream in the Lower Flathead River (approximately 3 miles downstream of Kerr Dam near Buffalo Rapids Bridge) during an electrofishing survey. The smallmouth bass had increased in size from 334 mm and 504 g to 344 mm and 765 g.

During the annual October 2012 gillnetting efforts in Thompson Falls Reservoir, one rainbow trout and one brown trout were recaptured. Both fish had ascended the ladder in 2011. Details of these fish are provided in Section 2.1.

The fourth fish, a rainbow trout, was captured approximately 35 miles upstream of the dam during the 2012 fall electrofishing survey between the towns of Paradise and Plains. Details of this fish are provided in Section 2.3.2.

3.2.4.2 Fallback

Fallback is defined as a fish that ascends the fish ladder, receives a PIT, Floy, or other unique identification tag, is released upstream, and then is later recaptured either below the 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 Reservoir.

The combine 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.

In 2011, there were a total of 225 fish implanted with PIT tags and 74 fish implanted with Floy tags (1 northern pikeminnow and 73 smallmouth bass) at the ladder. Ten of these fish were recaptured at the ladder at a later date in 2011 and defined as "fallback." Of the 10 individual fish, one rainbow trout ascended the ladder three times in 2011. In addition, Avista reported three fish observed downstream of the dam in Graves Creek (*refer to* Section 3.2.4 in PPL Montana, 2012) that had been tagged at the ladder in 2011. In total there were 13 fish (11 individual rainbow trout and two westslope cutthroat trout) of the 299 tagged fish (approximately 4.3%) that were identified as "fallback" in 2011 (*see* Table 3-4). Of the 13 fish, two fish (both rainbow trout) descended through the turbines, while the other 11 fish either descended through the turbines or the spillway. The method of decent for the 11 fish is unknown due to flow conditions in the river and operations during the period of time the fish may have moved downstream.

Table 3-4: Summary of the number of fish PIT or Floy tagged in 2011, 2012 and both years, and the number of "fallback" for the respective year.

Fish Species	2011 PIT/Floy Tagged Fish at Ladder	Tagged in 2011 - Fallback in 2011	2012 PIT/Floy Tagged Fish at Ladder	Tagged in 2012 - Fallback in 2012
BULL	2	-	-	-
RB	141	11	189	2
RBxWCT	9	-	7	-
WCT	20	2	20	-
LL	27	-	40	-
MWF	17	-	-	-
LN SU	1	-	-	-
LS SU	6	-	-	-
N PMN	3	-	-	-
SMB	73	-	30	-
TOTAL	**299**	**13**	**286**	**2**

In 2012, a total of 256 individual fish were implanted with PIT tags and 30 smallmouth bass were implanted with Floy tags at the ladder during the 2012 season. Of the 286 fish that were initially tagged at the ladder in 2012, two rainbow trout were identified as "fallback" (*see* Table 3-4). These two fish represent less than 1 percent of the total tagged (PIT and Floy) fish at the ladder in 2012.

Of the two rainbow trout, one fish (PIT #985121027405654) initially ascended the ladder on April 12, 2012 and then was later detected (100 days later) via the remote antennas in the ladder

on July 21, 2012. Although detected in the ladder, this fish was never recorded in the holding pool. Between April 12 and July 21, 2012 flows ranged between approximately 18,560 cfs and 85,980 cfs (as measured by PPL Montana at the Project). Therefore, it is unknown as to whether this fish moved downstream through the turbines or over the spillway.

The second rainbow trout (PIT #985121027409436) was initially captured at the ladder on May 9, 2012 when streamflows were approximately 42,500 cfs; and then recaptured at the ladder 57 days later on July 5, 2012 when flows were approximately 49,300 cfs. Between May 9 and July 5, the streamflow (PPL Montana, unpublished data) ranged between approximately 41,640 and 85,980 cfs. This range in streamflows indicates the rainbow trout moved downstream either through the Project turbines or over the spillway.

3.2.4.3 Fish Initially Tagged at the Ladder in 2011 and Recaptured at the Ladder in 2012

In 2011, there were a total of 299 individual fish that were implanted with a PIT or Floy tag during their first ascent of the ladder (*see* Table 3-4). A total of 10 of these fish were recaptured at the ladder in 2012. The 10 fish (six rainbow trout, two smallmouth bass, one bull trout, and one brown trout) returned to the ladder between 220 and 391 days after the first ascent in 2011. It is unknown as to when each of the 10 fish moved downstream or whether these fish moved downstream through the turbines or over the spillway because of the time period (approximately 1 year) between the first and second ascents for each fish at the fish ladder.

3.2.4.4 Fish Initially Tagged at the Ladder in 2011 and Recaptured Electrofishing below the Dam in 2012

There were a total of two fish (both rainbow trout) that were initially tagged at the ladder in 2011 that were recaptured downstream of the dam via electrofishing surveys in 2012 (*see* Table 3-6). Both fish initially ascended the ladder in April 2011 and were identified below the dam during spring electrofishing efforts on March 19 and April 3, 2012. The timing of when these fish moved downstream of the dam is unknown.

Table 3-5: Summary of 10 fish that ascended and were initially tagged at the fish ladder in 2011 and returned to the ladder in 2012.

#	Species	PIT/FLOY TAG	Initial Capture Date	Initial Length (mm)	Initial Weight (g)	Recapture Date	Recapture Location	Recap Length (mm)	Recap Weight (g)	# Days between Initial and Recap
1	BULL	985121023464730	4/26/2011	547	1438	5/21/2012	at Ladder Mortality	563	1404	391
2	LL	985121021918356	9/14/2011	432	680	9/11/2012	at Ladder	444	756	363
3	RB	985121023396645	4/17/2011	463	844	4/1/2012	at Ladder	500	1070	350
4	RB	985121021901853	4/13/2011	429	750	4/12/2012	at Ladder	440	834	365
5	RB	985121021913563	3/31/2011	530	1574	4/12/2012	at Ladder	525	1528	378
6	RB	985121021920485	4/9/2011	421	802	4/12/2012	at Ladder	420	728	369
7	RB	985121023466886	4/24/2011	440	918	4/15/2012	at Ladder	456	988	357
8	RB	985121023446120	10/3/2011	365	466	5/10/2012	at Ladder	400	606	220
10	SMB	Floy Y-16200	8/26/2011	225	140	7/29/2012	at Ladder	250	190	338
11	SMB	Floy Y-16197	8/26/2011	240	170	8/21/2012	at Ladder	272	286	361

Table 3-6: Summary of two fish that were initially PIT tagged at the ladder in 2011 and were detected below the dam during electrofishing efforts in 2012.

Species	PIT/FLOY TAG	Initial Capture Date	Initial Length (mm)	Initial Weight (g)	Recapture Date	Recapture Location	Recap Length (mm)	Recap Weight (g)	# Days between Initial and Recap
RB	985121021920528	4/1/2011	515	1450	4/3/2012	Efishing below dam	534	1774	368
RB	985121021894240	4/11/2011	426	724	3/19/2012	Efishing below dam	460	996	343

3.2.4.5 Initially Tagged Electrofishing below the Thompson Falls Dam in 2011 or 2012 and Recaptured at the Ladder in 2012

In 2011, there were 1,109 fish captured during electrofishing efforts below the dam. Of those fish 206 were implanted with PIT tags (no Floy tags). A total of seven fish (all rainbow trout) were later observed at the ladder between March and October 2011 approximately 13 to 120 days after their first observation electrofishing (PPL Montana, 2012).

In 2012, PPL Montana conducted electrofishing efforts downstream of the dam in March, April, May, and June (Table 3-7), collecting 737 fish representing 16 species and one hybrid (*see* Table 3-8). The electrofishing data collected in 2012 are provided in Appendix C.

Table 3-7: Summary of fish captured and PIT tagged during 2012 electrofishing efforts in March, April, May, and June downstream of the Thompson Falls Hydroelectric Project.

Date of sampling	Approx. Streamflow (cfs)	Water Temperature ºC	# Fish Recorded
3/6/2012	13,100	2.8	48
3/13/2012	14,100	4.0	37
3/19/2012	15,700	3.7	60
3/27/2012	14,300	5.2	63
4/3/2012	22,200	6.3	163
4/4/2012	21,900	6	21
4/10/2012	20,500	7.1	48
4/16/2012	28,100	7.4	2
5/21/2012	56,100	11.1	146
6/25/2012	74,400	14.4	149

Approximately 51 percent of the 737 fish collected during the 2012 electrofishing efforts below the dam had PIT (n=368) or Floy (n=13) tags, including one bull trout (Table 3-8). A total of 12 northern pike and one smallmouth bass received a Floy tag in 2012. A total of 24 fish were identified as having an old fin clips/marks or unique PIT tag during the 2012 survey. The PIT tagged fish represented 12 species and one hybrid, including bull trout, brook trout, largescale sucker, brown trout, longnose sucker, lake whitefish, mountain whitefish, northern pikeminnow, rainbow trout, rainbow x westslope cutthroat hybrid, smallmouth bass, and westslope cutthroat trout. The 13 fish implanted with a yellow Floy tag included 12 northern pike and one smallmouth bass.

Table 3-8: Summary of fish species captured and PIT or Floy tagged during 2012 electrofishing efforts in March, April, May, and June downstream of the Thompson Falls Hydroelectric Project. Recaptured fish represent fish captured during electrofishing efforts that had been previously tagged. Note that all walleye were euthanized during the 2012 survey.

Species	2012		
	Number Captured	Number PIT/Floy Tagged	Recaptured
BULL	1	1	0
EB	2	1	0
KOK	1	0	0
LS SU	330	168	3
LL	23	21	2
LN SU	33	11	0
LWF	39	0	0
MWF	87	65	7
N PMN	23	7	0
NP	12	12	0
PEA	1	0	0
PUMP	0	0	0
RB	86	74	10
RBxWCT	1	1	0
SMB	19	2	0
WCT	19	18	2
WE	58	0	0
YP	2	0	0
TOTAL	**737**	**381**	**24**

There were eight fish that had been initially tagged via electrofishing below the dam in 2011 that were recaptured at the ladder in 2012 (*see* fish #1 through 8 in Table 3-9). Of the eight fish, four rainbow trout ascended the ladder in April, one bull trout ascended in May, one rainbow trout ascended in early June, one largescale sucker ascended in mid-July, and one mountain whitefish ascended in October 2012 (*see* Table 3-9).

Of the PIT tagged fish tagged below the dam during the 2012 electrofishing efforts, a total of eight individual fish representing three species were later captured at the ladder in 2012, including one rainbow trout in May, four largescale suckers and one rainbow trout in July, one rainbow trout in August, and one westslope cutthroat trout in September (*see* fish #9 through 16 in Table 3-9). The length of time between recording the fish via electrofishing in 2012 and recapturing each fish at the ladder in 2012 varied between 37 and 127 days. It should be noted that a rainbow trout initially captured at the ladder on April 17, 2011 was subsequently recaptured below the dam by electrofishing on March 13, 2012 and then again in the ladder on April 1, 2012.

Table 3-9: Summary of the 16 fish that were initially PIT tagged below the dam during electrofishing efforts in 2011 or 2012 and ascended the ladder in 2012.

Year	Species	PIT TAG	Initial Capture Date	Initial Capture Location	Initial L (mm)	Initial Wt (g)	Recapture Date	Recapture Location	Recap L (mm)	Recap Wt (g)	Days (Recap minus Initial)
1	MWF	985121021896280	3/18/2011	efishing below dam	220	80	10/4/2012	Ladder	325	308	566
2	RB	985121021882245	3/18/2011	efishing below dam	401	684	4/11/2012	Ladder	433	700	390
3	RB	985121023445664	3/18/2011	efishing below dam	453	1006	4/13/2012	Ladder	482	1076	392
4	RB	985121021913294	3/28/2011	efishing below dam	358	498	4/12/2012	Ladder	405	716	381
5	BULL	985121021877906	5/31/2011	efishing below dam	482	966	5/15/2012	Ladder	510	1172	350
6	RB	985121021867822	6/14/2011	efishing below dam	380	562	4/12/2012	Ladder	420	782	303
7	RB	985121021888853	6/14/2011	efishing below dam	425	706	6/4/2012	Ladder	459	842	356
8	LS SU	985121021909504	9/13/2011	efishing below dam	478	1022	7/14/2012	Ladder	-	-	305
9	LS SU	985121021896450	3/19/2012	efishing below dam	435	816	7/14/2012	Ladder	430	754	117
10	LS SU	985121027402291	3/27/2012	efishing below dam	445	920	7/14/2012	Ladder	440	888	109
11	LS SU	985121027385525	3/27/2012	efishing below dam	420	682	7/14/2012	Ladder	-	-	109
12	RB	985121027370332	3/27/2012	efishing below dam	216		7/18/2012	Ladder	418		113
13	LS SU	985121027373549	4/3/2012	efishing below dam	455	942	7/14/2012	Ladder	444	838	102
14	RB	985121027360815	4/3/2012	efishing below dam	385	580	5/10/2012	Ladder	385	580	37
15	RB	985121027406346	4/3/2012	efishing below dam	322	358	8/8/2012	Ladder	354	448	127
16	WCT	985121027357907	5/21/2012	efishing below dam	300	274	9/25/2012	Ladder	335	378	127

3.2.4.6 Unknown Origin and Recaptured at Ladder/Electrofishing below Dam in 2012

Five fish were recaptured at the ladder and/or electrofishing below the dam with an unknown location of the initial tagging location or date. These fish include three rainbow, one westslope cutthroat trout, and one largescale sucker (*see* Table 3-10). Below is a table with the information of the recapture location and dates. One of the five fish did not have a PIT tag associated with it, because of a data entry error, but it was noted to be a recapture. The other four fish have PIT tag numbers, but no initial capture history was available.

Table 3-10: Summary of five fish that were recaptured below the dam during electrofishing efforts or at the Ladder in 2012. No initial capture history was available for these fish.

Fish Species	Recapture Date	Recapture Location	ID (PIT Tag)	L (mm)	W (g)	Comment
LS SU	4/3/2012	Efishing below Dam	985121027390464	483	1168	
RB	5/23/2011 & 4/3/2012	Efishing below Dam	985121021885948	282	202	
RB	7/22/2012	Ladder	No Data	404	640	PIT Tag Data Entry Error
RB	8/6/2012	Ladder	985121023467679	425	720	
WCT	4/10/2012	Efishing below Dam	985121027366296	260	198	

3.2.4.7 Initially Captured via Electrofishing below Dam in 2011/12 and Recaptured via Electrofishing Below Dam in 2012

Of the 737 fish collected via electrofishing downstream of the dam in 2012, there were three fish (one brown trout, one mountain whitefish, and one rainbow trout) that had been previously observed during the 2011 electrofishing efforts in the same reach of river (*see* Table 3-11). These fish have not been detected in the ladder in 2011 or 2012. A summary of these fish is provided in the table below. Details, including length and weight of these fish are also available in Appendix C.

Table 3-11: Summary of three fish that were initially PIT tagged below the dam during electrofishing efforts in 2011 and also captured below the dam during electrofishing efforts in 2012. These fish have not been observed at the ladder.

Fish Species	Efishing below Dam 2011	Efishing below Dam 2012	Duration (days)	ID (PIT/Floy Tag)	Comment
LL	3/25/2011	4/3/2012	375	985121021865085	
MWF	3/25/2011	4/3/2012	375	985121021914522	
RB	5/23/2011	4/3/2012	316	985121021885948	Initial location of tagging unknown, but observed two subsequent times

3.2.5 Movement from Tailrace to the Ladder

Refer to Section 3.2.4.5 for details regarding fish observed via electrofishing below the dam in 2012 and later observed in the ladder in 2012 (*see* fish #9 through 16 in Table 3-9).

3.2.6 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 and 2012 (*see* Table 3-12). Some of the fish that entered the ladder had been initially PIT tagged via electrofishing downstream of the Project while others had been PIT tagged initially at the ladder, gone downstream through the turbines or spillway, and were returning once again to ascend the ladder.

In 2011, a total of 17 fish representing three species (rainbow trout, largescale sucker, brown trout) with PIT tags were detected via the remote antennas. The majority of fish detected were rainbow trout and time ascending the ladder ranged from 0.85 to 19.65 hours. In 2012 a total of 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. For all 30 fish it took on average 2.7 hours to ascend the ladder. Salmonids appear to ascend more quickly than largescale suckers. However, 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 a fish spends ascending the ladder.

Table 3-12: Summary of the species, number of species detected via remote antennas in the ladder, and amount of time (hours) spent ascending the ladder in 2011 and 2012.

Year	Species	Number	Average Time (Hours)	Range of Time (Hours)
2011	RB	15	4.7	0.85-19.65
	LS SU	1	3.6	
	LL	1	10.8	
2012	BULL	2	2.6	2.4-2.8
	LL	1	1.1	
	RB	18	2.2	0.7-4.4
	MWF	1	2.1	
	WCT	1	1.7	
	LS SU	7	4.6	2.3-8.3

3.2.7 Timing of Fish Ascending the Ladder

Fish entry to the ladder and timing of ascent was evaluated on two spatial scales, daily timing of entry and seasonal movement. The following text summarizes the daily movements of fish

detected in the ladder during 2012 and seasonal movements patterns observed in 2011 and 2012 seasons.

3.2.7.1 Daily

Data collected from the three remote antennas, as described in the previous Section 3.2.6, were utilized to evaluate the time of day fish entered the ladder. A total of 63 fish representing seven species, including 30 largescale suckers, 18 rainbow trout, three brown trout, two bull trout, two mountain whitefish, one northern pikeminnow, one westslope cutthroat trout, and six unknown species, were documented in the ladder via the remote antennas. The six unknown species are fish that have PIT tags, but the PIT tag number is not recorded in the database so the species is unknown.

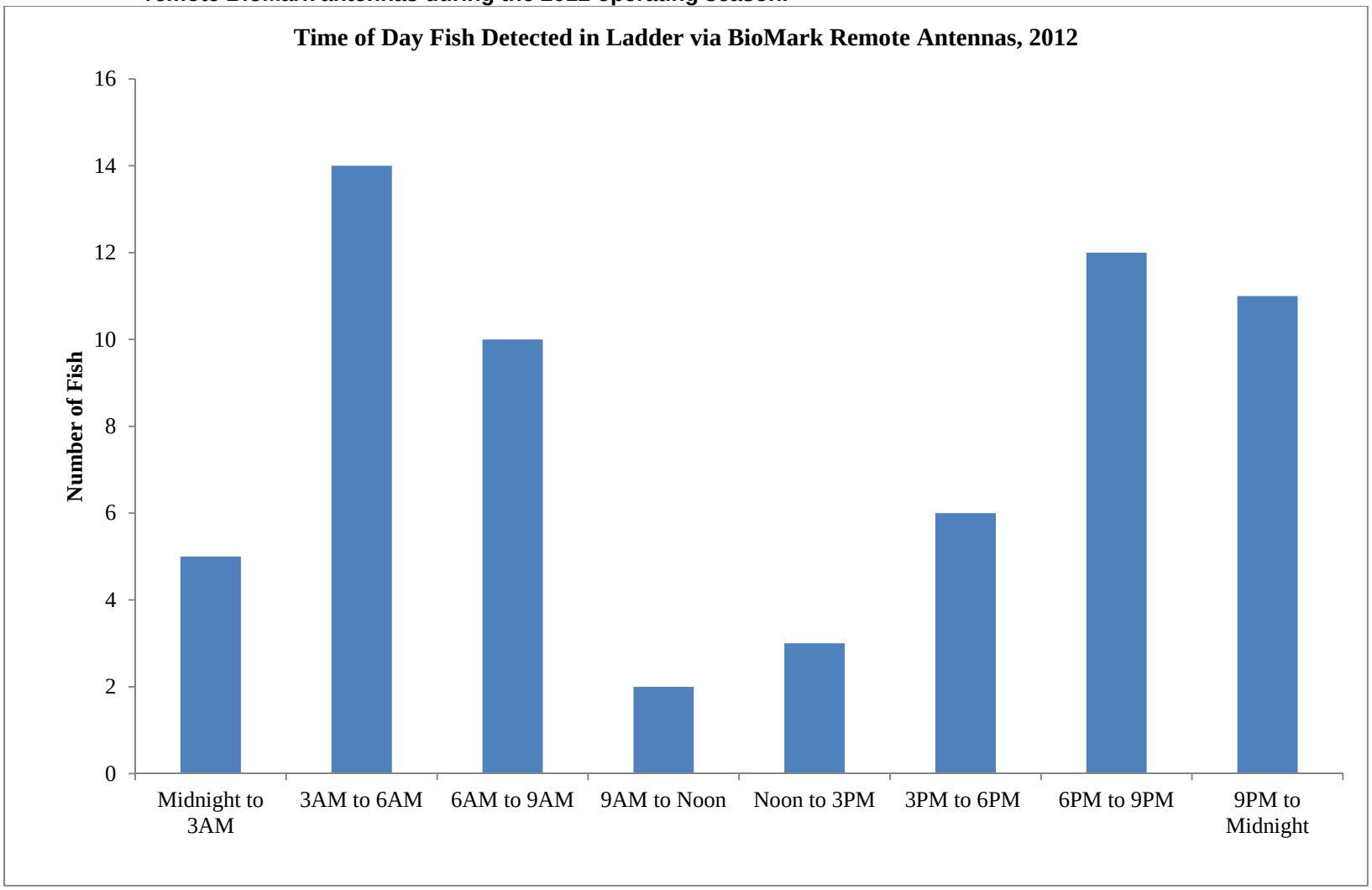
The timing of fish entry into the ladder was depicted by dividing a 24 hour period into 3-hour increments. The number of fish, by species, was tallied for each time interval (*see* Table 3-13). Largescale suckers appear to enter the ladder more frequently between 3AM and 9AM and between 6PM and midnight. Rainbow trout entered the ladder most often between 3AM and 9AM. For the other species, the sample size of fish observed entering the ladder was too small to make any conclusion regarding the potential preference.

It appears that fish will enter the ladder any time of day (*see* Figure 3-7), but have some preference to the early morning hours (pre-dawn and dawn) and evening hours (dusk and dark). Nearly half of the sample size is represented by largescale suckers, which may bias the results towards movement behaviors of the largescale sucker. The results indicate that fish may avoid entering the ladder midday and may be more likely to enter the ladder during dawn and dusk hours.

Table 3-13: Time of day that 63 fish (largescale sucker, rainbow trout, brown trout, bull trout, mountain whitefish, northern pikeminnow, westslope cutthroat, and unknown species) entered the Thompson Falls fish ladder and were detected via the remote BioMark antennas during the 2012 operating season. Filled in cells indicate no fish were detected in ladder during the specified time interval.

Species	# of Fish	Midnight to 3AM	3AM to 6AM	6AM to 9AM	9AM to Noon	Noon to 3PM	3PM to 6PM	6PM to 9PM	9PM to Midnight
LS SU	30	1	6	5	1	1	1	7	8
RB	18	2	5	5			2	2	2
LL	3				1	1	1		
BULL	2						1	1	
MWF	2					1		1	
NPMN	1							1	
WCT	1						1		
Unknown	6	2	3						1
Totals	**63**	**5**	**14**	**10**	**2**	**3**	**6**	**12**	**11**

Figure 3-7: Time of day that 63 fish (largescale sucker, rainbow trout, brown trout, bull trout, mountain whitefish, northern pikeminnow, westslope cutthroat, and unknown species) entered the Thompson Falls fish ladder and were detected via the remote BioMark antennas during the 2012 operating season.



3.2.7.2 Seasonal

The number of fish, including all species, caught daily at the ladder along with the hydrograph for the Clark Fork River and water temperature in Pool 48 (in the ladder) are shown in the Figures 3-8 and 3-9, respectively. The hydrograph for the Clark Fork River is based on the USGS gage near Plains. It is worth noting that although ladder operations for 2011 and 2012 spanned between March and October for both years, the individual days of operation varied significantly during the summer months in particular. Refer to Section 3.2.1 for specifics for operational days each year. The main difference to consider when evaluating the figures (Figures 3-8 through 3-11) is that the ladder was closed for the majority of the time between May 25 and August 21, 2011 and closed for two shorter intervals in late April/early May and late June in 2012. The blocks of non-operational times are color coded (yellow represents 2011 and blue represents 2012) as shown in Figure 3-8.

In 2011 and 2012, the majority of fish ascended the ladder during the summer months following the decline in the hydrograph *(see* Figure 3-8). The majority of the fish in the ladder during the summer months were non-salmonids. For example, during the peak daily fish counts in 2012 (between July 3 and July 15) a total of 2,002 individual fish were recorded at the ladder, which represents 75 percent of all fish recorded at the ladder in 2012. Of the 2,002 fish 1,990 were non-salmonids, including 1,113 largescale suckers, 875 northern pikeminnow, and two smallmouth bass. The 12 salmonids that ascended the ladder during this period included six rainbow trout, five brown trout, and one mountain whitefish.

In 2011, a similar trend was observed. The ladder was opened on August 22 and within a 10-day period (August 22 through August 31) a total of 1,546 fish ascended the ladder representing 86 percent of the fish that ascended the ladder in 2011. Of the 1,546 fish 1,523 were non-salmonids including 990 northern pikeminnow, 399 largescale suckers, 125 smallmouth bass, and nine longnose suckers. The 23 salmonids included 16 rainbow trout, five brown trout, one westslope cutthroat trout, and one hybrid rainbow x westslope cutthroat trout.

In contrast to 2011, no longnose sucker was identified at the ladder in 2012. Because 97 percent of the suckers ascended the ladder in large quantities between July 8 and July 22 (in 2012), it is possible that one or more longnose sucker was mistakenly identified as a largescale sucker.

Water temperature in the ladder was similar in both years (*see* Figure 3-9).

In order to better evaluate seasonal movement of salmonid species, Figures 3-10 and 3-11 were developed and show the daily count of salmonids at the ladder in 2011 (*see* Figure 3-10) and in 2012 (*see* Figure 3-11) along with water temperature in Pool 48. It is clear in both figures that rainbow trout are the dominant salmonid species recorded at the ladder in 2011 and 2012 and ascend the ladder throughout the duration the ladder is in operation. As with rainbow trout, westslope cutthroat trout and hybrid rainbow x westslope cutthroat trout also appear to ascend the ladder throughout the duration the ladder is in operation without any significant seasonal preference. Although less frequent in numbers, bull trout have only been documented in the

ladder in the spring (April or May). Brown trout were documented in the ladder in 2011 during the spring, but appear more frequently in the ladder in the summer and fall months. Mountain whitefish have primarily been documented in September and October. It is possible that the peak migration upstream for mountain whitefish occurs after the ladder is shut down in mid-October each year.

Figure 3-8: Summary of mean daily streamflow and the number of fish (all species) caught daily in the Thompson Falls fish ladder in 2011 and 2012. Shaded areas indicate time of year the ladder was not in operation.

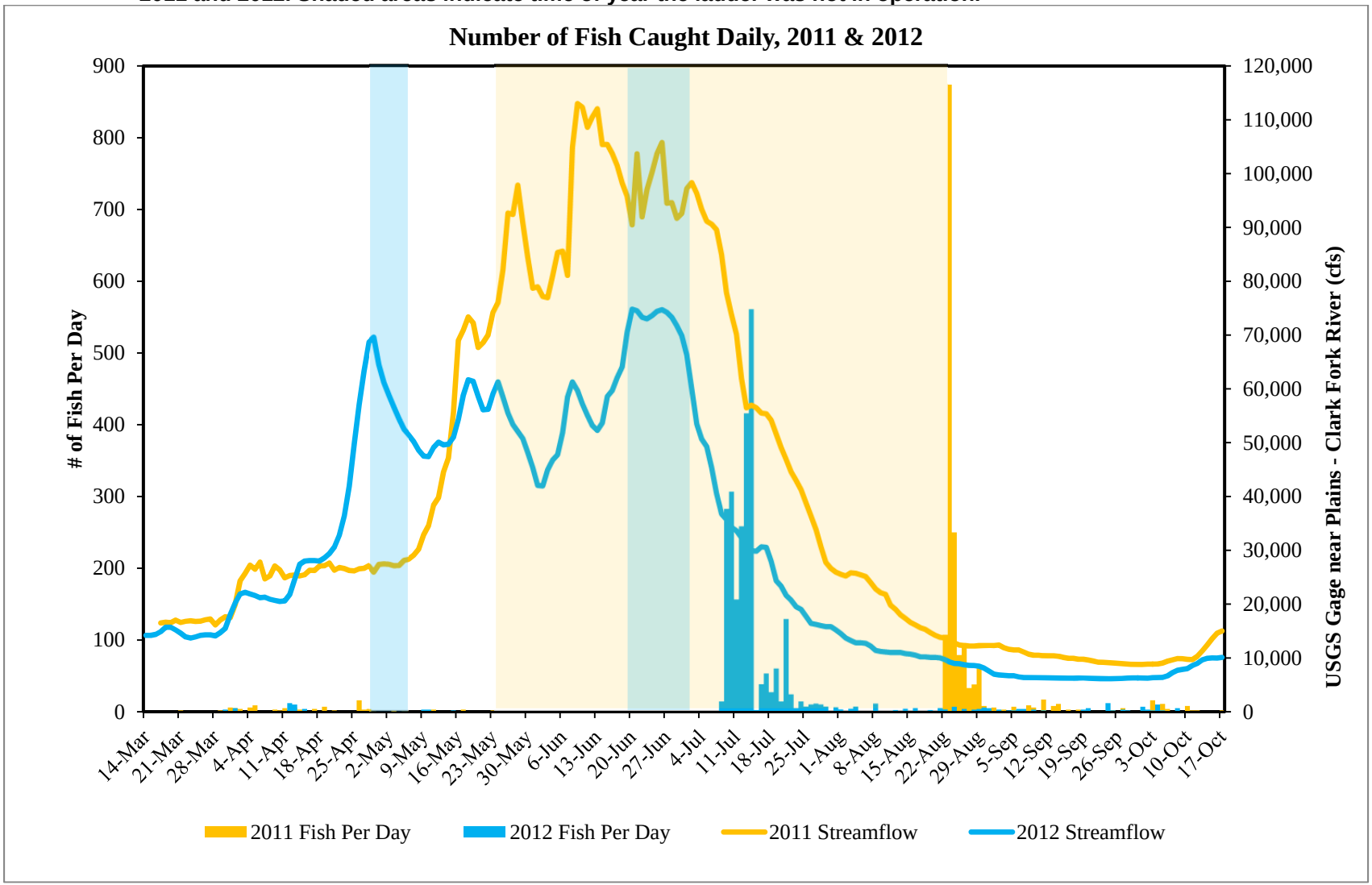


Figure 3-9: Summary of mean water temperature (Pool 48) and the number of fish (all species) caught daily in the Thompson Falls fish ladder in 2011 and 2012. Temperature in Pool 48 was only recorded when the ladder was checked for fish.

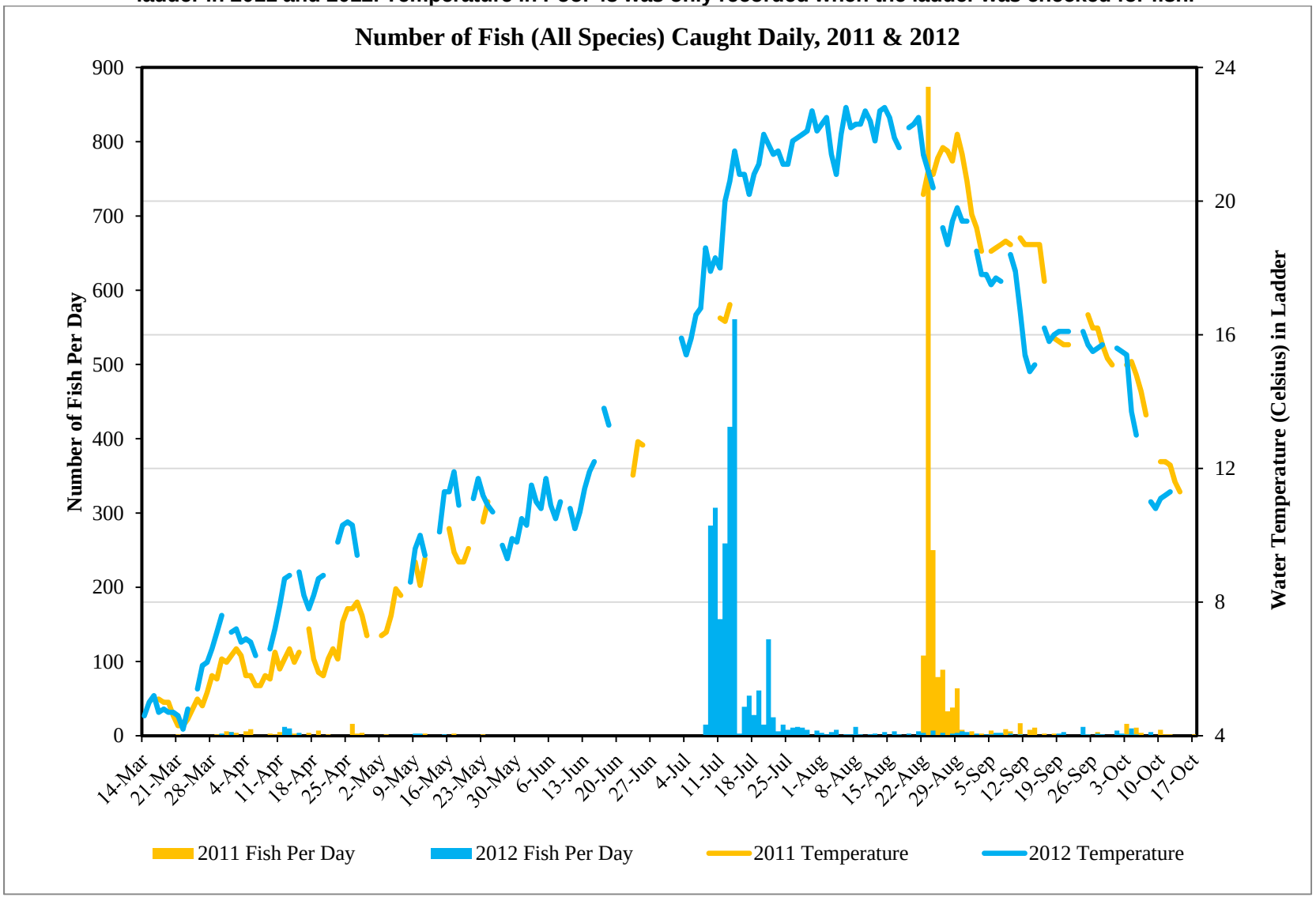


Figure 3-10: Summary of mean daily streamflow and the number of salmonids caught daily in the Thompson Falls fish ladder in 2011. Breaks in water temperature indicate days the ladder was not in operation.

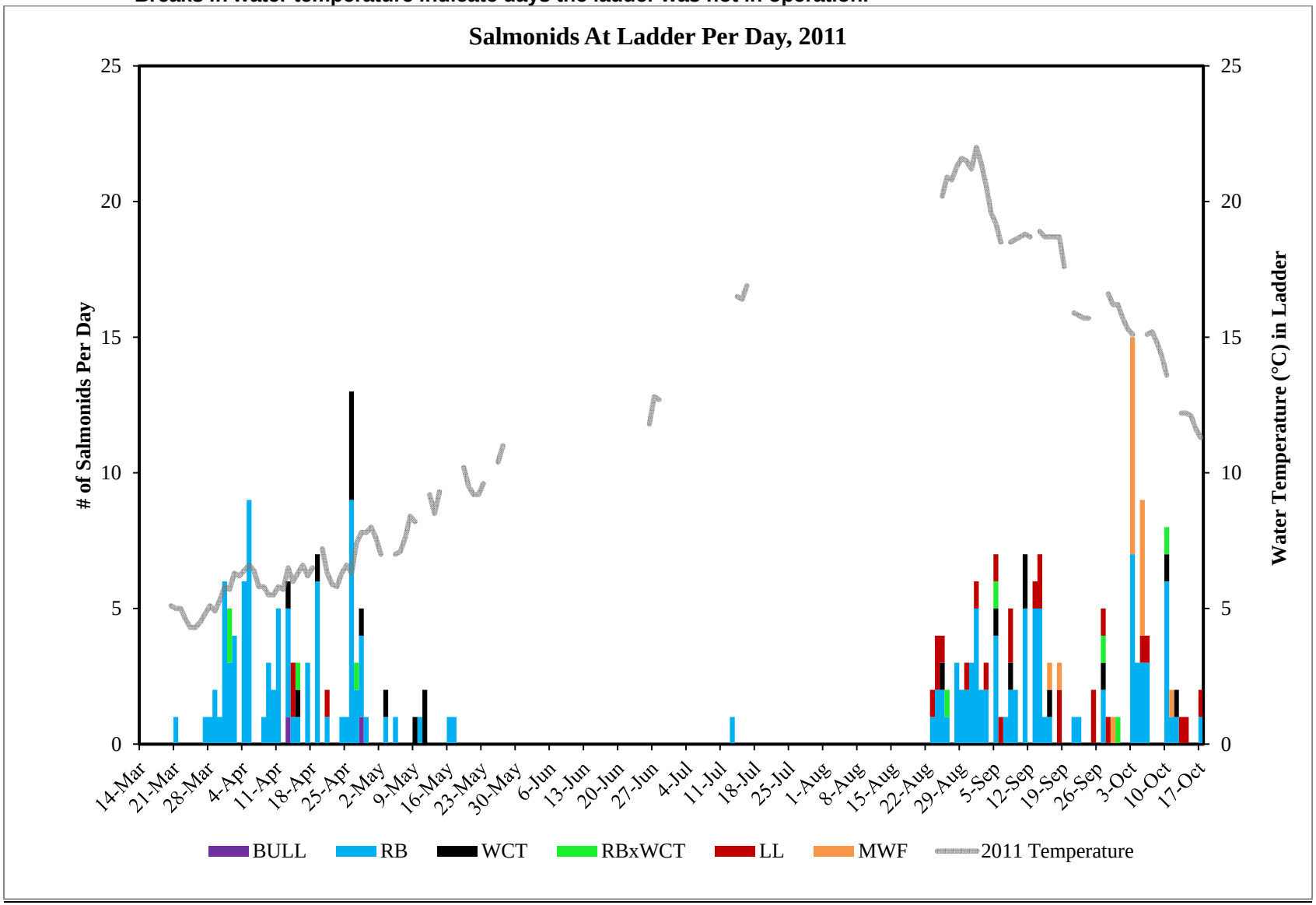
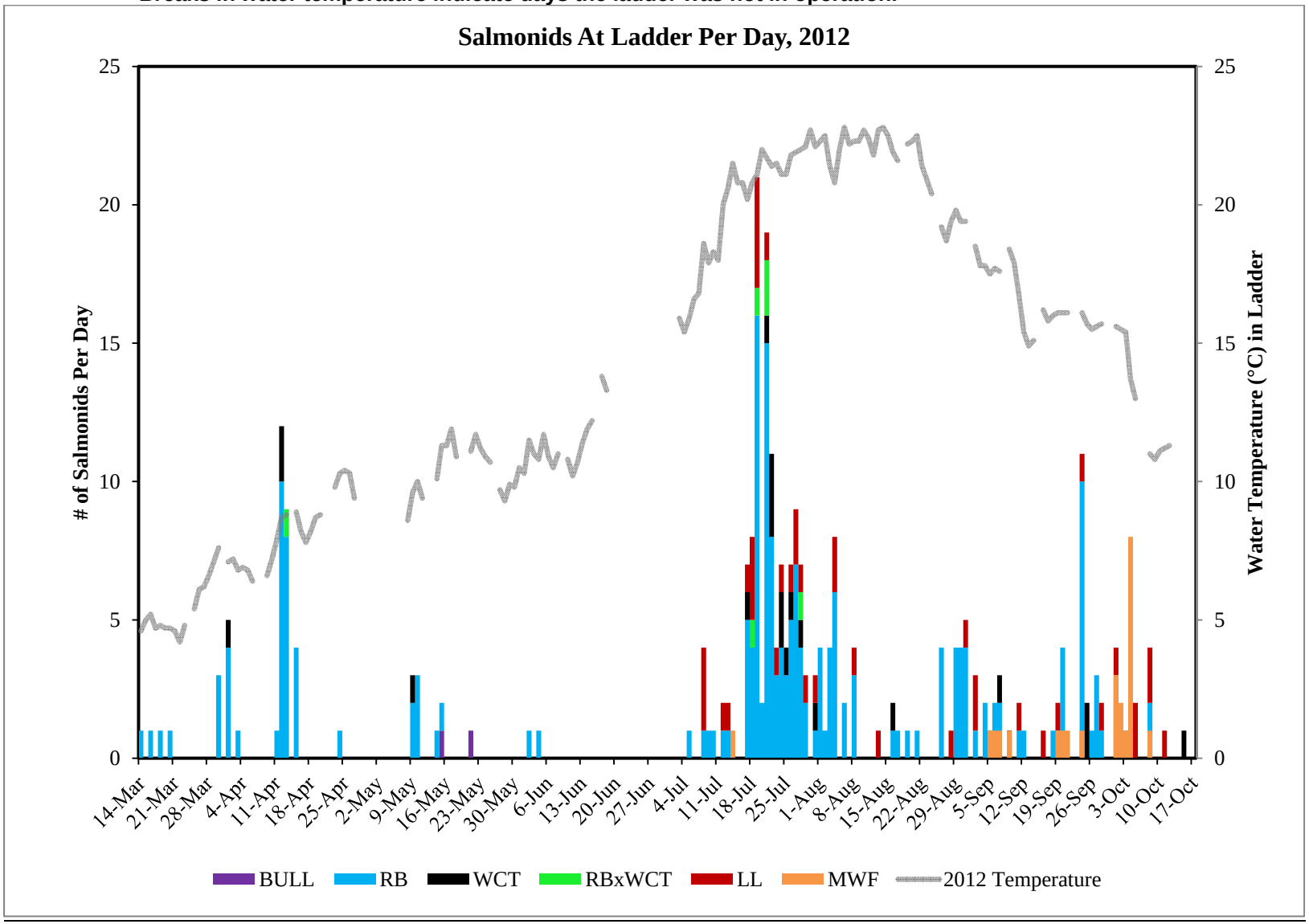


Figure 3-11: Summary of mean daily streamflow and the number of salmonids caught daily in the Thompson Falls fish ladder in 2012. Breaks in water temperature indicate days the ladder was not in operation.



3.2.8 Weir Modes: Notch vs. Orifice

In 2012 (as in 2011), operators alternated the weir setting in the ladder between notch and orifice modes on a weekly basis. Over the course of the 2012 season, the ladder was checked 168 times. During the ladder checks, the weir setting was in notch mode during 78 ladder checks and in orifice mode during 90 ladder checks. This was similar to 2011, when there was a total of 160 ladder checks, 66 during notch mode and 94 during orifice mode.

Approximately 86 percent of all fish captured at the ladder ascended the ladder during orifice mode in 2012 compared to approximately 94 percent ascending in orifice mode in 2011 (*see* Table 3-14). The percentages of salmonid and non-salmonid species ascending the ladder in notch compared to orifice mode are presented in Figure 3-6 and 3-7, respectively. Salmonid species did not show an overwhelming preference for either weir mode at the ladder and appear to be able to ascend the ladder in either mode (*see* Figure 3-6). In contrast, non-salmonid species clearly ascended more efficiently in the orifice mode (*see* Figure 3-7).

It is important to note that in 2011, after the ladder had been shut down for a long period of time in the summer months, operations resumed in orifice mode and there was a "surge" of fish (mostly non-salmonids) waiting to ascend the ladder. Therefore, the 2011 data are likely biased to show non-salmonids favoring orifice mode (*see* Figures 3-7 and 3-8). However, in 2012 when the ladder opened in July after being shutdown for a couple of weeks, operations began in notch mode. As visible in Figure 3-9, non-salmonids ascended the ladder when in notch mode, but the number of species ascending the ladder increased substantially when the weir mode was switched to orifice. In conclusion, it appears that all species documented at the ladder can adequately ascend the ladder when in orifice mode. Orifice mode also appears to provide the opportunity to pass the largest volume of fish upstream. During the December 5, 2012 annual Thompson Falls Technical Advisory Committee (TAC) meeting, PPL Montana recommended that the ladder be set in orifice mode for the entire 2013 season. The TAC voting members (U.S. Fish and Wildlife Service; Confederated Salish and Kootenai Tribes of the Flathead Nation; Montana Fish, Wildlife and Parks) supported this recommendation.

Table 3-14: Summary of the total number of fish (and species) that ascended the ladder, percent composition of fish that ascended the ladder, and the percentage of total fish that ascended during orifice and notch weir modes.

Species	2011				2012			
	Total Number (# Mortalities)	% of Total At Ladder	% Orifice Mode	% Notch	Total Number (# Mortalities)	% of Total At Ladder	% Orifice Mode	% Notch
BULL	2	0.1%	3.3%	0.1%	2 (1)	0.1%	5.1%	0.0%
RB	164 (2)	9.1%	5.4%	3.7%	208 (1)	7.8%	4.2%	3.6%
RBXWCT	9	0.5%	0.4%	0.1%	7	0.3%	0.1%	0.2%
WCT	21	1.2%	0.1%	1.2%	21	0.8%	0.0%	0.8%
LL	28	1.6%	0.8%	0.8%	42	1.6%	0.7%	0.9%
MWF	17	0.9%	0.3%	0.6%	24	0.9%	0.8%	0.1%
LN SU	10 (2)	0.6%	0.5%	0.1%	0	0.0%		
LS SU	418 (1)	23.2%	22.8%	0.4%	1,403 (4)	52.6%	45.5%	7.1%
N PMN	1,000 (73)	55.4%	55.2%	0.2%	926 (1)	34.7%	32.9%	1.8%
SMB	135 (4)	7.5%	7.4%	0.1%	34	1.3%	1.2%	0.1%
LT	1 (1)	0.1%	0.1%	0.0%	1 (1)	0.0%	0.0%	0.0%
TOTAL	**1,805 (83)**	**100.0%**	**93.7%**	**6.3%**	**2,668 (8)**	**100.0%**	**86.0%**	**14.0%**
Upstream of Dam	**1,722**	**-**	**-**	**-**	**2,660**	**-**	**-**	**-**

Figure 3-12: Percentage of salmonid species caught in the ladder during notch compared to orifice mode during the 2012 season.

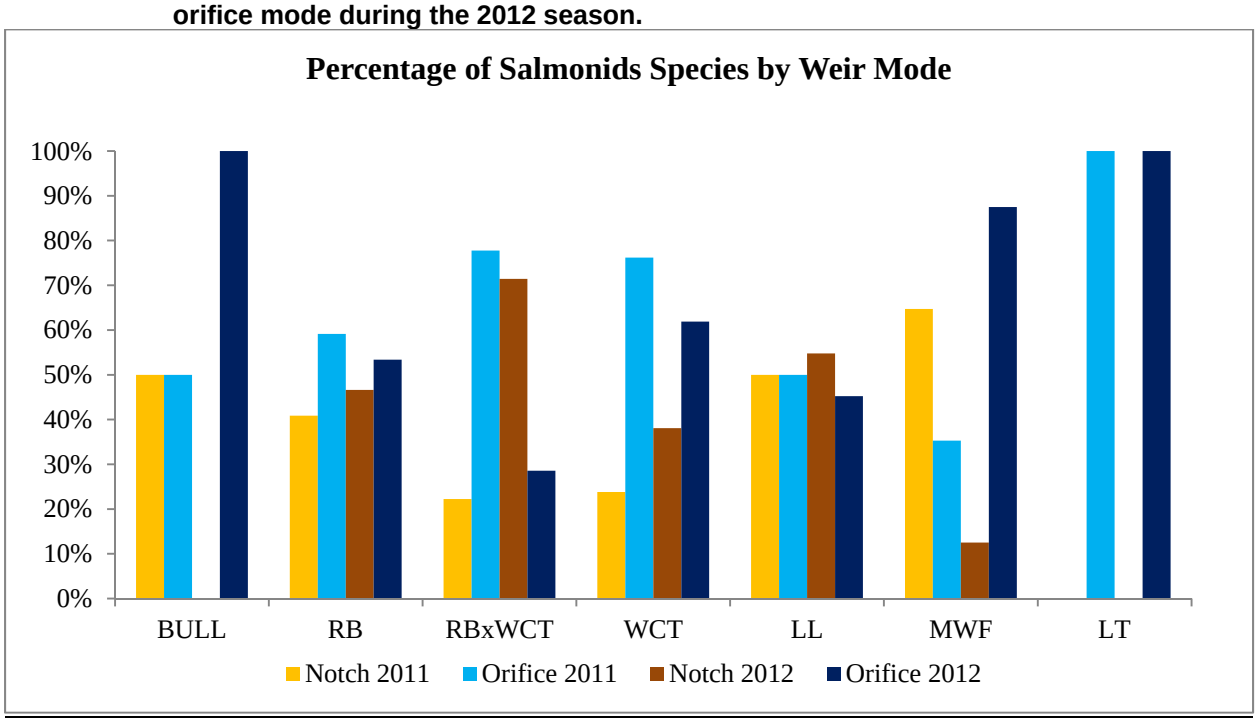


Figure 3-13: Percentage of non-salmonid species caught in the ladder during notch compared to orifice mode during the 2012 season.

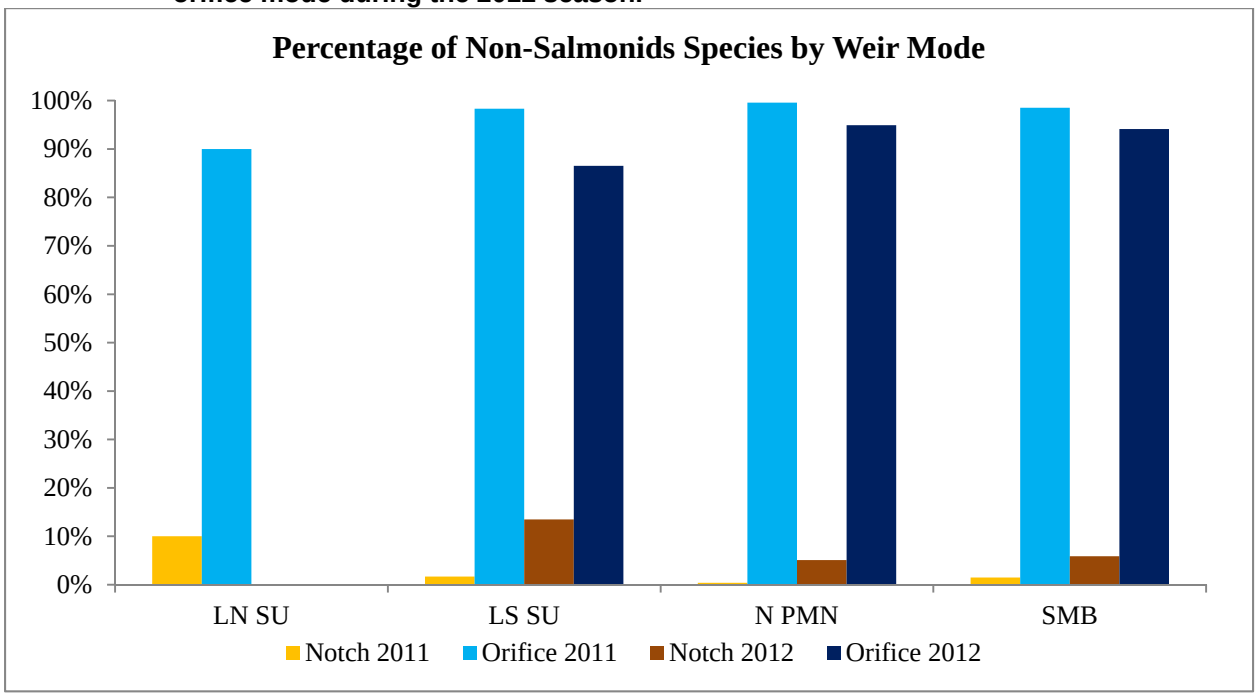


Figure 3-14: Daily fish count at the fish ladder in notch and orifice mode in 2011. Mean daily streamflow at Thompson Falls Dam (PPL Montana data, unpublished). The ladder was not in operation (with the exception of a few days in June and July) between May 25 and August 21, 2011.

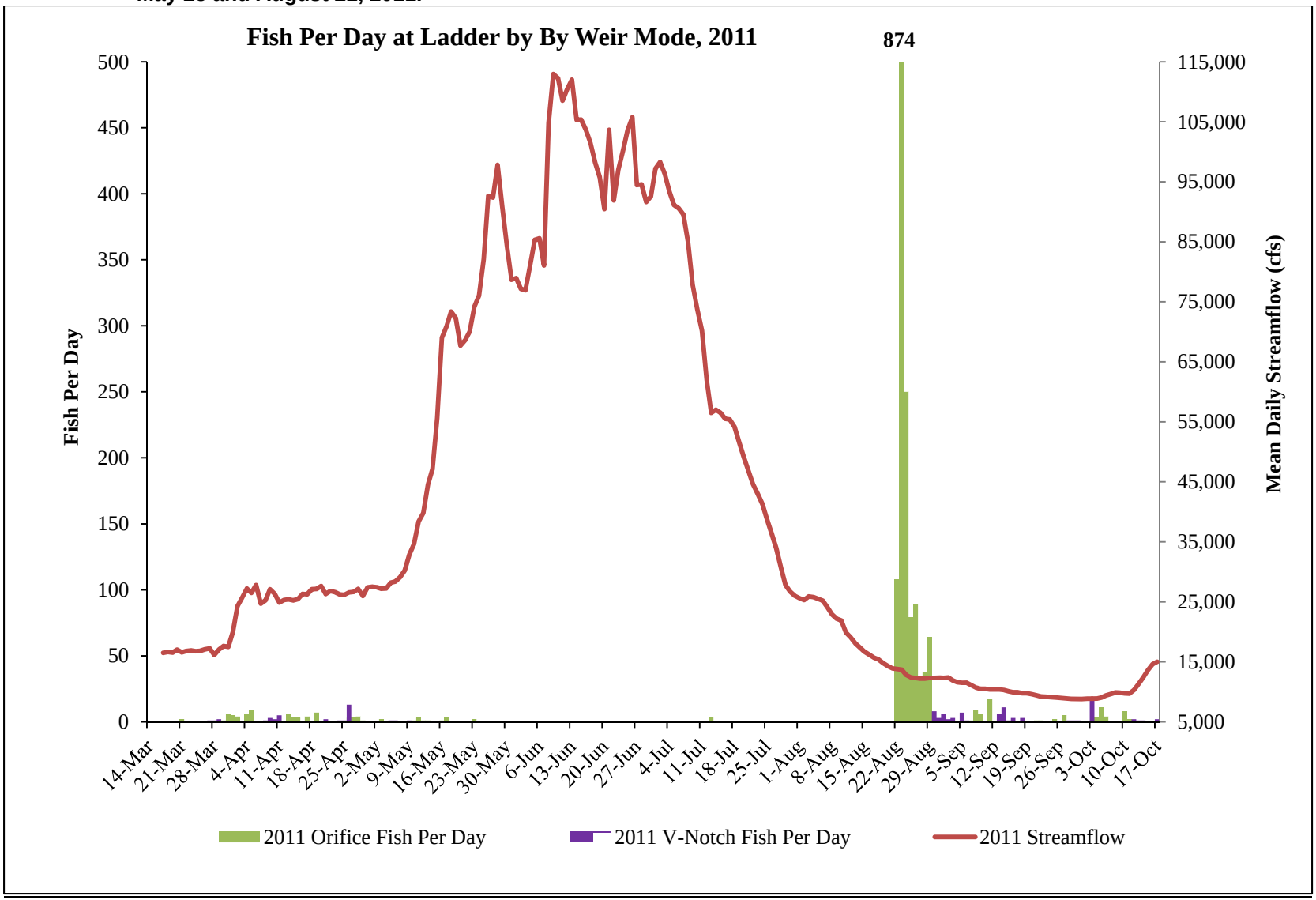
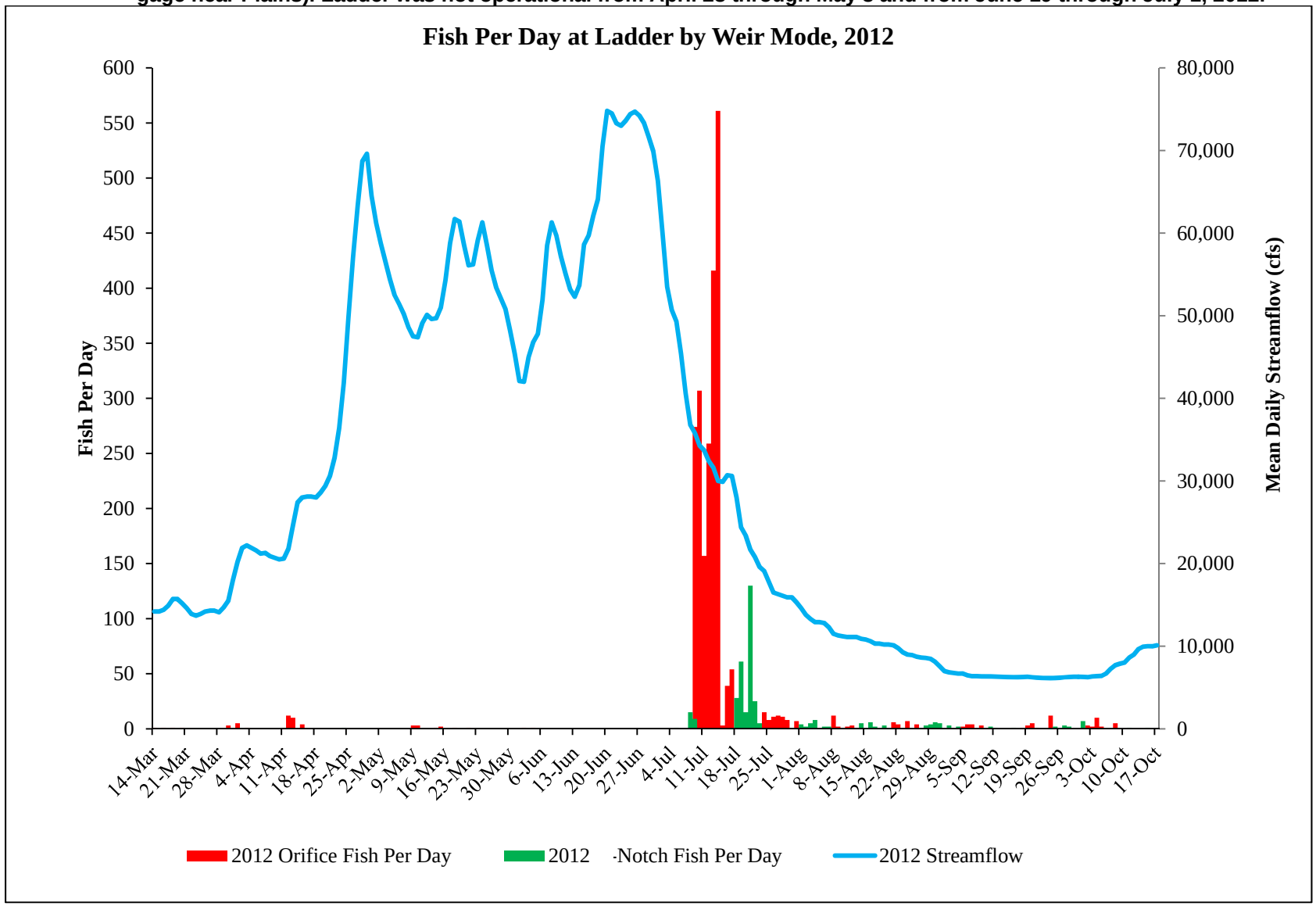


Figure 3-15: Daily fish count at the fish ladder in notch and orifice mode in 2012. Mean daily streamflow in the Clark Fork River (USGS gage near Plains). Ladder was not operational from April 28 through May 8 and from June 19 through July 1, 2012.



3.2.9 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, so that total discharge from Pool #1 of the ladder can be about 69 cfs. In 2012, the AWS system generally resulted in total flow from the ladder of approximately 59 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.

PPL Montana's observations of tailrace conditions downstream of the dam indicate that, during non-spill periods, additional flow is needed to allow fish to migrate upstream through the falls downstream of the Main Channel Dam. For this reason, both the AWS and the HVJ were operated throughout the non-spill season in 2012 to insure this migration through the falls to the fish ladder. PPL Montana will continue to operate the attractant flow system in this manner to insure that there is sufficient flow downstream of the Project to allow fish to successfully transit the falls.

3.2.10 Bull Trout Genetics

Genetic samples of bull trout collected in 2011 and 2012 in association to the Project, as referenced in Table 3-4, were submitted to Abernathy Labs for analysis. In 2011, there were a total of five bull trout including two bull trout that ascended the fish ladder and three bull trout collected via electrofishing below the dam. All five bull trout were genetically assigned to Clark Fork River Region 4 (upstream of Thompson Falls Dam). In 2012, there were a total of seven bull trout sampled including two bull trout at the ladder, one bull trout below the dam, two bull trout in the Reservoir electrofishing reach (one in the lower section and one 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 (*see* Table 3-4).

Of the seven bull trout recorded in 2012, two bull trout were recorded at the ladder and were both recaptures. One bull trout ascended the ladder on May 15, 2012 and had previously been recorded via electrofishing efforts below the dam on May 31, 2011. This bull trout was genetically assigned to Meadow Creek (Region 4), a tributary to the Bitterroot River, and was released upstream of the dam. However, the level of confidence in that assignment was relatively

low and was nearly equal to the second most likely population of origin, Fishtrap Creek in the Thompson River, also a Region 4 population. The second bull trout (PIT #985121023464730) recorded at the ladder on May 21, 2012 had ascended the ladder in 2011 and was already genetically tested (assigned to Fishtrap Creek, Region 4). In 2012, bull trout (985121023464730) jumped out the holding pool and died.

Table 3-15: Summary of bull trout genetics from bull trout captured during project activities in 2011 and 2012. Results were provided by Avista Corporation (2012).

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

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

4.0 Bull Trout Passage from Downstream Facilities

Avista Corporation (Avista) continued their trap and haul upstream fish passage program in 2012. Bull trout captured downstream of Cabinet Gorge Hydroelectric Project were genetically tested using rapid response genetic identification methodology (DeHaan et al., 2012). The rapid response genetic testing provides population assignment within 24 hours after receipt of fish tissue samples. The analysis estimates the natal stream of each bull trout. Bull trout are then either transported to their estimated region of origin, or released downstream of Cabinet Gorge Dam. Bull trout with a natal stream upstream of Thompson Falls Hydroelectric Project (Project) are referred to as "Region 4" fish.

Avista captured a total of 40 unique bull trout below Cabinet Gorge Hydroelectric Project (in 2012). Four of the 40 bull trout were too small to be considered mature and not eligible for transport upstream (less than 350 mm in total length) and were released in Region 1 (Lake Pend Oreille and Lower Clark Fork downstream of Cabinet Gorge Dam); six other fish were either genetically assigned to Region 1 and were released in Region 1 or were released in Region 1 due to previous capture information. In 2012 Avista transported 30 bull trout from downstream of Cabinet Gorge Hydroelectric Project to Region 2, which is Cabinet Gorge Reservoir (n = 15); Region 3, which is Noxon Reservoir (n = 7); or upstream of the Project to Region 4 (n=8) in cooperation with individuals from the FWP. The eight bull trout transported upstream of the Project were PIT tagged but not radio tagged. One of the eight fish was released at the St. Regis boat ramp on the Clark Fork River; six fish were released in Fishtrap Creek; and the last fish was released in the mainstem Thompson River. Table 4-1 summarizes the eight bull trout captured in 2012 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 2012 is available in Moran and Posselt (2013) and Bernall and Duffy (2013).

Table 4-1: Summary of the 8 bull trout captured below Cabinet Gorge Dam in 2012, assigned to Region 4, and released in Region 4. Results were provided by Avista Corporation (2012).

Capture Date	Capture Method	PIT Tag Number	Length (mm)	Weight (g)	Release Site	Release Date	Most Likely Pop. Of Origin	Second Most Likely Pop. Of Origin	Confidence
4/26/2012	LCFR-ID Night EFish	380180914261084	585	1928	Fishtrap Creek	5/2/2012	Fishtrap Creek	Cedar Creek	26,000
5/1/2012	LCFR-ID Night EFish	900226000035832	616	2324	Clark Fork River @ St. Regis boat ramp	5/4/2012	Cedar Creek	North Fork Jocko River	18.7
5/13/2012	LCFR-ID Night EFish	985121025905128, 900226000035851 (recap from 8/30/2011)	637	2154	Fishtrap Creek	5/14/2012	Fishtrap Creek	Vermilion River	2.5
5/13/2012	LCFR-ID Night EFish	900226000035807	520	1190	Fishtrap Creek	5/17/2012	Fishtrap Creek	East Fork Bull River	16,000
5/13/2012	LCFR-ID Night EFish	900226000035860	575	2211	Fishtrap Creek	5/17/2012	Fishtrap Creek	North Fork Jocko River	468.7
5/17/2012	LCFR-ID Night EFish	985121021199577, 900226000035789 (recap from 4/29/2010)	620	2580	Fishtrap Creek	5/18/2012	Fishtrap Creek	East Fork Bull River	63,000
6/26/2012	LCFR-ID Night EFish	900226000035803	815	6010	Fishtrap Creek	7/2/2012	Fishtrap Creek	Prospect Creek	2,830
6/28/2012	LCFR-ID Night EFish	900226000035797	575	1870	Thompson River below WF TR	7/5/2012	Thompson River	Upper Rock Creek	77,196,300

4.1 Monitoring Movement of Radio Tagged Bull Trout

Telemetry monitoring has been completed by Avista and FWP for bull trout that were captured below Cabinet Gorge Dam between 2008 and 2011 and transported upstream. Bull trout captured below Cabinet Gorge Dam were genetically tested prior to release to identify their most likely population of origin.

One component of the radio telemetry studies included monitoring movement and behavior of bull trout and detecting when bull trout are likely to migrate upstream or approach the Thompson Falls Dam (dam). Between 2008 and 2011, there were a total 15 bull trout with radio transmitters that were genetically assigned to Region 4. Seven of the 15 bull trout were released in Region 4 and monitored, while the other eight bull trout were released in Region 3 to be monitored for upstream movement patterns to the dam.

A summary of the 15 bull trout genetically assigned to Region 4 and monitored between 2008 and 2012 is provided in Table 4-2. The table also includes two additional bull trout that were genetically assigned to Region 3 and were detected near the dam (*refer to* bull trout #16 and #17 in Table 4-2). Table 4-2 provides a summary, in chronological order, of the year the bull trout were implanted with a radio transmitter, radio tag identification, PIT tag identification, genetic assignment, release location, release date, last date of detection, summary of key movements, and when (if applicable) the fish were detected immediately downstream of the dam.

A total of seven bull trout (of the 17 individual bull trout listed in Table 4-2) were detected near the dam. These bull trout are highlighted in Table 4-2. Of the seven bull trout that were detected immediately downstream of the dam, two had been released in Region 4 (upstream of the dam), three bull trout assigned to Region 4 had been released in Region 3 (near Vermilion Bay), and two bull trout assigned to Region 3 had been released in Graves Creek. However, none of the bull trout with radio transmitters were detected in the fish ladder in 2011 or 2012.

Two bull trout assigned to Region 4 that were released upstream of the dam moved downstream and were later detected immediately downstream of the dam (*refer to* bull trout #4 and #7 in Table 4-2). Bull trout #4 (in Table 4-2) moved downstream either through the turbines or over the spillway in May 2010 and was later detected below the dam in late May 2010. Bull trout #4 was last detected in November 2010 below Cabinet Gorge Dam.

Bull trout #7 (in Table 4-2) released upstream of the dam most likely moved downstream through the turbines at the dam in early May 2010 and was later detected below the dam in early June 2010, early October 2010, and late May 2011 before moving downstream of Noxon Rapids Dam and Cabinet Gorge Dam in June and July 2011, respectively. This bull trout was later recaptured below Cabinet Gorge Dam on May 7, 2012 and transported to Fishtrap Creek (Region 4).

The majority of the bull trout that were detected immediately downstream of the dam were identified in the area between May and late June. There was one bull trout detected within a

couple miles of the dam in late March and occasional detections of bull trout near the dam in April (#17 in Table 4-2), early July (#14 in Table 4-2), and early October (#7 in Table 4-2). In 2011, one bull trout (#14 in Table 4-2) was detected below the dam between June 27 and July 13. Flows during July 2010 were approximately double (55,000 to 94,000 cfs) the July average. With the higher than normal water year, water temperatures in the river remained cooler and thermal limitations for bull trout movement in the system was likely not an issue in July.

Additional data collected from four bull trout that ascended the ladder in 2011 and 2012, support the radio telemetry observations that upstream migration appears to occur most frequently in May and June on the ascending limb of the hydrograph. It is likely that the timing of fish movement may vary annually depending on springflow. Although the number of fish recorded at the ladder is small, it is interesting to note that one bull trout ascended the ladder in 2 consecutive years around the same time of year with the first ascent on April 26, 2011 and the second ascent around May 16, 2012. On April 26, 2011, streamflow was approximately 25,900 cfs (and climbing) and water temperature was around 7.8 ºC (in the ladder). In 2012, streamflow was approximately 54,300 cfs (and climbing) and water temperature was between 9.5 and 10.0 ºC (in ladder). In addition, the second bull trout that ascended the ladder on May 15, 2012 was also captured via electrofishing efforts immediately downstream of the dam the previous year on May 31, 2011. These recapture events along with the ladder data and radio telemetry observations indicate that bull trout are likely moving upstream and approaching Thompson Falls Dam in late April to early June. It is noteworthy that these fish were genetically assigned to Fishtrap Creek (or in one case, Meadow Creek, with Fishtrap a close second) and so were probably homing for the vicinity of the Thompson River at this time.

It is important to note that for this evaluation the sample size of fish recorded in the ladder is small and the number of fish observed via radio telemetry is also limited, therefore the information should be interpreted with caution.

Table 4-2: Summary of radio telemetry monitoring of tagged bull trout captured below Cabinet Gorge Dam in 2008-2011, and monitored through 2012. The summary includes all fish assigned to Region 4 and some fish assigned to Region 3 that approached the Thompson Falls Dam.

ID	Year(s) Monitored	Radio Tag	PIT Tag	Genetic Assignment	Release Location (Region)	Release Date	Last Detected	Movements	When Detected Below Thompson Falls Dam
1	2008	149.740	985121001904481	Upper Rock Creek (near Missoula)	Mouth of Cherry Creek (4)	28-Apr-08	7-Jul-08	Detected in July 2008 downstream of Bull River Bay (downstream of Thompson Falls and Noxon Rapids dams). Timing of downstream movement is unknown. Status of fish as alive or dead was unknown at time of detection.	N/A
2	2009	148.500 55	985121001829048	Monture Creek	Clark Fork River near Paradise, Montana (4)	10-Jun-09	25-Jun-09	All detections of this bull trout were upstream of Thompson Falls Dam. Last detection was near the town of Dixon in the lower Flathead River. The transmitter was found in October 2009; an illegal capture of this fish was suspected.	N/A
3	2010	148.480 27	985121021187084	Fishtrap Creek	Thompson River (4)	30-Jun-10	12-Oct-10	Bull trout moved downstream of Thompson Falls Dam between August 23 and September 27, 2010 and last recorded on October 12, 2010 near Vermilion River. Bull trout likely passed through the turbines (PPL Montana, 2011).	September and October 2010 (moving downstream)
4	2010	148.480 28	9851210216753895	Char Creek (Region 1) & Rattlesnake Creek (Region 4)	Thompson River (4)	19-May-10	8-Nov-10	Bull trout detected below Thompson Falls Dam within 14 hours of release. Spill data on May 19, 2010 indicate the fish could have moved downstream either through the turbines or spillways. This fish was detected in the Bull River drainage in September and October 2010 and then last detected below Cabinet Gorge Dam in November 2010.	Detected below Thompson Falls Dam and near the mouth of Prospect Creek between May 24 and June 2, 2010

ID	Year(s) Monitored	Radio Tag	PIT Tag	Genetic Assignment	Release Location (Region)	Release Date	Last Detected	Movements	When Detected Below Thompson Falls Dam
5	2010-2011	148.480 30	9851210216700470	Fishtrap Creek	Thompson River (4)	12-May-10	1-Aug-11	Detected upstream of Thompson Falls Dam throughout duration of transmitter detection. Last detected in Thompson Falls Reservoir (April 27 through August 1, 2011). Tag was recovered on August 1 in reservoir, fish not found.	N/A
6	2010	148.480 31	985121015963939	Fishtrap Creek	Thompson River (4)	19-May-10	12-Oct-10	Remained upstream of Thompson Falls Dam between May 19 and September 28, 2010. Between September 28 and October 12, 2010, the bull trout moved downstream near the Vermilion River. Passage through the dam was likely through the turbines (PPL Montana, 2011).	September and October 2010 (moving downstream)
7	2010-2012	148.480 32	985121021199577 (and second PIT in right cheek, 900226000035789)	Fishtrap Creek	Thompson River (4)	5-May-10	2-Jul-11 (recaptured below CGD 7-May-12)	The bull trout moved downstream of Thompson Falls Dam between May 6 and 11, 2010 and most likely went through the turbines (PPL Montana, 2011). The bull trout was first detected downstream of Thompson Falls Dam on May 11. Fish made several lengthy upstream and downstream migrations and eventually moved downstream of Noxon Rapids Dam on June 14, 2011 and Cabinet Gorge Dam on July 2, 2011. Recaptured below CGD on May 7, 2012 and transported to Fishtrap Creek.	Detected immediately below Thompson Falls Dam between June 2 and 4, 2010; on October 8, 2010; and again on May 26, 2011 near the old powerhouse before moving downstream.

ID	Year(s) Monitored	Radio Tag	PIT Tag	Genetic Assignment	Release Location (Region)	Release Date	Last Detected	Movements	When Detected Below Thompson Falls Dam
8	2011-2012	148.480 26	985121021183536	Meadow Creek (Bitterroot)	Upstream from Vermilion Bay (3)	22-Apr-11	6-May-12	Detected in Prospect between June 27 and October 24, 2011. March 28, 2012 detected near Finley Flats. Fish passed downstream of Noxon Rapids Dam on April 27, 2012 and downstream of Cabinet Gorge Dam on May 6, 2012.	Detected below Thompson Falls Dam on June 1 and 6, 2011.
9	2011	148.480 29	985121021159735	South Fork Jocko River	Upstream from Vermilion Bay (3)	27-Apr-11	19-Dec-11	Last detected in the Clark Fork River near Marten Creek Road. Never detected near the Thompson Falls Dam.	N/A
10	2011	148.500 35	985121021152977	Fishtrap Creek	Upstream from Vermilion Bay (3)	20-May-11	26-Oct-11	Last detected near a remote monitoring station downstream of Cabinet Gorge Dam. Fish moved downstream of Noxon Rapids Dam on June 14, 2011 and Cabinet Gorge Dam in Fall 2011.	N/A
11	2011-2012	148.480 36	985121001919071	Fishtrap Creek	Upstream from Vermilion Bay (3)	8-Jun-11	20-Jun-12	Detected near Graves Creek in July 2011 and then further downstream Fall 2011. Tag was detected in the same area (about 2 miles upstream of Vermilion Bay), between August 1, 2011 and June 20, 2012. It is possible the tag is out of water.	N/A
12	2011	148.500 37	985121021199621	Thompson River	Upstream from Vermilion Bay (3)	25-May-11	6-Dec-11	Bull trout moved downstream of Noxon Rapids Dam on June 21, 2011 and was last detected near the mouth of Rock Creek.	N/A

ID	Year(s) Monitored	Radio Tag	PIT Tag	Genetic Assignment	Release Location (Region)	Release Date	Last Detected	Movements	When Detected Below Thompson Falls Dam
13	2011-2012	148.500 38	985121021203256	Fishtrap Creek	Upstream from Vermilion Bay (3)	8-Jun-11	20-Jun-12	Detected below Thompson Falls Dam between June 9 and July 21, 2011, but then not detected again until October 7, 2011 downstream near the town of Trout Creek. Remained near in the area of Trout Creek through April 2012. Detected below Thompson Falls Dam between May 23 and June 20, 2012.	Detected below Thompson Falls Dam between June 9 and July 21, 2011. Detected below Thompson Falls Dam, May 23-June 20, 2012 (near Blue Creek Bay).
14	2011-2012	148.480 39	985121021146823	Fishtrap Creek	Upstream from Vermilion Bay (3)	23-Jun-11	20-Jun-12	Primarily detected near Vermilion Bay Bridge in 2011 and Swamp Creek Bridge in 2012.	N/A
15	2011	148.480 40	985121021183908	Fishtrap Creek	Upstream from Vermilion Bay (3)	24-Jun-11	13-Jul-11	Last detected near the high bridge at Thompson Falls Dam (PPL Montana, 2011). The ladder was shut down between June 25-July 10 and July 13-August 21, 2011 due to high flows and was operational for a 3 days in July (11-13).	Detected below Thompson Falls Dam between June 27 and July 13, 2011.
16	2010-2011	148.640 52	985121021160572	Graves Creek (Region 3)	Graves Creek (3)	2-Jul-10	30-Mar-11	Detected near the Hwy 200 bridge at Rimrock on March 23 and 30, 2011.	A couple miles downstream of Thompson Falls Dam in late March 2011.
17	2010-2011	148.640 100	985121016755925	Graves Creek (Region 3)	Graves Creek (3)	23-Jul-10	27-Apr-11	Detected below Thompson Falls Dam on April 6 and 12, 2011 and then downstream near Hwy 200 bridge at Rimrock on April 27, 2011.	Detected below Thompson Falls Dam in April 2011.

5.0 Thompson River Drainage (5-Year Reservoir Plan)

Term 5a of the USFWS's Biological Opinion Terms and Conditions states that:

> 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).

In compliance with USFWS's Biological Opinion Terms and Conditions 5a, PPL Montana developed a *5-Year Reservoir Monitoring Plan* (2011-2015) (Plan) (PPL Montana, 2010b). The Plan was developed with the Thompson Falls Technical Advisory Committee (TAC), and approved by the USFWS in 2010. PPL Montana submitted the *5-Year Reservoir Monitoring Plan* to the FERC on June 22, 2010. The FERC issued an Order approving the Plan on February 9, 2011.

The goal of the Plan is to gather information that will assist in developing recommendations to *maximize survival of outmigrant juvenile and adult bull trout through Thompson Falls Reservoir and Dam*. Additionally, there is assumed to be a large enough bull trout population present in the Thompson River drainage that will provide a reasonable sample size to study and gather more data to address the overall goal of the Plan.

The objectives identified in the Plan for the next 5 years (2010-2015) include:

6. Characterization of bull trout in the Thompson River drainage

7. Characterization of the affect that Thompson 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

5.1 Thompson River Drainage Assessment

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 Thompson Falls 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 for the implementation of bull trout protection and enhancement measures is to "boost recruitment of juvenile bull trout and partially mitigate for incidental take of bull trout caused by downstream passage through the turbines and spillways at Thompson Falls Dam" (FWS, 2008).

In 2012, PPL Montana funded the development of a *Thompson River Bull Trout Enhancement and Recovery Plan*, also known as the Thompson River 'Master Plan.' The objective of the Master Plan was to identify projects that focus on the recovery and enhancement of migratory bull trout in the Thompson River drainage. Such projects would be intended to improve the expression of the migratory life history component, thus reducing the selection to residency life history traits that are likely caused or associated with fragmented habitats (e.g., dams, other barriers) or other limiting factors. Increasing the number of juvenile outmigrants is considered a key element to enhancing migratory life history expression in the Thompson River drainage.

In order to evaluate opportunities to enhance migratory bull trout in the Thompson River drainage, PPL Montana completed an analysis identifying potential bull trout habitat patches and critical limiting factors. The results of this analysis will be used to:

1. Identify and prioritize potential bull trout habitat enhancement projects that focus on the recovery of bull trout
2. Identify subwatersheds that would benefit from additional studies or sampling
3. Identify subwatersheds that do not meet the criteria to support bull trout and should not be included on the priority list for further bull trout sampling or habitat improvement

Identifying potential bull trout habitat patches and critical limiting factors will assist in the process of identifying prospective projects to enhance bull trout habitat and recovery.

The analysis in the Master Plan concluded that migratory bull trout utilize two subwatersheds in the Thompson River drainage, the West Fork Thompson River and Fishtrap Creek. To the extent that there are habitat problems in these two watersheds which can be repaired, or habitat functions that can be enhanced, then those efforts will potentially benefit the migratory life

history. For this reason, the Master Plan's authors recommended that these two watersheds have the top priority for any habitat improvement project.

The mainstem Thompson River downstream of Fishtrap Creek is the migratory corridor for bull trout. There is also evidence to indicate that the mainstem Thompson River is used for overwintering by migratory bull trout. Habitat improvement projects which would enhance overwintering habitat, and security for adult bull trout at all times of the year, would be an additional top priority.

Big Rock Creek contains bull trout, but the presence of the migratory component is unknown. As a second priority, the Master Plan's authors recommended that additional research be conducted to determine if the Big Rock Creek bull trout population is migratory. If yes, then additional projects to restore and enhance the bull trout habitat in Big Rock Creek could be planned. In addition, it would mean that the mainstem Thompson River is still being used as a migratory corridor upstream of Fishtrap Creek. In that case, the mainstem Thompson River between Fishtrap Creek and Big Rock Creek would also be added to the priority list for habitat improvement and enhancement.

There are other subwatersheds in the Thompson River drainage which may have the potential to support bull trout. These are Mudd Creek, Alder Creek, Murr Creek, Lazier Creek, Twin Lakes Creek, and Indian Creek. Some of these watersheds have very little fish population data available. The Master Plan's authors recommended that some additional fish surveys be conducted to assess the current status of fish populations in these watersheds, as time and budget allows.

The final Thompson River Master Plan was distributed to the TAC in March 2013.

6.0 Total Dissolved Gas Study

6.1 Methods

6.1.1 Total Dissolved Gas Monitoring

PPL Montana has monitored total dissolved gases (TDG) in the Clark Fork River in the Thompson Falls Hydroelectric Project (Project) area since 2003. All field work and data gathering is conducted by PPL Montana personnel.

Hydrolab Series 4 and 5 DataSondes fitted with TDG sensors 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, the TDG sensors are compared to each other for accuracy and brought to within 1 mmHg of each other if necessary. Sensor membranes are pressure tested by PPL Montana to approximately 1000 mmHg at the beginning of the spill season. Each membrane is used once during the spill season.

TDG is monitored during the high flow season, typically from April until July, with exact dates varying slightly every year. In 2012, TDG monitors were deployed from April 11 to July 27. 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, dissolved oxygen and turbidity are calibrated at the beginning of each 4-week deployment period. During calibrations, sensors are cleaned and batteries replaced. Times and dates are checked. The stated accuracy of the TDG sensor is +/- 1.5 mmHg over a range of 400 to 1400 mmHg.

Barometric pressure (BP) is measured by an Onset Computer Corp HOBO Microstation Barometric Pressure Smart Sensor with a stated error of +/- 1.5 mbar = 1.1 mmHg at 25 ºC and a maximum error of +/- 2.5 mbar = 0.9 mmHg over the temperature range -10 ºC to +60 ºC. The barometer is mounted approximately 6 feet above the floor of the Control Room in the old powerhouse. The elevation of the barometer is approximately 2381.2 msl.

Monitoring sites have varied in some years, but in 2012 the sites monitored were 1) above dam, 2) High Bridge, and 3) Birdland Bay Bridge (Figure 6-1). 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 of where the Dry Channel Dam spill enters the river. The Birdland Bay Bridge monitoring site captures information on the level of TDG entering Noxon Rapids Reservoir. The High Bridge and Birdland Bay Bridge sensors suffered failures during some periods during the 2012 monitoring season. However, the data recovery is sufficiently complete to draw conclusions on TDG in the Clark Fork River during 2012.

Figure 6-1: Monitoring locations for total dissolved gas at the Thompson Falls Hydroelectric Project site.

6.1.2 Impact of Operations on TDG

The Thompson Falls Fish Ladder (ladder) was completed in March 2011; therefore, 2012 was the second year of testing to determine the impact of the ladder and spillway operation on TDG. The Thompson Falls Technical Advisory Committee (TAC) agreed that attracting fish to the ladder would be the priority effort in 2011 and 2012. For that reason, the Main Dam Spillway was operated in a manner estimated to be most beneficial for attracting fish to the fish ladder.

The impact of the spillway operation on TDG was evaluated through comparison with prior years with differing spillway operations.

6.1.3 Gas Bubble Trauma Monitoring

Electrofishing downstream of Thompson Falls Dam between the Main Dam and the Highway 200 Bridge was conducted during high flow time periods in 2012 (Table 6-1). This area was chosen for crew safety and because fish in this reach of river have the highest possibilities of showing symptoms of gas bubble trauma (GBT). Sampling occurred over 2 days when flows

were higher than 50,000 cfs, which is the discharge at which TDG begins to approach 115 percent of saturation at Birdland Bay Bridge.

Table 6-1: Sampling dates for biological sampling for gas bubble trauma in 2012.

Date of sampling	Discharge[3] (cfs)	Water Temperature ºC	# Fish Examined
5/21/2012	56,100	11.1	146
6/25/2012	74,400	14.4	149

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 4 feet 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 meter 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.

6.2 TDG Results

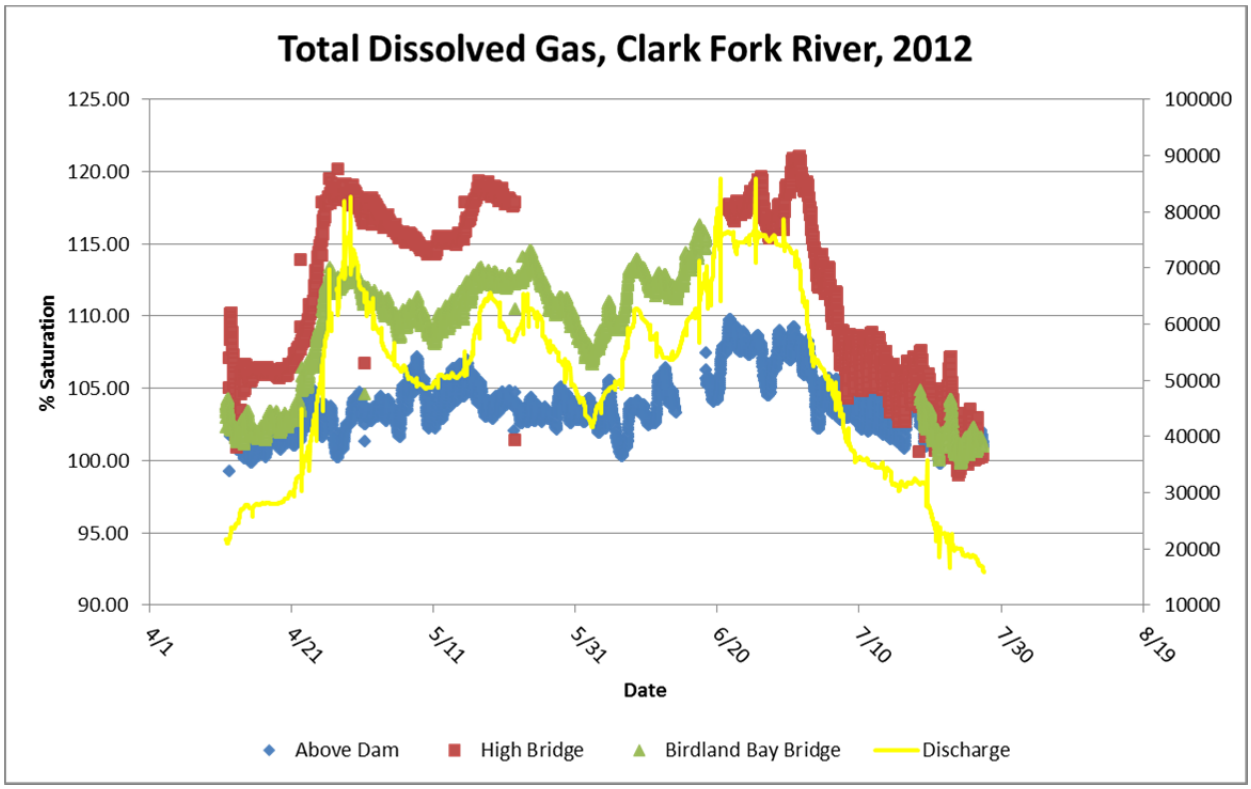
6.2.1 Measurements of TDG in the Project Area

Similar to past years, TDG in 2012 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 (Figures 6-2 and 6-3). TDG levels decline downstream of the High Bridge as a result of flow mixing with powerhouse discharge and, potentially, some degassing as the river moves downstream.

TDG upstream of the Project peaked at approximately 109 percent of saturation during 2012 (Figure 6-2). TDG levels at the High Bridge approached 121 percent of saturation, and TDG at the Birdland Bay Bridge site peaked at approximately 116 percent of saturation in 2012.

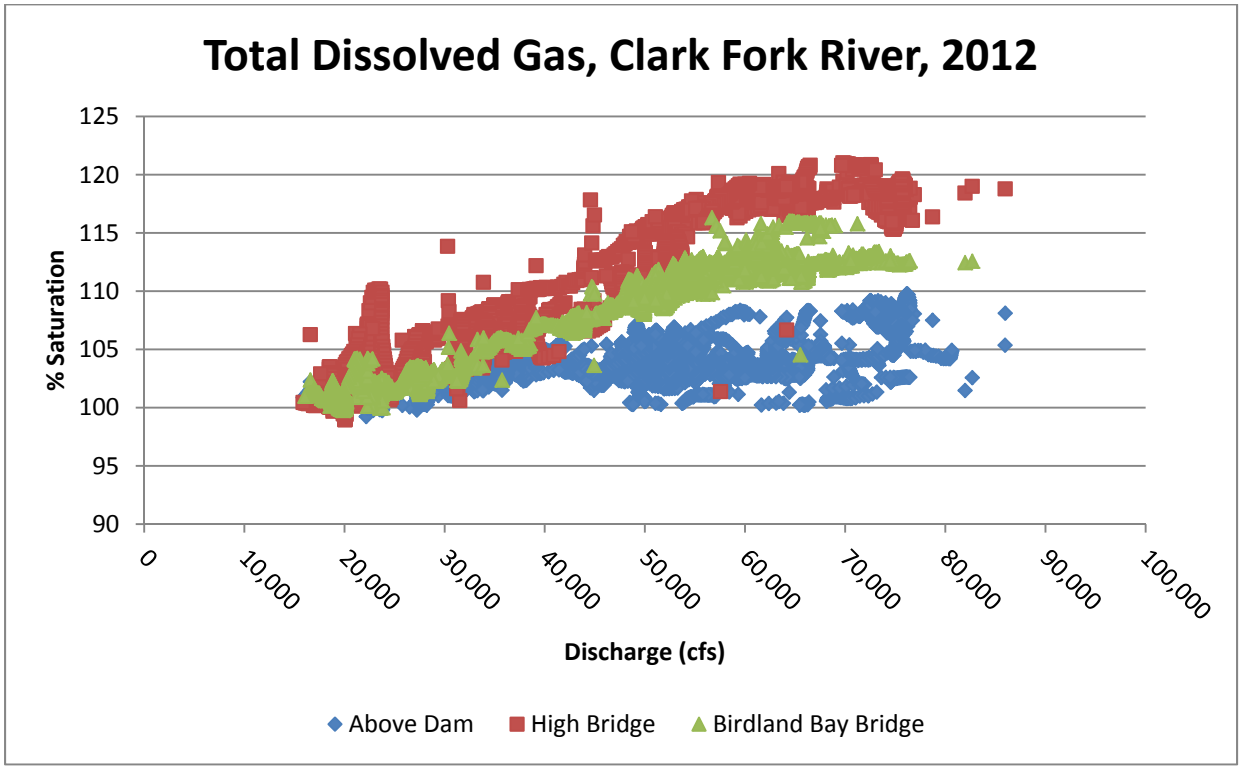
[3] Discharge measured by PPL Montana at the Thompson Falls Hydroelectric Project at noon on the date specified.

Figure 6-2: Total dissolved gas (% of saturation) and discharge (cfs) in the Clark Fork River upstream and downstream of the Thompson Falls Hydropower Project in 2012.



TDG increases with increased river flow, up to a point. Once total discharge reaches about 60,000 cfs, TDG levels tend to stabilize (Figure 6-3).

Figure 6-3: Total dissolved gas (% of saturation) in the Clark Fork River at varying streamflow in 2012.



Tables 6-2 and 6-3 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 in 2012 was similar to previous years. At total river flow between 70,000 and 90,000 cfs, 2012 had much lower TDG than 2011. 2011 was an extreme high flow year in the Clark Fork River, with a long period of peak runoff, and higher than usual TDG. In 2012, TDG levels were more typical to what has been seen in previous years.

Table 6-2: Maximum total dissolved gas recorded over a range of discharge at the Birdland Bay Bridge on the Clark Fork River, Montana. 2003-2012.

Total Flow (thousand cfs)	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
>23, <30	111.5	109.6	107.6	106.7	105.6	113.1	109.5	106.0	107.6	103.61
>30, <40	112.6	109.2	112.7	111.1	108.3	114.8	108.9	111.3	108.3	107.73
>40, <50	111.1	108.9	113.3	115.0	112.8	115.3	112.9	113.8	109.0	111.32
>50, <60	113.9	N/A	114.4	116.7	N/A	119.5	114.6	113.2	112.4	116.32
>60, <70	114.0	N/A	115.1	117.0	N/A	118.2	113.1	N/A	116.4	116.03
>70, <80	114.1	N/A	114.0	117.0	N/A	116.6	N/A	N/A	116.9	115.79
>80, <90	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	120.8	112.58
>90, <100	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	122.3	N/A
>100, <110	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	121.8	N/A
>110, <120	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	121.7	N/A

Table 6-3: Mean total dissolved gas recorded over a range of discharge at the Birdland Bay Bridge on the Clark Fork River, Montana. 2003-2012.

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

6.2.2 Spillway Panel Operations

Photos 6-1 and 6-2 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, PPL Montana 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" compared to the "non-fish" operating schedule indicated that TDG levels were higher by approximately 2-3 percent under the "fish" operating schedule, when total flow is in excess of approximately 45,000 cfs.

A *TDG Control Plan* (PPL Montana, 2010d) was prepared in 2010 which recommended a spillway opening schedule for the Main Dam Spillway that would be a "dual mode" plan (Figure 6-4). 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 Project to enhance fish attraction to the Main Dam to promote adult upstream fish passage, while minimizing potential impacts to TDG.

2012 was the second year that TDG was measured with the ladder in operation. The "Dual Mode" operating schedule for the Main Dam Spillway was implemented, with minor modifications, in order to attract the greatest number of migrating adult fish as possible.

Photo 6-1: The right bank and center bank of the Main Dam at the Thompson Falls Project, with spillway bays numbered.

Photo 6-2: The left bank of the Main Dam at the Thompson Falls Project, with the spillway bays numbered.

Figure 6-4: Spillway operational Plan for the Main Dam Spillway applied in 2012.

Thompson Falls Main Dam Spillway -"Dual Mode" Spill Schedule

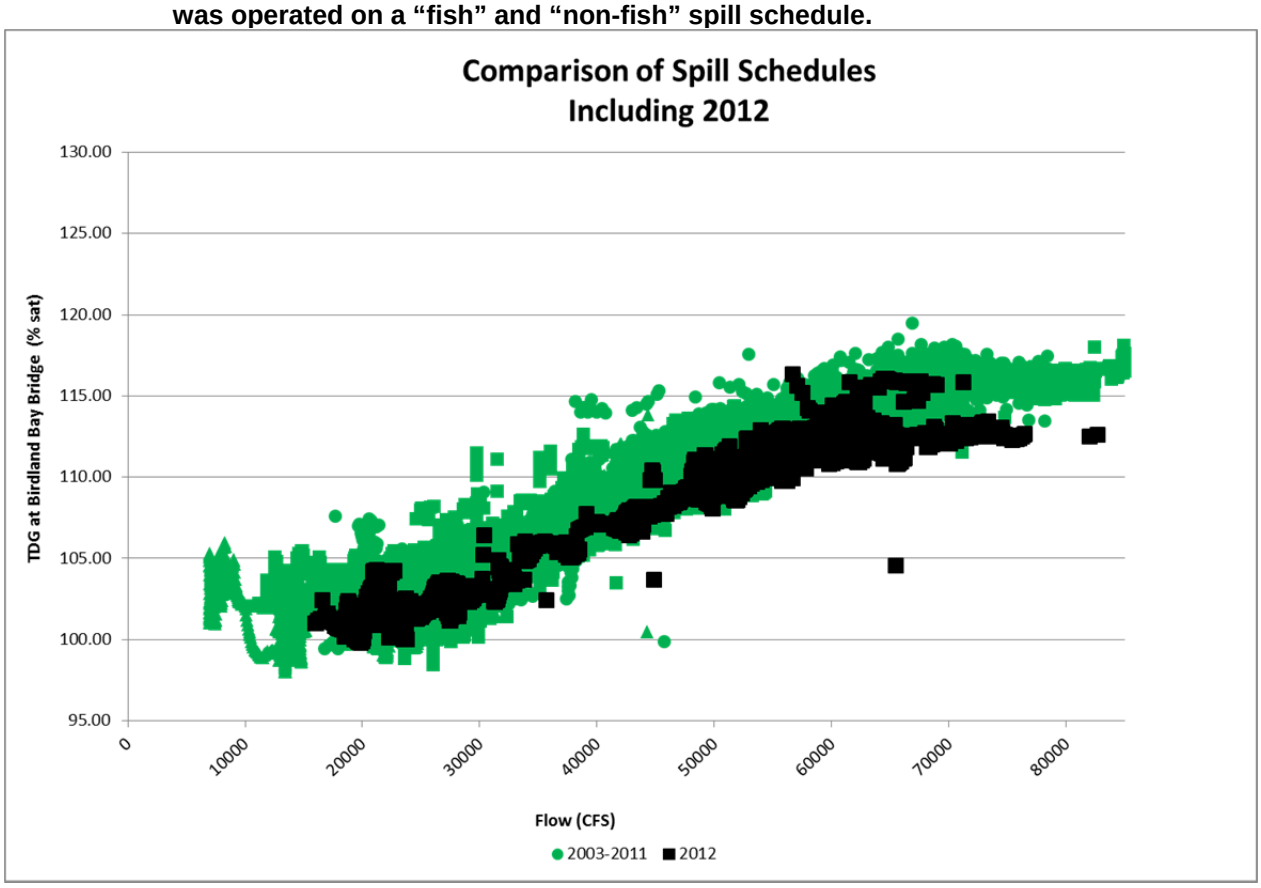
BAY NUMBER																																		Lift Gates	Total Flow (cfs)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36		
			1				1				1																								3	23,705
			1				1				1																	6	6	6	6	6	6	6	6	51	34,985
			1				1		6	6	1																	6	6	6	6	6	6	6	6	63	37,805
			1				1		6	6	1															6	6	6	6	6	6	6	6	6	75	40,625
			1				6	6	6	6	1															6	6	6	6	6	6	6	6	6	86	43,210
			1				6	6	6	6	1												6	6	6	6	6	6	6	6	6	6	6	6	98	46,030
			1		6	6	6	6	6	6	1												6	6	6	6	6	6	6	6	6	6	6	6	110	48,850
			1		6	6	6	6	6	6	1											6	6	6	6	6	6	6	6	6	6	6	6	6	122	51,670
			6	6	6	6	6	6	6	6	1											6	6	6	6	6	6	6	6	6	6	6	6	6	133	54,255
			6	6	6	6	6	6	6	6	1								6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	151	58,485
	6	6	6	6	6	6	6	6	6	6	1								6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	163	61,305
	6	6	6	6	6	6	6	6	6	6	1						6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	175	64,125
6	6	6	6	6	6	6	6	6	6	6	1						6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	181	65,535
DRY CHANNEL SPILLWAY (12 Bays)																																			
6	6	6	6	6	6	6	6	6	6	6	6																							72	82,455
Radial Gates (Bays 16 and 17)																																			
													Both - Full-Open - 11,000 cfs per bay																						104,455

Notes:

1. Numbers under each bay represent the six lift gates in each spill bay
2. Each bay should have all six lift gates opened, before opening lift gates from another bay
3. Closing sequence is opposite of the opening sequence
4. Bays 13 through 15 should never be opened
5. Bays 16 and 17 are radial gates, to be operated in a pre-set manner by operations for forebay elevation control, and load rejection purposes

As shown on Figure 6-5 and Tables 6-2 and 6-3, TDG levels in 2012 compared favorably to past years TDG levels, when compared on a TDG per cfs level. TDG levels at the Birdland Bay Bridge were as low, or lower, than the "non-fish" spillway operating schedule over a wide range of discharge. Therefore, operation of the spillway with the fish ladder in place, in a fish attraction operating mode, did not have a detrimental impact on TDG in the Clark Fork River downstream of the Project.

Figure 6-5: Total Dissolved Gas measurements up to 85,000 cfs at the Birdland Bay Bridge at varying levels of discharge in 2012, and in prior years when the Main Dam Spillway was operated on a "fish" and "non-fish" spill schedule.



6.2.3 GBT Monitoring

Table 6-4 shows the results of the fish impact evaluation done in 2008, 2009, 2011, and 2012. No GBT sampling was done in 2010 due to the short duration of flows in excess of 50,000 cfs. 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 individual species (one largescale sucker, one rainbow trout,

and one smallmouth bass) of the 295 fish representing 11 species were identified as 1 to 5 percent of the fins covered in bubbles.

Table 6-4: Number of fish evaluated for gas bubble trauma (GBT) and the number and types of fish observed to have symptoms of GBT. The three fish observed with signs of GBT in 2012 were all captured on June 25, 2012 when the mean daily streamflow was 74,400 cfs.

Year	# of Fish	# of Species	# of Fish with GBT Symptoms (% of fish sampled)	Species with Symptoms
2008	220	16	1 (0.4%)	L WF
2009	276	14	0	None
2010	No Sampling	-	-	-
2011	949	15	67 (7%)	RB, L WF, LS SU, PUMP, N PMN, LL
2012	295	11	3 (1%)	LS SU, SMB, RB

6.3 Recommendations

TDG levels in 2012 compared favorably to previous years, prior to the construction of the fish ladder at the Main Dam Spillway. Therefore, there is no indication that the fish ladder, or the operation of the Main Dam Spillway, is causing an increase in TDG in the Clark Fork River. It is recommended that the Main Dam Spillway be operated in the same manner as in 2013 as in 2012.

7.0 TAC Funded Projects in 2012

7.1 2012 TAC Funded Projects

The Thompson Falls TAC funded five projects in 2012, including development of a Thompson River bull trout habitat enhancement and recovery plan, genetic testing of bull trout sampled in the Clark Fork River drainage, a habitat improvement project in Fish Creek, a PIT tag array for Prospect Creek, and a bull trout genetic study for a sex identification marker. Results from the bull trout genetic sampling and Fish Creek habitat project are provided below. Results from the Prospect Creek PIT tag study and bull trout bull trout sex identification marker are ongoing and a summary of these projects will be included in the 2013 Annual Report scheduled for submittal in April 2014.

7.1.1 Thompson River Bull Trout Habitat Enhancement and Recovery Plan

Refer to Section 5.0 for a summary of the *Thompson River Bull Trout Habitat Enhancement and Recovery Plan*.

7.1.2 Bull Trout Genetic Sampling

In 2012, PPL Montana allocated approximately $10,000 to bull trout genetic analysis from samples collected in the Clark Fork River drainage to improve the genetic baseline database. Results from bull trout genetic analysis is reported annually by Abernathy Labs. The results of the bull trout sampled in the project area are provided in Section 3.2.10. No additional samples were taken in 2012.

In 2011, juvenile bull trout samples were taken from five tributaries in the Fishtrap Creek drainage (tributary to Thompson River located upstream of Thompson Falls Dam) and sent to Abernathy Labs for analysis. The sampling effort included approximately 50 samples collectively from Fishtrap, Beatrice, Beartrap, Jungle, and West Fork Fishtrap creeks. These samples were added to the baseline dataset for population assignments. The results of the analysis are available in the *Genetic Analysis of Native Salmonids from the Lake Pend Oreille and Clark Fork River System, Idaho and Montana, Annual Report For Calendar Year 2011* (DeHaan et al., 2012).

7.1.3 Fish Creek Large Woody Debris

Trout Unlimited (TU) was awarded $20,000 in 2012 by the Thompson Falls Bull Trout PM&E Fund for strategically adding large woody debris to the Fish Creek drainage to improve bull trout habitat. TU and the FWP proposed to construct engineered logjams in the 3 mile reach from the confluence of the South and

West Forks of Fish Creek downstream to the Big Pine State Park.

Funds from PPL Montana were used to procure two 300 class excavators and operators, as well as labor and other materials, during a 2-week period during low flow conditions in August 2012. This report describes the project activities and includes photos documenting the before and after conditions of the project areas.

7.1.3.1 Methods

TU and partners identified five distinct reaches where large woody debris and pool densities were below reference values. Reaches 1, 2, 3, and 5 were located adjacent to or surrounded by land managed by the Montana Department of Natural Resources and Conservation (DNRC). Therefore, the DNRC Missoula Unit Manager Jon Hansen was involved in site selection, site access, and tree acquisition for those areas. Reach 4 was located on land managed by the FWP. TU and the FWP staff used aerial photo analysis and extensive field identification to establish approximately 25 site locations and delineate access points and stockpile areas for the project. Permits were acquired from the Army Corps of Engineers on August 1, 2012.

Whole trees, most with rootwads, in combination with smaller diameter trees were acquired from along road margins or densely timbered areas outside the riparian area. Trees were stockpiled at the upstream and downstream ends of each reach to minimize equipment haul distances and impacts to riparian areas. The logjam structures were built with seven to 10 large trees, with portions of the trees outside the bankfull channel. This arrangement not only mimics the natural process of trees falling into a stream, but research shows that maximum stability is achieved when greater than 75 percent of the tree bole is on the floodplain or outside the bankfull channel. Trees were passively anchored along the streambank margins by tying them into existing vegetation (cottonwoods or woody vegetation) and boulders and interwoven to maximize weight displacement and stability.

7.1.3.2 Results

In total, 21 large woody debris structures were constructed in Reaches 1 to 5. The structures varied greatly in the number of trees used and their design, depending upon the site configuration and location. Structures were placed in areas that exhibited plane bed morphology, had high width to depth ratios, or were located on outside meander bends where high velocities would produce maximum bed scour. Approximately 239 trees were used in the construction of the logjams. Of the total, 46 trees were cottonwoods and 193 were conifers, mostly Douglas fir. 90 of the trees had substantial rootwads that were used as foundation for the logjams. The project team included a two-person road traffic crew managing public vehicle use on the Fish Creek road system and two excavator operators. One excavator was used for tree acquisition and transport, while the second excavator was used for building the logjams structures. Project design and oversight was primarily spearheaded by TU.

The following information was collected post-project to document project activities and serve as baseline data for future monitoring efforts:

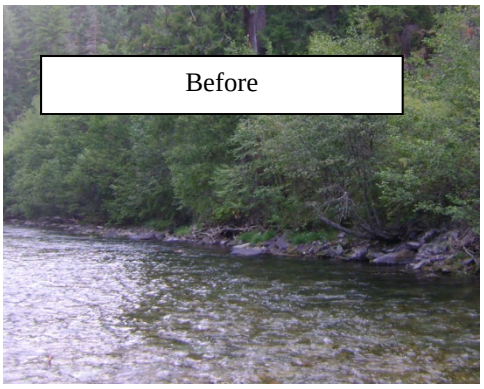
Site	GPS N	GPS W	Photo	Bank (L or R)	Cottonwood # S,M,L	Conifer # S,M,L	Total Trees	Rootwads #
1	46 56' 18.8"	114 41' 01.5"	1,2,3	L	1 1 1	6 5 3	18	7
2	46 56' 24.6"	114 40' 58.7"	4,5,6	R	0 0 2	2 7 0	11	4
3	46 56' 32.5"	114 41' 00.7"	7,8,9	L	1 1 0	3 10 5	20	10
4	46 56' 32.1"	114 40' 55.9"	10,11,12	R	0 5 3	1 5 1	15	3
5	46 56' 42.8"	114 40' 50.1"	13,14,15	L	1 1 4	0 1 0	7	2
6	46 56' 44.2"	114 40' 47.3"	16,17,18	L	3 0 1	2 3 1	10	0
7	46 56' 44.9"	114 40' 43.0"	19,20,21	R	0 0 0	0 2 1	3	1
8	46 56' 46.4"	114 40' 40.8"	22,23,24	L	1 1 1	1 3 0	7	1
9	46 56' 59.1"	114 40' 11.8"	25,26,27	L	0 0 0	0 5 2	7	4
10	46 56' 59.3"	114 40' 12.0"	28,29,30	R	1 2 0	3 7 6	19	10
11	46 57' 04.0"	114 40' 08.0"	31,32,33	R	0 0 0	3 10 2	15	6
12	46 57' 11.9"	114 40' 08.5"	34,35,36	R	0 1 0	7 7 2	17	4
13	46 57' 13.0"	114 40' 09.5"	37,38,39	R	0 0 0	2 7 2	11	6
14	46 56' 59.0"	114 40' 11.9"	40,41,42	L	0 3 2	4 3 0	12	5
15	46 57' 25.0"	114 40' 24.4"	43,44,45	R	0 0 0	6 3 0	9	4
16	46 57' 28.1"	114 40' 29.0"	46,47,48	L	0 0 0	5 7 0	12	3
17	46 57' 45.6"	114 39' 48.5"	49,50,51	L	0 4 1	0 4 2	11	3
18	46 57' 44.2"	114 39' 46.9"	52,53,54	R	0 1 1	0 5 2	9	5
19	46 57' 42.5"	114 39' 43.5"	55,56,57	L	0 0 0	2 3 1	7	3
20	46 57' 41.4"	114 39' 43.4"	58,59,60	R	0 2 0	3 6 3	14	7
21	46 57' 40.5"	114 39' 41.0"	61,62,63	R	0 0 0	1 3 1	5	2

The objectives for the project included the following:

- Increase pool abundance and residual pool depth in mainstem Fish Creek
- Increase the abundance of large woody debris within the bankfull channel

- Increase population densities of native westslope cutthroat trout and bull trout

Post project monitoring will be completed by the FWP and TU. Between 2009 and 2010, the FWP conducted snorkeling and habitat surveys on four reaches of mainstem Fish Creek to determine fish abundance and species composition in relation to habitat. This assessment concluded that the quantity of functioning, in-channel large woody debris in mainstem Fish Creek was below the natural potential in several areas, due to past disturbance and land management. Compared to stream segments with greater complexity, the 3-mile reach from the confluence of the South and West Forks of Fish Creek downstream to the Big Pine State Park had much less instream complexity and 30 to 40 percent lower densities of native fish. Post project snorkel surveys, habitat surveys and wood counts will be used to document the effectiveness of the project in increasing pool depth, abundance of large woody debris and population densities of native fish.



8.0 Compliance with the Terms and Conditions of the Biological Opinion

The sections below provide the seven Terms and Conditions from FWS's Biological Opinion followed by a statement describing PPL Montana's actions of compliance.

8.1 Term and Condition TC1 – Upstream Passage:

8.1.1 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).

8.1.2 Compliance

PPL Montana has completed project activities in compliance with TC1 (a, b, c). PPL Montana obtained the necessary permits for construction of the ladder and completed construction of the Thompson Falls Upstream Fish Passage Facility by fall 2010 [TC 1 (a, b)]. The FERC approved PPL Montana's *Thompson Falls Fish Ladder – Fishway Operations Manual 1.0* (SOP) in an Order issued on June 17, 2011.

PPL Montana will continue to stay in compliance with TC1d for the term of the License. PPL Montana will continue funding for the upstream fish passage facility and operate the facility in conformance with the approved SOP.

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

8.2 TC2 – Downstream Passage

8.2.1 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.

8.2.2 Compliance

In 2012 PPL Montana funded five projects, including the support of maintaining and enhancing the bull trout genetic database for the lower Clark Fork River drainage; a habitat enhancement project in Fish Creek; development of a bull trout habitat enhancement and recovery plan for the Thompson River drainage; a PIT tag array in Prospect Creek; and a bull trout genetic study for a sex identification marker. Details of the 2012 funded activities are provided in Section 7.0.

At the annual Thompson Falls Technical Advisory Committee (TAC) meeting held on December 5, 2012, PPL Montana approved two proposals requesting funding for 2013. The details of the

proposals are provided in Section 9.5 of this report. PPL Montana will continue to collaborate and coordinate with agencies and other entities to support projects in compliance with TC2a.

8.3 TC3 – Gas Supersaturation

8.3.1 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.
>
> 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 DEQ, in order to mitigate GBT concerns.

8.3.2 Compliance

PPL Montana prepared a *Total Dissolved Gas (TDG) Control Plan* (PPL Montana, 2010d) in collaboration with the TAC in October 2010, and submitted that plan to the Montana Department of Environmental Quality (MDEQ). The TDG Control Plan recommends continued monitoring of TDG at the Thompson Falls Hydroelectric Project, and also recommends a spillway operating plan for the Main Dam Spillway. In 2012, the TDG Control Plan was implemented, and the results are reported in Section 6.

PPL Montana 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.

In addition, PPL Montana monitors potential impacts of TDG of fish annually. The results of the 2012 GBT studies are reported in this document. In 2012, no bull trout showed external symptoms of GBT, either in the fish ladder or in the river downstream of the Thompson Falls Hydroelectric Project.

8.4 TC4 – MOU and TAC:

8.4.1 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.

8.4.2 Compliance

The current MOU expires on December 31, 2013. PPL Montana will coordinate with the TAC and FWS to revisit the terms of the MOU in 2013, prior to the expiration of the current agreement.

8.5 TC5 – Thompson Falls Reservoir

8.5.1 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.

8.5.2 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 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

In 2012, PPL Montana funded the development of a *Thompson River Bull Trout Enhancement and Recovery Plan*. The *Thompson River Bull Trout Enhancement and Recovery Plan* was developed, in part, to meet the objective of the *5-Year Reservoir Monitoring Plan* to characterize bull trout in the Thompson River drainage.

PPL Montana will continue the implementation of the *5-Year Reservoir Monitoring Plan* in 2013. In 2015, PPL Montana 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. This evaluation will be completed by December 31, 2015.

8.6 TC6 – System-wide Monitoring:

8.6.1 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 systemwide 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).

8.6.2 Compliance

PPL Montana will comply with these requirements by holding necessary TAC meetings (and sub-committee meetings) in 2013 to ensure compliance and to aggressively address the adaptive needs of the operations of the fish ladder. PPL Montana's proposal to continue bull trout genetic

sampling efforts in the Clark Fork River drainage in 2013 was approved and funded by the TAC during the annual TAC meeting held on December 5, 2012. PPL Montana has completed the construction of the fish ladder, which includes three antennas installed on the weirs. These antennas detect PIT tags as fish move through the ladder. PPL Montana will also continue to collaborate and coordinate with local biologists in support of ongoing and future radio telemetry studies.

8.7 TC7 – Reporting

8.7.1 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.

8.7.2 Compliance

PPL Montana complied with these requirements by preparing this annual report for the work completed in 2012. PPL Montana will continue to submit annual reports of the previous year's activities, fish passage totals, and next year's proposed activities and other fisheries monitoring. 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.

In 2012, PPL Montana collected a total of seven bull trout of which six of the seven were released live. Refer to Table 8-1 for details of the bull trout collected since 2009, including the seven bull trout collected in 2012.

Of the seven bull trout collected in 2012, one bull trout was collected via electrofishing below the dam in April (*refer to* Section 3.2.4 and Appendix C for more details), two bull trout were collected via electrofishing in the upper and lower section of the Thompson Reservoir (*refer to* Section 2.4 for more details) in April, two bull trout ascended the ladder in May (*refer to* Section 3.2.3.2 for more details), and two bull trout were observed electrofishing between Paradise and Plains in October (*refer to* Section 2.3.2 for more details). The following text provides additional details about each bull trout.

A total of two bull trout ascended the Thompson Falls fish ladder in 2012. One was released live upstream while one bull trout jumped out of the holding pool and was found dead. The first bull trout ascended the ladder on May 15, 2012 and was 510 mm and 1,172 g. This bull trout received a full duplex and half duplex PIT tag and was released live upstream of the dam. The second bull trout, found dead outside of the holding pool, was a recapture from 2011. The second bull trout was initially recorded and PIT tagged at the Thompson Falls fish ladder on April 26, 2011. In 2011, the bull trout was measured 547 mm and 1,438 g. This bull trout was detected (via Biomark remote antennas) re-entering the ladder 1 year later, on May 16, 2012. The remote antennas did not detect this bull trout moving out of the ladder and it was not until May 21, 2012 when FWP and PPL Montana personnel checking the ladder found the bull trout dead outside of the holding pool. The bull trout was measured at 563 mm and 1,404 g. PPL Montana contacted Wade Fredenberg, FWS and reported the mortality. In addition, PPL Montana has placed a fence and cover around and over the holding pool to prevent any fish from jumping out of the pool in the future.

A total of five bull trout were collected via electrofishing. One bull trout was collected via electrofishing downstream of the Thompson Falls Dam in April 2012, while the other four bull trout were collected upstream of the Thompson Falls Dam. Of the four bull trout observed upstream of the dam, one was collected in the upper section of the Thompson Reservoir in April 2012 (near confluence with Thompson River), one was collected in the lower section of the Thompson Reservoir in April 2012, and two were collected via electrofishing upstream of the Thompson Falls Dam between the towns of Paradise and Plains in October 2012. All five bull trout were released live after measurements of length and weight were recorded, a genetic sample was taken, and a PIT tag was implanted (*see* Table 8-1).

PPL Montana proposes to continue to provide the following information in future annual reports. PPL Montana will summarize annual activities associated with the evaluation of the fish ladder and include a summary report in the annual report submitted to the FERC by April 1 each year. The annual summary will include, 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 addition PPL Montana will archive electronic versions of all biological progress reports (dating back to 2005) annually by April 1. Sections b, d, and e will be addressed as these situations occur.

Table 8-1: Cumulative incidental "take" of bull trout for the Thompson Falls Project, since January 1, 2009. Note: EF = electrofishing. 2012 fish are listed in bold.

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	PPLM	271	174	98512009494278	Fishtrap Ck	Alive
10/12/10	EF	Clark Fork (Lower)	Clark Fork River, upstream of Island Complex	Long-term Population Monitoring	PPLM	325	240	N/A	Awaiting lab results	Alive
4/13/11	TFalls Ladder	Clark Fork (Lower)	TFalls Ladder	Fish Passage Studies	PPLM/FWP	365	364	985121023302169	Thompson River (R4)	Alive
4/26/11	TFalls Ladder	Clark Fork (Lower)	TFalls Ladder	Fish Passage Studies	PPLM/FWP	547	1438	985121023464730	Fishtrap Creek (R4)	Alive
5/31/11	EF	Clark Fork (Lower)	Below TFalls Ladder	Fish Passage Studies	PPLM/FWP	482	966	985121021877906	Meadow Creek (R4)	Alive
5/31/11	EF	Clark Fork (Lower)	Below TFalls Ladder	Fish Passage Studies	PPLM/FWP	180	50	985121021907887	Fishtrap Creek (R4)	Alive
5/31/11	EF	Clark Fork (Lower)	Below TFalls Ladder	Fish Passage Studies	PPLM/FWP	247	130	985121021914545	Fishtrap Creek (R4)	Alive
4/10/12	**EF**	**Clark Fork (Lower)**	**Below TFalls Ladder**	**Fish Passage Studies**	**PPLM/FWP**	**272**	**150**	**985121027393272**	**Graves Creek (R3)**	**Alive**
4/16/12	**EF**	**Clark Fork (Lower)**	**Thompson Reservoir (Lower Section)**	**Fish Passage Studies**	**PPLM/FWP**	**222**	**76**	**985121027360192**	**Fishtrap Creek (R4)**	**Alive**
4/17/12	**EF**	**Clark Fork (Lower)**	**Thompson Reservoir (Upper Section)**	**Fish Passage Studies**	**PPLM/FWP**	**260**	**140**	**985121027402995**	**Fishtrap Creek (R4)**	**Alive**
5/15/12	**TFalls Ladder**	**Clark Fork (Lower)**	**TFalls Ladder**	**Fish Passage Studies**	**PPLM/FWP**	**510**	**1172**	**985121021877906 (FDX) 982000357016269 (HDX)**	**Meadow Creek (R4)**	**Alive**

Date	Method of Capture	Drainage	Location	Action	Personnel	L (mm)	Wt (g)	PIT tag	Genetic Assignment	Condition at time of release
5/21/12	TFalls Ladder	Clark Fork (Lower)	TFalls Ladder	Fish Passage Studies	PPLM/FWP	563	1404	985121023464730	Fishtrap Creek (R4)	Mortality – Jumped out of Holding Pool at Ladder
10/30/12	EF	Clark Fork (Lower)	Paradise-Plains	Fish Passage Studies	PPLM/FWP	472	800	982000357016135	Monture Creek (R4)	Alive
10/30/12	EF	Clark Fork (Lower)	Paradise-Plains	Fish Passage Studies	PPLM/FWP	444	678	982000357016066	Fish Creek (R4)	Alive

9.0 Proposed Activities for 2013

9.1 Baseline Fisheries Data Collection

In 2013, PPL Montana 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 will be completed every other year (next survey in 2014). Baseline fisheries data will include spring and fall electrofishing and fall gillnetting at the designated sites shown in Figures 3-1 and 3-2. Data collected in 2013 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 2013 baseline fisheries studies will be no more than 10 bull trout.

9.2 Upstream Adult Fish Passage Studies

In 2013, PPL Montana will continue to implement the 10-year (2011-2020) Fish Passage Evaluation Plan that was developed and submitted to the FERC on October 18, 2010 and approved on June 9, 2011. PPL Montana will collect biological and operational data during ladder operations in 2013. PPL Montana 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 which fallback after passing the dam
- Bull trout genetic sampling and tributary assignment

PPL Montana will operate the fish ladder in orifice mode full time during the 2013 season. The fisheries data collected in 2013 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 10-year (2011-2020) Fish Passage Evaluation Plan will occur over multiple years. PPL Montana will provide a status report for the multi-year studies in next year's annual report and a comprehensive report following the completion of each study. A list of the studies and their respective schedule is provided in Table 9-1. Based on prior year's sampling in the Thompson Falls tailrace it is conservatively estimated that incidental take of bull trout during 2013 upstream adult fish passage studies will be no more than 10 bull trout.

Table 9-1: 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	TBD	TBD	TBD	TBD	TBD	TBD	TBD
	Attractant Flow & Radio Telemetry	x (no radio telemetry)	x (no radio telemetry)	x (maximum attractant flow, no radio telemetry)	Re-evaluation, Design 4-year Study Plan	x	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 Report (Dec 31, 2015 – TAC/FWS Submittal)	-	-	-	-	x	-	-	-	-	-
	10-year Report (Dec 31, 2020 – TAC/FWS Submittal)	-	-	-	-	-	-	-	-	-	x

9.2.1 Effectiveness of the Ladder and Operations

Effectiveness of the ladder is 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 fish ladder was designed to operate with flows up to 48,000 cfs, but in 2011 it was successful at capturing fish when total Clark Fork River discharge was approximately 75,000 cfs. In 2012, PPL Montana continued to test the range of streamflow over which the fish ladder collected migrating adult fish and found the ladder functional when flows ranged between 50,000 and 60,000 cfs. During periods of higher spring flow when the ladder was in operation, few fish were observed ascending the ladder. It should also be noted that ladder operations during higher spring flows were dependent on debris and sediment loading. In 2013, the ladder will be operated 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 have been evaluated based on studies of notch versus orifice weir mode and optimal attractant flow. The notch versus orifice weir mode study was implemented in 2011 and 2012. The results from 2011 and 2012 (*see* Section 3.2.8) indicate fish ascend the ladder in both weir modes, but more fish and a greater variety of species are likely to pass more efficiently during orifice mode. Therefore, PPL Montana recommended to the TAC during the December 5, 2012 annual meeting to run the ladder in orifice mode for the entire 2013 season. The TAC members supported this recommendation. Following the 2013 season, PPL Montana will analyze the data and determine if any additional studies regarding weir mode operations at the ladder are recommended.

The attractant flow study began in 2011. PPL Montana originally proposed to use the first 3 years of ladder operations (2011, 2012, 2013) to test variable attraction flows and learn operations. The flexibility to experiment with attractant flows in the first 3 years will help operators and biologists develop a more systematic approach and study design for implementation in 2014.

Based on observations in the first two years of study, PPL Montana has concluded that during non-spill time periods, the HVJ and AWS should be operated at near 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. PPL Montana proposes to continue to use near maximum attractant flow during 2013 operations.

9.2.2 Evaluation of Fish Movement Patterns, Timing, and Behavior

Fish movement patterns, timing, and behavior are evaluated through biological data collected at the fish ladder and radio telemetry data, when available. Bull trout captured 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) in 2013. Region 4 bull trout will be released in Region 4 and Region 3 fish will be released in Region 3 in 2013.

The TAC has concluded that no radio telemetry studies will be conducted by PPL Montana in 2013. 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 2011 and 2012, PPL Montana completed several electrofishing surveys immediately downstream of Thompson Falls Dam and implanted 1,169 unique tags (PIT and Floy) in 9 different fish species, plus one hybrid to evaluate fish movement patterns, timing, and behavior (*refer to* Section 3.2.4). PPL Montana proposes to discontinue the electrofishing and tagging efforts immediately downstream of the dam in future years starting in 2013, with the exception of electrofishing surveys associated with GBT monitoring. This proposal was presented to and approved by the TAC members during the December 5, 2012 Annual TAC meeting.

9.2.3 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.

9.3 Thompson River Drainage Studies (5-Year Reservoir Plan)

In 2013, PPL Montana 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 plan is to gather information that will assist in developing recommendations to *maximize survival of outmigrant juvenile and adult bull trout through Thompson Falls Reservoir and Dam*. Efforts to implement this plan will extend over the next 5 years. Each year PPL Montana will prepare a status report for the annual report. Following the completion of the 5-year monitoring plan, PPL Montana will compile, analyze, and summarize data collected and submit a comprehensive report to FWS by December 31, 2015.

Reservoir monitoring efforts will focus on two key objectives:

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 first objective will be to characterize the present bull trout population in the Thompson River drainage. PPL Montana continues to coordinate with the TAC and FWS to review available historic data, available literature, identify data gaps, and develop an annual work/study plan for data collection in the Thompson River drainage. PPL Montana continues to coordinate with the TAC and FWS to develop annual work plans for data collection addressing known data gaps in the Thompson River drainage.

The second objective will be to characterize the influences that the Thompson Falls Reservoir may have on emigrating bull trout. Through continued consultation with the TAC and FWS, PPL Montana has generated a list of tasks to address the second objective that is outlined in the *5-Year Reservoir Monitoring Plan (2011-2015)*. Because the Thompson River bull trout local population(s) are the ones most likely to be negatively affected by the dam and reservoir (proximity), it is those populations which will be emphasized and evaluated, but in the process of doing so PPL Montana anticipates learning more about potential migrants from and to other local populations further upstream in the Clark Fork River that may share the Thompson Falls Reservoir habitat. At this time, there is nothing to suggest that differential impacts would occur to other populations, but if PPL Montana and the TAC determine otherwise, adjustments can be made to future monitoring efforts.

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.

In 2013, a study plan will be developed for the Thompson River drainage, which is intended for funding and implementation through Montana State University. This study is expected to be initiated in 2014.

9.4 TDG Control Plan and GBT Monitoring

9.4.1 TDG Control Plan

PPL Montana prepared and submitted the *Total Dissolved Gas Control Plan* (PPL Montana, 2010d) to MDEQ in 2010. In this plan PPL Montana 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 Thompson Falls Hydroelectric Project to below Albeni Falls Dam.

Results of the 2012 TDG monitoring were reported to the TAC at the December 2012 meeting, and also in this report (Section 6). During discussion on the TDG monitoring results, the TAC

agreed that in 2013 the Main Dam Spillway will be operated in a manner than mimics the operations in 2012. In addition, the TAC agreed to:

- Consult with the TAC agencies regarding monitoring TDG depending on the stream runoff forecast. Provide streamflow forecasts to TAC members in early spring. PPL Montana will send an email to entire TAC with updates of the spring forecast. PPL Montana will recommend TDG monitoring if the runoff forecast indicates peak flows in excess of 75,000 cfs are likely.
- Make a monitoring decision in April - May in order to get new equipment installed before the beginning of the spring freshet
- Monitor fish for GBT when flows are greater than 75,000 cfs

PPL Montana will prepare a report summarizing results from the 2013 TDG monitoring, if any is conducted, and the proposed spillway operation plan for 2014, in next year's annual report.

9.4.2 GBT Monitoring

GBT monitoring in fish downstream of Thompson Falls Hydroelectric Project will continue in 2013 if the spring runoff exceeds 75,000 cfs. The data collected in 2013, if any, will be summarized and presented in the 2013 Annual Report.

9.5 TAC Proposals for 2013 Funding

The following projects were approved by the Thompson Falls TAC for 2013 funding.

9.5.1 Bull Trout Genetic Monitoring Proposal 2013

Proposal Submitted by: Brent Mabbott, PPL Montana

Location of Proposed Project: Funding may be used with cost-share opportunities and with the TAC's approval. Funding boundaries are the Clark Fork River and tributaries, upstream of Thompson Falls Dam. Sampling areas may extend from Thompson Falls Dam upstream to Rattlesnake Creek (near Missoula), but excludes the Flathead River drainage.

Total Project Cost: Unknown

TAC Funds (Cost-Share) Requested: $10,000

I. Introduction

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 data where needed within the boundaries noted above.

II. Objectives

The objective of this project is to provide funding to enable or update genetic analysis for bull trout populations in the Clark Fork River drainage above Thompson Falls Dam.

III. Methods

Bull trout tissue samples will be collected from 30 to 50 fish for each donor population to determine whether they are genetically pure and to determine genetic mapping for each Clark Fork tributary.

IV. Schedule

Funding will be for approved TAC work in 2013.

V. Personnel

Principle investigators will be identified with each proposal for genetic funding.

VI. Budget

$10,000

FWP and Avista may be asked to cost share, to be determinate based on sampling location.

VII. Deliverables

A detailed analysis/summery report submitted to the TAC for its next annual report.

VIII. Cultural Resources

There will be no ground disturbing actions associated with this activity

TAC VOTE: TAC voted to keep the $10,000 available for genetic sampling in 2013.

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

Proposal Submitted by: Wade Fredenberg and Doug Peterson, USFWS

Location of Proposed Project: Entire lower Clark Fork, including Thompson River drainage downstream to Lake Pend Oreille

Total Project Cost: $67,039

TAC Funds (Cost-Share) Requested: $6,704

I. Introduction

After nearly 15 years of implementation of the Native Salmonid Restoration Plan (NSRP Kleinschmidt, 1998), a large body of monitoring information has been collected in most major tributary drainages to the Lower Clark Fork project area in Montana. Significant efforts have been accomplished to trap and transport juvenile and adult bull trout around the dams, to restore

instream habitat in some watersheds, and to experimentally suppress nonnative fish in a few locations. However, there has not been a systematic effort to capitalize on existing data to strategically prioritize what types of efforts and in which locations are most likely to provide the greatest returns for native fish. This project will build a structured decision model, based on existing spatially explicit datasets, to allow managers to systematically evaluate alternatives, leading to strategic prioritization of mitigation resources. The model will allow us to map which populations (existing or potential) are most likely to contribute to increased population levels of migratory native fish and to prioritize what types of mitigation/management actions are likely to produce the best results. In so doing, we may discover there are existing programs that should be reprioritized into new or other efforts. Additionally, we will be able to better assess project expected increments of improvement over the remaining terms of the FERC License.

II. Objectives

1. Create a patch-based GIS map of important bull trout and westslope cutthroat trout resources of the lower Clark Fork, including watersheds from Cabinet Gorge Dam upstream to Thompson Falls Dam and including the Thompson River Drainage (Due: April 15, 2013).
2. Organize an initial 2-day workshop amongst the Avista AIT and other invited/involved parties (e.g., PPL Montana; USFS) to work on problem definition and objectives and develop a conceptual model to represent those objectives (Due: April 30, 2013).
3. Solicit data from the participants and convert the conceptual model to a quantitative model. The information to develop the model can come from general monitoring and project-derived data; examples include fish species composition and abundance, life-history expression, and site-specific habitat characteristics. (Due: August 1, 2013).
4. Hold a second 2-day workshop to refine the process-based model and analyze various forms of output (Due August 30, 2013). Conduct a second follow-up session if necessary (Due September 1, 2013 if needed).
5. Submit a final report, with the model results articulated in the form of management guidance to achieve predetermined project objectives (e.g., specific activities, where and when, most likely to improve status of bull and cutthroat trout) (Due: December 1, 2013).

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?

By refining the existing body of information into more site-specific (patch-based) management guidance, we will develop a clearer collaborative pathway forward so that on-the-ground actions in the Thompson River drainage to enhance native fish can move forward to implementation. This project will essentially translate the results of the existing Master Planning effort into an action plan. Examples could include activities such as greater emphasis on nonnative fish suppression; refocusing trap and transport program either spatially or temporally, more emphasis

on active or passive fish passage, reprioritizing habitat restoration, barrier removal, or other yet-to-be determined outcomes.

III. Methods

We will use an iterative process to clarify conservation objectives and build a visual representation of those objectives, convert stakeholder knowledge and empirical data into a decision support tool, and finally use that model to evaluate management alternatives. The process will be organized using principles of structured decision analysis (Clemen and Reilly, 2001) for complex ecological problems requiring stakeholder participation and iterative model building (e.g., Cain, 2001; Marcot et al., 2001; Johnson and Weaver, 2009).

Preliminary problem definition

To start the process we will build a template conceptual model that represents our understanding of the mitigation objectives for Native Salmonid Restoration Plan in the Lower Clark Fork project area, and which mitigation/management actions have been implemented to meet those objectives. We will focus on bull trout and westslope cutthroat trout, and the initial objective will be to increase the frequency of large-bodied migratory fish within and among populations. The intent here is not to capture all the mechanistic detail, but rather to describe the problem and objective in general terms and represent that in a form that helps to focus subsequent discussion (Figure 1). The model is necessarily incomplete and will require stakeholder input to refine.

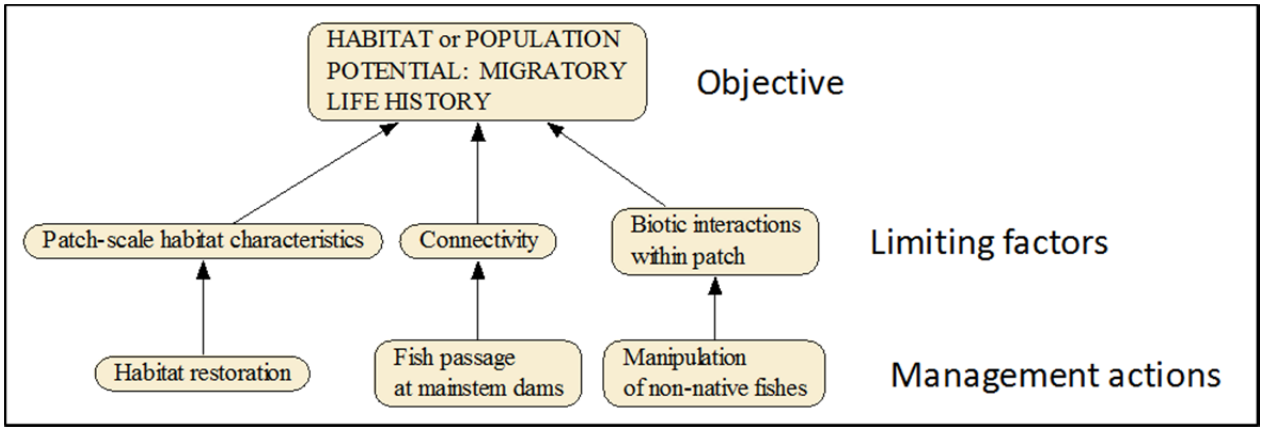


Figure 1. Example of a template conceptual model for the management paradigm of the Native Salmonid Restoration Plan.

Spatial representation of fishery resources

We will conduct a geographic information system (GIS) exercise to map fishery resources in the project area, and attribute a geo-database with relevant environmental and physical data. These data layers will facilitate discussion in subsequent workshops (see below), and create a foundation to display results of the spatially-explicit evaluation of management alternatives. Stream layers and watershed delineations will be based on version 2 of the National Hydrography Dataset Plus (NHDPlus) and its associated digital elevation models (DEMs) (NHDPlus 2012). We will then derive a suite of habitat variables believed correlated with occurrence and density of bull trout and cutthroat trout (e.g., Wenger et al., 2011), that we can

then use to characterize habitat potential. Our initial focus will be to map fishery resources and habitat characteristics at the patch scale, which we define here as spawning and rearing areas for an identifiable population or a set of interacting demes. We can refine these maps as needed to represent data at different spatial scales or levels of biological organization.

Initial workshop

The next step will be to refine and expand, or re-build if necessary, that model through stakeholder input. The method to do this will be a two-day workshop that includes domain experts: individuals with knowledge of the fish populations and their underlying biology, and managers or administrators involved in the mitigation planning process. Diverse experience and viewpoints are essential to this process. The format will be a series of guided discussions to explore aspects of the decision problem, including the management objectives, what is known about the underlying biology, and the effect of past or ongoing mitigation/management efforts. A template conceptual model can help facilitate this process (e.g., Figure 1). One fundamental goal will be to articulate, or re-iterate, a mitigation/management objective, or set of objectives, agreed to by all participants.

The participants will also be expected to provide input on practical aspects of analyzing the decision, especially on the scope and complexity of the decision support model. Some examples include: identifying other potential limiting factors (e.g., Al-Chokhachy et al., 2008) that have emerged since the NSRP was drafted; considering whether mitigation/management actions should be evaluated at the scale of individual patches and populations or as groups of populations (e.g., metapopulations), whether objectives for cutthroat trout should be analyzed separately or jointly, and identifying empirical data to use in the model building and evaluation process. The work product at the end of this workshop will be an evidence-based conceptual model that we can convert to a decision support tool using existing data.

Data compilation and draft decision support model

We will collate and synthesize the available empirical information provided by participants and from the relevant primary literature. With the conceptual model and the data in hand, we will then select an appropriate analytical framework to formally evaluate the mitigation/management objectives for bull trout and cutthroat trout. A number of formats are possible. We can utilize generalized demographic population models for the different species (Rieman and Allendorf, 2001; Post et al., 2003; Peterson et al., 2008), models for habitat potential (Burnett et al., 2007), models for genetic landscapes (Landguth et al., 2011), or a format that can incorporate these as sub-models within a larger modeling construct (e.g., Peterson et al., In Press). Initially we will focus on Bayesian networks as a modeling construct because they can incorporate different forms of information, are transparent, and do a good job at representing uncertainty (Marcot et al., 2001; Newton et al., 2007; Aguilera et al., 2011). Decision trees also may be a suitable alternative (Clemen and Reilly, 2001). Ultimately, the method will be selected based on its ability to link mitigation/management actions with the biology of the fishes, and to assimilate the spatially-explicit empirical data for the project area.

Model refinement and analysis

A second workshop will be held to get feedback on the draft decision support model and conduct a scenario planning exercise. Participants will be the same individuals who helped develop the conceptual model (see above). Workshop participants will familiarize themselves with the quantitative model, and we will conduct real-time analyses of selected mitigation/management scenarios to give the participants a sense of the model's capabilities. The objectives for this workshop are two-fold. First, we want to refine the draft decision support model, as necessary, to ensure that all the important ecological variables and mitigation/management actions are properly represented. Second, we want to solicit input on the specific mitigation/management scenarios to analyze for the final project report. This second objective is equivalent to a "scenario planning exercise" which helps ensure the analysis properly contrasts potential mitigation/management options under uncertainty (Peterson et al. 2003; Johnson and Weaver 2009).

An additional interactive session, either in person or using web-conferencing, may be needed if substantial revisions to the model structure and parameterization are required before analysis of the mitigation/management scenarios.

Final report

The final project report will summarize the interim work products generated by the interactive workshops, document the structure and metadata for the decision support model, and present the analysis of the mitigation/management scenarios. Model output will also be presented as a series of maps, to depict the predicted effect of mitigation/management options for populations and habitats within the project area. Concurrent with the final report, we will organize a web presentation (webinar) to communicate the project results to Avista, the AIT, and other interested parties.

IV. Schedule

This investigation and results will be completed in the last nine months of 2013, in time for incorporation into the 2014 planning process.

V. Personnel

The effort will be conducted with existing data (some of which may need to be summarized or reformatted), under the coordination of the project's principle sponsors (Doug Peterson, contractor; Wade Fredenberg, USFWS, Shana Bernall, Avista).

VI. Budget

Direct Labor	$43,770	
Travel	$4,060	
Materials	$500	
Direct Overhead	$18,709	(USFWS – Abernathy FTC)

TOTAL $67,039

Cost-share and partners – 90% paid by Avista Program = $60,335

10% requested from PPL Montana = $6,704

VII. Deliverables

Output from the model will be used to reprioritize strategic deployment of resources, beginning in 2014. Examples could include activities such as greater emphasis on nonnative fish suppression; refocusing trap and transport program either spatially or temporally, more emphasis on active or passive fish passage, reprioritizing habitat restoration, barrier removal, or other yet-to-be determined outcomes. Direct action in the form of projects to be proposed in 2014 is anticipated.

VIII. Cultural Resources

Not applicable

TAC voted and approved funding for $6,704 during the annual TAC meeting on December 5, 2012.

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Appendix A 2012 Baseline Fish Data Collection

Table A-1: Thompson Falls Reservoir gillnetting sample summary.

Date	NetID	NetType	NetLocation	Area	Latitude	Longitude	Temp	Duration	Set Time	Pull Time
10/12/2012	1a	FWP Experimental	Tfalls Res.	S.Shore. Wild G. Pnd. Across Boat Launch	47.58852	115.33651	10.1	22hrs.0min.	12:50	10:50
10/12/2012	1b	FWP Experimental	Tfalls Res.	S. Shore Wild G.Pnd next to Big Snag	47.58814	115.33336	10.1	21hrs.55min.	13:00	10:55
10/12/2012	2a	FWP Experimental	Tfalls Res.	N.Shore between Powerline and Pipeline	47.57942	115.31928	10.6	21hrs.48min.	13:40	11:28
10/12/2012	4a	FWP Experimental	Tfalls Res.	S.Shore just abv. excavated bnk. w/ rocks	47.56812	115.2957	10.4	21hrs.40min.	14:00	11:40
10/12/2012	6a	FWP Experimental	Abv. TR	N.Shore .75 mls. Abv. TR N.of mid chnnl. Islnd.	47.57809	115.2211	9.9	21hrs.17min.	14:55	12:12
10/12/2012	6b	FWP Experimental	Abv. TR	N. side mid chnnl. Islnd. Off islnd. 75'	47.57753	115.22084	9.4	21hrs.20min	14:45	12:05
10/12/2012	8a	FWP Experimental	Tfalls Res.	S.Shore .5 mls. Upstrm of Cherry Creek	47.57173	115.25995	10	21hrs.29min.	14:25	11:54
10/12/2012	9a	FWP Experimental	Tfalls Res.	N.Shore Wld. G. Pnd. NE corner	47.59103	115.32737	9.9	21hrs.58min.	13:10	11:08
10/12/2012	9b	FWP Experimental	Tfalls Res.	N.Shore Wld G. Pnd. Off of log/rocks	47.5921	115.33022	9.9	21hrs.57min.	13:17	11:14
10/12/2012	10	FWP Experimental	Tfalls Res.	E. Shore Wld. G. Pnd. S. side of pump house	47.58753	115.32697	10.4	21hrs.32min.	13:30	11:02

Table A-2. Fisheries data collected during October 12-13, 2012 fall gillnetting in the Thompson Falls Reservoir.

NetNumber	SpecAbbr	Length	Weight	Comment
1a				No Fish
1b	LS SU	495	1298	
1b	LS SU	466	974	
1b	NP	481	700	
1b	NP	330	186	
1b	NP	255	108	
1b	LS SU	522	1512	
1b	LS SU	491	1176	
1b	NP	376	382	
2a				No Fish
4a	SMB	327	528	
4a	SMB	337	592	
4a	N.PMN	380	574	
4a	SMB	270	282	
4a	N.PMN	344	426	
6a	LS SU	553	1654	
6a	NP	575	1606	
6a	NP	529	984	
6a	NP	651	2284	
6b	LS SU	469	1098	
6b	LS SU	551	1680	
6b	NP	726	3056	
6b	NP	640	2194	
8a	LL	234	106	
9a	NP	751	3616	
9a	NP	673	2384	
9a	LS SU	482	1238	
9a	LS SU	504	1386	
9a	LL	438	734	Pit.# 985121021902518
9a	NP	209	50	
9a	NP	249	84	
9a	LS SU	493	1426	
9b	LS SU	519	1412	
9b	LS SU	467	1096	
9b	NP	381	376	
9b	NP	377	392	

NetNumber	SpecAbbr	Length	Weight	Comment
9b	NP	555	1102	
9b	NP	254	86	
9b	NP	569	1344	
9b	NP	387	442	
9b	NP	285	152	
9b	RB	421	842	
9b	RB	471	1046	
9b	RB	485	1102	Pit.# 985121021876549
9b	RB	401	564	
9b	YP	203	112	
9b	YP	183	84	
9b	YP	212	110	
9b	YP	186	84	
10	NP	577	1416	
10	NP	394	376	
10	NP	548	1154	
10	NP	721	2918	
10	LS SU	471	1246	
10	N.PMN	459	934	

2012 Thompson Falls Reservoir Electrofishing, Lower Section
Sampling Location: N 47.58700, W 115.32805 Date 4/16/12
Sampling Time: Duration (sec): 2,971
Water Temp 7.4 ºC
Data Collectors: BM, JS, HC

Table A-3. Data collected during 2012 electrofishing efforts in Thompson Falls Reservoir, lower section.

Date	Fish Sp	# of Fish	Total L (mm)	Wt (g)	FDX 15-Digit PIT TAG #	Hexadecimal PIT TAG #	Genetic Sample ID	Floy Tag	Fin Clip Location
4/16/2012	BL BH	1	202	142					
4/16/2012	BULL	1	222	76	985-121-027-360-192	3D9.1C2DC-AF5C0	118-098		adipose fin
4/16/2012	LL	1	176	50	985-121-027-378-990	3D9.1C2DC-B3F2E			adipose fin
4/16/2012	LL	1	205	84	985-121-027-376-643	3D9.1C2DC-B3603			adipose fin
4/16/2012	LL	1	181	66	985-121-027-385-700	3D9.1C2DC-B5964			adipose fin
4/16/2012	LL	1	372	828				Y-Floy 16300	
4/16/2012	LL	1	182	58	985-121-027-357-336	3D9.1C2DC-AEA98			adipose fin
4/16/2012	LL	1	91	6					
4/16/2012	LL	1	167	40	985-121-027-363-459	3D9.1C2DC-B0283			adipose fin
4/16/2012	LL	1	196	92					
4/16/2012	LL	1	197	82	985-121-027-366-567	3D9.1C2DC-B0EA7			adipose fin
4/16/2012	LMB	1	395	874				Y-Floy 16515	
4/16/2012	LMB	1	175	76					
4/16/2012	LMB	1	185	92					
4/16/2012	LMB	1	176	72					
4/16/2012	LMB	1	195	100					
4/16/2012	LMB	1	382	610					
4/16/2012	LMB	1	186	86					
4/16/2012	LMB	1	192	104					
4/16/2012	LN SU	1	202	90					
4/16/2012	LN SU	1	326	396					
4/16/2012	LN SU	1	185	62					

Date	Fish Sp	# of Fish	Total L (mm)	Wt (g)	FDX 15-Digit PIT TAG #	Hexadecimal PIT TAG #	Genetic Sample ID	Floy Tag	Fin Clip Location
4/16/2012	LN SU	1	196	84					
4/16/2012	LN SU	1	167	48					
4/16/2012	LN SU	1	175	52					
4/16/2012	LS SU	1	120	18					
4/16/2012	LS SU	1	108	12					
4/16/2012	LS SU	1	500	1052					
4/16/2012	LS SU	1	485	872					
4/16/2012	LS SU	1	110	12					
4/16/2012	LS SU	1	140	20					
4/16/2012	LS SU	1	120	10					
4/16/2012	LS SU	1	140	28					
4/16/2012	LS SU	1	172	52					
4/16/2012	LS SU	1	490	1126					
4/16/2012	LS SU	1	183	58					
4/16/2012	LS SU	1	176	60					
4/16/2012	LS SU	1	550	1922					
4/16/2012	LS SU	1	521	1574					
4/16/2012	LS SU	1	81	56					
4/16/2012	LS SU	1	512	1524					
4/16/2012	LS SU	1	217	104					
4/16/2012	LS SU	1	530	1676					
4/16/2012	LS SU	1	560	2066					
4/16/2012	LS SU	1	470	1154					
4/16/2012	LS SU	1	532	1816					
4/16/2012	LS SU	1	492	1474					
4/16/2012	LS SU	1	167	38					
4/16/2012	MWF	1	312	240					
4/16/2012	N PMN	1	160	34					

Date	Fish Sp	# of Fish	Total L (mm)	Wt (g)	FDX 15-Digit PIT TAG #	Hexadecimal PIT TAG #	Genetic Sample ID	Floy Tag	Fin Clip Location
4/16/2012	N PMN	1	117	14					
4/16/2012	N PMN	1	108	8					
4/16/2012	N PMN	1	150	28					
4/16/2012	N PMN	1	128	20					
4/16/2012	N PMN	1	117	12					
4/16/2012	N PMN	1	122	14					
4/16/2012	N PMN	1	117	10					
4/16/2012	N PMN	1	142	24					
4/16/2012	N PMN	1	121	12					
4/16/2012	N PMN	1	122	18					
4/16/2012	N PMN	1	92	6					
4/16/2012	N PMN	1	126	20					
4/16/2012	N PMN	1	125	16					
4/16/2012	N PMN	1	120	18					
4/16/2012	N PMN	1	76	2					
4/16/2012	N PMN	1	125	16					
4/16/2012	NP	1	455	688				Y-Floy 16298	
4/16/2012	NP	1	302	194				Y-Floy 16299	
4/16/2012	NP	1	278	126				Y-Floy 16514	
4/16/2012	NP	1	312	176				Y-Floy 16518	
4/16/2012	NP	1	311	228				Y-Floy 16522	
4/16/2012	NP	1	400	380				Y-Floy 16521	
4/16/2012	NP	1	475	698				Y-Floy 16520	
4/16/2012	NP	1	552	1258				Y-Floy 16519	
4/16/2012	NP	1	396	376				Y-Floy 16525	
4/16/2012	NP	1	261	110				Y-Floy 16517	
4/16/2012	PEA	1	125	14					

Date	Fish Sp	# of Fish	Total L (mm)	Wt (g)	FDX 15-Digit PIT TAG #	Hexadecimal PIT TAG #	Genetic Sample ID	Floy Tag	Fin Clip Location
4/16/2012	PUMP	1	102	16					
4/16/2012	PUMP	1	83	8					
4/16/2012	RB	1	430	776	985-121-027-390-750	3D9.1C2DC-B6D1E			adipose fin
4/16/2012	RB	1	235	110	985-121-027-349-599	3D9.1C2DC-ACC5F			adipose fin
4/16/2012	RB	1	268	210	985-121-027-409-055	3D9.1C2DC-BB49F			adipose fin
4/16/2012	RB	1	301	290	985-121-027-408-823	3D9.1C2DC-BB3B7			adipose fin
4/16/2012	SMB	1	136	30					
4/16/2012	WCT	1	276	256	985-121-027-369-718	3D9.1C2DC-B1AF6			adipose fin
4/16/2012	WCT	1	242	140	985-121-027-351-893	3D9.1C2DC-AD555			adipose fin
4/16/2012	YP	1	172	72					
4/16/2012	YP	1	165	50					
4/16/2012	YP	1	182	78					
4/16/2012	YP	1	163	56					
4/16/2012	YP	1	122	18					
4/16/2012	YP	1	225	118					
4/16/2012	YP	1	185	86					
4/16/2012	YP	1	170	70					
4/16/2012	YP	1	182	80					
4/16/2012	YP	1	167	64					
4/16/2012	YP	1	202	108					

2012 Thompson Falls Reservoir Electrofishing, Upper Section
Sampling Location: N 47.58700, W 115.32805 Date 4/17/12
Sampling Time: Duration (sec): 6,741
Water Temp 7.2 ºC, Data Collectors: BM, JS, HC

Table A-4. Data collected during 2012 electrofishing efforts in Thompson Falls Reservoir, upper section.

Date	Fish Species	Number of Fish	Total Length (mm)	Weight (g)	FDX 15-Digit PIT TAG #	Hexadecimal PIT TAG #	Genetic Sample ID	Fin Clip Location
4/17/2012	BULL	1	260	140	985-121-027-402-995	3D9.1C2DC-B9CF3	118-094	adipose fin
4/17/2012	LL	1	270	186				
4/17/2012	LL	1	170	46				
4/17/2012	LL	1	192	66				
4/17/2012	LL	1	161	42				
4/17/2012	LL	1	270	166				
4/17/2012	LL	1	190	54				
4/17/2012	LL	1	211	96				
4/17/2012	LL	1	203	82				
4/17/2012	LL	1	232	106				
4/17/2012	LL	1	206	90				
4/17/2012	LL	1	228	114				
4/17/2012	LL	1	163	48				
4/17/2012	LL	1	252	166				
4/17/2012	LL	1	195	60				
4/17/2012	LL	1	182	72				
4/17/2012	LL	1	230	118				
4/17/2012	LL	1	195	76				
4/17/2012	LL	1	245	146				
4/17/2012	LL	1	197	62				
4/17/2012	LL	1	196	74				
4/17/2012	LL	1	435	660				
4/17/2012	MWF	1	160	34				

Date	Fish Species	Number of Fish	Total Length (mm)	Weight (g)	FDX 15-Digit PIT TAG #	Hexadecimal PIT TAG #	Genetic Sample ID	Fin Clip Location
4/17/2012	MWF	1	372	464				
4/17/2012	MWF	1	235	106				
4/17/2012	MWF	1	130	16				
4/17/2012	MWF	1	118	20				
4/17/2012	MWF	1	152	26				
4/17/2012	MWF	1	233	130				
4/17/2012	MWF	1	252	144				
4/17/2012	MWF	1	155	32				
4/17/2012	MWF	1	161	36				
4/17/2012	MWF	1	122	12				
4/17/2012	MWF	1	140	20				
4/17/2012	MWF	1	380	532				
4/17/2012	MWF	1	153	14				
4/17/2012	MWF	1	232	86				
4/17/2012	MWF	1	15	36				
4/17/2012	MWF	1	190	62				
4/17/2012	MWF	1	375	426				
4/17/2012	MWF	1	155	30				
4/17/2012	RB	1	400	654				
4/17/2012	RB	1	175	50				
4/17/2012	RB	1	148	30				
4/17/2012	RB	1	178	50				
4/17/2012	RB	1	300	306				
4/17/2012	RB	1	183	64				
4/17/2012	RB	1	221	98				
4/17/2012	RB	1	180	52				
4/17/2012	RB	1	217	96				
4/17/2012	RB	1	210	96				

Date	Fish Species	Number of Fish	Total Length (mm)	Weight (g)	FDX 15-Digit PIT TAG #	Hexadecimal PIT TAG #	Genetic Sample ID	Fin Clip Location
4/17/2012	RB	1	305	300				
4/17/2012	RB	1	238	124				
4/17/2012	RB	1	228	128				
4/17/2012	RB	1	210	84				
4/17/2012	RB	1	208	98				
4/17/2012	RB	1	181	60				
4/17/2012	RB	1	395	644				
4/17/2012	RB	1	253	176				
4/17/2012	RB	1	222	118				
4/17/2012	RB	1	210	82				
4/17/2012	RB	1	260	180				
4/17/2012	RB	1	220	130				
4/17/2012	RB	1	485	932				
4/17/2012	RB	1	150	30				
4/17/2012	RB	1	223	118				
4/17/2012	RB	1	169	46				
4/17/2012	RB	1	205	60				
4/17/2012	RB	1	221	90				
4/17/2012	RB	1	135	26				
4/17/2012	RB	1	197	60				
4/17/2012	RB	1	190	52				
4/17/2012	RB	1	162	42				
4/17/2012	RB	1	240	138				
4/17/2012	RB	1	157	32				
4/17/2012	RB	1	256	160				
4/17/2012	RB	1	203	86				
4/17/2012	RB	1	189	68				

Date	Fish Species	Number of Fish	Total Length (mm)	Weight (g)	FDX 15-Digit PIT TAG #	Hexadecimal PIT TAG #	Genetic Sample ID	Fin Clip Location
4/17/2012	RB	1	75					
4/17/2012	RB	1	210	82				
4/17/2012	RB	1	150	24				
4/17/2012	RB	1	262	188				
4/17/2012	RB	1	202	86				
4/17/2012	RB	1	178	48				
4/17/2012	RB	1	208	72				
4/17/2012	RB	1	166	48				
4/17/2012	RB	1	152	30				
4/17/2012	RB	1	200	80				
4/17/2012	RBxWCT	1	250	164				
4/17/2012	RBxWCT	1	210	88				
4/17/2012	WCT	1	318	486				
4/17/2012	WCT	1	285	222				

Table A-5. Data collected during 2012 electrofishing efforts in Clark Fork River above Islands. Electrofishing effort was 7,886 seconds on the right bank and 6,808 seconds on the left bank.

Date	Bank	SPECIES	LENGTH	WEIGHT	COUNT	FINCLIP	TAG	COMMENT
10/23/2012	Right Bank	LL	312	290	1			
10/23/2012	Right Bank	MWF	352	332	1			
10/23/2012	Right Bank	MWF	195	54	1			
10/23/2012	Right Bank	MWF	257	186	1			
10/23/2012	Right Bank	MWF	266	164	1			
10/23/2012	Right Bank	MWF	331	274	1			
10/23/2012	Right Bank	MWF	330	274	1			
10/23/2012	Right Bank	MWF	222	100	1			
10/23/2012	Right Bank	MWF	365	382	1			
10/23/2012	Right Bank	MWF	233	126	1			
10/23/2012	Right Bank	MWF	283	178	1			
10/23/2012	Right Bank	MWF	251	122	1			
10/23/2012	Right Bank	MWF	188	62	1			
10/23/2012	Right Bank	MWF	200	60	1			
10/23/2012	Right Bank	MWF	230	106	1			
10/23/2012	Right Bank	MWF	241	108	1			
10/23/2012	Right Bank	MWF	244	136	1			
10/23/2012	Right Bank	WCT	265	176	1			
10/23/2012	Right Bank	MWF	181	44	1			
10/23/2012	Right Bank	RB	275	208	1			
10/23/2012	Right Bank	MWF	203	62	1			
10/23/2012	Right Bank	MWF	203	66	1			
10/23/2012	Right Bank	MWF	376	558	1			
10/23/2012	Right Bank	MWF	298	212	1			
10/23/2012	Right Bank	MWF	250	134	1			
10/23/2012	Right Bank	MWF	378	352	1			

Date	Bank	SPECIES	LENGTH	WEIGHT	COUNT	FINCLIP	TAG	COMMENT
10/23/2012	Right Bank	MWF	345	342	1			
10/23/2012	Right Bank	MWF	205	68	1			
10/23/2012	Right Bank	MWF	238	108	1			
10/23/2012	Right Bank	MWF	335	266	1			
10/23/2012	Right Bank	MWF	195	56	1			
10/23/2012	Right Bank	MWF	331	306	1			
10/23/2012	Right Bank	MWF	195	60	1			
10/23/2012	Right Bank	MWF	240	118	1			
10/23/2012	Right Bank	SMB	213	148	1			
10/23/2012	Right Bank	LS SU	430	714	1			
10/23/2012	Right Bank	LS SU	520	1222	1			
10/23/2012	Right Bank	LS SU	512	1472	1			
10/23/2012	Right Bank	LS SU	472	974	1			
10/23/2012	Right Bank	LS SU	430	834	1			
10/23/2012	Right Bank	N PMN	360	420	1			
10/23/2012	Right Bank	N PMN	469	1000	1			
10/23/2012	Right Bank	N PMN	307	230	1			
10/23/2012	Right Bank	N PMN	481	1072	1			
10/23/2012	Right Bank	N PMN	392	476	1			
10/23/2012	Right Bank	N PMN	418	590	1			
10/23/2012	Right Bank	LS SU	358	478	1			
10/23/2012	Right Bank	LS SU	490	1142	1			
10/23/2012	Right Bank	LS SU	453	856	1			
10/23/2012	Right Bank	LS SU	342	422	1			
10/23/2012	Right Bank	MWF	215	86	1			
10/23/2012	Right Bank	MWF	215	78	1			
10/23/2012	Right Bank	MWF	410	650	1			
10/23/2012	Right Bank	N PMN	458	874	1			

Date	Bank	SPECIES	LENGTH	WEIGHT	COUNT	FINCLIP	TAG	COMMENT
10/23/2012	Right Bank	LL	244	132	1			
10/23/2012	Right Bank	RB	362	508	1			
10/23/2012	Right Bank	MWF	271	180	1			
10/23/2012	Right Bank	MWF	246	126	1			
10/23/2012	Right Bank	MWF	290	154	1			
10/23/2012	Right Bank	MWF	272	160	1			
10/23/2012	Right Bank	MWF	312	272	1			
10/23/2012	Right Bank	MWF	267	158	1			
10/23/2012	Right Bank	MWF	232	90	1			
10/23/2012	Right Bank	MWF	190	56	1			
10/23/2012	Right Bank	MWF	265	144	1			
10/23/2012	Right Bank	MWF	243	112	1			
10/23/2012	Right Bank	MWF	213	76	1			
10/23/2012	Right Bank	MWF	216	70	1			
10/23/2012	Right Bank	MWF	240	106	1			
10/23/2012	Right Bank	MWF	241	98	1			
10/23/2012	Right Bank	MWF	207	64	1			
10/23/2012	Right Bank	MWF	241	122	1			
10/23/2012	Right Bank	RB	290	214	1	AD	985121027434405	Relocation
10/23/2012	Right Bank	MWF	321	258	1			
10/23/2012	Right Bank	MWF	260	138	1			
10/23/2012	Right Bank	MWF	285	184	1			
10/23/2012	Right Bank	MWF	328	210	1			
10/23/2012	Right Bank	MWF	320	262	1			
10/23/2012	Right Bank	MWF	196	60	1			
10/23/2012	Right Bank	MWF	270	146	1			
10/23/2012	Right Bank	MWF	236	104	1			
10/23/2012	Right Bank	MWF	271	148	1			

Date	Bank	SPECIES	LENGTH	WEIGHT	COUNT	FINCLIP	TAG	COMMENT
10/23/2012	Right Bank	MWF	335	244	1			
10/23/2012	Right Bank	MWF	220	94	1			
10/23/2012	Right Bank	MWF	188	56	1			
10/23/2012	Right Bank	MWF	180	52	1			
10/23/2012	Right Bank	LL	280	196	1			
10/23/2012	Right Bank	SMB	288	346	1			
10/23/2012	Right Bank	MWF	212	72	1			
10/23/2012	Right Bank	N PMN	488	1112	1			
10/23/2012	Right Bank	N PMN	365	414	1			
10/23/2012	Right Bank	N PMN	371	466	1			
10/23/2012	Right Bank	N PMN	371	442	1			
10/23/2012	Right Bank	N PMN	322	284	1			
10/23/2012	Right Bank	RB	195	256	1			
10/23/2012	Right Bank	LL	312	280	1			
10/23/2012	Right Bank	RB	215	88	1			
10/23/2012	Right Bank	LS SU	341	392	1			
10/23/2012	Right Bank	LS SU	400	658	1			
10/23/2012	Right Bank	LS SU	352	420	1			
10/23/2012	Right Bank	LS SU	455	962	1			
10/23/2012	Right Bank	LS SU	462	1062	1			
10/23/2012	Right Bank	LS SU	368	522	1			
10/23/2012	Right Bank	LS SU	378	502	1			
10/23/2012	Right Bank	MWF	275	174	1			
10/23/2012	Right Bank	MWF	291	208	1			
10/23/2012	Right Bank	LL	202	74	1			
10/23/2012	Right Bank	MWF	216	76	1			
10/23/2012	Right Bank	MWF	238	114	1			
10/23/2012	Right Bank	MWF	162	30	1			

Date	Bank	SPECIES	LENGTH	WEIGHT	COUNT	FINCLIP	TAG	COMMENT
10/23/2012	Right Bank	N PMN	422	714	1			
10/23/2012	Right Bank	MWF	245	118	1			
10/23/2012	Right Bank	MWF	215	82	1			
10/23/2012	Right Bank	MWF	237	116	1			
10/23/2012	Right Bank	MWF	185	52	1			
10/23/2012	Right Bank	MWF	235	108	1			
10/23/2012	Right Bank	MWF	291	188	1			
10/23/2012	Right Bank	MWF	346	384	1			
10/23/2012	Right Bank	MWF	293	64	1			
10/23/2012	Right Bank	MWF	270	174	1			
10/23/2012	Right Bank	MWF	312	272	1			
10/23/2012	Right Bank	RB	262	200	1			
10/23/2012	Right Bank	MWF	391	450	1			
10/23/2012	Right Bank	MWF	220	78	1			
10/23/2012	Right Bank	MWF	213	78	1			
10/23/2012	Right Bank	MWF	213	78	1			
10/23/2012	Right Bank	MWF	276	170	1			
10/23/2012	Right Bank	MWF	240	108	1			
10/23/2012	Right Bank	MWF	328	268	1			
10/23/2012	Right Bank	MWF	381	374	1			
10/23/2012	Right Bank	RB	205	80	1			
10/23/2012	Right Bank	MWF	253	138	1			
10/23/2012	Right Bank	MWF	202	68	1			
10/23/2012	Right Bank	MWF	180	48	1			
10/23/2012	Right Bank	RS SH	123	16	1			
10/23/2012	Right Bank	RS SH	106	10	1			
10/23/2012	Right Bank	LL	323	316	1			
10/23/2012	Right Bank	N PMN	147	24	1			

Date	Bank	SPECIES	LENGTH	WEIGHT	COUNT	FINCLIP	TAG	COMMENT
10/23/2012	Right Bank	N PMN	350	352	1			
10/23/2012	Right Bank	N PMN	383	466	1			
10/23/2012	Right Bank	N PMN	372	396	1			
10/23/2012	Right Bank	N PMN	365	408	1			
10/23/2012	Right Bank	N PMN	242	342	1			
10/23/2012	Right Bank	N PMN	386	466	1			
10/23/2012	Right Bank	N PMN	345	306	1			
10/23/2012	Right Bank	MWF	217	74	1			
10/23/2012	Right Bank	LS SU	155	30	1			
10/23/2012	Right Bank	LS SU	488	942	1			
10/23/2012	Right Bank	N PMN	452	900	1			
10/23/2012	Right Bank	LS SU	451	836	1			
10/23/2012	Right Bank	MWF	258	146	1			
10/23/2012	Right Bank	MWF	270	182	1			
10/23/2012	Right Bank	MWF	272	168	1			
10/23/2012	Right Bank	MWF	235	130	1			
10/23/2012	Right Bank	MWF	285	178	1			
10/23/2012	Right Bank	MWF	238	108	1			
10/23/2012	Right Bank	NP	510	836	1			
10/23/2012	Right Bank	NP	750	3394	1			
10/23/2012	Right Bank	NP	371	342	1			
10/23/2012	Right Bank	NP	555	1340	1			
10/23/2012	Right Bank	MWF	427	726	1			
10/23/2012	Right Bank	MWF	300	210	1			
10/23/2012	Right Bank	NP	703	2518	1			
10/23/2012	Right Bank	NP	582	1304	1			
10/23/2012	Right Bank	MWF	265	148	1			
10/23/2012	Right Bank	MWF	348	428	1			

Date	Bank	SPECIES	LENGTH	WEIGHT	COUNT	FINCLIP	TAG	COMMENT
10/23/2012	Right Bank	MWF	260	154	1			
10/23/2012	Right Bank	MWF	210	90	1			
10/23/2012	Right Bank	MWF	241	114	1			
10/23/2012	Right Bank	MWF	360	376	1			
10/23/2012	Right Bank	MWF	222	88	1			
10/23/2012	Right Bank	MWF	231	118	1			
10/23/2012	Right Bank	MWF	360	354	1			
10/23/2012	Right Bank	MWF	204	64	1			
10/23/2012	Right Bank	LS SU	520	1316	1			
10/23/2012	Right Bank	LS SU	522	1028	1			
10/23/2012	Right Bank	LS SU	568	1830	1			
10/23/2012	Right Bank	LS SU	535	1396	1			
10/23/2012	Right Bank	LS SU	450	822	1			
10/23/2012	Right Bank	LN SU	410	742	1			
10/23/2012	Right Bank	LS SU	510	1224	1			
10/23/2012	Right Bank	LS SU	532	1464	1			
10/23/2012	Right Bank	RB	310	302	1			
10/23/2012	Right Bank	N PMN	445	834	1			
10/23/2012	Right Bank	MWF	365	412	1			
10/23/2012	Right Bank	MWF	215	82	1			
10/23/2012	Right Bank	MWF	270	174	1			
10/23/2012	Right Bank	MWF	197	770	1			
10/23/2012	Right Bank	MWF	209	88	1			
10/23/2012	Right Bank	MWF	257	162	1			
10/23/2012	Right Bank	MWF	195	80	1			
10/23/2012	Right Bank	MWF	181	48	1			
10/23/2012	Right Bank	MWF	261	150	1			
10/23/2012	Right Bank	RB	300	246	1			

Date	Bank	SPECIES	LENGTH	WEIGHT	COUNT	FINCLIP	TAG	COMMENT
10/23/2012	Right Bank	MWF	316	316	1			
10/23/2012	Right Bank	MWF	200	68	1			
10/23/2012	Right Bank	LS SU	333	324	1			
10/23/2012	Right Bank	MWF	200	66	1			
10/23/2012	Right Bank	MWF	248	152	1			
10/23/2012	Right Bank	MWF	307	272	1			
10/23/2012	Right Bank	MWF	213	78	1			
10/23/2012	Right Bank	MWF	240	102	1			
10/23/2012	Right Bank	MWF	297	218	1			
10/23/2012	Right Bank	MWF	320	272	1			
10/23/2012	Right Bank	MWF	202	76	1			
10/23/2012	Right Bank	MWF	197	60	1			
10/23/2012	Right Bank	MWF	355	436	1			
10/23/2012	Right Bank	MWF	220	84	1			
10/23/2012	Right Bank	NP	558	1174	1			
10/23/2012	Right Bank	RB	205	74	1			
10/23/2012	Right Bank	NP	497	772	1			
10/23/2012	Right Bank	NP	613	1766	1			
10/23/2012	Right Bank	LL	340	364	1			
10/23/2012	Right Bank	LL	299	226	1			
10/23/2012	Right Bank	RB	375	538	1			
10/23/2012	Right Bank	LS SU	560	1884	1			
10/23/2012	Right Bank	LS SU	440	920	1			
10/23/2012	Right Bank	LS SU	553	1408	1			
10/23/2012	Right Bank	LS SU	535	1562	1			
10/23/2012	Right Bank	LS SU	441	846	1			
10/23/2012	Right Bank	LS SU	417	738	1			
10/23/2012	Right Bank	LS SU	450	926	1			

Date	Bank	SPECIES	LENGTH	WEIGHT	COUNT	FINCLIP	TAG	COMMENT
10/23/2012	Right Bank	LS SU	513	1236	1			
10/23/2012	Right Bank	LS SU	480	1060	1			
10/23/2012	Right Bank	LS SU	481	1080	1			
10/23/2012	Right Bank	RB	355	392	1			
10/23/2012	Right Bank	LS SU	523	1472	1			
10/23/2012	Right Bank	LS SU	399	604	1			
10/23/2012	Right Bank	MWF	403	646	1			
10/23/2012	Right Bank	MWF	262	150	1			
10/23/2012	Right Bank	MWF	255	142	1			
10/23/2012	Right Bank	MWF	217	86	1			
10/23/2012	Right Bank	MWF	312	264	1			
10/23/2012	Right Bank	MWF	233	106	1			
10/23/2012	Right Bank	MWF	240	112	1			
10/23/2012	Right Bank	MWF	302	230	1			
10/23/2012	Right Bank	MWF	300	228	1			
10/23/2012	Right Bank	MWF	222	98	1			
10/23/2012	Right Bank	MWF	285	202	1			
10/23/2012	Right Bank	MWF	186	56	1			
10/23/2012	Right Bank	LL	205	74	1			
10/23/2012	Right Bank	MWF	215	78	1			
10/23/2012	Right Bank	MWF	186	54	1			
10/23/2012	Right Bank	MWF	212	82	1			
10/23/2012	Right Bank	MWF	212	78	1			
10/23/2012	Right Bank	N PMN	370	412	1			
10/23/2012	Right Bank	MWF	271	170	1			
10/23/2012	Right Bank	MWF	361	420	1			
10/23/2012	Right Bank	MWF	442	658	1			
10/23/2012	Right Bank	MWF	208	74	1			

Date	Bank	SPECIES	LENGTH	WEIGHT	COUNT	FINCLIP	TAG	COMMENT
10/23/2012	Right Bank	MWF	247	144	1			
10/23/2012	Right Bank	MWF	260	166	1			
10/23/2012	Right Bank	MWF	293	226	1			
10/23/2012	Right Bank	MWF	197	62	1			
10/23/2012	Right Bank	RB	406	566	1			
10/23/2012	Right Bank	NP	348	260	1			
10/23/2012	Right Bank	MWF	207	70	1			
10/23/2012	Right Bank	MWF	120	10	1			
10/23/2012	Right Bank	N PMN	460	776	1			
10/23/2012	Right Bank	N PMN	372	502	1			
10/23/2012	Right Bank	LL	252	150	1			
10/23/2012	Right Bank	RB	262	164	1			
10/23/2012	Right Bank	LS SU	515	1060	1			
10/23/2012	Right Bank	LS SU	448	846	1			
10/23/2012	Right Bank	LS SU	535	1580	1			
10/23/2012	Right Bank	LS SU	537	1708	1			
10/23/2012	Right Bank	LS SU	445	504	1			
10/23/2012	Right Bank	NP	350	300	1			
10/23/2012	Right Bank	LS SU	525	1180	1			
10/23/2012	Right Bank	WCT	300	252	1			
10/23/2012	Right Bank	RB	312	266	1			
10/23/2012	Right Bank	MWF	220	94	1			
10/23/2012	Right Bank	MWF	221	88	1			
10/23/2012	Right Bank	MWF	372	462	1			
10/23/2012	Right Bank	RB	238	126	1			
10/23/2012	Right Bank	LS SU	450	986	1			
10/23/2012	Right Bank	MWF	292	238	1			
10/23/2012	Right Bank	MWF	251	132	1			

Date	Bank	SPECIES	LENGTH	WEIGHT	COUNT	FINCLIP	TAG	COMMENT
10/23/2012	Right Bank	MWF	257	152	1			
10/23/2012	Right Bank	MWF	193	66	1			
10/23/2012	Right Bank	MWF	248	146	1			
10/23/2012	Right Bank	MWF	112	16	1			
10/23/2012	Right Bank	MWF	252	122	1			
10/23/2012	Right Bank	LL	287	194	1			
10/23/2012	Right Bank	MWF	202	68	1			
10/23/2012	Right Bank	MWF	280	84	1			
10/23/2012	Right Bank	RB	270	168	1			
10/23/2012	Right Bank	MWF	392	576	1			
10/23/2012	Right Bank	MWF	275	182	1			
10/23/2012	Right Bank	MWF	204	78	1			
10/23/2012	Right Bank	MWF	340	282	1			
10/23/2012	Right Bank	LL	254	144	1			
10/23/2012	Right Bank	MWF	245	130	1			
10/23/2012	Right Bank	MWF	318	258	1			
10/23/2012	Right Bank	MWF	340	362	1			
10/23/2012	Right Bank	MWF	123	10	1			
10/23/2012	Right Bank	MWF	277	174	1			
10/23/2012	Right Bank	MWF	200	60	1			
10/23/2012	Right Bank	MWF	215	80	1			
10/23/2012	Right Bank	MWF	200	62	1			
10/23/2012	Right Bank	MWF	190	56	1			
10/23/2012	Right Bank	MWF	222	82	1			
10/23/2012	Right Bank	MWF	340	310	1			
10/23/2012	Right Bank	MWF	186	56	1			
10/23/2012	Right Bank	MWF	225	96	1			
10/23/2012	Right Bank	MWF	173	52	1			

Date	Bank	SPECIES	LENGTH	WEIGHT	COUNT	FINCLIP	TAG	COMMENT
10/23/2012	Right Bank	MWF	197	64	1			
10/23/2012	Right Bank	MWF	182	56	1			
10/23/2012	Right Bank	MWF	261	150	1			
10/23/2012	Right Bank	LS SU	401	694	1			
10/23/2012	Right Bank	LS SU	317	298	1			
10/23/2012	Right Bank	LS SU	442	852	1			
10/23/2012	Right Bank	LL	272	188	1			
10/23/2012	Right Bank	MWF	211	78	1			
10/22/2012	Left Bank	N PMN	508	1316	1			
10/22/2012	Left Bank	N PMN	533	1750	1			
10/22/2012	Left Bank	MWF	428	718	1			
10/22/2012	Left Bank	MWF	293	194	1			
10/22/2012	Left Bank	MWF	290	208	1			
10/22/2012	Left Bank	MWF	211	74	1			
10/22/2012	Left Bank	MWF	291	226	1			
10/22/2012	Left Bank	MWF	292	220	1			
10/22/2012	Left Bank	MWF	348	312	1			
10/22/2012	Left Bank	MWF	200	68	1			
10/22/2012	Left Bank	MWF	381	404	1			
10/22/2012	Left Bank	MWF	258	170	1			
10/22/2012	Left Bank	MWF	177	44	1			
10/22/2012	Left Bank	MWF	300	224	1			
10/22/2012	Left Bank	MWF	291	216	1			
10/22/2012	Left Bank	MWF	292	226	1			
10/22/2012	Left Bank	MWF	294	246	1			
10/22/2012	Left Bank	MWF	350	420	1			
10/22/2012	Left Bank	LL	227	102	1			
10/22/2012	Left Bank	LS SU	552	1356	1			

Date	Bank	SPECIES	LENGTH	WEIGHT	COUNT	FINCLIP	TAG	COMMENT
10/22/2012	Left Bank	LS SU	510	1426	1			
10/22/2012	Left Bank	LS SU	421	702	1			
10/22/2012	Left Bank	LS SU	515	1178	1			
10/22/2012	Left Bank	LS SU	453	896	1			
10/22/2012	Left Bank	MWF	290	222	1			
10/22/2012	Left Bank	MWF	231	102	1			
10/22/2012	Left Bank	MWF	195	76	1			
10/22/2012	Left Bank	MWF	238	110	1			
10/22/2012	Left Bank	MWF	230	138	1			
10/22/2012	Left Bank	MWF	362	436	1			
10/22/2012	Left Bank	MWF	342	300	1			
10/22/2012	Left Bank	MWF	264	152	1			
10/22/2012	Left Bank	MWF	283	218	1			
10/22/2012	Left Bank	MWF	346	322	1			
10/22/2012	Left Bank	MWF	396	458	1			
10/22/2012	Left Bank	MWF	267	160	1			
10/22/2012	Left Bank	MWF	242	110	1			
10/22/2012	Left Bank	MWF	280	162	1			
10/22/2012	Left Bank	MWF	351	396	1			
10/22/2012	Left Bank	MWF	304	244	1			
10/22/2012	Left Bank	MWF	260	138	1			
10/22/2012	Left Bank	MWF	282	220	1			
10/22/2012	Left Bank	MWF	221	86	1			
10/22/2012	Left Bank	MWF	361	362	1			
10/22/2012	Left Bank	MWF	300	270	1			
10/22/2012	Left Bank	MWF	196	60	1			
10/22/2012	Left Bank	MWF	233	106	1			
10/22/2012	Left Bank	MWF	263	152	1			

Date	Bank	SPECIES	LENGTH	WEIGHT	COUNT	FINCLIP	TAG	COMMENT
10/22/2012	Left Bank	MWF	246	130	1			
10/22/2012	Left Bank	RB	286	208	1			
10/22/2012	Left Bank	RB	330	348	1			
10/22/2012	Left Bank	RB	341	374	1			
10/22/2012	Left Bank	MWF	206	74	1			
10/22/2012	Left Bank	MWF	197	62	1			
10/22/2012	Left Bank	MWF	186	48	1			
10/22/2012	Left Bank	RB	270	170	1			
10/22/2012	Left Bank	LL	321	296	1			
10/22/2012	Left Bank	MWF	318	268	1			
10/22/2012	Left Bank	MWF	282	186	1			
10/22/2012	Left Bank	MWF	191	54	1			
10/22/2012	Left Bank	MWF	371	494	1			
10/22/2012	Left Bank	MWF	326	290	1			
10/22/2012	Left Bank	MWF	225	88	1			
10/22/2012	Left Bank	MWF	241	122	1			
10/22/2012	Left Bank	MWF	193	54	1			
10/22/2012	Left Bank	MWF	352	378	1			
10/22/2012	Left Bank	MWF	277	190	1			
10/22/2012	Left Bank	MWF	401	428	1			
10/22/2012	Left Bank	MWF	207	68	1			
10/22/2012	Left Bank	MWF	201	60	1			
10/22/2012	Left Bank	LS SU	347	406	1			
10/22/2012	Left Bank	LS SU	475	978	1			
10/22/2012	Left Bank	LS SU	447	878	1			
10/22/2012	Left Bank	LS SU	540	1488	1			
10/22/2012	Left Bank	LS SU	426	780	1			
10/22/2012	Left Bank	LS SU	352	462	1			

Date	Bank	SPECIES	LENGTH	WEIGHT	COUNT	FINCLIP	TAG	COMMENT
10/22/2012	Left Bank	LS SU	337	384	1			
10/22/2012	Left Bank	LS SU	536	1392	1			
10/22/2012	Left Bank	LS SU	562	1632	1			
10/22/2012	Left Bank	LS SU	485	1102	1			
10/22/2012	Left Bank	N PMN	357	364	1			Blind Eye Right
10/22/2012	Left Bank	MWF	362	400	1			
10/22/2012	Left Bank	MWF	315	240	1			
10/22/2012	Left Bank	MWF	195	50	1			
10/22/2012	Left Bank	MWF	285	174	1			
10/22/2012	Left Bank	MWF	271	164	1			
10/22/2012	Left Bank	MWF	192	54	1			
10/22/2012	Left Bank	MWF	337	310	1			
10/22/2012	Left Bank	MWF	286	210	1			
10/22/2012	Left Bank	MWF	202	74	1			
10/22/2012	Left Bank	MWF	302	206	1			
10/22/2012	Left Bank	MWF	245	130	1			
10/22/2012	Left Bank	MWF	272	180	1			
10/22/2012	Left Bank	MWF	330	358	1			
10/22/2012	Left Bank	MWF	361	372	1			
10/22/2012	Left Bank	MWF	351	380	1			
10/22/2012	Left Bank	MWF	200	72	1			
10/22/2012	Left Bank	MWF	221	96	1			
10/22/2012	Left Bank	MWF	267	168	1			
10/22/2012	Left Bank	MWF	258	146	1			
10/22/2012	Left Bank	MWF	290	202	1			
10/22/2012	Left Bank	MWF	366	486	1			
10/22/2012	Left Bank	MWF	258	156	1			

Date	Bank	SPECIES	LENGTH	WEIGHT	COUNT	FINCLIP	TAG	COMMENT
10/22/2012	Left Bank	MWF	346	402	1			
10/22/2012	Left Bank	MWF	350	334	1			
10/22/2012	Left Bank	MWF	252	138	1			
10/22/2012	Left Bank	MWF	257	142	1			
10/22/2012	Left Bank	MWF	187	56	1			
10/22/2012	Left Bank	MWF	296	204	1			
10/22/2012	Left Bank	MWF	305	240	1			
10/22/2012	Left Bank	MWF	284	194	1			
10/22/2012	Left Bank	MWF	280	170	1			
10/22/2012	Left Bank	MWF	253	132	1			
10/22/2012	Left Bank	MWF	260	142	1			
10/22/2012	Left Bank	MWF	270	156	1			
10/22/2012	Left Bank	MWF	286	202	1			
10/22/2012	Left Bank	MWF	208	72	1			
10/22/2012	Left Bank	MWF	257	160	1			
10/22/2012	Left Bank	MWF	195	62	1			
10/22/2012	Left Bank	RB	333	344	1			
10/22/2012	Left Bank	LS SU	542	1524	1			
10/22/2012	Left Bank	LS SU	555	1476	1			
10/22/2012	Left Bank	LS SU	535	1450	1			
10/22/2012	Left Bank	LS SU	479	1078	1			
10/22/2012	Left Bank	LS SU	542	1402	1			
10/22/2012	Left Bank	LS SU	361	460	1			
10/22/2012	Left Bank	LS SU	382	546	1			
10/22/2012	Left Bank	LS SU	461	1008	1			
10/22/2012	Left Bank	LS SU	360	462	1			
10/22/2012	Left Bank	LS SU	335	426	1			
10/22/2012	Left Bank	N PMN	370	414	1			

Date	Bank	SPECIES	LENGTH	WEIGHT	COUNT	FINCLIP	TAG	COMMENT
10/22/2012	Left Bank	N PMN	353	316	1			
10/22/2012	Left Bank	N PMN	357	408	1			
10/22/2012	Left Bank	MWF	243	108	1			
10/22/2012	Left Bank	LS SU	308	286	1			
10/22/2012	Left Bank	MWF	177	42	1			
10/22/2012	Left Bank	MWF	243	116	1			
10/22/2012	Left Bank	MWF	358	374	1			
10/22/2012	Left Bank	MWF	330	350	1			
10/22/2012	Left Bank	MWF	208	74	1			
10/22/2012	Left Bank	MWF	350	428	1			
10/22/2012	Left Bank	MWF	302	216	1			Bird Wound
10/22/2012	Left Bank	MWF	305	226	1			
10/22/2012	Left Bank	MWF	290	536	1			
10/22/2012	Left Bank	MWF	372	346	1			
10/22/2012	Left Bank	RB	256	170	1			
10/22/2012	Left Bank	MWF	245	122	1			
10/22/2012	Left Bank	MWF	397	548	1			
10/22/2012	Left Bank	MWF	292	224	1			
10/22/2012	Left Bank	MWF	321	250	1			
10/22/2012	Left Bank	MWF	293	214	1			
10/22/2012	Left Bank	MWF	225	256	1			
10/22/2012	Left Bank	MWF	208	62	1			
10/22/2012	Left Bank	MWF	256	128	1			
10/22/2012	Left Bank	MWF	228	82	1			
10/22/2012	Left Bank	MWF	291	194	1			
10/22/2012	Left Bank	MWF	197	60	1			
10/22/2012	Left Bank	MWF	230	88	1			
10/22/2012	Left Bank	MWF	415	484	1			

Date	Bank	SPECIES	LENGTH	WEIGHT	COUNT	FINCLIP	TAG	COMMENT
10/22/2012	Left Bank	MWF	355	292	1			
10/22/2012	Left Bank	MWF	245	112	1			
10/22/2012	Left Bank	MWF	183	42	1			
10/22/2012	Left Bank	RB	227	110	1			
10/22/2012	Left Bank	MWF	317	278	1			
10/22/2012	Left Bank	MWF	235	96	1			
10/22/2012	Left Bank	MWF	357	380	1			
10/22/2012	Left Bank	MWF	233	102	1			
10/22/2012	Left Bank	RB	400	564	1			
10/22/2012	Left Bank	MWF	327	314	1			
10/22/2012	Left Bank	MWF	256	132	1			
10/22/2012	Left Bank	MWF	307	246	1			
10/22/2012	Left Bank	MWF	333	314	1			
10/22/2012	Left Bank	MWF	208	74	1			
10/22/2012	Left Bank	MWF	353	346	1			
10/22/2012	Left Bank	MWF	386	478	1			
10/22/2012	Left Bank	MWF	351	268	1			
10/22/2012	Left Bank	MWF	315	310	1			
10/22/2012	Left Bank	MWF	292	198	1			
10/22/2012	Left Bank	MWF	247	130	1			
10/22/2012	Left Bank	MWF	301	224	1			
10/22/2012	Left Bank	MWF	277	42	1			
10/22/2012	Left Bank	MWF	231	96	1			
10/22/2012	Left Bank	MWF	216	72	1			
10/22/2012	Left Bank	LL	270	160	1			
10/22/2012	Left Bank	MWF	256	148	1			
10/22/2012	Left Bank	MWF	322	272	1			
10/22/2012	Left Bank	MWF	294	216	1			

Date	Bank	SPECIES	LENGTH	WEIGHT	COUNT	FINCLIP	TAG	COMMENT
10/22/2012	Left Bank	MWF	250	122	1			
10/22/2012	Left Bank	MWF	308	220	1			
10/22/2012	Left Bank	MWF	195	42	1			
10/22/2012	Left Bank	MWF	275	150	1			
10/22/2012	Left Bank	MWF	338	288	1			
10/22/2012	Left Bank	MWF	248	150	1			
10/22/2012	Left Bank	MWF	280	192	1			
10/22/2012	Left Bank	LS SU	455	878	1			
10/22/2012	Left Bank	LS SU	420	746	1			
10/22/2012	Left Bank	LS SU	456	924	1			
10/22/2012	Left Bank	LS SU	500	918	1			
10/22/2012	Left Bank	LS SU	427	792	1			
10/22/2012	Left Bank	LS SU	440	960	1			
10/22/2012	Left Bank	LS SU	469	1030	1			
10/22/2012	Left Bank	N PMN	541	1540	1			
10/22/2012	Left Bank	N PMN	463	928	1			
10/22/2012	Left Bank	N PMN	361	416	1			
10/22/2012	Left Bank	N PMN	375	418	1			
10/22/2012	Left Bank	N PMN	372	444	1			
10/22/2012	Left Bank	N PMN	381	452	1			
10/22/2012	Left Bank	LS SU	512	1324	1			
10/22/2012	Left Bank	LS SU	335	372	1			
10/22/2012	Left Bank	LS SU	315	290	1			
10/22/2012	Left Bank	RB	258	196	1			
10/22/2012	Left Bank	MWF	303	246	1			
10/22/2012	Left Bank	RB	321	352	1			
10/22/2012	Left Bank	RB	358	392	1			
10/22/2012	Left Bank	RB	313	298	1			

Date	Bank	SPECIES	LENGTH	WEIGHT	COUNT	FINCLIP	TAG	COMMENT
10/22/2012	Left Bank	MWF	202	66	1			
10/22/2012	Left Bank	MWF	270	180	1			
10/22/2012	Left Bank	MWF	317	270	1			
10/22/2012	Left Bank	MWF	390	416	1			
10/22/2012	Left Bank	MWF	238	114	1			
10/22/2012	Left Bank	MWF	193	58	1			
10/22/2012	Left Bank	MWF	265	152	1			
10/22/2012	Left Bank	MWF	195	54	1			
10/22/2012	Left Bank	MWF	285	192	1			
10/22/2012	Left Bank	MWF	210	76	1			
10/22/2012	Left Bank	MWF	217	76	1			
10/22/2012	Left Bank	MWF	255	142	1			
10/22/2012	Left Bank	MWF	250	124	1			
10/22/2012	Left Bank	N PMN	490	1058	1			
10/22/2012	Left Bank	N PMN	370	424	1			
10/22/2012	Left Bank	N PMN	461	772	1			
10/22/2012	Left Bank	N PMN	417	634	1			
10/22/2012	Left Bank	N PMN	462	886	1			
10/22/2012	Left Bank	N PMN	483	938	1			
10/22/2012	Left Bank	N PMN	483	1040	1			
10/22/2012	Left Bank	LS SU	440	792	1			
10/22/2012	Left Bank	LS SU	550	1720	1			
10/22/2012	Left Bank	LS SU	525	1138	1			
10/22/2012	Left Bank	LS SU	523	1356	1			
10/22/2012	Left Bank	LS SU	452	1044	1			
10/22/2012	Left Bank	MWF	220	46	1			
10/22/2012	Left Bank	MWF	245	124	1			
10/22/2012	Left Bank	RB	321	318	1			

Date	Bank	SPECIES	LENGTH	WEIGHT	COUNT	FINCLIP	TAG	COMMENT
10/22/2012	Left Bank	RB	471	1142	1			
10/22/2012	Left Bank	RB	340	364	1	AD	985121027405602	Relocation
10/22/2012	Left Bank	MWF	360	398	1			
10/22/2012	Left Bank	MWF	194	66	1			
10/22/2012	Left Bank	MWF	262	158	1			
10/22/2012	Left Bank	MWF	200	64	1			
10/22/2012	Left Bank	MWF	267	158	1			
10/22/2012	Left Bank	MWF	405	528	1			
10/22/2012	Left Bank	MWF	210	74	1			
10/22/2012	Left Bank	MWF	307	242	1			
10/22/2012	Left Bank	MWF	245	120	1			
10/22/2012	Left Bank	MWF	226	90	1			
10/22/2012	Left Bank	MWF	258	152	1			
10/22/2012	Left Bank	RB	338	422	1			
10/22/2012	Left Bank	MWF	340	354	1			
10/22/2012	Left Bank	MWF	327	262	1			
10/22/2012	Left Bank	MWF	267	152	1			
10/22/2012	Left Bank	MWF	192	40	1			
10/22/2012	Left Bank	MWF	111	6	1			
10/22/2012	Left Bank	MWF	191	30	1			
10/22/2012	Left Bank	N PMN	528	1262	1			
10/22/2012	Left Bank	N PMN	551	1736	1			
10/22/2012	Left Bank	LS SU	552	1634	1			
10/22/2012	Left Bank	LS SU	560	1858	1			
10/22/2012	Left Bank	LS SU	552	1546	1			
10/22/2012	Left Bank	LS SU	519	1360	1			
10/22/2012	Left Bank	LS SU	512	1248	1			
10/22/2012	Left Bank	LS SU	437	872	1			

Date	Bank	SPECIES	LENGTH	WEIGHT	COUNT	FINCLIP	TAG	COMMENT
10/22/2012	Left Bank	LS SU	342	344	1			
10/22/2012	Left Bank	MWF	280	198	1			
10/22/2012	Left Bank	MWF	191	56	1			
10/22/2012	Left Bank	MWF	330	216	1			
10/22/2012	Left Bank	MWF	270	152	1			
10/22/2012	Left Bank	MWF	212	76	1			
10/22/2012	Left Bank	NP	325	190	1			
10/22/2012	Left Bank	RB	430	712	1	AD	985121027366869	Relocation
10/22/2012	Left Bank	MWF	212	80	1			
10/22/2012	Left Bank	MWF	232	112	1			
10/22/2012	Left Bank	MWF	326	288	1			
10/22/2012	Left Bank	RB	362	504	1			
10/22/2012	Left Bank	RB	351	418	1	AD	985121027431379	Relocation
10/22/2012	Left Bank	LS SU	555	1560	1			
10/22/2012	Left Bank	LS SU	513	1190	1			
10/22/2012	Left Bank	LS SU	471	1030	1			
10/22/2012	Left Bank	MWF	213	90	1			
10/22/2012	Left Bank	MWF	306	242	1			
10/22/2012	Left Bank	MWF	231	104	1			
10/22/2012	Left Bank	MWF	260	144	1			
10/22/2012	Left Bank	MWF	260	148	1			
10/22/2012	Left Bank	MWF	203	68	1			
10/22/2012	Left Bank	MWF	331	294	1			
10/22/2012	Left Bank	MWF	265	166	1			
10/22/2012	Left Bank	MWF	222	86	1			
10/22/2012	Left Bank	MWF	250	116	1			
10/22/2012	Left Bank	MWF	230	84	1			
10/22/2012	Left Bank	MWF	352	396	1			

Date	Bank	SPECIES	LENGTH	WEIGHT	COUNT	FINCLIP	TAG	COMMENT
10/22/2012	Left Bank	MWF	255	138	1			
10/22/2012	Left Bank	MWF	241	132	1			
10/22/2012	Left Bank	WCT x RB	231	110	1			
10/22/2012	Left Bank	N PMN	415	652	1			
10/22/2012	Left Bank	N PMN	540	1312	1			
10/22/2012	Left Bank	LS SU	521	1416	1			
10/22/2012	Left Bank	RB	335	376	1			

Table A-6. Data collected during 2012 electrofishing efforts in Clark Fork River from Paradise to Plains. Electrofishing effort was 6,564 seconds on the right bank and 7,423 seconds on the left bank.

Date	Bank	SPECIES	LENGTH	WEIGHT	COUNT	TAG	GENETICS	COMMENT
30-Oct-12	Left	BULL	472	800	1	HDX# 982000357016135	118-074	
30-Oct-12	Left	LL	308	272	1			
30-Oct-12	Left	LL	110	10	1			
30-Oct-12	Left	LL	229	100	1			
30-Oct-12	Left	LL	332	322	1			
30-Oct-12	Left	LL	260	184	1			
30-Oct-12	Left	LL	447	828	1			
30-Oct-12	Left	LL	247	142	1			
30-Oct-12	Left	LL	221	96	1			
30-Oct-12	Left	LS SU	567	1236	1			
30-Oct-12	Left	LS SU	550	1236	1			
30-Oct-12	Left	LS SU	465	1060	1			
30-Oct-12	Left	LS SU	317	310	1			
30-Oct-12	Left	LS SU	261	170	1			
30-Oct-12	Left	LS SU	253	164	1			
30-Oct-12	Left	LS SU	320	308	1			
30-Oct-12	Left	LS SU	282	222	1			
30-Oct-12	Left	LS SU	275	222	1			
30-Oct-12	Left	LS SU	215	110	1			
30-Oct-12	Left	LS SU	303	280	1			
30-Oct-12	Left	LS SU	230	112	1			
30-Oct-12	Left	LS SU	290	228	1			
30-Oct-12	Left	LS SU	257	162	1			
30-Oct-12	Left	LS SU	510	1268	1			
30-Oct-12	Left	LS SU	322	406	1			
30-Oct-12	Left	LS SU	173	52	1			

Date	Bank	SPECIES	LENGTH	WEIGHT	COUNT	TAG	GENETICS	COMMENT
30-Oct-12	Left	LS SU	207	84	1			
30-Oct-12	Left	LS SU	285	228	1			
30-Oct-12	Left	LS SU	255	148	1			
30-Oct-12	Left	LS SU	155	30	1			
30-Oct-12	Left	LS SU	143	22	1			
30-Oct-12	Left	LS SU	237	122	1			
30-Oct-12	Left	LS SU	373	498	1			
30-Oct-12	Left	LS SU	435	818	1			
30-Oct-12	Left	LS SU	405	666	1			
30-Oct-12	Left	LS SU	290	244	1			
30-Oct-12	Left	LS SU	237	118	1			
30-Oct-12	Left	LS SU	281	198	1			
30-Oct-12	Left	LS SU	367	468	1			
30-Oct-12	Left	LS SU	340	340	1			
30-Oct-12	Left	LS SU	340	362	1			
30-Oct-12	Left	LS SU	263	160	1			
30-Oct-12	Left	LS SU	231	104	1			
30-Oct-12	Left	LS SU	177	48	1			
30-Oct-12	Left	LS SU	142	20	1			
30-Oct-12	Left	LS SU	328	114	1			
30-Oct-12	Left	LS SU	185	62	1			
30-Oct-12	Left	LS SU	547	1446	1			
30-Oct-12	Left	LS SU	380	518	1			
30-Oct-12	Left	LS SU	262	194	1			
30-Oct-12	Left	LS SU	248	130	1			
30-Oct-12	Left	LS SU	290	228	1			
30-Oct-12	Left	LS SU	381	572	1			
30-Oct-12	Left	LS SU	201	82	1			

Date	Bank	SPECIES	LENGTH	WEIGHT	COUNT	TAG	GENETICS	COMMENT
30-Oct-12	Left	LS SU	356	446	1			
30-Oct-12	Left	LS SU	458	822	1			BER
30-Oct-12	Left	LS SU	325	326	1			
30-Oct-12	Left	LS SU	335	360	1			
30-Oct-12	Left	LS SU	180	48	1			
30-Oct-12	Left	LS SU	281	226	1			
30-Oct-12	Left	LS SU	229	102	1			
30-Oct-12	Left	LS SU	233	112	1			
30-Oct-12	Left	LS SU	125	18	1			
30-Oct-12	Left	LS SU	326	354	1			
30-Oct-12	Left	LS SU	302	254	1			
30-Oct-12	Left	LS SU	302	278	1			
30-Oct-12	Left	LS SU	271	187	1			
30-Oct-12	Left	LS SU	172	51	1			
30-Oct-12	Left	LS SU	188	61	1			
30-Oct-12	Left	LS SU	160	26	1			
30-Oct-12	Left	LS SU	246	140	1			
30-Oct-12	Left	LS SU	304	287	1			
30-Oct-12	Left	LS SU	253	152	1			
30-Oct-12	Left	LS SU	185	56	1			
30-Oct-12	Left	LS SU	212	96	1			
30-Oct-12	Left	LS SU	202	73	1			
30-Oct-12	Left	LS SU	221	108	1			
30-Oct-12	Left	LS SU	273	222	1			
30-Oct-12	Left	LS SU	161	48	1			
30-Oct-12	Left	LS SU	188	56	1			
30-Oct-12	Left	LS SU	190	60	1			
30-Oct-12	Left	LS SU	200	70	1			

Date	Bank	SPECIES	LENGTH	WEIGHT	COUNT	TAG	GENETICS	COMMENT
30-Oct-12	Left	LS SU	183	49	1			
30-Oct-12	Left	LS SU	225	99	1			
30-Oct-12	Left	LS SU	539	1534	1			
30-Oct-12	Left	LS SU	526	1348	1			
30-Oct-12	Left	LS SU	470	988	1			
30-Oct-12	Left	LS SU	507	1226	1			
30-Oct-12	Left	LS SU	463	992	1			
30-Oct-12	Left	LS SU	460	1130	1			
30-Oct-12	Left	LS SU	483	1216	1			
30-Oct-12	Left	LS SU	434	762	1			
30-Oct-12	Left	LS SU			201			
30-Oct-12	Left	MWF	272	156	1			
30-Oct-12	Left	MWF	270	158	1			
30-Oct-12	Left	MWF	212	88	1			
30-Oct-12	Left	MWF	210	26	1			
30-Oct-12	Left	MWF	213	82	1			
30-Oct-12	Left	MWF	220	78	1			
30-Oct-12	Left	MWF	277	158	1			
30-Oct-12	Left	MWF	230	94	1			
30-Oct-12	Left	MWF	255	136	1			
30-Oct-12	Left	MWF	323	328	1			
30-Oct-12	Left	MWF	203	80	1			
30-Oct-12	Left	MWF	227	90	1			
30-Oct-12	Left	MWF	233	112	1			
30-Oct-12	Left	MWF	246	118	1			
30-Oct-12	Left	MWF	215	84	1			
30-Oct-12	Left	MWF	270	180	1			
30-Oct-12	Left	MWF	276	178	1			

Date	Bank	SPECIES	LENGTH	WEIGHT	COUNT	TAG	GENETICS	COMMENT
30-Oct-12	Left	MWF	359	432	1			
30-Oct-12	Left	MWF	461	134	1			
30-Oct-12	Left	MWF	350	400	1			
30-Oct-12	Left	MWF	274	166	1			
30-Oct-12	Left	MWF	230	104	1			
30-Oct-12	Left	MWF	236	96	1			
30-Oct-12	Left	MWF	236	108	1			
30-Oct-12	Left	MWF	305	244	1			
30-Oct-12	Left	MWF	199	86	1			
30-Oct-12	Left	MWF	237	100	1			
30-Oct-12	Left	MWF	326	330	1			
30-Oct-12	Left	MWF	250	124	1			
30-Oct-12	Left	MWF	325	288	1			
30-Oct-12	Left	MWF	239	110	1			
30-Oct-12	Left	MWF	269	182	1			
30-Oct-12	Left	MWF	269	164	1			
30-Oct-12	Left	MWF	247	140	1			
30-Oct-12	Left	MWF	363	418	1			
30-Oct-12	Left	MWF	235	108	1			
30-Oct-12	Left	MWF	310	284	1			
30-Oct-12	Left	MWF	352	400	1			
30-Oct-12	Left	MWF	287	192	1			
30-Oct-12	Left	MWF	240	140	1			
30-Oct-12	Left	MWF	279	188	1			
30-Oct-12	Left	MWF	307	246	1			
30-Oct-12	Left	MWF	243	110	1			
30-Oct-12	Left	MWF	303	206	1			
30-Oct-12	Left	MWF	264	196	1			

Date	Bank	SPECIES	LENGTH	WEIGHT	COUNT	TAG	GENETICS	COMMENT
30-Oct-12	Left	MWF	225	86	1			
30-Oct-12	Left	MWF	229	96	1			
30-Oct-12	Left	MWF	327	322	1			
30-Oct-12	Left	MWF	294	240	1			
30-Oct-12	Left	MWF	238	110	1			
30-Oct-12	Left	MWF	261	158	1			
30-Oct-12	Left	MWF	214	100	1			
30-Oct-12	Left	MWF	242	126	1			
30-Oct-12	Left	MWF	228	94	1			
30-Oct-12	Left	MWF	263	146	1			
30-Oct-12	Left	MWF	282	164	1			
30-Oct-12	Left	MWF	214	78	1			
30-Oct-12	Left	MWF	469	850	1			
30-Oct-12	Left	MWF	224	90	1			
30-Oct-12	Left	MWF	231	106	1			
30-Oct-12	Left	MWF	273	194	1			
30-Oct-12	Left	MWF	274	210	1			
30-Oct-12	Left	MWF	289	228	1			
30-Oct-12	Left	MWF	311	288	1			
30-Oct-12	Left	MWF	279	158	1			
30-Oct-12	Left	MWF	278	186	1			
30-Oct-12	Left	MWF	253	132	1			
30-Oct-12	Left	MWF	198	84	1			
30-Oct-12	Left	MWF	292	180	1			
30-Oct-12	Left	MWF	192	80	1			
30-Oct-12	Left	MWF	224	84	1			
30-Oct-12	Left	MWF	270	174	1			
30-Oct-12	Left	MWF	207	76	1			

Date	Bank	SPECIES	LENGTH	WEIGHT	COUNT	TAG	GENETICS	COMMENT
30-Oct-12	Left	MWF	200	60	1			
30-Oct-12	Left	MWF	276	158	1			
30-Oct-12	Left	MWF	256	152	1			
30-Oct-12	Left	MWF	249	138	1			
30-Oct-12	Left	MWF	257	160	1			
30-Oct-12	Left	MWF	254	150	1			
30-Oct-12	Left	MWF	289	194	1			
30-Oct-12	Left	MWF	385	510	1			
30-Oct-12	Left	MWF	241	108	1			
30-Oct-12	Left	MWF	288	200	1			
30-Oct-12	Left	MWF	235	102	1			
30-Oct-12	Left	MWF	264	158	1			
30-Oct-12	Left	MWF	255	158	1			
30-Oct-12	Left	MWF	312	270	1			
30-Oct-12	Left	MWF	286	160	1			
30-Oct-12	Left	MWF	234	106	1			
30-Oct-12	Left	MWF	307	266	1			
30-Oct-12	Left	MWF	355	388	1			
30-Oct-12	Left	MWF	401	512	1			
30-Oct-12	Left	MWF	355	352	1			
30-Oct-12	Left	MWF	390	454	1			
30-Oct-12	Left	MWF	221	92	1			
30-Oct-12	Left	MWF	340	330	1			
30-Oct-12	Left	MWF	349	376	1			
30-Oct-12	Left	MWF	360	436	1			
30-Oct-12	Left	MWF	222	82	1			
30-Oct-12	Left	MWF	267	164	1			
30-Oct-12	Left	MWF	232	114	1			

Date	Bank	SPECIES	LENGTH	WEIGHT	COUNT	TAG	GENETICS	COMMENT
30-Oct-12	Left	MWF	270	152	1			
30-Oct-12	Left	MWF	258	156	1			
30-Oct-12	Left	MWF	243	76	1			
30-Oct-12	Left	MWF	322	266	1			
30-Oct-12	Left	MWF	271	162	1			
30-Oct-12	Left	MWF	362	376	1			
30-Oct-12	Left	MWF	260	178	1			
30-Oct-12	Left	MWF	274	194	1			
30-Oct-12	Left	MWF	362	370	1			
30-Oct-12	Left	MWF	396	534	1			
30-Oct-12	Left	MWF	310	268	1			
30-Oct-12	Left	MWF	258	160	1			
30-Oct-12	Left	MWF			77			
30-Oct-12	Left	N PMN	512	1398	1			
30-Oct-12	Left	N PMN	335	312	1			
30-Oct-12	Left	N PMN	360	432	1			
30-Oct-12	Left	N PMN	205	62	1			
30-Oct-12	Left	N PMN	307	240	1			
30-Oct-12	Left	N PMN	337	344	1			
30-Oct-12	Left	N PMN	512	1396	1			
30-Oct-12	Left	N PMN	233	104	1			
30-Oct-12	Left	N PMN	215	70	1			
30-Oct-12	Left	N PMN	332	296	1			
30-Oct-12	Left	N PMN	152	24	1			
30-Oct-12	Left	N PMN	182	46	1			
30-Oct-12	Left	N PMN	160	32	1			
30-Oct-12	Left	N PMN	186	48	1			
30-Oct-12	Left	N PMN	177	40	1			

Date	Bank	SPECIES	LENGTH	WEIGHT	COUNT	TAG	GENETICS	COMMENT
30-Oct-12	Left	N PMN	175	36	1			
30-Oct-12	Left	N PMN	145	20	1			
30-Oct-12	Left	N PMN	142	24	1			
30-Oct-12	Left	N PMN	315	250	1			
30-Oct-12	Left	N PMN	390	482	1			
30-Oct-12	Left	N PMN	350	364	1			
30-Oct-12	Left	N PMN	322	304	1			
30-Oct-12	Left	N PMN	291	190	1			
30-Oct-12	Left	N PMN	345	356	1			
30-Oct-12	Left	N PMN	322	278	1			
30-Oct-12	Left	N PMN	310	258	1			
30-Oct-12	Left	N PMN	421	608	1			
30-Oct-12	Left	N PMN	405	226	1			
30-Oct-12	Left	N PMN	196	58	1			
30-Oct-12	Left	N PMN	155	30	1			
30-Oct-12	Left	N PMN	165	34	1			
30-Oct-12	Left	N PMN	340	320	1			
30-Oct-12	Left	N PMN	508	1180	1			
30-Oct-12	Left	N PMN	501	1216	1			
30-Oct-12	Left	N PMN	366	410	1			
30-Oct-12	Left	N PMN	370	440	1			
30-Oct-12	Left	N PMN	256	130	1			
30-Oct-12	Left	N PMN	191	46	1			
30-Oct-12	Left	N PMN	403	656	1			
30-Oct-12	Left	N PMN	355	514	1			
30-Oct-12	Left	N PMN	443	766	1			
30-Oct-12	Left	N PMN	182	44	1			
30-Oct-12	Left	N PMN	302	224	1			

Date	Bank	SPECIES	LENGTH	WEIGHT	COUNT	TAG	GENETICS	COMMENT
30-Oct-12	Left	N PMN	167	38	1			
30-Oct-12	Left	N PMN	202	58	1			
30-Oct-12	Left	N PMN	299	224	1			
30-Oct-12	Left	N PMN	450	850	1			
30-Oct-12	Left	N PMN	325	302	1			
30-Oct-12	Left	N PMN	391	546	1			
30-Oct-12	Left	N PMN	295	216	1			
30-Oct-12	Left	N PMN	350	404	1			
30-Oct-12	Left	N PMN	376	430	1			
30-Oct-12	Left	N PMN	335	334	1			
30-Oct-12	Left	N PMN	308	234	1			
30-Oct-12	Left	N PMN	385	476	1			
30-Oct-12	Left	N PMN	396	560	1			
30-Oct-12	Left	N PMN	307	244	1			
30-Oct-12	Left	N PMN	335	320	1			
30-Oct-12	Left	N PMN	322	308	1			
30-Oct-12	Left	N PMN	382		1			
30-Oct-12	Left	N PMN	231	80	1			
30-Oct-12	Left	N PMN	271	162	1			
30-Oct-12	Left	N PMN	273	154	1			
30-Oct-12	Left	N PMN	161	30	1			
30-Oct-12	Left	N PMN	305	234	1			
30-Oct-12	Left	N PMN	203	64	1			
30-Oct-12	Left	N PMN	380	480	1			
30-Oct-12	Left	N PMN	262	146	1			
30-Oct-12	Left	N PMN	242	114	1			
30-Oct-12	Left	N PMN	180	36	1			
30-Oct-12	Left	N PMN	310	196	1			

Date	Bank	SPECIES	LENGTH	WEIGHT	COUNT	TAG	GENETICS	COMMENT
30-Oct-12	Left	N PMN	401	602	1			
30-Oct-12	Left	N PMN	167	32	1			
30-Oct-12	Left	N PMN	152	26	1			
30-Oct-12	Left	N PMN	305	224	1			
30-Oct-12	Left	N PMN	303	226	1			
30-Oct-12	Left	N PMN	175	46	1			
30-Oct-12	Left	N PMN	325	274	1			
30-Oct-12	Left	N PMN	338	296	1			
30-Oct-12	Left	N PMN	292	210	1			
30-Oct-12	Left	N PMN	312	248	1			
30-Oct-12	Left	N PMN	175	42	1			
30-Oct-12	Left	N PMN	281	188	1			
30-Oct-12	Left	N PMN	197	58	1			
30-Oct-12	Left	N PMN	235	98	1			
30-Oct-12	Left	N PMN	236	102	1			
30-Oct-12	Left	N PMN	286	196	1			
30-Oct-12	Left	N PMN	303	222	1			
30-Oct-12	Left	N PMN	306	230	1			
30-Oct-12	Left	N PMN	292	216	1			
30-Oct-12	Left	N PMN	221	88	1			
30-Oct-12	Left	N PMN	181	44	1			
30-Oct-12	Left	N PMN	183	44	1			
30-Oct-12	Left	N PMN	162	34	1			
30-Oct-12	Left	N PMN	156	28	1			
30-Oct-12	Left	N PMN	175	34	1			
30-Oct-12	Left	N PMN	210	74	1			
30-Oct-12	Left	N PMN	199	60	1			
30-Oct-12	Left	N PMN	146	26	1			

Date	Bank	SPECIES	LENGTH	WEIGHT	COUNT	TAG	GENETICS	COMMENT
30-Oct-12	Left	N PMN	217	72	1			
30-Oct-12	Left	N PMN	152	30	1			
30-Oct-12	Left	N PMN	196	62	1			
30-Oct-12	Left	N PMN	188	52	1			
30-Oct-12	Left	N PMN	182	50	1			
30-Oct-12	Left	N PMN	191	58	1			
30-Oct-12	Left	N PMN	162	34	1			
30-Oct-12	Left	N PMN	172	44	1			
30-Oct-12	Left	N PMN	187	48	1			
30-Oct-12	Left	N PMN	175	32	1			
30-Oct-12	Left	N PMN	202	57	1			
30-Oct-12	Left	N PMN	326	308	1			
30-Oct-12	Left	N PMN	326	272	1			
30-Oct-12	Left	N PMN	145	24	1			
30-Oct-12	Left	N PMN	182	43	1			
30-Oct-12	Left	N PMN	187	46	1			
30-Oct-12	Left	N PMN	180	40	1			
30-Oct-12	Left	N PMN	524	1470	1			
30-Oct-12	Left	N PMN	612	2114	1			
30-Oct-12	Left	N PMN			51			
30-Oct-12	Left	NP	702	2772	1			
30-Oct-12	Left	PEA	392	624	1			
30-Oct-12	Left	PEA	183	36	1			
30-Oct-12	Left	PEA	213	76	1			
30-Oct-12	Left	PEA	220	74	1			
30-Oct-12	Left	PEA	207	64	1			
30-Oct-12	Left	RB	455	904	1			
30-Oct-12	Left	RB	310	280	1			

Date	Bank	SPECIES	LENGTH	WEIGHT	COUNT	TAG	GENETICS	COMMENT
30-Oct-12	Left	RB	371	470	1			
30-Oct-12	Left	RB	343	390	1			
30-Oct-12	Left	RB	247	140	1			
30-Oct-12	Left	RB	300	226	1			
30-Oct-12	Left	RB	345	370	1			
30-Oct-12	Left	RB	267	160	1			
30-Oct-12	Left	RB	440	824	1			
30-Oct-12	Left	RB	340	346	1			
30-Oct-12	Left	RB	345	334	1			
30-Oct-12	Left	RB	428	654	1			
30-Oct-12	Left	RB	445	774	1			
30-Oct-12	Left	RB	426	790	1			
30-Oct-12	Left	RB	341	352	1			
30-Oct-12	Left	RB	313	310	1			
30-Oct-12	Left	RB	416	666	1			Bird Wound
30-Oct-12	Left	RB	467	888	1	FDX# 985121027357883		
30-Oct-12	Left	RB	327	322	1			Dolphin Head
30-Oct-12	Left	RBxWCT	331	324	1			BEL
30-Oct-12	Left	RS SH	135	20	1			
30-Oct-12	Left	RS SH	135	16	1			
30-Oct-12	Left	RS SH	85		1			
30-Oct-12	Left	RS SH	80	2	1			
30-Oct-12	Left	RS SH	93	4	1			
30-Oct-12	Left	RS SH	120	10	1			
30-Oct-12	Left	RS SH	131	18	1			
30-Oct-12	Left	RS SH	122	18	1			
30-Oct-12	Left	RS SH	102	13	1			

Date	Bank	SPECIES	LENGTH	WEIGHT	COUNT	TAG	GENETICS	COMMENT
30-Oct-12	Left	RS SH	140	22	1			
30-Oct-12	Left	RS SH	98	9	1			
30-Oct-12	Left	RS SH	112	18	1			
30-Oct-12	Left	RS SH	81	2	1			
30-Oct-12	Left	RS SH	122	12	1			
30-Oct-12	Left	RS SH	122	16	1			
30-Oct-12	Left	RS SH	88		1			
30-Oct-12	Left	RS SH	64		1			
30-Oct-12	Left	RS SH	71		1			
30-Oct-12	Left	RS SH	72		1			
30-Oct-12	Left	RS SH	135		1			
30-Oct-12	Left	RS SH	86		1			
30-Oct-12	Left	SMB	66		1			
30-Oct-12	Left	WCT	251	144	1			
30-Oct-12	Left	WCT	251	156	1			
30-Oct-12	Left	WCT	239	136	1			
30-Oct-12	Left	WCT	361	440	1			
30-Oct-12	Left	WCT	290	220	1			
30-Oct-12	Left	WCT	425	654	1			
30-Oct-12	Left	WCT	260	174	1			
30-Oct-12	Right	BULL	444	678	1	HDX# 982000357016066	118-075	
30-Oct-12	Right	LL	427	610	1			
30-Oct-12	Right	LL	176	44	1			
30-Oct-12	Right	LL	203	72	1			
30-Oct-12	Right	LL	214	84	1			
30-Oct-12	Right	LL	249	128	1			
30-Oct-12	Right	LL	213	82	1			

Date	Bank	SPECIES	LENGTH	WEIGHT	COUNT	TAG	GENETICS	COMMENT
30-Oct-12	Right	LL	240	120	1			
30-Oct-12	Right	LL	235	102	1			
30-Oct-12	Right	LL	329	322	1			
30-Oct-12	Right	LL	272	176	1			
30-Oct-12	Right	LL	216	100	1			Dolphin Head
30-Oct-12	Right	LL	215	80	1			
30-Oct-12	Right	LL	186	55	1			
30-Oct-12	Right	LL	269	196	1			
30-Oct-12	Right	LL	220	90	1			
30-Oct-12	Right	LL	252	154	1			
30-Oct-12	Right	LL	193	62	1			
30-Oct-12	Right	LN SU	524	1412	1			
30-Oct-12	Right	LS SU	94	7	1			
30-Oct-12	Right	LS SU			238			
30-Oct-12	Right	MWF			75			
30-Oct-12	Right	N PMN			97			
30-Oct-12	Right	RB	360	422	1			
30-Oct-12	Right	RB	227	92	1			
30-Oct-12	Right	RB	340	362	1			
30-Oct-12	Right	RB	196	108	1			
30-Oct-12	Right	RB	324	324	1			
30-Oct-12	Right	RB	333	340	1			
30-Oct-12	Right	RB	325	294	1			
30-Oct-12	Right	RB	374	454	1			
30-Oct-12	Right	RB	234	130	1			
30-Oct-12	Right	RB	307	280	1			
30-Oct-12	Right	RB	245	138	1			

Date	Bank	SPECIES	LENGTH	WEIGHT	COUNT	TAG	GENETICS	COMMENT
30-Oct-12	Right	RB	247	160	1			
30-Oct-12	Right	RB	225	98	1			
30-Oct-12	Right	RB	320	278	1			
30-Oct-12	Right	RB	340	382	1			
30-Oct-12	Right	RB	343	368	1			
30-Oct-12	Right	RB	229	134	1			
30-Oct-12	Right	RB	332	352	1			
30-Oct-12	Right	RB	172	50	1			
30-Oct-12	Right	RB	233	125	1			
30-Oct-12	Right	RB	253	156	1			
30-Oct-12	Right	RB	442	750	1			
30-Oct-12	Right	RB	341	346	1			Dolphin Head
30-Oct-12	Right	RB	249	154	1			
30-Oct-12	Right	RB	261	164	1			
30-Oct-12	Right	RB	247	152	1			
30-Oct-12	Right	RB	378	526	1			
30-Oct-12	Right	RB	311	270	1			
30-Oct-12	Right	RB	317	302	1			
30-Oct-12	Right	RB	370	430	1			
30-Oct-12	Right	RB	292	242	1			
30-Oct-12	Right	RB	270	186	1			
30-Oct-12	Right	RB	183	62	1			
30-Oct-12	Right	RB	281	232	1			
30-Oct-12	Right	RBxWCT	250	164	1			
30-Oct-12	Right	RBxWCT	415	548	1			
30-Oct-12	Right	RS SH	129	20	1			
30-Oct-12	Right	RS SH	114	15	1			

Date	Bank	SPECIES	LENGTH	WEIGHT	COUNT	TAG	GENETICS	COMMENT
30-Oct-12	Right	RS SH	138	22	1			
30-Oct-12	Right	RS SH	146	26	1			
30-Oct-12	Right	RS SH	122	15	1			
30-Oct-12	Right	RS SH	124	16	1			
30-Oct-12	Right	RS SH	103	8	1			
30-Oct-12	Right	RS SH	117	14	1			
30-Oct-12	Right	WCT	216	110	1			
30-Oct-12	Right	WCT	217	90	1			Bird Wound
30-Oct-12	Right	WCT	304	276	1			
30-Oct-12	Right	WCT	244	150	1			
30-Oct-12	Right	WCT	261	172	1			
30-Oct-12	Right	WCT	256	172	1			
30-Oct-12	Right	WCT	240	130	1			
30-Oct-12	Right	WCT	248	145	1			
30-Oct-12	Right	WCT	274	200	1			
30-Oct-12	Right	WCT	241	148	1			
30-Oct-12	Right	WCT	287	238	1			

Appendix B 2012 Fish Recapture Data

Table B-1: Summary of all 51 individual fish recaptured in 2012 either at the Thompson Falls fish ladder, electrofishing downstream of the Thompson Falls Dam, or upstream of Thompson Falls Dam during annual fisheries surveys.

FISH #	Species	PIT TAG	Initial Capture Date	Initial Capture Location	Length (mm)	Weight (g)	Recapture Date$_1$	Recapture Location$_1$	Length (mm)$_1$	Weight (g)$_1$	Recapture Date$_2$	Recapture Location$_2$	Length (mm)$_2$	Weight (g)$_2$
1	**BULL**	**985121023464730**	4/26/2011	at Ladder	547	1438	5/21/2012	at Ladder - Mortality	563	1404				
2	**BULL**	**985121021877906**	5/31/2011	efishing below dam	482	966	5/15/2012	at Ladder	510	1172				
3	**LL**	**985121021918356**	9/14/2011	at Ladder	432	680	9/11/2012	at Ladder	444	756				
4	**LL**	**985121021865085**	3/25/2011	efishing below dam	270	182	4/3/2012	efishing below dam	352	434				
5	**LL**	**985121027369899**	4/3/2012	efishing below dam	355	462	4/10/2012	efishing below dam	362	458				
6	**LS SU**	**985121027402291**	3/27/2012	efishing below dam	445	920	7/14/2012	at Ladder	440	888				
7	**LS SU**	**985121021896450**	3/19/2012	efishing below dam	435	816	4/3/2012	efishing below dam	436	808	7/14/2012	at Ladder	430	754
8	**LS SU**	**985121027385525**	3/27/2012	efishing below dam	420	682	7/14/2012	at Ladder	-	-				
9	**LS SU**	**985121027373549**	4/3/2012	efishing below dam	455	942	7/14/2012	at Ladder	444	838				
10	**LS SU**	**985121027385421**	4/3/2012	efishing below dam	482	1076	6/25/2012	efishing below dam	470	1038				
11	**LS SU**	**985121027390464**	UNKNOWN				4/3/2012	efishing below dam	483	1168				
12	**LS SU**	**985121021909504**	9/13/2011	efishing below dam	478	1022	7/14/2012	at Ladder	-	-				
13	**MWF**	**985121021909476**	3/6/2012	efishing below dam	420	634	4/3/2012	efishing below dam	413	630				
14	**MWF**	**985121021914522**	3/25/2011	efishing below dam	255	156	4/3/2012	efishing below dam	312	290				
15	**MWF**	**985121027360713**	4/3/2012	efishing below dam	233	124	4/4/2012	efishing below dam	236	120				
16	**MWF**	**985121027367087**	4/3/2012	efishing below dam	331	338	4/3/2012	efishing below dam	331	336				
17	**MWF**	**985121027381184**	4/3/2012	efishing below dam	272	180	4/3/2012	efishing below dam	272	188				
18	**MWF**	**985121027405995**	4/3/2012	efishing below dam	260	148	5/21/2012	efishing below dam	265	154				
19	**RB**	**985121021913294**	3/28/2011	efishing below dam	358	498	3/13/2012	efishing below dam	412	712	4/12/2012	at Ladder	405	716
20	**RB**	**985121023396645**	4/17/2011	at Ladder	463	844	3/13/2012	efishing below dam	498	1098	4/1/2012	at Ladder	500	1070
21	**RB**	**985121021894240**	4/11/2011	at Ladder	426	724	3/19/2012	efishing below dam	460	996				
22	**RB**	**985121021885948**	UNKNOWN	(MISSING PIT 5/23/2011)			5/23/2011	efishing below dam	282	202	4/3/2012	efishing below dam	372	526
23	**RB**	**985121021920528**	4/1/2011	at Ladder	515	1450	4/3/2012	efishing below dam	534	1774				
24	**MWF**	**985121021896280**	3/18/2011	efishing below dam	220	80	10/4/2012	at Ladder	325	308				
25	**RB**	**985121027351568**	4/3/2012	efishing below dam	411	690	4/3/2012	efishing below dam	402	684				
26	**RB**	**985121021882245**	3/18/2011	efishing below dam	401	684	4/11/2012	at Ladder	433	700				
27	**RB**	**985121023445664**	3/18/2011	efishing below dam	453	1006	4/13/2012	at Ladder	482	1076				
28	**RB**	**985121021901853**	4/13/2011	at Ladder	429	750	4/12/2012	at Ladder	440	834				
29	**RB**	**985121021913563**	3/31/2011	at Ladder	530	1574	4/12/2012	at Ladder	525	1528				
30	**RB**	**985121021920485**	4/9/2011	at Ladder	421	802	4/12/2012	at Ladder	420	728				

FISH #	Species	PIT TAG	Initial Capture Date	Initial Capture Location	Length (mm)	Weight (g)	Recapture Date$_1$	Recapture Location$_1$	Length (mm)$_1$	Weight (g)$_1$	Recapture Date$_2$	Recapture Location$_2$	Length (mm)$_2$	Weight (g)$_2$
31	**RB**	**985121021867822**	6/14/2011	efishing below dam	380	562	4/12/2012	at Ladder	420	782				
32	**RB**	**985121023466886**	4/24/2011	at Ladder	440	918	4/15/2012	at Ladder	456	988				
33	**RB**	**985121023446120**	10/3/2011	at Ladder	365	466	5/10/2012	at Ladder	400	606				
34	**RB**	**985121027349636**	4/3/2012	efishing below dam	390	638	4/10/2012	efishing below dam	390	628				
35	**RB**	**985121021888853**	6/14/2011	efishing below dam	425	706	6/4/2012	at Ladder	459	842				
36	**RB**	**985121027409436**	5/9/2012	at Ladder	405	614	7/5/2012	at Ladder (“fallback 2012”)	430	872				
37	**RB**	**985121027370332**	3/27/2012	efishing below dam	216		7/18/2012	at Ladder	418					
38	**RB**	**985121027378802**	4/3/2012	efishing below dam	437	624	4/3/2012	efishing below dam	438	638	4/10/2012	efishing below dam	435	620
39	**RB**	**Wrong PIT TAG Recorded, identified as a recaptured fish**	UNKNOWN				7/22/2012	at Ladder	404	640				
40	**RB**	**985121023467679**	UNKNOWN				8/6/2012	at Ladder	425	720				
41	**RB**	**985121027360815**	4/3/2012	efishing below dam	385	580	5/10/2012	at Ladder	385	580				
42	**SMB**	**Floy Y-16200**	8/26/2011	at Ladder	225	140	7/29/2012	at Ladder	250	190				
43	**SMB**	**Floy Y-16197**	8/26/2011	at Ladder	240	170	8/21/2012	at Ladder	272	286				
44	**RB**	**985121027406346**	4/3/2012	efishing below dam	322	358	8/8/2012	at Ladder	354	448				
45	**WCT**	**985121027366296**	UNKNOWN				4/10/2012	efishing below dam	260	198				
46	**WCT**	**985121027402765**	4/4/2012	efishing below dam	315	340	4/16/2012	efishing below dam	275	228				
47	**WCT**	**985121027357907**	5/21/2012	efishing below dam	300	274	9/25/2012	at Ladder	335	378				
48	**SMB**	**Floy Y - 16055**	7/14/2012	at Ladder	334	504	9/27/2012	efishing Lower Flathead River (Buffalo Rapids Bridge)	355	765				
49	**RB**	**985121027357883**	8/26/2012	at Ladder	450	772	10/30/2012	efishing Pardise to Plains	467	888				
50	**RB**	**985121021876549**	9/11/2011	at Ladder	451	846	10/12/2012	gillnetting in Thompson Reservoir	485	1102				
51	**LL**	**985121021902518**	4/14/2011	at Ladder	366	424	10/12/2012	gillnetting in Thompson Reservoir	438	734				

Appendix C 2012 Electrofishing Below Thompson Falls Dam

Table C-1. Electrofishing data collected in 2012 between March and June below the Thompson Falls Dam. Gas bubble trauma was evaluated for fish surveyed on May 21, and June 25, 2012.

Date	Temp °C	Seconds	Species	Length (mm)	Weight (g)	PIT Tag/Floy Tag	Mark/Clip	Recap	Mort	GBT Rank/Comment
3/6/2012	2.8	2800	LL	220	120	985121027360643	AD			
3/6/2012	2.8	2800	LL	257	156	985121027402660	AD			
3/6/2012	2.8	2800	LL	290	192	985121021901343	AD			
3/6/2012	2.8	2800	LL	350	384	985121027357357	AD			
3/6/2012	2.8	2800	LL	373	434	985121027391098	AD			
3/6/2012	2.8	2800	LL	421	100	985121027351598	AD			
3/6/2012	2.8	2800	LS SU	412	738	985121017409342	LC			
3/6/2012	2.8	2800	LS SU	415	760	985121027385361	LC			
3/6/2012	2.8	2800	LS SU	418	788	985121021889370	LC			
3/6/2012	2.8	2800	LS SU	427	836	985121027402575	LC			
3/6/2012	2.8	2800	LS SU	431	872	985121027367057	LC			
3/6/2012	2.8	2800	LS SU	432	918	985121027396078	LC			
3/6/2012	2.8	2800	LS SU	435	828	985121027387757	LC			
3/6/2012	2.8	2800	LS SU	440	982	985121027406186	LC			
3/6/2012	2.8	2800	LS SU	446	976	985121027408804	LC			
3/6/2012	2.8	2800	LS SU	450	932	985121027395937	LC			
3/6/2012	2.8	2800	LS SU	455	882	985121021909867	LC			
3/6/2012	2.8	2800	LS SU	455	978	985121023362435	LC			
3/6/2012	2.8	2800	LS SU	465	1040	985121021891155	LC			
3/6/2012	2.8	2800	LS SU	471	1078	985121027396816	LC			
3/6/2012	2.8	2800	LS SU	472	1238	985121027347857	LC			
3/6/2012	2.8	2800	LS SU	472	1292	985121027357895	LC			
3/6/2012	2.8	2800	LS SU	477	1146	985121021922694	AD			
3/6/2012	2.8	2800	LS SU	480	1260	985121027351855	LC			
3/6/2012	2.8	2800	LS SU	481	1134	985121027373653	LC			
3/6/2012	2.8	2800	LS SU	488	1252	985121027373057	LC			
3/6/2012	2.8	2800	LS SU	492	1296	985121027361003	LC			

Date	Temp °C	Seconds	Species	Length (mm)	Weight (g)	PIT Tag/Floy Tag	Mark/Clip	Recap	Mort	GBT Rank/Comment
3/6/2012	2.8	2800	LS SU	492	1378	985121027363048	LC			
3/6/2012	2.8	2800	LS SU	500	1386	985121021867241	AD			
3/6/2012	2.8	2800	LS SU	500	1280	985121027406191	LC			
3/6/2012	2.8	2800	MWF	238	120	985121027357496	AD			
3/6/2012	2.8	2800	MWF	238	116	985121027393667	AD			
3/6/2012	2.8	2800	MWF	295	234	985121027376192	AD			
3/6/2012	2.8	2800	MWF	310	266	985121021890336	AD			
3/6/2012	2.8	2800	MWF	315	294	985121027402761	AD			
3/6/2012	2.8	2800	MWF	328	312	985121021923740	AD			
3/6/2012	2.8	2800	MWF	340	348				y	
3/6/2012	2.8	2800	MWF	355	414	985121027356365	AD			
3/6/2012	2.8	2800	MWF	382	484	985121023450586	AD			
3/6/2012	2.8	2800	MWF	418	586	985121027360920	AD			
3/6/2012	2.8	2800	MWF	420	634	985121021909476	AD			
3/6/2012	2.8	2800	RB	220	94	985121027411274	AD			
3/6/2012	2.8	2800	RB	228	106	985121027399350	AD			
3/6/2012	2.8	2800	RB	247	150	985121023469970	AD			
3/6/2012	2.8	2800	RB	252	180	985121023448696	AD			
3/6/2012	2.8	2800	RB	255	166	985121027360889	AD			
3/6/2012	2.8	2800	WCT	340	394	985121021920599	AD			
3/6/2012	2.8	2800	WCT	343	372	985121027369962	AD			
3/13/2012	4	1909	MWF	298	226	985121027385299	AD			
3/13/2012	4	1909	MWF	300	264	985121027381129	AD			
3/13/2012	4	1909	MWF	305	270	985121021891191	AD			
3/13/2012	4	1909	LS SU	397	692	985121021898406	LC			
3/13/2012	4	1909	LS SU	412	824	985121021898349	LC			
3/13/2012	4	1909	RB	412	712	985121021913294	old AD	y		
3/13/2012	4	1909	LS SU	422	810	98512102739571	LC			
3/13/2012	4	1909	LS SU	425	850	985121021869936	LC			
3/13/2012	4	1909	LS SU	426	862	985121021901849	LC			
3/13/2012	4	1909	LS SU	430	682	985121021899851	LC			
3/13/2012	4	1909	LS SU	430	894	985121023467442	LC			

Date	Temp °C	Seconds	Species	Length (mm)	Weight (g)	PIT Tag/Floy Tag	Mark/Clip	Recap	Mort	GBT Rank/Comment
3/13/2012	4	1909	LS SU	431	756	985121021869249	LC			
3/13/2012	4	1909	LS SU	432	800	985121021893332	LC			
3/13/2012	4	1909	LS SU	435	808	985121027354556	LC			
3/13/2012	4	1909	LS SU	436	962	985121021891820	LC			
3/13/2012	4	1909	LS SU	445	1056	985121023444197	LC			
3/13/2012	4	1909	LS SU	445	874	985121027366550	LC			
3/13/2012	4	1909	LS SU	451	800	985121027370068	LC			
3/13/2012	4	1909	LS SU	455	960	985121021890316	LC			
3/13/2012	4	1909	LS SU	455	1012	985121021899489	LC			
3/13/2012	4	1909	LS SU	455	978	985121027379051	LC			
3/13/2012	4	1909	LS SU	457	1118	985121021867225	LC			
3/13/2012	4	1909	LS SU	460	1050	985121021911480	LC			
3/13/2012	4	1909	LS SU	460	1180	985121021911526	LC			
3/13/2012	4	1909	LS SU	460	1082	985121027367117	LC			
3/13/2012	4	1909	LS SU	462	1072	985121027353466	LC			
3/13/2012	4	1909	LS SU	464	994	985121021885840	LC			
3/13/2012	4	1909	LS SU	465	1086	985121021891162	LC			
3/13/2012	4	1909	LS SU	467	1004	985121021883000	LC			
3/13/2012	4	1909	LS SU	475	1286	985121021876613	LC			
3/13/2012	4	1909	LS SU	483	1128	985121021880112	LC			
3/13/2012	4	1909	LS SU	495	1284	985121021880227	LC			
3/13/2012	4	1909	rb	498	1098	985121023396645	old AD	y		
3/13/2012	4	1909	LS SU	511	1258	985121023473529	LC			
3/13/2012	4	1909	LS SU	512	1476	985121021909233	LC			
3/13/2012	4	1909	LS SU	528	1296	985121023444860	LC			
3/13/2012	4	1909	LS SU	560	1008	985121027414278	LC			
3/19/2012	3.7	2874	RB	156	32	985121023443886	AD			
3/19/2012	3.7	2874	RB	172	48	985121021892426	AD			
3/19/2012	3.7	2874	EB	217	56	985121023463673	AD			
3/19/2012	3.7	2874	MWF	225	100	985121023467566	AD			
3/19/2012	3.7	2874	LL	255	100	985121021893325	AD			
3/19/2012	3.7	2874	MWF	258	144	985121021889371	AD			

Date	Temp °C	Seconds	Species	Length (mm)	Weight (g)	PIT Tag/Floy Tag	Mark/Clip	Recap	Mort	GBT Rank/Comment
3/19/2012	3.7	2874	LL	271	168	985121021886945	AD			
3/19/2012	3.7	2874	RB	274	800	985121021898177	AD			
3/19/2012	3.7	2874	RB	291	232	985121023475728	AD			
3/19/2012	3.7	2874	MWF	320	330	985121021886464	AD			
3/19/2012	3.7	2874	MWF	352	380	985121021889384	AD			
3/19/2012	3.7	2874	MWF	390	470	985121021903597	AD			
3/19/2012	3.7	2874	MWF	392	492	985121021915841	AD			
3/19/2012	3.7	2874	LS SU	412	704	985121021885551	LC			
3/19/2012	3.7	2874	L WF	415	746		LC			
3/19/2012	3.7	2874	LS SU	417	752	985121021902326	LC			
3/19/2012	3.7	2874	LS SU	417	716	985121023446123	LC			
3/19/2012	3.7	2874	L WF	420	728		LC			
3/19/2012	3.7	2874	LS SU	426	710	985121023476755	LC			
3/19/2012	3.7	2874	L WF	428	776		LC			
3/19/2012	3.7	2874	L WF	430	876		LC			
3/19/2012	3.7	2874	LS SU	432	876	985121021869428	LC			
3/19/2012	3.7	2874	LS SU	432	843	985121021918732	LC			
3/19/2012	3.7	2874	LS SU	433	852	985121021865069	LC			
3/19/2012	3.7	2874	L WF	433	746		LC			
3/19/2012	3.7	2874	LS SU	435	816	985121021896450	LC			
3/19/2012	3.7	2874	L WF	435	822		LC			
3/19/2012	3.7	2874	L WF	435	666		LC			
3/19/2012	3.7	2874	LS SU	437	892	985121021919537	LC			
3/19/2012	3.7	2874	RB	438	818	985121021898309	AD			
3/19/2012	3.7	2874	L WF	440	916		LC			
3/19/2012	3.7	2874	LS SU	445	886	985121021918272	LC			
3/19/2012	3.7	2874	L WF	445	832		LC			
3/19/2012	3.7	2874	L WF	445	868		LC			
3/19/2012	3.7	2874	LS SU	447	828	985121021903595	LC			
3/19/2012	3.7	2874	LS SU	448	892	985121021893184	LC			
3/19/2012	3.7	2874	LS SU	448	852	985121021895954	LC			
3/19/2012	3.7	2874	LS SU	450	916	985121021923635	LC			

Date	Temp °C	Seconds	Species	Length (mm)	Weight (g)	PIT Tag/Floy Tag	Mark/Clip	Recap	Mort	GBT Rank/Comment
3/19/2012	3.7	2874	LS SU	452	900	985121021881684	LC			
3/19/2012	3.7	2874	L WF	452	990		LC			
3/19/2012	3.7	2874	LS SU	457	940	985121021893310	LC			
3/19/2012	3.7	2874	RB	460	996	985121021894240	old AD	Y		
3/19/2012	3.7	2874	LS SU	460	1132	985121021912234	LC			
3/19/2012	3.7	2874	LS SU	460	974	985121023448956	LC			
3/19/2012	3.7	2874	L WF	455	966		LC			
3/19/2012	3.7	2874	L WF	460	956		LC			
3/19/2012	3.7	2874	L WF	460	950		LC			
3/19/2012	3.7	2874	LS SU	461	990	985121021869809	LC			
3/19/2012	3.7	2874	LS SU	462	1106	985121023449286	LC			
3/19/2012	3.7	2874	LS SU	467	952	985121021897862	LC			
3/19/2012	3.7	2874	LS SU	475	1180	985121021909271	LC			
3/19/2012	3.7	2874	LS SU	476	1212	985121021895457	LC			
3/19/2012	3.7	2874	LS SU	478	1070	985121021893995	LC			
3/19/2012	3.7	2874	LS SU	490	1156	985121021887620	LC			
3/19/2012	3.7	2874	LN SU	495	1512	985121021894142	LC			
3/19/2012	3.7	2874	LS SU	495	1368	985121023451682	LC			
3/19/2012	3.7	2874	LS SU	496	1376	985121021880875	LC			
3/19/2012	3.7	2874	LS SU	502	1492	985121021899809	LC			
3/19/2012	3.7	2874	LS SU	503	1412	985121021895925	LC			
3/19/2012	3.7	2874	LS SU	540	1672	985121023468092	LC			
3/27/2012	5.2	2559	RB	211	98	985121027411778	AD			
3/27/2012	5.2	2559	RB	215	82	985121027357494	AD			
3/27/2012	5.2	2559	RB	216	676	985121027370332	AD			
3/27/2012	5.2	2559	RB	239	122	985121023292216	AD			
3/27/2012	5.2	2559	MWF	240	122	985121021915878	AD			
3/27/2012	5.2	2559	RB	240	140	985121027366956	AD			
3/27/2012	5.2	2559	MWF	240	120	985121027405938	AD			
3/27/2012	5.2	2559	MWF	247	140	985121027393619	AD			
3/27/2012	5.2	2559	MWF	255	144	985121027405589	AD			
3/27/2012	5.2	2559	WCT	258	194	985121027393223	AD			

Date	Temp °C	Seconds	Species	Length (mm)	Weight (g)	PIT Tag/Floy Tag	Mark/Clip	Recap	Mort	GBT Rank/Comment
3/27/2012	5.2	2559	MWF	260	190	985121027367356	AD			
3/27/2012	5.2	2559	MWF	275	168	985121027376463	AD			
3/27/2012	5.2	2559	LL	284	198	985121023454151	AD			
3/27/2012	5.2	2559	RB	340	392	985121027366732	AD			
3/27/2012	5.2	2559	LS SU	378	540	985121027406271	LC			
3/27/2012	5.2	2559	LS SU	405	638	985120127390777	LC			
3/27/2012	5.2	2559	LN SU	406	824	985121027345726	LC			
3/27/2012	5.2	2559	LS SU	420	682	985121027385525	LC			
3/27/2012	5.2	2559	LS SU	421	746	985121027393598	LC			
3/27/2012	5.2	2559	LS SU	428	798	985121021922685	LC			
3/27/2012	5.2	2559	LS SU	430	948	985121027351542	LC			
3/27/2012	5.2	2559	LS SU	430	730	985121027351594	LC			
3/27/2012	5.2	2559	LS SU	430	942	985121027378910	LC			
3/27/2012	5.2	2559	LS SU	431	922	985121021886801	LC			
3/27/2012	5.2	2559	LS SU	431	856	985121027409355	LC			
3/27/2012	5.2	2559	LS SU	432	798	985121027388220	LC			
3/27/2012	5.2	2559	LS SU	433	814	985121027370369	LC			
3/27/2012	5.2	2559	LS SU	435	948	985121027360595	LC			
3/27/2012	5.2	2559	LS SU	435	882	985121027363539	LC			
3/27/2012	5.2	2559	LS SU	438	832	985121027409306	LC			
3/27/2012	5.2	2559	LS SU	440	920	985121027378994	LC			
3/27/2012	5.2	2559	LS SU	441	934	985121027405994	LC			
3/27/2012	5.2	2559	LS SU	442	914	985121027360177	LC			
3/27/2012	5.2	2559	LS SU	442	884	985121027373159	LC			
3/27/2012	5.2	2559	LS SU	445	924	985121027370005	LC			
3/27/2012	5.2	2559	LS SU	445	920	985121027402291	LC			
3/27/2012	5.2	2559	LS SU	446	896	985121027354974	LC			
3/27/2012	5.2	2559	LS SU	450	964	985121021901859	LC			
3/27/2012	5.2	2559	LS SU	450	1006	985121027376586	LC			
3/27/2012	5.2	2559	LS SU	452	918	985121027357587	LC			
3/27/2012	5.2	2559	LS SU	452	906	985121027363822	LC			
3/27/2012	5.2	2559	LS SU	452	988	985121027376813	LC			

Date	Temp °C	Seconds	Species	Length (mm)	Weight (g)	PIT Tag/Floy Tag	Mark/Clip	Recap	Mort	GBT Rank/Comment
3/27/2012	5.2	2559	LS SU	452	928	985121027385774	LC			
3/27/2012	5.2	2559	LS SU	455	1026	985121021918699	LC			
3/27/2012	5.2	2559	LS SU	455	990	985121027406246	LC			
3/27/2012	5.2	2559	LS SU	461	1026	985121027357740	LC			
3/27/2012	5.2	2559	LS SU	462	1007	985121027354427	LC			
3/27/2012	5.2	2559	LS SU	463	992	985121027398260	LC			
3/27/2012	5.2	2559	LS SU	465	1100	985121027376465	LC			
3/27/2012	5.2	2559	LS SU	465	1008	985121027405874	LC			
3/27/2012	5.2	2559	LS SU	466	956	985121027360569	LC			
3/27/2012	5.2	2559	LS SU	468	1032	985121027399363	LC			
3/27/2012	5.2	2559	LS SU	470	1208	985121027399038	LC			
3/27/2012	5.2	2559	LN SU	470	1154	985121027450488	LC			
3/27/2012	5.2	2559	LS SU	475	1334	985121027363924	LC			
3/27/2012	5.2	2559	LS SU	475	1186	985121027403031	LC			
3/27/2012	5.2	2559	LS SU	490	1340	985121027396188	LC			
3/27/2012	5.2	2559	LS SU	498	1366	985121027414225	LC			
3/27/2012	5.2	2559	LS SU	500	1358	985121021896211	LC			
3/27/2012	5.2	2559	LS SU	500	1300	985121021912146	LC			
3/27/2012	5.2	2559	LN SU	522	1586	985121027402294	LC			
3/27/2012	5.2	2559	LS SU	525	1836	985121027393203	LC			
3/27/2012	5.2	2559	LS SU	530	1546	985121023457498	LC			
4/3/2012	6.3	2650	EB	157	34					
4/3/2012	5.6	3267	L WF	408	682		lc			
4/3/2012	5.6	3267	L WF	431	906		LC			
4/3/2012	5.6	3267	L WF	432	742		LC			
4/3/2012	5.6	3267	L WF	430	810		LC			
4/3/2012	5.6	3267	L WF	468	1148		LC			
4/3/2012	5.6	3267	L WF	461	938		LC			
4/3/2012	5.6	3267	L WF	465	1102		LC			
4/3/2012	6.3	2650	LL	352	434	985121021865085	old AD	Y		
4/3/2012	6.3	2650	LL	187	58	985121027360467	AD			
4/3/2012	6.3	2650	LL	237	108	985121027366886	AD			

Date	Temp °C	Seconds	Species	Length (mm)	Weight (g)	PIT Tag/Floy Tag	Mark/Clip	Recap	Mort	GBT Rank/Comment
4/3/2012	6.3	2650	LL	355	462	985121027369899	AD			
4/3/2012	5.6	3267	LL	261	156	985121027406013	AD			
4/3/2012	6.3	2650	LL	184	48	985121027449468	AD			
4/3/2012	5.6	3267	LN SU	468	1056	985121027363275	LC			
4/3/2012	5.6	3267	LN SU	455	1090	985121027366954	LC			
4/3/2012	5.6	3267	LN SU	458	1052	985121027373346	LC			
4/3/2012	5.6	3267	LN SU	522	1812	985121027379234	LC			
4/3/2012	5.6	3267	LN SU	488	1432	985121027393926	LC			
4/3/2012	5.6	3267	LN SU	490	1346	985121027402301	LC			
4/3/2012	5.6	3267	LN SU	517	1708	985121027412104	LC			
4/3/2012	5.6	3267	LS SU	436	808	985121021896450	old LC	Y		
4/3/2012	5.6	3267	LS SU	414	706	985121027347812	LC			
4/3/2012	5.6	3267	LS SU	442	980	985121027351717	LC			
4/3/2012	5.6	3267	LS SU	500	1650	985121027351881	LC			
4/3/2012	5.6	3267	LS SU	460	1050	985121027354566	LC			
4/3/2012	5.6	3267	LS SU	448	986	985121027354935	LC			
4/3/2012	5.6	3267	LS SU	452	1000	985121027357388	LC			
4/3/2012	5.6	3267	LS SU	481	1426	985121027357579	LC			
4/3/2012	5.6	3267	LS SU	465	960	985121027360389	LC			
4/3/2012	5.6	3267	LS SU	408	676	985121027360525	LC			
4/3/2012	5.6	3267	LS SU	523	1802	985121027360873	LC			
4/3/2012	5.6	3267	LS SU	460	922	985121027363096	LC			
4/3/2012	5.6	3267	LS SU	475	1148	985121027363342	LC			
4/3/2012	5.6	3267	LS SU	456	1064	985121027363475	LC			
4/3/2012	5.6	3267	LS SU	515	1642	985121027363704	LC			
4/3/2012	5.6	3267	LS SU	416	782	985121027366605	LC			
4/3/2012	5.6	3267	LS SU	476	1030	985121027369668	LC			
4/3/2012	5.6	3267	LS SU	531	1864	985121027369976	LC			
4/3/2012	5.6	3267	LS SU	464	936	985121027373350	LC			
4/3/2012	5.6	3267	LS SU	484	1354	985121027373366	LC			
4/3/2012	5.6	3267	LS SU	445	874	985121027373395	LC			
4/3/2012	5.6	3267	LS SU	455	942	985121027373549	LC			

Date	Temp °C	Seconds	Species	Length (mm)	Weight (g)	PIT Tag/Floy Tag	Mark/Clip	Recap	Mort	GBT Rank/Comment
4/3/2012	5.6	3267	LS SU	447	1076	985121027376412	LC			
4/3/2012	5.6	3267	LS SU	482	1076	985121027385421	LC			
4/3/2012	5.6	3267	LS SU	451	1044	985121027387795	LC			
4/3/2012	5.6	3267	LS SU	483	1168	985121027390464	old LC	Y		
4/3/2012	5.6	3267	LS SU	521	1666	985121027396160	LC			
4/3/2012	5.6	3267	LS SU	490	1312	985121027396445	LC			
4/3/2012	5.6	3267	LS SU	457	950	985121027399390	LC			
4/3/2012	5.6	3267	LS SU	425	922	985121027399445	LC			
4/3/2012	5.6	3267	LS SU	491	1380	985121027402611	LC			
4/3/2012	5.6	3267	LS SU	445	852	985121027402734	LC			
4/3/2012	5.6	3267	LS SU	480	1212	985121027408703	LC			
4/3/2012	5.6	3267	LS SU	472	1250	985121027408819	LC			
4/3/2012	5.6	3267	LS SU	431	820	985121027412079	LC			
4/3/2012	6.3	2650	MWF	413	630	985121021909476	old AD	Y		
4/3/2012	6.3	2650	MWF	312	290	985121021914522	old AD	Y		
4/3/2012	6.3	2650	MWF	338	354	985121027349503	AD			
4/3/2012	6.3	2650	MWF	261	179	985121027357735	AD			
4/3/2012	5.6	3267	MWF	251	122	985121027360176	AD			
4/3/2012	5.6	3267	MWF	385	502	985121027360358	AD			
4/3/2012	5.6	3267	MWF	233	124	985121027360713	AD			
4/3/2012	5.6	3267	MWF	141	22	985121027360787	AD			
4/3/2012	6.3	2650	MWF	259	170	985121027360805	AD			
4/3/2012	6.3	2650	MWF	241	128	985121027363656	AD			
4/3/2012	6.3	2650	MWF	322	316	985121027366754	AD			
4/3/2012	5.6	3267	MWF	331	338	985121027367087	AD			
4/3/2012	6.3	2650	MWF	331	336	985121027367087	old AD	Y		
4/3/2012	5.6	3267	MWF	146	26	985121027369792	AD			
4/3/2012	5.6	3267	MWF	268	174	985121027370067	AD			
4/3/2012	6.3	2650	MWF	396	534	985121027370132	AD			
4/3/2012	6.3	2650	MWF	289	234	985121027370696	AD			
4/3/2012	6.3	2650	MWF	317	304	985121027373015	AD			
4/3/2012	6.3	2650	MWF	259	166	985121027373344	AD			

Date	Temp °C	Seconds	Species	Length (mm)	Weight (g)	PIT Tag/Floy Tag	Mark/Clip	Recap	Mort	GBT Rank/Comment
4/3/2012	6.3	2650	MWF	248	144	985121027373484	AD			
4/3/2012	5.6	3267	MWF	268	160	985121027373610	AD			
4/3/2012	6.3	2650	MWF	313	296	985121027381100	AD			
4/3/2012	5.6	3267	MWF	272	180	985121027381184	AD			
4/3/2012	6.3	2650	MWF	272	188	985121027381184	AD	Y		
4/3/2012	6.3	2650	MWF	420	722	985121027383681	AD			
4/3/2012	5.6	3267	MWF	171	20	985121027385522	AD			
4/3/2012	5.6	3267	MWF	151	34	985121027385701	AD			
4/3/2012	6.3	2650	MWF	331	338	985121027385780	AD			
4/3/2012	6.3	2650	MWF	389	568	985121027387855	AD			
4/3/2012	5.6	3267	MWF	157	32	985121027387867	AD			
4/3/2012	5.6	3267	MWF	217	92	985121027393590	AD			
4/3/2012	6.3	2650	MWF	373	484	985121027399268	AD			
4/3/2012	5.6	3267	MWF	260	148	985121027405995	AD			
4/3/2012	6.3	2650	MWF	165	40					
4/3/2012	5.6	3267	MWF	238	94	985121027409454	AD			
4/3/2012	6.3	2650	N PMN	527	1408	985121027351687	LC			
4/3/2012	5.6	3267	N PMN	606	2490	985121027354235	LC			
4/3/2012	6.3	2650	N PMN	372	456	985121027391019	LC			
4/3/2012	6.3	2650	NP	762	3478	y Floy 16296				
4/3/2012	5.6	3267	RB	151	30	985121027360196	AD			
4/3/2012	5.6	3267	RB	153	30	985121027357771	AD			
4/3/2012	6.3	2650	RB	157	38	985121027364022	AD			
4/3/2012	5.6	3267	RB	157	30	985121027373323	AD			
4/3/2012	5.6	3267	RB	157	32	985121027406008	AD			
4/3/2012	5.6	3267	RB	168	52	985121027376439	AD			
4/3/2012	5.6	3267	RB	170	42	985121027349460	AD			
4/3/2012	6.3	2650	RB	178	52	985121027370249	AD			
4/3/2012	5.6	3267	RB	178	54	985121027388390	AD			
4/3/2012	5.6	3267	RB	180	60	985121027367106	AD			
4/3/2012	6.3	2650	RB	186	56	985121027349305	AD			
4/3/2012	5.6	3267	RB	187	56	985121027370142	AD			

Date	Temp °C	Seconds	Species	Length (mm)	Weight (g)	PIT Tag/Floy Tag	Mark/Clip	Recap	Mort	GBT Rank/Comment
4/3/2012	5.6	3267	RB	192	54	985121027373473	AD			
4/3/2012	6.3	2650	RB	195	76	985121027357591	AD			
4/3/2012	5.6	3267	RB	195	62	985121027370421	AD			
4/3/2012	6.3	2650	RB	201	74	985121027370372	AD			
4/3/2012	5.6	3267	RB	203	74	985121027363099	AD			
4/3/2012	6.3	2650	RB	207	102	985121027363774	AD			
4/3/2012	6.3	2650	RB	209	94	985121027360172	AD			
4/3/2012	6.3	2650	RB	211	78	985121027354220	AD			
4/3/2012	5.6	3267	RB	212	90	985121027406005	AD			
4/3/2012	6.3	2650	RB	220	92	985121027363267	AD			
4/3/2012	6.3	2650	RB	222	102	985121027363090	AD			
4/3/2012	6.3	2650	RB	228	100	985121027385817	AD			
4/3/2012	5.6	3267	RB	245	158	985121027366635	AD			
4/3/2012	5.6	3267	RB	260	174	985121027373471	AD			
4/3/2012	6.3	2650	RB	285	244	985121027406267	AD			
4/3/2012	5.6	3267	RB	322	358	985121027406346	AD			
4/3/2012	6.3	2650	RB	372	526	985121021885948	old AD	Y		
4/3/2012	6.3	2650	RB	381	580	985121027360815	old AD	Y		
4/3/2012	5.6	3267	RB	385	582	985121027360815	AD			
4/3/2012	6.3	2650	RB	390	638	985121027349636	AD			
4/3/2012	6.3	2650	RB	402	684	985121027351568	old AD	Y		
4/3/2012	5.6	3267	RB	411	690	985121027351568	AD			
4/3/2012	5.6	3267	RB	437	624	985121027378802	AD			
4/3/2012	6.3	2650	RB	438	836	985121027351923	AD			
4/3/2012	6.3	2650	RB	438	638	985121027378802	AD			
4/3/2012	5.6	3267	RB	478	1062	985121027376328	AD			
4/3/2012	5.6	3267	RB	120	20					
4/3/2012	6.3	2650	RB	117	18					
4/3/2012	5.6	3267	RB	534	1774	985121021920528	old AD	Y		
4/3/2012	5.6	3267	RBxWCT	252	152	985121027376795	AD			
4/3/2012	5.6	3267	SMB	373	944	985121027363119	LC			
4/3/2012	5.6	3267	WCT	242	126	985121027352068	AD			

Date	Temp °C	Seconds	Species	Length (mm)	Weight (g)	PIT Tag/Floy Tag	Mark/Clip	Recap	Mort	GBT Rank/Comment
4/3/2012	6.3	2650	WCT	237	154	985121027363645	AD			
4/3/2012	5.6	3267	WCT	240	132	985121027370624	AD			
4/3/2012	6.3	2650	WCT	288	232	985121027378923	AD			
4/3/2012	5.6	3267	WCT	238	134	985121027385696	AD			
4/3/2012	5.6	3267	WCT	260	152	985121027393575	AD			
4/3/2012	6.3	2650	WCT	256	158	985121027399453	AD			
4/3/2012		3573	WE	380	522				Y	
4/3/2012		3573	WE	422	698				Y	
4/3/2012		3573	WE	458	956				Y	
4/3/2012		3573	WE	471	1106				Y	
4/3/2012		3573	WE	474	1056				Y	
4/3/2012	6.3	2650	WE	485	1124				Y	
4/3/2012		3573	WE	485	1124				Y	
4/3/2012		3573	WE	489	1228				Y	
4/3/2012		3573	WE	491	1176				Y	
4/3/2012		3573	WE	496	1196				Y	
4/3/2012	6.3	2650	WE	504	1302				Y	
4/3/2012		3573	WE	504	1302				Y	
4/3/2012		3573	WE	505	1368				Y	
4/3/2012		3573	WE	550	1680				Y	
4/3/2012		3573	WE	572	1862				Y	
4/3/2012		3573	WE	621	2456				Y	
4/3/2012	5.6	3267	YP	207	114		LC			
4/3/2012	5.6	3267	YP	218	136		LC			
4/4/2012	6	5567	LL	220	94	985121027363593	AD			
4/4/2012	6	5567	MWF	236	120	985121027360713	old AD	Y		
4/4/2012	6	5567	RB	214	108	985121027390186	AD			
4/4/2012	6	5567	WCT	315	340	985121027402765	AD			
4/4/2012	6	5567	WE	537	1936				Y	
4/4/2012	6	5567	WE	484	1078				Y	
4/4/2012	6	5567	WE	506	1314				Y	
4/4/2012	6	5567	WE	475	1104				Y	

Date	Temp °C	Seconds	Species	Length (mm)	Weight (g)	PIT Tag/Floy Tag	Mark/Clip	Recap	Mort	GBT Rank/Comment
4/4/2012	6	5567	WE	571	2068				Y	
4/4/2012	6	5567	WE	475	1013				Y	
4/4/2012	6	5567	WE	495	1318				Y	
4/4/2012	6	5567	WE	473	1100				Y	
4/4/2012	6	5567	WE	490	1153				Y	
4/4/2012	6	5567	WE	513	1443				Y	
4/4/2012	6	5567	WE	492	1207				Y	
4/4/2012	6	5567	WE	507	1406				Y	
4/4/2012	6	5567	WE	465	1072				Y	
4/4/2012	6	5567	WE	538	1827				Y	
4/4/2012	6	5567	WE	544	1688				Y	
4/4/2012	6	5567	WE	460	1004				Y	
4/4/2012	6	5567	WE	413	669				Y	
4/10/2012	7.1	7076	BULL	272	150	985121027393272	AD			GEN#118-099
4/10/2012	7.1	7076	LL	278	200	985121027367137	AD			
4/10/2012	7.1	7076	LL	362	458	985121027369899	old AD	Y		
4/10/2012	7.1	7076	LL	355	400	985121027399047	AD			
4/10/2012	7.1	7076	MWF	323	272	985121027357301	AD			
4/10/2012	7.1	7076	MWF	340	352	985121027360888	AD			
4/10/2012	7.1	7076	MWF	245	140	985121027373545	AD			
4/10/2012	7.1	7076	MWF	265	154	985121027405995	old AD	Y		
4/10/2012	7.1	7076	MWF	396	562	985121027414449	AD			
4/10/2012	7.1	7076	N PMN	370	410	985121027360516	LC			
4/10/2012	7.1	7076	N PMN	352	364	985121027363767	LC			
4/10/2012	7.1	7076	N PMN	470	1142	985121027366325	LC			
4/10/2012	7.1	7076	N PMN	333	284	985121027385792	LC			
4/10/2012	7.1	7076	RB	205	88	985121027357903	AD			
4/10/2012	7.1	7076	RB	215	80	985121027370184	AD			
4/10/2012	7.1	7076	RB	290	244	985121027406267	old AD	Y		
4/10/2012	7.1	7076	RB	390	628	985121027349636	old AD	Y		
4/10/2012	7.1	7076	RB	420	838	985121027351923	old AD	Y		
4/10/2012	7.1	7076	RB	435	620	985121027378802	old AD	Y		

Date	Temp °C	Seconds	Species	Length (mm)	Weight (g)	PIT Tag/Floy Tag	Mark/Clip	Recap	Mort	GBT Rank/Comment
4/10/2012	7.1	7076	SMB	375	838	y Floy 16297	LC			
4/10/2012	7.1	7076	WCT	295	286	985121027351570	AD			
4/10/2012	7.1	7076	WCT	260	198	985121027366296	AD			
4/10/2012	7.1	7076	WCT	330	369	985121027381262	AD			
4/10/2012	7.1	7076	WE	540	1660				Y	
4/10/2012	7.1	7076	WE	500	1265				Y	
4/10/2012	7.1	7076	WE	748	6010				Y	
4/10/2012	7.1	7076	WE	535	1820				Y	
4/10/2012	7.1	7076	WE	650	2935				Y	
4/10/2012	7.1	7076	WE	540	1840				Y	
4/10/2012	7.1	7076	WE	490	1255				Y	
4/10/2012	7.1	7076	WE	492	1233				Y	
4/10/2012	7.1	7076	WE	551	1800				Y	
4/10/2012	7.1	7076	WE	375	510				Y	
4/10/2012	7.1	7076	WE	498	1290				Y	
4/10/2012	7.1	7076	WE	525	1647				Y	
4/10/2012	7.1	7076	WE	498	1105				Y	
4/10/2012	7.1	7076	WE	370	477				Y	
4/10/2012	7.1	7076	WE	465	1017				Y	
4/10/2012	7.1	7076	WE	476	1220				Y	
4/10/2012	7.1	7076	WE	480	1218				Y	
4/10/2012	7.1	7076	WE	469	1045				Y	
4/10/2012	7.1	7076	WE	492	1184				Y	
4/10/2012	7.1	7076	WE	516	1510				Y	
4/10/2012	7.1	7076	WE	500	1369				Y	
4/10/2012	7.1	7076	WE	480	1192				Y	
4/10/2012	7.1	7076	WE	371	512				Y	
4/10/2012	7.1	7076	WE	474	1143				Y	
4/10/2012	7.1	7076	WE	456	1012				Y	
4/16/2012	7.4		RB	385	786	985121027373611				
4/16/2012	7.4.		WCT	275	228	985121027402765		y		
5/21/2012	11.1	1916	L WF	412	604				Y	

Date	Temp °C	Seconds	Species	Length (mm)	Weight (g)	PIT Tag/Floy Tag	Mark/Clip	Recap	Mort	GBT Rank/Comment
5/21/2012	11.1	1800	L WF	427	720					
5/21/2012	11.1	1916	L WF	432	772					
5/21/2012	11.1	1916	L WF	435	702					
5/21/2012	11.1	1916	L WF	435	852					
5/21/2012	11.1	1916	L WF	443	872					
5/21/2012	11.1	1916	L WF	447	778					
5/21/2012	11.1	1916	L WF	452	822					
5/21/2012	11.1	1916	L WF	455	888					
5/21/2012	11.1	1916	L WF	455	1048					
5/21/2012	11.1	1916	L WF	458	902					
5/21/2012	11.1	1916	L WF	462	866					
5/21/2012	11.1	1916	L WF	470	1034					
5/21/2012	11.1	1916	LL	360	418	985121027363965	AD			
5/21/2012	11.1	1800	LL	287	208	985121027357966	AD			
5/21/2012	11.1	1800	LL	168	46					
5/21/2012	11.1	1800	LL	200	78					
5/21/2012	11.1	1800	LN SU	192	66					
5/21/2012	11.1	1916	LN SU	438	890					
5/21/2012	11.1	1916	LN SU	445	942					
5/21/2012	11.1	1800	LN SU	460	966					
5/21/2012	11.1	1800	LN SU	457	994					
5/21/2012	11.1	1800	LN SU	462	1004					
5/21/2012	11.1	1916	LN SU	468	1010					
5/21/2012	11.1	1916	LN SU	495	1024					
5/21/2012	11.1	1800	LN SU	472	1094					
5/21/2012	11.1	1916	LN SU	496	1126					
5/21/2012	11.1	1800	LN SU	478	1138					
5/21/2012	11.1	1800	LN SU	480	1200					
5/21/2012	11.1	1916	LN SU	482	1290					
5/21/2012	11.1	1800	LN SU	503	1310					
5/21/2012	11.1	1800	LN SU	503	1328					
5/21/2012	11.1	1916	LN SU	485	1394					

Date	Temp °C	Seconds	Species	Length (mm)	Weight (g)	PIT Tag/Floy Tag	Mark/Clip	Recap	Mort	GBT Rank/Comment
5/21/2012	11.1	1916	LN SU	512	1434					
5/21/2012	11.1	1916	LN SU	508	1444					
5/21/2012	11.1	1800	LN SU	528	1472					
5/21/2012	11.1	1916	LN SU	490	1482					
5/21/2012	11.1	1800	LN SU	500	1514					
5/21/2012	11.1	1916	LS SU	412	840					
5/21/2012	11.1	1916	LS SU	420	916					
5/21/2012	11.1	1916	LS SU	421	746					
5/21/2012	11.1	1916	LS SU	422	776					
5/21/2012	11.1	1800	LS SU	427	822					
5/21/2012	11.1	1916	LS SU	428	768					
5/21/2012	11.1	1916	LS SU	430	826					
5/21/2012	11.1	1916	LS SU	430	724					
5/21/2012	11.1	1916	LS SU	431	900					
5/21/2012	11.1	1916	LS SU	432	908					
5/21/2012	11.1	1916	LS SU	432	888					
5/21/2012	11.1	1916	LS SU	435	866					
5/21/2012	11.1	1800	LS SU	435	842					
5/21/2012	11.1	1800	LS SU	437	840					
5/21/2012	11.1	1916	LS SU	440	1032					
5/21/2012	11.1	1916	LS SU	442	834					
5/21/2012	11.1	1916	LS SU	442	932					
5/21/2012	11.1	1916	LS SU	445	982					
5/21/2012	11.1	1916	LS SU	445	996					
5/21/2012	11.1	1800	LS SU	445	966					
5/21/2012	11.1	1800	LS SU	445	1052					
5/21/2012	11.1	1800	LS SU	445	1008					
5/21/2012	11.1	1916	LS SU	448	850					
5/21/2012	11.1	1916	LS SU	450	906					
5/21/2012	11.1	1916	LS SU	452	988					
5/21/2012	11.1	1800	LS SU	454	1010					
5/21/2012	11.1	1800	LS SU	456	1036					

Date	Temp °C	Seconds	Species	Length (mm)	Weight (g)	PIT Tag/Floy Tag	Mark/Clip	Recap	Mort	GBT Rank/Comment
5/21/2012	11.1	1916	LS SU	457	1170					
5/21/2012	11.1	1800	LS SU	457	1006					
5/21/2012	11.1	1916	LS SU	459	1004					
5/21/2012	11.1	1916	LS SU	460	1090					
5/21/2012	11.1	1800	LS SU	460	1192					
5/21/2012	11.1	1916	LS SU	461	958					
5/21/2012	11.1	1916	LS SU	465	1066					
5/21/2012	11.1	1916	LS SU	465	1140					
5/21/2012	11.1	1916	LS SU	465	904					
5/21/2012	11.1	1800	LS SU	465	994					
5/21/2012	11.1	1800	LS SU	465	1118					
5/21/2012	11.1	1800	LS SU	467	944					
5/21/2012	11.1	1916	LS SU	470	1152					
5/21/2012	11.1	1800	LS SU	471	1034					
5/21/2012	11.1	1800	LS SU	472	1192					
5/21/2012	11.1	1800	LS SU	472	1104					
5/21/2012	11.1	1800	LS SU	472	1294					
5/21/2012	11.1	1916	LS SU	473	1228					
5/21/2012	11.1	1916	LS SU	475	1186					
5/21/2012	11.1	1800	LS SU	476	1196					
5/21/2012	11.1	1800	LS SU	480	1154					
5/21/2012	11.1	1800	LS SU	480	972					
5/21/2012	11.1	1916	LS SU	485	1366					
5/21/2012	11.1	1916	LS SU	485	1248					
5/21/2012	11.1	1800	LS SU	485	1098					
5/21/2012	11.1	1800	LS SU	492	1408					
5/21/2012	11.1	1916	LS SU	496	1278					
5/21/2012	11.1	1916	LS SU	500	1418					
5/21/2012	11.1	1800	LS SU	502	1484					
5/21/2012	11.1	1916	LS SU	505	1472					
5/21/2012	11.1	1800	LS SU	505	1450					
5/21/2012	11.1	1800	LS SU	508	1704					

Date	Temp °C	Seconds	Species	Length (mm)	Weight (g)	PIT Tag/Floy Tag	Mark/Clip	Recap	Mort	GBT Rank/Comment
5/21/2012	11.1	1916	LS SU	510	1508					
5/21/2012	11.1	1800	LS SU	512	1552					
5/21/2012	11.1	1916	LS SU	515	1224					
5/21/2012	11.1	1800	LS SU	520	1292					
5/21/2012	11.1	1916	LS SU	522	1726					
5/21/2012	11.1	1916	LS SU	528	1336					
5/21/2012	11.1	1800	LS SU	532	1628					
5/21/2012	11.1	1916	LS SU	541	1799					
5/21/2012	11.1	1800	LS SU	550	2084					
5/21/2012	11.1	1800	LS SU	550	2098					
5/21/2012	11.1	1916	LS SU	560	2154					
5/21/2012	11.1	1800	LS SU	563	2138					
5/21/2012	11.1	1800	LS SU	578	2210					
5/21/2012	11.1	1800	LS SU	580	1284					
5/21/2012	11.1	1800	MWF	242	132		old AD	y		
5/21/2012	11.1	1916	MWF	246	118					
5/21/2012	11.1	1916	MWF	162	32					
5/21/2012	11.1	1916	MWF	142	26					
5/21/2012	11.1	1916	MWF	235	110					
5/21/2012	11.1	1800	MWF	150	30					
5/21/2012	11.1	1800	MWF	153	32					
5/21/2012	11.1	1800	MWF	375	462					
5/21/2012	11.1	1800	MWF	132	20					
5/21/2012	11.1	1800	MWF	153	32					
5/21/2012	11.1	1800	MWF	165	40					
5/21/2012	11.1	1800	MWF	170	36					
5/21/2012	11.1	1800	MWF	153	32					
5/21/2012	11.1	1800	MWF	128	16					
5/21/2012	11.1	1800	MWF	138	22					
5/21/2012	11.1	1800	MWF	155	32					
5/21/2012	11.1	1800	MWF	162	42					
5/21/2012	11.1	1916	N PMN	470	986					

Date	Temp °C	Seconds	Species	Length (mm)	Weight (g)	PIT Tag/Floy Tag	Mark/Clip	Recap	Mort	GBT Rank/Comment
5/21/2012	11.1	1916	N PMN	508	1272					
5/21/2012	11.1	1800	N PMN	585	2034					
5/21/2012	11.1	1916	NP	710	2902	y Floy 16019				
5/21/2012	11.1	1800	NP	600	1600	y Floy 16020				
5/21/2012	11.1	1916	PEA	355	416					
5/21/2012	11.1	1800	RB	202	92	985121027363758	AD			
5/21/2012	11.1	1916	RB	232	136	985121027363105	AD			
5/21/2012	11.1	1916	RB	287	270	985121027385865	AD			
5/21/2012	11.1	1916	RB	395	610	985121027366354	AD			
5/21/2012	11.1	1800	RB	382	512		n			
5/21/2012	11.1	1800	RB	157	40		n			
5/21/2012	11.1	1800	RB	182	62		n			
5/21/2012	11.1	1800	RB	485	1158	985121027376358	AD			
5/21/2012	11.1	1800	SMB	277	256					
5/21/2012	11.1	1916	WCT	300	274	985121027357907	AD			
5/21/2012	11.1	1916	WCT	255	156	985121027373454	AD			
5/21/2012	11.1	1916	WCT	222	92					
6/25/2012	13.9	4405	RB	382	604	985121027278761	AD			
6/25/2012	13.9	4405	WCT	232	120	985121027360761				
6/25/2012	14.4	2180	RB	355	458	985121027373512	AD			
6/25/2012	13.9	4405	LS SU	470	1038	985121027385421		Y		
6/25/2012	13.9	4405	KOK	155	28				Y	
6/25/2012	13.9	4405	L WF	438	724					
6/25/2012	13.9	4405	L WF	490	1174					
6/25/2012	13.9	4405	L WF	428	776					
6/25/2012	13.9	4405	L WF	500	1228					
6/25/2012	14.4	2180	L WF	462	986					
6/25/2012	14.4	2180	L WF	455	920					
6/25/2012	14.4	2180	LN SU	480	1212					
6/25/2012	13.9	4405	LS SU	550	1638					
6/25/2012	13.9	4405	LS SU	480	1052					GBT rank 1
6/25/2012	13.9	4405	LS SU	445	850					

Date	Temp °C	Seconds	Species	Length (mm)	Weight (g)	PIT Tag/Floy Tag	Mark/Clip	Recap	Mort	GBT Rank/Comment
6/25/2012	13.9	4405	LS SU	450	1775					
6/25/2012	13.9	4405	LS SU	460	1102					
6/25/2012	13.9	4405	LS SU	450	1144					
6/25/2012	13.9	4405	LS SU	491	n					
6/25/2012	13.9	4405	LS SU	500	1176					
6/25/2012	13.9	4405	LS SU	510	1526					
6/25/2012	13.9	4405	LS SU	425	786					
6/25/2012	13.9	4405	LS SU	440	874					
6/25/2012	13.9	4405	LS SU	482	1196					
6/25/2012	13.9	4405	LS SU	507	1262					
6/25/2012	13.9	4405	LS SU	396	682					
6/25/2012	13.9	4405	LS SU	476	1096					
6/25/2012	13.9	4405	LS SU	460	952					
6/25/2012	13.9	4405	LS SU	445	818					
6/25/2012	13.9	4405	LS SU	507	1634					
6/25/2012	13.9	4405	LS SU	487	1280					
6/25/2012	13.9	4405	LS SU	462	932					
6/25/2012	13.9	4405	LS SU	410	774					
6/25/2012	13.9	4405	LS SU	450	884					
6/25/2012	13.9	4405	LS SU	475	1076					
6/25/2012	13.9	4405	LS SU	526	1566					
6/25/2012	13.9	4405	LS SU	435	866					
6/25/2012	13.9	4405	LS SU	445	990					
6/25/2012	13.9	4405	LS SU	473	900					
6/25/2012	13.9	4405	LS SU	470	906					
6/25/2012	13.9	4405	LS SU	465	1110					
6/25/2012	13.9	4405	LS SU	485	1154					
6/25/2012	13.9	4405	LS SU	475	1104					
6/25/2012	13.9	4405	LS SU	460	1064					
6/25/2012	13.9	4405	LS SU	426	764					
6/25/2012	13.9	4405	LS SU	458	1000					
6/25/2012	13.9	4405	LS SU	497	1228					

Date	Temp °C	Seconds	Species	Length (mm)	Weight (g)	PIT Tag/Floy Tag	Mark/Clip	Recap	Mort	GBT Rank/Comment
6/25/2012	13.9	4405	LS SU	204	88					
6/25/2012	13.9	4405	LS SU	125	30					
6/25/2012	13.9	4405	LS SU	510	1404					
6/25/2012	13.9	4405	LS SU	508	1364					
6/25/2012	13.9	4405	LS SU	452	492					
6/25/2012	13.9	4405	LS SU	460	1204					
6/25/2012	13.9	4405	LS SU	430	832					
6/25/2012	13.9	4405	LS SU	460	972					
6/25/2012	13.9	4405	LS SU	402	722					
6/25/2012	13.9	4405	LS SU	152	40					
6/25/2012	13.9	4405	LS SU	471	1144					
6/25/2012	13.9	4405	LS SU	481	1092					
6/25/2012	13.9	4405	LS SU	407	720					
6/25/2012	13.9	4405	LS SU	480	1190					
6/25/2012	13.9	4405	LS SU	420	746					
6/25/2012	13.9	4405	LS SU	326	390					
6/25/2012	13.9	4405	LS SU	145	34					
6/25/2012	14.4	2180	LS SU	417	766					
6/25/2012	14.4	2180	LS SU	500	1654					
6/25/2012	14.4	2180	LS SU	402	652					
6/25/2012	14.4	2180	LS SU	443	930					
6/25/2012	14.4	2180	LS SU	444	1006					
6/25/2012	14.4	2180	LS SU	490	1080					
6/25/2012	14.4	2180	LS SU	472	1340					
6/25/2012	14.4	2180	LS SU	495	1128					
6/25/2012	14.4	2180	LS SU	450	978					
6/25/2012	14.4	2180	LS SU	465	984					
6/25/2012	14.4	2180	LS SU	395	594					
6/25/2012	14.4	2180	LS SU	555	1906					
6/25/2012	14.4	2180	LS SU	481	1000					
6/25/2012	14.4	2180	LS SU	470	998					
6/25/2012	14.4	2180	LS SU	460	1030					

Date	Temp °C	Seconds	Species	Length (mm)	Weight (g)	PIT Tag/Floy Tag	Mark/Clip	Recap	Mort	GBT Rank/Comment
6/25/2012	14.4	2180	LS SU	421	774					
6/25/2012	14.4	2180	LS SU	322	482					
6/25/2012	14.4	2180	LS SU	515	1480					
6/25/2012	14.4	2180	LS SU	425	778					
6/25/2012	14.4	2180	LS SU	455	880					
6/25/2012	14.4	2180	LS SU	440	1056					
6/25/2012	14.4	2180	LS SU	485	1272					
6/25/2012	14.4	2180	LS SU	456	1042					
6/25/2012	14.4	2180	LS SU	435	828					
6/25/2012	14.4	2180	LS SU	475	1010					
6/25/2012	14.4	2180	LS SU	467	990					
6/25/2012	14.4	2180	LS SU	417	764					
6/25/2012	14.4	2180	LS SU	450	910					
6/25/2012	14.4	2180	LS SU	470	952					
6/25/2012	14.4	2180	LS SU	462	938					
6/25/2012	14.4	2180	LS SU	457	1040					
6/25/2012	14.4	2180	LS SU	397	604					
6/25/2012	14.4	2180	LS SU	433	900					
6/25/2012	14.4	2180	LS SU	480	1218					
6/25/2012	14.4	2180	LS SU	471	1164					ripe male
6/25/2012	14.4	2180	LS SU	402	708					
6/25/2012	13.9	4405	MWF	285	192					
6/25/2012	13.9	4405	MWF	177	48					
6/25/2012	13.9	4405	MWF	208	86				Y	
6/25/2012	13.9	4405	N PMN	602	2224					
6/25/2012	13.9	4405	N PMN	595	1772					
6/25/2012	13.9	4405	N PMN	590	2096					
6/25/2012	13.9	4405	N PMN	136	45					
6/25/2012	13.9	4405	N PMN	300	260					
6/25/2012	13.9	4405	N PMN	172	44					
6/25/2012	13.9	4405	N PMN	500	1128					
6/25/2012	13.9	4405	N PMN	138	20					

Date	Temp °C	Seconds	Species	Length (mm)	Weight (g)	PIT Tag/Floy Tag	Mark/Clip	Recap	Mort	GBT Rank/Comment
6/25/2012	14.4	2180	N PMN	530	1478					
6/25/2012	14.4	2180	N PMN	335	320					
6/25/2012	13.9	4405	NP	1035	n	yFloy 16021				
6/25/2012	13.9	4405	NP	650	2366	yFloy 16022				
6/25/2012	13.9	4405	NP	675	2184	yFloy 16023				
6/25/2012	13.9	4405	NP	560	1500	yFloy 16024				
6/25/2012	13.9	4405	NP	618	1560	yFloy 16025				
6/25/2012	13.9	4405	NP	620	1834	yFloy 16051				
6/25/2012	14.4	2180	NP	650	2452	yFloy 16052				
6/25/2012	14.4	2180	NP	650	2106	yFloy 16053				
6/25/2012	14.4	2180	NP	683	2522	yFloy 16054				
6/25/2012	14.4	2180	N PMN	143	24					
6/25/2012	14.4	2180	N PMN	145	23					
6/25/2012	14.4	2180	N PMN	412	626					
6/25/2012	13.9	4405	RB	455	732	985121027412262	AD			GBT rank 1
6/25/2012	13.9	4405	RB	128	22					
6/25/2012	13.9	4405	RB	229	134				Y	
6/25/2012	13.9	4405	RB	170	56					
6/25/2012	13.9	4405	RB	110	13					
6/25/2012	13.9	4405	RB	138	30				Y	
6/25/2012	14.4	2180	RB	124	20					
6/25/2012	14.4	2180	RB	213	128					
6/25/2012	13.9	4405	SMB	285	334					
6/25/2012	13.9	4405	SMB	395	470					
6/25/2012	13.9	4405	SMB	282	304					GBT rank 1
6/25/2012	13.9	4405	SMB	392	924					
6/25/2012	13.9	4405	SMB	282	294					
6/25/2012	13.9	4405	SMB	223	152					
6/25/2012	13.9	4405	SMB	292	294					
6/25/2012	13.9	4405	SMB	292	356					
6/25/2012	13.9	4405	SMB	230	178					
6/25/2012	13.9	4405	SMB	298	404					

Date	Temp °C	Seconds	Species	Length (mm)	Weight (g)	PIT Tag/Floy Tag	Mark/Clip	Recap	Mort	GBT Rank/Comment
6/25/2012	13.9	4405	SMB	242	202					
6/25/2012	14.4	2180	SMB	447	1208					
6/25/2012	14.4	2180	SMB	320	452					
6/25/2012	14.4	2180	SMB	262	238					
6/25/2012	14.4	2180	SMB	302	356					
6/25/2012	14.4	2180	SMB	270	254					