FISHERY MANAGEMENT INVESTIGATIONS

IDAHO DEPARTMENT OF FISH AND GAME

FISHERY MANAGEMENT ANNUAL REPORT

Cal Groen, Director

SOUTHEAST REGION

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Pelicans foraging along the Blackfoot River (June 2007)

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2007 Southeast Region Fishery Management Report

TABLE OF CONTENTS

2007 Southeast Region Fishery Management Report

ABSTRACT

In 2007, the southeast region fisheries crew continued several native cutthroat trout monitoring programs, estimated direct predation of American white pelicans on spawning cutthroat trout in the upper Blackfoot River, investigated a fish kill on Cub River, sampled six reservoirs to collect fish tissue for methyl-mercury concentrations, completed a study to document natural background level of selenium in fish tissue from the Blackfoot and Crow creek drainages, investigated an illegal introduction of rainbow trout in Preuss Creek, and renovated two reservoirs to maximize production of game fish.

A total of 98 adult Yellowstone cutthroat trout were collected at the Blackfoot River migration trap. The escapement count observed in 2007 was higher than the previous two years when less than 20 cutthroat trout were counted per year. A total of 27 Yellowstone cutthroat trout were fitted with radio transmitters. Those fish were tracked for several months and nine telemetry tags were recovered from pelican nests on Gull Island. That number accounts for 33% of the total number of Yellowstone cutthroat trout tagged. That predation rate is more than double the value reported in 2004 (15%). During the same time period, the adult pelican population nesting on Gull Island increased by the same relative proportion.

On July 5, the Department received notification of a fish kill on Cub River. Our investigation documented a kill covering about 2.5 km of river and more than 3,000 fish were observed dead. Salmonids made up 11% of the mortalities. A total of 207 dead Bonneville cutthroat trout were counted during the visual survey.

During the second week in July 2007, IDFG was notified by Trout Unlimited that rainbow trout, and hybrid cutthroat X rainbow trout were present in Preuss Creek. Preuss Creek supports a core population of Bonneville cutthroat trout that has been monitored for more than 20 years. Fisheries and enforcement crews completed an investigation to confirm the Trout Unlimited report. Results of the investigation include: 1) a private landowner along Preuss Creek constructed a pond and stocked it with fertile rainbow trout; 2) the pond intake and effluent were not screened, which released rainbow trout into Preuss Creek; 3) electrofishing surveys in Preuss Creek above and below the pond confirmed the presence rainbow trout and hybrid trout; and 4) rainbow trout and hybrids currently occupy the lowest 5 km of Preuss Creek.

Fish renovation projects were completed on Pleasantview and Crowthers reservoirs. The objective of the renovations was to remove Utah chub and green sunfish. Effectiveness of the renovations will be assessed in future years.

Yellowstone Cutthroat Trout Escapement in the Blackfoot River

Introduction and Methods

There are two monitoring programs in place for Yellowstone cutthroat trout *Oncorhynchus clarkii bouvieri* (YCT) in the upper Blackfoot River. The programs include estimating the number of spawning YCT migrating out of Blackfoot Reservoir and estimating YCT densities in the reach of river within the Idaho Department of Fish and Game's (IDFG) Blackfoot River Wildlife Management area located about 51 km above the reservoir. The spawning estimates are completed annually, while the upriver density estimates are completed every other year.

The spawning estimates are completed by operating a fish trap 3.2 km upriver of the confluence with Blackfoot Reservoir. The fish trap is an electric barrier designed by Smith Root Incorporated. The electric barrier is paired with a fish collection box. The trap components include four flush mounted electrodes embedded in Insulcrete®, four BP-1.5 POW pulsators, and a computer control and monitoring system. The computer system can be operated remotely. The computer monitors electrode outputs and has an alarm system that triggers during power outages. Detailed descriptions of these components and their function can be obtained at www.smith-root.com.

The electric barrier was operated from May 3rd to June 1st, 2007. Prior to observing fish at the trap, field crews checked the live box several times a week. Once fish began entering the trap, it was checked at least once per day. Fish species and lengths were recorded. Yellowstone cutthroat trout were visually checked for bird scars. Bird scar monitoring began in 2004 and was associated with an increase in pelicans using the Blackfoot River to feed.

Results and Discussion

In 2007, a total of 98 adult YCT were collected at the migration trap. The escapement count observed in 2007 was higher than the previous two years when less than 20 YCT were counted per year. About 15% of the YCT observed in the trap were scarred by birds. Scarring rates have varied from no visible scars on fish collected in 2002 to a high of 70% scared in 2004. Variation in scarring rates is likely impacted by the overall number of American White Pelicans *Pelecanus erythrorhynchos* feeding on the river below the migration trap, water levels, and hazing efforts exerted on the birds to reduce predation impacts. The hazing efforts were described by Teuscher and Scully (2008). Escapement and bird scar trends are shown in Table 1.

Table 1. Yellowstone cutthroat trout, water, and pelican information collected from the Blackfoot River system, 2007.

Year	Weir Type	YCT Count	Mean Length (mm)	% Bird Scars	Mean May River Discharge (cfs)	Adult Pelican Count
2001	Floating	4,747	486	No data	74	No data
2002	Floating	902	494	0	132	1,352
2003	Electric	427	495	No data	151	1,674
2004	Electric	125	478	70	127	1,748
2005	Electric	16	Na	6	388	2,800
2006	Electric	19	Na	38	453	2,548
2007	Electric	98	445	15	115	3,416

A Direct Measure of Pelican Predation on Spawning Yellowstone Cutthroat Trout in the Blackfoot River

Introduction and Methods

During the past five years, fisheries and wildlife crews have been investigating interactions between American White Pelicans and YCT in the Blackfoot River system. Summaries of bird diet analyses and consumption estimates as well as population trends for both species are available in Teuscher et al. (2005) and Teuscher and Scully (2006). Those studies focused on bird predation impacts on hatchery stocked rainbow trout. In 2004, we focused research on pelican interactions with native YCT during spawning migrations. Specifically, we estimated bird scarring rates on migrating fish, enumerated prey and predator abundance, and completed a fish telemetry study. In 2007, the objective of the radio telemetry study was to replicate the pelican predation portion of the 2004 study.

Radio transmitters were surgically implanted in YCT that were captured at the fish trap located on the Blackfoot River about 3.2 km upriver of the confluence with Blackfoot Reservoir. The radio transmitters were Advanced Telemetry Systems model F1300. Transmitters weighed about 11 grams and were implanted in YCT ≥ 600 grams. The transmitter carried mortality signals that would deploy if held stationary for more than 24 hours. The mortality indicators help determine mortality date, mortality location, and the potential cause of mortality (i.e., tags found in bird nests).

Surgery began by anesthetizing fish. Incisions were approximately 35 mm long, centered between the pectoral fins and pelvic fins. A grooved directional tool approximately 100 mm long was inserted into the incision and slid anteriorly, close to the flesh to prevent any contact with the internal organs. A 100 mm long catheter needle was inserted behind the pelvic fins and slid up the direction tool until it exits the opening of the incision. The antenna was inserted into the catheter needle and directed out the hole created behind the pelvic fins. The body of the tag is then gently inserted into the 35 mm incision. Incisions were closed with three or four stitches. Surgery times ranged from 6-8 minutes. Fish were placed in live wells filled with fresh water to recover and released about 100 m above the fish trap.

The pelican predation rate was estimated by recovering fish telemetry tags from pelican nest on Gull Island. Several times during the nesting period, a boat was used to circle Gull Island. If a tag signal was received, the boat was docked and a person would recover the tag from the island. The predation rate estimate was made by dividing the number of telemetry tags recovered from pelican nests by the total number implanted in migrating cutthroat trout.

Results and Discussion

A total of 27 YCT were fitted with radio transmitters. All of the YCT were tagged between May 12 and May 16, 2007. The mean size of YCT tagged was 440 mm, with a mean weight of 970 g. Of the 27 YCT tagged, 22 (81%) were female.

A total of 9 telemetry tags were recovered from pelican nests on Gull Island. That number accounts for 33% of the total number of YCT tagged. That predation rate is more than double the value reported in 2004 (15%). During the same time period, the adult pelican population nesting on Gull Island increased by the same relative proportion (Table 1).

There are several limitations of the predation study. First, the estimate does not account for total predation because pelicans likely excrete tags in other locations besides Gull Island. For example, in the 2004 predation study, about 30% of recovered tags were found on lands other than Gull Island. Unidentified predators may have carried some of those tags out of the river corridor, but it is not possible from our dataset to determine how many were lost to pelican predation. Secondly, our predation rate estimate does not include all of the Blackfoot River. Large flocks of pelicans forage in the lowest 3.2 km of river below the fish trap. Because we capture and tag YCT above that reach, predation below the trap was not measured. Future studies should focus on tagging YCT in the reservoir. That would allow for complete estimates of river predation. Additionally, predation losses of YCT in the reservoir should be evaluated.

Cub River Fish Kill

Introduction and Methods

On July 5, 2007, IDFG received notification of a potential fish kill on the Cub River. The following day, David Teuscher and Lynn Van Every, with Idaho Department of Environmental Quality (DEQ), met with local anglers in Preston to tour the reach of Cub River where dead fish were observed. The first location we investigated was at the 3200 E bridge crossing of the Cub River (Figure 1). Because dead fish were confirmed at that bridge, a river survey was conducted to assess the extent of the kill and to attempt to find the source or cause. As part of determining the cause, water quality parameters were measure at the 3200 bridge site (ie., DO, pH, Turbidity, Temperature).

DEQ and IDFG personnel surveyed about 2.5 km of river. Observers walked downriver of the 3200 E bridge until no more signs of dead fish were observed (Figure 1, lower boundary). Observers then walked upriver of that location counting dead fish. All salmonids were counted, but some estimates were made for large schools of dead suckers, shiners, and dace (Figure2). In addition to the dead-fish counts, backpack electrofishing surveys were completed on July 10th in two locations. The lowest site surveyed was a 120 m reach that included the 3200 E bridge area and the upper site was above the upper boundary where no dead fish were found. The upper site was 116 m long and was located at: 435376E, 4656329N (NAD83). The upper site was sampled to compare with the impacted reach.

Results

There was no indication of poor water quality at the 3200 E bridge measured on July 6, 2007. The dissolved oxygen concentration was 12.4 mg/l, which equated to a saturation level of 150%. The pH was 8.6. Water temperatures ranged from 21.0˚ C at 1300 hrs to 24.0˚ C at 1700 hrs. Turbidity was 2.4 ntu.

We estimated total fish mortality to exceed 3,000 fish over the 2.5 km reach. Salmonids made up 11% of the mortalities. A total of 207 dead Bonneville cutthroat trout *O. clarkii utah* were counted during the visual survey. The mean total length of Bonneville cutthroat trout was 305 mm. Brown trout *Salmo trutta* were the next most abundant trout killed at 71. Only 2 rainbow trout *O. mykiss* were observed (Table 2). Table 2 shows all species of dead fish observed within the 2.5 km survey reach of Cub River.

Electrofishing surveys showed fast repopulation into the impact reach or an incomplete fish kill. The densities of Bonneville cutthroat trout were 8.9/ 100m^2 above the kill and 3.8/100 m^2 in the impacted reach. Brown trout densities were higher in the impact reach (Table 3). Conversely, the event appeared to have a much greater impact on the mountain whitefish *Prosopium williamsoni* population. Whitefish densities were 3.8/ 100m^2 above the kill and zero in the impacted reach (Table 3). Since whitefish were observed dead in the impacted reach, it is reasonable to assume that the paucity of fish sampled was a result of the kill. Whitefish may have been more susceptible to the agent responsible for the kill than other species.

Investigating the Cause and Discussion

The DEQ and Idaho Department of Agriculture investigated potential causes of the fish kill. It was determined that the Cub River Canal Company hired a licensed applicator to treat its canals with MAGNACIDE H Herbicide. The applicator, Richard Warren, applied MAGNACIDE H Herbicide to the Cub River Canal at the main head gate at 22:45 hrs on July 3, 2007. The location of the application occurred at the main diversion structure above where we observed dead fish. Further, two potential connections were identified that returned MAGNACIDE H Herbicide treated canal water back to the Cub River. The two connections were a leaking spill gate and fields that were being irrigated with MAGNACIDE H Herbicide treated water. The same spill gate was identified by the Department of Agriculture as the source of a MAGNACIDE H Herbicide caused fish kill in the Cub River in 2000.

Applying MAGNACIDE H Herbicide to a canal with a surface connection to a river or stream is unlawful. On July 9 2007, the herbicide applicator met with representatives from DEQ, IDFG, and the Department of Agriculture. The spill gate that caused the 2000 fish kill had not been repaired and was still leaking water to the Cub River. No other potential cause for the fish kill was identified by DEQ or the Department of Agriculture investigators. However, prior to completing the 2007 investigation, the applicator that discharged MAGNACIDE H to the Cub River was involved in a fatal accident.

The fish kill documented in 2007 was similar in magnitude to the 2000 kill. The reach of river impacted was very similar. In both years, fish quickly repopulated the impacted reach or some fish survived. The estimated number of Bonneville cutthroat trout killed per $100m^2$ was 1.9 in 2000 and 1.6 in 2007. The estimated density of cutthroat trout above the kill was 11.7 per $100m^2$ in 2000 and 8.9 per $100m^2$ in 2007.

No action was taken against the Cub River Canal Company in 2000. At that time, the canal company agreed to fix the leaking spill gate and (or) apply MAGNACIDE H Herbicide in the canal below the gate. An attempt was made to plug holes in the spill gate, but they failed. To avoid future fish kills in the Cub River, the spill gate should be replaced or permanently removed.

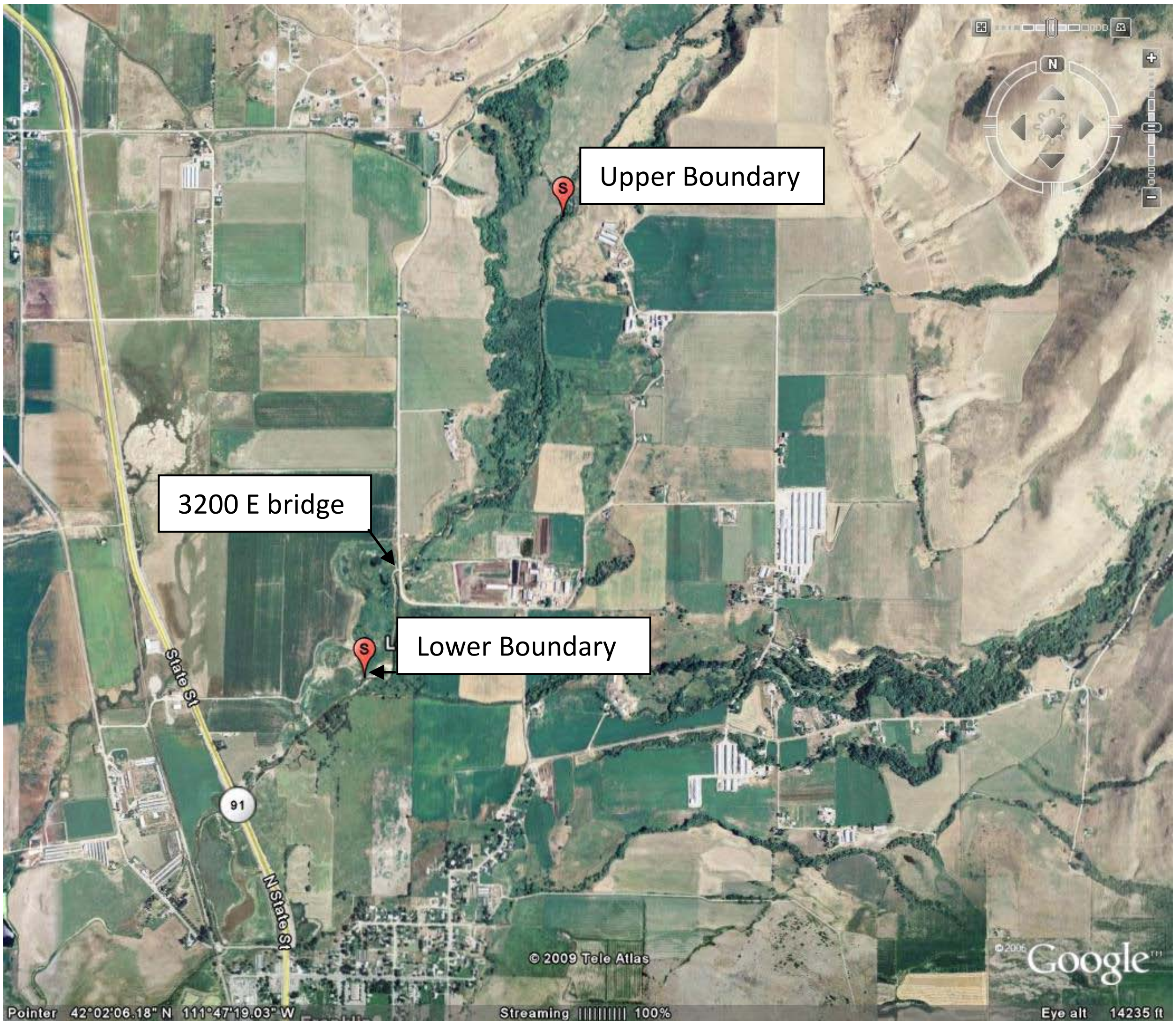

Figure 1. The lower and upper boundary of the Cub River fish Kill, surveyed on July 5, 2007. The reach is an estimated 2.5 km of river. The upper and lower boundaries of the survey were established based on dead fish observations.

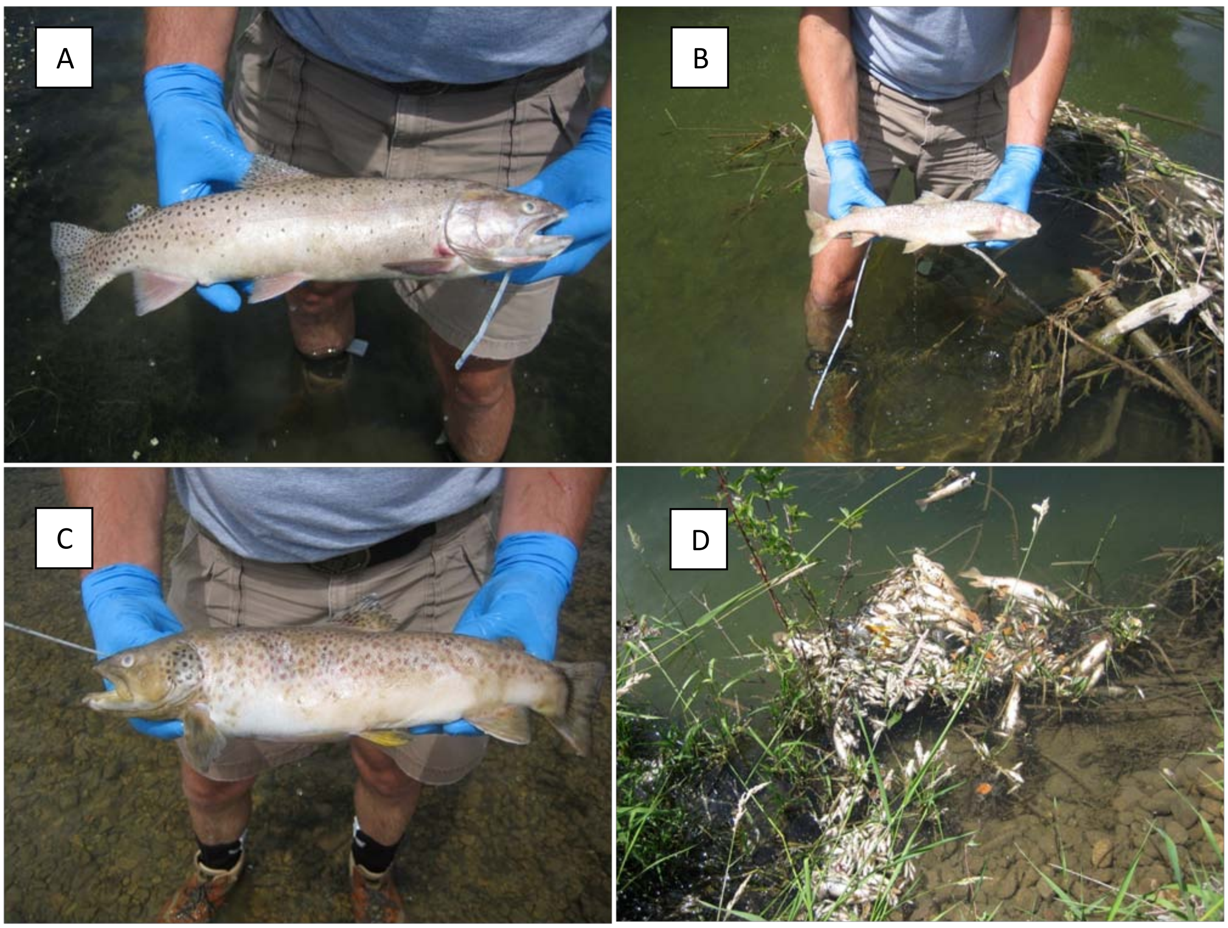

Figure 2. Dead fish that were observed during the Cub River fish kill. Species of fish are Bonneville cutthroat trout (A), mountain whitefish (B), brown trout (C), and a mixture of non-game species (D). When large groups of non-salmonids were observed (see D), we estimated the total number of dead fish in the group.

Table 2. Dead fish counts from Cub River on July 6, 2007.

Species	count	percent
Bonneville cutthroat trout	207	7%
Brown trout	71	2%
Mountain whitefish	65	2%
Rainbow trout	2	0%
Sucker sp.	663	21%
Redside shiners	1,760	56%
Dace sp.	390	12%
Total	3,158	

Table 3. Fish densities and size collected during the backpack electrofishing surveys completed on July 10, 2007.

Parameter	Reach	Cutthroat	Brown trout	Whitefish
Densities (number / 100m^2)	Upriver	8.9	0.6	3.8
	Impact	3.8	2.6	0.0
Mean total length (mm)	Upriver	239	298	200
	Impact	271	277	ND

Preuss Creek Investigation

Introduction

During the second week in July 2007, IDFG was notified by Trout Unlimited (TU) that rainbow trout, and hybrid cutthroatXrainbow trout were sampled from Preuss Creek. TU personnel were sampling Preuss Creek as part of a joint project with IDFG to quantify native cutthroat trout entrainment in irrigation diversion of Bear River tributaries. The non-native trout were unexpected and appeared to be associated with a man-made pond filled by an unscreened diversion of Preuss Creek. The pond is located on private property owned by John Makoff. On 4 July 2007, TU personnel captured a rainbow trout from the pond by hand and electrofished rainbow trout (n=2) and hybrid trout (n=4) in Preuss Creek near the unscreened outflow of the pond (Figure 3). TU personnel culled all of the rainbow and hybrid trout they sampled. On 5 July, TU personnel contacted John Makoff to inform him of rainbow trout escapement from the pond and the hybridization problem. John Makoff gave TU permission to return to his property the next day to remove rainbow trout and hybrids from the creek. TU made a request to IDFG to modify its collecting permit to include rainbow trout removal.

On July 6, TU completed an electrofishing removal effort of about 0.5 miles of Preuss Creek below the outlet of Makoff's pond. A total of 12 hybrids were culled. The following week, TU project leader Warren Colyer called David Teuscher of IDFG to relay their Preuss Creek findings. The remainder of this section documents IDFG response.

IDFG Investigation and Communication Record

An investigation of the pond and surrounding reaches of Preuss Creek were completed on September 24th 2007. Permission to complete an investigation was granted by John Makoff's ranch manager. We found the pond to be cut off from Preuss Creek flow (Figure 4 &5). Skeletal remains of fish were prevalent surrounding the desiccating pond. IDFG collected rainbow trout, hybrids, and Bonneville cutthroat trout above and below the pond (Figure 6).

Blake Phillips, IDFG district conservation officer, was contacted by John Makoff to discuss the pond and other wildlife issues. During the contact, John Makoff volunteered the following information: 1) he built the pond the first year of owning the property some seven to eight years ago, 2) he stocked the pond with fertile rainbow trout from Black Canyon hatchery, 3) that the pond banks failed during a high water event in 2005, 4) the high water event resulted in spilling fish to the creek, and 5) the pond was restocked after the stream/pond bank was repaired.

Defining the Extent of Upstream Hybrid Expansion

To assess the extent of hybridization in Preuss Creek, regional fisheries staff completed a systematic sampling effort over the entire length of Preuss Creek (Figure 7). A total of 35 sites were surveyed using a Smith-Root LR-24 electrofisher. Sites were distributed at 400 m intervals. At each site the first five trout collected were anesthetized, photographed, and fin clips taken for genetic analysis. Based on photographs taken in the field (Figure 8), visual determinations of species were made of every fish. Results of the survey suggest that hybridization appears to be limited to the lowest three miles of Preuss Creek (Table 4). No hybrids were visually detected from fish collected in the upper 8 miles of Preuss Creek. Hybrids, rainbow trout, and BCT were collected near the Makoff pond. Fin clips will be genetically analyzed for comparison with the visual observations.

Management Recommendation

In October 2009, use liquid rotenone to treat Preuss Creek from the forest boundary downstream to the confluence of the Thomas Fork or the Geneva Ditch (estimated cost of rotenone $3,000 and personnel $8,000 = total of $11,000). In 2010, the effectiveness of the rotenone treatment should be assessed by electrofishing within the Makoff reach of Preuss Creek (estimated cost $2,500).

Figure 3. Examples of rainbow trout and possible juvenile hybrid trout sampled by Trout Unlimited from Preuss Creek, July 2007.

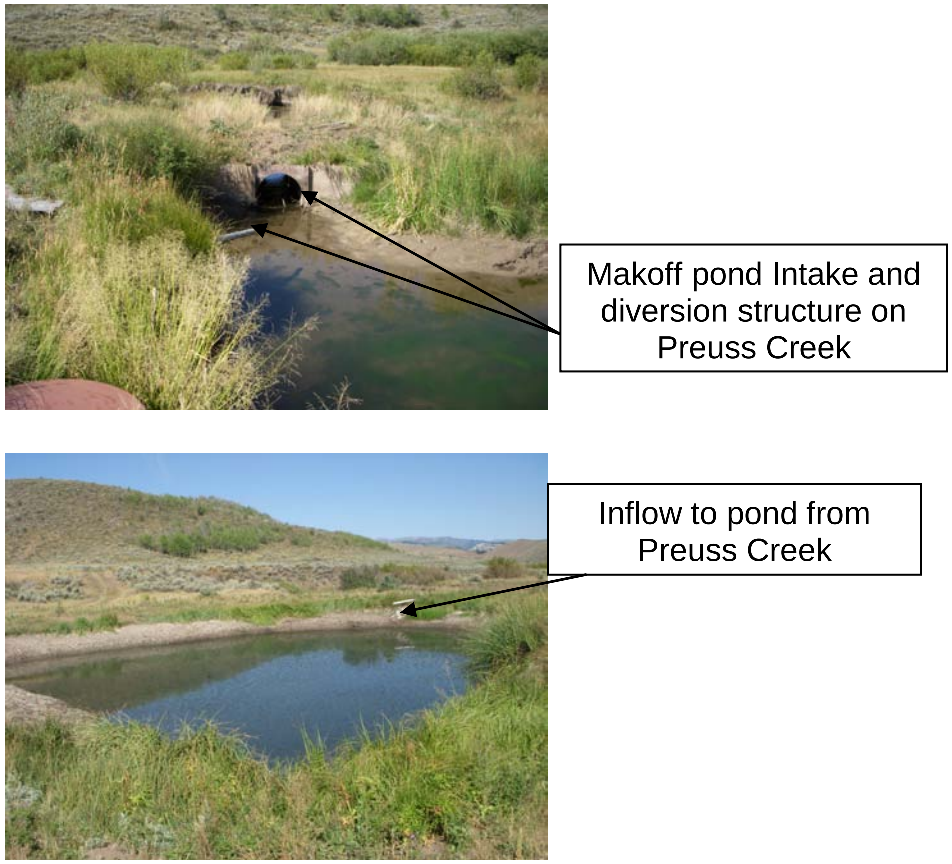

Figure 4. The top picture is the diversion on Preuss Creek that fills the Makoff pond. The bottom picture is the Makoff pond located about 300 meters below diversion structure. Both pictures were taken during the IDFG investigation on 24th August 2007. Makoff had turned off the water to the pond sometime after Trout Unlimited observed rainbow trout and hybrids in Preuss Creek.

Figure 5. The top picture shows the outlet of Makoff pond when Trout Unlimited sampled Preuss Creek on July 4th 2007. The bottom picture shows the outlet of the pond during the IDFG investigation on August 24th after Makoff turned off the water from the pond.

Figure 6. Examples of rainbow trout and possible hybrids collected from Preuss Creek during the IDFG investigation of the Makoff pond.

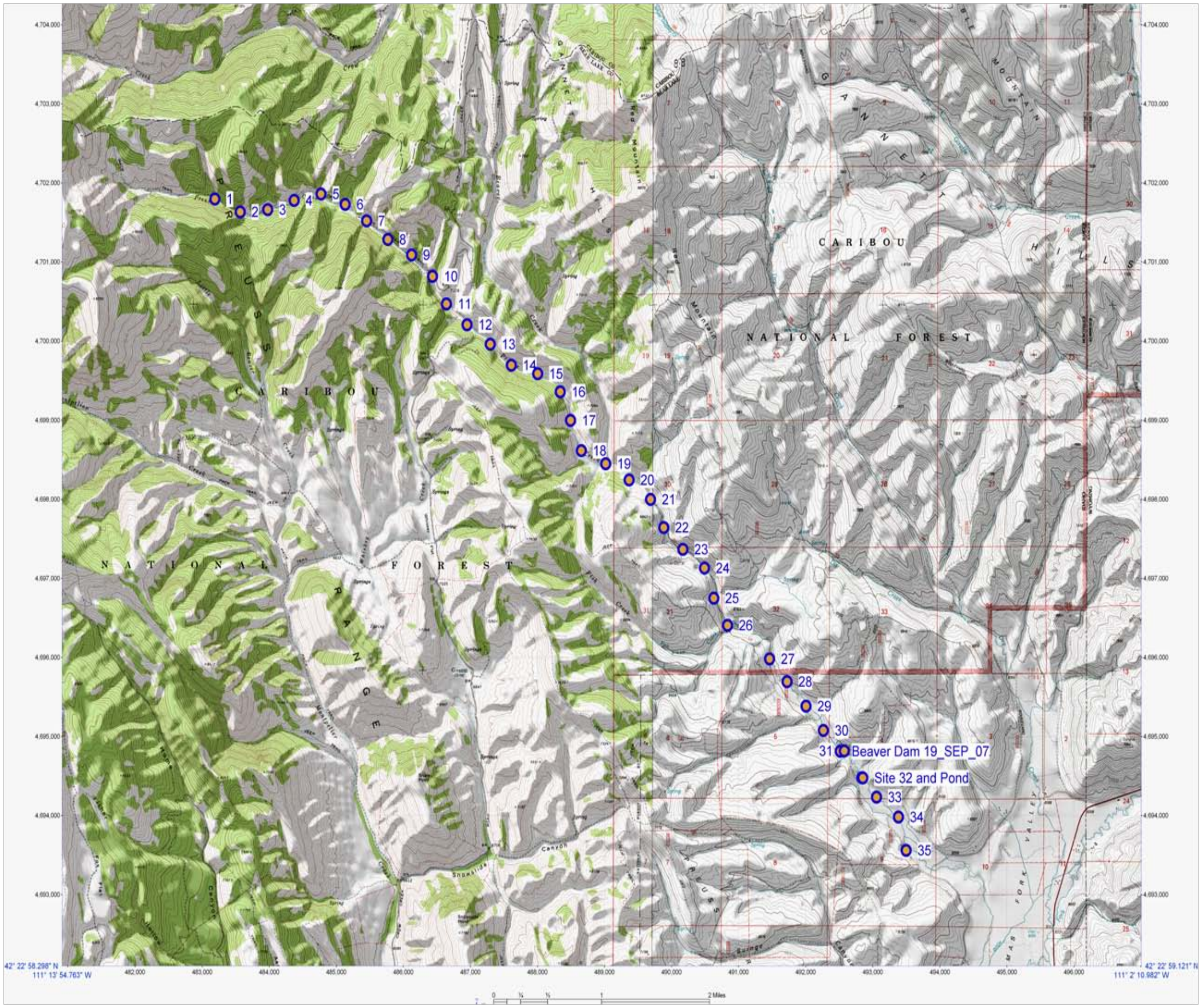

Figure 7. Sampling sites on Preuss Creek to determine the extent of hybridization.

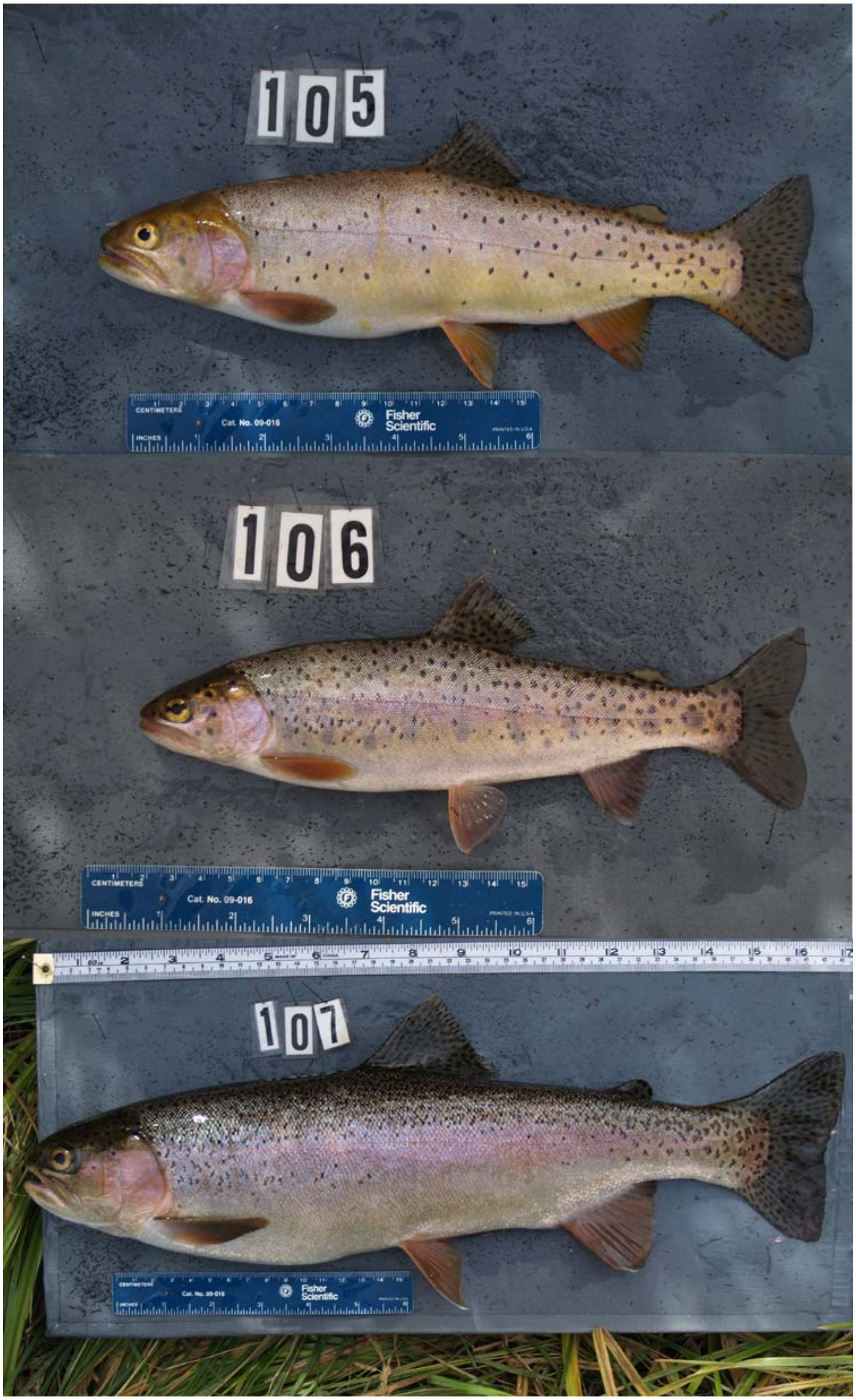

Figure 8. Examples of rainbow trout (107), hybrid trout (106), and Bonneville cutthroat trout (105) sampled during IDFG's survey of Preuss Creek, September 2007. These fish were the first three fish sampled from site 31.

Table 4. Fish collections and genetic samples from Preuss Creek.

	Trout	Species (visual)		
Site	Catch	BCT	HYB	RBT
1	0			
2	0			
3	0			
4	0			
5	5	5		
6	4	4		
7	5	5		
8	5	5		
9	5	5		
10	5	5		
11	5	5		
12	5	5		
13	2	2		
14	5	5		
15	5	5		
16	5	5		
17	5	5		
18	1	1		
19	0			
20	5	5		
21	5	5		
22	5	5		
23	5	5		
24	5	5		
25	5	5		
26	5	5		
27	5	5		
28	1	1		
29	0			
30	0			
31	4	2	1	1
32	0			
33	1	1		
34	0			
35	0			
Totals	108	106	1	1

Yellowstone Cutthroat Trout Monitoring in the Upper Portneuf River

Introduction and Methods

In 2004, an 8-km section of the upper Portneuf River was closed to Yellowstone cutthroat trout *Oncorhynchus clarkii bouvieri* harvest. The harvest closure covers the portion of the Portneuf River from the Pebble Creek Bridge crossing upriver to a steel bridge on Kelly-Toponce road. The harvest closure was implemented to enhance native Yellowstone cutthroat trout populations and provide higher catch rates in that reach.

In 2007, we surveyed 3.7 km of the no-harvest section of river. We completed a Mark-Recapture estimate of fish abundance using drift boat electrofishing equipment. During the Mark-Recapture survey, fish species, lengths (mm), and weights (grams) were recorded. All of the trout caught in initial run were mark using a paper punch to create a whole in the caudal fin. The marking run was completed on April 17, 2007 and the recapture run was completed on April 24, 2007.

Results and Discussion

A total of 173 trout were caught during the Mark-Recapture survey. However, sample efficiency in the river was exceptionally low. Only 4 of 89 trout caught during the recapture run were marked. That recapture rate was too low to perform a population estimate. Total catch and mean length of fish caught during the surveys are shown in Table 5. Length frequency distributions of trout are shown in Figure 10. The range in YCT lengths shown in Figure 10 indicates good year class strength and consistent production. The catch of 77 hatchery rainbow trout was surprising given that stocking was terminated in this reach in 2004. The origin of the hatchery fish is likely Chesterfield Reservoir. Hatchery rainbow trout are stocked in the lower Portneuf River, but natural barriers prevent those fish from migrating upriver. Furthermore, the very large hatchery rainbow trout (> 580 mm total length) in the sample are consistent with sizes observed in Chesterfield Reservoir more so than resident river populations (Figure 10).

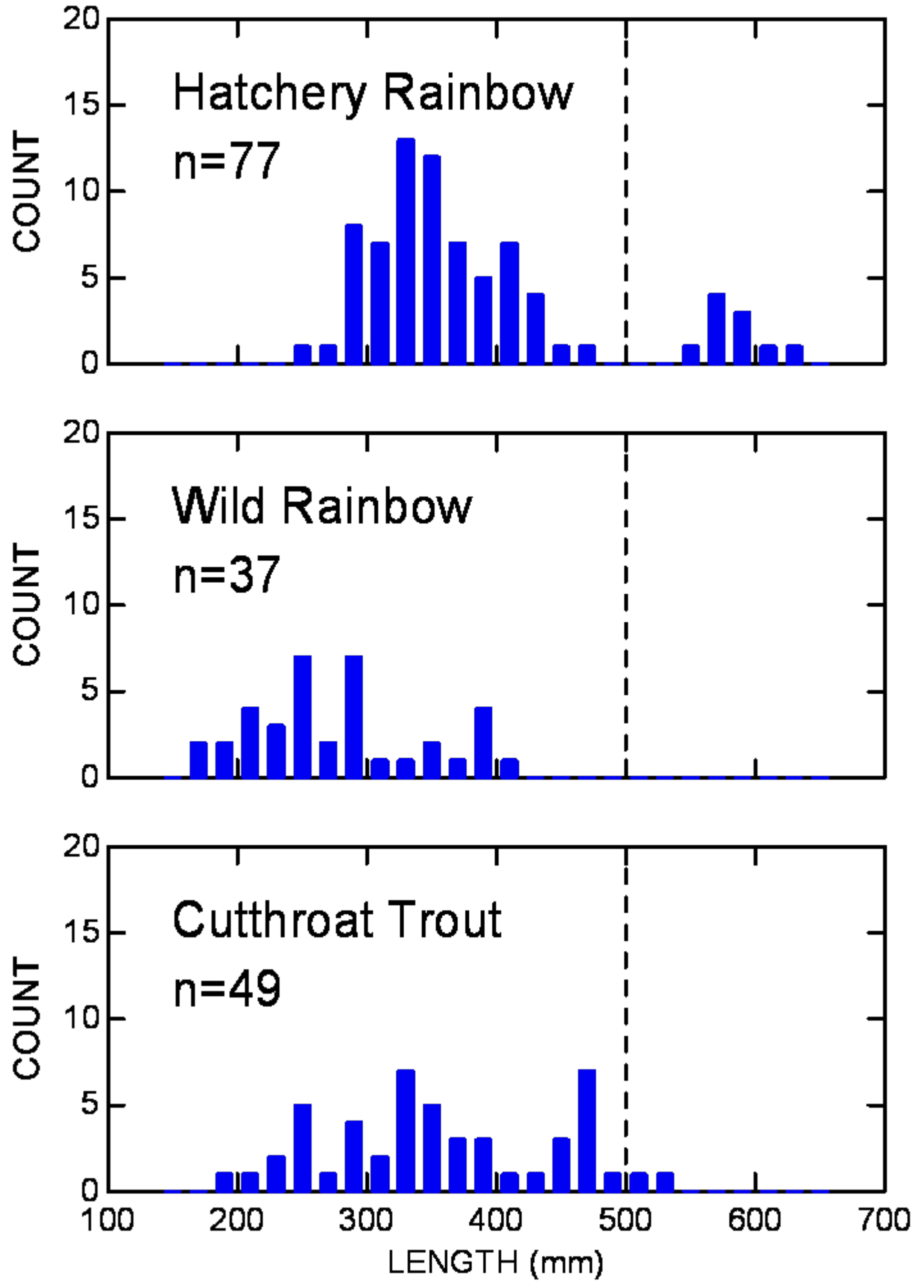

Figure 9. Length frequency plots of trout caught from the upper Portneuf River from the Yellowstone cutthroat trout catch and release zone.

Table 5. Catch and mean length data for fish caught on the upper Portneuf River from the cutthroat trout catch and release zone.

	Sample Size		Mean Length (mm)	
	Mark-Run	R-Run	Mark-Run	R-Run
Brown trout	2	1	435	503
Hatchery rainbow trout	44	33	384	358
HYBRID		7		457
Wild rainbow trout	14	23	244	285
Yellowstone cutthroat trout	29	20	347	354
Grand Total	89	84	351	347

Defining Background Selenium Levels in Fish Tissue from Southeast Idaho Phosphate Patch

Introduction and Methods

Phosphate mining is a large industry in southeast Idaho and is one of two major phosphate producing locations in the nation. In addition to producing valuable fertilizer products, the phosphate mining activity can elevate selenium levels in local aquatic and terrestrial communities. Bioaccumulation of that selenium can negatively impact fish and wildlife populations (Lemly 2002). However, undisturbed phosphoria formations may also elevate selenium concentrations. The primary objective of this work was to define natural background concentration of selenium in fish tissue samples collected from streams that flow through undisturbed phosphoria formations in southeast Idaho. Secondarily, those results will be compared to selenium concentrations observed in fish tissue from tributaries disturbed by mining activities and control habitats.

In 2006, the DEQ established a fish sampling protocol committee to guide the collection, handling, and analysis procedures for fish to be analyzed for selenium tissue concentrations. The committee agreed on several protocols. The protocols include: designating a target sample size for the number of fish that should be collected from a particular stream (n = 10), reducing fish migration bias by collecting young fish that are most likely to not have migrated from its natal stream (age-0 and age-1), further reducing fish migration biases by sampling at least 100 meter above confluence areas, and standardizing the time of year samples are collected (September-October). Those guidelines were followed for fish tissue results reported in this study.

We grouped streams into three categories. The three stream categories were control, background, and mined. A control stream was defined as a system located in the Blackfoot or Crow creek drainages, but that does not flow through a phosphoria formation as mapped by the USGS. Background streams are systems that intersect or flow through phosphoria formations, but have no past or active mining upslope of the sampling location. The mined category defines waters that flow through phosphoria formations that have past or active phosphate mines upslope of the sample locations.

Stream categories were selected by overlaying three GIS layers using ArcMap version 9.3 (Redland, CA). The layers included the phosphoria formations (USGS), mine locations, and a stream database layer. The stream definitions and sampling locations are show in Figure 10. Table 6 shows UTM locations and the number of fish sampled for each stream. To complete this study, we included fish tissue samples collected in 2007 by IDFG, Simplot consultants (Newfields), and the Greater Yellowstone Coalition.

This project was a collaboration of state, non-governmental organizations, and the mining industry. All cooperators have agreed to publish the results of this study in a peer reviewed journal. That publication will include final data analysis and conclusion which were not available at the time this report was submitted.

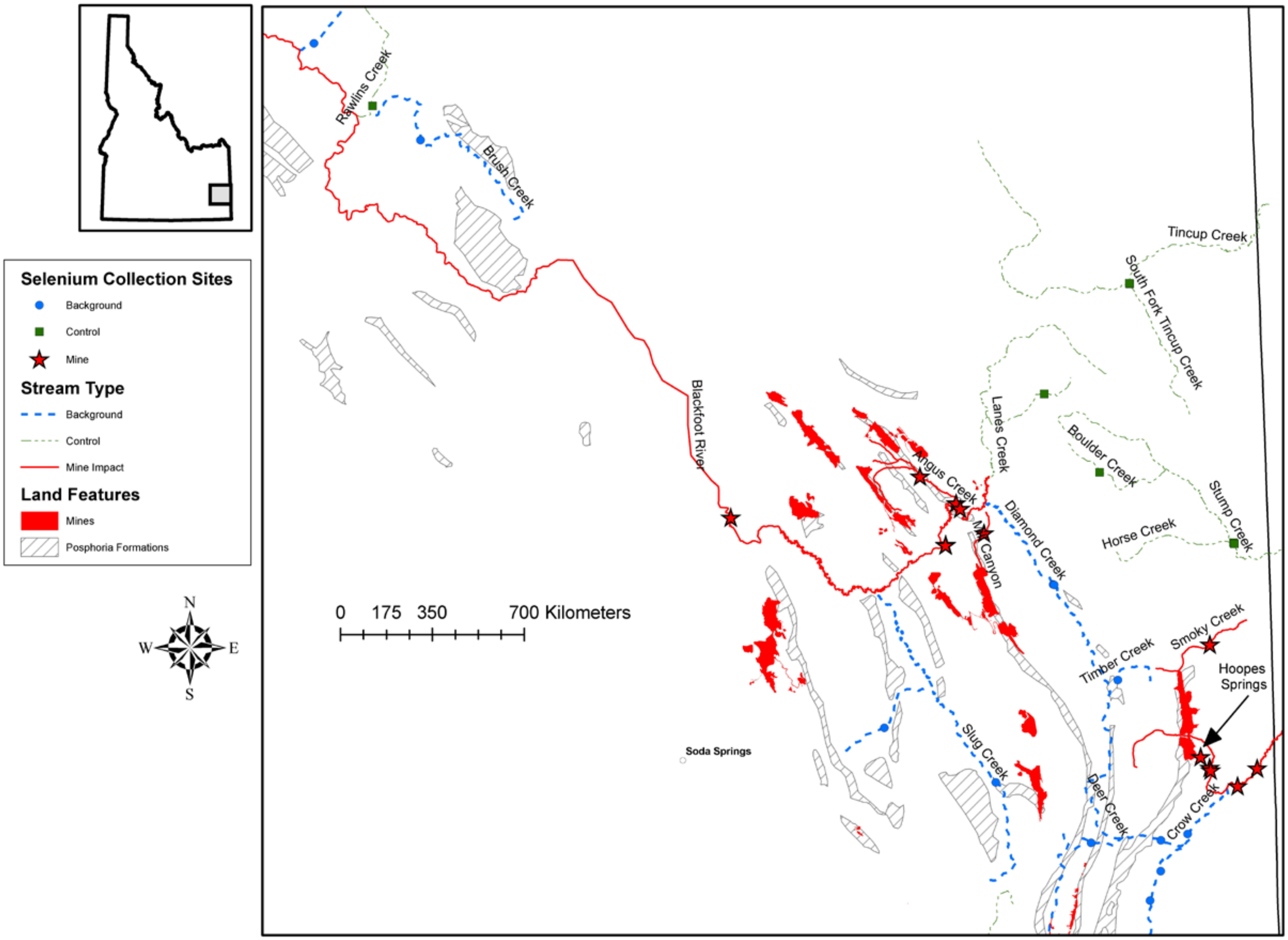

Figure 10. Mine sites, Phosphoria Formations, stream designations (control, background, mined), and locations where fish tissue samples were collected.

Table 6. Stream name, stream category, sample date, UTM locations (NAD 83), and sample size by species for selenium fish tissue concentration sampling.

STREAM	Type	DATE	EASTING	NORTHING	# SPECIES
Brush Ck.	Background	9/27/2007	431828	4771488	14 BKT
Crow Ck.	Background	8/23/2007	486290	4710434	11 BRT
Crow Ck.	Background	9/25/2007	486016	4704798	15 YCT
Crow Ck.	Background	8/23/2007	489400	4715494	3 BRT
Crow Ck.	Background	8/24/2007	487201	4712685	2 BRT
Deer Ck.	Background	8/27/2007	487306	4715076	10 YCT
Deer Ck.	Background	10/8/2007	481879	4715079	11 YCT
Diamond Ck.	Background	10/8/2007	479714	4735198	10 YCT 1 BKT
Johnson Ck.	Background	10/9/2007	466157	4724575	10 BKT
Miner Ck.	Background	10/11/2007	423820	4779293	15 YCT
Slug Ck.	Background	10/4/2007	474656	4720034	15 BKT
Timber Ck.	Background	10/8/2007	484394	4727637	11 YCT
Boulder Ck.	Control	9/26/2007	483557	4743817	15 BKT
Browns Ck.	Control	9/26/2007	479487	4750056	10 YCT
Horse Ck.	Control	10/9/2007	493781	4737922	11 YCT
L.F. Georgetown Ck.	Control	10/4/2007	472946	4706683	15 BKT
Rawlins Ck.	Control	10/11/2007	428199	4774269	15 YCT
S.F. Tin Cup Creek	Control	8/29/2007	486372	4758414	11 YCT
Smokey Canyon	Control	10/9/2007	491637	4730160	11 YCT
Stump Ck.	Control	10/9/2007	493791	4737883	10 YCT 1 BRT
Angus Ck.	Mine	9/26/2007	472356	4741817	10 YCT
Angus Ck.	Mine	10/8/2007	472657	4741380	11 YCT
Blackfoot R.	Mine	10/11/2007	471347	4738594	10 YCT
Blackfoot R.	Mine	10/8/2007	454835	4741339	4 RBT
Crow Ck.	Mine	8/25/2007	493385	4719106	11 BRT
Crow Ck.	Mine	8/26/2007	494962	4720423	13 BRT
Georgetown Ck.	Mine	10/4/2007	474854	4704883	10 BKT 5 RBT
Hoopes Springs	Mine	8/28/2007	491245	4720608	11 BRT
Hoopes Springs	Mine	8/24/2007	490614	4721466	4 BRT
Sage Creek	Mine	8/28/2007	491345	4720395	9 BRT

Mercury Concentrations in Fish Tissue from Southeast Idaho Lakes and Reservoirs

Introduction and Methods

In 2007, DEQ contracted with IDFG to collect fish from six lakes and reservoirs in southeast Idaho. The objective of the work was to evaluate methylmercury concentrations in game fish. A standard for human health criterion for mercury in fish tissue is 0.3 milligrams per kilogram [mg/kg] or 300 nanograms per gram [ng/g]. Fish tissue samples were collected from Bear Lake, American Falls, Blackfoot, Chesterfield, Oneida, and Weston reservoirs. Experimental gill nets (sinking and floating) and fyke nets were used to sample fish with the exception of Chesterfield Reservoir. Samples from Chesterfield were collected using shoreline boat electrofishing. Standard gillnet and fyke nets were used; floating and sinking monofilament nets, 46 m x 2 m, with six panels composed of 19, 25, 32, 38, 51, and 64 mm bar mesh; trap nets – 15 m lead, 1 m x 2 m sized frame, crowfoot throats on the first and third of five loops, 19 mm bar mesh, treated black.

Results and Discussion

A summary of methylmercury concentrations in game fish is shown in Table 7. In general, the warm water species such as largemouth bass show higher values than trout. All of the rainbow trout tissue concentrations were below 300 ug/kg. Conversely, all of the bass samples from the southeast region exceeded 300 ug/kg. A detailed report of the fish tissue results are report by Essig and Kosterman (2008).

Table 7. Methylmercury concentrations in game fish from select waters in Southeast Idaho. Values above the human health standard are shaded. See Idaho Department of Health for details on health advisories.

Site Name	Species	# of fish	Date Collected	Hg (ug/Kg)
American Falls Reservoir	Rainbow trout	8	7/27/2007	127
American Falls Reservoir	**Smallmouth bass**	10	7/27/2007	**467**
Bear Lake	Cutthroat trout	10	8/7/2007	70
Bear Lake	Whitefish	10	8/7/2007	45
Bear Lake	Lake trout	2	8/7/2007	74
Blackfoot Reservoir	Rainbow trout	10	7/10/2007	27
Chesterfield Reservoir	Rainbow trout	8	8/1/2007	227
Foster Reservoir	**Largemouth bass**	10	7/11/2007	**389**
Oneida Narrows Reservoirs	Walleye	10	7/3/2007	167
Weston Reservoir	**Largemouth bass**	10	6/28/2007	**577**
Weston Reservoir	Rainbow trout	10	6/28/2007	132
Weston Reservoir	**Yellow perch**	10	6/28/2007	**339**

Fish Renovation Projects

Introduction

Fish renovation projects were completed on Pleasantview and Crowthers reservoirs. The Pleasantview treatment was completed to remove Utah chub *Gila atraria*. The Crowthers treatment was completed to remove green sunfish *Lepomis cyanellus.* The green sunfish were illegally introduced sometime in the past five years. Both treatments were completed to maximize growth and survival of stocked rainbow trout.

Peasantview Reservoir

The water managers of Pleasantview Reservoir drained the reservoir prior to treatment (October 1, 2007). The inflow to Pleasantview is a large spring. The spring was treated with 9 kg of powder rotenone. After the powder rotenone was applied, a drip station was set to deliver 20 gallons of liquid rotenone over a two-day period. The drip station was set to deliver 3 ppm rotenone to 8 cfs of water. Future sampling of the reservoir should be done to document the success of the project.

Crowthers Reservoir

The day before treating Crowthers Reservoir, a bathymetric map of the reservoir was generated. An Eagle Sonar system (model 480 w/GPS) was used to complete the survey. The sonar system recorded depth and GPS coordinates every second. The survey was completed on September 4, 2007. Depth and GPS coordinate data were summarized using Surfer 8 software. A total of 2,871 depth estimates were recorded during the survey. Survey transects and bathymetry are shown in Figure 12. Total volume of treated water was an estimated 187,744 m^3 (152 acre-feet, 49,529,417 gallons). On September 5, 2007, we applied about 0.568 m^3 (150 gallons) of liquid rotenone to the surface of Crothers Reservoir. Future sampling of the reservoir should be completed to document the success of the project.

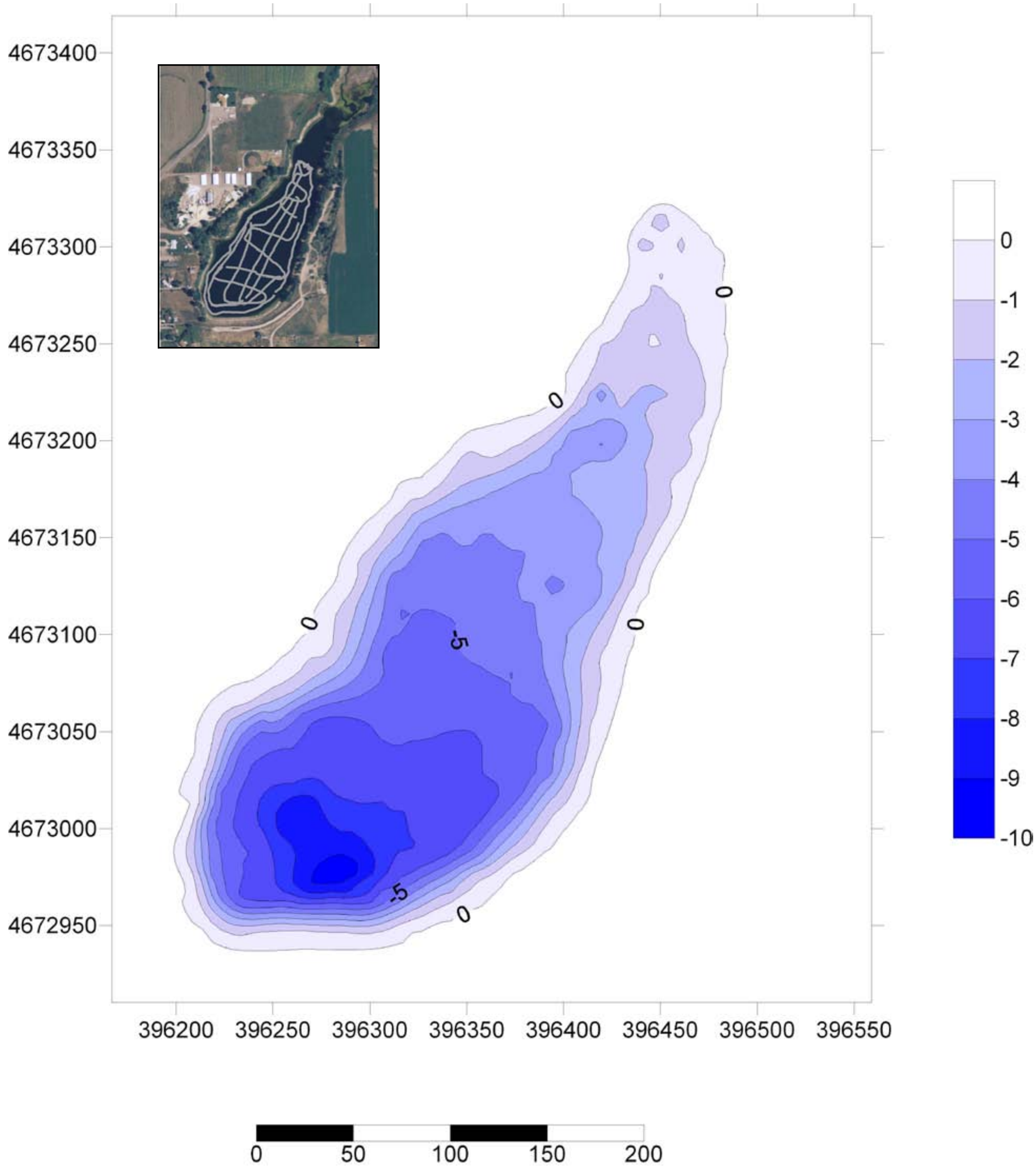

Figure 11. Transect map and bathymetric map for Crowthers Reservoir. The bathymetric map scales and depth contours are measured in meters. The inset figure shows the transect route used to collect GPS coordinates and water depth readings. A total of 2,934 depth records were taken to generate the map and volume estimate.

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