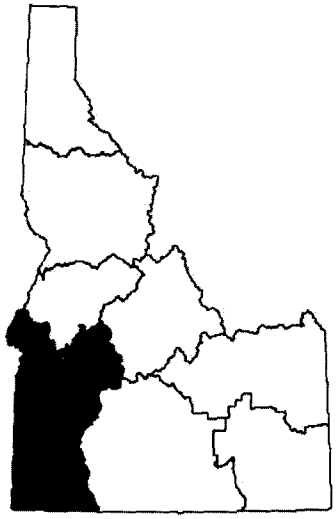
FISHERY MANAGEMENT INVESTIGATIONS

IDAHO DEPARTMENT OF FISH AND GAME

FISHERY MANAGEMENT ANNUAL REPORT

Cal Groen, Director



SOUTHWEST REGION - McCall

2004 - 2005

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MCCALL 2004 AND 2005 FISHERY MANAGEMENT REPORT

MOUNTAIN LAKES SURVEYS

ABSTRACT

Fish population status and/or physical habitat parameters were surveyed and stocking strategies were assessed on seven mountain lakes in 2004 and 130 in 2005.

In 2005, we increased our high lakes sampling by dedicating a survey crew for the summer season. We completed Idaho Department of Fish and Game standard mountain lake surveys on 130 lakes and ponds from June through October. We were focused on covering all lakes in the North Fork Payette drainage and a large portion of the west side of the South Fork Salmon River drainage that had not been surveyed in the last five years. We surveyed four fishless lakes in the Mid-Salmon Chamberlain drainage as well. We surveyed 76 lakes in the NF Payette drainage, 44 of these being fishless and 32 containing fish.

All lakes containing fish in the North Fork Payette drainage have had a survey completed since 2000. Approximately 50% of small (fishless) lakes in the drainage were surveyed.

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INTRODUCTION

The Idaho Department of Fish and Game (IDFG) conducts standard mountain lake surveys each year to evaluate and adjust the mountain lakes fish-stocking program. This data collection is imperative to document as much information as possible in our high mountain lake GIS and to allow educated fishery management decisions such as reassessing stocking strategies.

METHODS

In February of 2005, we took a new approach to collecting data from high mountain lakes by creating a part-time technician position and hiring a field crew to work exclusively on lake surveys and reconnaissance of regional mountain lakes and ponds.

We examined fish populations and habitats in each lake using IDFG standard mountain lakes survey methods. We set gill nets (125 ft sinking) in the afternoon and retrieved nets the next morning with the exception of a handful of lakes that were only set during the day. Due to time constraints, we were not able to allow these nets to set overnight. In addition, we sampled fish by angling the majority of the lakes surveyed in 2005. All fish collected were weighed to the nearest g and total length measured to the nearest mm.

In addition to the extra field crew, we started the development of a high mountain lake GIS. We believe it was the best way to convey information about mountain lakes in an organized manner. ArcMap and ArcCatalogue, the programs used to create a GIS, are complex programs that require a fair amount of specialized training. In order to achieve this task we had a technician trained in these programs.

In 2005, we included a lake classification for each lake surveyed. The classifications were as follows:

IA: Fishless Lake with stocking record,
IB: Fishless lake with no stocking record,
IIA: Fish present with low to moderate natural reproduction,
IIB: Fish present with high levels of natural reproduction,
IIIA: Native trout lake with possible pure strain,
IIIB: Native trout lake with probable hybrids from past stocking, and
IVA: Stockable lake not suitable for further stocking.

The intention of the classification is to aid in the organization of lake data for the high mountain lake GIS.

RESULTS

A database of mountain lake survey data collected in 2005 that can be projected spatially through ArcMap 9.0 has been developed and available data from the North Fork Payette River (NFPR) drainage and the South Fork Salmon River (SFSR) drainage have been entered into the database. All mountain lakes in the McCall region were organized by major drainages, and maps of these drainages are in various stages of production.

2004 Surveys

Department personnel collected fish population and habitat data from seven mountain lakes in 2004, which included Mud Lake (07-461), Summit Lake (07-518), Profile Lake (07-329), Big Creek Lakes (Wilson Lakes) #1 (07-730), #2 (07-733), and #3 (07-734), and Middle Lake (07-445). Fish were found in four of the seven lakes surveyed.

2005 Surveys

In 2005 the Department completed standard mountain lake surveys on 130 lakes and ponds. We focused on covering all lakes in the NFPR and a large portion of the west side of the SFSR drainage. We targeted lakes that had not been surveyed in the last five years. In addition, we surveyed four fishless lakes in the Mid-Salmon River Chamberlain Creek drainage.

All lakes containing fish in the NFPR drainage have had a survey completed on them since 2000. Approximately 50% of fishless lakes in the drainage were surveyed. Most of the ponds remaining were likely to be intermittent ponds smaller than 0.5 acres that dry up or ponds that have less than 1 meter at their maximum depth.

As a result of covering the majority of lakes and ponds in a given drainage, we were able to determine the percentage of fishless lakes in each hydrologic unit code (HUC) 5 drainage within the NFPR drainage. These findings are listed in Table 1. The presence of amphibian species in all lakes varied from 43 to 61 percent (Table 2). Colombia spotted frogs *Rana luteiventris* were present at 39% and Western toads *Bufo boreas* were present at 16% of the lakes surveyed in the NFPR drainage. Idaho Giant Salamanders *Dicamptodon aterrimus* and Long toed Salamanders *Ambystoma macrodactylum* were also present in some of the lakes surveyed in this drainage.

We surveyed 76 lakes in the NFPR drainage and found that 44 were fishless and 32 contained fish. Of the 32 lakes that contained fish, only five lakes contained brook trout *Salvelinus fontinalis*. Completed survey forms for all lakes were filed in the McCall office.

Twenty-nine lakes that were surveyed in the recent past were compared against their stocking record, and two will be removed from the stocking rotation due to the presence of brook trout (Table 3).

We surveyed 50 lakes on the west side of the SFSR drainage; 34 of these lakes contained fish. Of the 34 lakes that contained fish, 13 contained brook trout; 1 contained brook trout, rainbow trout, and bull trout; 1 contained cutthroat trout and golden trout; 13 contained cutthroat trout; 1 contained cutthroat and rainbow trout; 3 contained rainbow trout; and 2 contained grayling.

Seventeen lakes and their fish species that were surveyed recently were compared against their stocking records, and two were dominated by brook trout and will be removed from the stocking plan (Table 4).

Table 1. Percentage of fishless high mountain lakes broken down by HUC 5 drainage in the NFPR drainage.

HUC 5 #	Drainage Name	Number of Lakes Surveyed	Total number of lakes	% of fishless lakes
1705012301	Phillips Creek	1	1	100
1705012303	Clear Creek/Fawn Creek/Moores Creek	5	7	71.4
1705012305	Williams Creek/Lower Lake Fork Creek	7	7	28.5
1705012306	Upper NF Payette/Upper Lake Fork Creek	41	90	45.9
1705012307	Boulder Creek	3	3	0
1705012308	Rapid Creek	18	18	90.9
1705012309	Gold Fork Creek	1	7	Unknown
1705012310	Big Creek	0	1	Unknown

Table 2. Percentage of high mountain lakes with amphibian presence in NFPR drainage.

HUC 5 #	Drainage Name	Number of Lakes Surveyed	Total number of lakes	% of surveyed fishless lakes with amphibians present	Total % of surveyed lakes with amphibians present
1705012301	Phillips Creek	1	1	Unknown	Unknown
1705012303	Clear Creek/Fawn Creek/Moores Creek	5	7	40	42.9
1705012305	Williams Creek/Lower Lake Fork Creek	7	7	50	71
1705012306	Upper NF Payette/Upper Lake Fork Creek	41	90	44	36.7
1705012307	Boulder Creek	3	3	100	33.3
1705012308	Rapid Creek	18	18	72.7	61
1705012309	Gold Fork Creek	1	7	Unknown	Unknown
1705012310	Big Creek	0	1	Unknown	Unknown

Table 1. Comparison of survey results versus species stocked in select NF Payette River mountain lakes.

HUC 5#	Lake name	Catalog number	Date surveyed	Species collected	Species stocked
3	Blue	09-0256	8/13/2001	RBT	T1
3	Hidden	09-0226	8/22/2005	CT	C2
5	Lost	09-0263	8/22/2005	CT	C2
5	Skein Lake	0900000274	6/13/2005	CT/RC	C2
6	Blackwell	09-0366	8/15/2001	RBT	T9
6	Brush	09-0387	2003	RBT/CT	C2
6	Buck	0900000368	7/8/2005	CT	C2
6	Crystal	09-0351	9/28/2005	RBT/CT/HYB	C2
6	East Fork of Lake Fork Cr..	09-0342	8/30/2005	CT	C2
6	East Twentymile #2	09-0396	8/16/2005	CT	C2
6	Ellis	0900000382	8/4/2005	CT	C2
6	Golden	09-0353	7/29/2003	RBT	T9
6	Heart	09-0378	9/9/2003	CT	C2
6	Horton	0900000381	8/4/2005	CT	C2
6	Idler Creek #3	09-0349	8/30/2005	CT	C2
6	Malony	0900000338	8/25/2005	CT	GR
6	Marge (SF Twentymile #3)	09-0401	8/18/2005	CT	C2
6	North Twentymile #1	09-0395	8/16/2005	RBT/CT	C2
6	Pearl	0900000390	6/29/2005	CT	C2
6	Shaw Twin #2 upper	0900000332	8/18/2005	CT	C2
6	Sisters, South #2	09-0372	9/10/2003	BRK/CT	C2
6	Slab Butte	09-0379	9/4/2005	CT	C2
6	Squaw	09-0370	8/15/2001	CT	KT
7	Boulder	0900000321	6/9/2005	CT	C2
7	Louie	0900000318	6/8/2005	GR/CT	C2,KT,GR
8	Dismal	09-0296	9/7/2005	CT	
8	Fog	0900000308	7/13/2005	RBT	T9
8	Rapid Lake	0900000312	7/13/2005	BRK	C2
8	Summit	0900000313	7/13/2005	GLDN	GLDN

Table 4. Comparison of survey results versus species stocked in select SF Salmon River mountain lakes.

HUC 5 #	Lake name	Catalog number	Date surveyed	Type of survey	Species collected	Species stocked
9	Summit Lake	0700000518	8/18/2004	Angler/Gillnet	RBT	T9
10	Cougar Creek Lake #3	07-0500	6/20/2005	Gillnet/Angler	BRK	T9
14	Willow Basket Lake	0700000403	7/6/2005	Gillnet	CT	C2
15	Pete Creek #3	0700000416	7/11/2005	Angler/Gillnet	CT	C2
15	Pete Creek Lake #1	0700000417	7/11/2005	Angler/Gillnet	BRK	C2
15	Pete Creek Lake #2	0700000418	7/11/2005	Angler/Gillnet	RBT	KT
13	Cly Lake #3	0700000358	7/25/2005	angling/gillnet	CT	C2
13	Tsum Lake #2	700000363	7/26/2005	Angler/Gillnet	CT	C2
8	Curtis Lake	0700000514	8/2/2005	Angler/gillnet	CT	C2
13	Hum Lake	0700000364	8/8/2005	Angling/Gillnet	CT	GLDN
13	West Duck Lake	0700000366	8/8/2005	Angler/Gillnet	CT	C2
13	Burnside Lake #2	0700000369	8/15/2005	Gillnet	GR	GR
13	Storm Peak Lake	0700000389	8/15/2005	Angler/Gillnet	RBT	TT
14	North Lake	0700000400	8/20/2005	Gillnet/Angler	CT/RBT	TT
13	Prince Creek Lake #1	0700000350	9/20/2005	Angler/Gillnet	CT	C2
13	Prince Creek Lake #2	07-0353	9/20/2005	Angler	CT	C2
13	Prince Creek Lake #3	07-0354	9/20/2005	Gillnet	CT	C2

RECOMMENDATIONS

1. Continue to monitor fish populations in high mountain lakes to assess percentage of fishless lakes in all drainages.

2. Continue to collect data on amphibian presence.

3. Continue to utilize survey data to assess current management strategies and adjust fish stocking numbers and eliminate fish stocking from viable brook trout lakes.

4. Continue organizing data into appropriate database format for projection into a GIS.

2004 AND 2005 MCCALL FISHERY MANAGEMENT REPORT

LOWLAND LAKE SURVEYS

ABSTRACT

We completed a standard lowland lake survey on C. Ben Ross Reservoir in July 2004, which revealed that largemouth bass *Micropterus salmoides* were the most abundant fish in the reservoir in terms of numbers and biomass. The bass regulation appears to be working well. The largemouth bass population size structure exhibited a proportional stock density of 74 and a relative stock density of preferred length bass of 32. Largemouth bass reached 305 mm in 3.5 years.

We completed hydroacoustic surveys on Payette Lake to monitor kokanee population trends.

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C. BEN ROSS RESERVOIR LOWLAND LAKE SURVEY

INTRODUCTION

We completed an Idaho Department of Fish & Game (IDFG) standard lowland lake survey of C. Ben Ross Reservoir in 2004 to determine effectiveness of current fish management strategies. The population effects of the quality bass regulation of no harvest before July 1 and a two bass limit after July 1 none of which could be between 305 mm and 406 mm was of particular interest. This regulation had been in effect since 1994.

METHODS

We set one floating and one sinking IDFG Standard Survey gill net and one standard trap net in C. Ben Ross Reservoir. Electrofishing sites were chosen at random, electrofishing for a total of 10 minutes per site and then moving to a new site. We electrofished six sites (60 minutes). We collected length data from all fish and weights and scale samples from up to five fish from each one centimeter length group for all game fish species collected. Nongame fish were counted and mass weighed. Scales collected from game fish were later aged and measured for length back-calculations. We calculated Proportional Stock Densities (PSD) and Relative Stock Densities for preferred length and greater (RSD-P) largemouth bass using index ranges presented by Gabelhouse (1984). Assigned stock, quality and preferred length ranges were ≥200 mm, 300 to 379 mm, and ≥380 mm, respectively.

RESULTS AND DISCUSSION

We found that largemouth bass *Micropterus salmoides* and bluegill *Lepomis macrochirus* were the most abundant fish in C. Ben Ross Reservoir in 2004 (Table 1). Largemouth bass and largescale sucker *Catostomus macrocheilus* dominated total biomass. We collected seven species of fish from C. Ben Ross Reservoir including bluegill, largemouth bass, black crappie *Pomoxis nigromaculatus*, white crappie *Pomoxis annularis*, rainbow trout *Oncorhynchus mykiss*, black bullhead *Ameiurus melas* and largescale sucker. Length frequencies of each game fish species are presented in Table 2.

We found largemouth bass growth rates to be excellent, reaching 12 inches in 3+ years (Table 3). This was very similar to growth rates found in 1993, 1996, and 1999 as reported by Janssen et al. (1997, 2000, and 2003). Largemouth bass relative weights for all but one length groups less than 380 mm were over 100. Growth rates of bluegill and black crappie are also given in Tables 4 and 5.

The bass regulation initiated in 1994 continued to be effective at providing more quality size bass to anglers. We calculated the largemouth bass PSD and RSD-P to be 74 and 32 (Table 6). This compares with RSD-P's of zero in 1993 and 1996 and 6 in 1999 (Table 7). Maximum length of largemouth bass have steadily increased each sample year since 1993 (Table 8).

Low catch rates of forage species such as bluegill and crappie were of some concern. Total bluegill and crappie biomass collected in 2004 was 2.4 kg or 3.2% of the total biomass of all species. This compares to bluegill and crappie biomass totals of 20.8 kg, 4.7 kg, collected in

1993 and 1999 respectively (Janssen et. al. 1997 and 2003). However, bass growth rates and condition remained excellent. Forage abundance should be monitored in the next few years due to the steady decline in forage biomass since 1993.

Table 1. Percent abundance and relative biomass of all species of fish collected July 27, 2004 in C. Ben Ross Reservoir (all gear types combined).

Species	# Caught	% of Catch	Total Biomass (kg)	% of Total Weight
Bluegill	21	13.3	.96	1.3
Largemouth Bass	114	72.1	46.2	60.7
Black Crappie	3	1.9	1.1	1.5
White Crappie	2	1.3	.365	0.5
Largescale sucker	9	5.7	21.75	28.6
Rainbow Trout	1	0.6	1.4	1.8
Black Bullhead	8	5.1	4.3	5.6
Totals	158	100	76.075	100

The C. Ben Ross Reservoir largemouth bass population should be modeled to evaluate the potential to produce larger fish under a 518 mm minimum length regulation. Current growth rates suggest that larger fish could be produced. Maximum length of largemouth bass has steadily increased since 1993. Otoliths should be collected on older largemouth bass to verify ages and increase accuracy of the modeling. Previous aging efforts were made utilizing scales, which tend to be quite inaccurate for older fish.

Table 2. Number, weights, and relative weights of largemouth bass, bluegill, black crappie, and white crappie collected July 27, 1999 from C. Ben Ross Reservoir.

Total Length (CM)	Largemouth Bass				Bluegill				Black/White Crappie			
	# Coll.	% of Total	Avg. Wt	Rel. Wt	# Collected	% of Total	Avg. Wt	Rel. Wt	# Collected (B/W)	% of Total	Avg. Wt	Rel. Wt
30	4	3.5	2									
40	15	13.2	3									
50	10	8.8	4									
60	4	3.5	5									
70	1	0.9	7		3	13.6	--					
80	4	3.5	8		6	27.3	--					
90	2	1.7	10		1	4.5	--					
100	1	0.9	12.5		1	4.5	20	106.8				
110	0		--		1	4.5	30	104.2				
120	0		--		2	9.1	42.5	108.9				
130	0		--		4	18.2	50	110.6				
140	2	1.7	40	102.7	1	4.5	70	112.7				
150	0		--		0							
160	1	0.9	70	121.6	0							
170	1	0.9	70	103.5	0				0/1	50	65	107.9
180	0				1	4.5	140	100.5				
190	1	0.9	110	115.9	1	4.5	160	99.8				
200	0		--		1	4.5	160	76.6	1/0	25	160	115.1
210	0		--									
220	1	0.9	190	124.5								
230	0		--									
240	0		--						0/1	50	300	147.9
250	0		--									
260	1	0.9	270	109.9					1/0	25	310	107.5
270	6	5.3	378	129.2								
280	2	1.7	405	123.1								
290	4	3.5	470	128.1								
300	0		--									
310	2	1.7	510	115.4					1/0	25	640	123.2
320	3	2.6	547	109.6								
330	3	2.6	563	103.8					1/0	25	650	98.5
340	0		--									
350	4	3.5	662.5	101.2								
360	6	5.3	670	92.3								
370	13	11.4	796	100.8								
380	7	6.1	824	96.3								
390	9	7.9	850	93.3								
400	5	4.4	892	88.2								
410	1	0.9	960	91.4								

Table 3. Average back-calculated lengths (mm) for each age class of largemouth bass collected from C. Ben Ross Reservoir on July 27, 2004.

			Back-calculation Age							
Year Class	**Age**	**N**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
2003	1	5	99.3							
2002	2	10	112.7	231.3						
2001	3	9	93.8	190.4	282.8					
2000	4	2	99.4	190.2	266.7	323.5				
1999	5	12	107.1	209.4	275.9	323.4	360.3			
1998	6	15	102.9	190.3	263.8	312.4	344.0	370.1		
1997	7	3	68.9	183.7	247.5	282.6	318.0	344.4	366.9	
1996	8	1	56.7	135.8	190.9	264.3	291.1	323.6	354.7	374.5
All Classes			101.0	201.2	268.5	312.9	346.1	363.6	363.8	374.5
N		57	57	52	42	33	31	19	4	1

Table 4. Average back-calculated lengths (mm) for each age class of bluegill collected from C. Ben Ross Reservoir on July 27, 2004.

			Back-calculation Age					
Year Class	**Age**	**N**	**1**	**2**	**3**	**4**	**5**	**6**
2003	1	9	52.2					
2002	2	7	51.6	102.35				
All Classes			51.9	102.35				
N		16	16	7				

Table 5. Average back-calculated lengths (mm) for each age class of black crappie collected from C. Ben Ross Reservoir on July 27, 2004.

			Back-calculation Age					
Year Class	**Age**	**N**	**1**	**2**	**3**	**4**	**5**	**6**
2003	1	1	87.8					
2002	2	0						
2001	3	1	69.0	159.0	241.6			
2000	4	0						
1999	5	1	150.6	224.8	270.4	299.1	319.2	
1998	6	1	106.5	161.1	204.8	245.5	275.2	285.2
All Classes			103.5	181.6	238.9	272.3	297.2	285.2
N		4	4	3	3	2	2	1

Table 6. Largemouth bass age-length data and stock density indices for fish collected from Ben Ross Reservoir in 2004.

Age	Mean TL	Number
1	171	5
2	276.18	11
3	308.56	9
4	342.5	2
5	377.67	12
6	382.13	15
7	381.67	3
8	390	1

Incremental Sizes	
Substock =	0-200 mm
Stock =	200-300 mm
Quality =	300-380 mm
Preferred =	380- 510 mm

Traditional Stock Density Indices

PSD	RSD-P	RSD-M	RSD-T
79	33	0	0

Incremental Stock Density Indices

RSD S-Q	RSD Q-P	RSD P-M	RSD M-T
21	46	33	0

Mean Relative Weights

Substock (0-200 mm)	Stock (200-300 mm)	Quality (300-380 mm)	Preferred 380- 510 mm	Memorable 510-630 mm	Trophy >630
111.16	126.6	101.88	93.57	0	0

Table 7. Proportional stock densities (PSD: 200, 300 mm) and relative stock densities of preferred (RSD-P, ≥380 mm) and greater length largemouth bass from C. Ben Ross Reservoir in 1993, 1996, 1999, and 2004.

Year	PSD	RSD - P
1993	17	0
	New Regulation 1994	
1996	41	0
1999	34	6
2004	79	33

Table 8. Total length frequencies of all largemouth bass collected in 1993, 1996, 1999, and 2004 from C. Ben Ross Reservoir.

Total Length (mm)	Year			
	1993	1996	1999	2004
30	0	0	4	4
40	0	0	1	15
50	0	0	0	10
60	0	0	1	4
70	0	1	0	1
80	0	0	0	4
90	26	3	0	2
100	1	1	2	1
110	6	2	3	0
120	14	2	0	0
130	6	0	7	0
140	7	2	10	2
150	4	0	6	0
160	2	0	8	1
170	2	0	2	1
180	6	0	3	0
190	5	0	3	1
200	5	0	4	0
210	20	1	8	0
220	12	0	3	1
230	9	2	1	0
240	9	1	2	0
250	7	0	1	0
260	5	2	1	1
270	6	4	3	6
280	14	5	7	2
290	8	4	9	4
300	7	1	4	0
310	9	2	2	2
320	1	1	0	3
330	0	3	1	3
340	2	1	2	0
350		1	2	4
360		3	1	6
370		1	3	13
380			1	7
390			2	9
400				5
410				1

PAYETTE LAKE

INTRODUCTION

Kokanee *Oncorhynchus nerka kennerlyi* are the primary forage for lake trout *Salvelinus namaycush* in Payette Lake and kokanee eggs are usually in high demand by IDFG hatcheries for statewide stocking requests. Therefore, kokanee population estimates have been made on Payette Lake since 1990 to monitor this important lake trout forage and to predict kokanee surpluses in the lake for egg taking opportunities for state hatchery needs. To continue this monitoring a population estimate was made again in 2004 and 2005.

METHODS

We utilized the IDFG hydroacoustics fish survey crew to estimate kokanee numbers in the lake. Butts (2004) gives a description of the equipment and methodology used.

RESULTS

The hydroacoustic surveys of Payette Lake were completed on July 28 and August 2, 2004 and 2005 respectively. Butts (in review) estimated there were 223,212 + 49,263 age-0 kokanee, 184,787 + 45,238 age-1 kokanee, and 69,751 + 12,275 age-2 and older kokanee in the 2004 survey and 433,785 + 115,378 age-0 kokanee, 81,246 + 22,157 age-1 kokanee and 103,002 ± 18,769 age-2 and greater kokanee in the 2005 survey. Over the past six years, age-2 and older kokanee numbers have remained fairly stable. Figure 1 depicts the trends in kokanee numbers by age class. Specific population data by transect and side looking or down looking transducer are presented in Butts (in review).

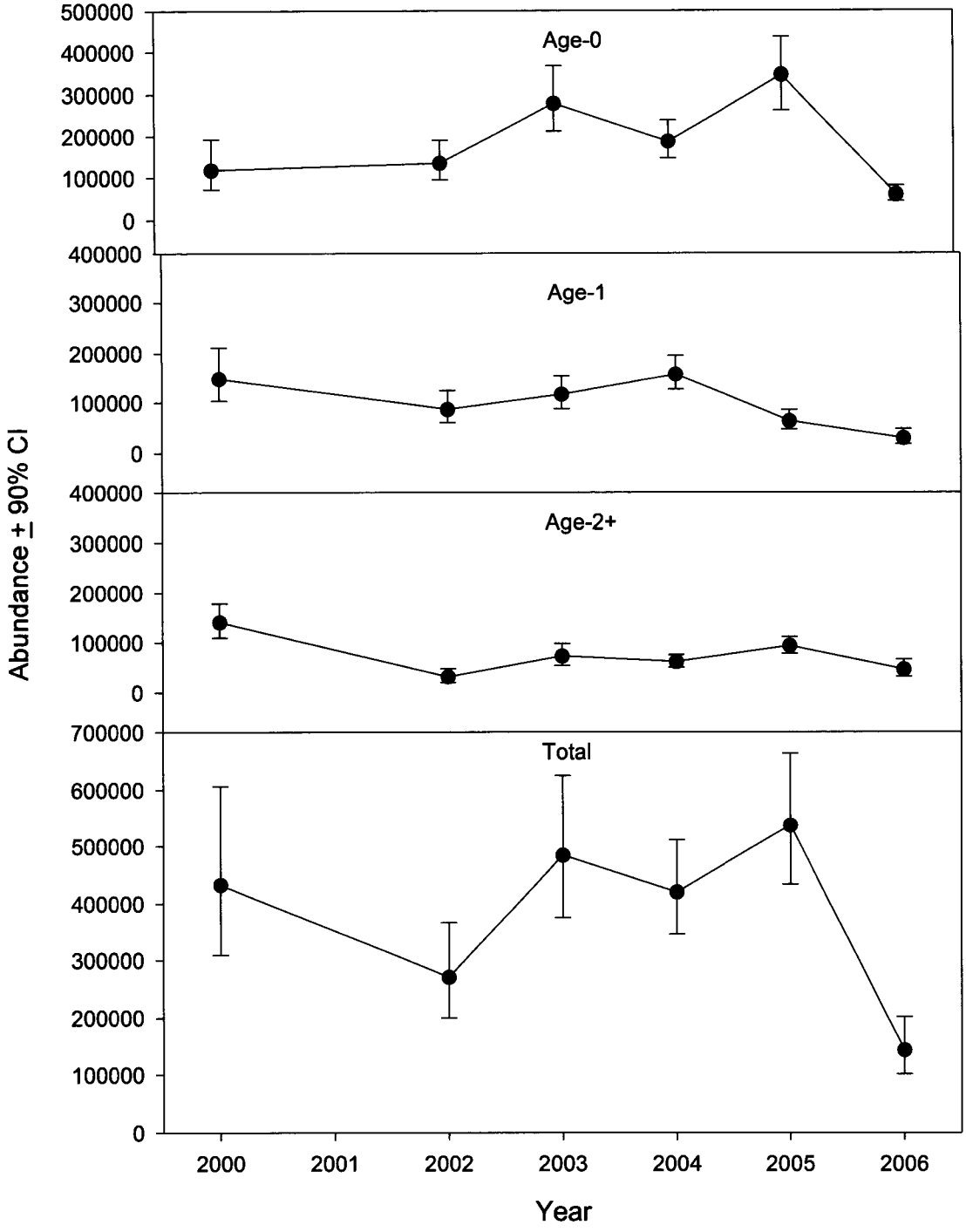

Figure 1. Payette Lake kokanee population estimates by age class from 2000 through 2006 obtained from hydroacoustic sampling (Butts *in review*).

LITERATURE CITED

Butts, A. E. In review. Lake and reservoir research. Job Performance Report. Program F-73-R-27. Project 5. Report period July 1, 2004 to June 30, 2005. Idaho Department of Fish and Game, Boise.

Butts, A. E. In review. Lake and reservoir research. Job Performance Report. Program F-73-R-28. Project 5. Report period July 1, 2005 to June 30, 2006. Idaho Department of Fish and Game, Boise.

Gabelhouse, D. W., Jr. 1984. A length categorization system to assess fish stocks. North American Journal of Fisheries Management 4:273-285.

Janssen, P. J., K. Apperson, D. Anderson, and J. Patterson. 1997. Regional fishery management investigations. Federal Aid in Fish Restoration. 1994 Job Performance Report, Program F-71-R-18. Idaho Department of Fish and Game, Boise.

Janssen, P. J., K. Apperson, and D. Anderson. 2000. Regional fishery management investigations. Federal Aid in Fish Restoration. 1996 Job Performance Report, Program F-71-R-21. Idaho Department of Fish and Game, Boise.

Janssen, P. J., K. Apperson, D. Anderson, L. Hostettler, and K. Buelow. 2003. Regional fishery management investigations. Federal Aid in Fish Restoration. 1999 Job Performance Report, Program F-71-R-24. Idaho Department of Fish and Game, Boise.

2004 AND 2005 MCCALL FISHERY MANAGEMENT REPORT

RIVERS AND STREAMS

ABSTRACT

The 2004 and 2005 kokanee *Oncorhynchus nerka kennerlyi* spawning runs in the North Fork Payette River above Payette Lake were estimated to be 19,532 and 20,780 fish, respectively.

Temperature recorders in 2004 monitored the upper Little Salmon River drainage throughout late spring, summer, and early fall of 2004. On July 17, mean daily temperatures peaked at 25.5°C. Mean daily temperatures exceeded 20.0°C on 37 days throughout the monitoring season. Stream temperature monitored in the North Fork Payette River upstream from Payette Lake recorded mean daily temperatures that peaked at 19.9°C on July 17.

In 2005, temperature recorders monitored the upper Little Salmon River drainage throughout late spring, summer, and early fall. On August 6, mean daily temperatures peaked at 22.1°C. Mean daily temperatures exceeded 20.0°C on 23 days throughout the monitoring season. Temperature monitors were also placed in Little Round Valley Creek and a spring located in the Round Valley drainage to help monitor an ongoing riparian improvement project. Both recorders showed mean daily temperatures that peaked at 14.6°C on August 1. Stream temperature monitored in the North Fork Payette River upstream from Payette Lake between June 14 and September 13 recorded mean daily temperatures that peaked at 18.9°C on July 22 and August 1, 8, and 9.

We completed nine IDFG standard stream surveys on seven different streams In 2004. Streams surveyed include upper Hazard, Clayburn, Vance, Warm Springs, and Round Valley creeks in the Little Salmon River drainage and East Branch Weiser River and Hornet Creek in the Weiser River drainage.

We completed 24 Department standard stream surveys on 14 different streams in 2005. Streams surveyed within the Weiser River drainage included Lost Creek, East Fork Lost Creek, Grouse Creek, East Branch of the Weiser River, West Branch of the Weiser River, and the West Fork of the Weiser River. Streams surveyed within the Little Salmon River drainage include Thorn Creek, Rock Flat Creek, Little Goose Creek, Squaw Creek, Shingle Creek, Little Round Valley Creek, and Little Mud Creek. Indian Creek, a tributary to the Snake River, was surveyed to determine the effects of a significant high flow event in July 2003 on habitat and the resident bull trout population.

The upper Little Salmon River was also electrofished in 2005 using a raft mounted boom shocker to determine the fish assemblage in the upper reaches of the river. For the past decade, the upper Little Salmon River has been the focus of ongoing riparian habitat improvement projects and improvements in agricultural land use practices. The data obtained from the 2005 surveys will be used to monitor future changes in fish assemblages due to the projects involved.

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NORTH FORK PAYETTE RIVER ABOVE PAYETTE LAKE

INTRODUCTION

The spawning run of kokanee *Oncorhynchus nerka kennerlyi* in the North Fork Payette River (NFPR) from Payette Lake has been enumerated since 1988 to assess spawning escapement and to serve as a method of validating kokanee population/density estimates and survival estimates from in-lake population work. This estimate was completed again in 2004 and 2005.

METHODS

We completed kokanee spawner counts by walking the entire stretch of river utilized by spawning kokanee and counting all live spawners. The total spawning run estimate was made by multiplying the largest daily count by 1.73 (Frost and Bennett, 1994).

RESULTS

2004

Kokanee spawners were counted five times from September 2 through September 23, 2004. The peak count of 11,290 live fish was made on September 15, 2004 (Table 1). The total spawning run estimate was 19,532 (11,290*1.73) fish. Average total length of 24 spawners sampled was 298 mm.

2005

Kokanee spawners were counted three times from August 31 through October 12, 2005. The peak count of 11,780 live fish was made on September 7, 2005 (Table 1) The total spawning run estimate was 20,780 (11,780*1.73) fish.

Table 1. Estimated total kokanee spawning run size and biomass from 1988 through 2005 from Payette Lake.

Year	Peak Count	Estimated # Spawners	KG/Lake HA_1	Number/Lake HA_1	Average Weight (g)
1988	13,200	22,800	4.6	13.3	346
1989	8,400	14,500	2.9	8.4	349
1990	9,642	16,700	3.5	9.7	358
1991	10,400	18,000	5.3	10.5	505
1992	16,945	29,300	6.4	17.1	377
1993	34,994	59,310[a]	8.5	34.6	245
1994	25,550	44,200	5.5	25.8	214[b]
1995	32,050	55,450	4.8	32.3	147
1996	35,090	60,707	5.7	35.4	162[c]
1997	36,300[e]	64,891[d]	5.6	37.8	148
1998	14,585	25,232	2.1	14.7	143
1999	15,590	26,971	2.9	15.7	184
2000	15,520	26,850	2.9	15.6	188.5
2001	15,690[e]	30,144[f]	4.4	17.6	250.5
2002	9,430	16,314	--	9.5	--
2003	5,430	9,394	1.5	5.5	279
2004	11,290	19,532	--	11.4	--
2005	11,780	20,780	--	12.1	--

1 1,717 ha usable kokanee habitat in Payette Lake (area w/ depth greater than 40').
a Estimate made from stream and weir counts (Frost and Bennett 1994)
b From gill net data of captured spawners in Payette Lake during lake survey.
c From trawling collections made in September 1996.
d Includes 2,092 fish spawned and killed by Nampa Fish Hatchery.
e Does not include 3,000 fish spawned and killed by Nampa Fish Hatchery.
f Includes 3,000 fish spawned and killed by Nampa Fish Hatchery.

NORTH FORK PAYETTE RIVER AND LITTLE SALMON RIVER TEMPERATURE MONITORING

INTRODUCTION

For the past decade, the upper Little Salmon River (LSR) drainage has been the focus of ongoing riparian habitat improvement projects and some improvements in agricultural land use practices. Debate has risen among stakeholders regarding what specific factors limit salmonid populations throughout the drainage. Summer stream temperature monitoring began in 1994 to establish baseline data and to track changes that may be influenced by recovery of riparian habitat. Monitoring of stream temperatures was intensified in 2004 to assist with Idaho Department of Environmental Quality's water quality assessment for development of Total Maximum Daily Load (TMDL) allowances. The Little Salmon River and some tributaries are currently listed as water quality limited for support of cold water biota, with high summer water temperature, fine sediment, and nutrients currently listed as pollutants of concern.

Summer stream temperature is monitored annually in the North Fork Payette River as part of ongoing evaluation of a minimum instream flow that was established in 2000 to provide for salmonid spawning and rearing (Idaho Department of Water Resources permit #65-13894).

METHODS

Hobo temperature recorders (Onset model HTI, -5 to +35°C) were deployed to monitor water temperature continuously, recording a temperature every 2.5 hours between May 18, 2004 and October 3, 2004 and in the late spring, summer, and early fall of 2005. All recorders were in waterproof Onset model containers and secured by cable to a cinder block. The cinder block was placed in the stream and cabled to shore. Protocol described by Zaroban (2000) was followed to calibrate recorders prior to use.

Little Salmon River Drainage

2004

In 2004, three recorders were placed in the main Little Salmon River. The furthest downstream recorder was located at the Circle C Bridge but only recorded between July 12 and July 26 due to a malfunction. One recorder was located at Osborn Ranch downstream from Zim's Hot Springs. The final recorder was placed approximately 50 m downstream from Meadow Creek Subdivision Bridge, adjacent to Highway 95, at road mile 163.4. Additionally, one recorder was placed in Mud Creek, a headwater tributary to the LSR, immediately below the confluence with Little Mud Creek under the Highway 95 Bridge. A map of the location of each recorder can be found in Appendix A.

2005

In 2005, five recorders were placed in the main Little Salmon River. The furthest downstream recorder was located at the Circle C Subdivision Bridge; one recorder was placed on the Osborn Ranch downstream from Zim's Hot Springs; one recorder was located on the Campbell Ranch upstream from Zim's Hot Springs; one was placed below the Meadow Creek

Bridge on the Campbell property; and the furthest upstream was placed at the Meadow Creek Bridge. A sixth recorder was placed in Mud Creek, a headwater tributary to the LSR, immediately below the confluence with Little Mud Creek under the Highway 95 Bridge. Two other recorders were placed in the Round Valley Creek drainage (a tributary to the Little Salmon River) in Little Round Valley Creek just below the national forest boundary and in a spring that flows into Round Valley Creek. Maps of the locations of each of the recorders can be found in Appendix A.

North Fork Payette River

2004 and 2005

In both 2004 and 2005, one temperature recorder was secured to the steel staff gauge that is associated with the USGS station in the NFPR approximately ¼ mile downstream from Fisher Creek. A map of the location of this recorder can be found in Appendix A.

RESULTS

Little Salmon River

2004

Appendix B1 shows daily mean, minimum, and maximum stream temperatures for the upper Little Salmon River and Mud Creek in 2004. Summer stream temperatures in the upper Little Salmon River continue to be high, with daily mean temperatures exceeding 20°C consistently throughout July and parts of August. Daily mean temperatures in Mud Creek were less severe, never reaching 20°C throughout the year and consistently being below 2003 recorded temperatures (Janssen et al., in review).

2005

Appendix B2 shows daily mean, minimum, and maximum stream temperatures for the upper Little Salmon River, Mud Creek, and Round Valley drainage sites in 2005. Summer stream temperatures in the upper Little Salmon River continue to be high, with daily mean temperatures exceeding 20°C on 23 days throughout July and parts of August. Conversely, mean stream temperatures in the Little Salmon River were consistently lower than 2004 recorded temperatures. Daily mean temperatures in Mud Creek were less severe, reaching 20°C on only 5 days throughout the year (Janssen et al. 2004, in review). Mean stream temperatures recorded at the two sites within the Round Valley Creek drainage remained consistently cool throughout the year, peaking at 14.6°C on August 1.

Unfortunately, the recorders placed at the Circle C Subdivision Bridge and at the Meadow Creek Bridge malfunctioned for their entire deployment.

North Fork Payette River

2004

Appendix B3 shows temperature data for the North Fork Payette River station in 2004. Summer stream temperatures in the North Fork Payette River remain adequate for rainbow trout rearing. Daily mean temperatures never reached 20°C, peaking at 19.9°C on July 17, 2004.

2005

Appendix B3 shows temperature data for the North Fork Payette River station in 2005. Summer stream temperatures in the North Fork Payette River remain adequate for rainbow trout rearing. Daily mean temperatures never reached 20°C, peaking at 18.9°C on July 22 and August 1, 8, and 9 of 2005.

Tables of the mean, minimum, and maximum stream temperatures broken down by day for all sites monitored in 2004 and 2005 can be found in Appendix C.

STANDARD STREAM SURVEYS

INTRODUCTION

Weiser River Drainage

2004

Standard stream surveys were completed on the East Branch Weiser River and Hornet Creek, both tributaries of the Weiser River in 2004. Hornet Creek was surveyed at the request of the U.S. Natural Resource Conservation Service to document fish species presence prior to the reconstruction of a stream diversion and control structure.

2005

Standard stream surveys were conducted in seven streams within the Weiser River drainage in the 2005 season to document fish species presence and habitat conditions. Tributaries surveyed include Lost Creek, East Fork Lost Creek, Grouse Creek, East Branch of the Weiser River, West Branch of the Weiser River, and the West Fork of the Weiser River. Three transects were surveyed in Lost Creek. Two transects were surveyed on the West Fork of the Weiser River. The remaining streams only had one transect done apiece.

Little Salmon River Drainage

2004

During the 2004 field season, standard stream surveys were conducted in the upper Hazard Creek drainage and Round Valley Creek, all in the Little Salmon River drainage, to document fish species presence and habitat conditions.

2005

Seven tributaries to the upper Little Salmon River were surveyed in 2005 in order to document fish species presence and habitat conditions. The seven streams surveyed in the Little Salmon drainage included Thorn Creek, Rock Flat Creek, Little Goose Creek, Squaw Creek, Shingle Creek, Little Round Valley Creek, and Little Mud Creek. Two transects were surveyed on Little Goose Creek, Squaw Creek, Shingle Creek, and Little Mud Creek. The other streams had one transect apiece.

Indian Creek, Snake River Drainage

Indian Creek was surveyed in 1997 and 1998 at four different sites to document stream habitat and population status of the resident bull trout *Salvelinus confluentus* population (Janssen et. al. 2000, Janssen et. al. 2003). We repeated these surveys in 2002 in conjunction with Idaho Power Company personnel to examine bull trout, brook trout, and rainbow trout population trends. In July 2003, a localized rainstorm event in the headwaters of Indian Creek produced significant high flows in the creek. The stream channel morphology in the upper 1/3 of the stream was changed dramatically. Dead bull trout were found and documented by USFS personnel immediately after the event in the upper reaches of the creek. IDFG and Idaho Power Company personnel surveyed the same four transects in 2005 to examine impacts of the 2003 high flow event on habitat and salmonid populations in the creek.

METHODS

We used IDFG standard stream survey methodology (B. Horton memo 8/15/1994) to complete the surveys. We surveyed the same four sites that were established in 1997 and 1998. We made two passes using two backpack electrofishing units concurrently to collect all fish and derive population estimates. Fish collected were identified and total length measured to the nearest mm. Maps of the sites surveyed in 2004 and 2005 can be found in Appendix D. Maps of survey sites on Indian Creek are presented in Janssen et al. (2000 and 2003).

RESULTS

Weiser River Drainage

2004

The only salmonid species observed in the East Branch of the Weiser River in 2004 were brook trout *Salvelinus fontinalis*. The only salmonid species discovered in Hornet Creek were rainbow trout *Oncorhynchus mykiss*. During the Hornet Creek survey largescale sucker *Catostomus macrocheilus*, shorthead sculpin *Cottus confusus*, speckled dace *Rhinichthys osculus,* and redside shiner *Richardsonius balteatus* were also collected. Specific fish and habitat data for these surveys were entered into the IDFG Standard Stream Survey Database. Estimated salmonid abundances can be found in Table 2.

2005

In the 2005 season, we found salmonids in all streams surveyed. We collected only brook trout from the East and West Branches of the Weiser River. Both sites within each of Grouse Creek and the West Fork of the Weiser River were the only streams surveyed that rainbow trout was the only species collected. We collected both rainbow trout and brook trout in the remainder of the streams. The top transect of Lost Creek turned out to be void of fish. The creek had great habitat and structure, but the only animal found in two electrofishing passes was one tailed frog. Nongame fish species were collected include Piute sculpin *Cottus beldingi*, speckled dace, and longnose sucker *Catostomus catostomus.* Specific fish and habitat data for these surveys were entered into the IDFG Standard Stream Survey Database. Estimated salmonid abundances can be found in Table 3. Length frequencies of salmonid species collected for each site surveyed in 2005 can be found in Table 4.

Little Salmon River Drainage

2004

In 2004, we completed seven standard IDFG stream surveys on five different streams within the Little Salmon River drainage. Clayburn Creek, Vance Creek, Warm Springs Creek, and Hazard Creek were all in the upper Hazard Creek drainage within the Little Salmon River drainage. All of these streams contained brook trout with the exception of Clayburn #2 where no fish were collected. Lower Clayburn Creek and Hazard Creek also contained rainbow trout. The lower Hazard Creek survey site had the highest numbers and densities of both brook and rainbow trout. Two Idaho giant salamanders *Dicamptodon aterrimus* were also collected from Warm Springs Creek. During the Round Valley Creek standard stream survey, the only salmonid species collected was brook trout. Specific fish and habitat data for these surveys were entered into the IDFG Standard Stream Survey Database. Estimated salmonid abundances can be found in Table 2.

Table 2. Estimates of salmonid abundance in streams surveyed in 2004.

Transect Site	Transect Length (m)	Fish Species	Estimated #/transect +/-95% CI	Estimated #/m^2
Clayburn Cr. #1	76	Brook trout	32.27 ± 7.22	0.09
Clayburn Cr. #1	76	Rainbow trout	1.00 ± 0	0.003
Clayburn Cr. #2	80	No Fish	0	0
E. Branch Weiser R.	70	Brook trout	12.50 ± 20.79	0.06
Hazard Cr. #2	76	Brook trout	32.11 ± 16.45	0.06
Hazard Cr. #2	76	Rainbow trout	3.00 ± 0.00	0.005
Hazard Cr. #1	73	Brook trout	71.27 ± 51.72	0.16
Hazard Cr. #1	73	Rainbow trout	36.00 ± 52.59	0.08
Hornet Cr.	161	Rainbow trout	9.14 ± 0.96	.24
Round Valley Cr.	84	Brook trout	2 ± [a]	0.008
Vance Cr.	84	Brook trout	22 ± [a]	0.04
Warm Springs Cr.	70	Brook trout	40.05 ± 6.27	0.08

[a] Total catch first and second runs had the same number of fish.

2005

Salmonids were found within all sites surveyed in the upper Little Salmon River tributaries in 2005. Brook trout were the only salmonids collected in the sites located on Thorn Creek, Rock Flat Creek, Little Mud Creek, and Little Round Valley Creek. Both rainbow trout and brook trout were found within the sites located on Little Goose Creek. Juvenile steelhead trout were the only salmonids found in the Squaw Creek–Above Diversion site. Both juvenile steelhead trout and Chinook salmon were found in the Squaw Creek–Mouth DS Hwy site and both sites located on Shingle Creek. Hatchery reared juvenile Chinook salmon were also found in both sites surveyed in Shingle Creek. Nongame fish species also collected within the Little Salmon River tributaries include longnose dace *Rhinichthys cataractae,* sculpin *Cottus spp.*, speckled dace, sucker *Catostomus spp.*, and northern pikeminnow *Ptychochelius oregonesis.* Estimated salmonid abundances can be found in Table 3. Length frequencies of salmonid species collected for each site surveyed in 2005 can be found in Table 4.

Table 3. Estimates of salmonid abundance in streams surveyed by McCall staff, 2005.

Transect Site	Transect Length (m)	Fish Species	Estimated #/transect +/- 95% CI	Estimated #/m^2
Lost Creek #1	40.85	No Fish		
Lost Creek #2	40.85	Rainbow	1 +/- 0	0.008
Lost Creek #2	40.85	Brook	18.8 +/- 5.19	0.15
Lost Creek #3	40.85	Rainbow	50.6 +/- 13.24	0.26
Lost Creek #3	40.85	Brook	4 +/- 6.79	0.02
East Fork Lost Creek	40.85	Rainbow	4 +/- 6.79	0.018
East Fork Lost Creek	40.85	Brook	73.10 +/- 21.00	0.33
Grouse Creek	40.85	Rainbow	26.67 +/- 4.36	0.29
East Branch Weiser River	40.85	Brook	21.6 +/- 2.16	0.36
West Branch Weiser River	40.85	Brook	18.75 +/- 2.60	0.29
West Fork Weiser River #1	80.48	Rainbow	6 +/- 0	0.01
West Fork Weiser River #2	40.85	Rainbow	24.14 +/- 13.60	0.13
Thorn Creek	40.85	Rainbow	1 +/- 0	0.02
Thorn Creek	40.85	Brook	42.25 +/- 11.94	0.74
Rock Flat Creek[a]	40.85	Brook	6	n/a
Little Goose Creek #1	80.48	Rainbow	64.69 +/- 36.10	0.17
Little Goose Creek #1	80.48	Brook	0 +/- 0	0
Little Goose Creek #2	40.85	Rainbow	1 +/- 0	0.01
Little Goose Creek #2	40.85	Brook	56.08 +/- 28.07	0.81
Little Mud Creek – Lower Little Mud	105.80	Brook	9.14 +/- 0.96	0.03
Little Mud Creek – Upper Little Mud	105.00	Brook	72.06 +/- 31.11	0.28
Shingle Creek – Below Diversion	34.00	Steelhead excludes yoy	36.45 +/- 5.40	0.25
Shingle Creek – Above Diversion	46.40	Steelhead excludes yoy	42.81 +/- 4.10	0.35
Squaw Creek – Mouth DS Hwy	34.30	Steelhead excludes yoy	24.92 +/- 5.01	0.35
Squaw Creek – Above Diversion	52.80	Steelhead excludes yoy	24.08 +/- 5.42	0.14
Little Round Valley Olsen Diversion	100.00	Brook	3	0.007
Indian Creek #1	158.50	Bull	2	0.003
Indian Creek #1	158.50	Rainbow	4	0.007
Indian Creek #2	160.93	Rainbow	18	0.02
Indian Creek #2	160.93	Brook	1	0.001
Indian Creek #3	160.93	Rainbow	28	0.03
Indian Creek #3	160.93	Brook	8	0.009
Indian Creek #3	160.93	Brook x Bull Hybrid	1	0.001
Indian Creek #4	160.93	No Fish		

[a] Total catch first and second runs had the same number of fish.

Table 4. Length frequencies of salmonids collected from streams surveyed in 2005.

Stream	Species	Number of fish collected per length group (mm)																										
		<39	40-49	50-59	60-69	70-79	80-89	90-99	100-109	110-119	120-129	130-139	140-149	150-159	160-169	170-179	180-189	190-199	200-209	210-219	220-229	230-239	240-249	250-259	260-269	270-279	>280
Little Round Valley Olsen Diversion	BKT	0	0	0	0	1	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lost Creek #2	RBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
	BKT	0	1	0	3	0	0	0	1	4	4	0	1	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0
Lost Creek #3	RBT	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	BKT	0	0	16	8	2	1	2	3	5	1	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
East Fork Lost Creek	RBT	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	BKT	0	4	21	17	0	2	3	3	4	4	0	0	0	1	0	1	1	0	0	0	0	0	0	0	0	0	0
Grouse Creek	RBT	0	0	0	2	3	4	2	3	3	3	1	1	0	0	2	0	0	1	0	0	0	0	0	0	0	0	0
East Branch Weiser River	BKT	0	4	2	2	0	0	4	0	0	1	1	1	1	1	3	0	0	0	0	0	0	0	0	0	0	0	0
West Branch Weiser River	BKT	0	2	0	0	0	2	3	0	1	2	3	0	2	1	1	1	0	0	0	0	0	0	0	0	0	0	0
West Fork Weiser River #1	RBT	0	1	0	0	0	0	0	0	1	0	1	1	0	0	0	2	0	0	0	1	0	0	0	0	0	0	0
West Fork Weiser River #2	RBT	0	0	0	0	0	3	2	2	2	2	3	0	1	1	2	1	0	0	2	0	0	1	0	0	0	0	0
Thorn Creek	BKT	0	1	0	0	0	2	12	5	4	3	1	0	3	3	0	0	1	1	0	0	0	0	0	0	0	0	0
Rock Flat Creek	BKT	0	0	1	0	1	0	0	0	1	0	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0
Little Goose Creek #1	RBT	0	0	0	0	1	2	10	6	8	4	4	4	2	1	1	2	0	1	0	0	0	0	0	0	0	0	0
	BKT	0	0	2	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Little Goose Creek #2	RBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
	BKT	0	1	1	1	0	0	4	5	4	10	2	2	3	1	2	2	2	0	0	0	0	1	0	0	0	0	0
Lower Little Mud	BKT	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	0	1	0	3	0	0	0	0	0	1	
Upper Little Mud	BKT	8	7	1	0	10	16	9	5	2	6	1	1	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0
Squaw Creek Above Diversion	STHD	11	0	0	0	0	0	7	6	4	1	0	1	0	0	2	0	1	0	0	0	0	0	0	0	0	0	0
Squaw Creek Mouth DS Hwy	STHD	15	12	3	0	0	1	2	6	4	2	2	3	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	CHNK	0	0	0	0	5	5	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Shingle Creek Above Diversion	STHD	5	0	0	0	3	10	7	5	2	0	3	1	4	3	1	0	2	0	0	0	0	0	0	0	0	0	0
	CH H	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Shingle Creek Below Diversion	STHD	3	8	2	0	3	3	3	7	1	4	4	4	1	1	1	0	2	0	0	0	0	0	0	0	0	0	0
	CHNK	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	CH H	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Indian Creek, Snake River Drainage

Impacts of the high flow event in 2003 on the bull trout population and habitat were significant. No fish were found in transect site #4 where the majority of bull trout were found prior to 2003. We found only two bull trout in site #1, and a possible brook trout and bull trout hybrid was found in site #3. This compares to 27 and 63 bull trout found in site #4 in 1998 and 2002, respectively, and 8 and 15 bull trout found in site 1 in 1998 and 2002, respectively.

Habitat measurements changed significantly as well in 2005 from those recorded in 1998. Changes in habitat included stream channel scouring and down cutting, loss of the majority of pools and pocket water and channel braiding in some areas. Pool and pocket water measurements in transect # 4 declined from 68.6% (% of stream area) in 1998 to 4.3% in 2005. Specific fish and habitat data for these surveys can be found in the IDFG Standard Stream Survey Database.

Table 5. Number of fish collected and population estimates by species and transect collected from Indian Creek on July 2, 2005 with electrofishing.

Indian Creek Transect	Transect Length (M)	Trout Collected	# Collected Pass 1 / Pass 2	Population Estimate Lower CL / Upper CL
#1	161	Bull	1/1	2/15
#1		Rainbow	1/3	NA
#2	161	Rainbow	12/6	18-31
#2		Brook	1/0	NA
#3	161	Rainbow	18/10	15/65
#3		Brook	5/3	5/11
#3		Brook x Bull	1/0	NA
#4	161	0	0	0

2005 UPPER LITTLE SALMON RIVER ELECTROFISHING

INTRODUCTION

Eight sites were surveyed along the upper reaches of the Little Salmon River above the anadromous barrier during 2005. The uppermost section begins at the Hwy. 95 bridge over the Little Salmon River west of New Meadows. The lowest section ends at the intersections of Hwy. 95 and Smokey Boulder road.

METHODS

All sites were surveyed using a Smith-Root VVP-15B electrofisher mounted on a raft rowing frame rigged with an electroshocking assembly. Shocking output was controlled by a foot pedal by the person rowing. The person netting was situated in the front of the raft near the anodes. Fish were netted and held in a holding tank mounted on the boat until the end of the survey site. The length and species of all fish were then recorded before fish were released. The lengths, shocking times, and starting and ending points of all sites surveyed can be found in Table 5. Maps of all sites surveyed can be found in Appendix E.

Table 5. Lengths, shocking times, and location of sites located on mainstem Little Salmon River.

Site	Length (m)[a]	Shocking[b] time (sec)	Start[c]		End	
			E	N	E	N
LSR #1	225	326	555646	4980250	555650	4980307
LSR #2	692	425	555730	4980375	555951	4970701
LSR #3	660	446	556015	4980864	556057	4981446
LSR #4	885	527	556159	4981672	556255	4982270
LSR #5	1030	784	556355	4982527	556648	4983337
LSR #6	644	315	554372	4994104	554459	4994709
LSR #7	1223	713	554474	4994796	554871	4995570
LSR #8	1609	853	554891	4995607	555132	4996889

[a] Lengths are approximations obtained from mapping software.
[b] All sites were done with DC current at 60Hz and 80 pulses per second.
[c] All UTMs are in zone 11T on WGS84 datum.

RESULTS

Electrofishing in the upper Little Salmon River showed that rainbow trout and mountain whitefish are the primary salmonids in the upper Little Salmon River (Table 6.) One cutthroat trout was collected in site #4 and one brook trout was collected in site #5. The lack of salmonids in sites #6 and #7 is believed to be due to the lack of pool and riffle habitats. The substrate in these sections was primarily sand with little or no structure present. Nonsalmonids collected during surveys include northern pikeminnow, longnose dace, largescale sucker, speckled dace, and sculpin spp. Length frequencies of salmonid species collected for each site can be found in Table 6.

Table 6. Length frequencies of salmonids collected from mainstem Little Salmon River sites surveyed in 2005.

Stream	Species	Number of fish collected per length group (mm)																										
		<39	40-49	50-59	60-69	70-79	80-89	90-99	100-109	110-119	120-129	130-139	140-149	150-159	160-169	170-179	180-189	190-199	200-209	210-219	220-229	230-239	240-249	250-259	260-269	270-279	>280	
LSR #1	RBT	0	0	0	0	0	0	0	0	0	1	0	1	0	0	2	0	1	0	6	3	4	1	1	2	0	300 mm	
	MWF	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	
LSR #2	RBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	2	1	4	2	0	0	320 mm	
LSR #3	RBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	3	0	0	0	290 mm	
	MWF	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	308 mm	
LSR #4	RBT	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	302 mm	
	MWF	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3	2	0	0	0	0	0	0	0	0	307 mm	
	CT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	
	BKT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	
LSR #5	RBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0	1	1	1	0	2	
	MWF	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	1	0	2	
	BKT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	300 mm	
LSR #6	No salmonids captured, 3 trout were missed by netter																											
LSR #7	No salmonids captured																											
LSR #8	RBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	329 mm	

[a] RBT = rainbow trout, BKT = brook trout, STHD = steelhead trout, CHNK = no mark Chinook, CH H = ad clip Chinook, CT = cutthroat trout, MWF = mountain whitefish.

[b] 360 mm, 400 mm.

[c] 289 mm, 331 mm.

RECOMMENDATIONS

1. Continue temperature monitoring of Region 3 (McCall area) waters.

2. Conduct riparian vegetation monitoring of restored areas of the upper Little Salmon River.

3. Conduct standard stream surveys to document densities and species occurrence in area waters.

4. Conduct stream surveys in all identified bull trout waters to document the presence of bull trout every five years to comply with the "Draft Bull Trout Recovery Plan" of the USFWS.

5. Continue to count spawning kokanee in the North Fork Payette River above Payette Lake in the established trend area annually.

LITERATURE CITED

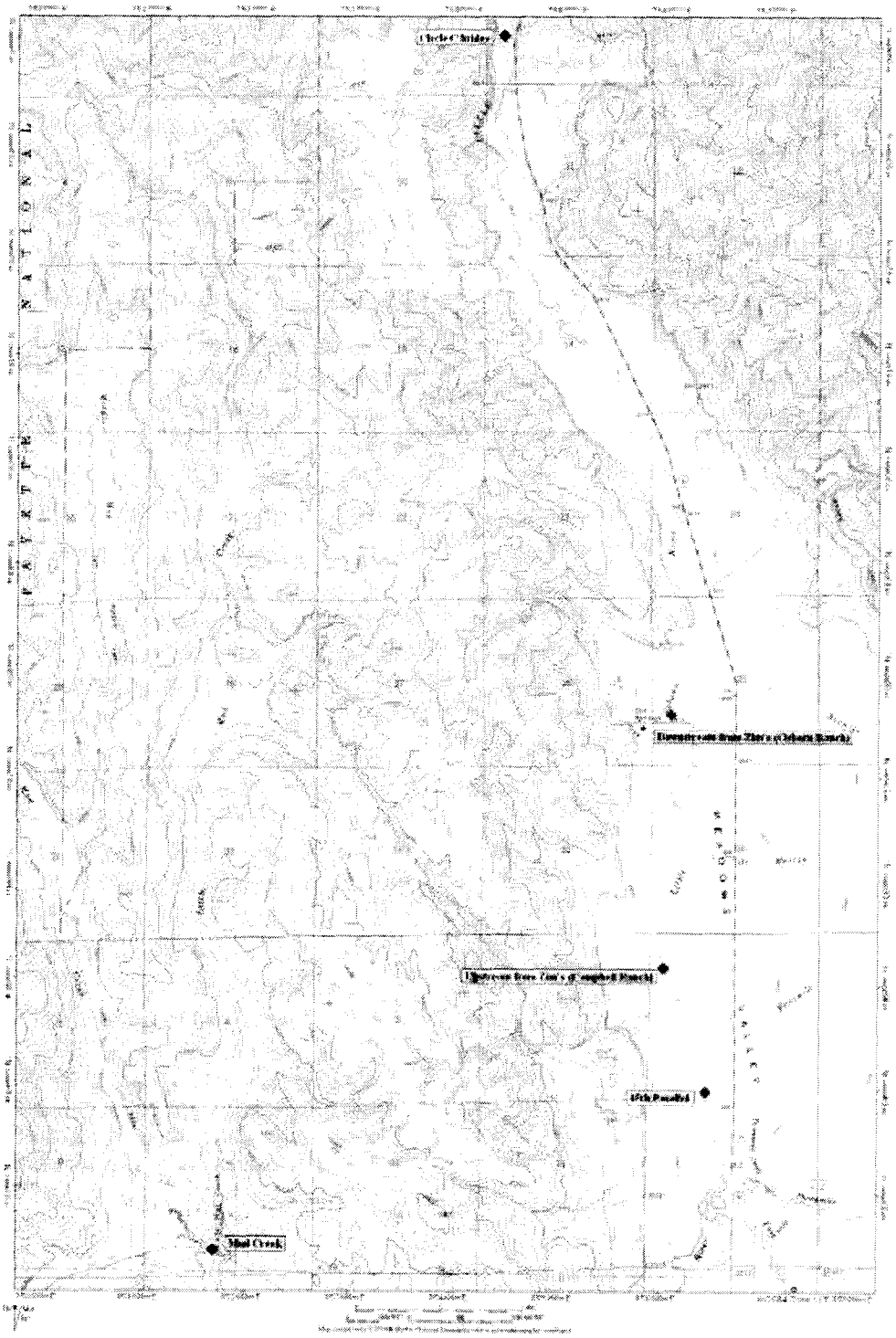
Frost, F. O., and D. H. Bennett. 1994. Determination of kokanee incubation success, potential egg deposition, and fry production from the North Fork Payette River, Idaho. Annual report. Department of Fish and Wildlife Resources. College of Forestry, Wildlife and Range Sciences. University of Idaho, Moscow.

Janssen, P., D. Allen, and K. A. Apperson. In review. Federal Aid in Fish Restoration. Regional Fishery management investigations. Job Performance Report, 2003. Project F-71-R-28. Idaho Department of Fish and Game, Boise.

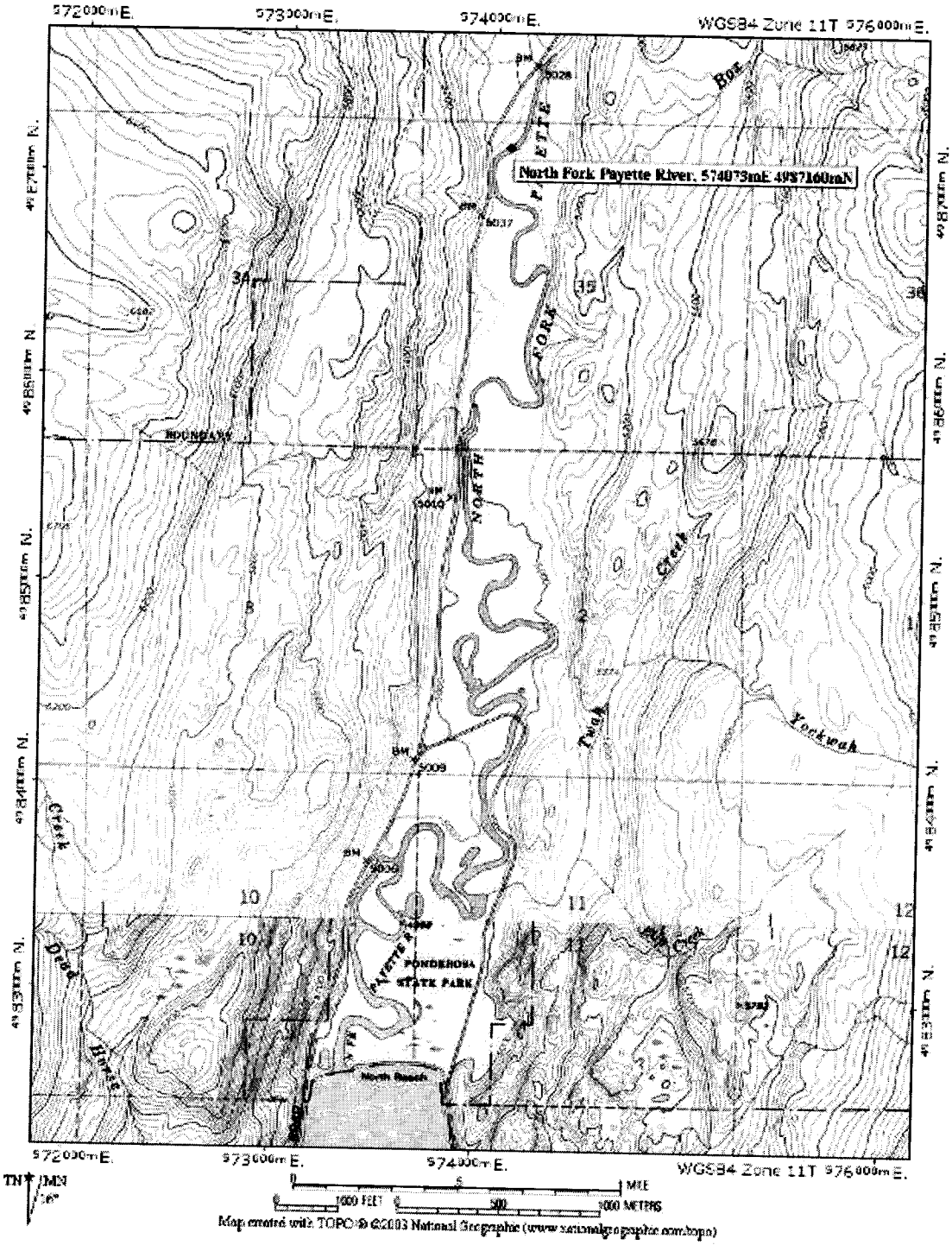
Zaroban, Donald W. 2000. Protocol for placement and retrieval of temperature data loggers in Idaho streams. Water Quality Monitoring Protocols. Report No. 10. Idaho Department of Environmental Quality, Boise.

APPENDICES

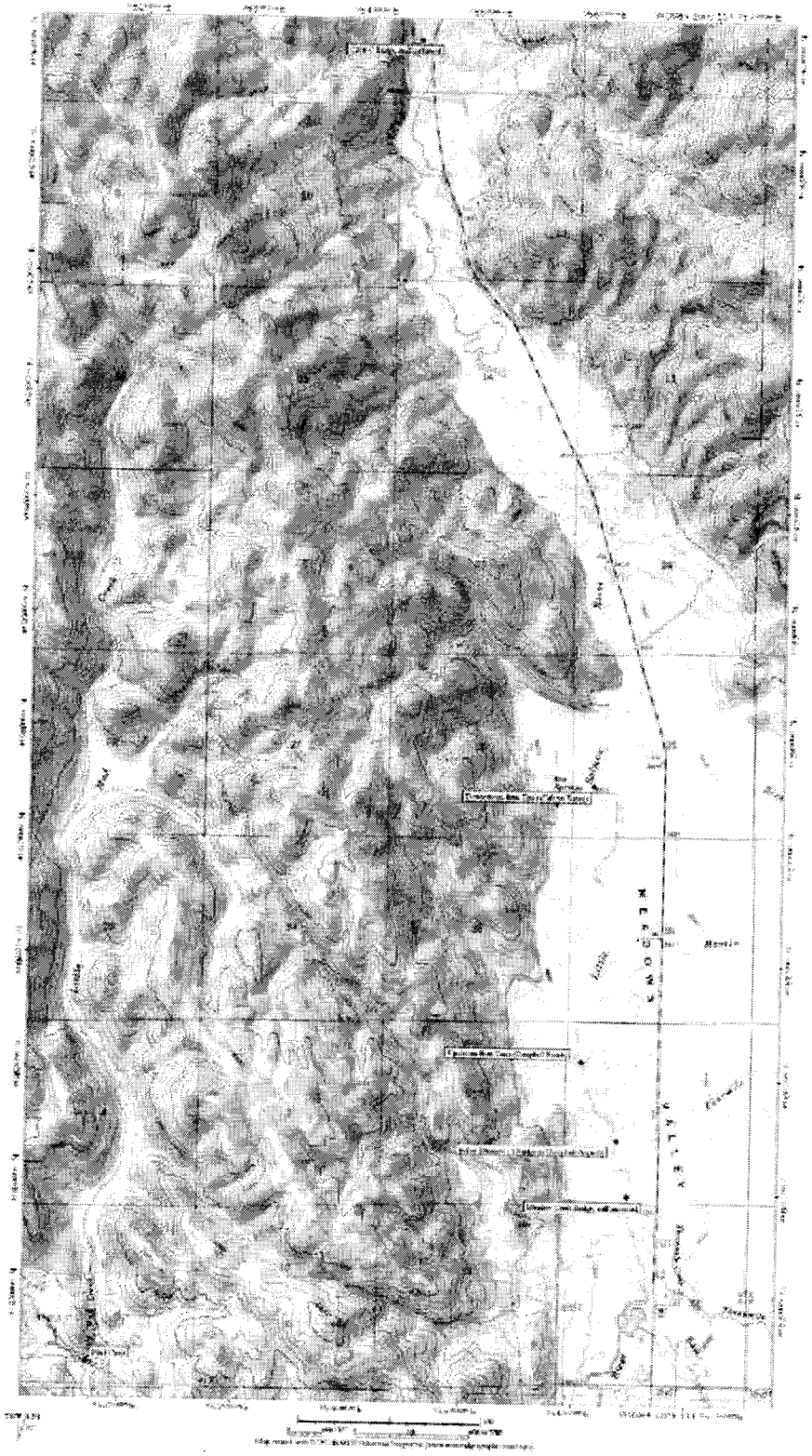
Appendix A1. Locations of five Hobo temperature recorders in the upper Little Salmon River drainage in 2004.



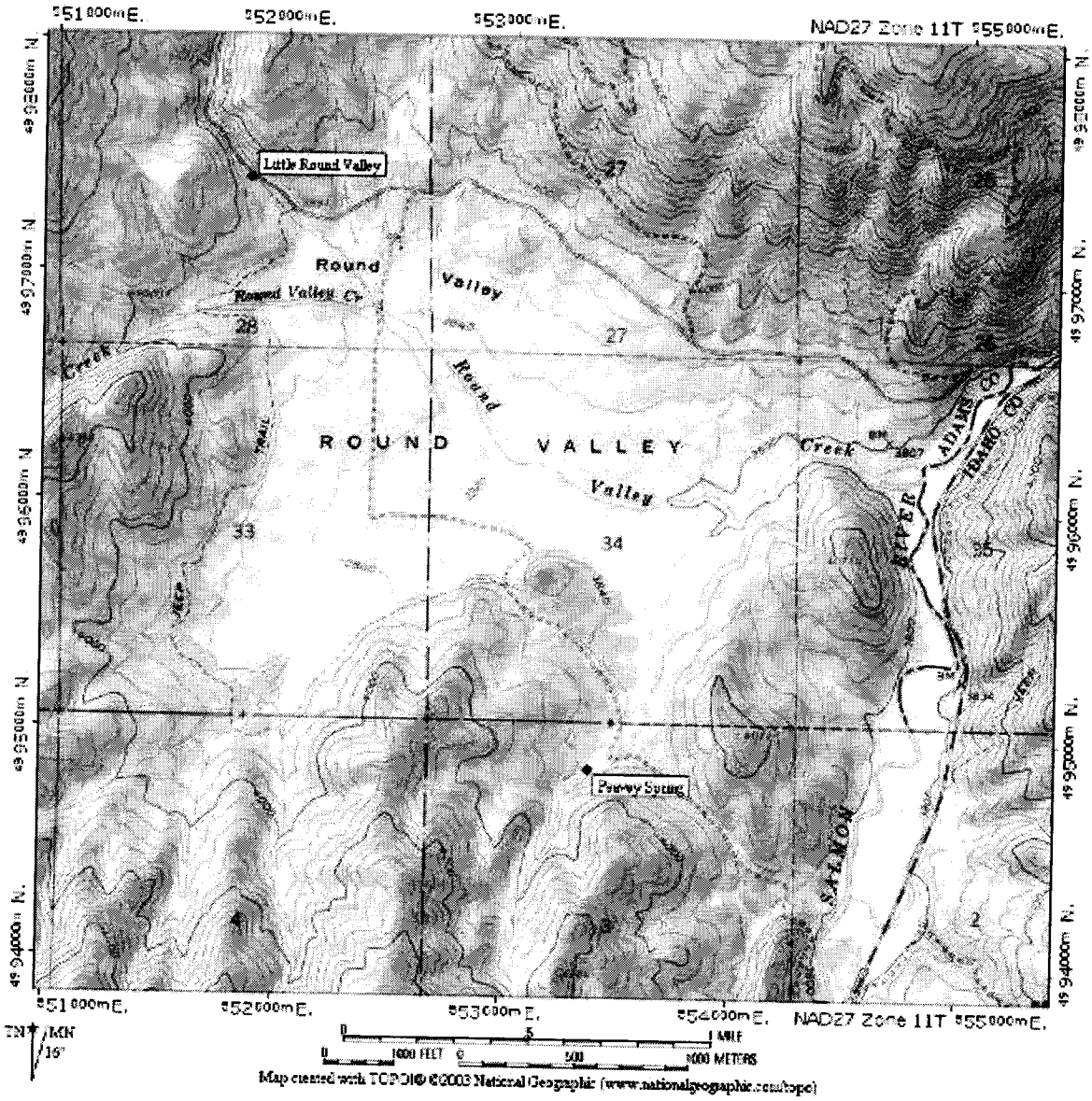
Appendix A2. Location of Hobo temperature recorder in the North Fork of Payette River near the USGS gauging station in 2004 and 2005.



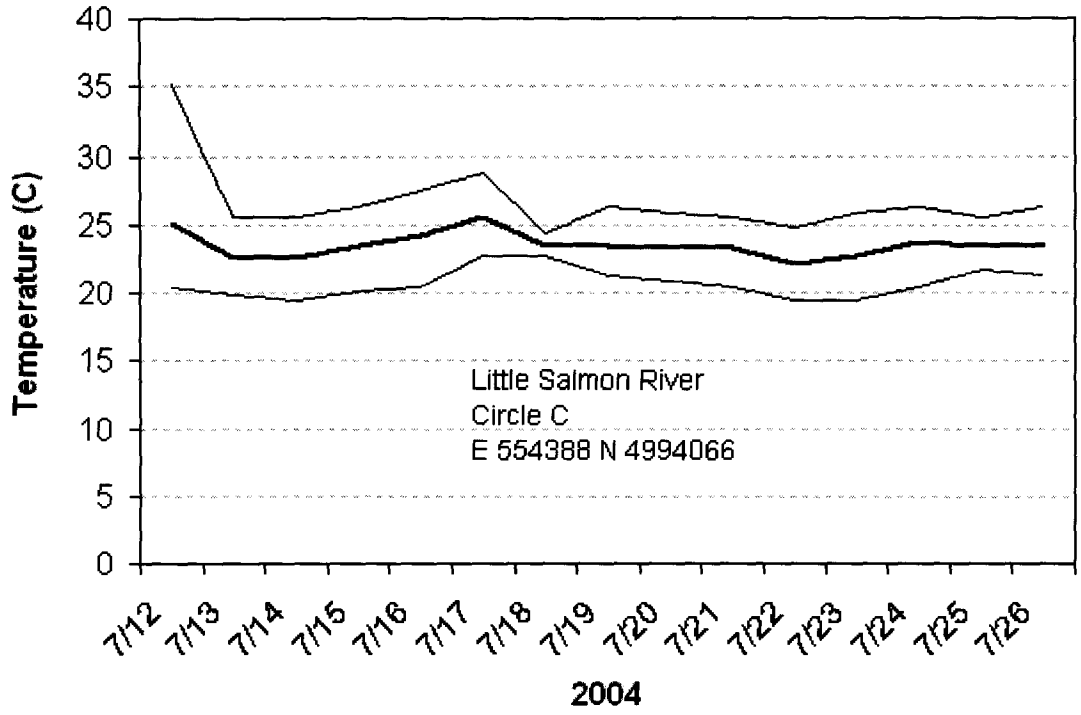
Appendix A3. Locations of six Hobo temperature recorders in the upper Little Salmon River drainage in 2005.

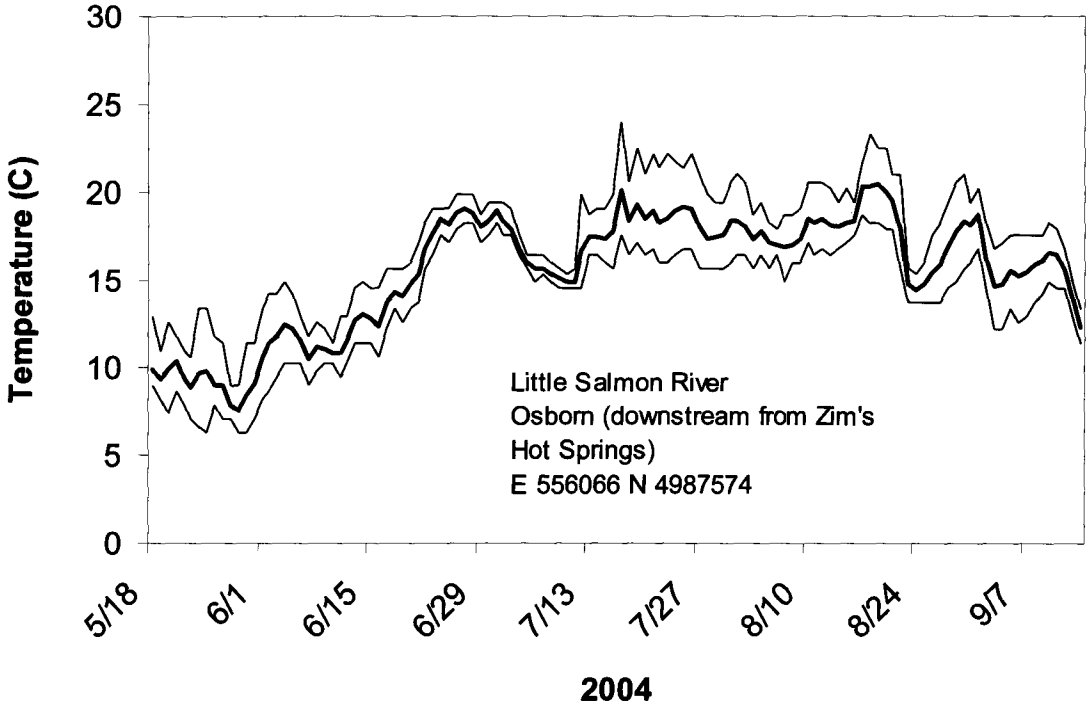


Appendix A4. Locations of Hobo temperature recorders in Round Valley Creek and Peavey Spring in 2005.

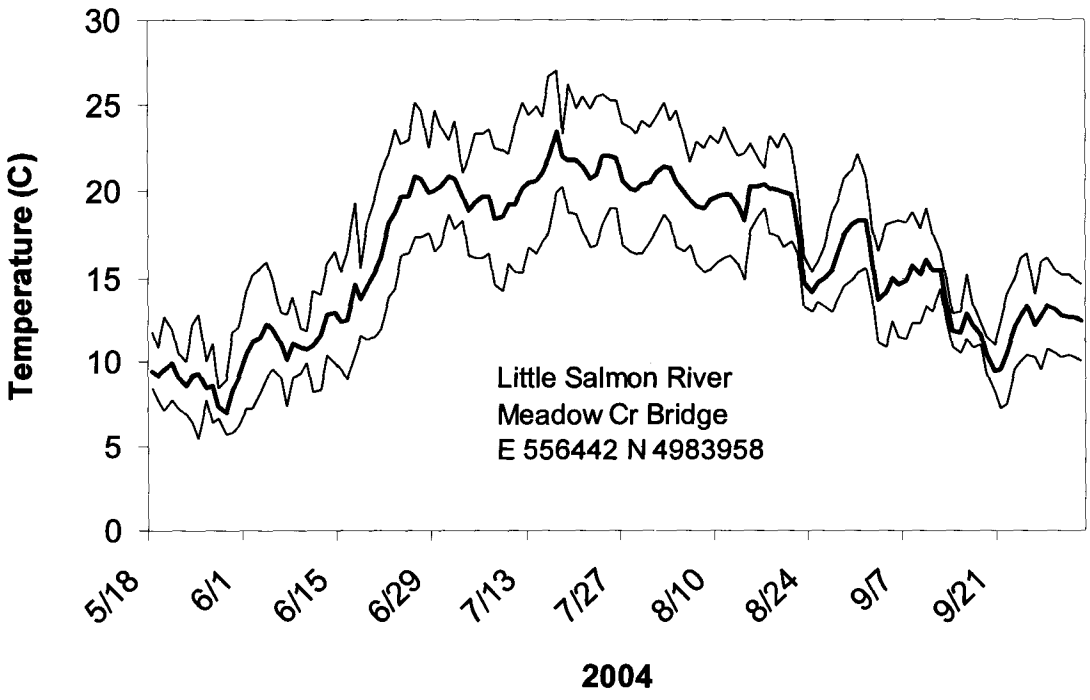


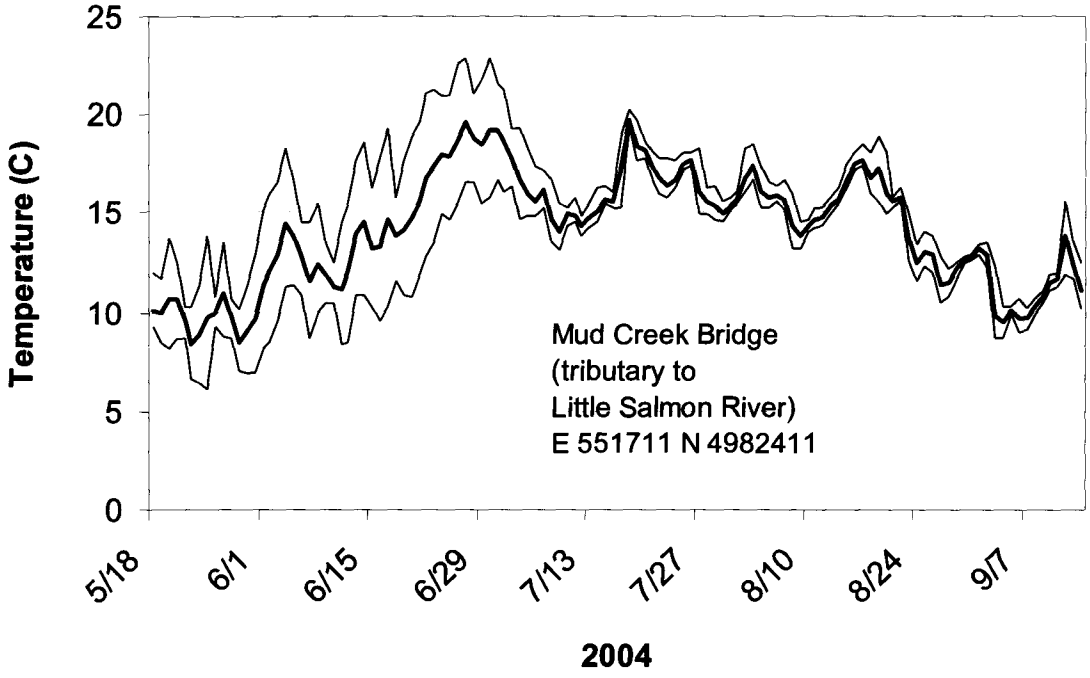
Appendix B1. Mean, maximum, and minimum daily water temperatures at given stations in upper Little Salmon drainage, 2004.



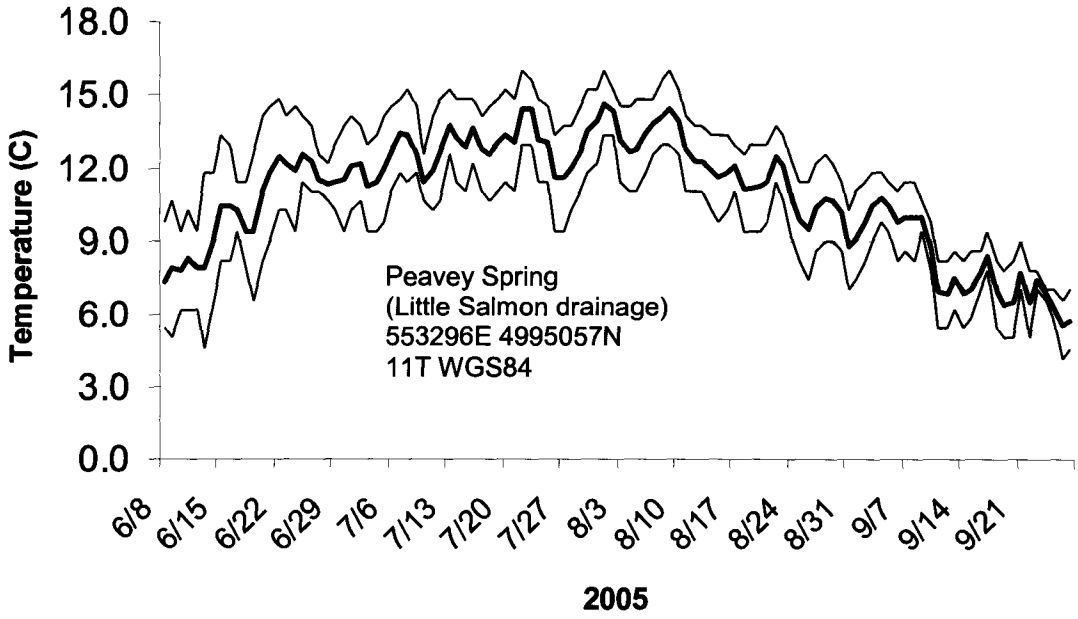


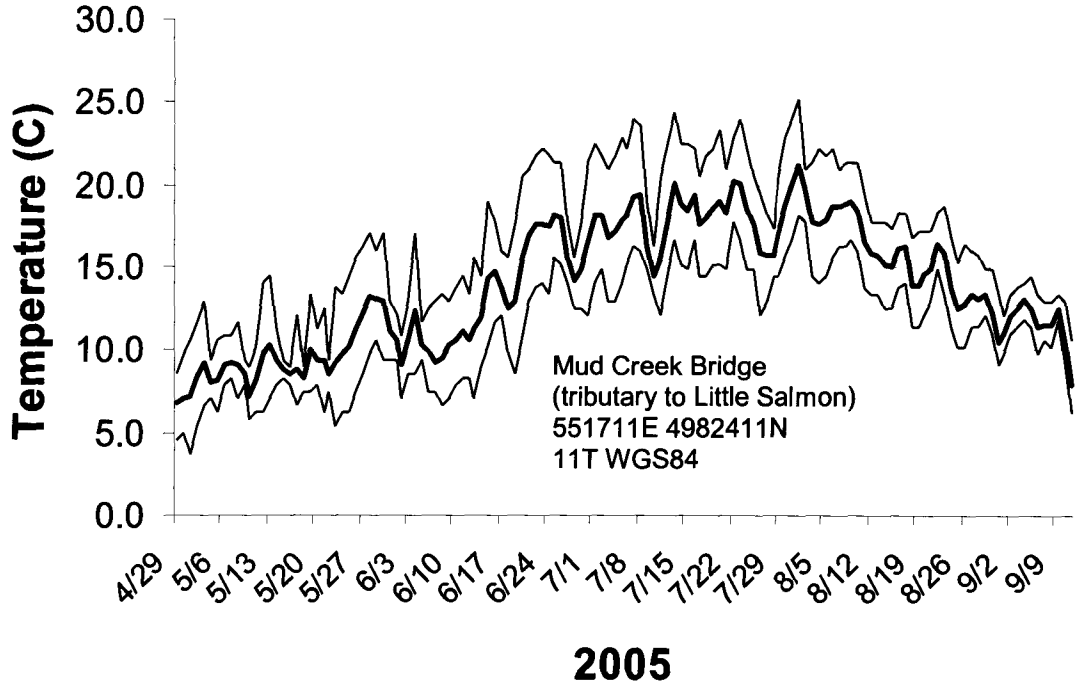
Appendix B1. Continued.



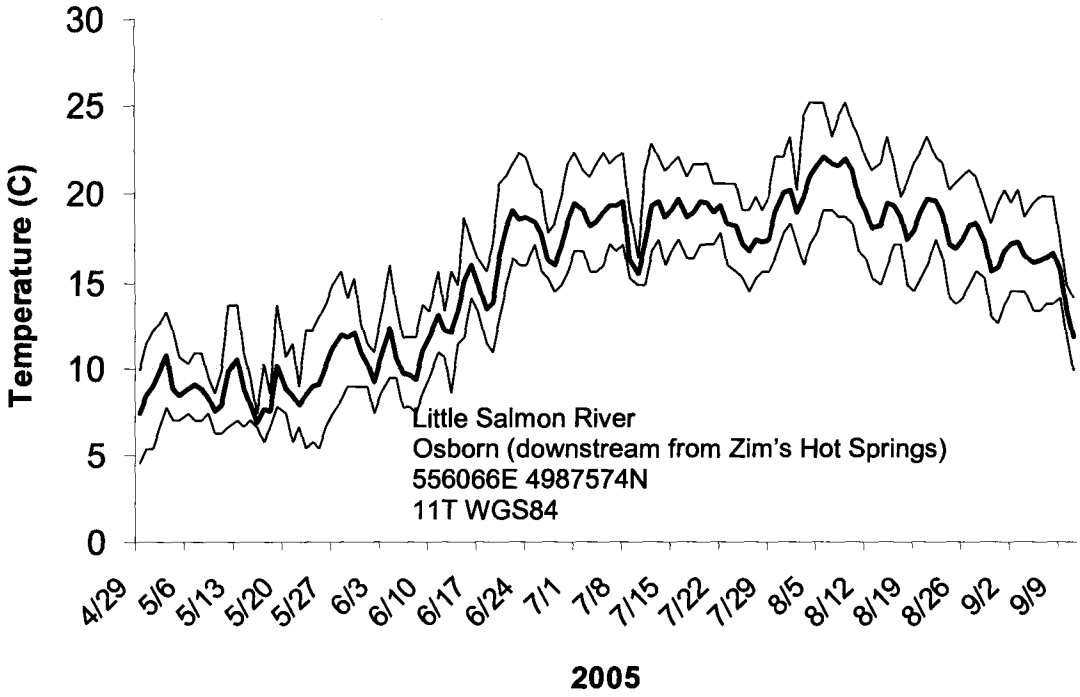


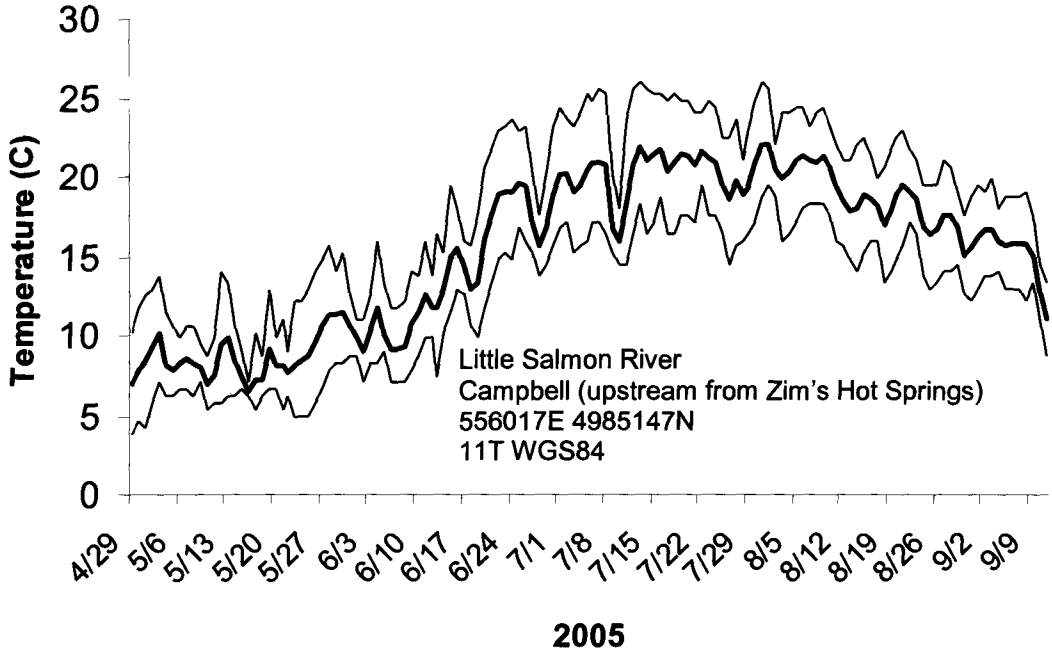
Appendix B2. Mean, maximum, and minimum daily water temperatures at given stations in upper Little Salmon drainage, 2005.



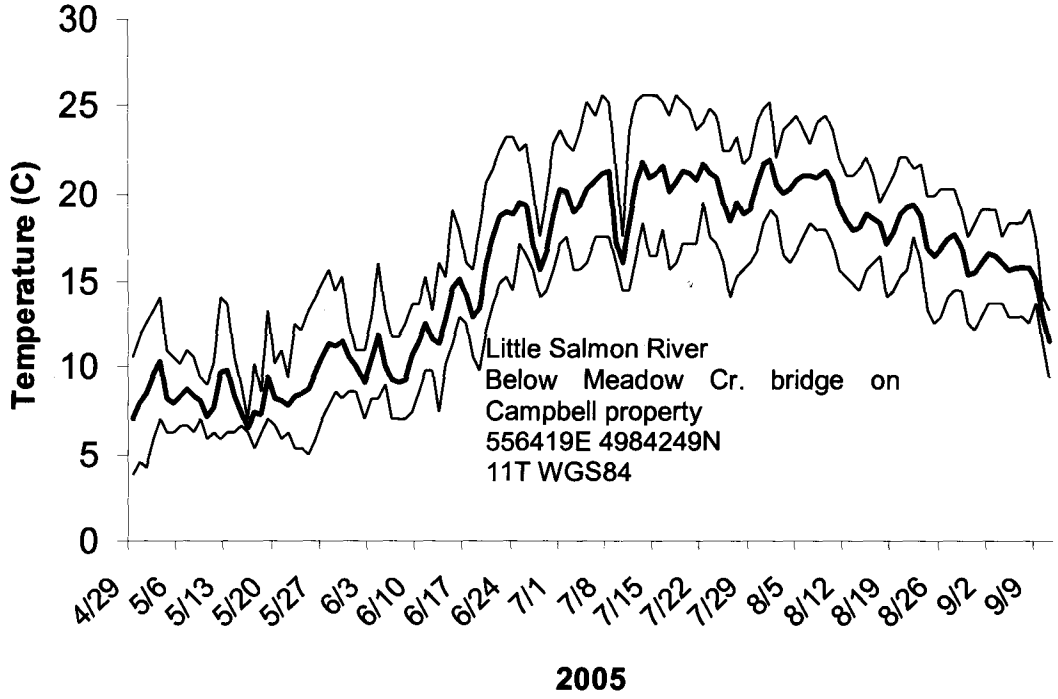


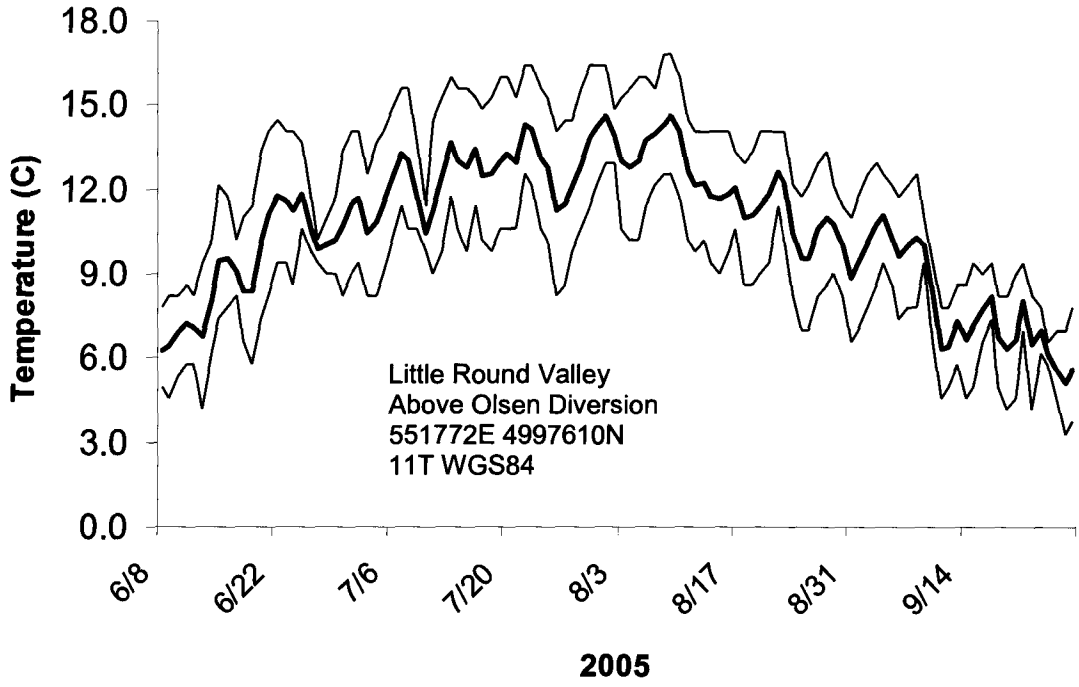
Appendix B2. Continued.



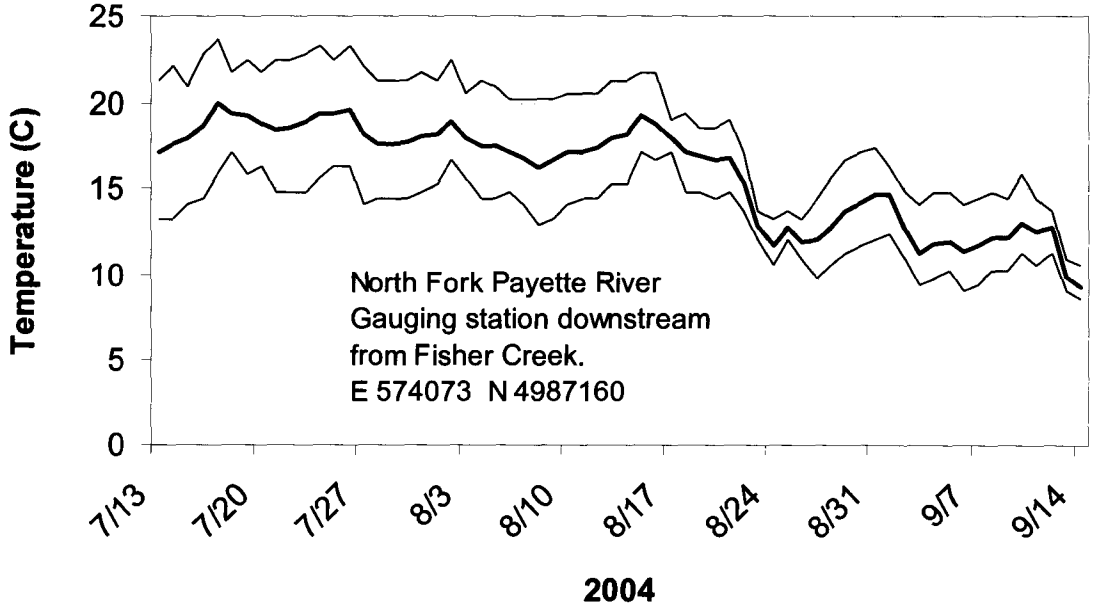


Appendix B2. Continued.





Appendix B3. Mean, minimum, and maximum daily water temperatures in the upper North Fork Payette River at the USGS gauge downstream from Fisher Creek, 2004 and 2005.



Appendix C1. Daily mean, minimum, and maximum stream temperatures for Circle C site in Little Salmon River, 2004.

Little Salmon River at Circle C, 2004			
Date	Mean	Min	Max
7/12	25.1	20.5	35.2
7/13	22.7	19.8	25.6
7/14	22.7	19.4	25.6
7/15	23.5	20.2	26.3
7/16	24.3	20.5	27.5
7/17	25.5	22.8	28.7
7/18	23.5	22.8	24.4
7/19	23.5	21.3	26.3
7/20	23.4	20.9	25.9
7/21	23.3	20.5	25.6
7/22	22.3	19.4	24.8
7/23	22.8	19.4	25.9
7/24	23.8	20.5	26.3
7/25	23.5	21.7	25.6
7/26	23.6	21.3	26.3

Appendix C2. Daily mean, minimum, and maximum stream temperatures for Osborn Ranch site in Little Salmon River, 2004.

Little Salmon River at Osborn Ranch (downstream from Zim's Hot Springs), 2004											
Date	Mean	Min	Max	Date	Mean	Min	Max	Date	Mean	Min	Max
5/18	10.0	9.0	12.9	6/28	18.8	18.3	19.8	8/8	17.0	16.0	18.7
5/19	9.4	8.2	11.0	6/29	18.0	17.1	18.7	8/9	17.3	16.0	19.0
5/20	9.9	7.4	12.6	6/30	18.4	17.5	19.4	8/10	18.5	17.1	20.6
5/21	10.3	8.6	11.8	7/1	19.0	18.3	19.4	8/11	18.3	16.4	20.6
5/22	9.3	7.8	11.0	7/2	18.4	17.5	19.4	8/12	18.5	16.8	20.6
5/23	9.0	7.0	10.6	7/3	17.9	17.5	19.0	8/13	18.1	16.4	20.2
5/24	9.7	6.6	13.3	7/4	16.7	16.4	17.5	8/14	18.0	16.8	19.4
5/25	9.8	6.2	13.3	7/5	16.0	15.6	16.4	8/15	18.3	17.1	20.2
5/26	9.1	7.8	11.8	7/6	15.6	14.9	16.4	8/16	18.3	17.5	19.4
5/27	9.1	7.0	11.4	7/7	15.6	15.2	16.4	8/17	20.3	18.7	21.7
5/28	7.9	7.0	9.0	7/8	15.3	14.9	16.0	8/18	20.3	18.3	23.2
5/29	7.5	6.2	9.0	7/9	15.0	14.5	15.6	8/19	20.4	18.3	22.5
5/30	8.4	6.2	11.4	7/10	14.9	14.5	15.2	8/20	20.0	17.9	22.5
5/31	9.2	7.0	11.4	7/11	14.8	14.5	15.6	8/21	19.5	17.9	21.0
6/1	10.6	8.2	13.3	7/12	16.7	14.5	19.8	8/22	18.0	15.6	21.0
6/2	11.4	8.6	14.1	7/13	17.5	16.4	18.7	8/23	14.7	13.7	15.6
6/3	11.8	9.4	14.1	7/14	17.4	16.4	19.0	8/24	14.3	13.7	15.2
6/4	12.5	10.2	14.9	7/15	17.3	16.0	19.0	8/25	14.8	13.7	16.0
6/5	12.2	10.2	14.1	7/16	17.7	15.6	19.8	8/26	15.4	13.7	17.5
6/6	11.6	10.2	12.9	7/17	20.0	17.5	24.0	8/27	15.8	13.7	18.3
6/7	10.5	9.0	11.8	7/18	18.3	16.4	20.6	8/28	16.9	14.5	19.4
6/8	11.2	9.8	12.6	7/19	19.3	17.1	22.5	8/29	17.8	14.9	20.6
6/9	11.0	10.2	12.2	7/20	18.5	16.4	21.0	8/30	18.3	15.6	21.0
6/10	10.9	10.2	11.4	7/21	19.0	16.8	22.1	8/31	18.2	16.0	19.4
6/11	10.8	9.4	12.9	7/22	18.2	16.0	21.3	9/1	18.7	16.8	20.2
6/12	11.6	10.2	12.9	7/23	18.5	16.0	22.1	9/2	16.2	14.5	18.3
6/13	12.6	11.4	14.5	7/24	19.0	16.4	21.7	9/3	14.6	12.2	16.8
6/14	13.0	11.4	14.9	7/25	19.1	16.8	21.3	9/4	14.7	12.2	17.1
6/15	12.8	11.4	14.5	7/26	19.0	16.8	22.1	9/5	15.5	13.3	17.5
6/16	12.3	10.6	14.5	7/27	18.0	15.6	21.0	9/6	15.2	12.6	17.5
6/17	13.7	12.2	15.6	7/28	17.4	15.6	19.8	9/7	15.4	12.9	17.5
6/18	14.3	13.3	15.6	7/29	17.4	15.6	19.4	9/8	15.9	13.7	17.5
6/19	14.0	12.6	15.6	7/30	17.6	15.6	19.4	9/9	16.1	14.1	17.5
6/20	14.7	13.3	16.0	7/31	18.4	16.0	20.6	9/10	16.5	14.9	18.3
6/21	15.3	13.7	17.1	8/1	18.4	16.4	21.0	9/11	16.4	14.5	17.9
6/22	16.8	15.6	18.3	8/2	18.1	16.4	20.6	9/12	15.5	14.5	16.8
6/23	17.7	16.4	19.0	8/3	17.4	15.6	18.7	9/13	13.9	12.9	14.9
6/24	18.5	17.5	19.0	8/4	17.8	16.4	19.4	9/14	12.4	11.4	13.3
6/25	18.2	17.1	19.0	8/5	17.1	15.6	18.3				
6/26	18.8	17.9	19.8	8/6	17.1	16.4	17.9				
6/27	19.0	18.3	19.8	8/7	16.9	14.9	18.7				

Appendix C3. Daily mean, minimum, and maximum stream temperatures for Meadow Creek Bridge site in Little Salmon River, 2004.

Little Salmon River at Meadow Creek Bridge, 2004											
Date	**Mean**	**Min**	**Max**	**Date**	**Mean**	**Min**	**Max**	**Date**	**Mean**	**Min**	**Max**
5/18	9.4	8.4	11.7	7/4	18.9	16.2	21.9	8/20	19.9	16.7	23.4
5/19	9.1	7.7	10.8	7/5	19.3	16.1	23.4	8/21	19.9	17.0	22.6
5/20	9.5	7.1	12.6	7/6	19.7	16.1	23.4	8/22	17.7	16.4	20.1
5/21	9.8	7.7	11.9	7/7	19.6	16.4	23.6	8/23	14.8	13.3	16.2
5/22	9.0	7.2	10.5	7/8	18.3	14.6	22.6	8/24	14.1	12.9	15.3
5/23	8.6	6.9	10.0	7/9	18.5	14.2	22.4	8/25	14.7	13.6	15.9
5/24	9.2	6.4	12.2	7/10	19.2	15.8	22.2	8/26	15.0	13.3	16.7
5/25	9.2	5.5	12.8	7/11	19.2	15.3	23.7	8/27	15.5	12.9	18.8
5/26	8.4	7.7	10.0	7/12	20.2	15.3	25.1	8/28	16.5	13.7	19.4
5/27	8.6	6.4	11.1	7/13	20.5	16.7	24.4	8/29	17.4	14.5	20.7
5/28	7.4	6.6	8.4	7/14	20.6	16.4	25.0	8/30	18.0	14.8	21.2
5/29	7.0	5.7	8.9	7/15	21.1	17.0	24.3	8/31	18.3	15.3	22.2
5/30	8.3	5.8	11.7	7/16	21.9	17.5	26.7	9/1	18.2	15.6	20.7
5/31	9.0	6.1	12.0	7/17	23.5	19.9	27.1	9/2	15.9	13.7	17.8
6/1	10.4	7.2	14.2	7/18	22.0	20.2	23.4	9/3	13.7	11.1	16.5
6/2	11.1	7.2	15.1	7/19	21.8	18.8	26.2	9/4	14.1	10.8	18.0
6/3	11.4	8.1	15.6	7/20	21.8	18.6	24.8	9/5	15.0	12.3	18.1
6/4	12.2	9.1	15.9	7/21	21.5	17.7	25.5	9/6	14.6	11.4	18.3
6/5	11.8	9.5	14.8	7/22	20.7	16.7	24.8	9/7	14.9	11.2	18.1
6/6	11.0	9.1	12.9	7/23	21.0	16.9	25.5	9/8	15.6	12.2	18.8
6/7	10.1	7.4	12.8	7/24	22.0	18.0	25.7	9/9	15.2	12.2	17.8
6/8	11.1	9.1	13.9	7/25	22.1	19.0	25.3	9/10	16.0	13.3	19.0
6/9	10.8	9.2	12.0	7/26	22.0	19.0	25.3	9/11	15.4	12.9	17.5
6/10	10.6	9.8	11.7	7/27	20.6	16.9	23.9	9/12	15.4	14.3	16.5
6/11	11.0	8.1	14.2	7/28	20.2	16.5	23.7	9/13	13.3	12.3	14.8
6/12	11.5	8.3	14.0	7/29	20.1	16.4	23.4	9/14	11.7	10.8	12.8
6/13	12.8	10.3	15.8	7/30	20.4	16.4	24.1	9/15	11.6	10.5	12.9
6/14	13.0	9.8	16.5	7/31	20.6	17.0	23.7	9/16	12.9	11.2	15.1
6/15	12.3	9.5	15.3	8/1	21.1	17.7	24.3	9/17	12.1	10.8	13.4
6/16	12.5	8.9	16.4	8/2	21.5	18.6	25.1	9/18	11.5	10.9	12.2
6/17	14.6	10.3	19.3	8/3	21.3	18.1	24.1	9/19	10.3	9.2	11.4
6/18	13.7	11.5	15.6	8/4	20.5	16.7	24.6	9/20	9.4	8.1	10.9
6/19	14.5	11.2	18.0	8/5	19.9	16.5	23.1	9/21	9.5	7.2	12.3
6/20	15.2	11.4	19.6	8/6	19.4	16.9	21.7	9/22	10.4	7.5	14.0
6/21	16.1	11.9	21.1	8/7	19.1	15.8	22.9	9/23	11.9	9.5	15.0
6/22	18.1	13.9	22.2	8/8	19.0	15.3	22.6	9/24	12.7	10.0	16.1
6/23	18.7	14.3	23.6	8/9	19.5	15.4	23.2	9/25	13.3	10.3	16.4
6/24	19.7	16.2	22.7	8/10	19.7	15.9	22.7	9/26	12.1	10.2	14.0
6/25	19.7	16.4	23.1	8/11	19.9	16.1	23.7	9/27	12.7	9.5	15.9
6/26	20.8	17.3	25.1	8/12	19.8	16.2	22.9	9/28	13.3	10.6	16.1
6/27	20.7	17.3	24.6	8/13	19.0	15.8	22.1	9/29	13.0	10.5	15.4
6/28	20.0	17.5	22.6	8/14	18.2	14.8	22.2	9/30	12.7	10.2	15.1
6/29	20.0	16.5	24.6	8/15	20.2	17.7	22.7	10/1	12.6	10.3	15.1
6/30	20.3	16.9	23.7	8/16	20.3	18.5	21.9	10/2	12.6	10.2	14.8
7/1	20.9	18.6	23.1	8/17	20.4	19.0	21.4	10/3	12.3	10.0	14.6
7/2	20.7	17.8	24.1	8/18	20.2	17.5	23.2				
7/3	19.7	18.3	21.1	8/19	20.0	17.3	22.6				

Appendix C4. Daily mean, minimum, and maximum stream temperatures for Mud Creek site, 2004.

Mud Creek at Hwy 95 Bridge (tributary to Little Salmon River), 2004											
Date	Mean	Min	Max	Date	Mean	Min	Max	Date	Mean	Min	Max
5/18	10.1	9.2	12.0	6/28	18.8	16.5	21.1	8/8	14.3	13.3	15.9
5/19	10.0	8.4	11.7	6/29	18.5	15.4	21.7	8/9	13.9	13.3	14.5
5/20	10.6	8.1	13.7	6/30	19.2	15.8	22.9	8/10	14.3	14.0	14.6
5/21	10.6	8.6	12.5	7/1	19.2	16.7	21.6	8/11	14.7	14.2	15.3
5/22	9.5	8.6	10.3	7/2	18.6	16.1	21.2	8/12	14.7	14.3	15.3
5/23	8.3	6.6	10.3	7/3	17.8	16.4	19.3	8/13	15.4	15.0	15.8
5/24	8.9	6.4	11.4	7/4	16.6	14.6	19.3	8/14	15.7	15.4	16.2
5/25	9.7	6.1	13.9	7/5	16.0	14.8	18.3	8/15	16.6	16.2	17.5
5/26	10.0	9.2	10.8	7/6	15.6	14.8	17.3	8/16	17.5	17.2	18.1
5/27	11.0	8.8	13.6	7/7	16.1	15.3	17.2	8/17	17.7	17.3	18.5
5/28	9.7	8.6	10.6	7/8	14.6	13.6	16.7	8/18	16.7	15.9	18.1
5/29	8.4	7.1	10.2	7/9	14.0	13.1	15.4	8/19	17.3	15.6	19.0
5/30	9.0	6.9	11.4	7/10	14.9	14.3	15.3	8/20	15.9	15.0	18.1
5/31	9.6	6.9	12.9	7/11	14.8	14.5	15.8	8/21	15.6	15.3	15.8
6/1	11.4	8.1	15.1	7/12	14.3	13.9	14.8	8/22	15.8	15.6	16.2
6/2	12.0	8.4	15.9	7/13	14.7	14.2	15.4	8/23	13.8	12.6	15.0
6/3	12.9	9.5	16.5	7/14	15.0	14.5	16.2	8/24	12.5	11.5	13.4
6/4	14.4	11.2	18.3	7/15	15.7	15.4	16.4	8/25	13.0	12.3	14.0
6/5	13.8	11.4	16.7	7/16	15.6	15.3	16.1	8/26	12.9	12.0	13.9
6/6	12.8	10.9	14.5	7/17	17.3	15.3	19.0	8/27	11.4	10.5	12.8
6/7	11.6	8.6	14.5	7/18	19.7	19.4	20.2	8/28	11.5	10.8	12.2
6/8	12.4	10.0	15.4	7/19	18.4	17.7	19.8	8/29	12.1	11.7	12.5
6/9	11.9	10.5	13.4	7/20	18.1	17.8	18.6	8/30	12.6	12.5	12.8
6/10	11.3	10.5	12.5	7/21	17.3	16.5	18.1	8/31	12.8	12.6	12.9
6/11	11.2	8.3	14.5	7/22	16.8	15.9	17.8	9/1	13.2	12.9	13.4
6/12	12.1	8.4	15.4	7/23	16.4	15.8	17.8	9/2	12.9	12.3	13.6
6/13	13.9	10.9	17.7	7/24	16.6	16.2	17.7	9/3	9.7	8.6	12.3
6/14	14.5	10.9	18.6	7/25	17.5	17.2	18.1	9/4	9.4	8.6	10.3
6/15	13.2	10.3	16.2	7/26	17.7	17.3	18.1	9/5	10.1	9.8	10.3
6/16	13.3	9.5	17.8	7/27	16.0	15.0	18.3	9/6	9.6	8.9	10.6
6/17	14.6	10.3	19.3	7/28	15.5	15.0	16.2	9/7	9.6	9.1	10.2
6/18	13.8	11.5	15.8	7/29	15.3	14.6	16.4	9/8	10.2	9.8	10.6
6/19	14.2	10.9	17.7	7/30	15.0	14.5	15.6	9/9	10.8	10.5	11.1
6/20	14.7	10.8	19.0	7/31	15.4	15.1	15.8	9/10	11.5	11.1	11.9
6/21	15.5	11.9	19.6	8/1	15.7	15.4	16.1	9/11	11.7	11.2	12.0
6/22	16.8	12.8	21.1	8/2	16.8	16.1	18.3	9/12	13.8	11.9	15.6
6/23	17.4	13.6	21.2	8/3	17.3	16.7	18.5	9/13	12.4	11.7	13.6
6/24	18.0	15.0	20.9	8/4	16.1	15.3	17.3	9/14	11.1	10.2	12.5
6/25	17.8	14.6	20.9	8/5	15.7	15.3	16.5				
6/26	18.7	15.4	22.6	8/6	15.9	15.6	16.4				
6/27	19.6	16.5	22.9	8/7	15.7	15.1	16.7				

Appendix C5. Daily mean, minimum, and maximum stream temperatures for North Fork Payette River site, 2004.

North Fork Payette River at gauging station downstream from Fisher Creek, 2004							
Date	**Mean**	**Min**	**Max**	**Date**	**Mean**	**Min**	**Max**
7/13	17.2	13.3	21.3	8/14	18.1	15.2	21.3
7/14	17.6	13.3	22.1	8/15	19.3	17.1	21.7
7/15	17.9	14.1	20.9	8/16	18.8	16.7	21.7
7/16	18.7	14.4	22.8	8/17	17.9	17.1	19.0
7/17	19.9	15.9	23.6	8/18	17.2	14.8	19.4
7/18	19.4	17.1	21.7	8/19	16.9	14.8	18.6
7/19	19.2	15.9	22.4	8/20	16.6	14.4	18.6
7/20	18.8	16.3	21.7	8/21	16.8	14.8	19.0
7/21	18.5	14.8	22.4	8/22	15.3	13.7	17.1
7/22	18.5	14.8	22.4	8/23	12.9	12.1	13.7
7/23	18.9	14.8	22.8	8/24	11.8	10.6	13.3
7/24	19.4	15.6	23.2	8/25	12.8	12.1	13.7
7/25	19.3	16.3	22.4	8/26	11.9	10.9	13.3
7/26	19.5	16.3	23.2	8/27	12.0	9.8	14.4
7/27	18.2	14.1	22.1	8/28	12.8	10.6	15.6
7/28	17.7	14.4	21.3	8/29	13.8	11.3	16.7
7/29	17.6	14.4	21.3	8/30	14.2	11.7	17.1
7/30	17.7	14.4	21.3	8/31	14.7	12.1	17.4
7/31	18.0	14.8	21.7	9/1	14.7	12.5	16.3
8/1	18.2	15.2	21.3	9/2	12.7	10.9	14.8
8/2	19.0	16.7	22.4	9/3	11.3	9.4	14.1
8/3	18.0	15.6	20.5	9/4	11.9	9.8	14.8
8/4	17.5	14.4	21.3	9/5	12.0	10.2	14.8
8/5	17.5	14.4	20.9	9/6	11.4	9.0	14.1
8/6	17.2	14.8	20.2	9/7	11.8	9.4	14.4
8/7	16.8	14.1	20.2	9/8	12.3	10.2	14.8
8/8	16.2	12.9	20.2	9/9	12.2	10.2	14.4
8/9	16.6	13.3	20.2	9/10	13.1	11.3	15.9
8/10	17.2	14.1	20.5	9/11	12.5	10.6	14.4
8/11	17.2	14.4	20.5	9/12	12.8	11.3	13.7
8/12	17.3	14.4	20.5	9/13	9.9	9.0	10.9
8/13	17.9	15.2	21.3	9/14	9.3	8.6	10.6

Appendix C6. Daily mean, minimum, and maximum stream temperatures for North Fork Payette River site, 2005.

North Fork Payette River at gauging station downstream from Fisher Creek, 2005							
Date	**Mean**	**Min**	**Max**	**Date**	**Mean**	**Min**	**Max**
6/14	8.0	6.2	9.0	7/30	17.7	14.5	21.3
6/15	9.6	7.0	12.2	7/31	18.5	16.4	21.3
6/16	10.0	7.8	12.2	8/1	18.9	16.4	21.7
6/17	9.0	7.8	11.0	8/2	18.1	16.4	19.4
6/18	8.5	7.8	9.4	8/3	17.2	14.5	20.2
6/19	9.3	6.6	12.6	8/4	17.4	14.5	21.0
6/20	11.6	9.4	14.9	8/5	17.6	14.5	21.0
6/21	12.6	10.2	15.2	8/6	18.4	15.6	21.3
6/22	13.1	10.6	16.0	8/7	18.6	16.0	21.3
6/23	13.2	11.0	16.4	8/8	18.9	16.4	21.7
6/24	13.8	11.4	17.1	8/9	18.9	16.4	21.7
6/25	14.3	12.6	16.4	8/10	18.0	15.6	20.6
6/26	14.3	13.3	16.0	8/11	16.8	14.1	19.4
6/27	12.4	11.0	13.7	8/12	16.1	13.7	18.3
6/28	11.6	10.6	12.6	8/13	15.8	13.3	18.7
6/29	12.5	11.8	13.7	8/14	15.8	12.9	19.0
6/30	13.4	11.4	16.4	8/15	15.9	13.3	19.0
7/1	14.3	11.8	17.9	8/16	16.1	13.7	18.7
7/2	14.4	12.2	17.5	8/17	16.0	14.5	17.1
7/3	13.6	11.0	16.8	8/18	15.0	12.9	16.8
7/4	14.3	11.4	17.9	8/19	15.3	12.6	18.3
7/5	15.3	12.2	19.0	8/20	15.8	12.9	19.0
7/6	16.2	12.9	19.8	8/21	16.2	13.7	19.0
7/7	16.7	13.7	20.6	8/22	16.6	15.2	18.3
7/8	16.7	13.3	20.6	8/23	16.1	14.1	18.7
7/9	14.4	13.3	17.1	8/24	14.2	11.8	16.8
7/10	13.3	12.6	14.1	8/25	13.7	11.4	16.8
7/11	14.7	11.4	18.7	8/26	13.9	11.0	17.1
7/12	16.3	12.6	20.6	8/27	14.7	12.2	17.5
7/13	17.6	14.5	21.0	8/28	14.8	12.2	17.9
7/14	17.0	13.7	20.6	8/29	14.5	12.6	17.1
7/15	17.0	13.3	21.3	8/30	13.1	11.4	15.2
7/16	17.6	14.5	21.0	8/31	12.5	9.8	16.0
7/17	16.7	12.9	20.6	9/1	13.2	10.6	16.8
7/18	17.2	13.3	21.3	9/2	13.8	11.4	17.1
7/19	17.7	13.7	21.7	9/3	14.0	11.8	17.5
7/20	17.8	14.1	21.7	9/4	13.7	12.2	16.4
7/21	17.3	13.7	20.6	9/5	13.3	11.4	16.8
7/22	18.9	16.0	22.5	9/6	12.8	10.2	16.8
7/23	18.7	15.2	22.1	9/7	13.3	10.6	17.5
7/24	17.7	13.7	21.7	9/8	13.5	11.0	17.5
7/25	17.3	13.7	21.0	9/9	12.5	11.0	14.9
7/26	16.3	12.2	20.2	9/10	10.0	8.2	11.4
7/27	16.9	12.6	21.3	9/11	8.1	5.8	11.4
7/28	16.5	13.7	19.8	9/12	10.7	5.4	22.9
7/29	17.4	14.1	21.3	9/13	10.7	5.4	22.9

Appendix C7. Daily mean, minimum, and maximum stream temperatures for Mud Creek site, 2005.

Mud Creek at Hwy 95 Bridge (tributary to Little Salmon River), 2005											
Date	Mean	Min	Max	Date	Mean	Min	Max	Date	Mean	Min	Max
4/29	6.7	4.5	8.6	6/14	12.0	9.0	14.4	7/30	18.7	15.6	22.8
4/30	7.1	4.9	9.8	6/15	14.4	10.2	19.0	7/31	20.2	16.7	24.0
5/1	7.2	3.7	10.6	6/16	14.7	11.7	17.8	8/1	21.2	18.2	25.2
5/2	8.4	5.3	11.7	6/17	13.8	12.1	15.9	8/2	19.7	17.8	20.9
5/3	9.2	6.6	12.9	6/18	12.5	9.8	15.6	8/3	17.7	14.4	21.3
5/4	8.0	7.0	9.4	6/19	13.0	8.6	17.8	8/4	17.6	14.1	22.1
5/5	8.1	6.2	10.6	6/20	15.4	10.6	20.5	8/5	17.9	14.4	21.7
5/6	9.1	7.8	10.9	6/21	16.9	12.9	20.9	8/6	18.7	15.6	22.1
5/7	9.2	8.2	10.9	6/22	17.7	13.7	21.7	8/7	18.7	16.3	20.9
5/8	9.1	7.0	11.7	6/23	17.7	14.1	22.1	8/8	18.8	16.3	21.3
5/9	8.5	7.8	9.4	6/24	17.5	13.3	21.7	8/9	19.1	16.7	21.3
5/10	7.2	5.8	9.0	6/25	18.2	15.6	21.3	8/10	18.4	15.9	21.3
5/11	8.1	6.2	10.2	6/26	18.0	15.2	21.3	8/11	16.5	13.7	19.4
5/12	9.8	6.2	14.1	6/27	15.5	14.1	17.8	8/12	15.8	13.3	17.8
5/13	10.3	7.0	14.4	6/28	14.2	12.5	15.6	8/13	15.7	13.3	17.8
5/14	9.4	7.8	11.3	6/29	14.8	12.5	17.8	8/14	15.1	12.5	17.8
5/15	8.8	8.2	9.4	6/30	16.5	12.1	21.3	8/15	15.0	12.5	17.4
5/16	8.5	7.8	9.0	7/1	18.2	14.1	22.4	8/16	16.1	13.7	18.3
5/17	8.8	6.6	12.1	7/2	18.1	14.8	21.7	8/17	16.2	14.1	18.3
5/18	8.3	7.4	9.0	7/3	16.8	12.9	20.9	8/18	13.9	11.4	16.8
5/19	10.1	7.4	13.3	7/4	17.2	12.9	21.7	8/19	14.0	11.4	17.1
5/20	9.4	7.8	11.3	7/5	17.9	14.1	22.8	8/20	14.6	12.2	17.1
5/21	9.3	6.2	12.5	7/6	18.1	15.2	22.1	8/21	14.9	12.9	17.1
5/22	8.5	7.4	9.4	7/7	19.3	16.3	24.0	8/22	16.3	14.9	18.3
5/23	9.2	5.3	13.7	7/8	19.4	15.9	23.6	8/23	15.8	13.3	18.7
5/24	9.7	6.2	13.3	7/9	16.3	14.8	19.0	8/24	13.8	11.4	16.8
5/25	10.1	6.2	14.4	7/10	14.5	13.3	16.3	8/25	12.6	10.2	15.2
5/26	11.3	7.4	15.6	7/11	15.6	12.1	20.5	8/26	12.8	10.2	16.4
5/27	12.2	8.6	16.3	7/12	17.7	14.4	22.4	8/27	13.4	11.4	16.0
5/28	13.3	9.8	17.1	7/13	20.1	16.7	24.4	8/28	13.1	11.4	15.6
5/29	13.1	10.6	15.9	7/14	18.9	15.2	22.4	8/29	13.3	12.2	14.9
5/30	13.0	9.4	17.1	7/15	18.5	14.8	22.4	8/30	12.3	11.0	14.9
5/31	11.2	9.4	12.9	7/16	19.4	16.7	22.1	8/31	10.4	9.0	13.3
6/1	10.6	9.4	12.1	7/17	17.7	14.4	20.5	9/1	11.0	9.8	12.2
6/2	9.1	7.0	10.9	7/18	18.0	14.4	21.7	9/2	12.1	11.0	13.3
6/3	10.6	8.6	12.9	7/19	18.6	15.2	22.1	9/3	12.5	11.4	13.7
6/4	12.4	8.6	17.1	7/20	19.0	15.2	23.2	9/4	13.0	11.8	14.1
6/5	10.4	9.4	11.7	7/21	18.3	14.8	20.9	9/5	12.5	11.4	14.5
6/6	10.0	7.4	12.5	7/22	20.2	17.8	22.8	9/6	11.5	9.8	13.3
6/7	9.2	7.4	12.9	7/23	20.1	16.7	24.0	9/7	11.6	10.6	12.9
6/8	9.5	6.6	13.3	7/24	18.5	14.8	22.1	9/8	11.5	10.2	12.9
6/9	10.3	7.0	12.9	7/25	17.7	14.8	20.5	9/9	12.6	11.8	13.3
6/10	10.6	7.8	13.7	7/26	15.9	12.1	19.4	9/10	10.5	9.0	12.9
6/11	11.2	8.2	14.4	7/27	15.7	12.9	18.2	9/11	7.8	6.2	10.6
6/12	10.6	8.2	13.3	7/28	15.7	14.4	17.4				
6/13	11.3	7.0	15.6	7/29	17.0	14.4	20.5				

Appendix C8. Daily mean, minimum, and maximum stream temperatures for Meadow Creek Bridge site on Little Salmon River, 2005.

Little Salmon River below Meadow Creek Bridge on Campbell Property, 2005											
Date	**Mean**	**Min**	**Max**	**Date**	**Mean**	**Min**	**Max**	**Date**	**Mean**	**Min**	**Max**
4/29	7.1	3.7	10.6	6/14	12.8	10.2	15.2	7/30	20.5	16.8	24.0
4/30	8.0	4.6	11.8	6/15	14.6	11.4	19.0	7/31	21.6	18.3	24.8
5/1	8.5	4.2	12.6	6/16	15.2	12.9	17.9	8/1	21.9	19.0	25.2
5/2	9.5	5.8	13.3	6/17	14.2	12.6	16.0	8/2	20.5	18.7	22.1
5/3	10.3	7.0	14.1	6/18	12.9	10.6	15.6	8/3	19.9	16.4	23.6
5/4	8.2	6.2	11.0	6/19	13.4	9.8	17.9	8/4	20.2	16.0	24.0
5/5	7.9	6.2	10.6	6/20	16.0	12.2	20.6	8/5	20.8	16.8	24.4
5/6	8.3	6.6	10.2	6/21	17.5	13.7	21.3	8/6	21.1	17.5	23.6
5/7	8.7	6.6	11.0	6/22	18.6	14.9	22.5	8/7	21.0	18.3	22.9
5/8	8.4	6.2	10.6	6/23	18.9	15.2	23.2	8/8	20.9	17.9	24.0
5/9	8.1	7.0	9.4	6/24	18.8	14.5	23.2	8/9	21.3	17.9	24.4
5/10	7.2	5.8	9.0	6/25	19.4	17.1	22.5	8/10	20.6	17.1	23.6
5/11	7.7	6.2	10.2	6/26	19.3	16.4	22.9	8/11	19.2	15.6	22.1
5/12	9.7	5.8	14.1	6/27	17.0	15.6	20.2	8/12	18.4	15.2	21.0
5/13	9.8	6.2	13.7	6/28	15.7	14.1	17.5	8/13	17.9	14.9	21.0
5/14	8.3	6.2	10.6	6/29	16.7	14.5	19.8	8/14	18.0	14.5	21.3
5/15	7.5	6.6	9.0	6/30	18.8	15.6	22.9	8/15	18.8	15.6	22.1
5/16	6.6	6.2	7.0	7/1	20.2	17.1	23.6	8/16	18.6	16.0	21.0
5/17	7.4	5.4	10.2	7/2	20.1	17.5	22.9	8/17	18.3	16.4	19.4
5/18	7.3	6.2	8.6	7/3	18.9	15.6	22.5	8/18	17.1	14.1	20.2
5/19	9.3	7.0	13.3	7/4	19.3	15.6	23.6	8/19	17.7	14.5	21.0
5/20	8.2	6.6	10.2	7/5	20.2	16.0	25.2	8/20	18.8	15.2	22.1
5/21	8.1	5.8	11.0	7/6	20.8	17.5	24.4	8/21	19.2	15.6	22.1
5/22	7.8	6.2	9.4	7/7	21.2	17.5	25.6	8/22	19.2	17.5	21.3
5/23	8.3	5.4	12.6	7/8	21.3	17.5	25.2	8/23	18.7	16.0	21.7
5/24	8.5	5.4	12.2	7/9	17.2	16.0	21.3	8/24	16.9	13.3	19.8
5/25	8.7	5.0	13.3	7/10	16.0	14.5	17.5	8/25	16.4	12.6	19.8
5/26	9.7	5.8	14.1	7/11	18.2	14.5	23.6	8/26	16.8	12.9	20.2
5/27	10.6	7.0	14.9	7/12	20.6	16.4	25.2	8/27	17.4	14.1	20.2
5/28	11.3	7.8	15.6	7/13	21.7	18.3	25.6	8/28	17.6	14.5	20.2
5/29	11.3	8.6	14.5	7/14	20.9	16.4	25.6	8/29	17.0	14.5	19.0
5/30	11.5	8.2	15.2	7/15	21.1	16.4	25.6	8/30	15.3	12.6	17.5
5/31	10.6	8.6	12.6	7/16	21.6	17.9	25.2	8/31	15.5	12.2	18.3
6/1	10.1	8.6	11.0	7/17	20.0	15.6	24.4	9/1	16.1	12.9	19.0
6/2	9.1	7.0	11.0	7/18	20.7	16.0	25.6	9/2	16.5	13.7	19.0
6/3	10.4	8.2	12.9	7/19	21.3	17.1	25.2	9/3	16.5	13.7	19.0
6/4	11.8	8.2	16.0	7/20	21.1	17.1	24.8	9/4	16.0	13.7	17.5
6/5	10.1	9.0	13.3	7/21	20.7	17.1	23.6	9/5	15.7	12.9	18.3
6/6	9.3	7.0	11.8	7/22	21.7	19.4	24.0	9/6	15.7	12.9	18.3
6/7	9.1	7.0	11.8	7/23	21.1	17.5	24.8	9/7	15.7	12.9	18.3
6/8	9.2	7.0	12.6	7/24	20.9	17.1	24.4	9/8	15.8	12.6	19.0
6/9	10.6	7.4	13.7	7/25	19.4	16.0	22.5	9/9	15.1	13.7	17.5
6/10	11.5	8.6	13.7	7/26	18.4	14.1	22.5	9/10	13.0	11.4	14.1
6/11	12.6	9.8	15.2	7/27	19.4	15.2	23.2	9/11	11.4	9.4	13.3
6/12	11.6	9.8	13.3	7/28	18.8	15.6	21.7				
6/13	11.4	7.4	16.0	7/29	19.0	16.0	22.1				

Appendix C9. Daily mean, minimum, and maximum stream temperatures for Campbell Ranch site on Little Salmon River, 2005.

Little Salmon River at Campbell Ranch (upstream from Zim's Hot Springs), 2005											
Date	**Mean**	**Min**	**Max**	**Date**	**Mean**	**Min**	**Max**	**Date**	**Mean**	**Min**	**Max**
4/29	7.0	3.7	10.2	6/14	12.8	10.2	15.2	7/30	20.9	17.1	24.8
4/30	7.9	4.6	11.8	6/15	14.9	11.4	19.4	7/31	22.0	18.7	26.0
5/1	8.4	4.2	12.6	6/16	15.4	12.9	17.9	8/1	22.0	19.4	25.6
5/2	9.3	5.8	12.9	6/17	14.4	12.6	16.0	8/2	20.4	18.7	22.1
5/3	10.2	7.0	13.7	6/18	12.9	10.6	15.6	8/3	19.8	16.0	24.0
5/4	8.2	6.2	11.4	6/19	13.3	9.8	17.5	8/4	20.2	16.4	24.0
5/5	7.9	6.2	10.6	6/20	16.1	11.8	20.6	8/5	21.0	17.1	24.4
5/6	8.2	6.6	9.8	6/21	17.5	13.3	21.7	8/6	21.3	17.9	24.4
5/7	8.6	6.6	10.6	6/22	18.9	14.9	22.9	8/7	20.9	18.3	23.2
5/8	8.3	6.2	10.6	6/23	19.0	15.2	23.2	8/8	20.9	18.3	24.0
5/9	8.0	7.0	9.4	6/24	19.0	14.9	23.6	8/9	21.3	18.3	24.4
5/10	7.0	5.4	8.6	6/25	19.6	16.8	22.9	8/10	20.6	17.5	23.2
5/11	7.6	5.8	9.8	6/26	19.4	16.0	23.2	8/11	19.3	16.0	22.1
5/12	9.5	5.8	14.1	6/27	16.9	15.2	20.2	8/12	18.4	15.6	21.0
5/13	9.8	6.2	13.3	6/28	15.6	13.7	17.5	8/13	17.8	14.9	21.0
5/14	8.3	6.2	10.6	6/29	16.8	14.5	20.2	8/14	17.9	14.1	22.1
5/15	7.5	6.6	9.0	6/30	18.9	15.6	23.2	8/15	18.9	15.2	22.5
5/16	6.5	6.2	7.0	7/1	20.2	16.8	24.4	8/16	18.5	16.0	21.3
5/17	7.3	5.4	10.2	7/2	20.1	17.1	23.6	8/17	18.1	16.0	19.8
5/18	7.2	6.2	8.6	7/3	19.0	15.2	23.2	8/18	17.0	13.3	20.6
5/19	9.1	6.6	12.9	7/4	19.5	15.6	24.0	8/19	17.8	14.1	21.7
5/20	8.1	6.6	9.8	7/5	20.4	16.0	25.2	8/20	18.8	14.9	22.5
5/21	8.0	5.4	11.0	7/6	20.9	17.1	24.8	8/21	19.5	15.6	22.9
5/22	7.7	6.2	9.0	7/7	20.9	17.1	25.6	8/22	19.0	17.1	21.7
5/23	8.1	5.0	12.2	7/8	20.8	16.4	25.2	8/23	18.5	16.4	21.0
5/24	8.4	5.0	12.2	7/9	16.7	15.2	20.2	8/24	16.8	13.7	19.4
5/25	8.6	5.0	12.9	7/10	15.9	14.5	17.9	8/25	16.3	12.9	19.4
5/26	9.6	5.8	14.1	7/11	18.3	14.5	23.6	8/26	16.7	13.3	19.4
5/27	10.6	6.6	14.9	7/12	20.7	16.4	25.6	8/27	17.6	14.1	21.0
5/28	11.3	7.8	15.6	7/13	21.9	18.3	26.0	8/28	17.5	14.1	20.6
5/29	11.2	8.2	14.1	7/14	21.0	16.4	25.6	8/29	16.8	14.5	19.0
5/30	11.5	8.2	15.2	7/15	21.4	17.1	25.2	8/30	15.1	12.6	17.5
5/31	10.5	8.6	12.6	7/16	21.7	18.7	25.2	8/31	15.5	12.2	18.7
6/1	9.9	8.6	11.0	7/17	20.3	16.4	24.8	9/1	16.2	12.9	19.4
6/2	9.0	7.0	11.0	7/18	20.9	16.4	25.2	9/2	16.7	13.7	19.0
6/3	10.2	8.2	12.6	7/19	21.4	17.5	24.8	9/3	16.7	13.7	19.8
6/4	11.7	8.2	16.0	7/20	21.3	17.5	24.8	9/4	15.9	14.1	17.9
6/5	10.0	9.0	13.3	7/21	20.7	17.1	24.0	9/5	15.6	12.9	18.7
6/6	9.2	7.0	11.8	7/22	21.6	19.4	24.0	9/6	15.7	12.9	18.7
6/7	9.2	7.0	11.8	7/23	21.1	17.5	24.8	9/7	15.8	12.9	18.7
6/8	9.2	7.0	12.2	7/24	20.9	17.5	24.4	9/8	15.8	12.2	19.0
6/9	10.8	7.8	14.1	7/25	19.4	16.4	22.5	9/9	15.1	13.3	17.5
6/10	11.5	8.6	13.7	7/26	18.6	14.5	22.5	9/10	12.8	11.0	14.5
6/11	12.7	9.8	16.0	7/27	19.6	15.6	23.6	9/11	11.1	8.6	13.3
6/12	11.8	9.8	13.7	7/28	18.9	16.0	21.0				
6/13	11.7	7.4	16.4	7/29	19.3	16.4	22.9				

Appendix C10. Daily mean, minimum, and maximum stream temperatures for Osborn Ranch site on Little Salmon River, 2005.

Little Salmon River at Osborn Ranch (downstream from Zim's Hot Springs), 2005											
Date	Mean	Min	Max	Date	Mean	Min	Max	Date	Mean	Min	Max
4/29	7.3	4.5	9.8	6/14	13.3	11.3	14.8	7/30	18.9	16.3	22.1
4/30	8.4	5.3	11.3	6/15	15.1	11.7	18.6	7/31	20.1	17.8	22.1
5/1	9.0	5.3	12.1	6/16	16.0	14.1	17.4	8/1	20.2	18.2	23.2
5/2	9.8	6.6	12.5	6/17	15.0	13.3	16.3	8/2	18.9	17.1	20.2
5/3	10.7	7.8	13.3	6/18	13.4	11.3	15.6	8/3	19.8	15.9	24.4
5/4	8.8	7.0	12.1	6/19	13.7	10.9	17.1	8/4	20.9	17.1	25.2
5/5	8.4	7.0	10.6	6/20	16.5	12.9	20.5	8/5	21.6	17.8	25.2
5/6	8.8	7.4	10.2	6/21	18.0	14.8	20.9	8/6	22.1	19.0	25.2
5/7	9.0	7.0	10.9	6/22	19.0	16.3	21.7	8/7	21.7	19.0	23.2
5/8	8.8	7.0	10.9	6/23	18.5	15.9	22.4	8/8	21.5	18.6	24.4
5/9	8.3	7.4	9.4	6/24	18.6	15.9	22.1	8/9	22.0	18.6	25.2
5/10	7.5	6.2	8.6	6/25	18.4	17.1	20.5	8/10	21.3	18.2	24.0
5/11	7.9	6.2	9.8	6/26	17.6	15.6	20.2	8/11	19.8	16.7	23.2
5/12	9.9	6.6	13.7	6/27	16.2	15.2	17.8	8/12	19.0	16.3	22.1
5/13	10.4	7.0	13.7	6/28	16.0	14.4	18.2	8/13	18.0	15.2	21.3
5/14	8.8	6.6	10.9	6/29	17.0	14.8	19.8	8/14	18.1	14.8	21.7
5/15	7.9	7.0	9.4	6/30	18.4	15.6	21.7	8/15	19.5	15.9	23.2
5/16	6.9	6.6	7.4	7/1	19.4	16.7	22.4	8/16	19.3	17.1	21.7
5/17	7.7	5.8	10.2	7/2	19.0	16.7	21.3	8/17	18.7	17.1	19.8
5/18	7.6	6.6	8.6	7/3	18.1	15.6	20.9	8/18	17.4	14.8	20.5
5/19	10.1	7.8	13.7	7/4	18.4	15.6	21.7	8/19	17.8	14.4	21.7
5/20	8.8	7.4	10.6	7/5	18.9	15.9	22.4	8/20	18.9	15.2	22.4
5/21	8.4	5.8	11.3	7/6	19.3	17.1	21.7	8/21	19.7	15.9	23.2
5/22	8.0	6.6	9.0	7/7	19.3	16.7	22.1	8/22	19.5	17.4	22.1
5/23	8.5	5.3	12.1	7/8	19.6	17.1	22.4	8/23	18.8	16.3	21.7
5/24	8.9	5.8	12.1	7/9	16.2	15.2	19.0	8/24	17.1	14.1	20.2
5/25	9.1	5.3	12.9	7/10	15.4	14.8	16.3	8/25	16.9	13.7	20.5
5/26	10.1	6.6	13.7	7/11	17.2	14.8	21.3	8/26	17.4	14.1	20.9
5/27	11.1	7.4	14.8	7/12	19.3	16.7	22.8	8/27	18.1	14.8	21.3
5/28	11.9	8.2	15.6	7/13	19.5	17.4	22.1	8/28	18.2	15.6	20.9
5/29	11.8	9.0	14.1	7/14	18.6	15.9	21.3	8/29	17.3	15.2	19.4
5/30	12.0	9.0	15.2	7/15	19.0	16.7	21.7	8/30	15.6	12.9	18.2
5/31	10.8	9.0	12.5	7/16	19.6	17.4	22.1	8/31	15.8	12.5	19.4
6/1	10.2	9.0	11.3	7/17	18.6	16.3	20.9	9/1	16.8	13.7	20.2
6/2	9.3	7.4	10.9	7/18	18.9	16.3	21.7	9/2	17.1	14.4	19.4
6/3	10.6	8.6	12.9	7/19	19.5	17.1	21.7	9/3	17.2	14.4	20.2
6/4	12.2	9.4	15.9	7/20	19.4	17.1	21.7	9/4	16.4	14.4	18.6
6/5	10.6	9.4	13.7	7/21	18.9	17.1	20.5	9/5	16.1	13.3	19.4
6/6	9.6	7.8	11.7	7/22	19.3	17.8	20.5	9/6	16.2	13.3	19.8
6/7	9.6	7.8	11.7	7/23	18.2	15.9	20.5	9/7	16.4	13.7	19.8
6/8	9.3	7.4	11.7	7/24	18.1	15.6	20.5	9/8	16.5	13.7	19.8
6/9	11.0	8.6	13.7	7/25	17.1	15.2	19.0	9/9	15.7	14.1	17.4
6/10	11.7	9.4	13.3	7/26	16.7	14.4	19.0	9/10	13.3	11.7	14.8
6/11	13.0	10.9	15.6	7/27	17.4	15.2	19.8	9/11	11.8	9.8	14.1
6/12	12.2	10.6	13.3	7/28	17.2	15.6	19.0				
6/13	12.0	8.6	15.6	7/29	17.4	15.6	19.8				

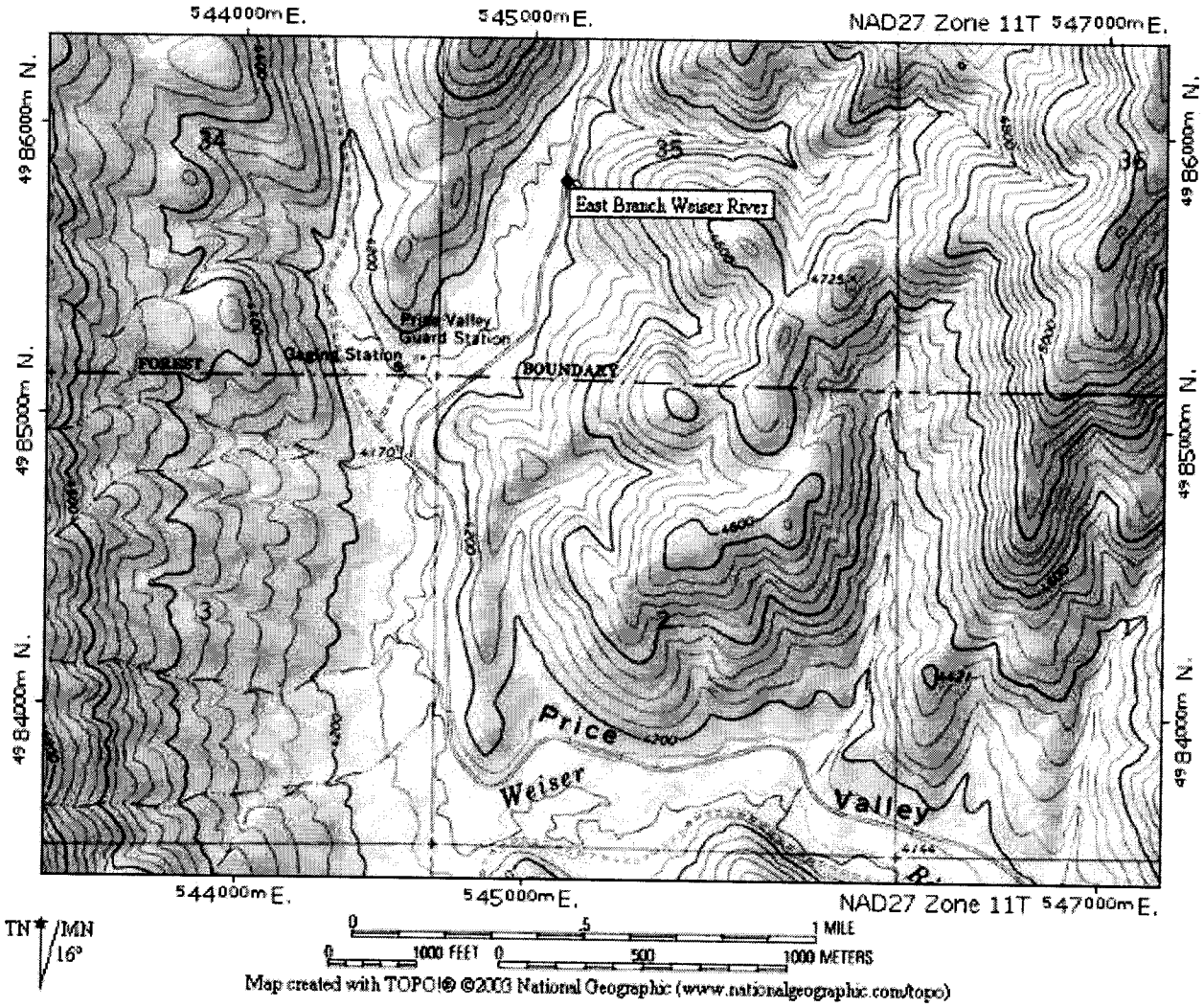
Appendix C11. Daily mean, minimum, and maximum stream temperatures for Peavey Spring site, 2005.

Peavey Spring, 2005											
Date	Mean	Min	Max	Date	Mean	Min	Max	Date	Mean	Min	Max
6/8	7.4	5.4	9.8	7/24	13.2	11.4	14.9	9/8	10.0	8.2	11.4
6/9	7.9	5.0	10.6	7/25	13.1	11.4	14.5	9/9	10.0	9.4	10.6
6/10	7.8	6.2	9.4	7/26	11.6	9.4	13.3	9/10	8.7	7.8	9.8
6/11	8.3	6.2	10.2	7/27	11.6	9.4	13.7	9/11	6.9	5.4	8.2
6/12	7.9	6.2	9.4	7/28	12.0	10.2	13.7	9/12	6.9	5.4	8.2
6/13	7.9	4.6	11.8	7/29	12.6	11.0	14.5	9/13	7.6	6.2	8.6
6/14	9.1	6.6	11.8	7/30	13.5	11.8	15.2	9/14	6.8	5.4	8.2
6/15	10.4	8.2	13.3	7/31	14.0	12.2	15.2	9/15	7.0	5.8	8.6
6/16	10.5	8.2	12.9	8/1	14.6	13.3	16.0	9/16	7.7	7.0	8.6
6/17	10.3	9.4	11.4	8/2	14.3	13.3	15.2	9/17	8.4	7.8	9.4
6/18	9.4	7.8	11.4	8/3	13.1	11.4	14.5	9/18	7.0	5.4	8.2
6/19	9.3	6.6	12.6	8/4	12.7	11.0	14.5	9/19	6.4	5.0	7.8
6/20	11.0	8.2	14.1	8/5	12.8	11.0	14.9	9/20	6.4	5.0	8.2
6/21	11.8	9.0	14.5	8/6	13.4	11.8	14.9	9/21	7.8	7.0	9.0
6/22	12.5	10.2	14.9	8/7	13.8	12.6	14.9	9/22	6.5	5.0	7.8
6/23	12.2	10.2	14.1	8/8	14.1	12.9	15.6	9/23	7.4	7.0	7.8
6/24	11.9	9.4	14.5	8/9	14.4	12.9	16.0	9/24	6.8	6.6	7.0
6/25	12.6	11.4	14.1	8/10	13.9	12.6	15.2	9/25	6.3	5.8	7.0
6/26	12.3	11.0	13.7	8/11	12.8	11.0	14.1	9/26	5.5	4.2	6.6
6/27	11.5	11.0	12.6	8/12	12.3	11.0	13.7	9/27	5.8	4.6	7.0
6/28	11.3	10.6	12.2	8/13	12.3	11.0	13.7				
6/29	11.4	10.2	12.9	8/14	11.9	10.2	13.3				
6/30	11.5	9.4	13.7	8/15	11.6	9.8	13.3				
7/1	12.1	10.2	14.1	8/16	11.8	10.2	13.3				
7/2	12.2	10.6	13.7	8/17	12.1	11.0	12.9				
7/3	11.2	9.4	12.9	8/18	11.1	9.4	12.6				
7/4	11.4	9.4	13.3	8/19	11.1	9.4	12.9				
7/5	12.0	9.8	14.1	8/20	11.2	9.4	12.9				
7/6	12.7	11.0	14.5	8/21	11.4	9.8	12.9				
7/7	13.4	11.8	14.9	8/22	12.5	11.4	13.7				
7/8	13.3	11.4	15.2	8/23	12.1	10.6	13.3				
7/9	12.6	11.8	14.5	8/24	10.7	9.0	12.2				
7/10	11.4	10.6	12.6	8/25	9.9	8.2	11.4				
7/11	11.9	10.2	14.1	8/26	9.5	7.4	11.4				
7/12	12.7	10.6	14.9	8/27	10.4	8.6	12.2				
7/13	13.8	12.6	15.2	8/28	10.7	9.0	12.6				
7/14	13.3	11.4	14.9	8/29	10.6	9.0	12.2				
7/15	12.9	11.0	14.9	8/30	10.2	8.6	11.4				
7/16	13.7	12.2	14.9	8/31	8.8	7.0	10.2				
7/17	12.8	11.0	14.1	9/1	9.1	7.4	11.0				
7/18	12.6	10.6	14.5	9/2	9.8	8.2	11.4				
7/19	13.0	11.0	14.9	9/3	10.5	9.0	11.8				
7/20	13.3	11.4	15.2	9/4	10.8	9.8	11.8				
7/21	13.0	11.0	14.9	9/5	10.4	9.4	11.4				
7/22	14.4	12.9	16.0	9/6	9.7	8.2	11.0				
7/23	14.4	12.9	15.6	9/7	10.0	8.6	11.4				

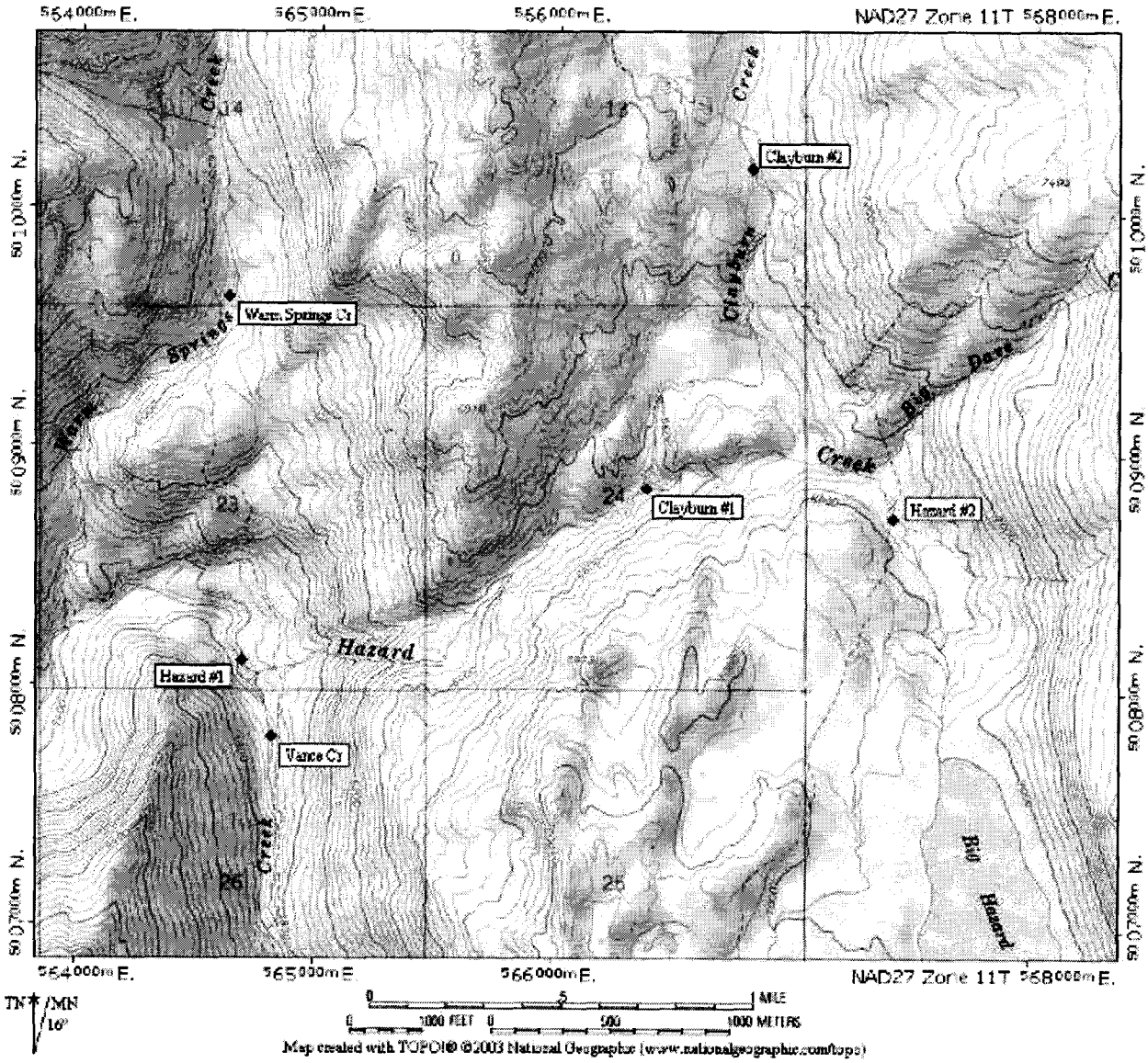
Appendix C12. Daily mean, minimum, and maximum stream temperatures for Little Round Valley site, 2005.

Little Round Valley Creek upstream from Olsen Diversion, 2005											
Date	Mean	Min	Max	Date	Mean	Min	Max	Date	Mean	Min	Max
6/8	6.2	5.0	7.8	7/24	13.1	10.6	15.6	9/8	10.3	7.8	12.6
6/9	6.5	4.6	8.2	7/25	12.8	10.2	15.2	9/9	10.0	9.4	11.0
6/10	6.9	5.4	8.2	7/26	11.3	8.2	14.1	9/10	8.2	6.6	9.4
6/11	7.2	5.8	8.6	7/27	11.5	8.6	14.5	9/11	6.4	4.6	7.8
6/12	7.0	5.8	8.2	7/28	12.1	9.8	14.5	9/12	6.4	5.0	7.8
6/13	6.8	4.2	9.4	7/29	12.9	10.6	15.6	9/13	7.3	5.8	8.6
6/14	8.0	6.2	10.2	7/30	13.8	11.4	16.4	9/14	6.7	4.6	8.6
6/15	9.4	7.4	12.2	7/31	14.3	12.2	16.4	9/15	7.2	5.0	9.4
6/16	9.6	7.8	11.8	8/1	14.6	12.9	16.4	9/16	7.7	6.6	9.0
6/17	9.1	8.2	10.2	8/2	13.9	12.9	14.9	9/17	8.2	7.4	9.4
6/18	8.4	6.6	11.0	8/3	13.0	10.6	15.2	9/18	6.8	5.0	8.2
6/19	8.3	5.8	11.4	8/4	12.7	10.2	15.6	9/19	6.4	4.2	8.2
6/20	10.1	7.4	13.3	8/5	13.0	10.2	16.0	9/20	6.7	4.6	9.0
6/21	11.1	8.2	14.1	8/6	13.7	11.4	16.0	9/21	8.0	7.0	9.4
6/22	11.7	9.4	14.5	8/7	14.0	12.2	15.6	9/22	6.5	4.2	8.2
6/23	11.6	9.4	14.1	8/8	14.3	12.6	16.8	9/23	7.0	6.2	7.8
6/24	11.2	8.6	14.1	8/9	14.7	12.6	16.8	9/24	6.1	5.8	6.6
6/25	11.8	10.6	13.7	8/10	14.1	11.8	16.0	9/25	5.6	4.6	7.0
6/26	10.6	9.8	11.8	8/11	12.6	10.2	14.5	9/26	5.2	3.3	7.0
6/27	9.9	9.4	10.2	8/12	12.1	9.8	14.1	9/27	5.7	3.7	7.8
6/28	10.0	9.0	11.0	8/13	12.3	10.2	14.1				
6/29	10.2	9.0	11.8	8/14	11.7	9.4	14.1				
6/30	10.7	8.2	13.3	8/15	11.6	9.0	14.1				
7/1	11.5	9.0	14.1	8/16	11.8	9.8	14.1				
7/2	11.7	9.4	14.1	8/17	12.1	10.6	13.3				
7/3	10.4	8.2	12.6	8/18	11.0	8.6	12.9				
7/4	10.8	8.2	13.7	8/19	11.1	8.6	13.3				
7/5	11.5	9.0	14.1	8/20	11.4	9.0	14.1				
7/6	12.4	10.2	14.9	8/21	11.8	9.4	14.1				
7/7	13.3	11.4	15.6	8/22	12.6	11.4	14.1				
7/8	13.0	10.6	15.6	8/23	12.2	10.2	14.1				
7/9	11.7	10.6	13.7	8/24	10.4	8.2	12.2				
7/10	10.5	9.8	11.4	8/25	9.5	7.0	11.8				
7/11	11.3	9.0	14.5	8/26	9.6	7.0	12.2				
7/12	12.4	9.8	15.2	8/27	10.6	8.2	12.9				
7/13	13.7	11.8	16.0	8/28	11.0	8.6	13.3				
7/14	13.0	10.6	15.6	8/29	10.8	9.0	12.2				
7/15	12.8	9.8	15.6	8/30	10.0	8.2	11.4				
7/16	13.4	11.4	15.2	8/31	8.8	6.6	11.0				
7/17	12.4	10.2	14.9	9/1	9.4	7.0	11.8				
7/18	12.5	9.8	15.2	9/2	10.2	7.8	12.6				
7/19	13.0	10.6	16.0	9/3	10.8	8.6	12.9				
7/20	13.3	10.6	16.0	9/4	11.1	9.4	12.6				
7/21	12.9	10.6	15.2	9/5	10.3	8.6	12.2				
7/22	14.3	12.6	16.4	9/6	9.7	7.4	11.8				
7/23	14.2	12.2	16.4	9/7	10.1	7.8	12.2				

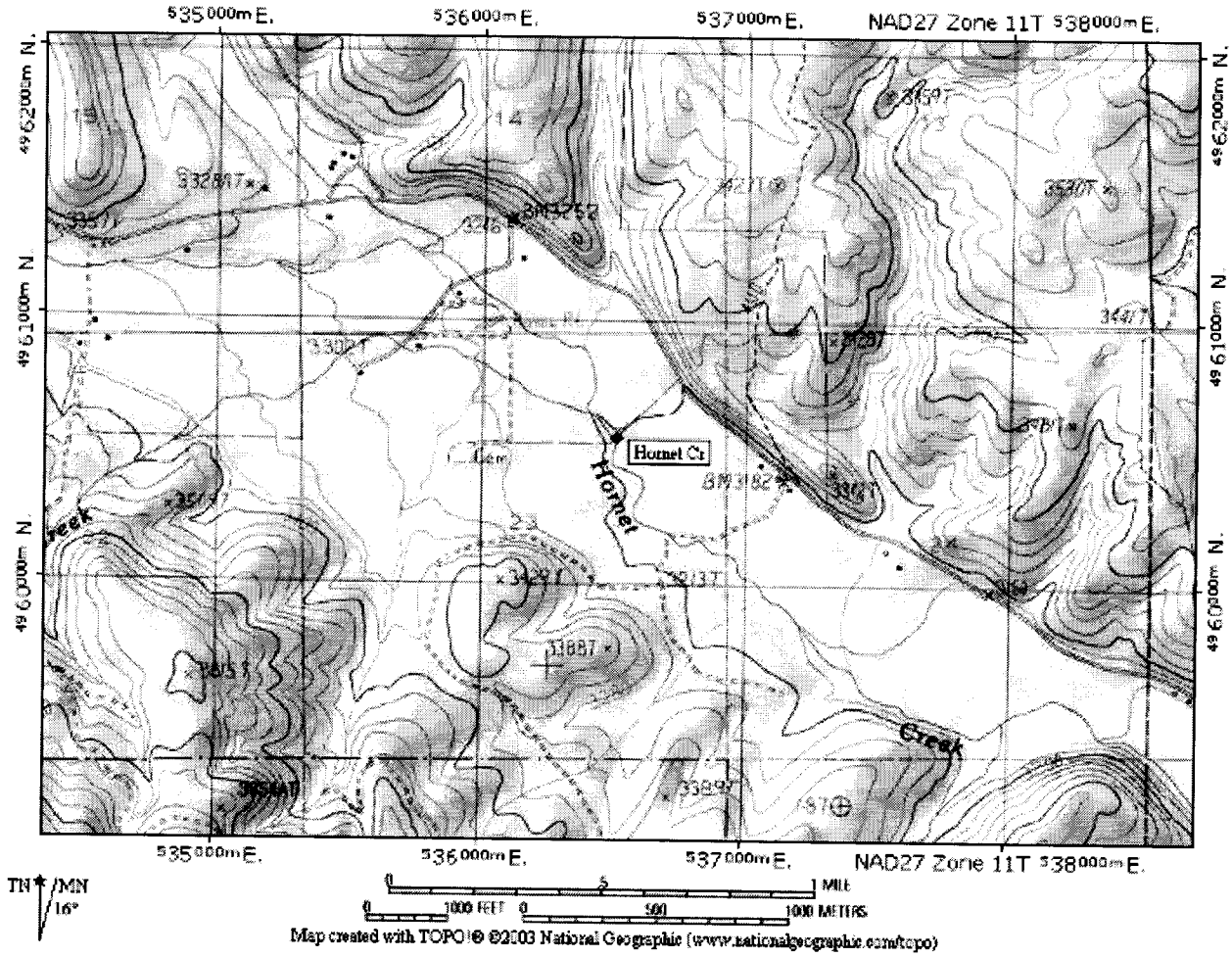
Appendix D1. 2004 East Branch Weiser River standard stream survey site.



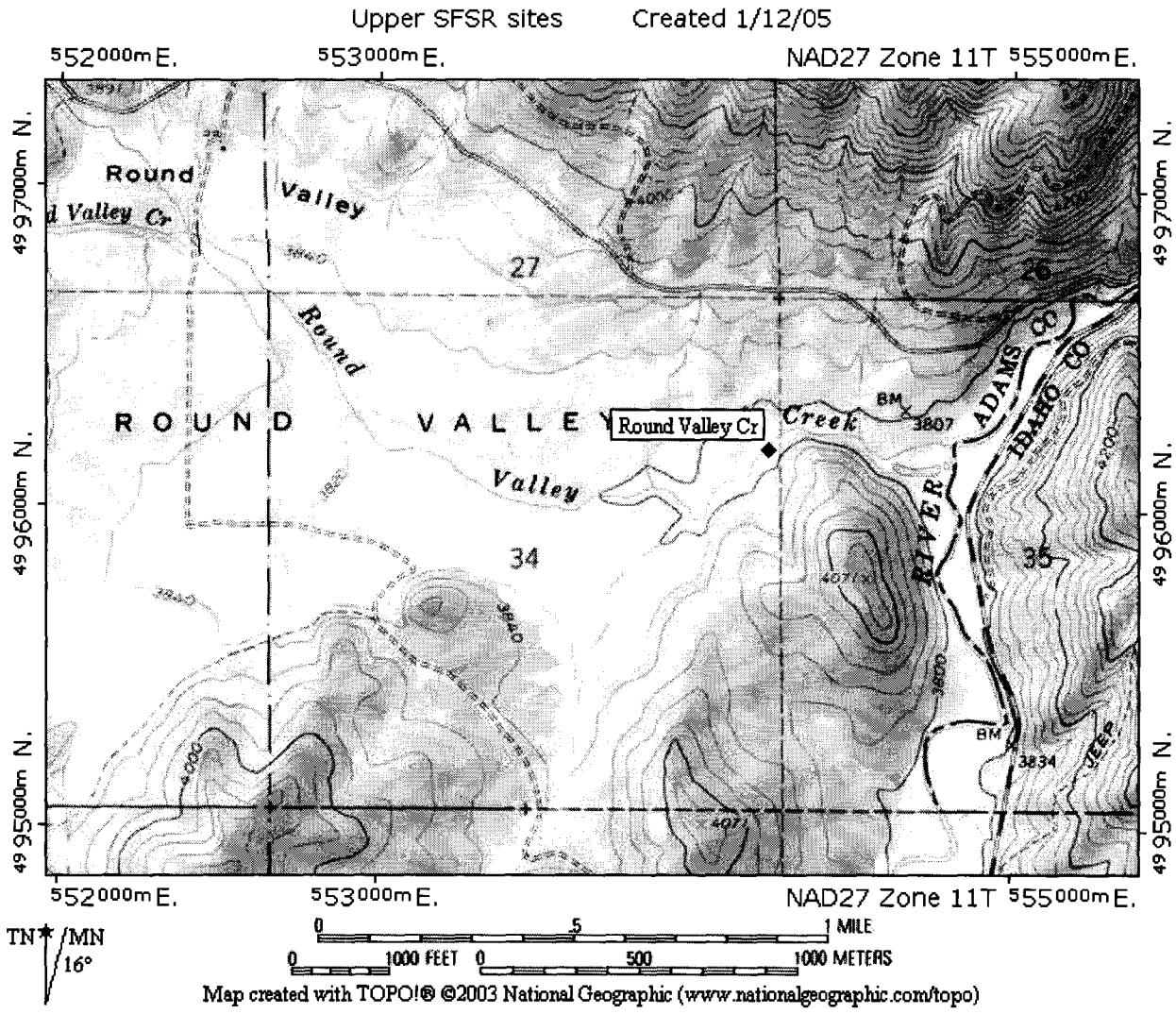
Appendix D2. 2004 Standard stream survey sites in Hazard Creek Drainage.



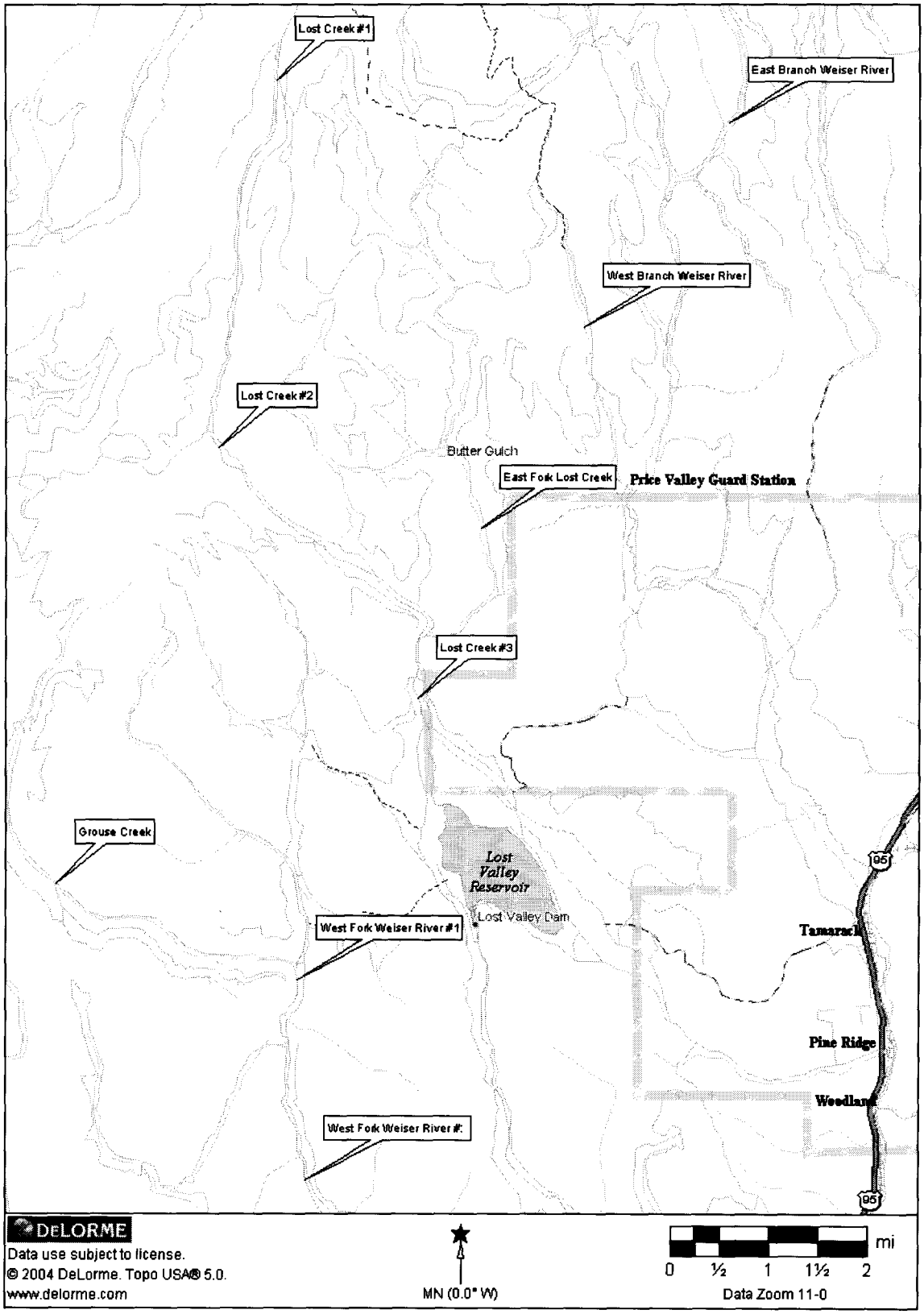
Appendix D3. 2004 Hornet Creek standard stream survey site.



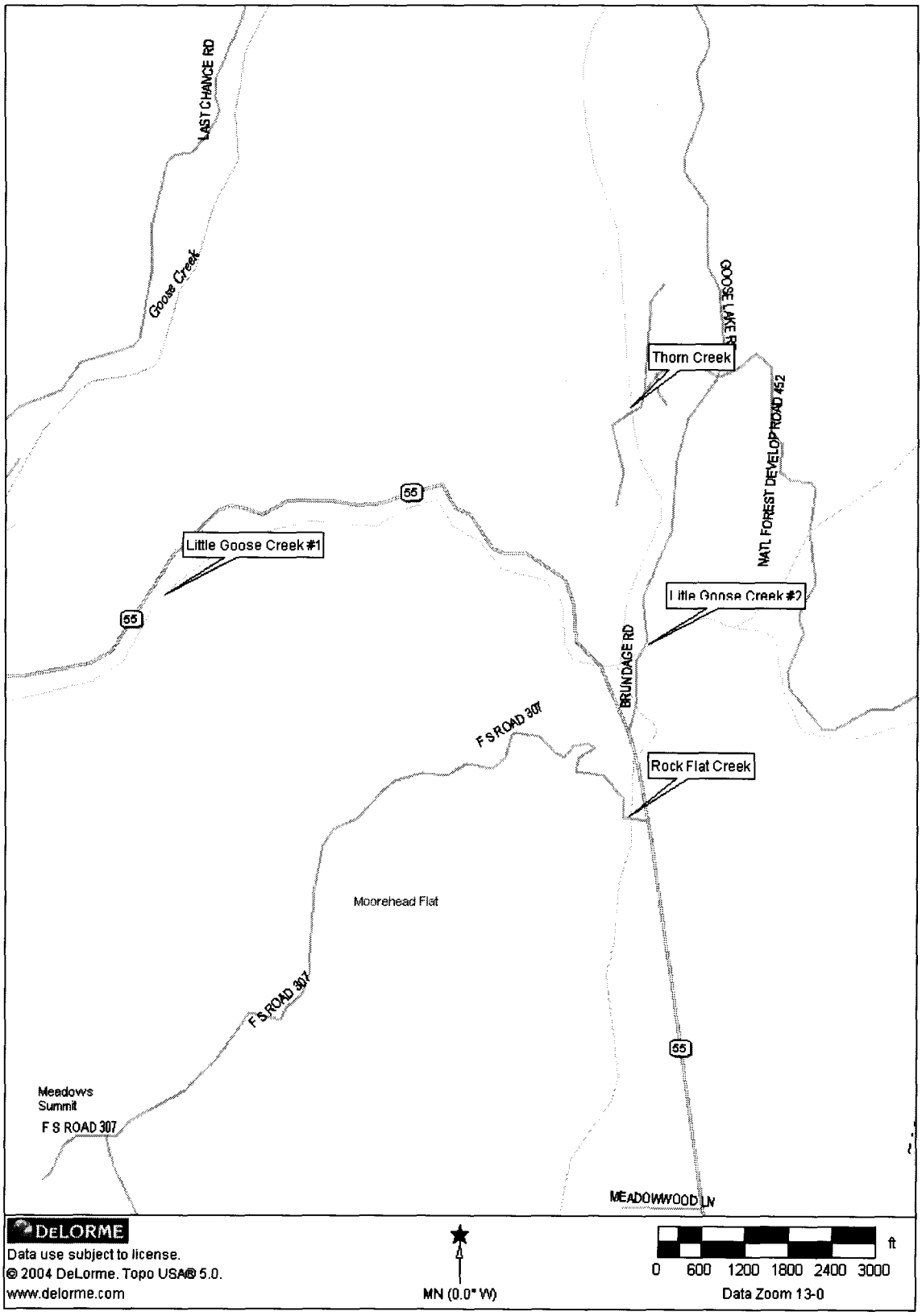
Appendix D4. 2004 Round Valley Creek standard stream survey site.



Appendix D5. 2005 Weiser River drainage standard stream survey sites.

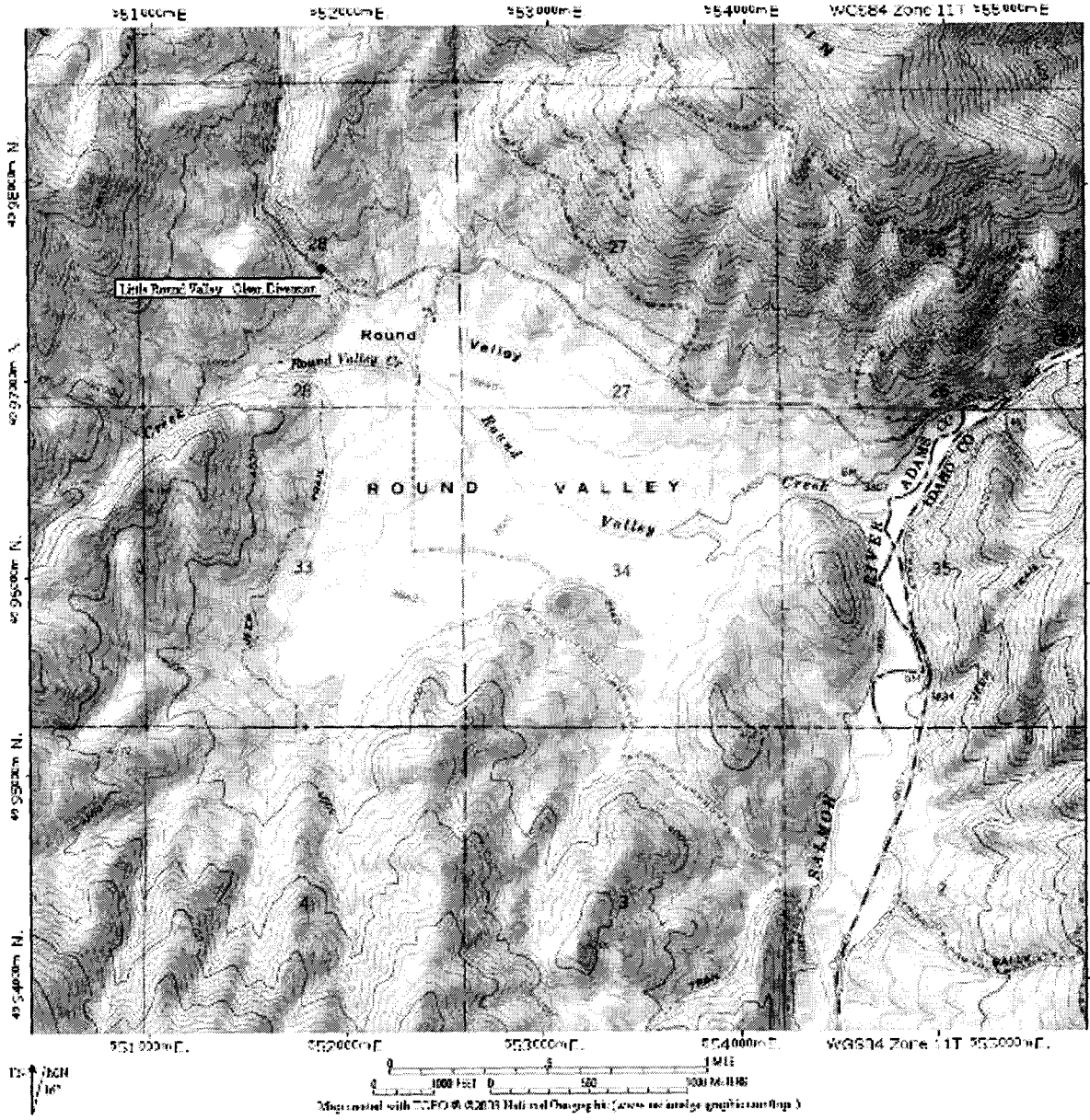


Appendix D6. 2005 upper Little Salmon River drainage standard stream survey sites.

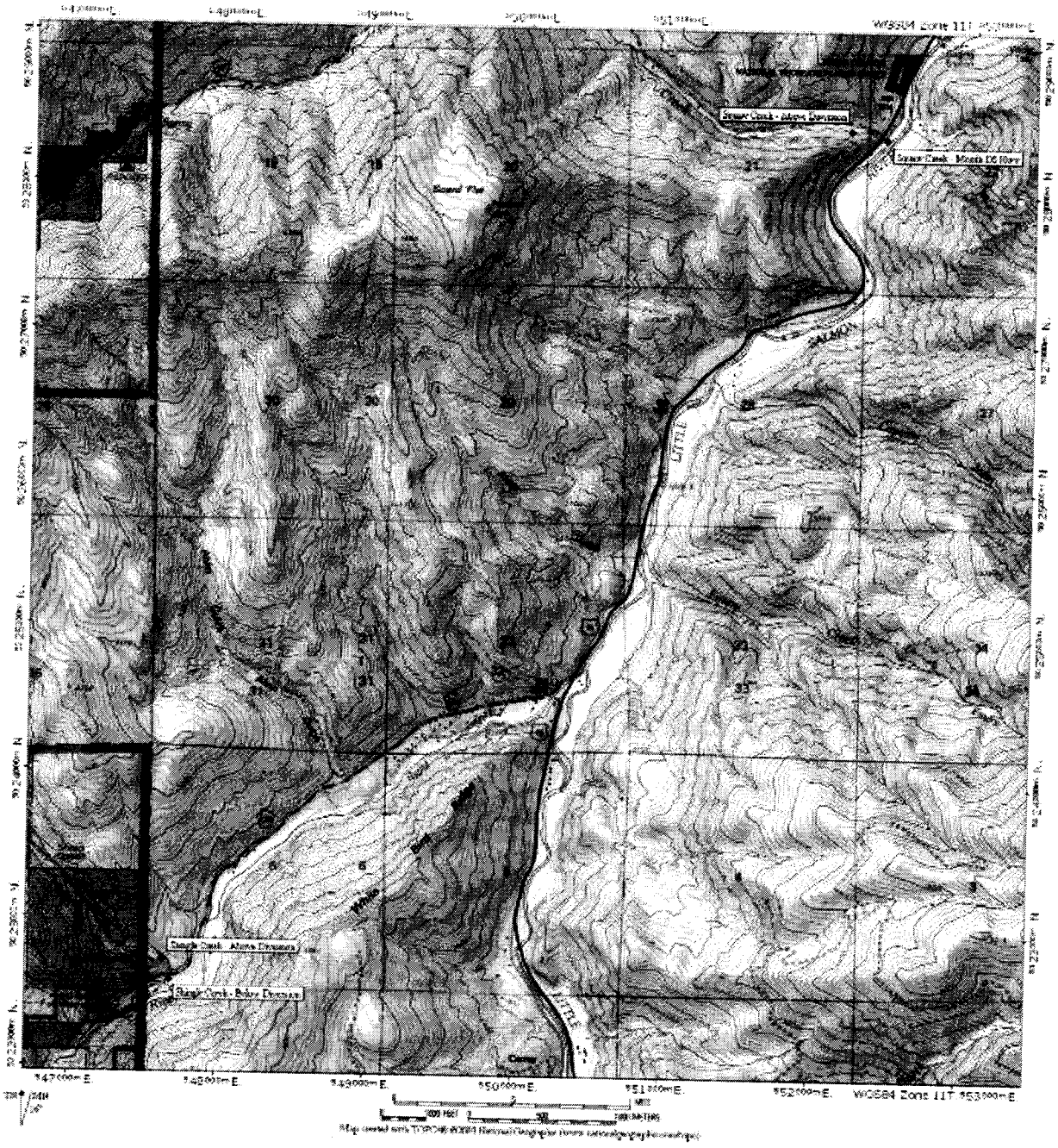


Appendix D7. 2005 upper Little Salmon River drainage standard stream survey sites.

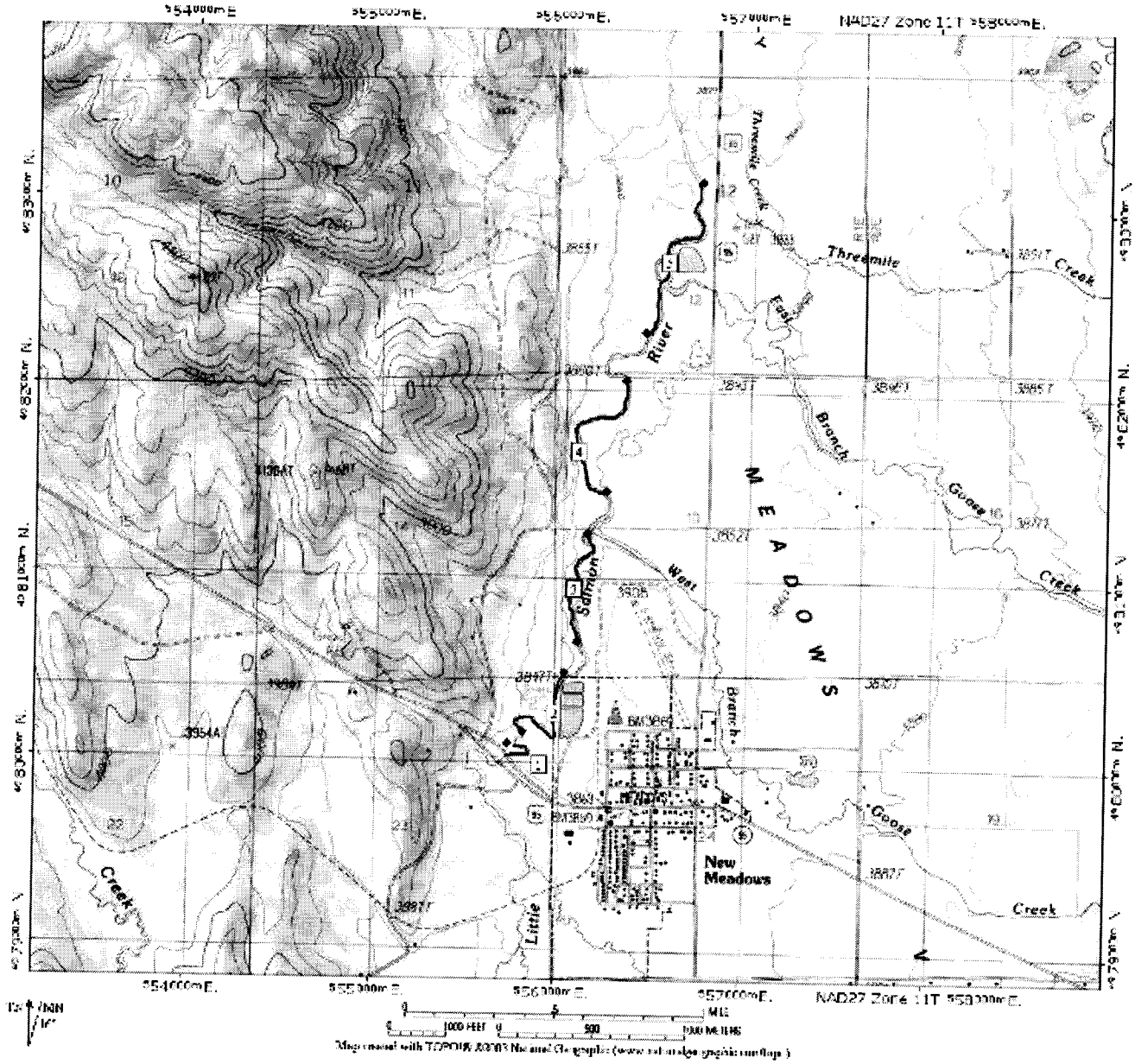
Appendix D8. 2005 Little Round Valley – Olsen Diversion standard stream survey site.



Appendix D9. 2005 lower Little Salmon River drainage standard stream survey sites.



Appendix E2. 2005 upper Little Salmon River electrofishing survey sites.



MCCALL 2004 AND 2005 FISHERY MANAGEMENT REPORT
LAKE CASCADE YELLOW PERCH RESTORATION AND INVESTIGATIONS
ABSTRACT

In early 2004, the Department began fishery restoration efforts to rebuild the yellow perch *Perca flavescens* fishery in Lake Cascade by capturing and transplanting yellow perch and by reducing the numbers of adult northern pikeminnow *Ptychocheilus oregonensis.* We also documented the production of young-of-the-year yellow perch and the reduction of northern pikeminnow numbers.

In 2004, we transplanted 96,650 yellow perch from Phillips reservoir near Baker City, Oregon into Lake Cascade. These fish were captured with three large Merwin traps set in the reservoir. We also set traps in Montpelier Reservoir in southeast Idaho and had poor results and only transported 3,200 yellow perch to Lake Cascade. IDFG fish transport trucks hauled 20,475 yellow perch from Lake Mary Ronan, Montana that Montana Department of Fish, Wildlife, and Parks supplied from a trapping operation that was ongoing there.

In 2005, we set six Merwin traps in Phillips Reservoir and captured and transported 182,300 yellow perch to Lake Cascade. We also set two Merwin traps in Lost Valley Reservoir near New Meadows, Idaho and captured and moved 172,800 yellow perch to Lake Cascade.

To reduce numbers of northern pikeminnow we applied rotenone to the North Fork Payette River (NFPR) above Lake Cascade during their 2004 spawning migration. We applied rotenone five times killing an estimated 11,161 adult northern pikeminnow. In 2005, we applied rotenone six times to the NFPR and estimated we killed 1,813 adult northern pikeminnow.

A second method for reducing the numbers of adult northern pikeminnow was to deploy the Merwin traps in Lake Cascade after we finished capturing yellow perch from other waters. In 2004, we removed 2,181 adult northern pikeminnow and 1,563 juveniles from the reservoir that had been captured in the Merwin traps. We also documented all other fish species captured from May to October. We again used the Merwin traps in 2005 in the reservoir and killed 4,618 northern pikeminnow larger than 250 mm and 5,748 juvenile northern pikeminnow.

Aerial holiday angler counts were again conducted on Lake Cascade on Memorial Day, Fourth of July, and Labor Day 2004 and 2005. Angler use was still fairly light with an average count of 23 and 28 boats for 2004 and 2005, respectively.

A roving creel survey was conducted on Lake Cascade from July through September 2004. We estimated that anglers fished 17,559 hours to catch 13,469 fish. Angling pressure and harvest of rainbow trout and yellow perch in July through September were all significantly less than found in previous surveys.

Hydroacoustic fish surveys were completed on the reservoir in 2004 and 2005. The population estimates for northern pikeminnow larger than 250 mm was 10,407 in 2004 and 8,959 in 2005.

We conducted trawling surveys in June, August, and October of both years to document changes in the yellow perch population. In 2004 we collected 6,042 yellow perch. Age-1 yellow perch (2003 cohort) had virtually disappeared by the August trawling series. In 2005 we

collected 13,873 yellow perch. Catch rates were the highest documented since we began trawling in 1998. We collected more age-1 yellow perch in August and October than we have since trawling started in 1998.

Beach seining to monitor young-of-year (YOY) yellow perch presence and abundance was conducted in both 2004 and 2005. Mean catch per haul and 95% Confidence Intervals were 282 and 173 in 2004 and 2005 respectively. Although more YOY yellow perch were collected in 2004 than in 2005, there were many more sites with more perch collected in 2005. Most of the yellow perch collected in 2004 came from two sites. There was also an increase in numbers of fish older than YOY in 2005.

Zooplankton sampling was completed in July, August, and September in 2004 and in June, July, August, September and October in 2005. Average zooplankton quality index (ZQI) values were markedly lower in 2005 than in 2004. However, average ZQI values still rank in the top 25% of Idaho waters sampled.

Trend gillnetting was completed reservoir-wide in the fall of 2005. We fished a total of 17 sinking gill nets and collected a total of nine species and 2,332 fish.

LAKE CASCADE YELLOW PERCH FISHERY RESTORATION

In 2003 IDFG proposed the draining of Lake Cascade as our preferred method to restore a quality yellow perch *Perca flavescens* fishery in the reservoir. Since the reservoir is federally managed by the United States Bureau of Reclamation (USBOR), joint studies were begun by the two agencies to identify possible issues with IDFG's proposal. The USBOR, in order to comply with the National Environmental Protection Act (NEPA), determined that the draining proposal from IDFG would necessitate the development of an Environmental Impact Statement (EIS). The IDFG and USBOR developed a memorandum of understanding to proceed with the necessary studies to create an EIS, with the IDFG funding the work.

A critical issue was the complete understanding of how the reservoir could be drained and subsequently refilled and the effects of this action on existing water rights in the river basin. IDFG contracted with a modeling group from the USBOR Regional office in Boise to develop a predictive water model of the Payette River and reservoir system. These efforts began in August of 2003 and were completed with the model developed and proofed in February of 2004.

The USBOR modeling studies of the proposed reservoir draining revealed there was a small potential for irrigation shortages in the years following the drawdown, which likely could have been managed and overcome. However, there was a higher probability of a reduction in salmon flow augmentation water from Lake Cascade. The USBOR under the Endangered Species Act had committed to provide up to 427,000 acre-feet of water annually from Idaho to increase flows to aid in juvenile salmon migration in the Snake and Columbia Rivers. Lake Cascade contributed up to approximately 100,000 acre-feet of the total 427,000 acre-feet depending on the Snake River basin's water supply as a whole. With the probability shown that there would be impacts to USBOR's ability to supply some of Lake Cascade's part of the 427,000 acre-feet of water, the studies would now have to expand to encompass the whole Snake River in Idaho and Wyoming. Given the complexity of developing an accurate water model of the Snake River basin for the proposed action at Lake Cascade, the USBOR and IDFG were forced to withdraw the EIS. Therefore, the reservoir drawdown proposal was abandoned and all work towards that goal was suspended.

Widespread interest in restoring the yellow perch fishery from the local community and from southwest Idaho fishermen kept IDFG committed to working on Lake Cascade in 2004. IDFG proceeded with a two-fold plan: restoring yellow perch production by stocking large numbers of yellow perch adults, and secondly reducing the number of yellow perch predators, specifically adult northern pikeminnow *Ptychocheilus oregonensis.* Biologists were tasked to find and move yellow perch into Lake Cascade and to develop effective methods to reduce the adult northern pikeminnow population.

The following sections document restoration and monitoring activities that were undertaken in 2004 and 2005 on Lake Cascade.

CAPTURE AND TRANSPLANT OF YELLOW PERCH TO LAKE CASCADE

INTRODUCTION

Transplanting a large number of adult yellow perch into Lake Cascade was recommended by fishery managers to increase yellow perch recruitment to offset predation by

northern pikeminnow. Population modeling completed by Bennett (2004) suggested it was feasible. A two pronged approached was proposed: capture and stock adult yellow perch to increase recruitment and secondly to try all methods to reduce the adult northern pikeminnow population. This section will discuss the 2004 and 2005 yellow perch transplanting efforts to Lake Cascade.

METHODS

2004

Beginning in late March 2004, a fishery management crew from the McCall subregional office began trapping yellow perch from Phillips Reservoir near Sumpter, Oregon to transplant to Lake Cascade. This capture operation was coordinated with the Northeast Regional Office of Oregon Department of Fish and Wildlife (ODFW). Since this was the first time the two agencies had tried to capture and move yellow perch, the goal was to trap for approximately three weeks and document the results and refine techniques. Captured fish were transported by IDFG fish transport trucks and shipped under permit from ODFW.

The first date of trapping was March 29, 2004 when six small trap nets were set in Phillips Reservoir. By April 1, Department crews had three large 18-foot deep Merwin traps fishing. Daily operations consisted of removing, sorting, weighing, and placing yellow perch into holding pens near the boat ramp. Fish were dipped out of the Merwin trap holding pot and nontarget species were sorted out and removed. The yellow perch were then weighed and placed in a transport tank with supplemental oxygen and boated to the holding pens. Occasionally a subsample of yellow perch was taken from the transport tank to collect number per pound and sex ratio data. At the holding pens, fish were removed from the transport tank and put in a net slide where fish could be individually examined and all fish other than yellow perch were removed and released back into the reservoir. The remaining yellow perch were then brushed into the holding pens. To load the trucks, the pens were pulled to the boat ramp and hand netted into the transport trucks. Inventories of yellow perch weights were kept for each net pen so that transport trucks could be loaded accurately.

In addition to the fish trapped and hauled from Phillips Reservoir, yellow perch were also trapped from Montpelier Reservoir in Southeast Idaho and from Lake Mary Ronan, Montana.

2005

Yellow perch trapping began at Phillips Reservoir earlier in 2005 than 2004. Six new Merwin traps were used. Generally the procedures were the same as in 2004. Lost Valley Reservoir was also used as a source of yellow perch in 2005. Only two traps were set up at Lost Valley Reservoir after the equipment was removed from the Oregon operation.

RESULTS

2004

The first load of yellow perch was moved to Lake Cascade on April 2, 2004. Virtually all of the female yellow perch were spawned out before they were stocked into Lake Cascade. Merwin traps were fished until April 13, 2004 when the traps were removed. We estimate that

we moved 96,650 yellow perch from Phillips Reservoir to Lake Cascade (Table 1). Total weight transported was 12,217 pounds. The yellow perch handled the trip well with little mortality except for the first load. The first load was mostly from small trap nets, which required more handling of fish than was the norm for the Merwin traps. We also reduced poundage per gallon of water trucked slightly to about one pound per gallon. Three hatcheries provided trucks and drivers: McCall, Nampa, and Hagerman. A roundtrip to Phillips Reservoir, load yellow perch and then to Lake Cascade and return to hatchery station was about 10 hours per truck. The semi tractor transport truck from Hagerman was used for one load.

The capture of nontarget species was very low by the Merwin traps in Phillips Reservoir. Table 2 summarizes other species captured. The low incidence of other species was helpful to the operation. No bull trout were observed in any traps. One large walleye *Sander vitreus* was captured and killed.

The three Merwin traps and other equipment were relocated to Montpelier Reservoir in mid-April. The traps were fished until April 27. Trapping success was low; the yellow perch population was not nearly as large as anticipated. Unknown individuals conducted a vandalism campaign against our operation by untying traps, boats, etc. and ultimately emptied two of the three holding pens of yellow perch. We transported 3,200 yellow perch to Lake Cascade.

IDFG transported 20,475 yellow perch in fish transport trucks from Lake Mary Ronan near Flathead Lake, Montana. Montana Department of Fish, Wildlife, and Parks provided the fish from a trapping operation they were conducting on that lake in late April.

2005

Six Merwin traps were fishing by March 19, 2005 in Phillips Reservoir. As in 2004, the yellow perch spawned before they made it to Lake Cascade. The first truckload of yellow perch was stocked into Lake Cascade on March 20. Overall 28 truck loads of fish were moved to Lake Cascade (Table 3). The traps were fished for 24 days and an estimated 182,304 yellow perch were moved. Average lengths and weights were slightly higher in 2005 than 2004. The sex ratio was skewed to males (81.6%) in 2005.

After equipment was removed from Phillips Reservoir, we began an experimental trapping operation in Lost Valley Reservoir near New Meadows. On May 1, two Merwin traps were deployed in Lost Valley Reservoir. The last trap was pulled on May 25. We moved 172,869 yellow perch to Lake Cascade (Table 4). The mean length of yellow perch was 154.3 mm and the sex ratio was 59 % female.

CONCLUSIONS

2004

Overall we were pleased with the trapping operation at Phillips Reservoir in 2004. The amount of yellow perch moved well exceeded our expectations for a first-time effort. In retrospect we should have fished the gear for another week; we likely would have collected many more yellow perch even though the catch per unit effort had dropped off. The Montpelier Reservoir trapping operation didn't justify the expense.

2005

The new Merwin traps worked well and the additional traps used in 2005 increased overall catch for transplanting. The shift in the sex ratio to predominately males at Phillips Reservoir could indicate that we have exploited that population fairly heavily. The number of yellow perch captured at Lost Valley Reservoir was a welcome surprise (at least for this project). Overall, we have moved approximately 475,000 yellow perch into Lake Cascade in these two years.

RECOMMENDATIONS

1. Capture and transplant yellow perch for one more year.

2. Trap yellow perch at Lost Valley and Horsethief reservoirs.

3. Do not trap yellow perch at Phillips Reservoir in 2006.

Table 1. Summary of yellow perch captured in Phillips Reservoir, Oregon and transported to Lake Cascade in April 2004.

Date	Boat Ramp Stocked	Number	Total Weight in lbs	No./lb	Mortalities	Comments
4/2	Sugarloaf	8,090	1,207	6.7	500	Heavy egg loss in tank
4/4	Sugarloaf	7,000	1,000	7.0	50	Hauled better
4/5	Sugarloaf/City	11,900	1,700	7.0	20	
4/6	Gold Fork	13,600	1,600	8.5	20	
4/7	Gold Fork	4,550	650	7.0	20	
4/8	City Ramp	17,850	2,100	8.5	50	18 wheeler
4/9	City Ramp	13,600	1,600	8.5	25	
4/12	City/sugarloaf	14,450	1,700	8.5	20	
4/14	Sugarloaf	5,610	660	8.5	20	
Total		96,650	12,217 lbs	7.8 ave	725	

Table 2. Summary of nontarget fish species captured in Merwin traps in Phillips Reservoir, Oregon in April 2004.

Species	Number	Comments
Rainbow trout	131	232.5 mm average length, 190 mm to 290 mm; 5 RBT >300 mm
Northern pikeminnow	25	
Largescale sucker	20	
Black crappie	17	
Walleye	1	600 mm

Table 3. Summary of yellow perch transported from Phillips Reservoir, Oregon to Lake Cascade in 2005.

Date shipped	Pounds loaded	Number loaded	Number of trucks
3/20/05	1,009	6,023	1
3/21/05	1,208	7,211	1
3/22/05	2,300	13,731	2
3/23/05	956	5,707	1
3/24/05	2,390	14,268	2
3/25/05	2,250	13,432	2
3/26/05	2,280	13,611	2
3/27/05	2,155	12,865	2
3/28/05	2,280	13,611	2
3/29/05	2,200	13,134	2
3/30/05	1,201	7,169	1
4/1/05	2,200	13,134	2
4/3/05	900	5,373	1
4/4/05	1,175	7,014	1
4/5/05	1,115	6,656	1
4/6/05	2,204	13,157	2
4/7/05	754	4,500	1
4/8/05	1,032	6,161	1
4/11/05	775	4,626	1
Totals	30,384	181,383	28

Table 4. Yellow perch catch and transport statistics from Lost Valley Reservoir, Idaho in 2005.

Date	Total pounds caught per day	Pounds shipped per day	Number of perch shipped per day	Number of trucks
5/2/2005	1,737	0	0	0
5/3/2005	1,289	1,737	16,675	2
5/4/2005	915	1,289	14,565	2
5/5/2005	1,156	400	4,640	1
5/6/2005	Not tended	915	9,150	2
5/7/2005	Not tended	450	4,500	1
5/9/2005	2,305	1,816	18,160	4
5/10/2005	Not tended	875	8,750	2
5/11/2005	783	912	9,120	2
5/12/2005	Not tended	825	8,250	2
5/16/2005	3,510	1,800	19,800	4
5/17/2005	1,915	2,700	29,513	6
5/18/2005	Not tended	1,000	9,900	2
5/23/2005	1,517	1,005	9,845	2
5/24/2005	Pulled 1 trap	500	5,000	1
5/25/2005	Pulled 1 trap	500	5,000	1
Total		16,724	172,868	34[a]

[a] A mix of 2-ton trucks and a trailer were used.

ROTENONE TREATMENT OF NORTHERN PIKEMINNOW IN THE NORTH FORK PAYETTE RIVER IN 2004 AND 2005

INTRODUCTION

Removal of a significant portion of the adult northern pikeminnow *Ptychocheilus oregonensis* population in Lake Cascade was the management recommendation of Janssen et al. (*In press*) and Bennett (2004) to allow recovery of the yellow perch *Perca flavescens* fishery in the reservoir. Recent management studies (Allen et al. 2002; Janssen et al. *In press*; Bennett 2004) documented the timing, population size, and the effectiveness of weirs in the tributaries of Lake Cascade. Investigations of Allen et al. (2002) and Bennett (2004) documented the most significant spawning run of northern pikeminnow annually entered the NFPR at the end of May. The strategy developed for 2004 involved blocking the spawning runs of northern pikeminnow with an electric weir in the NFPR at Smylie Lane Bridge and applying the piscicide rotenone weekly at a lethal concentration for the current river flows. We would also attempt to estimate the number of fish killed by this strategy.

METHODS

Electric Barrier

A removable electric barrier developed by Smith Root Inc. was installed on April 8, 2004 directly downstream of Smylie Lane Bridge on the NFPR. The barrier was described in Allen et al. (2002). The barrier was placed on the substrate and spanned the river at low flows. Metal picket weirs were constructed on each shoreline to further block fish movement around the edge of the electric barrier as river levels rose. The electric barrier was operated 24 hours per day beginning on April 25, 2004. An IDFG employee was housed at the site to maintain the barrier and provide information to the public. Various signs were posted warning the public of the electric barrier. Observations were made daily to monitor the effectiveness of the weir stopping and holding fish.

A barrier was not installed in 2005 due to high flows at the time when manpower was available.

Rotenone Application

2004

A short-term water quality activity exemption was obtained through Idaho Department of Environmental Quality for the application of rotenone to the NFPR and Gold Fork River for weekly treatments in May and June 2004. We proposed applying 5% rotenone to flowing water at label rate of 1.0 to 1.2 ppm depending on manufacturer and specific formula label. We introduced the rotenone approximately ¼ mile upstream from the Smylie Lane Bridge. Rotenone application amounts were calculated using the real-time flow gauge on the NFPR in McCall.

To deliver a metered amount of rotenone to the river, a constant head flow-metering valve was attached to the 30 gallon barrel of rotenone. The metering valve was calibrated just prior to treatment. Rotenone barrels remained in the truck above the river to allow for the gravity flow of metered rotenone via a garden hose attached to the valve to the mixing barrel lying in

the river. The mixing barrel simply consisted of a 30 gallon barrel with approximately ½ of its side cut out to allow river water to flow into it and mix with the metered rotenone. A 5 hp water pump was used to pump the diluted rotenone solution from the mixing barrel to an adjustable spray nozzle. The diluted rotenone spray was broadcast over as much of the river width as possible to facilitate even mixing in the river. The spray droplets were kept large so that wind drift was kept to a minimum. This mixing method allowed the applicators to have little contact with the rotenone, required no mixing and pouring of rotenone, and no loading and unloading of rotenone barrels at the treatment site.

We planned on applying rotenone once per week after northern pikeminnow were observed in appreciable numbers below the electric barrier. River flows were very high and variable due to weather, snowmelt, and water management of Payette Lake. We coordinated with the District 65 water-master to try and reduce flows and stabilize water releases from Payette Lake on treatment days, which would allow for us to use less rotenone and make more precise treatments.

2005

Rotenone applications methods in 2005 were the same as 2004. However, the electric barrier was not utilized in 2005 due to expected high spring runoff flows. The first three treatments were completed at the same site as in 2004. However, biologists felt that some northern pikeminnow had moved upstream of the original application site. Therefore, after the first three treatments we moved the application site upstream approximately 13.7 river kilometers to a location on Idaho State property East North East of Hait Reservoir approximately 1 mile. The UTM coordinates of the new site were 566611E, 4966307N.

Treatment Effect Counts

2004

Dead fish counts were conducted from Smylie Lane Bridge downstream to the influence of the reservoir pool and were made after each treatment. Small catarafts or kayaks were used to transport fish counters downstream. Counts were made by floating down to a random point, stopping, and walking both shorelines for a given distance. All dead fish encountered were identified to species and counted. The number of fish counted in each transect on each shoreline was divided by the length of the count transect to determine the number of fish killed per foot of stream counted. All transects were averaged together to obtain a number of fish killed per stream foot and then multiplied by the total length of the river to the reservoir. Counters had to differentiate between freshly killed fish and carcasses from previous treatments.

2005

Dead fish counts were also conducted in 2005 and started from the point of application upstream of Smylie Bridge (see above). Fish kills were observed all the way to the lake indicating that rotenone dilution was not a problem in the NFPR.

RESULTS

Electric Barrier

The electric barrier operated from April 25, 2004 until turned off on June 10, 2004. Very few problems were encountered with the constant operation of the barrier. The barrier was slightly damaged by a tree tangling in the electrical cables during a high flow event. The barrier was off for two days at that time. As soon as the water level dropped, the cables were repaired and the barrier operated correctly. It is unknown how many fish moved past during that power off time period, but our observations on fish movement indicated not many fish passed. The barrier was not used in 2005 due to predicted high spring runoff flows.

Rotenone Application

2004

Five separate applications were made from May 14, 2004 to June 10, 2004. A total of 382 gallons of 5% rotenone were used on the project (Table 5). River flows ranged from 450 to 2,100 cfs during the applications. Control of river flow was largely unsuccessful due to timing of snowmelt and rains. The District 65 water-master adjusted the gates at Payette Lake to the best of his ability and could at least give us a steady flow before and during the application. Obviously a river flow of 500 cfs would need less rotenone than a 2,000 cfs flow. Every spring will be different because of weather, snowpack runoff, and how Lake Cascade and Payette Lake are filled. We were pleased with the method we developed because of application ease and the low probability of a spill.

2005

Nine treatments were made from May 12, 2005 through June 30, 2005 (Table 7). The application site was relocated upstream on May 31, 2005 to the Idaho State property after the second application. The upstream site was approximately 13.7 km upstream of the initial application site.

Treatment Effect Counts

2004

We estimated 11,161 adult northern pikeminnow were killed with the series of rotenone applications (Table 6). Four counts were conducted with one count being skipped because of other projects. We only encountered four species of fish during counts. The estimates generated are likely minimum numbers due to fish floating out of the count area or being carried off by animals. The estimate is close to 1/2 of the total estimated population of adult northern pikeminnow in 2003 (Janssen et al. *In press*). We surveyed the reservoir waters below the river mouth by boat several times to try and define the lowest most impact of the rotenone. The first treatment on May 14, 2004 likely had the largest impact on the reservoir. Dead fish were observed about 1/2 mile below the Tamarack Falls Bridge in the main reservoir body. The rotenone plume likely stayed in the NFPR channel into the reservoir before diluting to nontoxic concentrations. Subsequent treatments did not go past the Tamarack Falls area and live fish

were seen at that bridge. During the project, the reservoir elevation was rising and creating a larger pool above the Tamarack Falls constriction allowing more dilution. We had planned on the pool area above Tamarack Falls becoming a toxic zone as that pool absorbed the rotenone.

Comments from the general public were minimal. We received one call to remove dead fish from in front of a house about a ½ mile below Tamarack Falls Bridge. We collected a bushel basket of fish from the shoreline and disposed of them in the main lake body. We did not receive any calls in the McCall office even after a television story and several newspaper articles about the project. There was a dead fish odor for a period of time in the Tamarack Falls area and even that did not bring any public comment.

2005

We killed six times the number of northern pikeminnow in 2004 versus 2005. A similar reduction in the kill of largescale sucker was also noted (Table 8). Overall estimated poundage of killed fish was also much reduced at 11,376 pounds. As in 2004 we feel these are minimum estimates as many dead and dying fish were being moved with the current into the upper end of the reservoir as in 2004. We observed dead fish below Tamarack Falls Bridge after the first several treatments but at lower numbers than observed in 2004. No public complaints were called into the McCall office.

RECOMMENDATIONS

Overall the project exceeded our expectations and modifications for future years involve reducing labor costs to lower the cost of the project. Hopefully river flows can be managed for the day of treatment; this could result in significantly lower costs in rotenone. The application could be reduced to two hours in duration. The product label recommends four hours of application to running waters, which was planned for but we felt comfortable by observing the fish behavior that we had achieved a good fish kill and could aim for two hours. Downstream fish counts should be done the day of application or the next day and need to be conducted for each treatment.

Table 5. Details of rotenone treatments in the North Fork Payette River upstream of Smylie Lane Bridge, Valley County, Idaho in 2004.

Date	Application Rate (ppm)	Amount Applied (Gallon)	Stream Flow (cfs)	Total Minutes of Treatment	Rotenone Brand
5/14/2004	1.0	100	1200	143	Noxfish
5/22/2004	1.2	30	`450	135	Chemfish
5/28/2004	1.0	120	2100	128	Chemfish
6/04/2004	1.0	72	1675	95	Noxfish
6/10/2004	1.0	60	1210	110	Chemfish

Table 6. Summary of estimated dead fish from rotenone treatments in the North Fork Payette River in 2004.

Date of Count	Days After Treatment	Northern pikeminnow	Largescale sucker	Mountain whitefish	Rainbow trout	Estimated number or pounds
5/17/2004	3	251	5,263	389	5	
6/02/2004	4	2,962	6,032	208	104	
6/04/2004	Same	7,702	655	491	16	
6/11/2004	1	246	16	10	0	
Number		11,161	11,966	1,098	125	24,350
Totals		22,322	41,881	439	50	70,272

Note: average weight of fish was 2.5 lbs per northern pikeminnow, 3.5 lbs per largescale sucker, 0.4 lbs per mountain whitefish, 0.4 lbs per rainbow trout.

Table 7. Details of 2005 rotenone applications in the NF Payette River.

Date	Application Rate (ppm)	Amount Applied (gal.)	Stream Flow (cfs)	Total Time of treatment (hr)	Rotenone Brand
5/12/2005[a]	1.0	52.6	1400	1.4	Chem Fish Regular
5/26/2005*	1.0	21.5	400	2.0	Chem Fish Regular
5/31/2005	1.0	60.6	1220	1.85	Chem Fish Regular
6/3/2005	1.0	42.1	785	2.0	Chem Fish Regular
6/7/2005	1.0	14.8	275	2.0	Prentox
6/10/2005	1.0	10.0	230	1.6	Prentox
6/16/2006	1.0	15.2	283	2.0	Chem Fish Regular
6/20/2005	1.0	23.4	498	1.75	Chem Fish Regular
6/30/2005	1.0	30.5	569	2.0	Chem Fish Regular
Total Rotenone Applied (gal.)		270.7			

[a] Location of application NF Payette River, ¼ mile upstream of Smylie Bridge. All other applications located upstream on Idaho Department of Lands property (566611 E, 4966307 N UTM).

Table 8. Estimate of species, numbers, and weights of fish killed per rotenone treatment in the NFPR in 2005.

Date	Northern pikeminnow	Largescale sucker	Mountain whitefish	Rainbow trout	Estimated total numbers or pounds
5/12/2005	4	83	637	0	
5/26/2005	36	61	207	9	
5/31/2005	1,148	914	761	0	
6/3/2005	277	471	162	1	
6/7/2005	92	157	54	0	
6/20/2005	55	13	32	0	
6/30/2005	201	6	328	0	
Total number	1,813	1,705	2,181	10	5,709
Total pounds	4,532.5	5,967.5	872.4	4.0	11,376.4

Note: average weight of fish was 2.5 lbs per northern pikeminnow, 3.5 lbs per largescale sucker, 0.4 lbs per mountain whitefish, 0.4 lbs per rainbow trout.

MERWIN TRAP NETTING FOR REDUCTION OF NORTHERN PIKEMINNOW IN LAKE CASCADE

INTRODUCTION

Merwin traps were tried as a second method to reduce northern pikeminnow in the reservoir. The Merwin traps were set up in Lake Cascade after returning from yellow perch capture operations. Also several new traps were set out in 2004 that had just been purchased. The Merwin traps had proved successful the previous year in capturing northern pikeminnow to conduct a population estimate in Lake Cascade.

METHODS

2004

We operated Merwin trap nets as described by Janssen et al. (*In Review*). Trap locations by trap number and UTM coordinates are presented in Figure 1. Each trap was visited from one to three times a week to collect, count, and release all fish species with the exception of largescale suckers *Catostomus macrocheilus* and northern pikeminnow. All northern pikeminnow collected in 2004 were measured and counted as either greater than or less than 250 mm in total length and then euthanized. All largescale suckers collected were also counted and then euthanized.

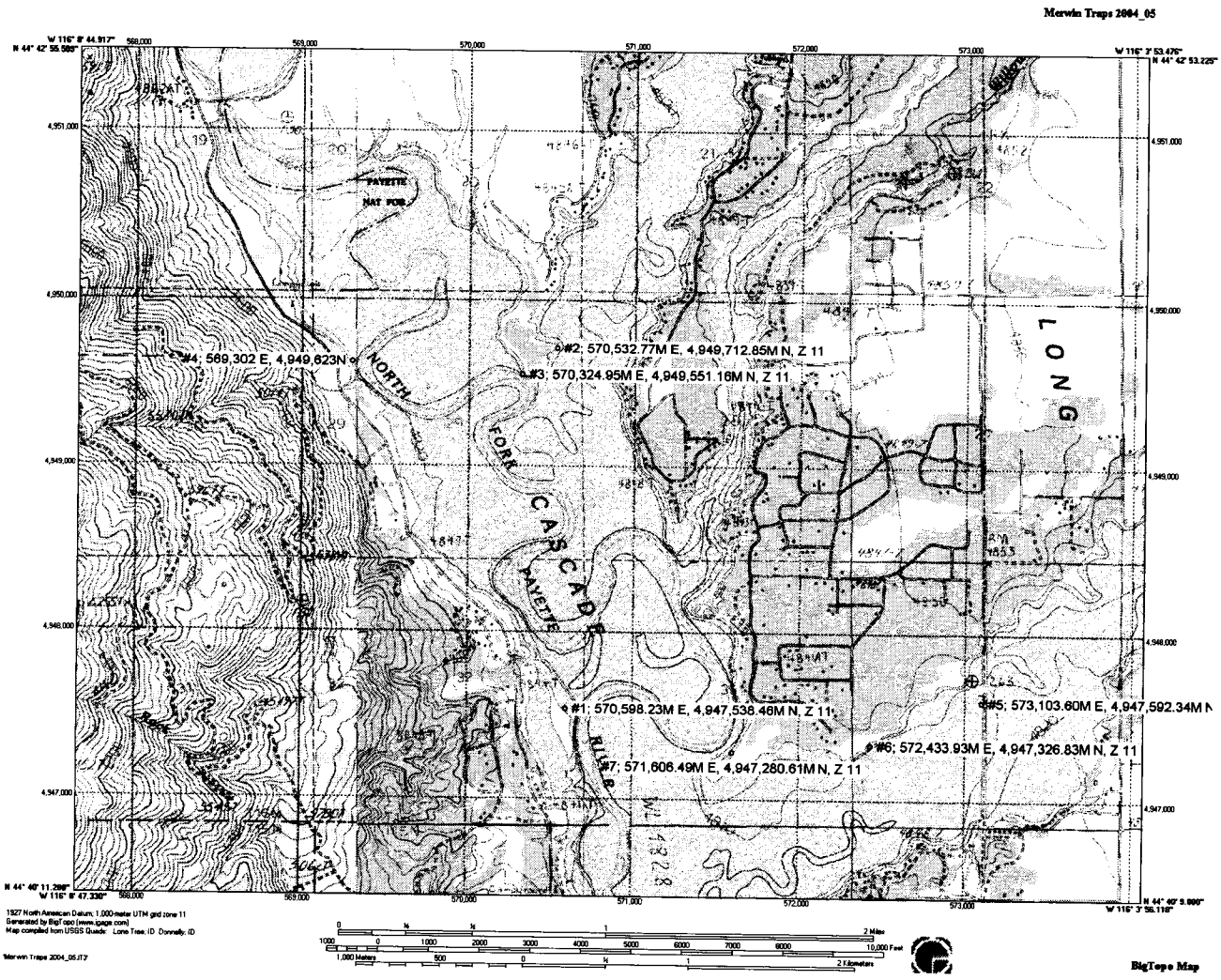


Figure 1. Merwin Trap Locations and UTM coordinates in Lake Cascade in 2004 and 2005.

2005

All northern pikeminnow collected in 2005 were measured. Fish less than 250 mm were counted and euthanized. Northern pikeminnow over 250 mm were further examined and counted as juveniles or adults and then euthanized. Juveniles were generally less than 350 mm in total length and silver in color versus the brownish gold color of adults. All largescale suckers collected were also counted and then euthanized. A representative sample of northern pikeminnow collected in the traps was measured to the nearest 10 mm and an opercle cover was removed and preserved for later age and growth analysis.

RESULTS

2004

We operated three to seven Merwin traps from May through October 2004. We captured and removed a total of 2,181 northern pikeminnow greater than 250 mm in total length and 1,563 less than 250 mm (Table 9.). We also collected and removed 1,546 largescale suckers. We collected many other species as well including yellow perch, rainbow trout *Oncorhynchus mykiss*, black bullhead *Ameiurus melas*, smallmouth bass *Micropterus dolomieu*, coho salmon *Oncorhynchus kisutch*, black crappie *Pomoxis nigromaculatus*, and pumpkinseed *Lepomis gibbosus*.

Table 9. Monthly Merwin trap catch in Lake Cascade by location and species in 2004.

		SPECIES									
MONTH	Merwin #	NPM >250 mm	NPM ≤250 mm.	LSS	YP	RBT	BBH	SMB	COHO	BC	PS
May	1	7	29	16	134	2	202	0	2	1	40
	2	110	95	165	187	4	21539	1	1	19	151
	3	71	20	150	95	7	4383	2	0	30	49
	4	57	21	11	2	4	25	0	1	3	3
May Total		245	165	342	418	17	26149	3	4	53	243
June	1	3	16	5	1	2	35	1	0	1	4
	2	106	15	37	1	1	317	1	0	1	5
	3	124	5	81	0	8	57	0	0	5	2
	4	346	92	77	1	9	498	4	2	6	0
	5	135	40	82	0	10	5116	8	0	10	15
	6	34	86	55	0	8	507	1	2	12	3
	7	146	59	37	1	6	175	2	1	3	0
June Total		894	313	374	4	44	6705	17	5	38	29
July	1	4	1	2	2	0	2	0	0	0	1
	2	12	19	25	37	0	2388	0	0	37	6
	3	5	0	6	0	0	18	0	0	1	0
	4	99	152	15	183	0	929	3	1	50	29
	5	94	107	52	177	1	270	18	0	62	120
	6	176	83	49	63	2	3100	7	0	60	42
	7	174	82	107	178	0	1916	10	0	85	23
July Total		564	444	256	640	3	8623	38	1	295	221
August	1	0	0	0	1	0	5	0	0	0	22
	2	4	12	6	12	0	1007	0	0	67	55
	3	4	0	3	1	2	76	0	0	27	31
	4	21	53	44	308	1	20924	23	0	67	54
	5	82	97	126	377	2	13235	16	0	27	133
	6	33	38	20	3	1	2432	10	0	84	47
	7	46	125	186	56	0	13411	6	0	138	146
August Total		190	325	385	758	6	51090	55	0	410	488
September	3	104	3	49	1	0	1026	0	0	25	2
	4	103	20	23	174307	1	1754	4	0	0	84
	5	8	50	38	3747	0	2013	6	0	26	323
	7	44	217	55	15068	2	14905	9	0	119	351
September Total		259	290	165	193123	3	19698	19	0	170	760
October	3	5	0	9	5	0	46	0	0	0	0
	4	13	5	0	63250	0	35	0	0	0	50
	5	0	0	0	0	0	6	0	0	4	0
	7	11	21	15	2530	1	13	3	0	1	24
October Total		29	26	24	65785	1	100	3	0	5	74
Grand Totals		**2181**	**1563**	**1546**	**260728**	**74**	**112365**	**135**	**10**	**971**	**1815**

Species Codes:

NPM:	Northern pikeminnow	LSS:	Largescale sucker
YP:	Yellow Perch	RBT:	Rainbow trout
BBH:	Black bullhead	SMB:	Smallmouth bass
Coho:	Coho salmon	BC:	Black Crappie
PS:	Pumpkinseed		

2005

We operated four Merwin traps from May through September in 2005. We captured and removed a total of 4,618 northern pikeminnow greater than 250 mm of which 1,312 were classified as juveniles (Table 10). We also captured and removed 5,748 northern pikeminnow less than 250 mm and 5,291 largescale suckers. We also captured tiger muskie *Esox lucius x E. masquinongy*, mountain whitefish *Prosopium williamsoni*, westslope cutthroat trout *Oncorhynchus clarkii lewisi*, kokanee *Oncorhynchus nerka kennerlyi*, and largemouth bass *Micropterus salmoides* in 2005 in addition to all the species caught in 2004.

Length frequencies of a representative sample of northern pikeminnow collected in Merwin traps in 2005 ranged from 110 to 570 mm (Figure 2). Ages of these fish ranged from 1 to 18 years (Figure 3). We observed a large gap in fish numbers between ages 4 and 11 and large overlaps in ages of fish from 110 to 300 mm.

Table 10. Monthly Merwin trap catch in Lake Cascade by location and species in 2005.

		SPECIES															
MONTH	Merwin #	NPM >250 mm All	NPM ≥250 mm Juvenile	NPM <250 mm	LSS	YP	RBT	BBH	SMB	COHO	BC	PS	TM	MWF	CTT	KOK	LMB
May	3	277	0	604	330	807	36	4931	11	0	211	355	1	1	0	0	0
	4	128	0	150	63	28	8	855	2	0	16	8	0	0	0	0	0
	5	231	0	21	461	1	12	919	3	0	25	1	0	0	0	0	0
May Total		636	0	775	854	836	56	6705	16	0	252	364	1	1	0	0	0
June	3	270	0	87	195	53	14	1035	26	0	32	30	0	2	0	0	0
	4	392	0	59	193	23	19	471	6	0	3	15	0	4	0	0	0
	5	602	0	82	64	4	13	859	12	0	16	28	0	4	0	0	0
	7	251	0	42	163	10	7	258	9	0	5	5	0	1	0	0	0
June Total		1515	0	270	615	90	53	2623	53	0	56	78	0	11	0	0	0
July	3	123	50	253	260	479	18	2907	14	1	549	67	0	4	0	0	0
	4	152	56	413	258	128	6	1040	4	0	49	26	0	3	1	0	0
	5	215	60	321	94	88	12	388	8	2	69	16	0	1	0	0	0
	7	390	73	284	541	30	5	1790	8	1	104	20	0	0	0	0	0
July Total		880	239	1271	1153	725	41	6125	34	4	771	129	0	8	1	0	0
August	3	23	102	230	322	859	9	36543	12	0	1185	1008	0	0	0	1	0
	4	21	137	585	450	166	10	21727	22	0	161	275	0	0	0	0	0
	5	70	360	519	185	77	10	14934	22	0	254	84	0	0	0	1	0
	7	74	191	449	602	137	12	14821	8	0	172	170	0	0	0	0	0
August Total		188	790	1783	1559	1239	41	88025	64	0	1772	1537	0	0	0	2	0
September	3	9	14	99	253	120	0	44188	11	1	161	1160	0	0	0	0	0
	4	18	39	379	353	99	20	5018	10	32	99	1007	4	0	0	2	7
	5	45	156	820	88	61	14	16219	34	0	123	561	0	0	0	0	0
	7	15	74	351	416	152	6	39042	22	4	24	829	0	0	0	0	0
September Total		87	283	1649	1110	432	40	104467	77	37	407	3557	4	0	0	2	7
Grand Totals		**3306**	**1312**	**5748**	**5291**	**3322**	**231**	**207945**	**244**	**41**	**3258**	**5665**	**5**	**20**	**1**	**4**	**7**

Species Codes:

NPM: Northern pikeminnow
BBH: Black bullhead
PS: Pumpkinseed
KOK: Kokanee
YP: Yellow Perch
SMB: Smallmouth bass
TM: Tiger muskie
LMB: Largemouth bass
RBT: Rainbow trout
Coho: Coho salmon
MWF: Mountain whitefish
LSS: Largescale sucker
BC: Black Crappie
CTT: Cutthroat trout

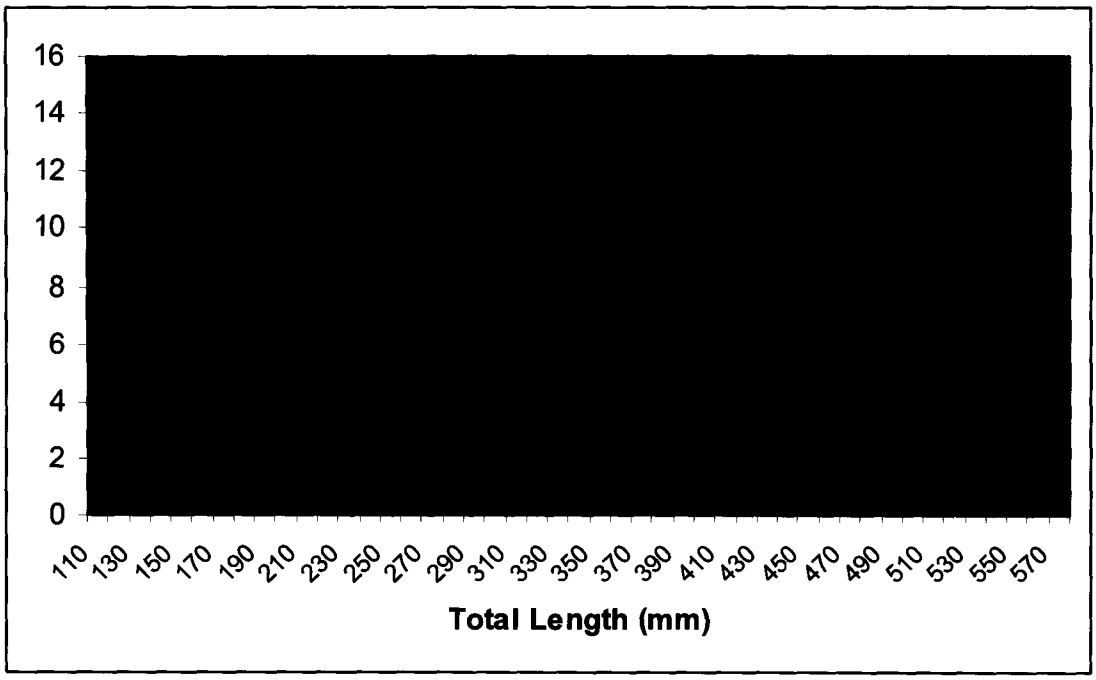


Figure 2. Length frequencies of northern pikeminnow collected in Merwin traps in 2005 for age analysis (all fish from one days catch).

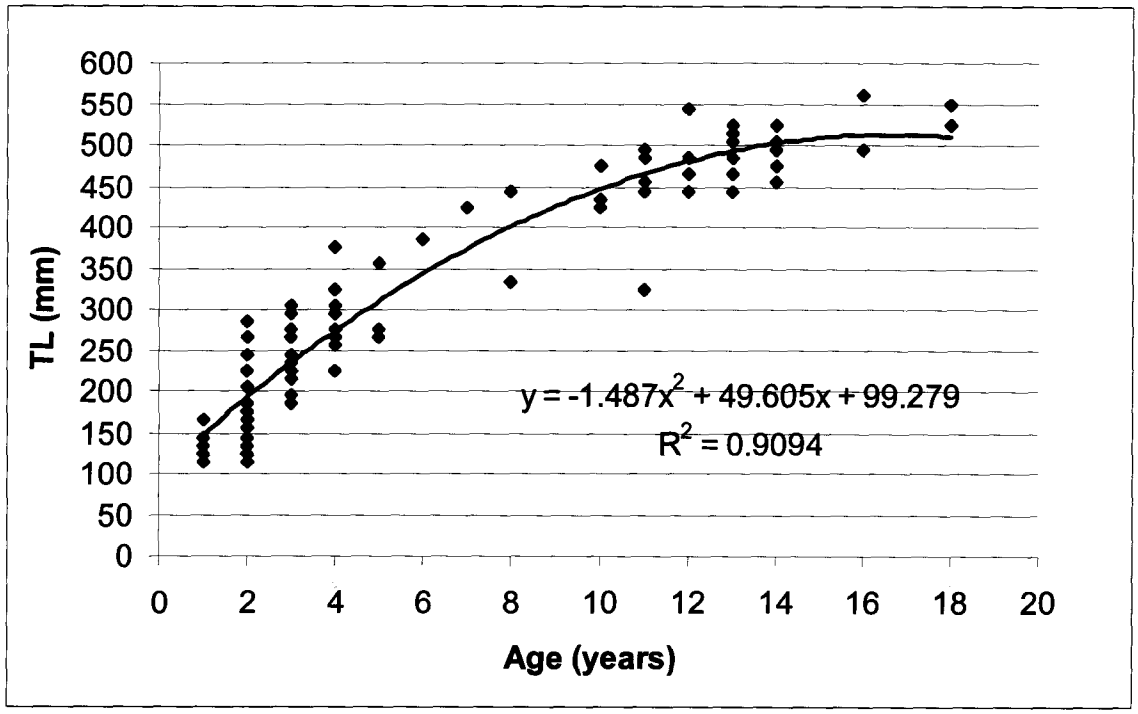


Figure 3. Lake Cascade northern pikeminnow lengths at age collected in Merwin Traps in July 2005.

SUMMARY

We trapped and transported a total of 475,000 yellow perch to Lake Cascade during 2004 and 2005 from five different operations. Because fish released eggs in the traps, in the holding pens, and in the transport tanks most of the females were spawned out before their release into Lake Cascade in both years. We should see the first large cohort produced in the spring of 2005 from yellow perch transplanted in 2004. We should begin to see survival of older year classes beginning in 2005 due to the predator reductions we have completed.

Over the two-year period we conservatively estimate that we killed 13,715 adult northern pikeminnow in rotenone treatments in the NF Payette River. We captured and killed 4,587 adult and 7,311 juvenile northern pikeminnow in the Merwin traps in Lake Cascade. The mark-recapture population estimate completed in fall of 2003 was 24, 413 ± 7,089 adult northern pikeminnow (Janssen et al. *In Review*). During the last two years, these efforts have removed over ½ of the estimated adult northern pikeminnow from the reservoir.

LAKE CASCADE FISHERIES MONITORING

The primary focus of Lake Cascade fishery sampling in 2004 and 2005 was to continue monitoring the population status and structures of yellow perch and northern pikeminnow in conjunction with the initiation of yellow perch restoration efforts begun in 2004 which were described earlier in this report. We also monitored abundance and size of zooplankton in summer and fall of 2004 and 2005.

We continued annual holiday angler counts and completed a creel survey in 2004 to document use and harvest on Lake Cascade.

HOLIDAY ANGLER COUNTS

INTRODUCTION

Angler counts were made on Memorial Day, Fourth of July, and Labor Day to monitor and compare relative angling pressure with past survey years. Annual holiday counts have been conducted since 1996.

METHODS

2004 and 2005

We completed angler counts on Memorial Day, Fourth of July, and Labor Day on Lake Cascade as described by Janssen (2000). We conducted counts in 2004 and 2005 using a fixed wing airplane at 0900 and 1400 hrs on each holiday day. All shore anglers and all fishing boats were counted.

RESULTS

2004 and 2005

We counted an average of 23 and 28 fishing boats and 8.5 and 12.5 shore anglers respectively in 2004 and 2005 (Table 11). No year-long, structured creel surveys were conducted either year. However, a three-month long creel survey was conducted in 2004 (see Lake Cascade Creel Survey section of this report).

Table 11. Average boat and shore angler counts on Lake Cascade on three major holidays: Memorial Day, Fourth of July, and Labor Day in 1982, 1991, 1992, and 1996 through 2005 with corresponding intensive creel survey angler hour estimates for 1982, 1991, and 1992.

	Holiday Counts		Estimated Angler Hours (hours * 1000)		
Year	Ave. # Boats	Ave. # Shore Anglers	Boat Anglers	Shore Anglers	Total Pressure[a]
1982	154	85	255.6	129.8	385.4
1991	41.5	32	135.2	102	237.2
1992	52.5	116	144.2	177.3	321.5
1996	35	27	-	-	-
1997	36.5	19	-	-	-
1998	58	39.5	-	-	-
1999	27	31	-	-	-
2000	15	12	-	-	-
2001	11	12	-	-	-
2002	16.5	12	-	-	-
2003	17	6	-	-	-
2004	23	8.5	-	-	-
2005	28	12.5	-	-	-

[a] Does not include ice-fishing hours.

2004 CREEL SURVEY

INTRODUCTION

There had been no formal intensive creel survey completed on Lake Cascade since 1992. Annual angler count data collected on specific holidays and anecdotal evidence indicated that angler use on the reservoir dropped to all time lows in the late 1990s through 2005 due to a serious decline in the yellow perch fishery (Table 10). We completed an abbreviated creel survey in 2004 to help characterize current use.

METHODS

We conducted a roving creel survey using a stratified sampling design to estimate daily angler effort and harvest (Neuhold and Lu 1957). We sampled three to four weekend days and four to six weekdays in each of July, August, and September. We alternated each consecutive creel day between AM and PM sampling periods. The AM period was 0600 to 1330 hours and the PM period was 1400 to 2130 hours. Angler counts were made two times each creel day from a boat. AM counts were made at 0800 and 1100 hours and PM angler counts were made at 1300 and 2000 hrs. The entire lake was circled with the boat and all shore anglers and fishing boats were counted on each count. We did not count anglers in boats. Angler interviews were typically conducted between counts but on low angler days, interviews and counts were made simultaneously from a boat. Angler interviews were conducted to contact as many anglers as possible each survey day.

Data collected from angler interviews included: number of anglers in party, total time fishing, and number of fish caught by species (harvested and released). When harvested fish were encountered they were identified to species and counted. Salmonids were examined for differential stock markings. Angler interview data and counts were then used to estimate total fishing effort (hours), catch and harvest rates, and total harvest by species. Total fishing effort, catch rates, and total catch estimates were calculated for shore anglers and boats. Due to increased angler effort on weekends, estimates of effort, catch rates, and harvest were stratified by weekend and weekday periods, with holidays considered as weekend days.

RESULTS

We surveyed anglers on 26 days from July 3 through September 27, 2004. We estimated there were 17,559 angler hours spent to catch 13,469 fish (Tables 12, 14, 16). Fishing boat hours accounted for 63% (11,127) of the total hours and 54% (7,219) of the total catch. Anglers caught an estimated 13,469 fish of which 1,562 rainbow trout and 1,375 yellow perch were harvested (Tables 13, 13, 17). Anglers also caught and released an estimated 3,896 smallmouth bass. Angling pressure and harvest of rainbow trout and yellow perch in July, August, and September 2004 were all significantly less than that found in previous surveys in 1986, 1991, and 1992 (Table 17).

Table 14. Summary of August 2004 Lake Cascade interview data, total angling pressure, and total catch.

August Fishing Success Data:	Shore Anglers	Boats	Total Anglers
Number of interviews	27	64	91
Fish caught	87	238	325
Success rate	1.626	0.915	1
Variance	0.280144318	0.269442837	0.549587155
95% CI	±1.059	±1.038	±2.096
Total fishing pressure			
Total estimated hours	2522	2820	5342
Variance	709766	612534	1322300
95% CI	±1685	±1565	±2300
Total estimated fish caught			
# Of fish	4551	2615	7165
Variance	2590433	1431701	4022134
95% CI	+3219	±2393	±4011

Table 15. August 2004 catch and catch rates for boat and shore anglers by species for Lake Cascade.

	Shore		Boat anglers		Total		
Species	Number	Catch Rate	Number	Species	Number	Catch Rate	Number
Rainbow trout kept	53	0.019	255	0.088	308	0.058	4.3
Coho kept	0	0.000	44	0.015	44	0.008	0.6
Smallmouth bass kept	370	0.131	986	0.342	1356	0.254	18.9
Trout/salmon kept	0	0.000	33	0.012	33	0.006	0.5
Trout/salmon released	212	0.075	55	0.019	267	0.050	3.7
Northern pikeminnow	370	0.131	133	0.046	503	0.094	7.0
Smallmouth bass released	317	0.112	1075	0.373	1392	0.261	19.4
Rainbow trout adipose clipped kept	0	0.000	11	0.004	11	0.002	0.2
Rainbow trout right vent clipped kept	0	0.000	0	0.000	0	0.000	0.0
Rainbow trout left vent clipped kept	0	0.000	0	0.000	0	0.000	0.0
Yellow perch kept	688	0.243	0	0.000	688	0.129	9.6
Yellow perch released	1217	0.430	11	0.004	1228	0.230	17.1
Black bullhead kept	106	0.037	11	0.004	117	0.022	1.6
Black bullhead released	529	0.187	0	0.000	529	0.099	7.4
Mountain whitefish released	688	0.243	0	0.000	688	0.129	9.6
Total =	4550		2614		7164	1.34	0

		Weekend	Weekday
Count data:	Total Days	10	21
	Hours/Day	15	15
	Days Sampled	5	4
	Counts/Day	2	2

Table 16. Summary of September 2004 Lake Cascade interview data, total angling pressure, and total catch.

September Fishing Success Data:	Shore Anglers	Boats	Total Anglers
Number of interviews	27	44	71
Fish caught	54	220	274
Success rate	0.688	1.275	1
Variance	0.149486835	0.774856369	0.924343204
95% CI	±0.773	±1.761	±2.532
Total fishing pressure			
Total estimated hours	1342	1387	2729
Variance	254879	219158	474037
95% CI	±1010	±936	±1377
Total estimated fish caught			
# Of fish	1033	1804	2838
Variance	270455	1110403	1380859
95% CI	±1040	±2108	±2350

Table 17. September 2004 catch and catch rates for boat and shore anglers by species for Lake Cascade.

	Shore		Boat Anglers		Total		
Species	Number	Catch Rate	Number	Catch Rate	Number	Catch Rate	%
Rainbow trout kept	96	0.064	139	0.099	235	0.086	8.3
Coho kept	0	0.000	16	0.012	16	0.006	0.6
Smallmouth bass kept	0	0.000	57	0.041	57	0.021	2.0
Trout/salmon kept	0	0.000	33	0.023	33	0.012	1.2
Trout/salmon released	0	0.000	16	0.012	16	0.006	0.6
Northern pikeminnow	0	0.000	74	0.052	74	0.027	2.6
Smallmouth bass released	172	0.115	1394	0.986	1566	0.574	55.2
Rainbow trout adipose clipped kept	0	0.000	0	0.000	0	0.000	0.0
Rainbow trout right vent clipped kept	0	0.000	0	0.000	0	0.000	0.0
Rainbow trout left vent clipped kept	0	0.000	0	0.000	0	0.000	0.0
Yellow perch kept	268	0.178	16	0.012	284	0.104	10.0
Yellow perch released	421	0.280	57	0.041	478	0.175	16.9
Black bullhead kept	0	0.000	0	0.000	0	0.000	0.0
Black bullhead released	19	0.013	0	0.000	19	0.007	0.7
Mountain whitefish released	57	0.038	0	0.000	57	0.021	2.0
Total =	1033		1802		2835		

		Weekend	Weekday
Count data:	Total Days	9	21
	Hours/Day	13.5	13.5
	Days Sampled	5	4
	Counts/Day	2	2

Table 18. Monthly total angling pressure (boat and shore) and total harvest of rainbow trout and yellow perch from Lake Cascade from creel surveys in 1986, 1991, 1992, and 2004.

	Angling Pressure (X 1,000)			Harvest (July through September)	
Year	July	August	September	Rainbow Trout	Yellow Perch
1986	74.1	69.3	22.3	10,200	242,800
1991	69.7	41.9	37.5	7,700	18,900
1992	42.4	31.2	38.9	11,300	61,800
2004	9.5	5.3	2.7	1,600	1,400

HYDROACOUSTIC FISH POPULATION ESTIMATES

INTRODUCTION

We completed a hydroacoustic fish survey and population estimates of several fish species present in Lake Cascade in 2004 and 2005. However, our primary emphasis was the enumeration of the northern pikeminnow population. This survey has been completed annually since 2000.

METHODS

2004 and 2005

We utilized IDFG hydroacoustic research project crew to estimate fish populations by species in the lake. Butts (*in review*) describes the equipment and methodology used. We completed one hydroacoustic survey in both 2004 and 2005.

RESULTS

2004

The hydroacoustic sampling on Lake Cascade was completed on July 26, 2004. The total fish abundance estimate was 1,598,736 (Table 19). The northern pikeminnow estimate for all sizes and fish greater than 250 mm was 241,150 and 10,407 respectively (Table 19). No yellow perch were collected in gill nets set for hydroacoustic calibration, therefore the estimate was zero.

Table 19. Lake Cascade species population estimates for fish greater than 250mm and for all fish from hydroacoustic sampling on 7/27/04.

Fish >250 mm			
Species	**Proportion ± 90% CI**	**Abundance**	**90% CI**
Northern pikeminnow	0.19 ± 0.14	10,407	2,617
Largescale sucker	0.48 ± 0.25	26,210	4,605
Rainbow trout	0.28 ±+ 0.25	15,032	4,593
Coho Salmon	0.01 ± 0.01	771	248
Mountain Whitefish	0.03 ± 0.01	1,542	270
Smallmouth bass	0.01 ± 0.01	385	259
Totals		54,347	12,592

All fish			
Species	**Proportion ± 90% CI**	**Abundance**	**90% CI**
Northern pikeminnow	0.15 ± 0.10	241,150	29,806
Largescale sucker	0.38 ± 0.26	607,341	78,226
Rainbow trout	0.35 ± 0.30	553,752	88,534
Coho Salmon	0.01 ± 0.01	17,863	3,496
Mountain Whitefish	0.02 ± 0.01	35,726	3,407
Black Bullhead	0.08 ± 0.11	125,041	34,022
Smallmouth bass	0.01 ± 0.02	17,863	6,520
Totals		1,598,736	244,011

2005

The hydroacoustic sampling on Lake Cascade was completed on July 26, 2005. The total fish abundance estimate for Lake Cascade in 2004 was 5,154,990 (Table 20). The northern pikeminnow estimate for all sizes and fish greater than 250 mm was 258,785 and 8,959, respectively (Table 20). No yellow perch were collected in gill nets set for hydroacoustic calibration.

Table 20. Lake Cascade species population estimates for all fish >250 mm and for all fish from hydroacoustic sampling on 7/27/05.

Fish >250 mm			
Species	**Proportion ± 90% CI**	**Abundance**	**90% CI**
Northern pikeminnow	0.12 ± 0.09	8,959	2,113
Largescale sucker	0.18 ± 0.13	13,652	2,979
Rainbow trout	0.47 ± 0.11	35,409	2,476
Kokanee	0.21 ± 0.14	15,785	3,051
Mountain whitefish	0.01 ± 0.02	427	231
Yellow Perch	0.01 ± 0.01	427	239
Totals		74,659	11,089

All fish			
Species	**Proportion ± 90% CI**	**Abundance**	**90% CI**
Northern pikeminnow	0.05 ± 0.04	258,785	65,853
Largescale sucker	0.06 ± 0.07	331,244	103,623
Rainbow trout	0.17 ± 0.11	890,219	172,166
Kokanee	0.35 ± 0.21	1,821,844	321,117
Coho Salmon	0.01 ± 0.02	62,108	27,683
Yellow Perch	0.34 ± 0.25	1,790,790	382,027
Totals		5,154,990	1,072,469

YELLOW PERCH POPULATION TREND MONITORING

INTRODUCTION

A reliable, repeatable method to document annual production is critical to monitoring changes in survival of young-of-the-year and older yellow perch. We continued the annual yellow perch population sampling using a bottom trawl in 2004 and 2005.

METHODS

2004 and 2005

We repeated the trawling effort and methodology developed in 1998 and 1999 and described by Janssen et al. (2003) and Anderson et al. (2001). Trawl transect locations in 2004 and 2005 were established in 1998 and 1999 and are presented in Janssen et al. (2003). We counted all yellow perch collected and a representative sample of yellow perch from each sample area was measured in total length to the nearest 1 mm and weighed to the nearest 0.1 g.

RESULTS

2004

We completed 65 trawl transects in 2004, fishing a total of 325 minutes, collecting 6,042 yellow perch. We averaged 207, 57, and 10.5 yellow perch per five minute transect in June, August, and October, respectively (Table 21). Catch rates in June were the highest since 1998;

however, most of the fish collected were age-0. Age-0 yellow perch also dominated trawl catches in August and October 2004 (Figures 4 and 5) (No length frequency data in June). As in the past three years, age-1 yellow perch (2003 cohort) had virtually disappeared by the August trawl sampling.

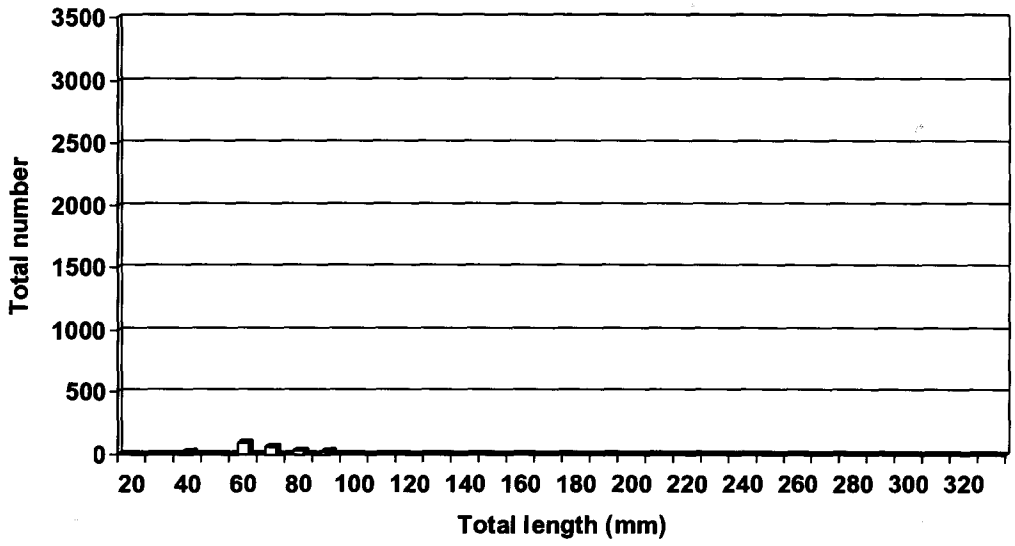


Figure 4. Length frequencies (catch/105 minutes of effort) of yellow perch collected with a bottom trawl from Lake Cascade in August 2004.

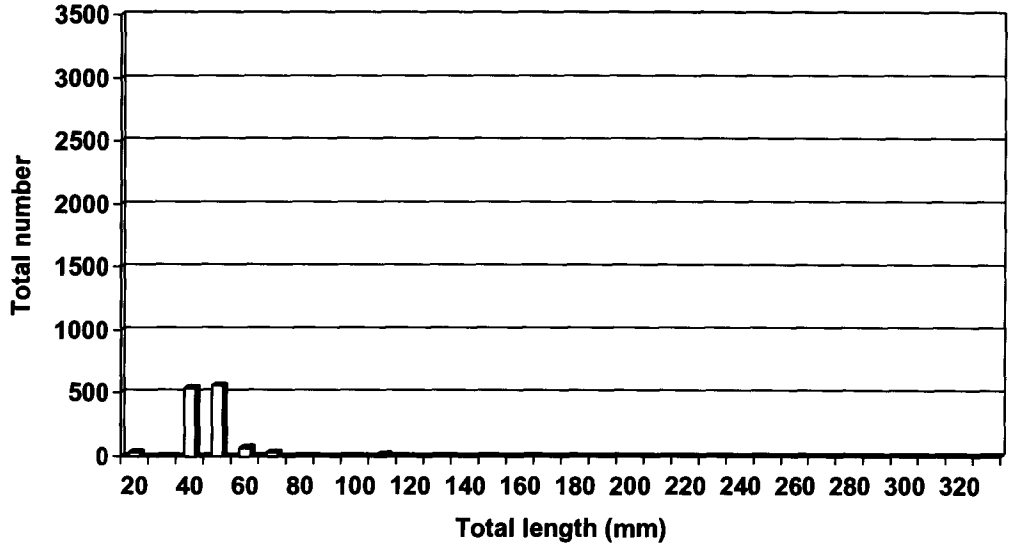


Figure 5. Length frequencies (catch/105 minutes of effort) of yellow perch collected with a bottom trawl from Lake Cascade in October 2004.

Table 21. Total and mean catch per 5 minute trawl of yellow perch in Lake Cascade with 95% confidence intervals (+/-) by area in June, August, and October 2004.

	Area											
	South			West			East			North		
Month	Total # Perch	Average Catch per Transect	# Transects	Total # Perch	Average Catch per Transect	# Transects	Total # Perch	Average Catch per Transect	# Transects	Total # Perch	Average Catch Per Transect	# Transects
June	659	94(201)	7	1581	226(436)	7	2320	331(561)	7	0	0	1
August	848	121(190)	7	144	21(47)	7	267	38(92)	7	2	2	1
October	150	21(41)	7	26	3.7(3.9)	7	45	6.4(12)	7	NA		0

2005

We completed 63 trawl transects in 2005, fishing a total of 325 minutes, collecting 13,873 yellow perch. We averaged 1.9, 347, and 313 yellow perch per five minute transect in June, August, and October, respectively (Table 22). Catch rates in August were the highest since we began trawling in 1998. Age-0 yellow perch dominated trawl catches in August and October 2005. However, unlike the past seven years, age-1 yellow perch were still present in the lake in August and October. We collected more age-1 perch in August and October than we have since we began annual trawling in 1998 (Figures 6 and 7).

The large number of age-0 fish collected in August and October 2005 would have been the first cohort produced by the adult yellow perch transplanted into the lake in 2004 from Oregon and Montana (See "Adult Yellow Perch Transplants" section of this report). The survival of some age-1 yellow perch through October 2005 is thought to be the direct result of northern pikeminnow population reduction efforts in the lake.

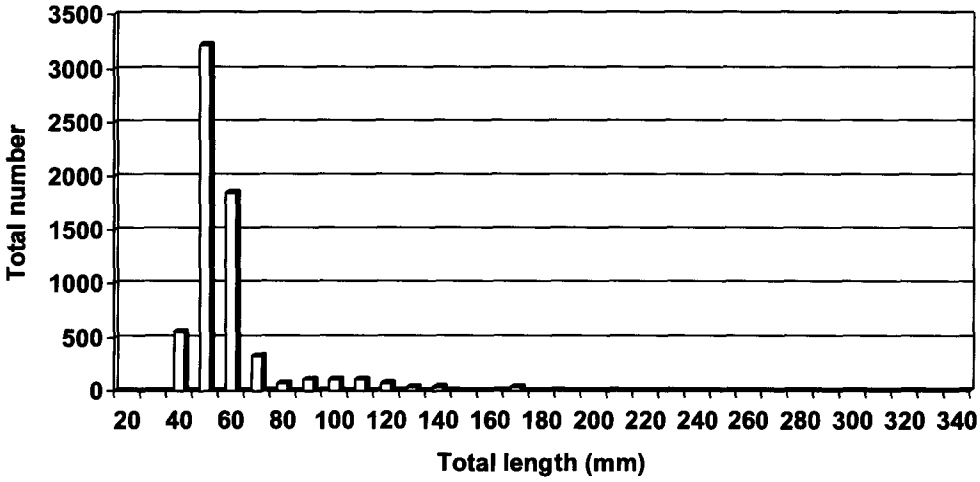


Figure 6. Length frequencies (catch/110 minutes of effort) of yellow perch collected with a bottom trawl from Lake Cascade in August 2005.

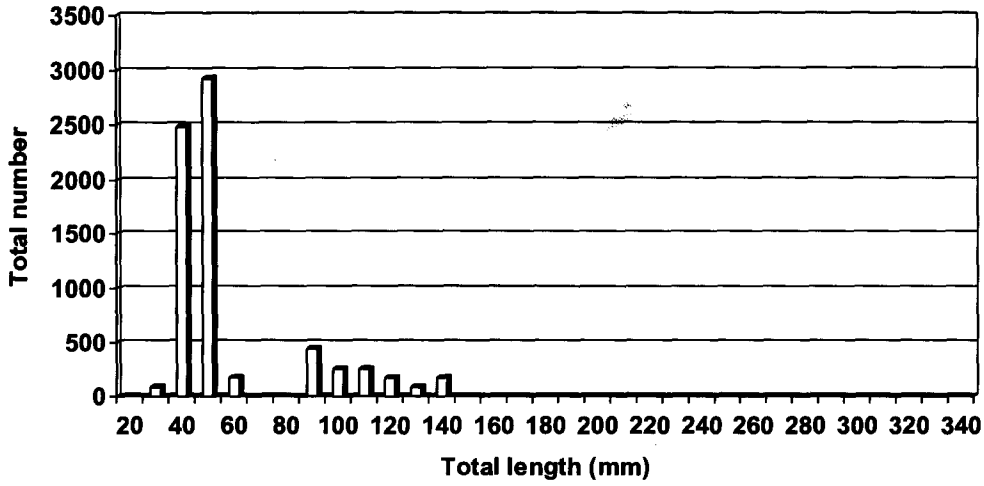


Figure 7. Length frequencies (catch/110 minutes of effort) of yellow perch collected with a bottom trawl from Lake Cascade in October 2005.

Table 22. Total and mean catch per 5 minute trawl of yellow perch in Lake Cascade with 95% confidence intervals (+/-) by area in June, August and October, 2005.

	AREA											
	South			West			East			North		
Month	Total # Perch	Average Catch per Transect	# Transects	Total # Perch	Average Catch per Transect	# Transects	Total # Perch	Average Catch per Transect	# Transects	Total # Perch	Average Catch per Transect	# Transects
June	3	0.43(.72)	7	36	5.1(3.1)	7	0	0	7	NA		0
August	1159	166(386)	7	4663	666(785)	7	1456	208(387)	7	NA		0
October	3296	471(472)	7	480	69(44)	7	2780	397(385)	7	NA		0

YELLOW PERCH YOUNG-OF-YEAR PRODUCTION MONITORING

INTRODUCTION

To monitor the response in annual yellow perch production to the yellow perch restoration efforts begun in 2004 we initiated a beach seining effort targeted at sampling young-of-year yellow perch.

METHODS

2004 and 2005

Yellow perch were sampled with a 2.4 m deep x 15.2 m long beach seine with a 1.2 m x 1.2 m x 1.2 m bag in the center. The entire seine was constructed with 4.8 mm Delta mesh nylon netting. A standard haul consisted of anchoring one end of the seine on shore and pulling the other end straight out, perpendicular to shore as far as possible. The end of the seine in the deep water was then pulled in an arc back to shore.

Each site's latitude and longitude coordinate was measured with a GPS unit and recorded (Table 23). The same seine haul sites were sampled again in 2005. Lake water levels dictated exactly how close we actually were to the 2004 sample sites.

Table 23. Latitude and Longitude coordinates of each seine haul site on Lake Cascade in 2004 and 2005 (Site #23 thrown out in 2005 as it is identical to site #24).

Site #	Latitude	Longitude	Site #	Latitude	Longitude	Site #	Latitude	Longitude
1	44.705750	116.1185	11	44.613183	116.0815	21	44.495833	116.0795
2	44.695283	116.1214	12	44.588233	116.0653	22	44.508500	116.0932
3	44.684417	116.0986	13	44.581200	116.0634	23		
4	44.675850	116.1101	14	44.569867	116.0652	24	44.542267	116.1177
5	44.678950	116.0846	15	44.552283	116.0629	25	44.557583	116.1408
6	44.674050	116.0795	16	44.539400	116.0634	26	44.566950	116.1407
7	44.669717	116.0896	17	44.526900	116.0601	27	44.574767	116.1469
8	44.654167	116.0901	18	44.516767	116.0558	28	44.579883	116.1475
9	44.645700	116.1041	19	44.497417	116.0614	29	44.585033	116.1468
10	44.639983	116.0887	20	44.490467	116.0559	30	44.594783	116.1372

RESULTS

2004 and 2005

We completed 30 randomly chosen sample sites around the lake in September 2004. We sampled 29 of the same 30 sites in September 2005. We collected a total of 8,471 and 5,020 age-0 yellow perch, respectively, in 2004 and 2005 (Table 24). Mean catch per haul with 95% Confidence Intervals (+/-) was 282 (421) and 173 (115), respectively, in 2004 and 2005. Sample site #23 was not sampled in 2005 as its GPS coordinates were identical to #24's. Although more age-0 yellow perch were collected in 2004 than in 2005, there were more sites

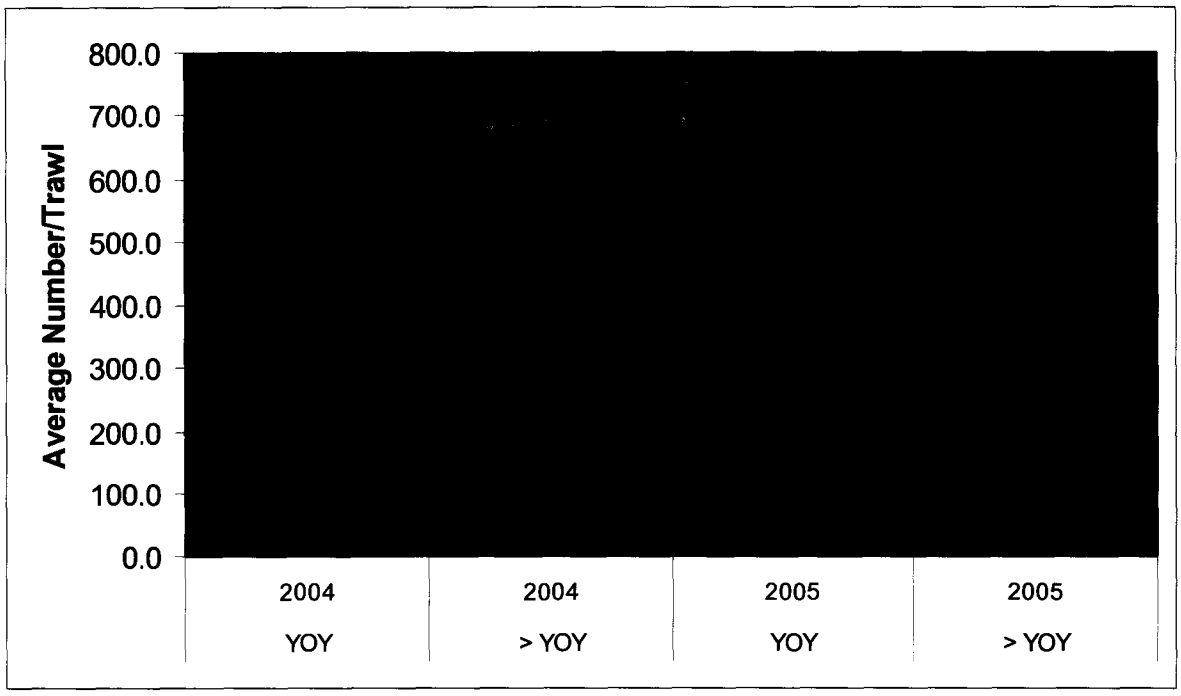


Figure 8. Average catch per seine haul and maximum confidence level (95%) of young-of-year and older yellow perch in Lake Cascade in September 2004 and 2005.

ZOOPLANKTON QUALITY INDEX MONITORING

METHODS

2004 and 2005

We monitored zooplankton quality and abundance using the Zooplankton Quality Index (ZQI) technique described by Teuscher (1999). The same sites were sampled as in 1999 and 2002. The approximate NAD 27 map datum UTM coordinates for the Cascade City boat ramp, Sugarloaf Island, and Poison Creek sample sites were 573509 E, 4929565 N, 570065 E, 4941978 N and 571331 E, and 4945528 E, respectively.

RESULTS

2004 and 2005

Zooplankton sampling was completed in July, August, and September in 2004 and in June, July, August, September, and October in 2005. The ZQI values in 2004 averaged 0.95, 1.4, and 1.9 for the Poison Creek, Sugarloaf Island, and Cascade City boat ramp, respectively, and in 2005 the site averages were 0.51, 0.26, and 0.5, respectively (Table 24). Average ZQI values were markedly lower in 2005 than in 2004 (Figures 9 and 10). Average ZQI values presented in Table 25 rank in the top 25% of Idaho waters sampled and reported by Teuscher (1999).

Table 25. Zooplankton quality index values for Lake Cascade by sample area and date collected in 2004 and 2005.

	ZQI		
2004	**Poison Creek**	**Sugarloaf Island**	**Cascade Boat Ramp**
7/22/04	0.5	0.6	2.8
7/27/04	1.2	1.8	2.1
8/3/04	0.8	1.8	0.6
8/13/04	0.9	2.5	3.4
8/21/04	0.9	2.3	0.8
8/28/04	0.3	0.45	0.8
9/2/05	0.3	0.5	--
9/12/04	--	0.8	1.16
9/23/04	0.95	1.8	3.9
Average ZQI	**0.95**	**1.4**	**1.9**
2005			
6/24/05	1.9	0.6	0.3
6/28/05	0.2	0.2	--
7/13/05	0.7	0.3	1.0
7/25/05	0.2	0.2	1.25
8/8/05	--	0.08	0.15
8/26/05	0.2	0.04	0.2
9/15/05	0.2	0.6	0.2
10/6/05	0.2	0.065	0.4
Average ZQI	**0.51**	**0.26**	**0.5**

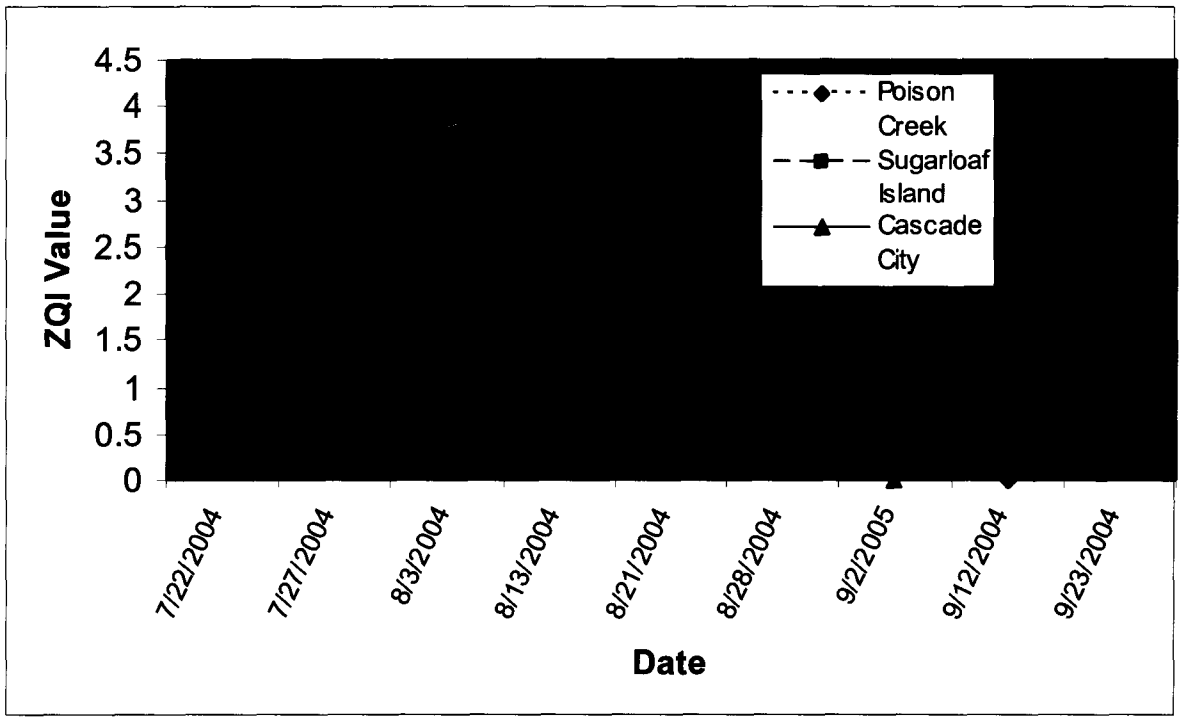


Figure 9. ZQI values measured by date in Lake Cascade in 2004 at the Poison Creek, Sugarloaf Island, and Cascade City sample sites.

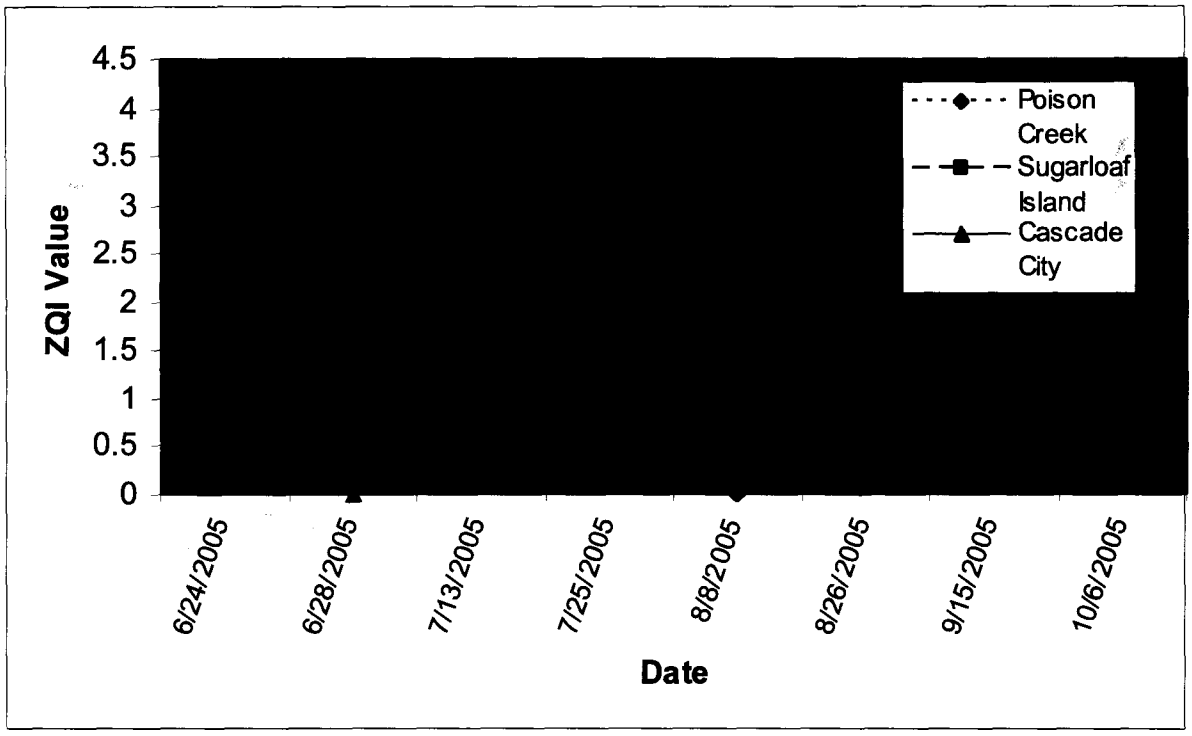


Figure 10. ZQI values by date measured in Lake Cascade in 2005 at the Poison Creek, Sugarloaf Island, and Cascade City sample sites.

2005 FISH COMMUNITY SURVEY

INTRODUCTION

We completed an intensive fish sampling effort to help evaluate the population structure and status of the Lake Cascade fish community and the effects of the yellow perch restoration efforts.

METHODS

We used IDFG standard lowland lake experimental gill nets to conduct this survey. Gillnetting sites were selected and placed in areas where the water was at least deep enough to totally submerge the offshore end of the net (greater than six feet). Deeper water sites were selected when possible. We selected sites distributed from the north end to the south end of the lake. Most of the gillnetting sites were located on the east shore of the lake because of shallow water restrictions on the west shoreline. All gill nets used were sinking nets, which allowed each gill net to fish multiple water depths and thermal zones.

Gill nets were set with the small mesh end of the net attached to shore. The net was then pulled tight and anchored perpendicular to shore. Gill nets were set in the afternoon, fished

overnight, and pulled the next morning. All fish collected were counted and total length measured to the nearest 10 mm. Specific gillnetting sites and UTM coordinates are presented in Table 26.

Table 26. Gill net site coordinates (WGS84 Datum).

Site #	Latitude	Longitude
1	44.684642	116.100485
2	44.679032	116.109678
3	44.663176	116.098003
4	44.699434	116.114904
5	44.677309	116.078609
6	44.642387	116.090387
7	44.653081	116.107857
8	44.638246	116.103138
9	44.613673	116.086144
10	44.528465	116.066738
11	44.570567	116.065038
12	44.59007	116.075958
13	44.562109	116.070932
14	44.609096	116.087372
15	44.498011	116.062672
16	44.519623	116.054477
17	44.50229	116.084058

RESULTS

We fished a total of 17 sinking gill nets beginning September 14, 2005 collecting a total of nine species and 2,332 fish. Species composition and catch was 519 black bullheads, 360 yellow perch, 355 largescale suckers, 512 northern pikeminnow, 192 smallmouth bass, 168 pumpkinseed, 110 coho salmon, 100 black crappie, and 16 rainbow trout. Thirty-six of the 512 northern pikeminnow caught were greater than 400 mm, 202 were 250 mm to 350 mm, and 274 were less than 250 mm (Table 27).

Table 27. Length (total length) frequencies of all fish collected in 17 gill nets in Lake Cascade in 2005.

Total Length (mm)	Species										
			Northern Pikeminnow								
	LSS	BBH	<250 mm	250 to 400 mm	>400 mm	YP	BC	PS	SMB	Coho	RBT
<80	0	0	0	0	0	0	0	4	0	0	0
80	0	0	0	0	0	4	2	4	0	0	0
90	0	0	1	0	0	0	0	39	0	0	0
100	0	0	0	0	0	0	1	27	0	0	0
110-119	0	1	1	0	0	0	0	5	0	0	0
120-129	0	2	0	0	0	1	0	41	0	0	0
130-139	0	3	0	0	0	4	6	22	3	0	0
140-149	1	9	1	0	0	20	8	13	4	2	0
150-159	2	6	1	0	0	32	16	10	2	5	0
160-169	4	11	16	0	0	25	20	3	0	20	0
170-179	6	24	48	0	0	16	5	1	2	24	1
180-189	2	35	49	0	0	18	2	0	5	20	1
190-199	1	42	47	0	0	27	2	1	4	9	1
200-209	3	35	33	0	0	41	6	0	3	11	2
210-219	2	31	23	0	0	34	16	0	3	10	0
220-229	0	31	16	0	0	33	9	1	11	7	2
230-239	4	38	16	0	0	34	7	0	17	4	0
240-249	9	39	26	0	0	26	7	0	12	2	0
250-259	1	35	0	30	0	18	2	0	11	0	0
260-269	4	39	0	29	0	11	1	0	4	0	0
270-279	4	52	0	40	0	5	0	0	11	0	1
280-289	4	42	0	31	0	13	0	0	8	1	0
290-299	8	24	0	28	0	4	0	0	12	0	0
300-309	10	4	0	19	0	2	0	0	8	1	0
310-319	6	6	0	12	0	0	0	0	6	1	4
320-329	12	3	0	12	0	0	0	0	11	0	0
330-339	11	1	0	6	0	0	0	0	13	0	1
340-349	17	2	0	2	0	0	1	0	12	0	1
350-359	15	0	0	0	0	0	0	0	6	0	0
360-369	13	2	0	3	0	0	0	0	2	0	1
370-379	9	1	0	1	0	0	0	1	6	0	1
380-389	10	1	0	1	0	0	0	0	1	0	0
390-399	4	0	0	1	0	0	0	0	1	0	1
400-409	7	0	0	0	1	0	0	0	6	0	0
410-419	12	0	0	0	1	0	0	0	1	0	0
420-429	6	0	0	0	1	0	0	0	1	0	1
430-439	9	0	0	0	1	0	0	0	1	0	0
440-449	3	0	0	0	1	0	0	0	2	0	1
450-459	2	0	0	0	1	0	0	0	0	1	1
460-469	5	0	0	0	0	0	0	0	2	1	0
470-479	6	0	0	0	5	0	0	0	0	0	0
480-489	3	0	0	0	1	0	0	0	1	0	0
490-499	5	0	0	0	4	0	0	0	0	0	1
500-509	18	0	0	0	2	0	0	0	0	0	0
510-519	16	0	0	0	4	0	0	0	0	0	0
520-529	21	0	0	0	3	0	0	0	0	0	1
530-539	11	0	0	0	0	0	0	0	0	0	0
540-549	6	0	0	0	2	0	0	0	0	0	0
550-559	14	0	0	0	1	0	0	0	0	0	0
560-569	4	0	0	0	0	0	0	0	0	0	0
570-579	10	0	0	0	1	0	0	0	0	0	0
580-589	8	0	0	0	0	0	0	0	0	0	0
590-599	6	0	0	0	0	0	0	0	0	0	0
600-609	13	0	0	0	1	0	0	0	0	0	1
610-619	6	0	0	0	0	0	0	0	0	0	0
620-629	2	0	0	0	0	0	0	0	0	0	0
TOTAL NUMBER	355	519	274	208	30	360	100	168	192	110	16

Species Codes

LSS= largescale sucker
BBH=black bull head
PS=pumpkinseed
SMB=smallmouth bass
YP=yellow perch
BC=black crappie
RBT=rainbow trout

DISCUSSION

Yellow perch and northern pikeminnow population structures were of primary interest in the fish survey. Historical and current data (Figures 11 and 12) illustrate that in the past when 90% of northern pikeminnow lengths were greater than 350 mm we have lost virtually all recruitment of juvenile fish of all species in the reservoir. Over 95% of the northern pikeminnow population in 1991 was greater than 350 mm and although juvenile yellow perch recruitment appeared to be good in 1991, the 1990 age class of yellow perch was the last and only age class to recruit to the fishery through 2005 (Figure 12).

An old age northern pikeminnow population appears to be the result of the loss of sufficient fish forage of all species including yellow perch and northern pikeminnow juveniles in the reservoir. Regardless of why fish forage disappeared (presumably northern pikeminnow predation but possibly other causes), an old age northern pikeminnow population was an indication that northern pikeminnow were the dominant species in the reservoir. At this point northern pikeminnow numbers were large enough to consume virtually all juvenile fish production of all species throughout the lake, eliminating recruitment of young adult northern pikeminnow and yellow perch and probably causing the crash of the yellow perch fishery. Given time the northern pikeminnow population would probably also crash allowing for the eventual recovery of the yellow perch fishery. However, because northern pikeminnow are very long lived this process could take decades.

Currently the yellow perch fishery has been virtually eliminated for nearly a decade and it has been 15 years since a successful year class has recruited to the fishery. Lake Cascade adult northern pikeminnow populations were reduced in the 1950s, 1960s, 1970s, and in 2004 and 2005 by chemically removing spawning adults primarily from the North Fork Payette River. The results were large reductions in the adult northern pikeminnow population size and a shift in age structure to much younger fish. The first northern pikeminnow reductions resulted in dramatic increases in the yellow perch, rainbow trout, and bullhead fisheries (Welch 1975). Impacts of the 2004 and 2005 northern pikeminnow reduction actions were evident with the changes in northern pikeminnow length frequencies found in 2005 compared with those found in 2000 and 2003 and hopefully with yellow perch recruitment in 2006 and beyond (Figure 12).

Future adult northern pikeminnow reduction actions should be initiated before northern pikeminnow length frequencies have shifted to where nearly all northern pikeminnow present are larger than 350 mm. This is an indication that northern pikeminnow predation is cropping off virtually all juvenile northern pikeminnow as well those of all species in the lake. Future adult pikeminnow reduction efforts should keep predatory pressure on juvenile yellow perch and other game fish species below the threshold of a population collapse. It took approximately 15 years, from 1973 to 1989, from the last reduction effort for the northern pikeminnow population to recover and totally consume adult recruitment of all fish in the lake.

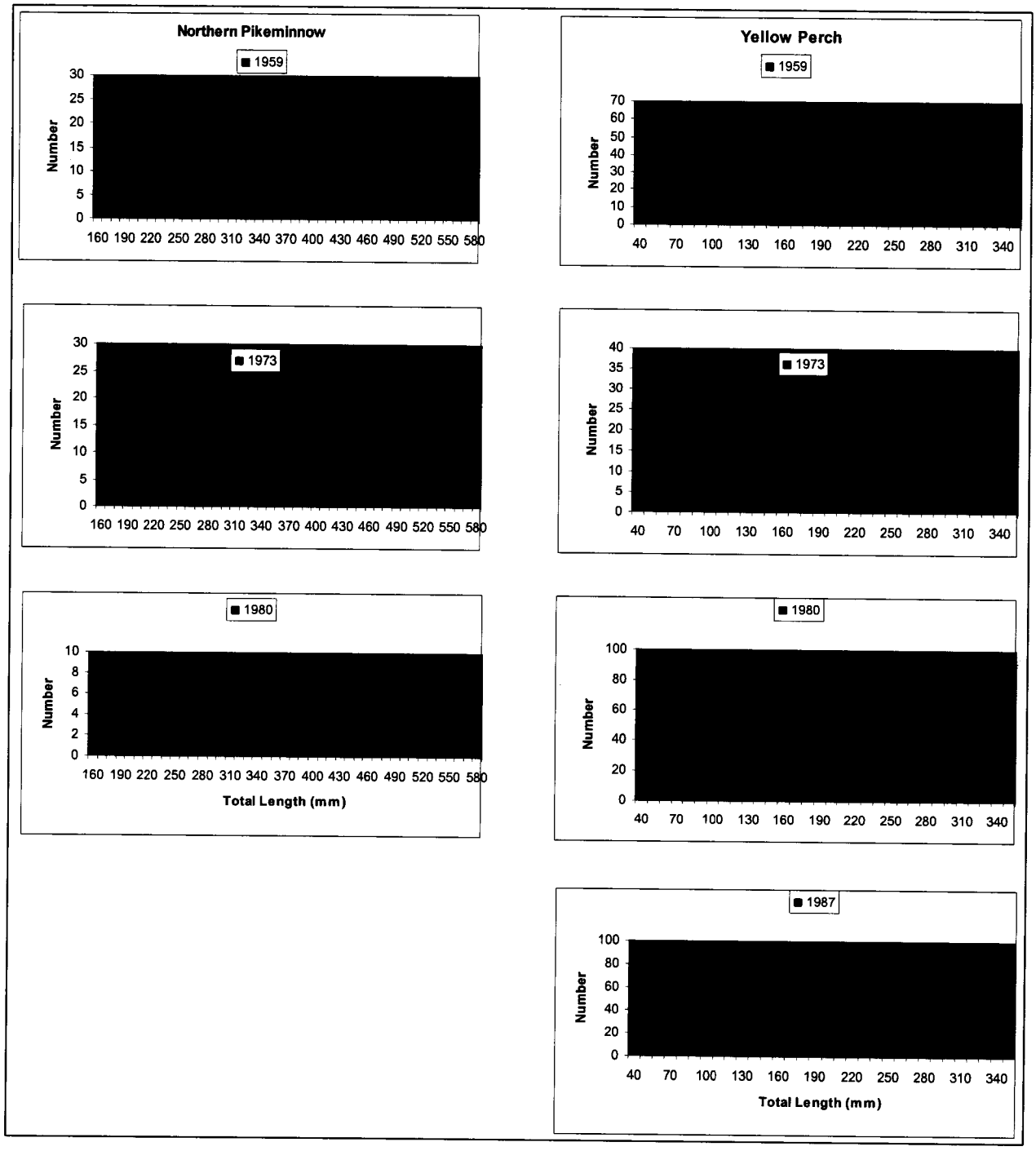


Figure 11. Length frequencies of northern pikeminnow and yellow perch in Lake Cascade in 1959, 1973, 1980, and 1987.

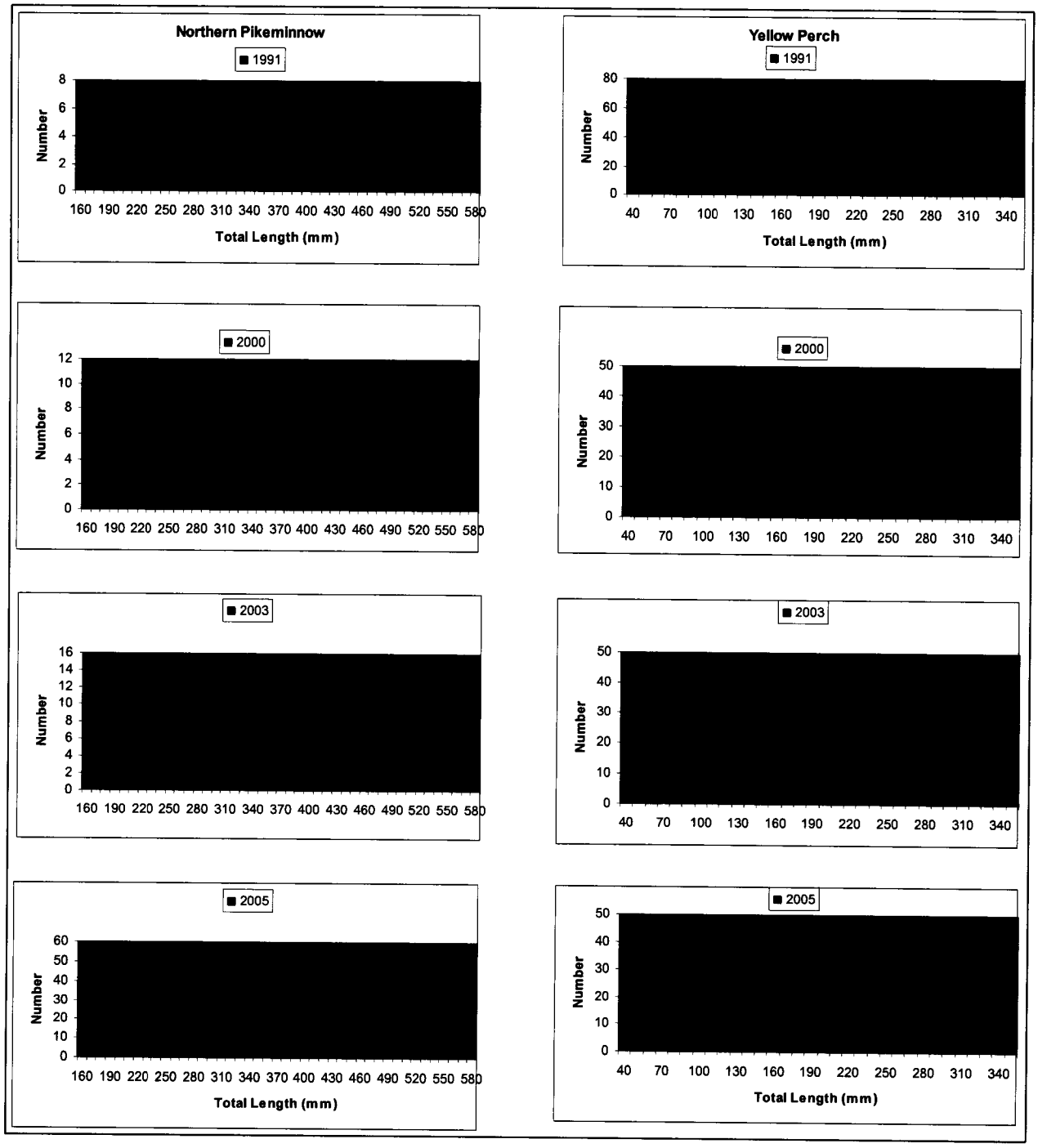


Figure 12. Length frequencies of northern pikeminnow and yellow perch in Lake Cascade in 1991, 2000, 2003, and 2005.

LAKE CASCADE FISHERY MONITORING RECOMMENDATIONS

1. Continue holiday aerial angler counts.
2. Conduct a yearlong creel survey in 2008.
3. Continue hydroacoustic surveys for northern pikeminnow.
4. Continue trawling as main method for following yellow perch production.
5. Continue beach seining at a reduced number of sites for several more years.
6. Conduct fall trend gillnetting every other year.

LITERATURE CITED

Allen, D. B., P. J. Janssen, D. Teuscher, K. Apperson, and L. Hostettler. 2002. Regional fishery management investigations. Federal Aid in Fish Restoration. 2002 Job Performance Report, Program F-71-R-26. Idaho Department of Fish and Game, Boise.

Anderson, D., P. J. Janssen, K. Apperson, and L. Hostettler. 2001. Regional fishery management investigations. Federal Aid in Fish Restoration. 1998 Job Performance Report, Program F-71-R-23. Idaho Department of Fish and Game, Boise.

Bennett, D. H. 2004. Interactions of northern pikeminnow and yellow perch in Lake Cascade, Idaho. University of Idaho, Moscow.

Butts, A. E. In review. Lake and reservoir research. Job Performance Report. Program F-73-R-26. Project 5. Idaho department of Fish and Game, Boise.

Griswold, R. G., and T. C. Bjorn. 1989. Development of indices of yellow perch abundance in Cascade Reservoir, Idaho. Job Completion Report, Project F-71-R-12. Subproject III, Job No. 6. Idaho Department of Fish and Game, Boise.

Janssen, P. J., D. B. Allen, and K. Apperson. In review. Regional fishery management investigations. Federal Aid in Fish Restoration. 2003 Job Performance Report, Program F-71-R-27. Idaho Department of Fish and Game, Boise.

Neuhold, J. M., and K. H. Lu. 1957. Creel census methods. Utah State Department of Fish and Game, Publication 8, Salt Lake City.

Teuscher, D. 1999. Project 8. Hatchery trout evaluations. Job Performance Report. July 1, 1998 to June 30, 1999. Program F-73-R-20. Idaho Department of Fish and Game, Boise.

Welsh, T. L. 1975. Distribution, survival, and growth of game fish at Cascade Reservoir (Research). Job IIb, Project F-53-R-10, Idaho Department of Fish and Game, Boise.

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