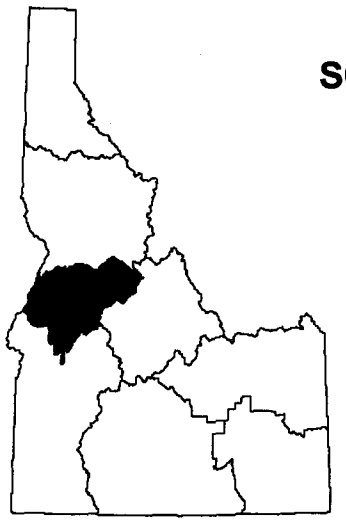
FISHERY MANAGEMENT INVESTIGATIONS

IDAHO DEPARTMENT OF FISH AND GAME

FISHERY MANAGEMENT ANNUAL REPORT

Cal Groen, Director



SOUTHWEST REGION - McCALL

2006

By:
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SOUTHWEST - MCCALL 2006 FISHERY MANAGEMENT ANNUAL REPORT

Mountain Lake Surveys

ABSTRACT

The mountain lake survey work in 2006 included the field based surveys of 84 lakes and the expanded use of Geographic Information Systems (GIS) in the management of survey and stocking datasets. All 84 lakes surveyed had amphibians present. Forty-one of the lakes were fishless. Geographically, most lakes surveyed this season were to the northwest of McCall including the Seven Devils Range and the lakes among the high peaks bounded by Patrick Butte to the north and Granite Peak to the south. Several trips outside of those locales included Chamberlain Basin, West Fork Buckhorn Creek of the South Fork Salmon River, and the Rapid Creek of the Gold Fork River.

Authors:

Paul Mitchell
Fishery Technician

Dale Allen
Regional Fishery Manager

INTRODUCTION

In 2006 the mountain lake survey work included field based surveys of 84 lakes and the expanded use of Geographic Information Systems (GIS) in the management of survey and stocking datasets. Geographically, most lakes surveyed this season were to the northwest of McCall including the Seven Devils Range and the lakes among the high peaks bounded by Patrick Butte to the North and Granite Peak to the south. Several trips outside of those locales included Chamberlain Basin, West Fork Buckhorn Creek of the South Fork Salmon River, and Rapid Creek of the Gold Fork River. The majority of lakes surveyed drain to the Salmon River.

The increased use of GIS began with the importing of 2005 survey data and by the end of the field season led to the development of a statewide lakes geodatabase that offers the user access to spatial data, digital images of the lakes, state stocking records, and mountain lakes survey data. Due to the new role of GIS in the mountain lakes survey, significant attention was also directed to the process, design, and migration of survey data to a geodatabase attribute table. This process has included coordinating with the Salmon, Clearwater and Southwest Regions so that a uniform model could be shared among all offices.

METHODS

The mountain lake surveys in 2006 included the data collection of fish and amphibian population/presence, social & environmental use, basic water chemistry, and digital photography. Fish population/presence data was accomplished through gillnetting and angling while amphibian presence was determined through the Visual Encounter Survey method (VES).

Human social and environmental use data was a cumulative sense for the impact visually encountered at a lake through the identification of trails, grazing use, and numbers and size of campsites and fire pits.

Basic water chemistry testing included conductivity, water temperature, pH, Secchi and maximum water depth. Digital pictures were taken to document fish/amphibian appearance, lake geomorphic and ecological condition, and social/environmental use.

GIS

GIS and geodatabase development were pursued with the intent of creating a singular model through which spatial, survey, and stocking history data could be input, retrieved and analyzed for use by fishery managers. The development process involved the input of 2000-2006 mountain lake survey data and the acquisition of the state lakes shapefile and the state stocking database. These three datasets are the primary features that are managed in the final version of the geodatabase.

The geodatabase is an Environmental Systems Research Institute (ESRI) ArcGIS model that is contained within a Microsoft Access database format. As a relational database this model allows the user to relate tabular datasets by common attributes while storing all data in one common file. The relational capability of the geodatabase model is particularly useful as there are several one-to-many relationships shared between the spatial, survey, and stocking datasets. For example one lake may have several stocking records and conversely one type of fish may have been stocked in many lakes.

So the resulting geodatabase model that is accessed through an ArcMap-ArcView project file allows the user to spatially select a lake and then from that selection retrieve all related survey and stocking records.

An additional component of the integration of GIS into the mountain lakes surveys in 2006 was the introduction of a Personal Digital Assistant (PDA) and ESRI ArcPad field GIS software. This combination of hardware and software allowed the user to directly input data into a spatial software while in the field. This is the least developed of the GIS components and will require additional work to use at its full capability and efficiency.

RESULTS

The survey season in 2006 began June 21 and lasted until September 27. Climatically and environmentally the surveys began with snow pack still melting into lakes which gave way to hot and dry conditions through August and concluding with wet and snowy weather again by the end of September. Thus with this assumption known the data collected was dependent upon the current conditions on the survey date (e.g., some lakes may have had a greater abundance of amphibians in August rather than early July when we may have surveyed it).

Columbia Spotted Frogs *Rana pretiosa*, Western Toads *Bufo boreas*, and Western Long-Toed Salamanders *Ambystoma macrodactylum* were the most common amphibians found. Pacific Chorus Frogs *Pseudacris regilla*, Common Garter *Thamnophis siralis*, and Western Terrestrial Garter Snakes *Thamnophis elegans* were rarely encountered. It was also noted that Long Toed Salamanders were usually found as larvae and rarely as juveniles or adults. This was true through the end of the season. Amphibian abundance for the 84 surveyed lakes is included in Table 1.

Fish presence was determined through a combined gillnet and/or angler survey depending upon the field schedule for any given trip. The one record of an unknown fish was encountered at Hanson Creek Lake #2 in the Seven Devils range. This data was recorded as such because one fish was seen jumping but no fish were caught via angling or one full gillnet night. Nearly half the lakes surveyed were found to be fishless. A breakdown of the primary fish species encountered is listed below in Table 2.

For the most part lakes closer to roads, trails, or trailheads were found to have the greatest level of human use. There were rare exceptions like Ruth Lake where we encountered high levels of litter, an archery practice area, and log furniture. Table 3 categorizes human use levels in the survey waters.

A cursory analysis of the data does not establish a clear pattern for the presence of fish or amphibians or an impact of the presence of either upon the other. We visited fishless lakes with few amphibians and as well found some lakes with what appeared a simultaneously high population of brook trout and western toads. An inspection of fish stomachs never yielded a predated amphibian or amphibian larvae. However, lakes with fish generally seemed to have a lower abundance of amphibians. In further research of mountain lakes it would seem wise to revisit lakes at a different time of the season to account for any amphibians that may have been overlooked due to a survey being accomplished to early or late in the year. Table 4, lists the 84 lakes surveyed including fish presence and amphibian abundance.

Table 1. Amphibian (VES) survey counts of lakes within each category.

Amphibian (VES) Abundance	Count of Lakes
HIGH	18
MED	22
LOW	20
RARE	24

Table 2. Fish species distribution among surveyed lakes.

Primary Fish Species Presence	Count of Lakes
FISHLESS	41
GOLDEN TROUT *Oncorhynchus aguabonita*	1
RAINBOW TROUT *O. mykiss*	5
WESTSLOPE CUTTHROAT TROUT *O. clarkii lewisi*	18
BROOK TROUT *Salvelinus fontinalis*	18
UNKNOWN	1

Table 3. Human use levels.

Human Use Level	Count of Lakes
HIGH	13
MED	22
LOW	28
RARE	21

Table 4. All Lakes Surveyed in 2006.

LLID	Catalog Number	Lake Name	Date	Primary Fish Presence	Amphibian (YES) Abundance
1166026451932		SIX LAKE BASIN #3	9/7/2006	FISHLESS	LOW
1166196452146	0500000130.20	BIG OXBOW CREEK LAKE	9/6/2006	FISHLESS	MED
1166011451964	0500000135.00	SIX LAKE BASIN #1	9/6/2006	FISHLESS	MED
1165940451977	0500000136.00	SIX LAKE BASIN #2	9/6/2006	BROOK TROUT	LOW
1165991451947	0500000137.00	SIX LAKE BASIN #4	9/6/2006	FISHLESS	LOW
1165959451949	0500000138.00	SIX LAKE BASIN #5	9/6/2006	FISHLESS	HIGH
1165919451912	0500000139.00	SIX LAKE BASIN #8	9/7/2006	RAINBOW TROUT	RARE
1165941451939	0500000139.10	SIX LAKE BASIN #6	9/7/2006	FISHLESS	RARE
1165950451927	0500000139.20	SIX LAKE BASIN #7	9/7/2006	FISHLESS	RARE
1165712451785	0500000141.00	BIG HORSE PASTURE LAKE	9/8/2006	FISHLESS	HIGH
1165174453447	0700000113.00	SEVEN DEVILS LAKE	7/27/2006	FISHLESS	LOW
1165255453372	0700000114.00	MIRROR LAKE	7/27/2006	WESTSLOPE CUTTHROAT TROUT	RARE
1165122453234	0700000115.00	LOWER CANNON LAKE	7/26/2006	WESTSLOPE CUTTHROAT TROUT	RARE
1165270453226	0700000117.00	UPPER CANNON LAKE	7/25/2006	WESTSLOPE CUTTHROAT TROUT	RARE
1165300453227	0700000117.20	UNNAMED	7/25/2006	FISHLESS	RARE
1165268453211	0700000117.40	UNNAMED	7/26/2006	FISHLESS	RARE
1165353453119	0700000118.00	HANSON CREEK LAKE #1	7/24/2006	WESTSLOPE CUTTHROAT TROUT	RARE
1165344453130	0700000118.50	UNNAMED	7/25/2006	FISHLESS	MED
1165372453143	0700000119.00	HANSON CREEK LAKE #2	7/24/2006	UNKNOWN	LOW
1165452453192	0700000120.00	HANSON CREEK LAKE #3	7/25/2006	FISHLESS	RARE
1165460453083	0700000120.20	HANSON CREEK LAKE #4	8/3/2006	FISHLESS	RARE
1165564452952	0700000122.00	DOG LAKE	7/31/2006	WESTSLOPE CUTTHROAT TROUT	RARE
1165561452933	0700000122.10	UNNAMED	7/31/2006	FISHLESS	HIGH
1165506452820	0700000123.00	HORSE HEAVEN LAKE #1	8/2/2006	FISHLESS	HIGH
1165527452769	0700000124.00	HORSE HEAVEN LAKE #2	8/2/2006	FISHLESS	RARE
1165609452787	0700000125.00	HAAS LAKE	8/2/2006	FISHLESS	HIGH
1165630452875	0700000127.00	HORSE HEAVEN LAKE #5	8/1/2006	FISHLESS	HIGH
1165583452873	0700000128.00	HORSE HEAVEN LAKE #4	8/1/2006	WESTSLOPE CUTTHROAT TROUT	LOW
1165676452905	0700000129.00	SLIDE ROCK LAKE	8/1/2006	WESTSLOPE CUTTHROAT TROUT	RARE
1165571452424	0700000130.00	RUTH LAKE	8/14/2006	BROOK TROUT	MED
1165521452363	0700000133.00	BLACK IMP LAKE	8/15/2006	FISHLESS	RARE
1165439452300	0700000133.10	LITTLE BLACK IMP LAKE	8/15/2006	FISHLESS	HIGH
1165473452106	0700000137.00	PARADISE CREEK LAKE	8/16/2006	FISHLESS	MED
1165534452227	0700000138.00	CRYSTAL LAKE	8/15/2006	WESTSLOPE CUTTHROAT TROUT	LOW
1165433452045	0700000139.00	UNNAMED LAKE	8/16/2006	FISHLESS	RARE
1165541452013	0700000140.00	SATAN LAKE	8/16/2006	WESTSLOPE CUTTHROAT TROUT	RARE
1165687451893	0700000143.10	PURGATORY SADDLE LAK	9/5/2006	FISHLESS	HIGH
1161984452455	0700000160.00	BLACK LAKE	7/11/2006	BROOK TROUT	LOW
1162051452437	0700000163.00	EDEN LAKE	7/11/2006	FISHLESS	MED
1161963452547	0700000164.00	RAINBOW LAKE	7/11/2006	BROOK TROUT	MED
1162101452655	0700000165.00	HARD BUTTE LAKE	7/12/2006	WESTLOPE CUTTHROAT TROUT	RARE
1161981452627	0700000166.00	WARM SPRINGS LAKE	7/14/2006	WESTSLOPE CUTTHROAT TROUT	MED
1161637451929	0700000167.00	LLOYDS LAKE	9/26/2006	BROOK TROUT	LOW
1161449451724	0700000173.00	HARD CREEK LAKE	9/27/2006	BROOK TROUT	HIGH
1162055451001	0700000175.00	GRANITE HOLE LAKE	9/18/2006	WESTSLOPE CUTTHROAT TROUT	RARE

Table 4. Continued.

LLID	Catalog Number	Lake Name	Date	Primary Fish Presence	Amphibian (YES) Abundance
1161838451208	0700000177.00	CORRAL LAKE	7/6/2006	BROOK TROUT	LOW
1161573451146	0700000178.00	DUCK LAKE	9/20/2006	BROOK TROUT	MED
1161520451487	0700000179.00	HIDDEN LAKE	8/3/2006	WESTSLOPE CUTTHROAT TROUT	LOW
1161935451667	0700000180.00	GRASSY MTN. LAKE #1	7/5/2006	BROOK TROUT	HIGH
1161992451673	0700000183.00	GRASSY MTN. LAKE #2	7/5/2006	BROOK TROUT	LOW
1161986451601	0700000184.00	FROG LAKE	7/6/2006	FISHLESS	HIGH
1162226453150	0700000204.00	GOAT LAKE	9/11/2006	BROOK TROUT	MED
1162401453084	0700000205.00	GAY LAKE	6/27/2006	BROOK TROUT	RARE
1162365453075	0700000207.00	MARY LAKE	6/27/2006	GOLDEN TROUT	HIGH
1162419453028	0700000208.00	PIPER LAKE	6/28/2006	BROOK TROUT	LOW
1162320453038	0700000209.00	JOHN LAKE	6/28/2006	BROOK TROUT	MED
1162055453052	0700000210.00	PARADISE LAKE	9/12/2006	BROOK TROUT	HIGH
1161987452760	0700000212.00	PARTRIDGE CREEK LAKE	9/25/2006	FISHLESS	MED
1161964452726	0700000213.00	TWIN LAKE #1	9/13/2006	BROOK TROUT	LOW
1161987452699	0700000214.00	TWIN LAKE #2	7/13/2006	FISHLESS	HIGH
1162023452695	0700000215.00	TWIN LAKE #3	7/13/2006	BROOK TROUT	MED
1162078452682	0700000217.00	TWIN LAKE #4	7/12/2006	BROOK TROUT	RARE
1162064452654	0700000218.10	UNNAMED LAKE	7/12/2006	FISHLESS	MED
1162064452649	0700000218.20	UNNAMED LAKE	7/12/2006	FISHLESS	MED
1158447449132	0700000480.00	RAINBOW #1	7/20/2006	RAINBOW TROUT	RARE
1158535449156	0700000483.00	RAINBOW LAKE #2	7/20/2006	RAINBOW TROUT	MED
1158647448958	0700000485.00	BUCKHORN LAKE #2	7/18/2006	WESTSLOPE CUTTHROAT TROUT	RARE
1158665448944	0700000487.00	BUCKHORN LAKE #3	7/18/2006	WESTSLOPE CUTTHROAT TROUT	LOW
1158649449042	0700000495.00	NORTH BUCKHORN LAKE	7/19/2006	WESTSLOPE CUTTHROAT TROUT	LOW
1152847454130	0700000529.60	FROG LAKE	8/8/2006	FISHLESS	HIGH
1152790454017	0700000540.00	GAME CREEK LAKE	8/8/2006	FISHLESS	MED
1152747453940	0700000543.00	FLOSSIE LAKE	8/7/2006	RAINBOW TROUT	LOW
1153352453760	0700000545.00	CUTTHROAT LAKE	8/9/2006	WESTSLOPE CUTTHROAT TROUT	LOW
1153369453674	0700000545.20	UNNAMED LAKE	8/10/2006	FISHLESS	MED
1153348453679	0700000545.30	UNNAMED LAKE	8/10/2006	FISHLESS	MED
1153331453641	0700000545.40	UNNAMED LAKE	8/10/2006	FISHLESS	MED
1153349453567	0700000545.50	UNNAMED LAKE	8/10/2006	FISHLESS	HIGH
1153341453483	0700000545.60	UNNAMED LAKE	8/10/2006	FISHLESS	HIGH
1153336453809	0700000547.00	SALAMANDER LAKE	8/9/2006	FISHLESS	LOW
1153195453880	0700000548.00	FISH LAKE	8/8/2006	RAINBOW TROUT	LOW
1153379453847	0700000549.00	SHEEPEATER LAKE	8/9/2006	WESTSLOPE CUTTHROAT TROUT	MED
1159470448374	0900000304.00	UNNAMED LAKE	6/21/2006	FISHLESS	MED
1159510448361	0900000305.00	UNNAMED LAKE	6/21/2006	FISHLESS	HIGH
1159185448366	0900000306.00	UNNAMED LAKE	6/22/2006	FISHLESS	RARE

RECOMMENDATIONS

1. Continue mountain lake surveys in 2007 focusing on completing the South Fork Salmon River basin lakes then begin Middle Fork Salmon River watershed lakes.
2. Continue to add old surveys into the databases.
3. Analyze lake groups in fourth and fifth order HUC watersheds for distribution of fish and amphibians.
4. Work with other regions to produce a statewide Mountain Lakes Management Plan.

SOUTHWEST - MCCALL 2006 FISHERY MANAGEMENT REPORT

Lowland Lakes Management

ABSTRACT

We chemically treated Horsethief and Corral Creek Reservoirs with rotenone to remove unwanted yellow perch *Perca flavescens* populations. Both reservoirs are managed as rainbow trout *Oncorhynchus mykiss* put and take family fishing waters. Horsethief Reservoir was drained entirely prior to the treatment and Corral Creek Reservoir was left at late fall reservoir levels (approximately half pool).

We surveyed the lake trout *Salvelinus namaycush* population in Payette Lake to evaluate current fishing regulations and impacts of recent lake trout stockings. Surveys showed an increased number of lake trout over 914 mm from that observed in 2001. Lake trout originating from the recent hatchery stockings made up 3.2% of captured fish. However, natural recruitment had been sufficient to maintain this trophy fishery.

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HORSETHIEF RESERVOIR

INTRODUCTION

We chemically treated the drained Horsethief Reservoir to eliminate an unwanted yellow perch *Perca flavescens* population. Reasons, background and methods for the treatment are given in the Application to Idaho Department of Environmental Quality for the Short-Term Activity Exemption. This application is presented below.

APPLICATION FOR SHORT-TERM ACTIVITY EXEMPTION

Applicant: Idaho Department of Fish and Game (IDFG)

Contact Person: Dale Allen, 634-8137

Body of Water: Horsethief Reservoir

Tributary To: Big Creek (North Fork Payette River).

Objective: To chemically eradicate stunted yellow perch and restock with rainbow trout *Oncorhynchus mykiss.*

Date: October 13, 2006

Evidence of protection or promotion of public interest

Horsethief Reservoir is owned and operated by the Idaho Department of Fish and Game (IDFG). It was constructed in 1963 and is managed as a trout fishery. The reservoir is maintained at a full pool year around. At full pool the reservoir contains 4,900 acre-feet of water with a surface area of 270 acres. Rainbow trout are stocked annually and brown trout *Salmo trutta* semi annually to maintain the trout fishery in Horsethief Reservoir.

Yellow perch were first reported in Horsethief Reservoir in 1981, the result of an illegal introduction. By 1983 they totally dominated the fishery and were then chemically eradicated with rotenone in the fall of 1983. Following treatment the reservoir was restocked with trout and trout fishing was excellent until 1993.

Yellow perch were again reported being caught in Horsethief Reservoir in 1993. The Department completed a fish survey in 1994 and sampled 323 fish of four species. These included yellow perch, rainbow trout, brown trout and splake *S. fontinalis x S. naymaycush.* Yellow perch, rainbow trout, brown trout and splake made up 88%, 8.5%, 2% and 1.5% respectively. Expressed as biomass, these same four species made up 51.5%, 29.6%, 12.8%, and 6% respectively. By 1995 yellow perch totally dominated the fishery and were chemically removed in the fall of 1995.

Yellow perch were again documented in 1997 suggesting they were once again illegally introduced, or we were not 100% effective in our 1995 treatment. We chemically eradicated all fish from the lake in 1999 and by 2003 yellow perch were again documented present in the lake. The current perch population is very similar to that observed in 1983, 1994, and 1999. Yellow perch range in length from 50 to 300 mm with the largest number of fish in the 65 to 90 mm range.

Trout fishing deteriorated rapidly in 2006. Yellow perch in the 5 – 6 inch range dominated the fishery. Angler complaints increased over the summer due to slow trout fishing and small perch consuming trout baits before trout could.

A statewide IDFG press release which addressed the proposed draining and treatment and requested public comment was issued on August 28, 2006. At least one local newspapers and the Idaho Statesman published the release. Public response to the proposal was light with some opposition to the removal of the yellow perch. However, the Departments management plan for the reservoir is strictly trout management. No concern over the use of Rotenone or environmental impacts were expressed by any respondents.

Prevention of long-term injury to beneficial use

The IDFG plans to restock Horsethief Reservoir in the spring of 2007 with catchable size rainbow trout to provide a fishery soon after ice out. Brown trout and rainbow trout fingerlings will also be stocked in the spring/summer of 2007.

The reservoir draining will begin on September 7, 2006 and is expected to completely drain by October 7, 2006. Only the stream channel and a few pot holes within the reservoir boundary are expected to retain water.

The main creek channel (Horsethief Creek) will be treated with a drip station located just above the road culvert approximately .53 km east of the reservoir. The reservoir valve will be closed when the chemical is first detected near the lakes outlet valve. Once closed the remaining pools will them be treated. Backpack sprayers will be utilized to treat small pockets of water and spring areas that would otherwise be isolated from the chemical. Horsethief Creek just below the outlet will be treated for a distance of 0.4 to 0.8 km below the dam after the outlet valve is closed and flows drop to near zero. Fish kills are expected in Horsethief Creek down to its confluence with Big Creek, mostly from dewatering.

The total treatment of the channel, pool and spring areas is expected to take approximately 120 liters of 5% rotenone. However, exact flows and volume of remaining pools will not be known until just before the treatment. Creek flows and pool volumes will be calculated just prior to the treatment. Due to all the mud and organic debris on the drained reservoir bottom we will treat all water at a rotenone concentration of 1.0 ppm even though past IDFG bio assay work indicate that 0.5 ppm is toxic to all yellow perch.

RESULTS

Results are presented in the following rotenone application record competed and filed in compliance of Idaho Department of Agriculture pesticide application regulations.

Rotenone Application Record

Location of Application:Horsethief Reservoir

Date of Application: 10/13/06

Time:0930-1330 Fish Species Targeted:yellow perch

Brand of Chemical used:Chem Fish Regular EPA Registration #:1439-157

Length of Streams Treated:see note Stream Flow Rate (m^3/s): 0.096 (3.4 cfs)

Amount of Chem. Applied to Streams: 18.9 L Length of Treatment in Hours: 13.9 hrs

Area of standing water treated:pools, pockets of water inside reservoir boundary

Amount of Chem. Applied to Standing Water:24.6 L

Name and License Number of Applicator:Paul Janssen, 43145

Name of Property Owner:IDFG

Rate of Application: 4 ppm Wind Speed and Direction:0

Person who Recommended the Product:IDFG

Worker Protection Information Exchange: NA

Comments: Streams, seeps, and flat water treated were all within existing lake boundary except for approximately 0.40 km of Horsethief Creek which flowed directly into the lake basin. Therefore all chemical was technically treating standing water as the dam outlet was closed before rotenone passed through it. We applied enough rotenone in the reservoir treatment to keep all standing water toxic to perch for approximately eight days. Approximately 0.95 L of rotenone was applied to the pools in a 0.40 km section of the creek just below the outlet in the dam.

We observed a small number of yellow perch and rainbow trout dead or dying in the small pools on the flat in front of the dam. The vast majority of fish in the reservoir had been flushed down the creek prior to the actual rotenone application.

CORRAL CREEK RESERVOIR

INTRODUCTION

We chemically treated Corral Creek Reservoir in 2006 to eliminate an unwanted yellow perch *Perca flavescens* population. Reasons, background and methods for the treatment are given in the Application to Idaho Department of Environmental Quality for the Short-Term Activity Exemption. This application is presented below.

APPLICATION FOR SHORT-TERM ACTIVITY EXEMPTION

Applicant: Idaho Department of Fish and Game (IDFG)

Contact Person: Dale Allen, 634-8137

Body of Water: Corral Creek Reservoir

Tributary To: Big Creek (North Fork Payette River)

Objective: To chemically eradicate stunted yellow perch and restock with rainbow trout *Oncorhynchus mykiss.*

Date: November 2, 2006

Evidence of protection or promotion of public interest

Corral Creek Reservoir is owned and operated by Joe Kennedy of Cascade, Idaho. It was constructed in 1951 and is maintained as an irrigation reservoir. At full pool the reservoir contains 560 acre-feet of water. IDFG manages the reservoir as a rainbow trout fishery. Rainbow trout are stocked annually to maintain this fishery.

Yellow perch were first reported in Corral Creek Reservoir around 2000, and documented with surveys in 2002. The presence of yellow perch was the result of an illegal introduction. Over half of the gill net sample in 2002 was yellow perch.

Rainbow trout fishing has deteriorated continuously from 2002 to 2006. Yellow perch in the 125 to 150mm range dominated the fishery. Angler complaints have increased due to slow trout fishing, small perch and perch consuming trout baits before trout could.

Prevention of long-term injury to beneficial use

The reservoir is presently holding around 250 acre-feet of water and it will be held at this level for the treatment. Exact water volumes will be determined prior to the treatment. The outlet will be closed as tight as possible prior to treatment. Some leakage may occur so we expect to kill fish down to Big Creek but no further.

There are a few small inlet streams/seeps in the two main arms of the reservoir and these will be treated appropriately, with either drip stations, backpack sprayers or both. The main reservoir pool will be treated using boats to distribute the rotenone around the lake and to spray the shallow shoreline areas. The lake will be treated at 1 to 2 ppm rotenone concentration which is the recommended label amount for normal pond use.

The total treatment of the pool is expected to take approximately 643 L of 5% rotenone at 2 ppm. However, exact flows and volume of remaining pools will not be known until just before the treatment. Creek flows and pool volumes will be calculated just prior to the treatment.

The IDFG plans to restock Corral Creek Reservoir in the spring of 2007 with catchable size rainbow trout to provide a fishery soon after ice out.

The owner and operator of the dam, Joe Kennedy, had been notified of our intent to chemically renovate the lake and he had no objections to the project.

RESULTS

Results are presented in the following rotenone application record completed and filed in compliance of Idaho Department of Agriculture pesticide application regulations.

Rotenone Application Record

Location of Application: Corral Creek Reservoir

Date of Application: 11/02/06

Time: 1030-1530

Species targeted: yellow perch

Brand of Chemical used: Synpren-Fish Toxicant

EPA Registration #: 655-6A-1

Length of Streams Treated: NA

Stream Flow Rate (CFS): NA

Amount of Chem. Applied to Streams: 0

Length of Treatment in Hours: 0

Area of standing water treated: ~250 acre-feet

Amount of Chem. Applied to Standing Water: 738 L

Amount of Powder Applied to All Areas:0

Name and License Number of Applicator: Paul Janssen, 43145

Name of Property Owner: Joe Kennedy

Rate of Application:~2.3 ppm

Wind Speed and Direction: 0-8 km/hr, direction variable

Person who Recommended the Product: IDFG

Worker Protection Information Exchange: NA

Comments: There were no live streams or springs visibly entering the reservoir therefore, all rotenone was applied by two boats. Total rotenone application was 738 L which included 284 L of rotenone in each of the north and south arms of the lake and 170 L in the basin in front of the dam. Of the total rotenone application, one boat sprayed the perimeter of the reservoir with 114 L and then pumped an additional 170 L of rotenone down near the bottom of the reservoir in the basin in front of the dam where water was deeper than 6.1 m. The other boat distributed 454 L

into the lake with a venturri pump while driving around the lake. There was approximately 0.003 m^3/s (.1 cfs) of water flowing out of the dam outlet that could not be physically shutoff therefore we expected fish kills in the small creek below the reservoir.

We observed several thousand yellow perch of three or four age classes after the treatment. The vast majority of yellow perch killed during the treatment were 50 to 75 mm and outnumbered other age classes by at least 1000:1. The oldest age class observed averaged 200 to 225 mm. We observed less than 15 rainbow trout and no other species after treatment surveys.

Payette Lake Lake Trout Survey

INTRODUCTION

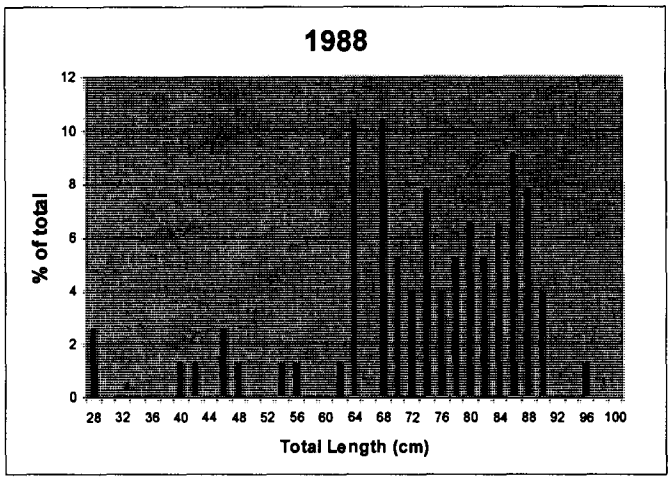
The trophy lake trout *Salvelinus namaycush* fishery on Payette Lake is very successful and popular, and considered by many to be world class. The majority of fishing pressure on the lake in recent years is estimated to be lake trout angling. These anglers are targeting lake trout even though it is a catch and release fishery. Fish in excess of 91.4 cm and 9.1 kg are commonly caught and fish over 1,016 mm and 13.6 kg are quite common.

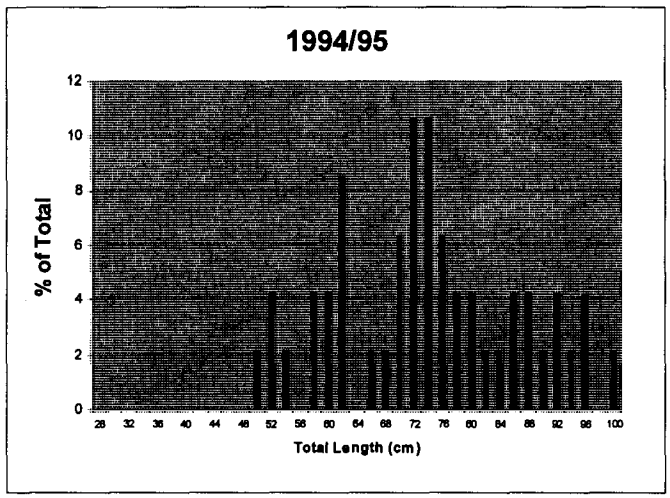
The lake trout harvest regulations have changed twice since 1995. In 1995, Janssen et al. (2000) found that lake trout recruitment was limited with only 17% of all fish observed being less than 610 mm (assumed size of maturity), that the percent of fish in the population greater than 760 mm had decreased since 1988, and that there had been an increase in exploitation rates from that found in 1988 (Figure 1). Subsequently, in 1996 the lake trout harvest regulation was changed from a five fish limit to one fish over 914 mm per day limit. Lake trout population surveys in 2001 revealed a significant decline in the percent of fish over 914 mm and an increase in the percent of fish less than 610 mm (29%) (Figure 1) (Janssen et al. 2002). This decline was attributed to the harvest of a large number of fish over 914 mm and lack of sufficient recruitment of fish to lengths greater than 914 mm. Lake trout harvest regulations were changed again in 2002 to catch and release to protect all age classes and preserve this trophy lake trout fishery. We repeated the previous lake trout surveys in 2006 to evaluate the response of the lake trout population to the 2002 regulation change.

Lake trout have been stocked into Payette Lake since at least 1955 (Idaho Department of Fish and Game (IDFG) Stocking Records) and anecdotally we suspect fish were stocked as early as the 1930's. Lake trout were stocked semi annually through 1985 in various numbers and sizes. As many as 36,400 catchable size lake trout were stocked in a given year. Lake trout stockings were discontinued after 1985 to help determine importance of natural recruitment (Personal communication, IDFG, Don Anderson). Since 1985, lake trout stockings were made in 1997, 2002, and 2003 with adipose fin clipped fish for stocking impact evaluations. The three lake trout stockings included: 1,000 fish @ 305 mm mean total length in 1997, 15,660 fish @ 290 mm in 2002 and 8,005 fish @ 287 mm in 2003. We repeated the previous lake trout surveys in 2006 to evaluate the success and impacts of these stockings.

METHODS

We set five, 45.7 m long, standard IDFG, sinking gill nets in six areas of the lake historically used by lake trout and sampled in previous surveys. Each area was sampled in one night. Sampling was completed between 6/28/07 and 7/28/07. The sample areas included: Luck's Point, Huckleberry Bay, Southeast of Cougar Island, Northeast of Channel Island, Sheppard's Point and Duck Bay. We also set five gill nets around the lake attached to rocky shore areas in an attempt to increase our small lake trout catch. Nets were set just before sundown, allowed to fish overnight and then pulled early the next morning. All fish collected were measured to the nearest mm, weighed to the nearest 10 g and then released. Otoliths were collected from all mortalities for age determination.





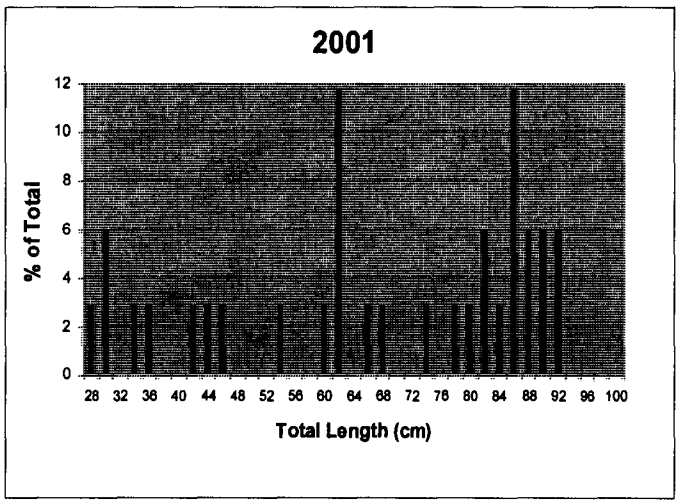


Figure 1. Length frequencies of lake trout in 1988, 1994, 1995, and 2001 in Payette Lake.

RESULTS

We collected 62 lake trout ranging in size from 353 to 960 mm in 35 net nights (Figure 2). We collected 12 fish (19% of the total catch) less than 610 mm in total length, only two of which were adipose fin clipped. The marked fish were 425 and 422 mm in length and weighed 284 g and 539 g respectively. Fish greater than 760 mm made up 48% of all fish collected and fish greater than 914 mm made up 8% of the population. The two hatchery origin fish collected made up 17% of all fish less than 610 mm collected. Ageing of otoliths collected from the 422 mm adipose fin clipped fish indicated it originated from the 1997 stocking (age 9+).

DISCUSSION

We found that 11% of the lake trout collected were greater than 914 mm in 2006. This compares to 6% in 2001 and 12.6 % in 1995. Length frequencies in 2006 more closely resembled those found in 1995 (Figure 2). Numbers of fish caught per net night are not directly comparable over the years as some nets were fished all night and others fished only a couple of hours at dawn and/or dusk or a mix of both.

Recent lake trout stockings have contributed to the Payette Lake, lake trout population. Two of the 62 (3.2%) lake trout collected originated from these stockings. Marked hatchery fish made up 17% of fish less than 610 mm. Natural recruitment since the last lake trout stocking in 1985 appeared to be sufficient to maintain this catch and release fishery. Unpublished IDFG growth data for Payette Lake, lake trout suggests that all fish less than 940 mm were produced since 1985. This would imply that all but six of the 62 fish collected were produced naturally since 1985. Growth rates of the two stocked fish collected averaged 13 mm annually given the average size of stocked fish in 1997 was 305 mm.

RECOMMENDATIONS

1. Continue with the catch and release lake trout regulation.

2. Survey Payette Lake lake trout again in approximately five years to further evaluate the 1997, 2002, and 2003 hatchery stockings of lake trout and effects of the current catch and release regulation.

3. Discontinue any future lake trout stockings as natural recruitment appears to be sufficient to maintain this fishery.

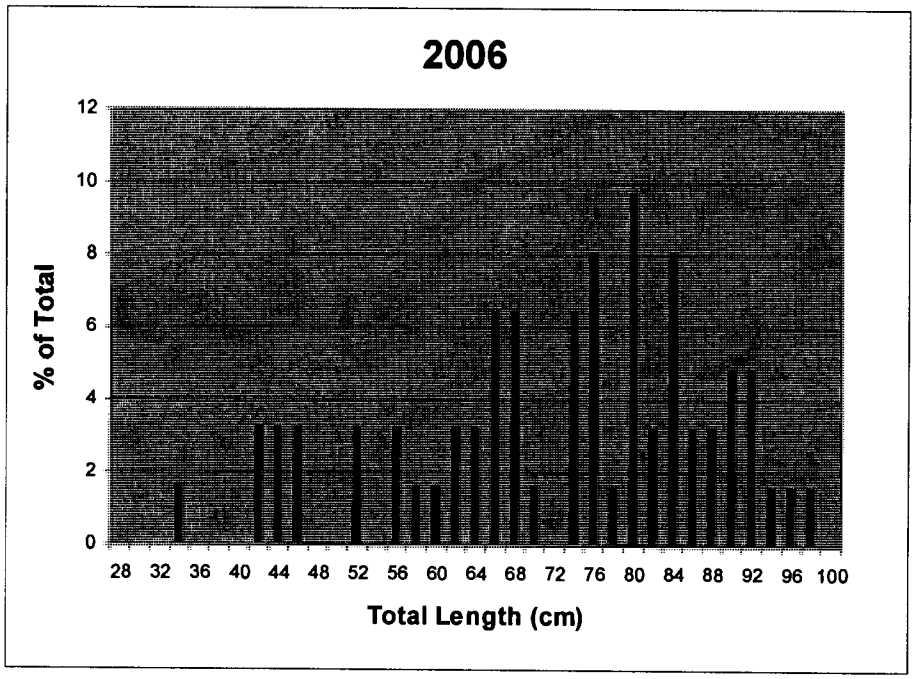


Figure 2. Lake trout length frequencies collected with gill nets in 2006 in Payette Lake.

MCCALL 2006 FISHERY MANAGEMENT REPORT

Lake Cascade Yellow Perch Restoration and Investigations

ABSTRACT

The Department began yellow perch *Perca flavescens* fishery restoration efforts in 2004 in Lake Cascade by capturing and transplanting adult yellow perch and by reducing adult northern pikeminnow *Ptychocheilus oregonensis* numbers (Allen et al. In review). We continued these restoration strategies in 2006.

We captured approximately 357,450 yellow perch from Lost Valley Reservoir and 23,500 yellow perch from Horsethief Reservoir and transplanted them into Lake Cascade. We have transplanted a total of 865,000 adult yellow perch into Lake Cascade over the last three years.

Spawning adult northern pikeminnow were chemically removed from the North Fork Payette River above Lake Cascade for the third consecutive year. The adult northern pikeminnow spawning run in the North Fork Payette River appeared to have been virtually eliminated by the previous two years of treatments. We estimated killing only 24 northern pikeminnow in 3 treatments in 2006.

Merwin traps placed in Lake Cascade captured 681 adult northern pikeminnow, 3,629 juvenile pikeminnow, and 2,894 largescale suckers *Catostomus macrocheilus* all of which were removed.

Hydroacoustic fish surveys were completed again in 2006. The total population estimate for northern pikeminnow larger that 250 mm was 1,091.

We conducted trawling surveys in June, August, and October 2006 to document changes in the yellow perch population. We collected 27,060 yellow perch in 62 trawl transects. 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 and yearling yellow perch presence and abundance was conducted in 2006. We sampled only a subset of the original sample sites. Mean catch per haul was 388 age-0 and 51 age-1 and greater. We collected more fish age-1 and older in 2006 than in both 2004 and 2005.

Zooplankton sampling was completed in May through October, 2006. Average Zooplankton Quality Index values were markedly lower in 2006 than in 2004. However, average values still rank in the top 50% of Idaho waters.

Aerial holiday angler counts were again conducted on Lake Cascade on the Fourth of July, and Labor Day 2006. Mean average angler counts have increased annually since 2000.

Authors:

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RESULTS

Three Merwin traps were placed in Horsethief Reservoir on May 1, 2006 and eight days later, three Merwin traps were placed in Lost Valley Reservoir giving a total of six Merwin traps operational by May 9, 2006. The first truck load of perch from Horsethief Reservoir was shipped on May 4, 2006 and the last load was shipped on May 25, 2006. We collected and transplanted a total of 23,485 yellow perch in three truck loads from Horsethief Reservoir (Table 1). Brown trout *Salmo trutta* and rainbow trout *Oncorhynchus mykiss* were the only other species collected from Horsethief Reservoir.

The first load of perch transplanted into Lake Cascade from Lost Valley Reservoir was on May 11, 2006 and the last load on June 13, 2006. The traps were fished for 36 days harvesting 13,793 kg of perch. We estimated that 357,450 total perch were hauled in 26 truck loads to Lake Cascade (Table 2). The female ratio was 52%, or 185,875 fish. Rainbow trout and brook trout *Salvelinus fontinalis* were the only other species observed during the netting and sorting process on Lost Valley Reservoir.

Yellow perch females spawned in the Merwin traps, in the holding pens, and in the transport trucks as they did the first two years of the project. Therefore, most female yellow perch were spawned out before they were stocked into Lake Cascade.

CONCLUSIONS

The Merwin traps in Lost Valley Reservoir proved to be a very effective at capturing yellow perch. The addition of the third trap helped cover the reservoir to provide a broad capture area as the yellow perch roamed the shores looking for spawning grounds. Female yellow perch made up 52% of the total catch. The Merwin traps at Horsethief Reservoir did not produce as expected either due to the high water allowing the perch to spawn in flooded vegetation or lower numbers of yellow perch than expected. However, the fish were larger with an average of 19.25 fish per kg compared to Lost Valley Reservoir at 26 fish per kg. Overall, 380,935 perch were moved in the spring of 2006, almost totaling the previous two years total of 475,000 perch. The three year combined effort was 856,000 yellow perch transplanted into Lake Cascade.

Over the past three years we've trapped and transplanted 865,000 adult yellow perch from five different lakes into Lake Cascade (Allen et al. In review). This was the last year of yellow perch transplants.

Because most female perch were spawned out by the time they were released into Lake Cascade there was a one year lag between transplant year and resulting infusion of young-of-year fish. Therefore, we expect the largest cohort of yellow perch from transplanted fish to be produced the spring of 2007 when all transplanted fish will spawn. We expect somewhere around 2.7 billion eggs to be released at spawning time in the spring of 2007 if we assume no mortality, that 50% of these fish are females averaging 178 mm, and a fecundity of 12,300 eggs/female (Tsai and Gibson, 1971).

Table 1. Yellow perch catch and transport statistics from Horsethief Reservoir, Idaho in 2006.

Date	Total kg caught per day	Kg shipped per day	Number of perch shipped per day	Number of trucks per day
5/2/06	201	0	0	0
5/3/06	121	0	0	0
5/4/06	69	393	7,587	1
5/8/06	348	0	0	0
5/11/06	98	363	7,000	1
5/18/06	125	0	0	0
5/25/06	255	461	8,898	1
Totals	1,217	1,491	23,485	3

Table 2. Yellow perch catch and transport statistics from Lost Valley Reservoir, Idaho in 2006.

Date	Total kg caught per day	Kg shipped per day	Number of perch shipped per day	Number of trucks per day
5/10/06	1,327	0	0	0
5/11/06	807	1,186	30,746	2
5/12/06	1,064	1,640	42,490	4
5/15/06	1,003	0	0	0
5/16/06	1,350	1,160	30,074	2
5/17/06	812	1,088	28,189	2
5/18/06	905	1,232	31,924	2
5/19/06	819	1,322	34,268	2
5/22/06	1,409	934	24,228	3
5/25/06	470	1,093	28,319	2
5/26/06	732	744	19,296	2
5/29/06	493	0	0	0
5/30/06	0	655	16,968	1
6/2/06	530	575	14,902	1
6/6/06	568	568	14,713	1
6/9/06	632	723	18,742	1
6/13/06	873	873	22,618	1
Totals	13,864	13,793	357,477	26

RECOMMENDATIONS

1. Discontinue capture and transplant efforts as our yellow perch transplant goals have been met.
2. Chemically treat Lost Valley Reservoir again in the near future to remove the large numbers of small yellow perch to maximize rainbow trout growth.
3. Monitor yellow perch population response in Lake Cascade.

North Fork Payette River Rotenone Treatments

INTRODUCTION

Removal of a significant proportion of the adult northern pikeminnow population in Lake Cascade was the second strategy of the yellow perch fishery restoration project. North Fork Payette River (NFPR) rotenone treatments during the northern pikeminnow spawning run were successfully completed in 2004 and 2005 (Allen et al. In review). This same treatment was also completed in 2006.

METHODS

A short term water quality activity exemption was obtained through the Idaho Department of Environmental Quality for the application of rotenone to the NFPR. We proposed applying 2.5% synergized 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 at a location on Idaho State property East North East of Hait Reservoir approximately one mile. The UTM coordinates of the site were 566611E, 4966307N (NAD27 Datum).

Precise rotenone introductions to the river were made using the rotenone filled barrels, a constant head control valve, a mixing barrel and a water pump and hose. This setup is described as follows: A constant head, flow control valve and length of garden hose were attached to a 113 L barrel of rotenone. A mixing barrel made from an empty 113 L barrel with approximately ½ of its side cut out was placed on its side in the water at rivers edge and tied off to shore to prevent it from floating away. River water moved unobstructed into the barrel cutouts and mixed with the undiluted rotenone running into the barrel via the garden hose. A five hp water pump was used to pump the diluted rotenone solution out of the barrel to a spray nozzle anchored to the bank and aimed to spray over the river. The spray was broadcast over as much of the river width as possible to facilitate even mixing. The spray droplets were kept large to minimize drift. This mixing method allowed the two applicators to have little contact with the rotenone and required virtually no mixing or pouring of rotenone.

Calculations of treatment day rotenone dosage were made using the United States Geological Survey's real-time flow gauge in the river in McCall. Rotenone control valve calibrations were started with low flows to prevent exceeding labeled application rate maximums. The flow rate was measured with a graduated cylinder and timed and if needed flows were adjusted. This was repeated until the prescribed flow was met and maintained. Once the correct flow rate was achieved the constant head valve maintained consistent flow until the barrel was emptied. When needed, a second barrel of rotenone a valve and hose was set up and readied for startup as soon as the first barrel was emptied. A new calibration was quickly done with the second barrel with little break in rotenone application to the river.

We worked closely with the District 65 irrigation water-master to reduce and stabilize river flows on days of treatment to reduce rotenone costs and increase effectiveness of the treatment. River flows can be quite variable in the NFPR due to weather, snowmelt and water releases through the dam at Payette Lake. Due to high snow pack levels and concerns of resulting high flows in the spring we did not install the electric barrier in the river in 2006.

Fish counts were conducted the day after each rotenone treatment and began at the point of rotenone introduction and went downstream to the influence of the reservoir pool. Small catarafts or kayaks were used to transport fish counters downstream. Dead fish counts were made by floating down to a predetermined transect. Some transects were straight channel

stretches and some were bends in the river. Counts of all dead fish by species were made on both shorelines of each transect. The number of fish counted in each transect was divided by the length of each transect to calculate the number of fish killed per km of stream. All transects were averaged together to obtain a mean number of fish per km killed and then multiplied by the total length of the river. Counters had to differentiate between freshly killed fish and carcasses from previous treatments.

RESULTS

We completed three rotenone treatments in 2006 and applied a total of 579 L of rotenone (Table 3). Dead fish counts were a fraction of what was observed after the past two years of treatments. We estimated killing only 24 northern pikeminnow and 421 largescale sucker (Table 4). Also noted was the appearance of other fish species that were absent the previous two years of treatments.

DISCUSSION AND RECOMMENDATIONS

Rotenone treatments were extremely effective over the first two years (2004 and 2005) and as a result only 24 adult northern pikeminnow spawners were estimated killed in 2006. As discussed in Allen et al. (In review) no rotenone treatments should be necessary in 2007 and beyond until the in-reservoir northern pikeminnow population is dominated by adults.

Table 3. Details of 2006 rotenone applications in the North Fork Payette River.

Date	Application Rate (ppm)	Amount Applied (L)	Stream Flow (cfs)	Total Treatment Time (hr.)	Rotenone Brand
5/31/06	1.0	341	1820	2.0	Synpren
6/19/06	1.0	204	1000	2.0	Synpren
6/28/06	1.0	34	200	1.75	Synpren
Total		579			

Table 4. Estimate of species, numbers and weights of fish killed per rotenone treatment in the NFPR in 2006.

Date	Northern Pikeminnow	Largescale Suckers	Mountain Whitefish	RBT Fry	RBT yearling and older	Black Bullhead	Pumpkinseed	Smallmouth Bass	Brook Trout
6/1/06	8	122	570	0	22	0	0	0	0
6/20/06	6	290	200	445	22	46.5	1.4	1.4	0
6/29/06	10	8	15	0	77	4.2	0	1.9	1.9
Total	24	420	785	445	122.3	50.7	1.4	3.3	1.9

Lake Cascade Northern Pikeminnow Merwin Trap Netting

INTRODUCTION

Merwin traps were used as a second method to reduce northern pikeminnow numbers in Lake Cascade. The Merwin traps were used successfully in 2004 and 2005 (Allen et al. In review) and this effort was repeated in 2006.

METHODS

We operated three Merwin trap nets in 2006 as described by Allen et al. (2006). The three most effective locations for capturing northern pikeminnow over the last three years were chosen as trapping sites in 2006. 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 less than 250 mm were counted and removed. Northern pikeminnow over 250 mm were further examined and counted as juveniles or adults and then removed. 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 removed.

RESULTS

We operated three Merwin traps from May 30 through July 24, 2006. We captured and removed a total of 3,061 northern pikeminnow greater than 250 mm of which 681 were classified as adults (Table 5). We captured and removed 1,249 northern pikeminnow less than 250 mm and 2,894 largescale suckers. We also captured and released several other species; yellow perch, rainbow trout *Oncorhynchus mykiss*, black bullhead *Ameiurus melas*, smallmouth bass *Micropterus dolomieu*, black crappie *Pomoxis nigromaculatus*, and pumpkinseed *Lepomis gibbosus.*

SUMMARY

Over the past three years we conservatively estimate that we have removed 13,740 adult northern pikeminnow in rotenone treatments in the NF Payette River and we've captured and removed 5,268 adult and 10,940 juvenile northern pikeminnow in the Merwin traps in Lake Cascade. The mark-recapture population estimate completed in fall of 2003 was 24, 413 $\pm$ 7,089 adult northern pikeminnow (Janssen et al. 2006). During the last three years, trapping and rotenone treatments have removed over 77% of the estimated adult northern pikeminnow from the reservoir.

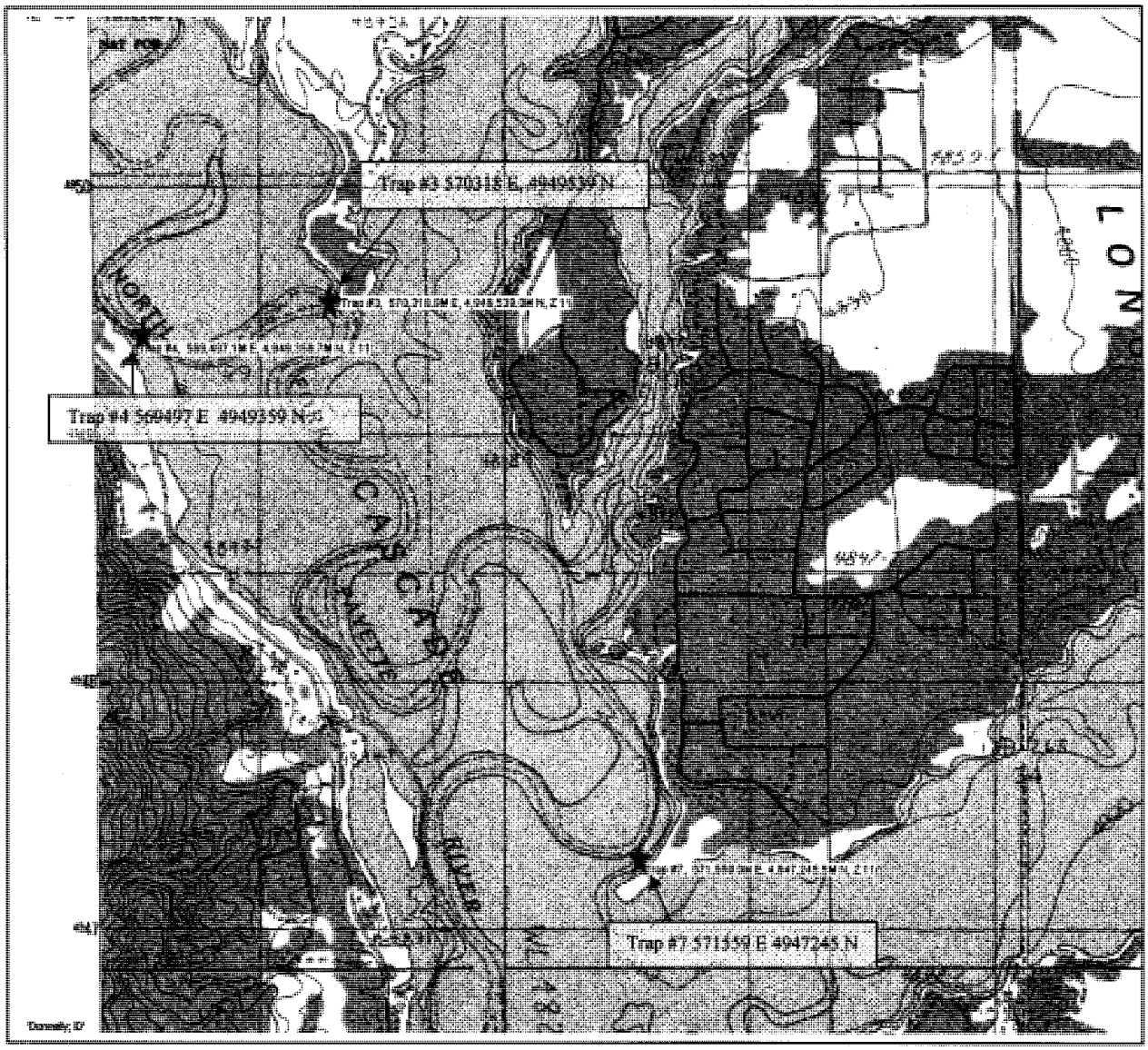

Figure 1. Merwin Trap Locations and UTM coordinates in Lake Cascade in 2006 (Trap number corresponds to 2005 trap numbers (Allen In review)).

Table 5. Monthly Merwin trap catch in Lake Cascade by location and species in 2006.

		SPECIES									
MONTH	Merwin #	NPM Adults	NPM >250mm Juvenile	NPM <250mm	LSS	YP	RBT	BBH	SMB	BC	PS
May	3	5	43	39	42	156	1	3000	9	3	23
	4	24	3	29	11	60	3	455	1	1	26
	7	71	70	2	201	56	1	550	2	34	30
May Total		100	116	70	254	272	5	4005	12	38	79
June	3	115	330	102	666	298	11	6410	15	21	111
	4	109	489	163	382	1680	8	2274	16	26	87
	7	160	291	42	682	19	11	4067	5	71	40
June Total		384	1110	307	1730	1997	30	12751	36	118	238
July	3	33	399	252	292	753	7	3095	3	89	56
	4	40	411	475	129	1880	8	6094	18	106	55
	7	124	344	145	489	352	20	2665	5	112	51
July Total		197	1154	872	910	2985	35	11854	26	307	162
Grand Totals		681	2380	1249	2894	5254	70	28610	74	463	479

Species Codes:

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

Hydroacoustic Fish Population Estimates

INTRODUCTION

We completed a hydroacoustic fish survey and population estimates of several fish species present in Lake Cascade in 2006. However, our primary emphasis was the enumeration of the northern pikeminnow and yellow perch population. This survey has been completed annually since 2000.

METHODS

We utilized the Department 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 2006.

RESULTS

The hydroacoustic sampling on Lake Cascade was completed on 7/26/06. The total abundance estimate was 28,836,661 fish (Table 6). The northern pikeminnow estimate for all sizes and fish greater than 250 mm was 1,091 and 918,783 respectively (Table 6). The total yellow perch estimate was 20,620,117 of which 24,483 were greater than 250 mm.

DISCUSSION

Hydroacoustic population estimate work since 2000 appeared to be effective at tracking changes in population structure of various species in the lake as reported by Butts et al. (in review). Yellow perch estimates have increased dramatically since 2004 while adult northern pikeminnow have shown a sharp decline (Table 7). Juvenile northern pikeminnow as well as many other species have also increased dramatically in the last two years. These increases in juvenile fish are a direct result of removal of the primary predator; adult northern pikeminnow. Species richness increased as well.

Table 6. Lake Cascade species population estimates for fish of all lengths and for fish > 250 mm from hydroacoustic sampling in September 2006.

All fish		
Species	Abundance	+/- 90% CI
Northern pikeminnow	918,783	109,026
Largescale sucker	288,760	127,332
Rainbow trout	433,141	151,181
Kokanee	1,260,045	438,855
Coho Salmon	1,141,916	348,001
Yellow Perch	20,620,117	307,587
Black Bullhead	4,029,520	923,169
Smallmouth Bass	13,125	8,369
Black Crappie	65,627	21,135
Pumpkinseed	65,627	64,036
Totals	28,836,661	2,498,691

Fish > 250 mm Total Length		
Species	Abundance	+/- 90% CI
Northern pikeminnow	1,091	131
Largescale sucker	343	151
Rainbow trout	514	180
Kokanee	1,496	522
Coho Salmon	1,356	414
Yellow Perch	24,483	605
Black Bullhead	4,784	1,100
Smallmouth Bass	16	10
Black Crappie	78	25
Pumpkinseed	78	76
Totals	34,239	3,214

Table 7. Lake Cascade hydroacoustic fish population estimates for 2000 through 2006.

Year	Fish Species and Size		
	Northern Pikeminnow > 250 mm	Northern Pikeminnow < 250 mm	Yellow Perch
2000	240,000	0	0
2001	118,091	0	4,072
2002	79,537	0	0
2003	35,675	13,8571	7,521
2004	10,407	241,150	0
2005	8,959	258,785	1,790,790
2006	1,091	918,783	20,620,117

Yellow Perch Population Trend Monitoring

INTRODUCTION

A reliable, repeatable method to document annual production is critical to monitoring changes in survival of young-of-year and older yellow perch. We continued the annual yellow perch population sampling using a bottom trawl in 2006.

METHODS

We repeated the sampling of yellow perch using the bottom trawl. We continued to use the same effort and transect sites that we developed in 1998 and 1999 and described by Anderson et al. (2001) and Janssen et al. (2003). Trawl transect locations were as close as possible to the established sites. Exact sites change due to water levels and weed bed development. 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

We completed 62 trawl transects in 2006, trawling a total of 310 minutes, collecting 27,060 yellow perch. We averaged 125, 720, and 466 yellow perch per five minute transect in June, August and October respectively (Table 8). Catch rates in August were the highest since we began trawling in 1998. We observed both age-1 and age-2 fish in the June trawl (Figure 1). Age-0 yellow perch dominated trawl catches in all three collection periods. Age-1 and older yellow perch were still present in the lake in August (Figure 2) and October (Figure 3) unlike years 1998 through 2004. We collected more age-1 perch in August and October than we have since we began annual trawling surveys in 1998. The mean catch per transect for all months has increased annually since 2003 (Table 9).

The large number of age-0 fish collected in August and October 2006 would have been the second cohort produced by the adult yellow perch transplanted into the lake in 2004 and 2005 from Oregon, Montana and Idaho (Allen et al. In review). The survival of age-1 and age-2 yellow perch through October 2006 is thought to be the direct result of northern pikeminnow population reductions in the lake.

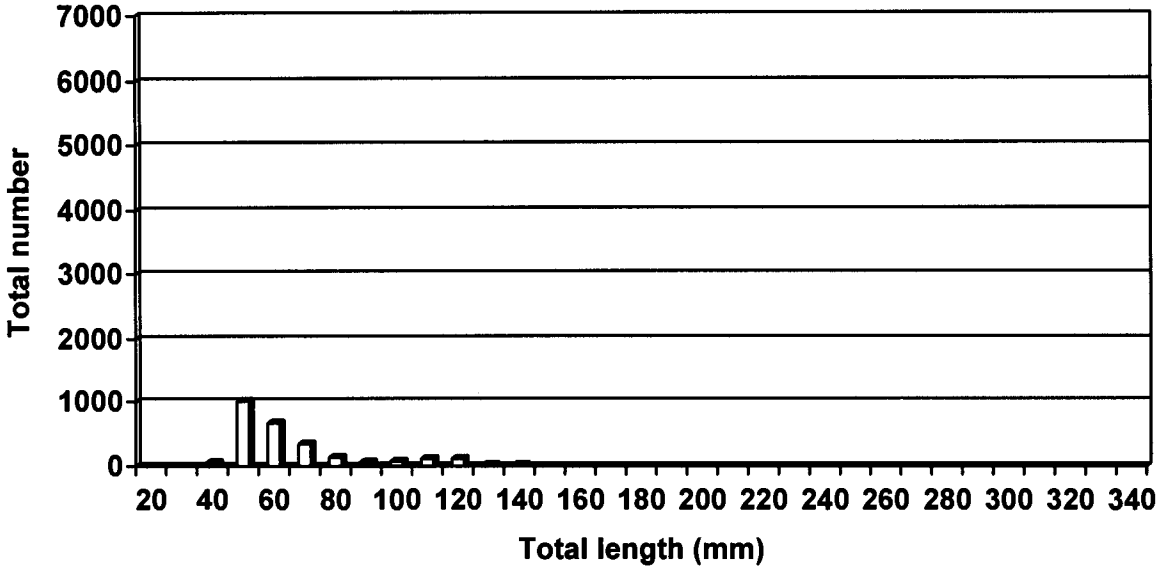

Figure 1. Lake Cascade yellow perch length frequencies collected with a bottom trawl in June 2006 (catch/110 minutes of effort).

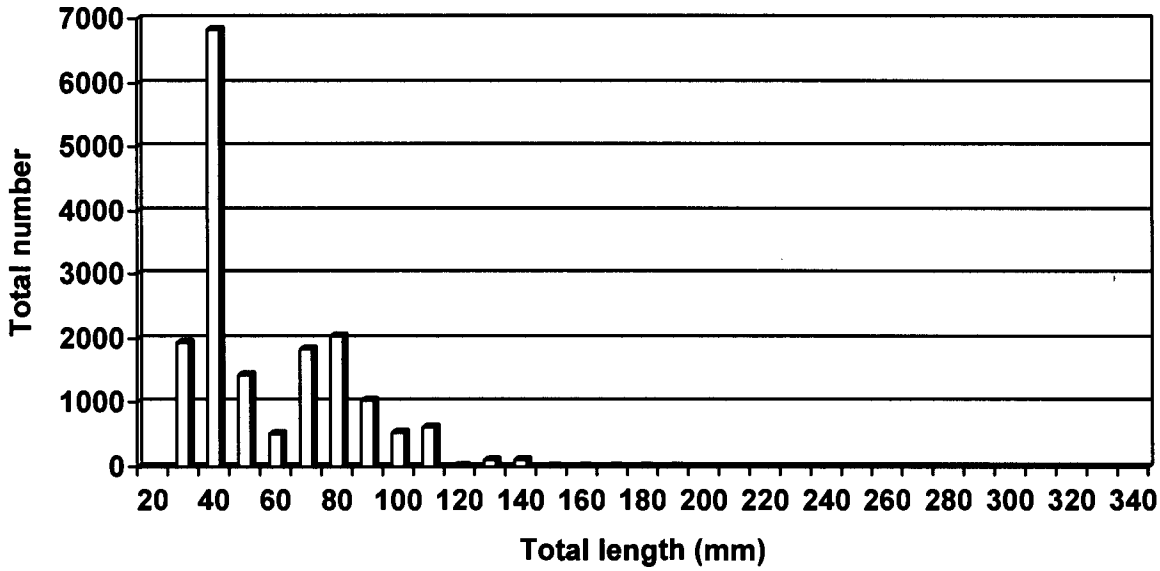

Figure 2. Lake Cascade yellow perch length frequencies collected with a bottom trawl in August 2006 (catch/110 minutes of effort).

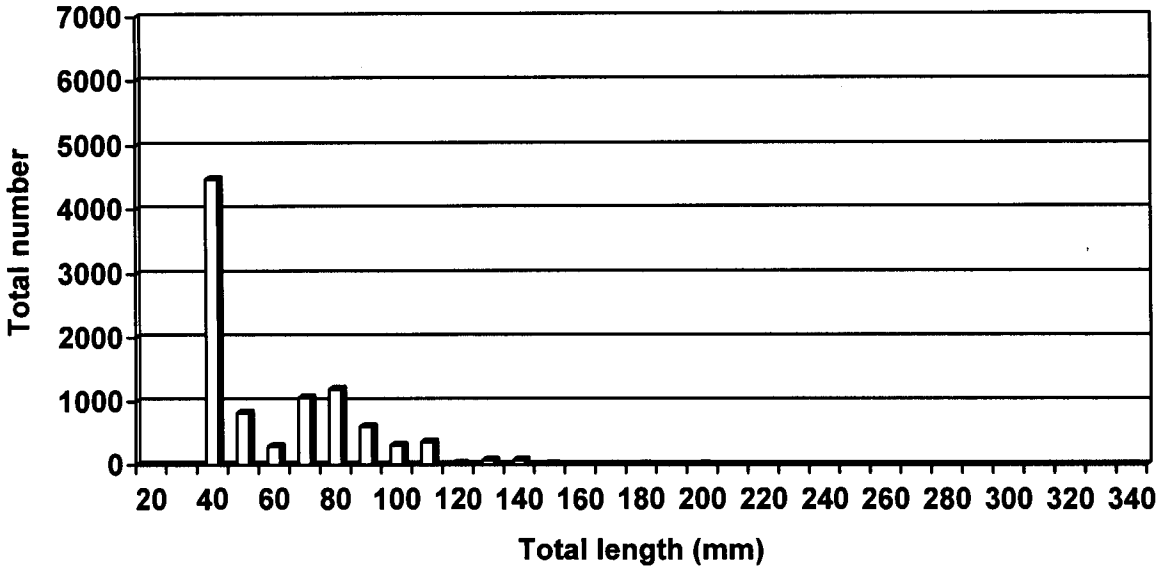

Figure 3. Lake Cascade yellow perch length frequencies collected with a bottom trawl in October 2006 (catch/110 minutes of effort).

Table 8. Total and mean catch of yellow perch collected from Lake Cascade with a bottom trawl with 95% confidence intervals (+/-) by area in June, August and October, 2006.

Month	AREA									
	South			West						North
	Total # Perch	Average Catch per Transect	# Transects							# Transects
June	2213	316	7	102	15	7	308	44	7	0
August	3877	554	7	5630	804	7	5603	800	7	0
October	1904	317	6	7047	1007	7	376	54	7	0
Totals/Averages	7994	395.7	20	12779	608.7	21	6287	299.3	21	0

Table 9. Average yellow perch catch per trawl transect for all transects and areas in Lake Cascade from 1998 through 2006.

YEAR	Average yellow Perch Catch per 5 Minute Trawl
1998	2
1999	217
2000	10
2001	18
2002	7
2003	12
2004	93
2005	220
2006	436

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 in 2004. We repeated this effort in 2006.

METHODS

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 1.2m 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 deep water end of the seine was then pulled in an arc back to shore.

Universal Transverse Mercator (UTM) coordinates for all sample site were presented in Allen et al. (In review). We examined seining results from 2004 and 2005 and selected only those sites where yellow perch were collected in both years for sampling in 2006 (Table 10). Many of the original sites were not conducive to effective seining due to depth contours that were too flat (shallow) or too steep. Lake water levels dictated exactly how close we actually were to the 2004 sample sites.

RESULTS

We sampled 11 sites around the lake in October 2006. Sampling was completed one month later than in 2004 and 2005 with unknown effects on the number of fish collected. We collected a total of 4,272 age-0 and 557 age-1 and greater yellow perch (Table 11). We collected more age-1 and greater fish in 2006 than in the previous two years of sampling even though we sampled less than half the number of sites.

Table 10. UTM, 11T coordinates (WGS 84 Datum) of each seine haul site on Lake Cascade in 2006 selected from sites sampled in 2004 and 2005.

Site #	Easting	Northing
1	0569831	4950642
12	0574192	4937635
13	0574356	4936855
14	0574230	4935595
15	0574430	4933644
16	0574405	4932212
17	0574684	4930827
18	0575045	4929705
19	0574618	4927551
21	0573182	4927358
22	0572079	4928753

Table 11. Number of young-of-year and older perch collected at each seine haul site in October 2006 in Lake Cascade.

Site #	2004		2005		2006	
	# YOY Perch	# Perch > YOY	# YOY Perch	# Perch > YOY	# YOY Perch	# Perch > YOY
1	294	0	176	0	24	0
2	0	0	1071	0	-	-
3	0	0	0	25	-	-
4	2	1	8	0	-	-
5	0	0	0	0	-	-
6	0	0	0	0	-	-
7	0	0	0	1	-	-
8	0	0	0	1	-	-
9	0	0	0	0	-	-
10	6	0	0	0	-	-
11	52	0	2	0	-	-
12	14	0	415	6	954	1
13	1493	0	237	3	1845	131
14	2	0	48	1	17	0
15	8	0	134	5	4	0
16	0	0	69	20	22	1
17	0	0	563	12	546	5
18	0	0	64	31	0	0
19	77	0	866	15	844	419
20	1	0	81	0	-	-
21	35	0	21	0	2	0
22	6341	0	16	0	14	0
23	1	0	NA	NA	-	-
24	0	0	11	0	-	-
25	1	0	1071	0	-	-
26	3	0	17	1	-	-
27	62	0	72	0	-	-
28	4	0	29	1	-	-
29	75	1	33	0	-	-
30	0	0	16	0	-	-
Total	8471	2	5020	122	4272	557
Mean	282.4	0.1	173.1	4.2	388.4	50.6
95% CI+/-	421.1	0.1	115.0	3.0	387.9	82.16

Zooplankton Quality Index Monitoring

METHODS

We monitored zooplankton quality and abundance using the Zooplankton Quality Index (ZQI) technique described by Teuscher (1999). The same sites were sampled in 2006 as in the past three years. 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

Zooplankton sampling was completed in May through October in 2006. The ZQI values in 2006 averaged 0.333, 0.644, and 0.344 for the Poison Creek, Sugarloaf Island and Cascade City boat ramp respectively (Table 12). Average ZQI values were markedly lower in 2006 than in 2004 and similar to those recorded in 2005 (Figures 4, 5 and 6). However, average ZQI values for 2005 and 2006 rank in the top 50% of Idaho waters sampled and reported by Teuscher (1999). Low ZQI values in August, September, October and November of 2005 and 2006 may be the result of zooplankton cropping by large numbers of juvenile yellow perch.

Table 12. Zooplankton quality index values for Lake Cascade by sample area and date collected in 2006.

Date	ZQI		
	Poison Creek	Sugarloaf Island	Cascade Boat Ramp
5/30/2006	0.199	1.531	0.832
6/12/2006	1.129	0.096	0.798
6/26/2006	0.707	1.695	0.151
7/10/2006	0.016	0.016	0.066
7/24/2006	0.064	0.079	0.058
8/07/2006	0.160	0.030	0.012
9/05/2006	0.255	0.474	0.206
10/06/2006	0.266	0.345	0.137
Average ZQI	**0.333**	**0.644**	**0.344**

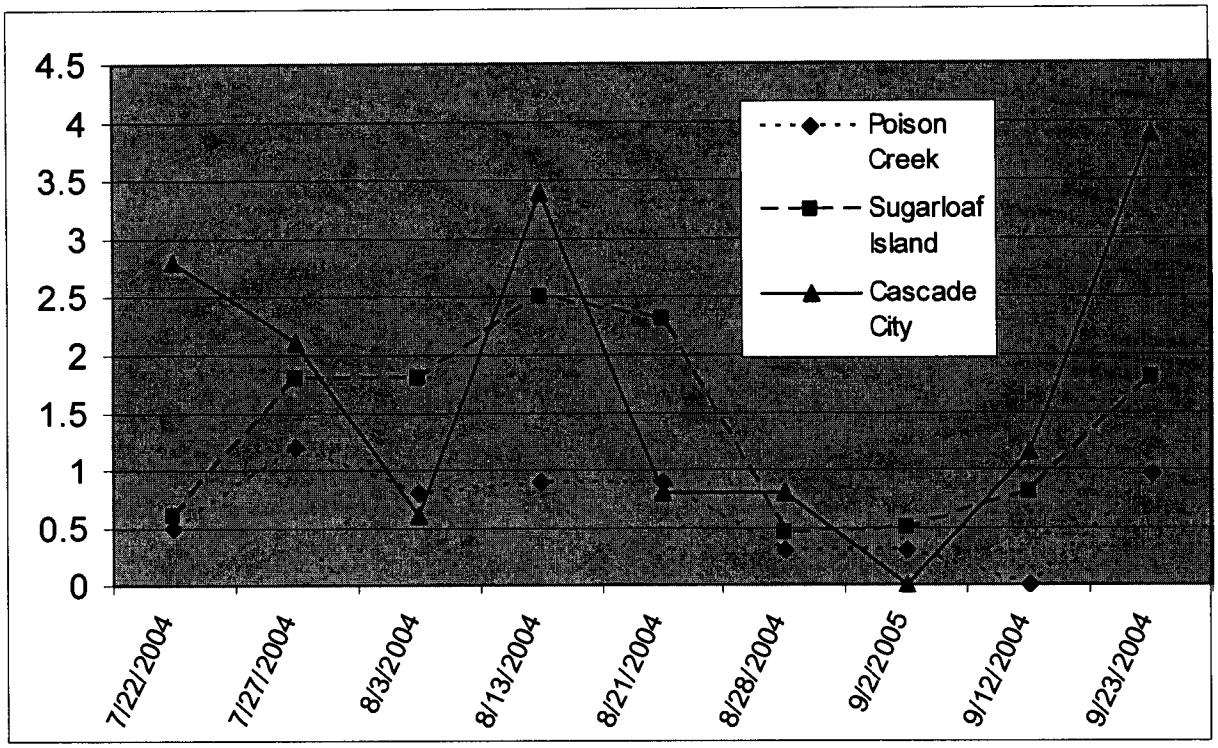

Figure 4. Lake Cascade Zooplankton Quality Index values measured by date at the Poison Creek, Sugarloaf Island, and Cascade City sample sites in 2004.

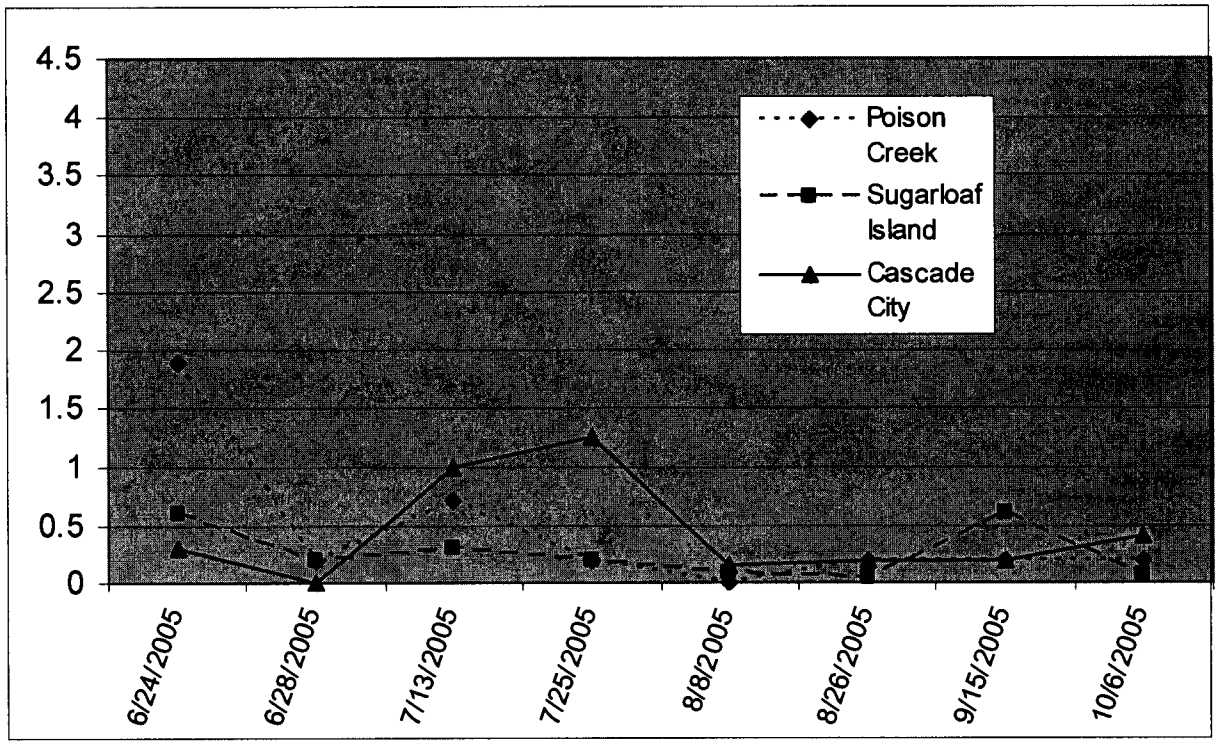

Figure 5. Lake Cascade Zooplankton Quality Index values measured by date at the Poison Creek, Sugarloaf Island, and Cascade City sample sites in 2005.

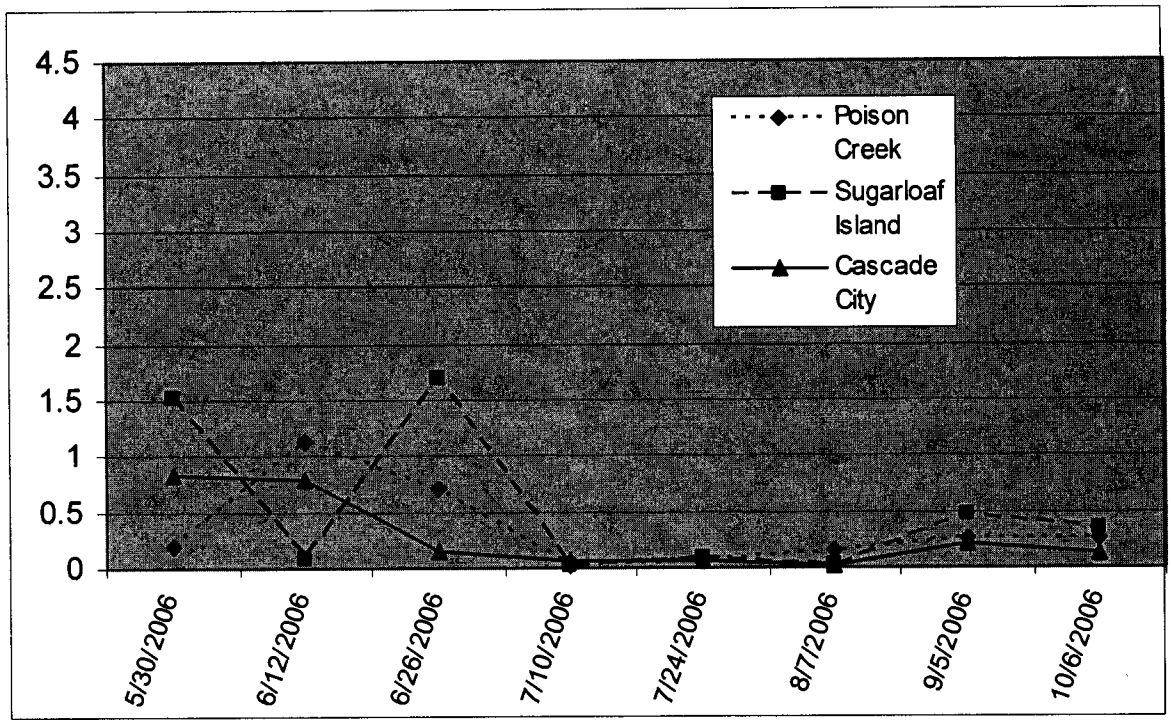

Figure 6. Lake Cascade Zooplankton Quality Index values measured by date at the Poison Creek, Sugarloaf Island, and Cascade City sample sites in 2006.

Holiday Angler counts

INTRODUCTION

Angler counts were made on Memorial Day, July 4th, and Labor Day to monitor and compare relative angling pressure to past survey years. Annual holiday counts have been conducted since 1996.

METHODS

We completed angler counts on Memorial Day, July 4th, and Labor Day on Lake Cascade as described by Janssen (2000). We conducted counts in 2006 using a fixed wing airplane at 0900 and 1400 hrs on each holiday. All shore anglers and all fishing boats were counted.

RESULTS

Angler counts were completed on July 4th and Labor Day (September 25). No counts were made on Memorial Day due to poor weather conditions (Cold, wind and rain). We counted an average of 25 fishing boats and 23 shore anglers respectively in 2006 (Table 13). Angler use continued to increase slowly from the lows of 2000 through 2003.

Lake Cascade Fishery Monitoring Recommendations

1. Continue holiday aerial angler counts.
2. Conduct a year long creel in 2008 or 2009.
3. Continue hydroacoustic surveys for northern pikeminnow.
4. Continue trawling as primary method to monitor 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.

Table 13. Average boat and shore angler counts on Lake Cascade on three major holidays: Memorial Day, July 4th, and Labor Day, in 1982, 1991, 1992 and 1996 through 2006 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
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	--	--	--
2006	25	23	-	-	-

[1] Does not include ice fishing hours.

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MCCALL 2006 FISHERY MANAGEMENT REPORT
RIVERS AND STREAMS

ABSTRACT

The 2006 kokanee *Oncorhynchus nerka kennerlyi* spawning run in the North Fork Payette River above Payette Lake was estimated to be 9,650 fish.

In 2006, temperature recorders were used to monitored the upper Little Salmon River and upper North Fork Payette River drainages throughout summer, and early fall. Stream temperatures peaked in late July, and mean daily temperatures exceeded 20°C throughout July in the main stem Little Salmon River, with higher temperatures at the downstream site. Mud Creek, a tributary to the Little Salmon, remained generally cooler with mean daily temperatures exceeding 20°C on only four occasions. Mean daily temperatures in the upper North Fork Payette River exceeded 20° C in late July.

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North Fork Payette River Kokanee Counts 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 2006.

METHODS

We completed kokanee spawner counts by walking the entire stretch of river utilized by spawning kokanee and counting all live spawners. Counts were made every three to four days until a peak count was established. The total spawning run estimate was made by multiplying the largest daily count by 1.73 (Frost and Bennett 1994).

RESULTS

Live kokanee spawners were counted on September 8, 11, and 15, 2006. We counted 4,190, 5,580, and 4,160 kokanee respectively on each of the three days. The total spawning run estimate was 9,650 (5,580*1.73) fish (Table 1). Average total length of 24 spawners sampled was 317 mm.

Table 1. Payette Lake kokanee spawner counts and estimated spawning run size and biomass in the North Fork Payette River from 1988 through 2005.

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	--
2006	5,580	9,650	--	5.6	--

[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 12 years, 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 2006 water quality assessment for development of Total Maximum Daily Load (TMDL) allowances. We consider the sites monitored in 2006 adequate to characterize long-term trends in the upper LSR. The LSR 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 listed as pollutants of concern.

Summer stream temperature is monitored annually in the North Fork Payette River (NFPR) as part of ongoing evaluation of a minimum in-stream 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 from June 26 through September 11 (NFPR), and through September 26 (LSR). Each recorder was placed in a waterproof Onset model container 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

Two recorders were placed in the main LSR. Recorders were located at the Circle C Bridge and approximately .4 km downstream from Meadow Creek Subdivision Bridge, on Campbell Ranch. 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.

North Fork Payette River

One temperature recorder was secured to the steel staff gauge that is associated with the United States Geological Survey gauging station in the NFPR approximately 0.4 km downstream from Fisher Creek. A map of the location of this recorder can be found in Appendix A.

RESULTS

Little Salmon River

Appendix B shows graphically and in table format the daily mean, minimum, and maximum stream temperatures for the upper LSR and Mud Creek in 2006. Summer stream temperatures in the main stem upper LSR continue to be high, with daily mean temperatures exceeding 20°C consistently throughout July and early August. Temperature was generally higher at the downstream station. Daily mean temperatures in Mud Creek were less severe, reaching 20°C on four days during July.

North Fork Payette River

Appendix C shows graphically and in table format the daily mean, minimum, and maximum stream temperatures for the upper NFPR station in 2006. Summer stream temperatures in the NFPR generally remain adequate for rainbow trout rearing. Mean daily temperature exceeded 20°C on four days in late July.

RECOMMENDATIONS

1. Continue temperature monitoring of McCall area waters.

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

3. 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 Plan" of the USFWS.

4. Continue to count spawning kokanee in the NFPR above Payette Lake annually.

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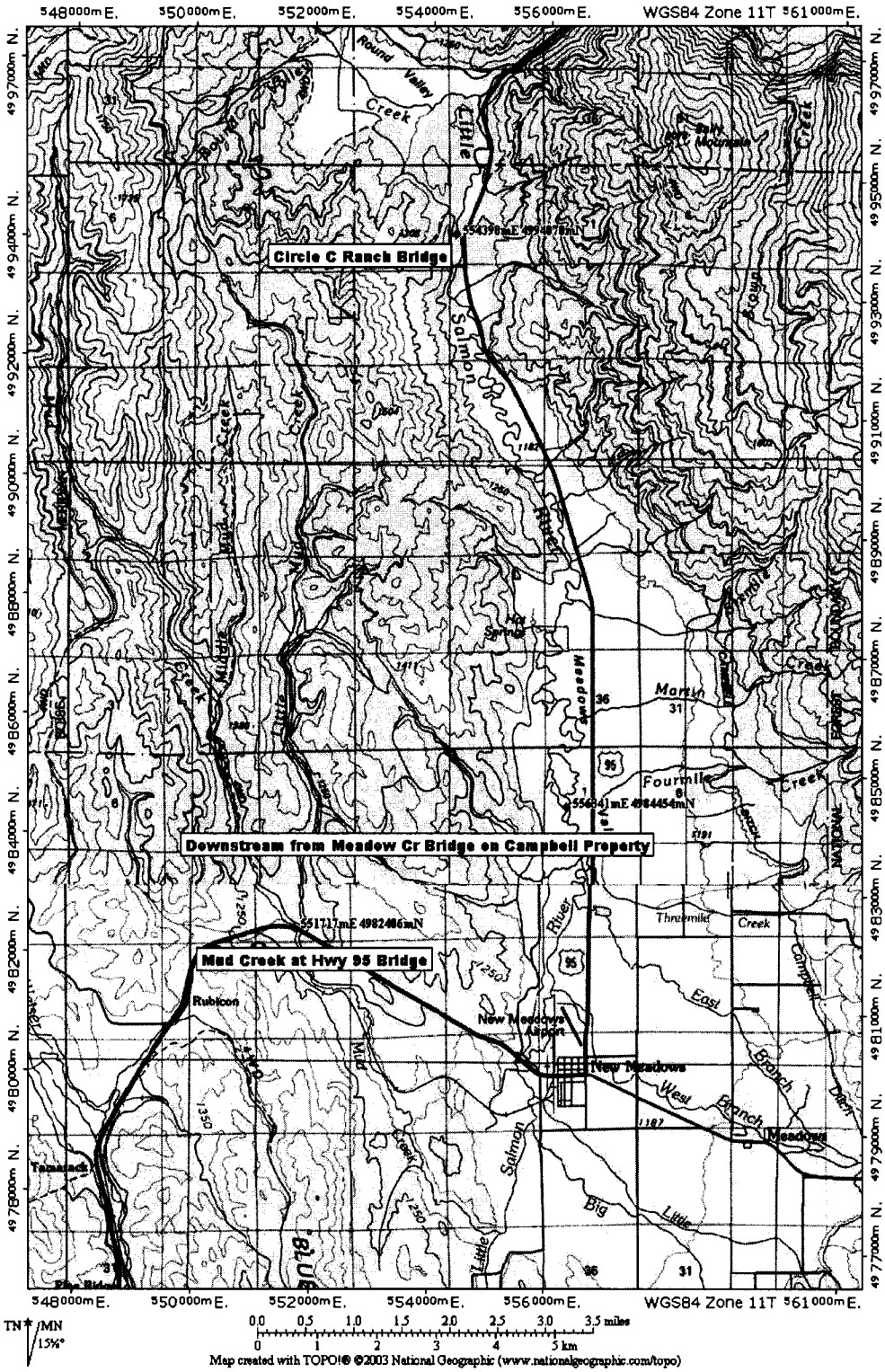
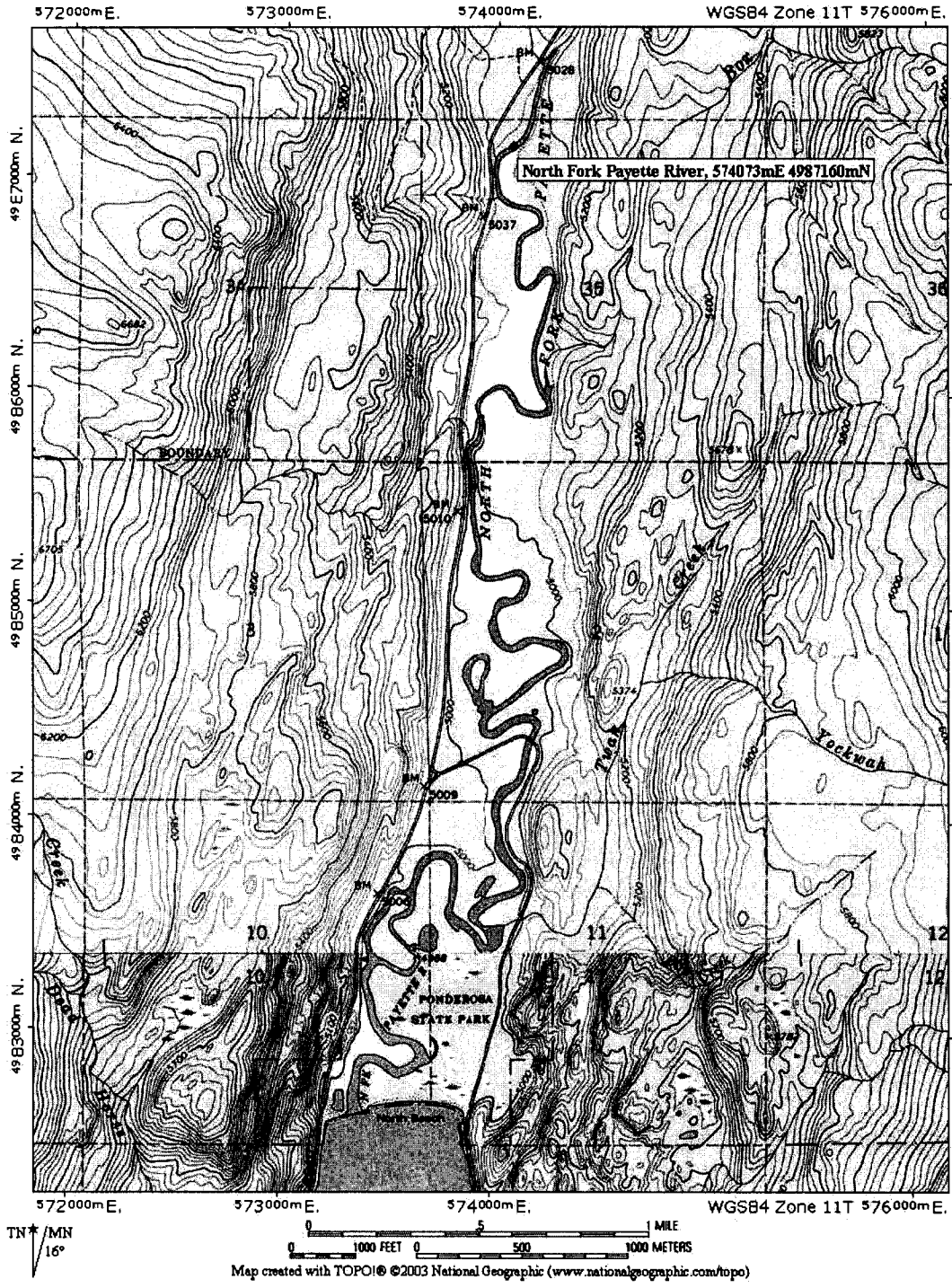
APPENDICES

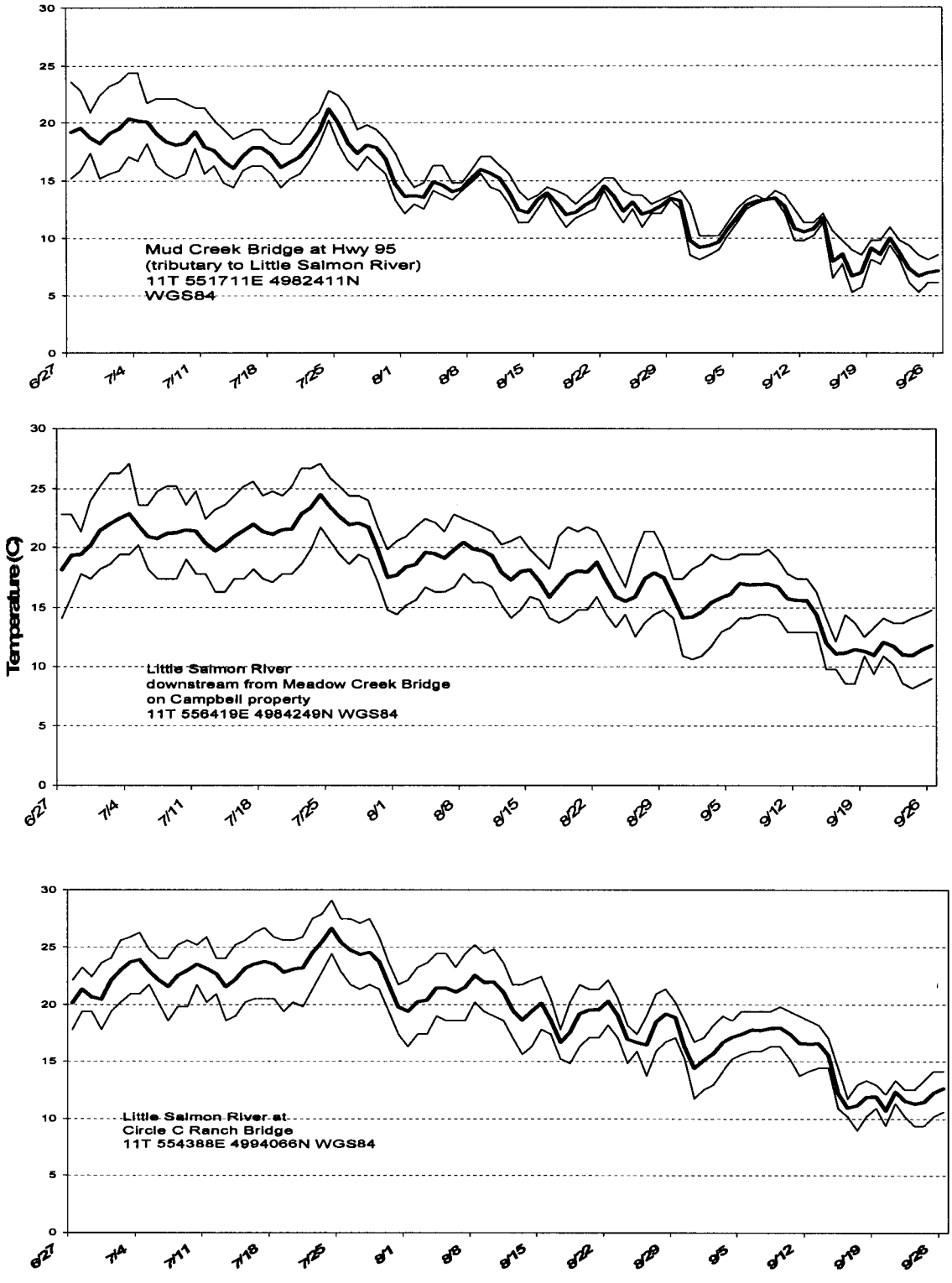
Appendix A. Location of the Hobo temperature recorders in the Little Salmon River and North Fork Payette River drainages, 2006.



Appendix A. Continued.



Appendix B. Daily mean, minimum, and maximum water temperature (C°) in the upper Little Salmon River drainage, 2006.



Appendix B. Continued.

Mud Creek at Highway 95 Bridge.

Date	Mean	Min	Max	Date	Mean	Min	Max
6/27	19.18	15.20	23.60	8/12	13.95	12.90	15.60
6/28	19.54	15.90	22.80	8/13	12.40	11.30	14.10
6/29	18.69	17.40	20.90	8/14	12.18	11.30	13.30
6/30	18.24	15.20	22.40	8/15	13.33	12.50	13.70
7/1	19.08	15.60	23.20	8/16	13.92	13.70	14.40
7/2	19.48	15.90	23.60	8/17	13.03	12.10	14.10
7/3	20.34	17.10	24.40	8/18	12.00	10.90	13.70
7/4	20.16	16.70	24.40	8/19	12.20	11.70	12.90
7/5	20.08	18.20	21.70	8/20	12.83	12.10	13.70
7/6	19.04	16.30	22.10	8/21	13.29	12.50	14.40
7/7	18.38	15.60	22.10	8/22	14.52	14.10	15.20
7/8	18.11	15.20	22.10	8/23	13.60	12.50	15.20
7/9	18.26	15.60	21.70	8/24	12.30	11.30	14.10
7/10	19.24	17.80	21.30	8/25	13.10	12.50	13.70
7/11	17.94	15.60	21.30	8/26	12.03	10.90	13.70
7/12	17.62	16.30	20.20	8/27	12.33	12.10	12.90
7/13	16.70	14.80	19.40	8/28	12.75	12.10	13.30
7/14	16.09	14.40	18.60	8/29	13.43	13.30	13.70
7/15	17.16	15.90	19.00	8/30	13.20	12.50	14.10
7/16	17.88	16.30	19.40	8/31	9.78	8.60	12.90
7/17	17.86	16.30	19.40	9/1	9.20	8.20	10.20
7/18	17.26	15.60	18.60	9/2	9.35	8.60	10.20
7/19	16.18	14.40	18.20	9/3	9.68	9.00	10.20
7/20	16.63	15.20	18.20	9/4	10.79	10.20	11.30
7/21	17.11	15.60	19.00	9/5	11.78	11.30	12.50
7/22	18.11	16.70	20.20	9/6	12.88	12.50	13.30
7/23	19.29	18.20	20.90	9/7	13.18	12.90	13.70
7/24	21.18	20.20	22.80	9/8	13.30	13.30	13.30
7/25	19.93	18.20	22.40	9/9	13.45	13.30	14.10
7/26	18.25	16.70	21.30	9/10	12.73	12.10	13.70
7/27	17.38	15.90	19.40	9/11	10.81	9.80	12.50
7/28	18.08	17.10	19.80	9/12	10.54	9.80	11.30
7/29	17.88	16.30	19.40	9/13	10.79	10.20	11.30
7/30	16.88	15.60	18.60	9/14	11.73	11.30	12.10
7/31	14.69	13.30	17.40	9/15	8.03	6.60	10.60
8/1	13.60	12.10	15.60	9/16	8.68	7.80	9.80
8/2	13.68	12.90	14.40	9/17	6.79	5.30	9.00
8/3	13.53	12.50	14.80	9/18	7.10	5.80	8.60
8/4	14.88	14.10	16.30	9/19	9.15	8.20	9.80
8/5	14.58	13.70	16.30	9/20	8.65	7.80	9.80
8/6	14.02	13.30	14.80	9/21	9.99	9.40	10.90
8/7	14.29	14.10	14.80	9/22	8.75	8.20	9.80
8/8	15.21	14.80	15.90	9/23	7.43	6.20	9.40
8/9	15.98	15.60	17.10	9/24	6.79	5.30	8.60
8/10	15.63	14.40	17.10	9/25	7.08	6.20	8.20
8/11	15.19	14.10	16.30	9/26	7.23	6.20	8.60

Appendix B. Continued.

Campbell property downstream from Meadow Creek Bridge.

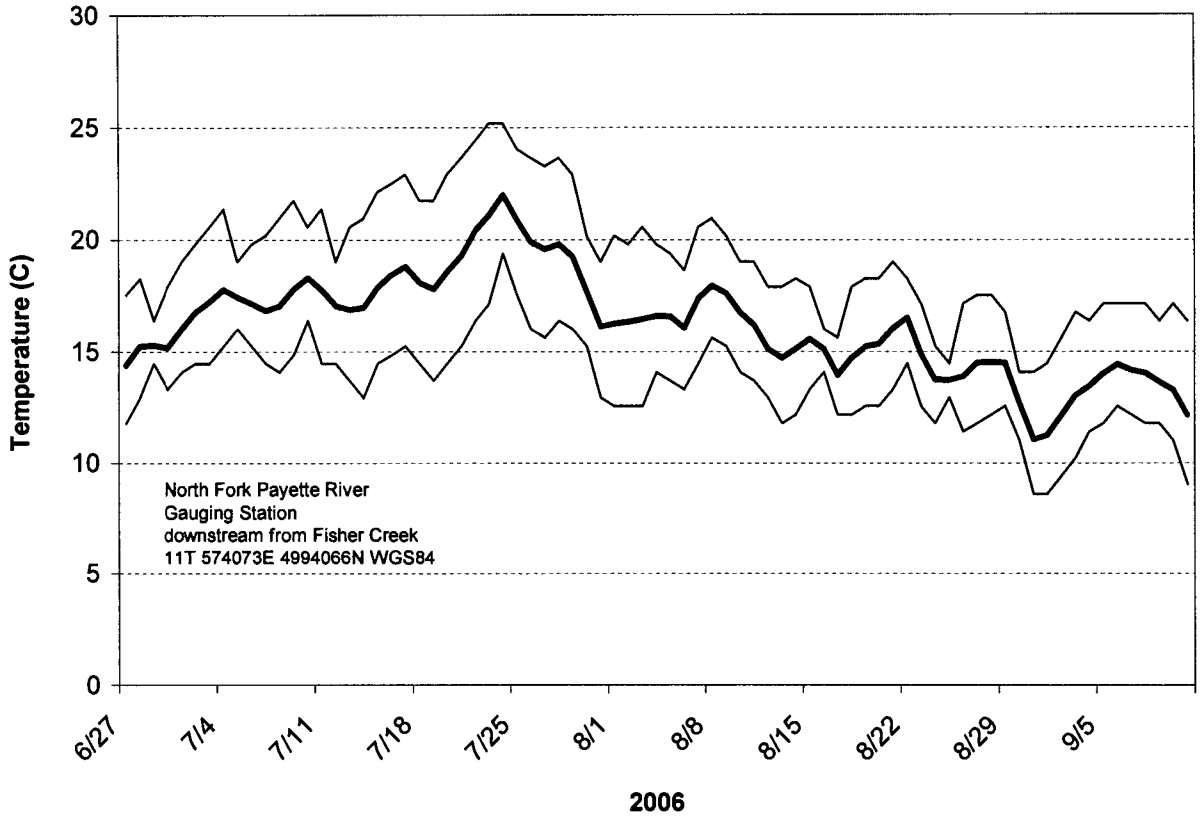
Date	Mean	Min	Max	Date	Mean	Min	Max
6/27	18.14	14.10	22.80	8/12	17.93	15.20	20.20
6/28	19.32	15.90	22.80	8/13	17.31	14.10	20.50
6/29	19.42	17.80	21.30	8/14	17.99	14.80	20.90
6/30	20.18	17.40	24.00	8/15	18.14	15.90	19.80
7/1	21.43	18.20	25.20	8/16	17.16	15.60	19.00
7/2	22.01	18.60	26.30	8/17	15.86	14.10	18.20
7/3	22.47	19.40	26.30	8/18	16.83	13.70	20.90
7/4	22.87	19.40	27.10	8/19	17.76	14.10	21.70
7/5	21.83	20.20	23.60	8/20	18.04	14.80	21.30
7/6	20.91	18.20	23.60	8/21	17.96	14.80	21.70
7/7	20.74	17.40	24.80	8/22	18.78	15.90	21.30
7/8	21.16	17.40	25.20	8/23	17.28	14.40	19.80
7/9	21.23	17.40	25.20	8/24	15.92	13.30	18.20
7/10	21.47	19.00	23.60	8/25	15.56	14.40	16.70
7/11	21.35	17.80	24.80	8/26	15.90	12.50	19.40
7/12	20.36	17.80	22.40	8/27	17.40	13.70	21.30
7/13	19.71	16.30	23.20	8/28	17.89	14.40	21.30
7/14	20.21	16.30	23.60	8/29	17.49	14.80	19.80
7/15	20.91	17.40	24.40	8/30	15.89	14.10	17.40
7/16	21.40	17.40	25.20	8/31	14.13	10.90	17.40
7/17	21.94	18.20	25.60	9/1	14.19	10.60	18.20
7/18	21.32	17.40	24.40	9/2	14.64	10.90	18.60
7/19	21.08	17.10	24.80	9/3	15.44	11.70	19.40
7/20	21.48	17.80	24.40	9/4	15.83	12.90	19.00
7/21	21.52	17.80	25.20	9/5	16.14	13.30	19.00
7/22	22.83	18.60	26.70	9/6	17.04	14.10	19.40
7/23	23.38	19.80	26.70	9/7	16.91	14.10	19.40
7/24	24.51	21.70	27.10	9/8	16.96	14.40	19.40
7/25	23.44	20.50	25.90	9/9	16.97	14.40	19.80
7/26	22.61	19.40	25.20	9/10	16.74	14.10	19.00
7/27	21.93	18.60	24.40	9/11	15.74	12.90	17.80
7/28	22.05	19.40	24.40	9/12	15.60	12.90	17.40
7/29	21.71	19.00	24.00	9/13	15.58	12.90	17.40
7/30	19.77	17.10	21.70	9/14	14.37	12.90	16.30
7/31	17.52	14.80	19.80	9/15	11.99	9.80	14.10
8/1	17.70	14.40	20.50	9/16	11.09	9.80	12.10
8/2	18.39	15.20	20.90	9/17	11.14	8.60	14.40
8/3	18.59	15.60	21.70	9/18	11.44	8.60	13.70
8/4	19.57	16.70	22.40	9/19	11.30	10.90	12.50
8/5	19.48	16.30	22.10	9/20	10.96	9.40	13.30
8/6	19.09	16.30	21.30	9/21	12.05	10.90	14.10
8/7	19.78	16.70	22.80	9/22	11.72	10.20	13.70
8/8	20.41	17.80	22.40	9/23	11.00	8.60	13.70
8/9	19.84	17.10	22.10	9/24	10.93	8.20	14.10
8/10	19.71	17.10	21.70	9/25	11.41	8.60	14.40
8/11	19.31	16.70	21.30	9/26	11.78	9.00	14.80

Appendix B. Continued.

Circle C Ranch Bridge.

Date	Mean	Min	Max	Date	Mean	Min	Max
6/27	20.16	17.80	22.10	8/12	19.50	17.10	21.70
6/28	21.32	19.40	23.20	8/13	18.64	15.60	21.70
6/29	20.64	19.40	22.40	8/14	19.43	16.30	22.10
6/30	20.45	17.80	23.60	8/15	20.12	17.80	22.40
7/1	22.09	19.40	24.00	8/16	18.59	17.40	20.50
7/2	22.98	20.20	25.60	8/17	16.68	15.20	17.80
7/3	23.67	20.90	25.90	8/18	17.56	14.80	20.20
7/4	23.90	20.90	26.30	8/19	19.21	16.30	21.70
7/5	22.88	21.70	24.80	8/20	19.54	17.10	21.30
7/6	22.11	20.20	24.00	8/21	19.56	17.10	21.30
7/7	21.55	18.60	24.00	8/22	20.29	18.20	22.10
7/8	22.49	19.80	25.20	8/23	19.04	17.10	20.50
7/9	22.96	19.80	25.60	8/24	16.96	14.80	18.20
7/10	23.48	21.70	25.20	8/25	16.69	15.90	17.40
7/11	23.10	20.20	25.90	8/26	16.46	13.70	19.00
7/12	22.64	20.90	24.00	8/27	18.48	15.90	20.90
7/13	21.52	18.60	24.00	8/28	19.21	16.70	21.30
7/14	22.18	19.00	25.20	8/29	18.86	17.10	20.20
7/15	23.12	20.20	25.60	8/30	16.23	15.20	18.60
7/16	23.49	20.50	26.30	8/31	14.36	11.70	16.70
7/17	23.71	20.50	26.70	9/1	15.10	12.50	17.10
7/18	23.50	20.50	25.90	9/2	15.69	12.90	18.20
7/19	22.76	19.40	25.60	9/3	16.69	14.10	19.00
7/20	23.04	20.20	25.60	9/4	17.13	15.20	18.60
7/21	23.17	19.80	25.90	9/5	17.39	15.60	19.40
7/22	24.46	21.30	27.50	9/6	17.79	15.90	19.40
7/23	25.45	22.80	27.90	9/7	17.74	15.90	19.40
7/24	26.66	24.40	29.10	9/8	17.94	16.30	19.40
7/25	25.43	22.80	27.50	9/9	17.96	16.30	19.80
7/26	24.71	21.70	27.50	9/10	17.44	15.20	19.40
7/27	24.33	21.30	27.10	9/11	16.58	13.70	19.00
7/28	24.52	21.70	27.50	9/12	16.55	14.10	18.60
7/29	23.69	21.30	25.90	9/13	16.56	14.40	18.20
7/30	21.66	19.40	23.60	9/14	15.56	14.40	17.10
7/31	19.79	17.40	21.70	9/15	12.22	10.90	14.40
8/1	19.41	16.30	22.10	9/16	10.94	10.20	11.70
8/2	20.23	17.40	23.20	9/17	11.15	9.00	12.90
8/3	20.38	17.40	23.60	9/18	11.87	10.20	13.30
8/4	21.42	19.00	24.40	9/19	11.90	10.90	12.90
8/5	21.41	18.60	24.40	9/20	10.71	9.40	12.10
8/6	21.06	18.60	23.20	9/21	12.33	11.30	13.30
8/7	21.49	18.60	24.40	9/22	11.53	10.20	12.50
8/8	22.50	20.20	25.20	9/23	11.28	9.40	12.50
8/9	21.89	19.40	24.40	9/24	11.44	9.40	13.30
8/10	21.93	19.00	24.80	9/25	12.24	10.20	14.10
8/11	21.04	18.60	23.60	9/26	12.61	10.60	14.10

Appendix C. Daily Mean, maximum, and minimum water temperature (C°) in the upper North Fork Payette River at the USGS gauge downstream from Fisher Creek, 2006.



Appendix C. Continued.

North Fork Payette River, at USGS gauging station downstream from Fisher Creek.

Date	Mean	Min	Max	Date	Mean	Min	Max
6/27	14.38	11.77	17.52	8/5	16.57	13.70	19.42
6/28	15.25	12.93	18.28	8/6	16.06	13.32	18.66
6/29	15.28	14.47	16.38	8/7	17.39	14.47	20.57
6/30	15.17	13.32	17.90	8/8	17.97	15.62	20.95
7/1	16.00	14.09	19.04	8/9	17.63	15.23	20.19
7/2	16.76	14.47	19.81	8/10	16.74	14.09	19.04
7/3	17.22	14.47	20.57	8/11	16.20	13.70	19.04
7/4	17.77	15.23	21.33	8/12	15.10	12.93	17.90
7/5	17.43	16.00	19.04	8/13	14.72	11.77	17.90
7/6	17.16	15.23	19.81	8/14	15.12	12.16	18.28
7/7	16.84	14.47	20.19	8/15	15.55	13.32	17.90
7/8	17.03	14.09	20.95	8/16	15.11	14.09	16.00
7/9	17.81	14.85	21.71	8/17	13.96	12.16	15.62
7/10	18.31	16.38	20.57	8/18	14.72	12.16	17.90
7/11	17.76	14.47	21.33	8/19	15.21	12.55	18.28
7/12	17.04	14.47	19.04	8/20	15.34	12.55	18.28
7/13	16.87	13.70	20.57	8/21	16.06	13.32	19.04
7/14	16.96	12.93	20.95	8/22	16.50	14.47	18.28
7/15	17.88	14.47	22.09	8/23	14.88	12.55	17.14
7/16	18.46	14.85	22.48	8/24	13.75	11.77	15.23
7/17	18.82	15.23	22.86	8/25	13.72	12.93	14.47
7/18	18.11	14.47	21.71	8/26	13.89	11.38	17.14
7/19	17.81	13.70	21.71	8/27	14.50	11.77	17.52
7/20	18.60	14.47	22.86	8/28	14.53	12.16	17.52
7/21	19.30	15.23	23.63	8/29	14.50	12.55	16.76
7/22	20.41	16.38	24.40	8/30	12.70	10.99	14.09
7/23	21.08	17.14	25.17	8/31	11.03	8.63	14.09
7/24	21.96	19.42	25.17	9/1	11.23	8.63	14.47
7/25	20.86	17.52	24.01	9/2	12.11	9.42	15.62
7/26	19.90	16.00	23.63	9/3	13.03	10.21	16.76
7/27	19.59	15.62	23.24	9/4	13.44	11.38	16.38
7/28	19.81	16.38	23.63	9/5	14.03	11.77	17.14
7/29	19.27	16.00	22.86	9/6	14.45	12.55	17.14
7/30	17.71	15.23	20.19	9/7	14.18	12.16	17.14
7/31	16.12	12.93	19.04	9/8	14.05	11.77	17.14
8/1	16.25	12.55	20.19	9/9	13.65	11.77	16.38
8/2	16.33	12.55	19.81	9/10	13.29	10.99	17.14
8/3	16.45	12.55	20.57	9/11	12.14	9.03	16.38
8/4	16.60	14.09	19.81				

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