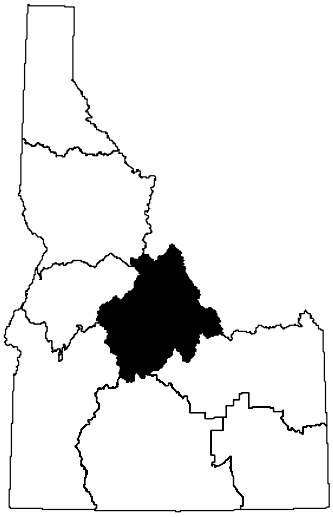
FISHERY MANAGEMENT INVESTIGATIONS

IDAHO DEPARTMENT OF FISH AND GAME
FISHERY MANAGEMENT ANNUAL REPORT

Steven M. Huffaker, Director

SALMON REGION
2005



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SALMON REGION FISHERY MANAGEMENT ANNUAL REPORT

Mountain Lake Activities

July 1, 2005 to June 30, 2006

ABSTRACT

The Idaho Department of Fish & Game stocked 39 mountain lakes in the Salmon-Challis National Forest and Sawtooth National Recreation Area by airplane during the summer of 2005. Thirty-two lakes were stocked with 14,955 westslope cutthroat trout *Oncorhynchus clarkii lewisi* fry. Seven lakes were stocked with 1,650 triploid Hayspur rainbow trout *O. mykiss* (T9) fry.

Two mountain lakes were stocked via backpacking with 776 Arctic grayling *Thymallus arcticus* fry in 2005.

Department personnel surveyed seven mountain lakes in the Salmon-Challis National Forest during the summer of 2005. A fisheries crew assessed fish status visually and by hook and line, evaluated lake use, natural recruitment potential, and presence of amphibians by species, and reviewed past stocking efforts. Three of the seven lakes surveyed were previously stocked. Of the three lakes previously stocked, two had fish in them at the time of the surveys and had naturally reproducing fish populations. The crew determined that fish stocking should be discontinued in one of the seven lakes surveyed because a naturally reproducing fish population was present. Five of the seven lakes surveyed were fishless. Of these five lakes, four should remain fishless to provide refugia for native fauna. Three of seven lakes had amphibians present. Two of the three lakes with amphibians also had fish present. Four surveyed lakes showed campsite impact rates of low use. The remaining three of the seven lakes were not rated.

The fish communities in Merriam Lake and Spruce Gulch Lake were surveyed to establish baseline data before a proposed tiger muskellunge Esox lucius x E. masquinongy stocking in 2006. Brook trout *Salvelinus fontinalis* made up 100% of the fish captured in gillnet surveys in both lakes. The nets at Merriam Lake were fished a total of 73.25 overnight hours and had a capture rate of 0.51 fish/gillnet hour. The nets at Spruce Gulch Lake were fished a total of 65.5 overnight hours and had a capture rate of 0.95 fish/gillnet hour.

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INTRODUCTION

The Salmon Region has approximately one thousand mountain lakes. Some of these lakes have never been inventoried or have not been surveyed in decades. A baseline alpine lake management plan, high levels of angler satisfaction, and increased requests for information on alpine lake angling opportunities led the Salmon Region to increase the priority of mountain lake surveys. In 2000, the Salmon Region began conducting cursory mountain lake surveys to rapidly assess regional alpine lakes and increase the number of lakes surveyed annually. The information collected from these surveys is stored in a regional database. The database is used to provide alpine lake information for the angling public, regional planning, and government agencies.

OBJECTIVES

Mountain Lake Stocking

Maintain a viable and diverse high mountain lake fishery in the Salmon Region.

Mountain Lake Surveys

Assess the status of all fish and amphibian populations by using rapid, cursory surveys of all stocked and unstocked mountain lakes within the Salmon Region. Surveys will document fish and amphibian populations, determine spawning potential of inlets and outlets, and record status of angler/camper use.

Evaluate Merriam and Spruce Gulch lakes to assess their suitability for proposed tiger muskellunge *Esox lucius x E. masquinongy* introduction and monitor effects on the brook trout *Salvelinus fontinalis* populations in 2006.

METHODS

Mountain Lake Stocking

Salmon Region high mountain lakes were stocked using a Cessna – 185 fixed-wing airplane and by backpack during 2005. Three flights were flown by McCall Aviation on September 19 and September 21, 2005. The September 19 flight was aborted after three mountain lakes were planted because of deteriorating weather conditions. Stocking resumed two days later with two flights that stocked 29 mountain lakes with westslope cutthroat trout *Oncorhynchus clarkii lewisi*. Salmon Region fishery staff stocked arctic grayling *Thymallus arcticus* fry via backpacking in two mountain lakes in the Lemhi River drainage. The arctic grayling were reared at Ashton Fish Hatchery. McCall Fish Hatchery personnel stocked triploid Hayspur rainbow trout *O. mykiss* (T9) fry by fixed wing aircraft in the Salmon Region.

Mountain Lake Surveys

Department personnel conducted cursory surveys by backpacking into seven mountain lakes in the Salmon-Challis National Forest during the summer of 2005. We documented fish presence and species by visual observation and by angling. The presence or absence of amphibians was determined by a modification of the timed visual encounter survey (VES) methodology of the lake's shoreline perimeter reported by Crump and Scott (1994). The main deviation from the VES methodology was that a fisheries crew performed a full perimeter search without accounting for various habitat types.

Each lake was surveyed to document campsite impacts. Lakes were visually surveyed for campsites and signs of human use and the difficulty of access was assessed. We used Bahls (1992) campsite impact rating (Table 1) to assess the condition of areas surrounding three of the seven lakes. The remaining four lakes were not surveyed for campsite impacts because trained personnel were not available.

Nampa Research surveyed two additional alpine lakes, Merriam and Spruce Gulch, in late September to assess fish populations in each lake. Four gillnets were deployed while surveying each lake and removed the next day. Captured fish were identified by species and sex, measured to total length (mm), weighed (g), and checked for sexual maturity. Otoliths were also taken for age anaysis.

All survey data was entered into the Salmon Region alpine lake Microsoft Access database for future analysis. Data sheets were archived at the Salmon Region office.

Table 1. Bahls Total Campsite Impact Rating for Lakes.

Impact Rating	No. of Campsites Observed
None	0
Low	1 - 4
Moderate	5 - 7
High	> 7

RESULTS AND DISCUSSION

Mountain Lake Stocking

In 2005, Sawtooth Fish Hatchery personnel stocked a total of 14,955 westslope cutthroat trout fry into 32 mountain lakes (Table 2). The average size of fish stocked in 2005 was 5.1 fish

Table 2. Salmon Region high mountain lakes stocked during the summer of 2005 by Sawtooth Fish Hatchery personnel.

Lake Name	Catalog No.	Land Area[a]	Species[b]	No. Stocked
Big Frog Lake #2	7-1385	SNRA	C2	800
Cache Creek Lake #1	7-0843	SCNF	C2	125
Castle Lake	7-1420	SNRA	C2	500
Castle Lake #1	7-0835	SCNF	C2	125
Castle View Lake	7-1440	SNRA	C2	250
Challis Creek Lake #2	7-1333	SCNF	C2	600
Challis Creek Lake #3	7-1335	SCNF	C2	875
Chamberlain Lake #7	7-1439	SNRA	C2	450
Cirque Lake	7-1369	SNRA	C2	1,000
Cove Lake	7-1364	SNRA	C2	950
Crater Lake	7-1460	SNRA	C2	750
Drift Lake	7-1424	SNRA	C2	275
East Basin Lake #1	7-1514	SCNF	C2	265
Elk Lake	7-1479	SNRA	C2	500
Goat Lake	7-1375	SNRA	C2	975
Gunsight Lake	7-1350	SNRA	C2	350
Hindman Lake #1	7-1495	SCNF	C2	250
Honey Lake	7-1433	SNRA	C2	100
Hoodoo Lake	7-1463	SNRA	C2	200
Little Redfish Lake	7-1347	SNRA	C2	125
Martindale Lake #2	7-0816	SCNF	C2	200
Mystery Lake #3	7-0879	SNRA	C2	75
Ocalkens Lake #1	7-1464	SNRA	C2	450
Ocalkens Lake #2	7-1465	SNRA	C2	650
Sapphire Lake	7-1367	SNRA	C2	1,100
Sheep Lake	7-1356	SNRA	C2	450
Slide Lake	7-1363	SNRA	C2	200
Snow Lake	7-1374	SNRA	C2	275
West Fork Bear Creek Lake #1	7-1328	SCNF	C2	100
West Fork Camas Creek Lake #1	7-0818	SCNF	C2	1,000
West Fork Camas Creek Lake #3	7-0820	SCNF	C2	600
West Fork Camas Creek Lake #5	7-0824	SCNF	C2	390
Total				14,955

[a] SCNF = Salmon-Challis National Forest, SNRA = Sawtooth National Recreation Area.
[b] C2 = Westslope cutthroat trout fry.

per gram. The total flight time was 5.3 hours at a cost of $1,537.00, or an average of $48.03 per lake. An additional 12 lakes were not stocked this year because of their location within the temporary flight restriction zone caused by the Valley Road wildfire in the Stanley area (R. Elmore, Idaho Department of Fish and Game, personal communication). Sawtooth Hatchery personnel felt that the 5,450 cutthroat trout fry requested for the 12 lakes could possibly be included in next year's stocking schedule. Table 3 lists the 12 lakes and number of fish that were not stocked.

A total of 776 arctic grayling were hand stocked in Buck and Nez Perce lakes on August 9, 2005 (Table 4). Additionally in 2005, one lake was not stocked with golden trout *O. aguabonita* and eight lakes were not stocked with arctic grayling due to the unavailability of fry (Table 5).

Table 3. Salmon Region high mountain lakes not stocked during the summer of 2005 by Sawtooth Fish Hatchery personnel due to the Valley Road wildfire's airplane flight restriction zone.

Lake Name	Catalog No.	Land Area[a]	Species[b]	No. Fish
Fourth of July Lake	7-1685	White Clouds	C2	725
Garland Lake #1	7-1468	SNRA	C2	500
Garland Lake #2	7-1469	SNRA	C2	500
Garland Lake #3	7-1470	SNRA	C2	350
Lightning Lake	7-1680	SNRA	C2	275
Phyllis Lake	7-1683	SNRA	C2	375
Pipe Lake (Blackrock Lake)	7-1732	SNRA	C2	200
Rainbow Lake	7-1727	SNRA	C2	200
Six Lake #1	7-1672	SNRA	C2	475
Swimm Lake	7-1467	White Clouds	C2	875
Thunder Lake	7-1679	SNRA	C2	225
Washington Lake #2	7-1444	White Clouds	C2	750
Total				5,450

[a] SNRA = Sawtooth National Recreation Area.
[b] C2 = Westslope cutthroat trout fry.

Table 4. Salmon Region high mountain lakes stocked by Salmon Region fishery staff in 2005.

Lake Name	Catalog No.	Land Area	Species[a]	No. Stocked
Buck Lake #4	7-1242	Lemhi	GR	259
Nez Perce Lake	7-1273	Lemhi	GR	517
Total				776

[a] GR = Arctic grayling.

Table 5. Salmon Region high mountain lakes not stocked in 2005 by Sawtooth Fish Hatchery due to unavailability of fry.

Lake Name	Catalog No.	Land Area	Species[a]	No. Fish
Cache Lake #3	7-0845	Sleeping Deer	GR	250
Cache Lake #5	7-0848	Sleeping Deer	GR	375
China Lake #3	7-0885	Loon Creek	GN	3,860
Feldspar Lake	7-1380	White Clouds	GR	550
Hope Lake	7-1430	White Clouds	GR	650
MacRae Lake (Upper Deer L.)	7-1450	White Clouds	GR	600
Martindale Lake #1	7-0815	Sleeping Deer	GR	250
Nelson Lake #2	7-0873	Sleeping Deer	GR	500
Tin Cup Lake	7-1349	White Clouds	GR	1,350
Total				8,385

[a] GR = Arctic grayling, GN = golden trout.

A total of 1,650 rainbow trout fry were stocked into seven lakes (Table 6) by McCall Fish Hatchery staff in 2005. The fry averaged 1.8 fish per gram and 38.1 total length (mm). McCall Aviation flew one fish stocking flight on September 1, 2005 at a total cost of $353.00, or $50.43 per lake.

Table 6. Salmon Region high mountain lakes stocked during the summer of 2005 by McCall Fish Hatchery personnel.

Lake Name	Catalog No.	Land Area[a]	Species[b]	No. Stocked
Gentian Lake	7-1370	SNRA	T9	325
Liberty Lake #1	7-0830	SCNF	T9	150
Liberty Lake #2	7-0833	SCNF	T9	200
Pole Lake	7-0834	SCNF	T9	175
Rock Lake #1	7-0863	SCNF	T9	125
Rock Lake #2	7-0864	SCNF	T9	550
Twin Creek Lake #2	7-1319	SCNF	T9	125
Total				1,650

[a] SNRA = Sawtooth National Recreation Area, SCNF = Salmon-Challis National Forest.

[b] T9 = Triploid Hayspur rainbow trout.

Mountain Lake Surveys

Seven mountain lakes were surveyed in 2005, all in the Salmon-Challis National Forest (Tables 7-13). Three of the seven lakes surveyed this year were previously stocked. Of the three previously stocked lakes, we determined that stocking should be discontinued in Little Eightmile Lake because fish were naturally reproducing. Fish were documented in two of the seven lakes. Three of the seven lakes had amphibians present. In two of the three lakes with amphibians, fish were found to co-exist. Cutthroat trout and rainbow trout were present in the two lakes supporting both amphibians and fish. No fish were encountered in five of seven lakes surveyed. Four of the unstocked lakes should remain fishless to provide refugia for native fauna.

Bahls (1992) campsite impact rating in Table 1 demonstrated that three of the seven lakes surveyed showed a campsite impact rate of low use. These three lakes, Allan, Little Eightmile, and Nez Perce lakes, were previously stocked.

On September 28-29, 2005, 37 brook trout *Salvelinus* fontinalis were encountered in Merriam Lake during 73.25 overnight hours of gillnetting (Table 14). This resulted in a catch rate of 0.51 fish per hour. Brook trout sizes ranged from 110-273 mm total length and the mean total length was 205.2 mm. The relative weight of the fish sample was calculated at 91.4. Otolith aging determined the 36-fish sample ranged in age from one to 14 years old; one otolith could not be aged (J. Kozfkay, Idaho Department of Fish and Game, personal communication). Age one fish (N=1) comprised 3%, two-year-old fish (N=16) comprised 44% (the largest age group of the sample), followed by 19% three-year-old fish (N=7). Four-year-old (N=3) and five-year-old fish (N=2) totaled 8% and 6%, respectively. One six-year-old comprised 3%, eight-year-old fish (N=5) had 14%, and one fourteen-year-old fish tallied the final 3% of the sample (Appendix A). Maturation stage was also noted for the sample. Mature fish and those undergoing sexual development comprised 57% and 38%, respectively, of the captured brook trout. The remaining two fish were classified as immature (5%).

The fisheries crew spent 65.5 overnight hours gillnetting in Spruce Gulch Lake on September 29-30, 2005 (Table 15). A total of 63 brook trout were captured for a catch per unit effort of 0.95 fish/hour. The fish ranged in size from 141-267 mm total length and had a mean total length of 206.8 mm. The netted fish demonstrated a relative weight value of 96.4. Age classes one through four were well represented in the Spruce Gulch Lake sample (Appendix A). Age one fish (N=10) tallied 20%, and two- (N=12) and three-year-old fish (N=12) each comprised 24% of the 50-fish sample. Four- (N=9) and five-year-old fish (N=5) totaled 18% and 10%, respectively. Two seven-year-old fish rounded out the final 4% of the sample. The crew recorded that mature fish and those undergoing sexual maturation comprised 75% and 21%, respectively, of the captured brook trout. The remaining three fish were classified as immature (5%).

Table 7. Alpine lake survey of Allan Lake.

LAKE LOCATION

Lake: Allan Lake Survey Date: 7/01/2005
IDFG Catalog: 71214
Primary: North Fork Salmon River Secondary: Ditch Cr. County: Lemhi
Land Area: Divide USFS Ranger District: North Fork Elevation (ft): 7,802
Township: 26N Range: 20E Section: 13 Acres: 2.5
UTM East: 730394 UTM North: 5052372

LAKE USE

Campsites: 4 Campsite Impact Rating: Low Trail Around Lake: Intermittent
Trampled: Yes Access Good (Mi): 3.0 Access Poor (Mi): 0
Access X-Country (Mi): 0 Trailhead Location: Allan Lake

AMPHIBIAN SURVEY DATA

Search Time (hr): 0.58

Adults	#	Juveniles	#
Western Chorus Frog	0	Western Chorus Frog	0
Spotted Frog	1	Spotted Frog	0
Pacific Chorus Frog	0	Pacific Chorus Frog	0
Tailed Frog	0	Tailed Frog	0
Western Toad	0	Western Toad	0
Long Toed Salamander	0	Long Toed Salamander	0

FISHERY AND FISH POPULATIONS

Anglers: 1 Hrs: 1.0 # Fish Caught: 2 Fish/Hr: 2
Fish Abundance: Moderate Fish Gear: Angling Hrs Set (gn): 0

LENGTH	RBT	CT	GN	BU	RBTx CT	GR	EBT
0-49mm:	0	0	0	0	0	0	0
50-99mm:	0	0	0	0	0	0	0
100-149mm:	0	0	0	0	0	0	0
150-199mm:	0	0	0	0	0	0	0
200-249mm:	1	1	0	0	0	0	0
250-299mm:	0	0	0	0	0	0	0
300-349mm:	0	0	0	0	0	0	0
350-399mm:	0	0	0	0	0	0	0
>399mm:	0	0	0	0	0	0	0

Comments:

Submerged lily pads near inlet provide great refugia for amphibians. Observed 4 age classes of fish. Water clarity great. Trail well maintained.

Table 8. Alpine lake survey of Allan Lake A.

LAKE LOCATION

Lake: Allan Lake A Survey Date: 7/01/2005
IDFG Catalog: 71214
Primary: North Fork Salmon River Secondary: None County: Lemhi
Land Area: Divide USFS Ranger District: North Fork Elevation (ft): 8,220
Township: 26N Range: 20E Section: 14 Acres: 0.25
UTM East: 729490 UTM North: 5051959

LAKE USE

Campsites: Campsite Impact Rating: Not rated Trail Around Lake:
Trampled: Access Good (Mi): 3.0 Access Poor (Mi): 0
Access X-Country (Mi): 0.03 Trailhead Location: Allan Lake

AMPHIBIAN SURVEY DATA

Search Time (hr): 0

Adults	#	Juveniles	#
Western Chorus Frog	0	Western Chorus Frog	0
Spotted Frog	0	Spotted Frog	0
Pacific Chorus Frog	0	Pacific Chorus Frog	0
Tailed Frog	0	Tailed Frog	0
Western Toad	0	Western Toad	0
Long Toed Salamander	0	Long Toed Salamander	0

FISHERY AND FISH POPULATIONS

Anglers: 0 Hrs: 0 # Fish Caught: 0 Fish/Hr: 0
Fish Abundance: None Fish Gear: None Hrs Set (gn): 0

LENGTH	RBT	CT	GN	BU	RBTx CT	GR	EBT
0-49mm:	0	0	0	0	0	0	0
50-99mm:	0	0	0	0	0	0	0
100-149mm:	0	0	0	0	0	0	0
150-199mm:	0	0	0	0	0	0	0
200-249mm:	0	0	0	0	0	0	0
250-299mm:	0	0	0	0	0	0	0
300-349mm:	0	0	0	0	0	0	0
350-399mm:	0	0	0	0	0	0	0
>399mm:	0	0	0	0	0	0	0

Comments:

None.

Table 9. Alpine lake survey of Allan Lake B.

LAKE LOCATION

Lake: Allan Lake B Survey Date: 7/01/2005
IDFG Catalog: 71214
Primary: North Fork Salmon River Secondary: Ditch Cr. County: Lemhi
Land Area: Divide USFS Ranger District: North Fork Elevation (ft): 8,202
Township: 26N Range: 20E Section: 14 Acres: 0.25
UTM East: 729576 UTM North: 5051981

LAKE USE

Campsites: Campsite Impact Rating: Not rated Trail around Lake:
Trampled: Access Good (Mi): 4.7 Access Poor (Mi): 0
Access X-Country (Mi): 0 Trailhead Location: Allan Lake

AMPHIBIAN SURVEY DATA

Search Time (hr): 0.25

Adults	#	Juveniles	#
Western Chorus Frog	0	Western Chorus Frog	0
Spotted Frog	0	Spotted Frog	0
Pacific Chorus Frog	0	Pacific Chorus Frog	0
Tailed Frog	0	Tailed Frog	0
Western Toad	0	Western Toad	0
Long Toed Salamander	0	Long Toed Salamander	0

FISHERY AND FISH POPULATIONS

Anglers: 1 Hrs: 0 # Fish Caught: 0 Fish/Hr: 0
Fish Abundance: None Fish Gear: None Hrs Set (gn): 0

LENGTH	RBT	CT	GN	BU	RBTx CT	GR	EBT
0-49mm:	0	0	0	0	0	0	0
50-99mm:	0	0	0	0	0	0	0
100-149mm:	0	0	0	0	0	0	0
150-199mm:	0	0	0	0	0	0	0
200-249mm:	0	0	0	0	0	0	0
250-299mm:	0	0	0	0	0	0	0
300-349mm:	0	0	0	0	0	0	0
350-399mm:	0	0	0	0	0	0	0
>399mm:	0	0	0	0	0	0	0

Comments:

Too shallow.

Table 10. Alpine lake survey of Little Eightmile Lake.

LAKE LOCATION

Lake: Little Eightmile Lake Survey Date: 8/15/2005
IDFG Catalog: None

Primary: Lemhi River Secondary: Little Eightmile Cr. County: Lemhi

Land Area: Divide USFS Ranger District: Leadore Elevation (ft): 7,188

Township: 12S Range: 26E Section: 13 Acres: 4.0

UTM East: 310357 UTM North: 4964464

LAKE USE

Campsites: 0 Campsite Impact Rating: None Trail Around Lake: Partial
Trampled: No Access Good (Mi): 1.3 Access Poor (Mi): 0
Access X-Country (Mi): 1.5 Trailhead Location: Continental Divide Trail

AMPHIBIAN SURVEY DATA

Search Time (hr): 0.25

Adults	#	Juveniles	#
Western Chorus Frog	0	Western Chorus Frog	0
Spotted Frog	1	Spotted Frog	0
Pacific Chorus Frog	0	Pacific Chorus Frog	0
Tailed Frog	0	Tailed Frog	0
Western Toad	0	Western Toad	0
Long Toed Salamander	0	Long Toed Salamander	0

FISHERY AND FISH POPULATIONS

Anglers: 1 Hrs: 0 # Fish Caught: 0 Fish/Hr: 0
Fish Abundance: Low Fish Gear: Visual Hrs Set (gn): 0

LENGTH	RBT	CT	GN	BU	RBTx CT	GR	EBT
0-49mm:	0	0	0	0	0	0	0
50-99mm:	0	0	0	0	0	0	0
100-149mm:	0	0	0	0	0	0	0
150-199mm:	0	4	0	0	0	0	0
200-249mm:	0	0	0	0	0	0	0
250-299mm:	0	0	0	0	0	0	0
300-349mm:	0	0	0	0	0	0	0
350-399mm:	0	0	0	0	0	0	0
>399mm:	0	0	0	0	0	0	0

Comments:

Currently lake has nearly dewatered and is about one acre in size. Outlet not flowing. One inlet (northern) flowing. Fish observed in inlet.

Table 11. Alpine lake survey of Little Eightmile Lake A.

LAKE LOCATION

Lake: Little Eightmile Lake A Survey Date: 8/15/2005
IDFG Catalog: None

Primary: Lemhi River Secondary: Little Eightmile Cr. County: Lemhi

Land Area: Divide USFS Ranger District: Leadore Elevation (ft): 7,569
Township: 17N Range: 26E Section: 8 Acres: 0.5

UTM East: 311011 UTM North: 4965754

LAKE USE

Campsites: Campsite Impact Rating: Not rated Trail around Lake: Partial
Trampled: Access Good (Mi): 1.3 Access Poor (Mi): 0
Access X-Country (Mi): 0.6 Trailhead Location: Continental Divide Trail

AMPHIBIAN SURVEY DATA

Search Time (hr): 0.02

Adults	#	Juveniles	#
Western Chorus Frog	0	Western Chorus Frog	0
Spotted Frog	0	Spotted Frog	0
Pacific Chorus Frog	0	Pacific Chorus Frog	0
Tailed Frog	0	Tailed Frog	0
Western Toad	0	Western Toad	0
Long Toed Salamander	0	Long Toed Salamander	0

FISHERY AND FISH POPULATIONS

Anglers: 1 Hrs: 0 # Fish Caught: 0 Fish/Hr: 0
Fish Abundance: None Fish Gear: Visual Hrs Set (gn): 0

LENGTH	RBT	CT	GN	BU	RBTx CT	GR	EBT
0-49mm:	0	0	0	0	0	0	0
50-99mm:	0	0	0	0	0	0	0
100-149mm:	0	0	0	0	0	0	0
150-199mm:	0	0	0	0	0	0	0
200-249mm:	0	0	0	0	0	0	0
250-299mm:	0	0	0	0	0	0	0
300-349mm:	0	0	0	0	0	0	0
350-399mm:	0	0	0	0	0	0	0
>399mm:	0	0	0	0	0	0	0

Comments:

Lake is dry.

Table 12. Alpine lake survey of Little Eightmile Lake B.

LAKE LOCATION

Lake: Little Eightmile Lake B Survey Date: 8/15/2005
IDFG Catalog: None
Primary: Lemhi River Secondary: Little Eightmile Cr. County: Lemhi
Land Area: Divide USFS Ranger District: Leadore Elevation (ft): 7,603
Township: 17N Range: 26E Section: 8 Acres: 0.5
UTM East: 3111521 UTM North: 4965918

LAKE USE

Campsites: Campsite Impact Rating: Not rated Trail around Lake: Partial
Trampled: Access Good (Mi): 1.3 Access Poor (Mi): 0
Access X-Country (Mi): 0.4 Trailhead Location: Continental Divide Trail

AMPHIBIAN SURVEY DATA

Search Time (hr): 0.02

Adults	#	Juveniles	#
Western Chorus Frog	0	Western Chorus Frog	0
Spotted Frog	0	Spotted Frog	0
Pacific Chorus Frog	0	Pacific Chorus Frog	0
Tailed Frog	0	Tailed Frog	0
Western Toad	0	Western Toad	0
Long Toed Salamander	0	Long Toed Salamander	0

FISHERY AND FISH POPULATIONS

Anglers: 1 Hrs: 0 # Fish Caught: 0 Fish/Hr: 0
Fish Abundance: None Fish Gear: Visual Hrs Set (gn): 0

LENGTH	RBT	CT	GN	BU	RBTx CT	GR	EBT
0-49mm:	0	0	0	0	0	0	0
50-99mm:	0	0	0	0	0	0	0
100-149mm:	0	0	0	0	0	0	0
150-199mm:	0	0	0	0	0	0	0
200-249mm:	0	0	0	0	0	0	0
250-299mm:	0	0	0	0	0	0	0
300-349mm:	0	0	0	0	0	0	0
350-399mm:	0	0	0	0	0	0	0
>399mm:	0	0	0	0	0	0	0

Comments:

Lake is dry.

Table 13. Alpine lake survey of Nez Perce Lake.

LAKE LOCATION

Lake: Nez Perce Lake Survey Date: 6/29/2005
IDFG Catalog: 71273

Primary: Lemhi River Secondary: Nez Perce Cr. County: Lemhi

Land Area: Lemhi USFS Ranger District: Leadore Elevation (ft): 8,901
Township: 13N Range: 26E Section: 27 Acres: 7.5

UTM East: 311075 UTM North: 4931000

LAKE USE

Campsites: 2 Campsite Impact Rating: Low Trail Around Lake: Partial
Trampled: No Access Good (Mi): 2.4 Access Poor (Mi): 0
Access X-Country (Mi): 0 Trailhead Location: Nez Perce Cr.

AMPHIBIAN SURVEY DATA

Search Time (hr): 1.25

Adults	#	Juveniles	#
Western Chorus Frog	0	Western Chorus Frog	0
Spotted Frog	0	Spotted Frog	0
Pacific Chorus Frog	0	Pacific Chorus Frog	0
Tailed Frog	0	Tailed Frog	0
Western Toad	0	Western Toad	0
Long Toed Salamander	2	Long Toed Salamander	4

FISHERY AND FISH POPULATIONS

Anglers: 3 Hrs: 1.25 # Fish Caught: 0 Fish/Hr: 0
Fish Abundance: None Fish Gear: Angling Hrs Set (gn): 0

LENGTH	RBT	CT	GN	BU	RBTx CT	GR	EBT
0-49mm:	0	0	0	0	0	0	0
50-99mm:	0	0	0	0	0	0	0
100-149mm:	0	0	0	0	0	0	0
150-199mm:	0	0	0	0	0	0	0
200-249mm:	0	0	0	0	0	0	0
250-299mm:	0	0	0	0	0	0	0
300-349mm:	0	0	0	0	0	0	0
350-399mm:	0	0	0	0	0	0	0
>399mm:	0	0	0	0	0	0	0

Comments:

Lots of scuds, boatmans, and mayflies. Lake level seems 3 feet above recent years.

Table 14. Alpine lake survey of Merriam Lake.

LAKE LOCATION

Lake: Merriam Lake Survey Date: 9/28/2005
IDFG Catalog: None

Primary: Pahsimeroi River Secondary: West Fork Pahsimeroi R. County: Custer

Land Area: Pahsimeroi USFS Ranger District: Challis Elevation (ft): 9,602
Township: 9N Range: 22E Section: 17 Acres: 4.0

UTM East: 279642 UTM North: 4888190

LAKE USE

Campsites: 2 Campsite Impact Rating: Low Trail around Lake: 90% Complete
Trampled: No Access Good (Mi): 1.9 Access Poor (Mi): 0
Access X-Country (Mi): 0 Trailhead Location: Merriam Lake (W. Fk. Pah.)

AMPHIBIAN SURVEY DATA

Search Time (hr): 0

Adults	#	Juveniles	#
Western Chorus Frog	0	Western Chorus Frog	0
Spotted Frog	0	Spotted Frog	0
Pacific Chorus Frog	0	Pacific Chorus Frog	0
Tailed Frog	0	Tailed Frog	0
Western Toad	0	Western Toad	0
Long Toed Salamander	0	Long Toed Salamander	0

FISHERY AND FISH POPULATIONS

Anglers: 2 Hrs: 0 # Fish Caught: 37 Fish/Hr: 0.51
Fish Abundance: High Fish Gear: Gillnet Hrs Set (gn): 73.25

LENGTH	RBT	CT	GN	BU	RBTx CT	GR	EBT
0-49mm:	0	0	0	0	0	0	0
50-99mm:	0	0	0	0	0	0	0
100-149mm:	0	0	0	0	0	0	1
150-199mm:	0	0	0	0	0	0	18
200-249mm:	0	0	0	0	0	0	10
250-299mm:	0	0	0	0	0	0	8
300-349mm:	0	0	0	0	0	0	0
350-399mm:	0	0	0	0	0	0	0
>399mm:	0	0	0	0	0	0	0

Comments:

Outlet is 80-100 feet long, and then goes over 15-18 foot waterfall. Very little wood in lake. Very few macrophytes in lake. Redds seen in lake by outlet. Weather too cold for amphibian survey.

Table 15. Alpine lake survey of Spruce Gulch Lake.

LAKE LOCATION

Lake: Spruce Gulch Lake Survey Date: 9/29/2005
IDFG Catalog: 71316

Primary: Main Salmon River (Pahsimeroi-E. Fk.) Secondary: Challis Cr.
County: Custer

Land Area: Challis USFS Ranger District: Challis Elevation (ft): 8,852
Township: 15N Range: 17E Section: 27 Acres: 4.0

UTM East: 702327 UTM North: 48941877

LAKE USE

Campsites: 1 Campsite Impact Rating: Low Trail Around Lake: Partial
Trampled: No Access Good (Mi): 2.8 Access Poor (Mi): 0
Access X-Country (Mi): 0 Trailhead Location: End of White Valley Cr. road

AMPHIBIAN SURVEY DATA

Search Time (hr): 0

Adults	#	Juveniles	#
Western Chorus Frog	0	Western Chorus Frog	0
Spotted Frog	0	Spotted Frog	0
Pacific Chorus Frog	0	Pacific Chorus Frog	0
Tailed Frog	0	Tailed Frog	0
Western Toad	0	Western Toad	0
Long Toed Salamander	0	Long Toed Salamander	0

FISHERY AND FISH POPULATIONS

Anglers: 2 Hrs: 0 # Fish Caught: 63 Fish/Hr: 0.96
Fish Abundance: High Fish Gear: Gillnet Hrs Set (gn): 65.5

LENGTH	RBT	CT	GN	BU	RBTx CT	GR	EBT
0-49mm:	0	0	0	0	0	0	0
50-99mm:	0	0	0	0	0	0	0
100-149mm:	0	0	0	0	0	0	6
150-199mm:	0	0	0	0	0	0	15
200-249mm:	0	0	0	0	0	0	36
250-299mm:	0	0	0	0	0	0	6
300-349mm:	0	0	0	0	0	0	0
350-399mm:	0	0	0	0	0	0	0
>399mm:	0	0	0	0	0	0	0

Comments:
Weather too cold for amphibian survey.

RECOMMENDATIONS

Continue stocking high mountain lakes using Rotation B in 2006, including the stocking request for the 12 lakes not stocked in 2005 during Rotation A.

Continue cursory surveys of high mountain lakes to determine the current status of fish and amphibian populations, human use, and the success of current stocking strategies.

Standard mountain lake surveys will be performed on selected lakes based on the results of cursory surveys and historical stocking information. These surveys will provide additional information for the development of a statewide mangement plan. A collection of amphibian samples has been initiated for future genetic evaluation.

Stock all arctic grayling and golden trout lakes in 2006 that were not stocked in 2005. Coordinate with the Department's Fisheries Bureau to find a reliable source of arctic grayling fry and golden trout fry.

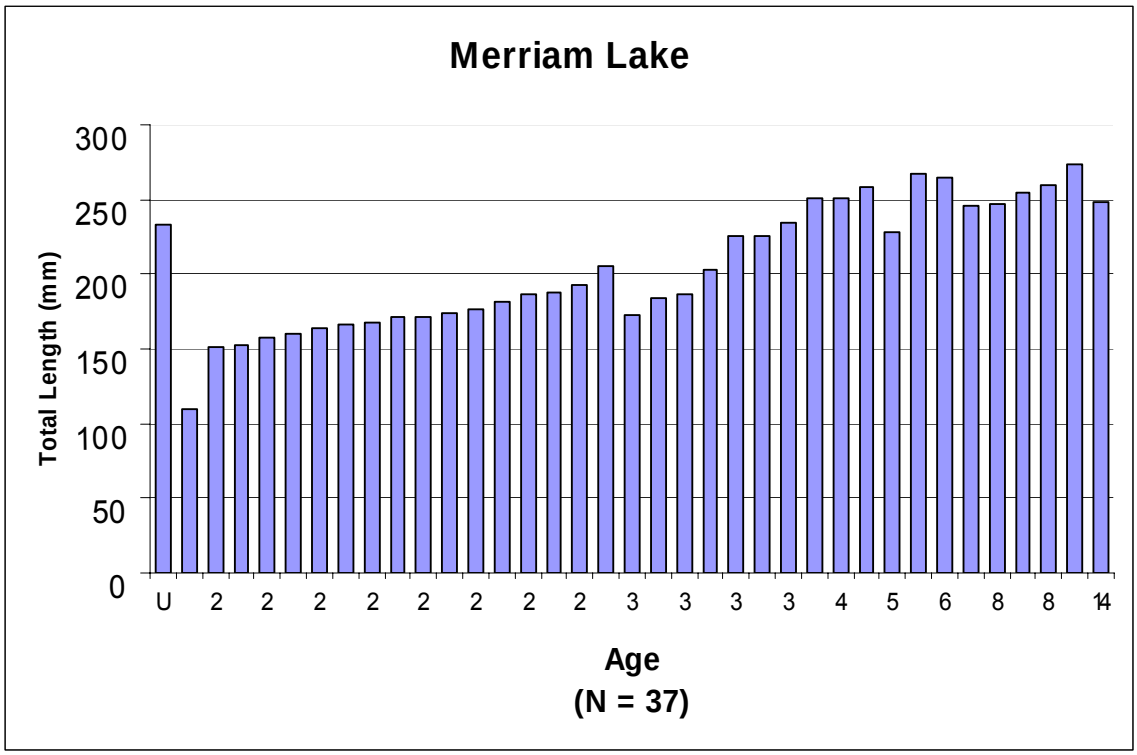
LITERATURE CITED

Bahls, P. 1992. A Survey Methodology for High Mountain Lakes, High Lake Fisheries Project 1991. Nez Perce National Forest, U. S. Forest Service, Grangevile, Idaho, and Idaho Fish and Game, Boise, Idaho.

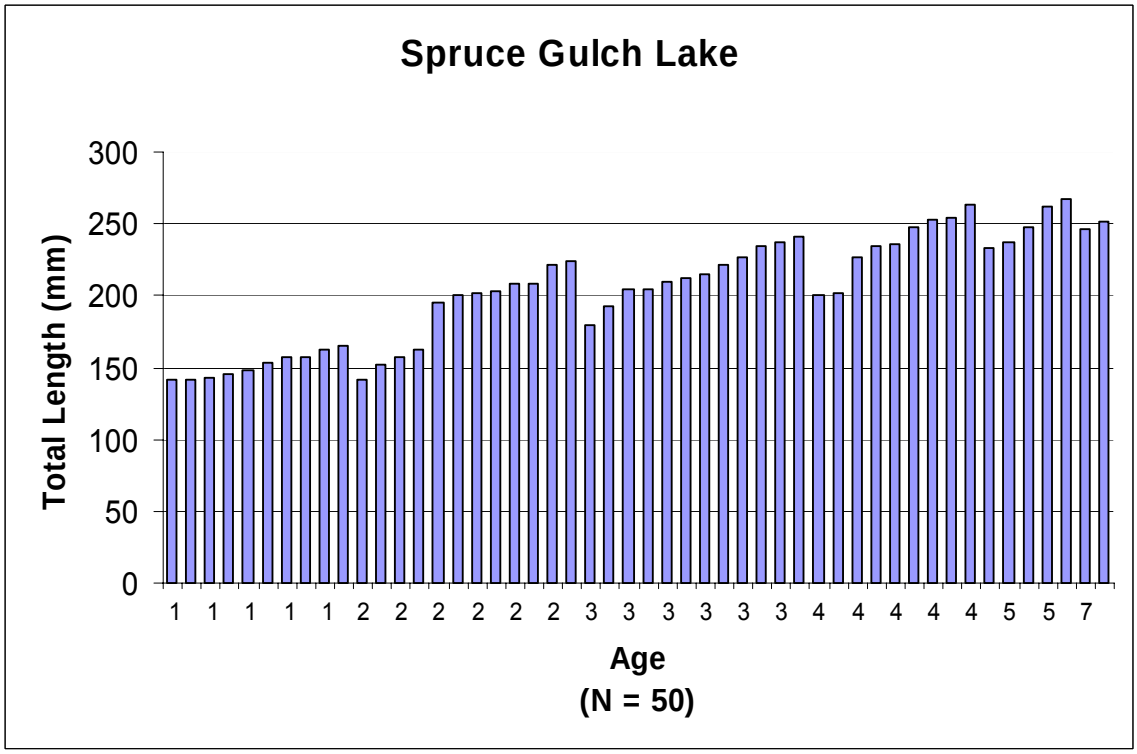
Crump, M.L. and N.J. Scott, Jr., Heyer, W.R., M.A. Donnelly, R.W. McDiarmid, L.C. Hayek, and M.S. Foster (Editors). 1994. Visual Encounter Surveys in Measuring and Monitoring Biological Diversity: Standard Methods for Amphibians. Smithsonian Institution Press, Washington, D.C.

APPENDIX

Appendix A. Age classes of brook trout otolith samples taken from Merriam and Spruce Gulch lakes, 2005.



U = Unknown age.



SALMON REGION FISHERY MANAGEMENT ANNUAL REPORT

Rivers and Stream Investigations

Wild Trout Redd Counts and Stream Surveys

July 1, 2005 to June 30, 2006

ABSTRACT

During the summer and fall of 2005, the Idaho Department of Fish Game, U.S. Forest Service, and Idaho Department of Environmental Quality sampled 61 tributary streams of the upper Salmon River basin to determine fish species composition, relative abundance, and size distribution. Of these 61 tributary streams surveyed, 59 had fish present. Rainbow trout/steelhead *Oncorhynchus mykiss* were found in 56% of the 59 fish-bearing streams surveyed and had total lengths ranging from 25 to 340 mm. Westslope cutthroat trout *O. clarkii lewisi* were found in 53% of the fish-bearing streams surveyed and had total lengths ranging from 35 to 265 mm. Bull trout *Salvelinus confluentus* were found in 47% of the fish-bearing streams and had total lengths ranging from 40 to 801 mm. Brook trout *S. fontinalis* were found in 27% of the streams with fish and had total lengths ranging from 27 to 228 mm. Juvenile Chinook salmon *O. tshawytscha* were found in 8% of streams with fish present. Apparent hybrid rainbow/cutthroat trout *O. mykiss x O. clarkii lewisi* were found in 2% of streams where fish were detected. Apparent hybrid rainbow/cutthroat trout total lengths ranged from 165 to 230 mm. Non-game fish were found in 24% of the fish-bearing streams.

Project personnel conducted three rainbow trout spawning ground surveys to monitor redd count trends: one survey transect in the upper Lemhi River and two others in Big Springs Creek, a tributary to the Lemhi River. A total of 215 redds were counted from the three survey transects on April 27, 2006.

On September 13, 2005 regional department staff surveyed a meadow reach of Bear Valley Creek, a tributary to Hayden Creek, and 34 fluvial bull trout redds were observed.

On September 13, 2005 Department staff surveyed a meadow reach of the East Fork of Hayden Creek and counted 41 resident bull trout redds.

On September 8, 2005 regional fishery staff counted 22 bull trout redds and 43 bull trout adults in a roadless section of upper Hayden Creek. Based on observed lengths, 23 of the adults were classified as resident bull trout with total lengths of approximately 170 to 330 mm. The remaining 20 fish were classified as fluvial bull trout greater than 350 mm total length. Resident and fluvial bull trout spawning in the same stretch of Hayden Creek was not previously known and is considered unique.

On September 2, 2005 a reach of Fourth of July Creek near Stanley was surveyed and 41 completed bull trout redds were counted.

On August 30 and September 12, 2005 a total of 13 completed bull trout redds in Alpine Creek and 23 bull trout redds Fishhook Creek were counted in the Stanley basin.

The number of fluvial-sized rainbow trout encountered at the Pahsimeroi Hatchery weir has remained relatively stable in recent years. Fifty-four rainbow trout were counted at the hatchery rack in 2005.

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INTRODUCTION

Wild Trout Population Surveys

During the summer and fall of 2005, the Idaho Department of Fish and Game (IDFG), U.S. Forest Service, and the Idaho Department of Environmental Quality cooperatively inventoried fish communities in tributary streams of the upper Salmon River basin. Accurate and current information is needed to effectively manage fish stocks, particularly since several ESA-listed endangered or threatened fish species, including bull trout *Salvelinus confluentus*, Chinook salmon *Oncorhynchus tshawytscha*, sockeye salmon *O. nerka*, and steelhead trout *O. mykiss,* are known to inhabit the upper Salmon River basin.

Fluvial Trout Monitoring

Big Springs Creek and Lemhi River

In 1994, IDFG initiated resident rainbow trout redd count surveys on Big Springs Creek (BSC), a tributary to the upper Lemhi River near Leadore. Regional staff established three transect areas in 1997 to monitor long term resident rainbow trout population trends: two on BSC and one on the upper Lemhi River. These efforts are conducted to identify trends in the numbers of redds observed. Regulation changes on the Lemhi River were implemented in 1994 so that only rainbow trout over 14 inches could be harvested. Theoretically, regulation changes, habitat improvement projects, and tributary reconnect projects should produce increased number of rainbow trout spawners within these transect areas.

Bear Valley Creek

This year marked the fourth year of counting bull trout redds in Bear Valley Creek, a tributary of Hayden Creek in the Lemhi River drainage. The area surveyed in Bear Valley Creek is located within a relatively low gradient meadow formed by a landslide. The redd count transect is located about 3.2 km upstream from the confluence of Bear Valley Creek with Hayden Creek. Bear Valley Creek is likely the most important tributary for spawning fluvial bull trout in the Lemhi River drainage (Curet et al. 2004).

East Fork of Hayden Creek

The East Fork of Hayden Creek, a tributary to Hayden Creek in the Lemhi River drainage, has a bull trout spawning transect in a meadow 5 km upstream from its confluence with Hayden Creek.

Hayden Creek

Historically, the main stem of Hayden Creek has been monitored annually in the early fall for Chinook salmon redds and is also known as a high quality bull trout rearing and spawning tributary to the Lemhi River. In September 2005 while an IDFG fishery crew was surveying traditional Chinook salmon transects, they discovered many bull trout adults were present and spawning in upper Hayden Creek above the mouth of Bear Valley Creek. Consequently, regional fishery staff counted bull trout redds on Hayden Creek from approximately the mouth of the East Fork of Hayden Creek upstream to the mouth of Carol Creek.

Alpine and Fishhook Creeks

In 1995 IDFG initiated informal bull trout redd count surveys on Alpine Creek (tributary to Alturas Lake) and Fishhook Creek (inlet to Redfish Lake) near Stanley. In 1998, standardized transects on these creeks were established to monitor long term bull trout spawning trends.

Fourth of July Creek

Bull trout redds in Fourth of July Creek were counted for the third year in 2005. Fourth of July Creek is a tributary to the main stem Salmon River 23.4 km south of Stanley in the Sawtooth National Recreation Area (SNRA). The survey area starts approximately 6.8 km upstream from the mouth of Fourth of July Creek and ends approximately 4 km upstream. Bull trout redd counts in Fourth of July Creek were started in 2003 after flow alterations and stream improvements were performed by the IDFG Screen Program in Salmon.

Resident Trout Monitoring

Annually, non-target salmonid species are encountered at the Pahsimeroi Hatchery weir as part of routine trapping activities. These non-target catches provide a reliable method of enumerating fluvial fish migrating into the Pahsimeroi drainage.

OBJECTIVES

Evaluate fish populations in rivers and streams of the Salmon Region.

Evaluate the effects of harvest restrictions and habitat improvement efforts on resident rainbow trout populations in the upper Lemhi River and Big Springs Creek.

Evaluate the number of bull trout redds in Bear Valley, East Fork of Hayden, Hayden, Alpine, Fishhook, and Fourth of July creeks to provide baseline and trend information relative to bull trout recovery efforts and harvest restrictions.

STUDY AREA AND METHODS

Wild Trout Population Studies

Between June 7 and October 3, 2005, 61 tributary streams of the upper Salmon River basin were surveyed for fish composition, relative abundance, and size distribution. Stream characteristics, including temperature, channel type, and area sampled, were typically recorded. Drainage information and map coordinates were also documented.

Fish presence and abundance was documented using backpack electrofishing methodologies. Site locations were selected to encompass a complete coverage of fish communities within various habitats, although some locations were based on adequate access and permission from landowners.

Streams were sampled by electrofishing with a Smith Root SR-15 or 15D backpack shocking unit. Samplers attempted to catch all sizes of fish while moving upstream in transects

that ranged from 76 to 260 meters in length following one of two stream survey protocols. For a standard stream survey (the most commonly used survey method used in 2005), a given transect was sampled one, two, or three times. Captured fish were measured in total length (mm), placed in holding pens, and monitored for recovery. Once electrofishing was completed, fish were released back into the surveyed reach. Genetic samples were taken on some game fish for analysis at a later date. Non-target fish were enumerated only. The second survey type used was presence and absence sampling whereby a stream section of unmeasured length and width was sampled to determine if fish could be detected. The deviation between sampling methods was a result of varying agency objectives and needs at sampling locations.

Where applicable, density estimates were expressed as the number of fish per 100 m². Population estimates were calculated using Microfish population software (Van Deventer and Platts, 1987). Population estimates for all species of salmonids were calculated for two- and three-pass electrofishing transect sites when a 50% reduction in salmonid numbers was counted. Estimates were based on total sample size of all salmonids sampled during each electrofishing pass. When consecutive electrofishing passes did not achieve a 50% reduction, no population estimate for the stream was calculated. Young of the year (YOY) fish were included in density estimate calculations. However, YOY fish were not included in population estimates where individual species could not be identified during electrofishing surveys.

Fluvial Trout Monitoring

Big Springs Creek and Lemhi River

Since 1994 IDFG personnel have conducted resident rainbow trout redd count surveys on Big Springs Creek (BSC). We established three transect areas in 1997 to monitor long term resident rainbow trout population trends, two on BSC and one on the upper Lemhi River near Leadore. The two BSC sites included the entire stream flowing through the current Karl Tyler ranch (Start: NAD27, 12 310017mE, 4953211mN, and end: 12 307299mE, 4955469mN) and the current Darwin Neibaur ranch (Start: NAD27, 12 311162mE, 4952233mN, and end: 12 310017mE, 4953211mN). The upper Lemhi River site includes that section of river flowing through the current Merrill Beyeler Ranch from the fence line 100 meters upstream of the upper water gap to the lower fenced boundary (Start: NAD27, 12 312832mE, 4950675mN, ,and end: 12 312238mE, 4952088mN). Redd counts are usually conducted during the last week of April or the first week of May using visual ground count methods. This year, IDFG fishery personnel conducted redd counts on April 27, 2006.

Bear Valley Creek

Fluvial bull trout redd counts on Bear Valley Creek were conducted September 13, 2005, by IDFG fishery personnel using ground count methods. The redd count transect started at NAD27, 12 283019mE, 4961561mN, and ended at 12 282254mE, 4962248mN. The Bear Valley transect consists of c-channel habitat.

East Fork of Hayden Creek

The resident bull trout redd count on the East Fork of Hayden Creek was conducted September 13, 2005 using ground count methods. The redd count transect started at NAD27, 12 288525mE, 4956202mN, and ended at 12 288880mE, 4955583mN. The East Fork of Hayden Creek transect consisted of c-channel type habitat.

Hayden Creek

Two transects on upper Hayden Creek were surveyed for bull trout redds in 2005 incidental to an on-going, yearly survey for Chinook salmon redds using ground count methods. The survey transects, located upstream of the mouth of Bear Valley Creek, were conducted September 8, 2005. The two transects totaled 6.1 km in length. UTM coordinates for the Hayden Creek surveys started at NAD27, 12 285350mE, 4958731mN, and ended at 12 283236mE, 4953428mN.

Alpine and Fishhook Creeks

Two counts are conducted annually about two weeks apart on both Alpine and Fishhook creeks to monitor the progress of bull trout spawning activity. Redd counts were conducted by department research personnel on Alpine and Fishhook creeks August 30 and September 12, 2005. All redds in progress or redds that were completed were counted during the first survey and flagged for later identification. On the second survey 13 days later, additional redds were counted and included with the number of flagged redds to provide an annual total number of redds counted for each stream. Coordinates for the Alpine Creek survey transect started at NAD27, 11 666259mE, 4863406mN, and ended at 11 665656mE, 4863195mN. Coordinates for the Fishhook Creek survey started at NAD27, 11 662581mE, 4888855mN, and ended at 11 661766mE, 4888863mN.

Fourth of July Creek

The Fourth of July Creek bull trout redd count was conducted September 2, 2005 using ground count methods. Coordinates for the Fourth of July Creek survey started at NAD27 11 679680mE NAD27, 4878679mN, and ended at 11 684992mE, 4879856mN.

Resident Trout Monitoring

Pahsimeroi Fish Hatchery personnel annually provide results of resident rainbow trout encountered during trapping operations for reporting and analysis by regional fisheries staff.

RESULTS AND DISCUSSION

Wild Trout Population Studies

Salmonids and other non-target fish were found in 59 (97%) of 61 streams surveyed in 2005 (Tables 1-3). Rainbow trout was the predominant salmonid species encountered during this year's investigations. Rainbow trout were found in 33 (56%) of the streams surveyed with fish present and measured from 25 to 340 mm total length (Tables 1 and 2). The highest densities of rainbow trout were found in Carmen and Haynes creeks. Westslope cutthroat trout were observed in 31 (53%) of streams with fish and had total lengths ranging from 35 to 265 mm. The highest densities of westslope cutthroat trout occurred in Hawley and Salzer creeks. Bull trout were found in 28 (47%) of the streams surveyed with fish and had total lengths ranging from 40 to 801 mm. Horse and Mill creeks had the highest densities of bull trout. Brook trout were found in 16 (27%) streams surveyed with fish and had total lengths ranging from 27 to 228 mm. The highest density of brook trout were found in two survey transects on

Frenchman Creek. Juvenile Chinook salmon *O. tshawytscha* were found in five (8%) streams surveyed with fish present. Fourth of July (located in the SNRA) and Gold creeks had the highest densities of juvenile Chinook salmon. Apparent hybrid rainbow/cutthroat trout were found in only one (2%) of the 59 tributary streams surveyed with fish. The apparent hybrid rainbow/cutthroat trout measurements ranged from 165 to 230 mm total lengths. Fish were not found in two (3%) of the 61 streams surveyed, Cleveland and West Fork of Wimpey creeks.

Young of the year (YOY) trout were enumerated on ten transects in 2005, but their individual species could not be differentiated during surveys. Thirty-five YOY trout were counted in the following streams: Little Deep, Moose (2 transects), Phelan, Rapps, Wagonhammer (4 transects), and Woods Fork of Horse Creek. In addition to the YOY trout, other small fish may have been missed also during the surveys. The backpack electrofisher used for stream surveys is selective toward larger fish. Detection of smaller fish is therefore biased during shocking and numbers of small fish should be considered with caution (Nielsen and Johnson, 1983). Table 1 includes these 35 YOY fish in density calculations. However, they were not counted as part of the salmonid composition percentages in Table 2 due to their unknown species origin.

The sole non-target species recorded during surveys was sculpin *Cottus sp* (Table 3). Sculpin were found in 14 (25%) tributaries surveyed with fish present. The number of sculpin shown in Table 3 should be considered very low since non-game species were not targeted during surveys by all cooperating agencies and the number of sculpin and other non-target species were not enumerated on some surveys. For example, over 120 records of fish observed during two stream surveys in Moose Creek recorded the presence of longnose dace *Rhinichthys cataractae*, mountain whitefish *Prosopium williamsoni*, and sculpin in the comments section of the survey form, but these fish were not counted as actual observations even though present. The highest abundance of sculpin enumerated during surveys was found in Little Eightmile and Big Casino creeks. In future surveys, cooperating agencies will be asked to enumerate and account for non-target fish as is currently done for salmonids.

Table 1. Combined salmonid population estimates including fry, 95% confidence intervals (CI), and species composition for selected streams in the upper Salmon River basin, 2005.

Stream	Transect	Sample Date	Transect Area (m^2)	No. Fish Sampled	Population Estimate (95% CI)	Fish/ 100 m^2	Species Composition (%)[b] CT	RBT	BU	RBT x CT	EBT	CK	GT
Allan	L	08/10/2005	ND	1	--	--	100						
Arnett	L	07/07/2005	7.2	38	42 (33,51)	527.8		79			21		
Bear Valley	M	08/11/2005	410.0	27	30 (22, 38)	6.6	7		93				
Big Bear	M	07/05/2005	190.0	17	18 (13, 23)	9.4	94	6					
Big Casino	L	08/30/2005	303.0	26	--	8.6		35			35	30	
Big Casino	L	08/30/2005	320.0	45	48 (42, 54)	14.1		20			80		
Big Casino	M	08/12/2005	93.0	10	10 (7, 13)	10.8	100						
Big Casino	M	08/12/2005	323.0	18	--	5.6	33				67		
Big Casino	M	08/12/2005	350.0	30	--	8.6	20				80		
Big Casino	U	08/11/2005	195.0	35	36 (32, 40)	17.9	9				91		
Big Casino	U	08/11/2005	257.4	19	--	7.4	11				89		
Big Deer	L	07/26/2005	1,064.0	17	18 (13, 23)	1.6	100						
Big Eightmile	U	07/05/2005	479.0	33	36 (28, 44)	6.9			100				
Big Lake	L	07/13/2005	157.0	0	--	--							
Big Lake	M	07/12/2005	158.0	2	--	1.3		100					
Big Lake	M	07/12/2005	ND	0	--	--							
Big Lake	M	07/13/2005	224.0	0	--	--							
Big Lake	U	07/11/2005	ND	0	--	--							
Big Lake	U	07/11/2005	ND	1	--	--		100					
Big Lake	U	07/11/2005	ND	1	--	--		100					
Big Lake	U	07/12/2005	ND	0	--	--							
Big Timber	M	08/02/2005	570.0	26	28 (22, 34)	4.6		96	4				
Boulder	M	07/06/2005	318.0	10	10 (8, 12)	3.1			100				
Boundary	L	07/27/2005	121.0	3	--	2.4	100						
Boundary	M	07/27/2005	102.0	1	--	1.0	100						
Camp	L	06/30/2005	170.0	32	45 (18, 72)	18.8		6	9		85		
Carmen	M	08/30/2005	470.0	213	235(216,254)	45.3		100					
Carmen	U	08/05/2005	548.0	32	33 (29, 37)	5.8			100				
Cleveland	L	07/27/2005	68.0	0	--	--							
Crooked	L	07/18/2005	255.0	6	--	2.4					100		
Crooked	L	07/20/2005	373.0	5	--	1.3		40			60		
Crooked	M	0718/2005	287.0	5	--	1.7					100		
Crooked	M	0718/2005	327.0	5	--	1.5					100		

Table 1. Continued.

Stream	Transect	Sample Date	Transect Area (m^2)	No. Fish Sampled	Population Estimate (95% CI)	Fish/ 100 m^2	Species Composition (%)[b] CT	RBT	BU	RBT x CT	EBT	CK	GT
Crooked	M	07/19/2005	305.0	1	--	0.3					100		
Crooked	U	07/19/2005	250.0	2	--	0.8		50			50		
Crooked	U	07/19/2005	339.0	9	--	2.7					100		
Deep	L	07/26/2005	480.0	22	29 (11, 47)	4.6	6	94					
Ditch	L	08/10/2005	222.0	45	53 (38, 68)	20.3	11	89					
Dump	L	07/27/2005	134.0	15	15 (14, 16)	11.2		80				20	
E. Fork Hayden	M	07/19/2005	368.0	37	38 (34, 42)	10.1			100				
Eighteenmile	L	11/04/2005	ND	18	--	--					100		
Eighteenmile	L	11/04/2005	ND	1	--	--					100		
Ellis	L	06/29/2005	138.0	2	--	1.4		100					
Everson	M	07/05/2005	215.0	1	--	0.5			100				
Fourth of July	M	07/21/2005	472.0	36	42 (29, 55)	7.6	50	3	47				
Fourth of July	U	08/03/2005	446.0	30	31 (27, 35)	6.7			100				
Fourth of July	L	09/21/2005	500.0	13	--	2.6		15			15	70	
Fourth of July	U	09/20/2005	550.0	40	--	7.3	98	2					
Frenchman	L	08/12/2005	256.0	30	--	11.7		3			97		
Frenchman	L	08/12/2005	267.0	20	--	7.5					100		
Frenchman	L	08/12/2005	291.0	40	--	13.7		2			98		
Frenchman	M	08/11/2005	212.0	26	--	12.3					100		
Frenchman	M	08/09/2005	236.0	77	--	32.6					100		
Frenchman	U	08/11/2005	208.0	53	--	25.5					100		
Frenchman	U	08/11/2005	277.0	106	--	38.3					100		
Frenchman	U	08/11/2005	347.0	20	--	5.8	10				90		
Gold	L	07/21/2005	153.0	18	--	11.8					39	61	
Gold	L	07/21/2005	235.0	17	--	7.2		6			94		
Gold	L	07/21/2005	251.0	6	--	2.4	17	16			67		
Gold	M	07/20/2005	243.0	5	--	2.1	100						
Gold	M	07/20/2005	249.0	14	--	5.6	74				26		
Hat	U	09/01/2005	316.0	40	42 (37, 47)	12.7	58		42				
Hawley	M	07/05/2005	498.9	75	114(60, 168)	15.1		100					
Hawley	M	07/06/2005	418.0	44	48 (40, 56)	10.5		100					
Hawley	M	07/06/2005	450.0	18	--	4.0	44	45	11				
Hawley	M	07/06/2005	493.5	28	--	5.7		96		4			
Hawley	U	07/06/2005	245.0	10	--	4.1	70	20		10			
Hawley	U	07/07/2005	200.0	13	--	6.5	77	15		8			
Hawley	U	07/07/2005	243.0	20	20 (18, 22)	8.2	90	5		5			

Table 1. Continued.

Stream	Transect	Sample Date	Transect Area (m^2)	No. Fish Sampled	Population Estimate (95% CI)	Fish/ 100 m^2	Species Composition (%)[b] CT	RBT	BU	RBT x CT	EBT	CK	GT
Hawley	U	07/07/2005	270.0	14	--	5.2	64	14	14	8			
Hawley	U	07/25/2005	133.0	18	--	13.5	89		11				
Hawley	U	07/25/2005	180.0	17	17 (15, 19)	9.4	82	6	12				
Hawley	U	07/25/2005	235.0	19	--	8.1	84		16				
Hawley	U	07/26/2005	106.0	19	19 (17, 21)	17.9	89		11				
Hawley	U	07/26/2005	115.0	8	--	7.0	100						
Hawley	U	07/26/2005	123.0	38	39 (36, 42)	30.9	100						
Hawley	U	07/26/2005	135.0	5	--	3.7	100						
Hawley	U	07/26/2005	163.0	11	11(9, 13)	6.7	91	9					
Hawley	U	07/27/2005	78.3	1	--	1.3	100						
Hawley	U	07/28/2005	80.0	3	--	3.8	100						
Hawley	U	07/28/2005	83.0	6	6 (5, 7)	7.2	100						
Haynes	L	06/07/2005	ND	16	--	--		100					
Haynes	L	06/07/2005	193.0	20	20 (19, 21)	10.4		100					
Haynes	L	06/07/2005	220.0	2	--	0.9		100					
Haynes	M	06/08/2005	316.2	95	102 (93, 111)	30.0		100					
Haynes	M	06/08/2005	418.0	60	--	14.4		100					
Haynes	U	06/09/2005	328.0	37	--	11.3		100					
Hoodoo	L	07/19/2005	300.0	15	--	5.0		100					
Horse	U	07/20/2005	200.0	42	49 (35, 63)	21.0			100				
Hughes	M	08/03/2005	494.0	22	30 (24, 36)	4.5	32	18	50				
Jefferson	L	07/07/2005	150.0	5	5 (4, 6)	3.3			20		80		
Lee	L	06/27/2005	238.0	11	12 (6, 18)	4.6		100					
Lee	L	06/28/2005	353.6	1	--	0.3	100						
Lee	M	06/28/2005	200.0	9	--	4.5	11		89				
Lee	M	06/30/2005	288.0	8	--	2.8	100						
Lee	U	06/23/2005	170.0	15	15 (13, 17)	8.8			100				
Lee	U	06/30/2005	303.0	45	54 (39, 69)	14.9	100						
Lee	U	07/20/2005	135.0	10	--	7.4	100						
Lee	U	07/20/2005	230.0	33	--	14.3	100						
Lee	U	08/22/2005	260.0	33	--	12.7			100				
Little Casino	L	07/06/2005	173.0	10	--	5.8		30			70		
Little Casino	L	07/06/2005	346.0	10	--	2.9					100		
Little Casino	M	07/06/2005	238.0	10	--	4.2	10		90				
Little Casino	U	07/06/2005	110.0	26	--	23.6	19				81		

Table 1. Continued.

Stream	Transect	Sample Date	Transect Area (m^2)	No. Fish Sampled	Population Estimate (95% CI)	Fish/ 100 m^2	Species Composition (%)[b] CT	RBT	BU	RBT x CT	EBT	CK	GT
Little Casino Trib.	L	07/07/2005	222.0	10	--	4.5	20				80		
Little Casino Trib.	L	07/07/2005	275.0	8	--	2.9	12				88		
Little Casino Trib.	M	07/07/2005	254	4	--	1.6	25				75		
Little Deep	M	08/08/2005	204.0	31	33 (27, 39)	15.2	81		19				
Little Deer	L	07/14/2005	228.0	21	--	9.2		100					
Little Eightmile	L	08/01/2005	235.0	38	39 (36, 42)	16.2	100						
Little Eightmile	L	08/02/2005	290.0	27	--	9.3	78		22				
Little Eightmile	M	08/02/2005	193.0	54	64 (49, 79)	28.0	94		6				
Little Eightmile	U	08/15/2005	170.0	7	--	4.1	100						
Little Eightmile	U	08/15/2005	180.0	50	--	27.8	86		14				
Martin	L	07/30/2005	348.0	11	--	3.2	91		9				
Martin	M	07/29/2005	229.0	11	--	4.8	100						
Martin	U	07/29/2005	192.0	8	--	4.2	100						
Mill	L	06/20/2005	145.0	1	--	0.7					100		
Mill	L	06/20/2005	218.0	1	--	0.5					100		
Mill	M	06/16/2005	195.0	3	--	1.5		33	67				
Mill	M	06/22/2005	440.0	2	--	0.5			100				
Mill	M	07/12/2005	375.0	12	--	3.2	25		75				
Mill	M	07/12/2005	388.0	32	32 (30, 34)	8.2	9		91				
Mill	M	09/29/2005	ND	26	--	--	4		96				
Mill	U	06/15/2005	250.0	10	--	4.0	40		60				
Mill	U	06/15/2005	261.4	57	62 (54, 70)	21.8			100				
Mill	U	07/18/2005	413.0	27	31 (21, 41)	6.5	4		96				
Mill	U	07/18/2005	450.0	14	--	3.1	7		93				
Moose	L	07/13/2005	298.0	23	26 (17, 35)	7.7	87	13					
Moose	L	07/27/2005	406.0	129	149 (128, 170)	31.8		88				12	
Otter	L	07/12/2005	233.0	10	10 (7, 13)	4.3	30		70				
Panther	U	08/04/2005	363.0	26	27 (23, 31)	7.2	15		77		8		
Phelan	L	07/07/2005	375.0	16	--	4.3		69			31		
Pigtail	L	07/30/2005	171.0	8	--	4.7	63		37				
Pigtail	M	07/30/2005	108.0	0	--	--							
Pigtail Trib.	L	07/31/2005	155.0	12	--	7.7	92		8				
Pigtail Trib.	M	07/31/2005	149.0	10	--	6.7	100						

Table 1. Continued.

Stream	Transect	Sample Date	Transect Area (m^2)	No. Fish Sampled	Population Estimate (95% CI)	Fish/ 100 m^2	Species Composition (%)[b] CT	RBT	BU	RBT x CT	EBT	CK	GT
Pony	L	07/11/2005	218.0	16	N/A[c]	7.3		19			81		
Rapps	L	07/14/2005	290.0	30	30 (28, 32)	10.3		30			70		
Sage	M	08/10/2005	ND	1	--	--	100						
Salzer	L	08/25/2005	206.0	43	43 (41, 45)	20.9	100						
S. Fk. Big	L	07/27/2005	ND	8	--	--		63	37				
Squaw	L	07/18/2005	176.0	18	21 (11, 31)	10.2		50	50				
Tobias	L	08/01/2005	125.0	8	8 (6, 10)	6.4	100						
Twin	L	07/18/2005	462.0	12	13 (7, 19)	2.6			100				
Wagonhammer	L	06/29/2005	ND	7	7 (5, 9)	--	100						
Wagonhammer	M	10/03/2005	76.0	20	15 (12, 18)	26.3	87	13					
Wagonhammer	M	10/03/2005	88.0	6	6 (3, 9)	6.8	100						
Wagonhammer	M	09/22/2005	116.0	22	20 (20, 22)	19.0	100						
Wagonhammer	M	09/22/2005	146.0	21	--	14.4	100						
W. Fk. Wimpey	U	09/13/2005	230.0	0	--	--							
Withington	U	08/11/2005	220.0	2	N/A	0.9	50	50					
Woods Fk. Horse	L	07/20/2005	201.0	43	48 (38, 58)	21.4		88	12				
Yankee Fork	M	07/25/2005	1,380.0	1	--	0.1			100				

[a] L = transect's lower reach, M = middle reach, and U = upper reach.

[b] CT = westslope cutthroat trout, RBT = rainbow trout/steelhead, BU = bull trout, RBxCT = rainbow trout/steelhead x westslope cutthroat trout hybrid, EBT = eastern brook trout, CK = Chinook salmon, and GT = Golden trout.

[c] Population estimate calculation returned a negative value for the 95% confidence interval and was not reported.

Table 2. Salmonid species, number of fish observed, mean total lengths (mm) and size range (total length mm) for selected streams in the upper Salmon River basin, 2005.

Stream	No. of Fish Observed	Salmonid Species[a]	Mean Total Length (mm)	Size Range (Total Length mm)
Allan	1	CT	80.0	80
Arnett	8	EBT	133.8	90-190
Arnett	30	RBT	93.7	50-190
Bear Valley	25	BU	179.8	70-801
Bear Valley	2	CT	200.0	180-220
Big Bear	16	CT	149.4	70-230
Big Bear	1	RBT	200.0	200
Big Casino	8	CK	ND[b]	ND
Big Casino	27	CT	111.5	75-210
Big Casino	130	EBT	110.5	35-205
Big Casino	18	RBT	125.3	70-153
Big Deer	17	CT	144.4	110-160
Big Eightmile	33	BU	145.9	70-260
Big Lake	4	RBT	117.5	65-175
Big Timber	1	BU	130.0	130
Big Timber	25	RBT	144.6	90-250
Boulder	10	BU	126.0	75-185
Boundary	4	CT	140.8	68-217
Camp	3	BU	101.7	65-125
Camp	27	EBT	87.2	55-160
Camp	2	RBT	130.0	130
Carmen	32	BU	ND	ND
Carmen	213	RBT	ND	ND
Crooked	30	EBT	122.1	70-165
Crooked	3	RBT	137.0	84-212
Deep	1	CT	180.0	180
Deep	21	RBT	141.0	65-200
Ditch	5	CT	125.0	115-130
Ditch	40	RBT	98.5	60-190
Dump	3	CK	66.7	65-70
Dump	12	RBT	112.1	90-150
E. Fork Hayden	37	BU	186.4	50-270
Eighteenmile	19	EBT	140.3	84-210
Ellis	2	RBT	125.0	120-130
Everson	1	BU	210.0	210
Fourth of July (SCNF[c])	47	BU	146.4	55-200
Fourth of July (SCNF)	18	CT	138.3	90-210
Fourth of July (SCNF)	1	RBT	85.0	85
Fourth of July (SNRA[d])	9	CK	102.3	88-113
Fourth of July (SNRA)	39	CT	110.8	63-163
Fourth of July (SNRA)	2	EBT	163.5	125-202
Fourth of July (SNRA)	3	RBT	133.0	62-176
Frenchman	2	CT	175.0	173-177
Frenchman	368	EBT	109.2	27-226
Frenchman	2	RBT	175.0	160-190

Table 2. Continued.

Stream	No. of Fish Observed	Salmonid Species[a]	Mean Total Length (mm)	Size Range (Total Length mm)
Gold	11	CK	71.3	60-83
Gold	15	CT	93.9	62-145
Gold	32	EBT	112.9	60-190
Gold	2	RBT	141.5	126-157
Hat	17	BU	106.2	70-160
Hat	20	CT	140.0	70-215
Hat	3	RBT	150.0	95-180
Hawley	13	BU	204.2	80-400
Hawley	188	CT	140.2	65-225
Hawley	159	RBT	150.3	25-255
Hawley	8	RBTxCT	204.4	165-230
Haynes	230	RBT	103.7	45-245
Hoodoo	15	RBT	138.0	85-200
Horse	42	BU	90.8	50-170
Hughes	7	BU	208.3	120-320
Hughes	11	CT	127.7	70-190
Hughes	4	RBT	80.0	60-120
Jefferson	1	BU	80.0	80
Jefferson	4	EBT	96.3	90-100
Lee	56	BU	144.6	55-215
Lee	98	CT	103.8	35-220
Lee	11	RBT	228.2	130-340
Little Casino	6	CT	137.2	120-157
Little Casino	47	EBT	106.6	69-228
Little Casino	3	RBT	134.3	95-178
Little Casino Trib.	4	CT	124.8	94-150
Little Casino Trib.	18	EBT	92.5	67-162
Little Deep	1	All Trout	ND	ND
Little Deep	6	BU	131.7	90-150
Little Deep	25	CT	136.0	65-220
Little Deer	21	RBT	96.9	70-140
Little Eightmile	16	BU	142.5	50-245
Little Eightmile	160	CT	145.6	20-245
Martin	1	BU	186	186
Martin	29	CT	127.1	71-201
Mill	169	BU	111.3	40-230
Mill	13	CT	126.5	40-265
Mill	2	EBT	172.0	134-210
Mill	1	RBT	90	90
Moose	12	All Trout	ND	ND
Moose	15	CK	86.7	80-90
Moose	20	CT	106.0	60-160
Moose	117	RBT	104.7	60-200
Otter	7	BU	124.3	100-175
Otter	3	CT	143.3	125-165
Panther	20	BU	138.8	45-210
Panther	4	CT	113.8	60-205

Table 2. Continued.

Stream	No. of Fish Observed	Salmonid Species[a]	Mean Total Length (mm)	Size Range (Total Length mm)
Panther	2	EBT	155.0	140-170
Phelan	2	All Trout	ND	ND
Phelan	5	EBT	151.0	110-205
Phelan	11	RBT	117.7	65-175
Pigtail	3	BU	132.3	120-155
Pigtail	5	CT	136.8	110-185
Pigtail Trib.	1	BU	126.0	126
Pigtail Trib.	21	CT	111.9	75-190
Pony	13	EBT	96.9	80-150
Pony	3	RBT	115.0	100-150
Rapps	5	All Trout	ND	ND
Rapps	21	EBT	88.8	70-130
Rapps	9	RBT	128.3	90-180
Sage	1	CT	60.0	60
Salzer	43	CT	114.2	65-165
S. Fk. Big	3	BU	125.0	105-155
S. Fk. Big	5	RBT	115.0	75-170
Squaw	9	BU	88.3	80-95
Squaw	9	RBT	136.7	70-160
Tobias	8	CT	137.5	80-195
Twin	12	BU	155.0	80-245
Wagonhammer	14	All Trout	71.4	30-170
Wagonhammer	62	CT	151.9	90-210
Wagonhammer	2	RBT	167.5	155-180
Withington	1	CT	235.0	235
Withington	1	RBT	135.0	135
Woods Fk. Horse	1	All Trout	50.0	50
Woods Fk. Horse	5	BU	78.0	60-100
Woods Fk. Horse	38	RBT	108.8	50-190
Yankee Fk.	1	BU	175.0	175

[a] All trout = non-speciated young-of-year trout, CK = Chinook salmon, CT = westslope cutthroat trout, BU = bull trout, EBT = eastern brook trout, RBT = rainbow trout/ steelhead, RBTxCT = Rainbow trout/steelhead x westslope cutthroat trout hybrid.

[b] ND = No data.

[c] SCNF = Salmon-Challis National Forest.

[d] SNRA = Sawtooth National Recreation Area.

Table 3. Combined non-target fish population densities, and species composition for selected streams surveyed in the upper Salmon River Basin, 2005.

Stream	Transect[a]	Sample date	Transect area	No. Fish Sampled	Fish/ 100m^2	SCU	Species Composition (%)[b] DAC	SUC	MWF	MSC	RSS
Big Casino	L	08/30/2005	303.0	47	15.5	100					
Big Casino	L	08/30/2005	320.0	175	54.7	100					
Big Casino	M	08/12/2005	323.0	36	11.1	100					
Big Lake	M	07/12/2005	158.0	2	1.3	100					
Crooked	L	07/18/2005	255.0	25	9.8	100					
Crooked	L	07/20/2005	373.0	22	5.9	100					
Crooked	M	07/18/2005	287.0	16	2.1	100					
Crooked	M	07/18/2005	327.0	15	4.6	100					
Crooked	M	07/19/2005	305.0	6	2.0	100					
Fourth of July	L	09/21/2005	500.0	21	4.2	100					
Frenchman	L	08/12/2005	267.0	100	37.5	100					
Frenchman	L	08/12/2005	291.0	100	34.4	100					
Frenchman	M	08/11/2005	212.0	100	47.2	100					
Hawley	M	07/05/2005	498.0	236	47.4	100					
Hawley	M	07/06/2005	418.0	180	43.1	100					
Hawley	M	07/06/2005	450.0	108	24.0	100					
Hawley	M	07/06/2005	493.5	36	7.3	100					
Hawley	U	07/06/2005	245.0	2	0.8	100					
Hawley	U	07/07/2005	270.0	19	7.0	100					
Hawley	U	07/25/2005	133.0	11	8.3	100					
Hawley	U	07/25/2005	180.0	1	0.01	100					
Hawley	U	07/25/2005	235.0	4	1.7	100					
Haynes	L	06/07/2005	193.0	2	1.0	100					
Haynes	M	06/08/2005	316.2	151	47.8	100					
Haynes	M	06/08/2005	418.0	41	9.8	100					
Haynes	U	06/09/2005	328.0	84	25.6	100					
Lee	L	06/27/2005	238.0	22	9.2	100					
Lee	L	06/27/2005	ND	2	--	100					
Lee	M	06/30/2005	288.0	27	9.4	100					
Little Casino	L	07/06/2005	173.0	21	12.1	100					

Table 3. Continued.

Stream	Transect[a]	Sample date	Transect area	No. Fish Sampled	Fish/ 100m^2	Species Composition (%)[b]					
						SCU	DAC	SUC	MWF	MSC	RSS
Little Casino	L	07/06/2005	346.0	16	4.6	100					
Little Eightmile	L	08/01/2005	235.0	129	54.9	100					
Mill	L	06/20/2005	145.0	9	6.2	100					
Mill	M	09/29/2005	ND	103	--	100					
S. Fk. Big	L	07/27/2005	ND	11	--	100					
Yankee Fork	M	07/25/2005	1,380.0	54	3.9	100					

[a] L = stream transect's lower reach, M = middle reach, and U = upper reach.

[b] SCU = Sculpin, DAC = Dace, SUC = Sucker, MWF = Mountain whitefish, MSC = Mottled sculpin, and RSS = Redside shiner.

Standard stream survey protocol was followed on all streams surveyed in 2005 except for Allan Creek and one lower transect in Crooked Creek, which were sampled for presence/absence. More detailed information on stream survey sites is located in Appendix A and B. Appendix A lists stream sites surveyed, sampling dates, and transect measurements. Appendix B lists streams transects surveyed, primary drainage, secondary drainage, UTM zone, and UTM coordinates.

Fluvial Trout Monitoring

Big Springs Creek

We observed a total of 215 rainbow trout redds on two transects of Big Springs Creek (BSC) and one transect on the upper Lemhi River (Table 4 and Figure 1). Sixty-three redds were counted on the Neibaur Ranch transect while 143 redds were observed on the Tyler Ranch transect. Nine redds were counted on the Beyeler Ranch transect in the upper Lemhi River.

The Neibaur Ranch reach had a fencing project of 2.5 km completed during March of 2003. Variable numbers of redds observed on the Neibaur Ranch may be a ramification of lack of bank stability which should improve over time as effects of the new fencing project are realized. The BSC transect within the Tyler Ranch boundaries had an exclusionary fencing project completed in 1998. This reach contained more redds in 2006 than the previous year. We believe the general increase over time and improving stability of the habitat will result in continued upward trends in future redd count numbers.

Reviewing redd counts from the three reaches over time suggests there may be alternate year spawning occurring. Should alternate year spawning be occurring, this year (2006) would be the expected greater year. The 215 redds counted this year was higher than the 121 redds counted in 2005. The increase could be from maturing adults originating from the 2002 year class. To date, the total number of redd counts have fluctuated from 39 to 556 annually and may indicate other unknown environmental issues are affecting resident rainbow trout spawning. These sites will continue to be monitored and trends evaluated in the rainbow trout population in future years. Habitat changes will be monitored over the next 10 years to document improvements in the riparian areas.

Bear Valley Creek

IDFG fishery personnel counted 34 bull trout redds in the Bear Valley Creek transect on September 13, 2005, compared with 44 bull trout redds observed in 2004 (Figure 2). The 2005 count was slightly lower than the number of redd counts observed for each of the two previous two years, but is still higher than the count completed in 2002. The population of bull trout that uses Bear Valley Creek for spawning appears to be a fluvial population in that relatively large adults have been observed during yearly spawning (Curet et al. 2004). Results from a regional, on-going fluvial bull trout study indicate these fish may spend part of their lives in the main stem Salmon and Lemhi rivers, and then migrate on the descending limb of the hydrograph upstream through Hayden Creek into Bear Valley Creek to spawn (Schoby 2006).

Table 4. Number of resident rainbow trout redds counted in Big Springs Creek (BSC) and Lemhi River, 1994 to 2006.

Date	Lemhi River (Beyeler Ranch[a])	BSC (Neibaur Ranch[b])	BSC (Tyler Ranch[c])	Total
4/26/1994	-	-	-	40[d]
5/3/1995	-	57	-	57
5/3/1996	7	32	-	39
4/21-5/3/1997	8	44	45	97
5/3/1998	18	93	124	235
4/29/1999	29	39	71	139
4/20/2000	23	160	123	306
4/5/2001	2	95	186	283
4/25/2002	3	360	193	556
4/22/2003	56	128	103	287
4/22/2004	15	174	45	234
4/26/2005	3	75	43	121
4/27/2006	9	63	143	215

[a] Habitat improvement project implemented in Spring 1995.
[b] Habitat improvement project completed in 2003.
[c] Habitat improvement project implemented in Spring 1998.
[d] Incidental count taken during a Lemhi Model Watershed Project habitat survey; includes all of Big Springs Creek.

East Fork of Hayden Creek

Forty-one bull trout redds were observed in the East Fork of Hayden Creek, an increase of 15 redds from the 2004 count (Figure 3). This population appears to be a resident population with individuals being significantly smaller than the Bear Valley Creek population (Curet et al. 2004).

Hayden Creek

Twenty-two bull trout redds were counted in upper Hayden Creek on September 8, 2005. Eighteen completed redds and four redds in progress were observed in the transects. Additionally, 43 bull trout adults were observed; 23 appeared to be resident sized fish (estimated at approximately 170-330 mm total length), and 20 more were counted as fluvial sized bull trout (estimated to be greater than 350 mm total length). The finding of apparent resident and fluvial bull trout spawning in the same transect of Hayden Creek was not previously known and is considered unique (G. Schoby, Idaho Department of Fish and Game, personal communication). As a result, these transects will be monitored in future surveys to document further spawning of these two populations within the same waters.

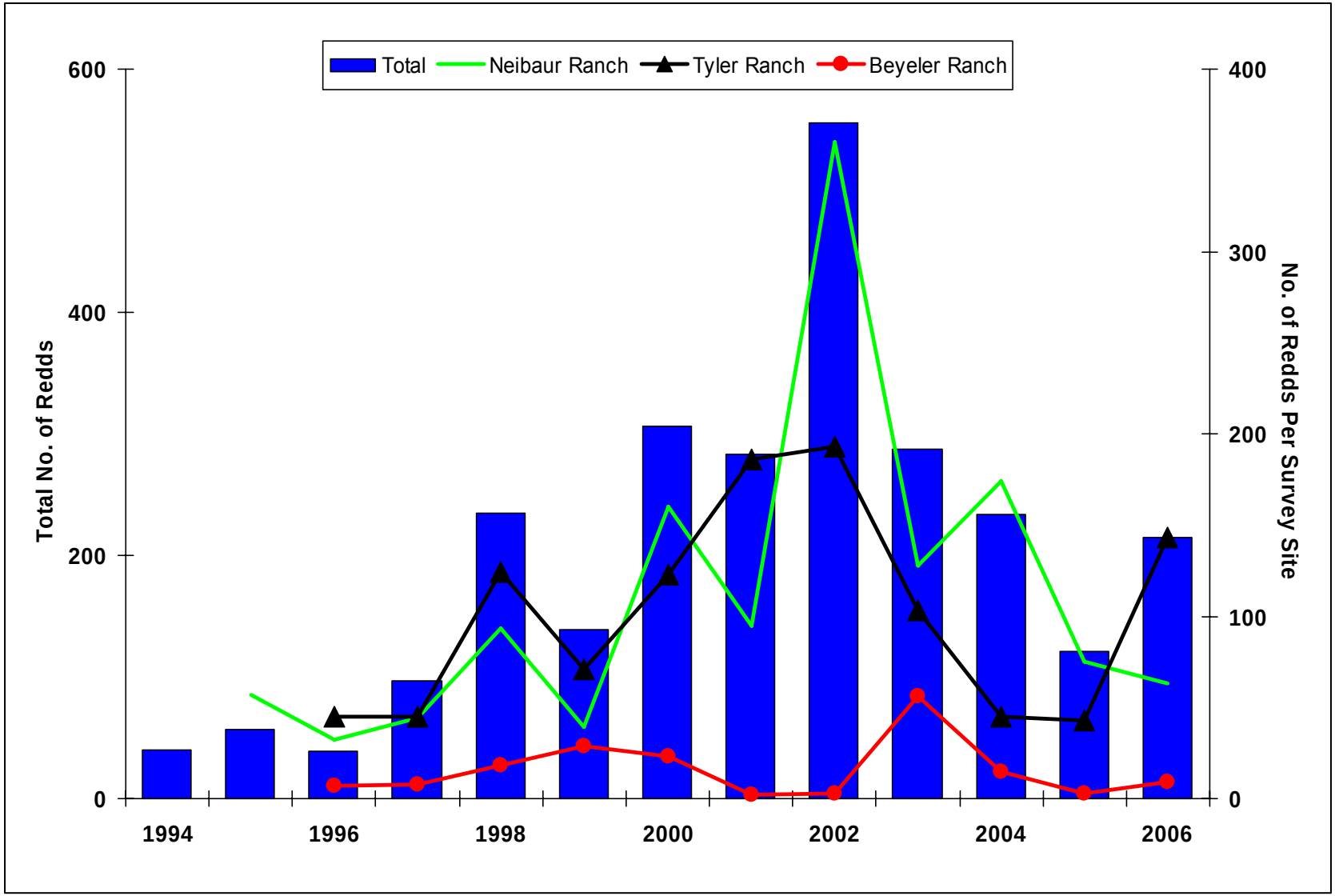

Figure 1. Resident rainbow trout spawning redds counted during ground surveys in the upper Lemhi River (Beyeler Ranch) and Big Springs Creek (Neibaur and Tyler ranches), 1994 to 2006.

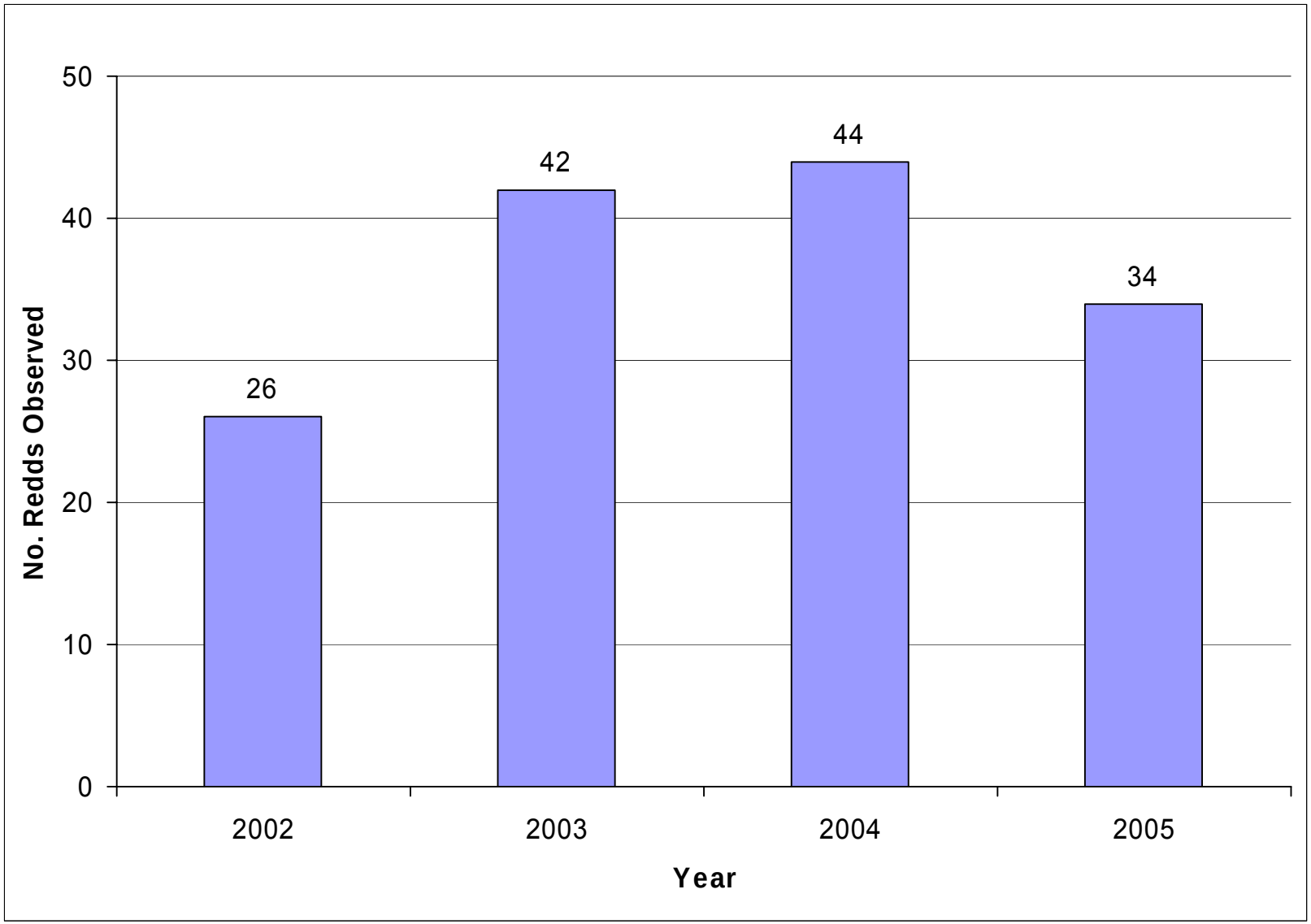

Figure 2. Bear Valley Creek bull trout redd counts, 2002 to 2005.

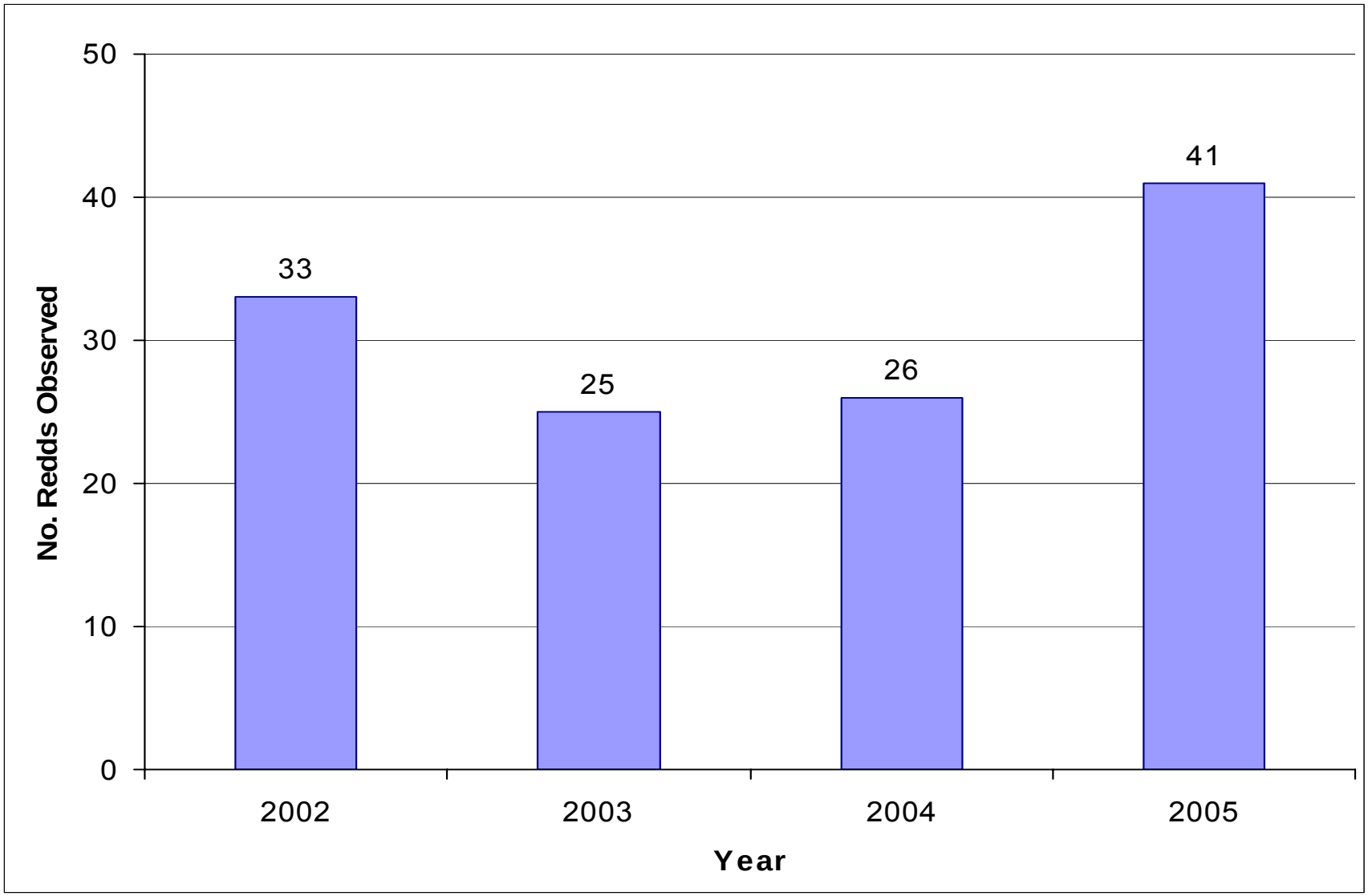

Figure 3. Bull trout redd counts in the East Fork of Hayden Creek, 2002 to 2005.

Alpine and Fishhook Creeks

Bull trout redd counts were conducted in Alpine and Fishhook creeks on August 30 and September 12, 2005, respectively. Thirteen redds were observed in Alpine Creek (Table 4) and 23 redds in Fishhook Creek (Table 5). By comparison in 2004, nine redds were counted in Alpine Creek and 15 redds were counted in Fishhook Creek. Historical redd count trend data for Alpine and Fishhook creeks for the last eight years are shown in Tables 4 and 5, respectively (K. Plaster, Idaho Department of Fish and Game, personal communication). The Alpine Creek counts have remained relatively stable since 2000, varying from nine to 15 redds counted each year. This year's number of redds counted on Fishhook Creek represents the highest count recorded in the last eight years and is more than double the 2004 count of 11 redds. However, since bull trout may spawn every year or on alternating years, redd count numbers may vary from year to year (Willard et al. 2005).

Fourth of July Creek

On September 2, 2005 41 completed bull trout redds were counted on Fourth of July Creek (Figure 4). Ten adults were also observed, ranging in size from approximately 300 to 700 mm total length. This marks the third year of counts for this survey location. By comparison, the 2004 count was conducted one week later and 33 complete and three possible redds were counted. Since counts were initiated, there has been a general upward trend in redd counts.

Table 5. Bull trout redd counts observed in trend survey sections of Alpine Creek, 1998 to 2005.

Year	Survey Dates	No. of Redds
1998	8/23	0
	9/11	1
1999[a]	8/26	3
2000	8/30	6
	9/15	9
2001[b]	8/28	11
	9/11	15
2002	8/30	8
	9/12	14
2003	8/27	11
	9/8	14
2004	8/30	6
	9/9	9
2005	8/30	9
	9/12	13

[a] Only one count completed.
[b] Counts done independently, not cumulatively.

Table 6. Bull trout redd counts observed in trend survey sections of Fishhook Creek, 1998 to 2005.

Year	Survey Dates	No. of Redds
1998	8/22	5
	9/10	11
1999	8/22	0
	8/26	15
2000	8/31	12
	9/14	18
2001[a]	8/28	15
	9/11	11
2002	9/4	6
	9/11	17
2003	8/27	6
	9/8	17
2004	8/30	10
	9/9	11
2005	8/30	12
	9/12	23

[a] Counts done independently, not cumulatively.

Resident Trout Monitoring

Overall, there has been a stable and improving trend in the number of resident rainbow trout migrating past the Pahsimeroi Fish Hatchery weir since 2001. Fifty-four adults were counted in 2005 compared to 50 the year before (Table 6). There were historical verbal reports suggesting that the population has declined dramatically since the 1960's and 1970's. An attempt will be made to review historical trapping records to see if non-target species were properly documented in the early trapping period at the hatchery.

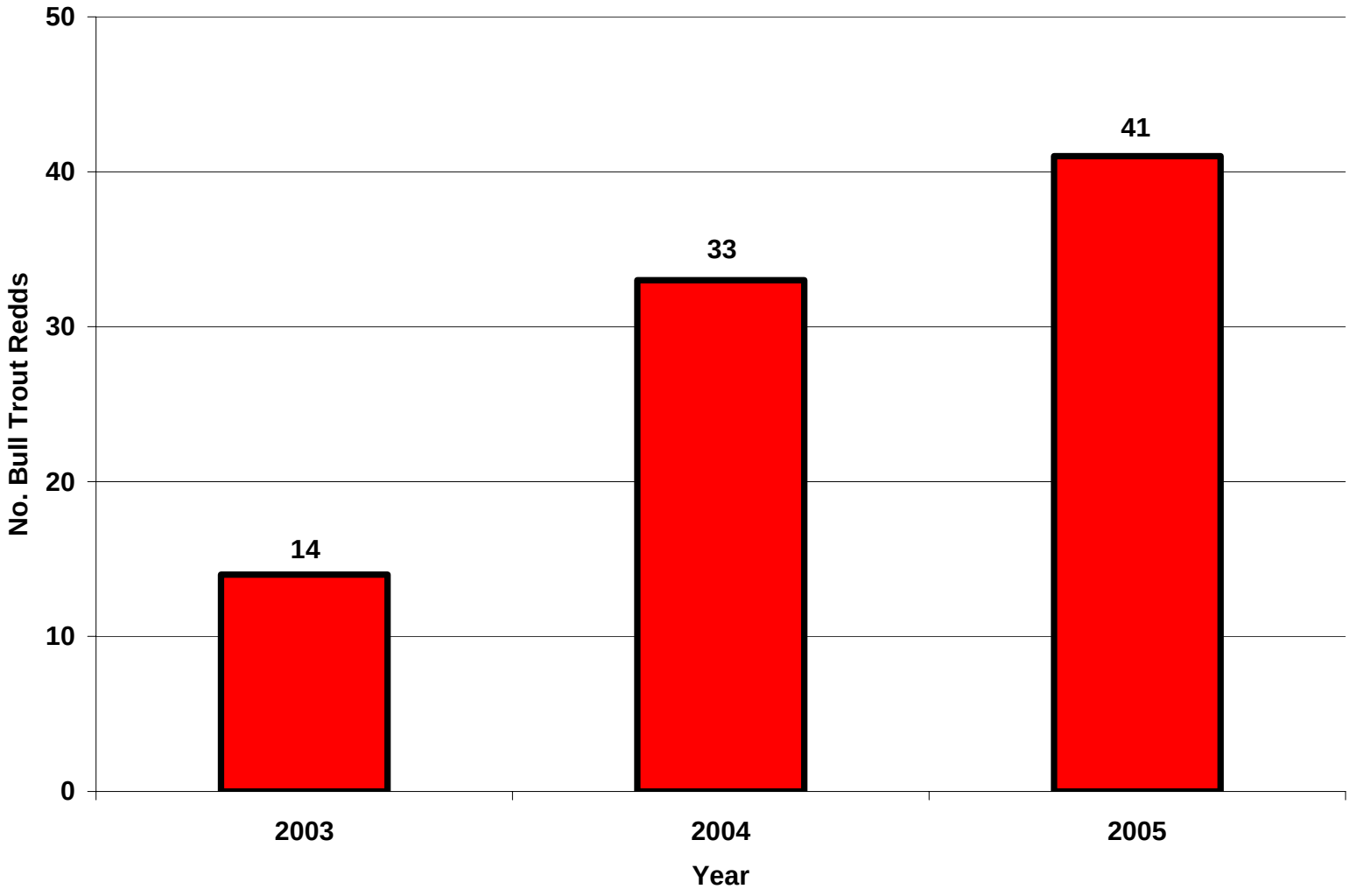

Figure 4. Annual counts of completed fluvial bull trout redds observed in Fourth of July Creek (SNRA), 2003 to 2005.

Table 7. Resident rainbow trout trapping summary at the Pahsimeroi Fish Hatchery, 1990 to 2005.

Year	No. of resident rainbow trout			Trapping Dates	No. of Bull Trout	No. of Trout Hybrids
	Males	Females	Total			
1990	ND[a]	ND	--	2/22 - 4/24	ND	ND
1991	ND	ND	81	2/13 - 5/15	ND	ND
1992	ND	ND	55	2/7 - 4/30	ND	ND
1993	7	36	43	2/19 - 5/4	ND	ND
1994	10	17	27	2/15 - 5/6	ND	ND
1995	11	17	28	2/20 - 5/16	ND	ND
1996	5	23	28	3/1 - 5/25	ND	ND
1997	1	7	8	3/1 - 5/9	ND	ND
1998	8	17	25	3/1 - 5/8	ND	ND
1999	7	17	24	2/19 - 5/3	ND	ND
2000	10	27	37	2/25 - 5/1	ND	ND
2001	27	41	68	3/1 - 3/17	ND	ND
2002	19	43	62	3/1 - 5/5	ND	ND
2003	9	31	40	2/28 - 5/2	ND	ND
2004	11	39	50	3/5 - 4/29	1	0
2005	4	50	54	3/2 - 5/12	1	1

[a] ND = no data.

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APPENDIX

Appendix A. Site characteristics of streams surveyed in the upper Salmon River in 2005.

Stream	Transect[a]	Sample Date	Channel Type	Water Temperature (°C)	Transect Length (m)	Transect Mean Width (m)	Transect Area (m^2)
Allan	L	08/10/2005	ND	12.2	ND	ND	--
Arnett	L	07/07/2005	ND	ND	100	0.00	7.2
Bear Valley	M	08/11/2005	ND	11.1	100	4.10	410.0
Big Bear	M	07/05/2005	ND	14.4	100	1.90	190.0
Big Casino	L	08/30/2005	ND	11.0	100	3.03	303.0
Big Casino	L	08/30/2005	ND	10.0	100	3.20	320.0
Big Casino	M	08/12/2005	ND	8.0	100	0.93	93.0
Big Casino	M	08/12/2005	ND	10.0	100	3.23	323.0
Big Casino	M	08/12/2005	ND	8.0	100	3.50	350.0
Big Casino	U	08/11/2005	ND	10.0	100	1.95	195.0
Big Casino	U	08/11/2005	ND	11.0	110	2.34	257.4
Big Deer	L	07/26/2005	ND	ND	ND	ND	24.3
Big Eightmile	U	07/05/2005	ND	7.8	100	4.79	479.0
Big Lake	L	07/13/2005	ND	ND	97	ND	157.0
Big Lake	M	07/12/2005	ND	ND	98	ND	158.0
Big Lake	M	07/13/2005	ND	ND	113	ND	224.0
Big Lake	M	07/12/2005	ND	ND	102	ND	--
Big Lake	U	07/11/2005	ND	ND	100	ND	--
Big Lake	U	07/11/2005	ND	ND	105	ND	--
Big Lake	U	07/11/2005	ND	ND	115	ND	--
Big Lake	U	07/12/2005	ND	ND	105	ND	--
Big Timber	M	08/02/2005	ND	9.4	ND	5.70	570.0
Boulder	M	07/06/2005	ND	7.2	100	3.18	318.0
Boundary	L	07/27/2005	ND	ND	99	ND	121.0
Boundary	M	07/27/2005	ND	ND	100	ND	102.0
Camp	L	06/30/2005	ND	7.2	100	1.70	170.0
Carmen	M	08/30/2005	ND	14.4	100	4.70	470.0
Carmen	U	08/05/2005	ND	12.8	100	5.48	548.0
Cleveland	L	07/27/2005	ND	ND	101	ND	68.0
Crooked	L	07/18/2005	ND	ND	115	ND	255.0
Crooked	L	07/20/2005	ND	ND	125	ND	373.0
Crooked	M	0718/2005	ND	ND	107	ND	287.0
Crooked	M	0718/2005	ND	ND	123	ND	327.0
Crooked	M	07/19/2005	ND	ND	103	ND	305.0
Crooked	U	07/19/2005	ND	ND	103	ND	250.0
Crooked	U	07/19/2005	ND	ND	116	ND	339.0
Deep	L	07/26/2005	ND	ND	100	4.80	480.0
Ditch	L	08/10/2005	ND	17.2	100	2.22	222.0
Dump	L	07/27/2005	ND	15.6	100	1.34	134.0

Appendix A. Continued.

Stream	Transect[a]	Sample Date	Channel Type	Water Temperature (°C)	Transect Length (m)	Transect Mean Width (m)	Transect Area (m^2)
E. Fk. Hayden	M	07/19/2005	ND	11.7	100	3.68	368.0
Eighteenmile	L	11/04/2005	ND	ND	100	ND	--
Eighteenmile	L	11/04/2005	ND	ND	200	ND	--
Ellis	L	06/29/2005	ND	11.5	100	1.38	138.0
Everson	M	07/05/2005	ND	8.9	100	2.15	215.0
Fourth of July	M	07/21/2005	ND	8.3	100	4.72	472.0
Fourth of July	U	08/03/2005	ND	7.8	100	4.46	446.0
Fourth of July	L	09/21/2005	ND	7.0	100	5.0	500.0
Fourth of July	U	09/20/2005	ND	7.0	110	5.0	550.0
Frenchman	L	08/12/2005	ND	ND	100	ND	256.0
Frenchman	L	08/12/2005	ND	ND	105	ND	267.0
Frenchman	L	08/12/2005	ND	ND	112	ND	291.0
Frenchman	M	08/11/2005	ND	ND	103	ND	212.0
Frenchman	M	08/09/2005	ND	ND	93	ND	236.0
Frenchman	U	08/11/2005	ND	ND	106	ND	208.0
Frenchman	U	08/11/2005	ND	ND	109	ND	277.0
Frenchman	U	08/11/2005	ND	ND	114	ND	347.0
Gold	L	07/21/2005	ND	ND	116	ND	153.0
Gold	L	07/21/2005	ND	ND	112	ND	235.0
Gold	L	07/21/2005	ND	ND	103	ND	251.0
Gold	M	07/20/2005	ND	ND	98	ND	243.0
Gold	M	07/20/2005	ND	ND	102	ND	249.0
Hat	U	09/01/2005	ND	7.2	100	3.16	316.0
Hawley	M	07/05/2005	ND	14.4	100	4.98	498.0
Hawley	M	07/06/2005	ND	13.3	100	4.18	418.0
Hawley	M	07/06/2005	ND	13.3	100	4.50	450.0
Hawley	M	07/06/2005	ND	13.3	105	4.70	493.5
Hawley	U	07/06/2005	ND	14.4	100	2.45	245.0
Hawley	U	07/07/2005	ND	17.2	100	2.00	200.0
Hawley	U	07/07/2005	ND	16.6	100	2.43	243.0
Hawley	U	07/07/2005	ND	8.8	100	2.70	270.0
Hawley	U	07/25/2005	ND	12.0	100	1.33	133.0
Hawley	U	07/25/2005	ND	15.0	100	1.80	180.0
Hawley	U	07/25/2005	ND	11.0	100	2.35	235.0
Hawley	U	07/26/2005	ND	14.0	100	1.06	106.0
Hawley	U	07/26/2005	ND	16.0	100	1.15	115.0
Hawley	U	07/26/2005	ND	19.0	100	1.23	123.0
Hawley	U	07/26/2005	ND	6.0	100	1.35	135.0
Hawley	U	07/26/2005	ND	10.0	100	1.63	163.0

Appendix A. Continued.

Stream	Transect[a]	Sample Date	Channel Type	Water Temperature (°C)	Transect Length (m)	Transect Mean Width (m)	Transect Area (m^2)
Hawley	U	07/27/2005	ND	5.0	76	1.03	78.3
Hawley	U	07/28/2005	ND	10.0	100	0.80	80.0
Hawley	U	07/28/2005	ND	10.0	100	0.83	83.0
Haynes	L	06/07/2005	ND	9.0	ND	2.40	ND
Haynes	L	06/07/2005	ND	9.0	100	1.93	193.0
Haynes	L	06/07/2005	ND	5.5	100	2.20	220.0
Haynes	M	06/08/2005	ND	7.0	93	3.40	316.2
Haynes	M	06/08/2005	ND	5.0	100	4.18	418.0
Haynes	U	06/09/2005	ND	7.0	100	3.28	328.0
Hoodoo	L	07/19/2005	ND	13.4	100	3.00	300.0
Horse	U	07/20/2005	ND	10.0	100	2.00	200.0
Hughes	M	08/03/2005	ND	13.3	100	4.94	494.0
Jefferson	L	07/07/2005	ND	ND	100	1.50	150.0
Lee	L	06/27/2005	ND	12.0	100	2.38	238.0
Lee	L	06/28/2005	ND	9.0	260	1.36	353.6
Lee	M	06/28/2005	ND	7.0	100	2.00	200.0
Lee	M	06/30/2005	ND	10.0	100	2.88	288.0
Lee	U	06/23/2005	ND	10.0	100	2.60	260.0
Lee	U	06/30/2005	ND	12.0	100	3.03	303.0
Lee	U	07/20/2005	ND	14.0	100	1.35	135.0
Lee	U	07/20/2005	ND	10.0	100	2.30	230.0
Lee	U	08/22/2005	ND	10.0	100	2.60	260.0
Little Casino	L	07/06/2005	ND	ND	102	ND	173.0
Little Casino	L	07/06/2005	ND	ND	121	ND	346.0
Little Casino	M	07/06/2005	ND	ND	87	ND	238.0
Little Casino	U	07/06/2005	ND	ND	102	ND	110.0
Little Casino Trib.	L	07/07/2005	ND		101		222.0
Little Casino Trib.	L	07/07/2005	ND		109		275.0
Little Casino Trib.	M	07/07/2005	ND		103		254.0
Little Deep	M	08/08/2005	ND	ND	100	2.04	204.0
Little Deer	L	07/142005	ND	ND	100	2.28	228.0
Little Eightmile	L	08/01/2005	ND	11.0	100	2.35	235.0
Little Eightmile	L	08/01/2005	ND	10.0	100	2.90	290.0
Little Eightmile	M	08/02/2005	ND	14.0	100	1.93	193.0
Little Eightmile	U	08/02/2005	ND	8.0	100	1.70	170.0
Little Eightmile	U	08/02/2005	ND	13.0	100	1.80	180.0
Martin	L	07/30/2005	ND	ND	115	ND	348.0

Appendix A. Continued.

Stream	Transect[a]	Sample Date	Channel Type	Water Temperature (°C)	Transect Length (m)	Transect Mean Width (m)	Transect Area (m^2)
Martin	M	07/29/2005	ND	ND	106	ND	229.0
Martin	U	07/29/2005	ND	ND	99	ND	192.0
Mill	L	06/20/2005	ND	13.0	100	1.45	145.0
Mill	L	06/20/2005	ND	2.1	100	2.18	218.0
Mill	M	06/16/2005	ND	ND	100	1.95	195.0
Mill	M	06/22/2005	ND	5.0	100	4.40	440.0
Mill	M	07/12/2005	ND	11.0	100	3.75	375.0
Mill	M	07/12/2005	ND	9.0	100	3.88	388.0
Mill	M	09/29/2005	ND	9.0	200	ND	--
Mill	U	06/15/2005	ND	6.0	100	2.50	250.0
Mill	U	06/15/2005	ND	3.0	132	1.98	261.4
Mill	U	07/18/2005	ND	10.0	100	4.13	413.0
Mill	U	07/18/2005	ND	13.0	100	4.50	450.0
Moose	L	07/13/2005	ND	10.0	100	2.98	298.0
Moose	L	07/27/2005	ND	15.0	100	4.06	406.0
Otter	L	07/12/2005	ND	ND	100	2.33	233.0
Panther	U	08/04/2005	ND	ND	100	3.63	363.0
Phelan	L	07/07/2005	ND	ND	100	3.75	375.0
Pigtail	L	07/30/2005	ND	ND	102	ND	171.0
Pigtail	M	07/30/2005	ND	ND	100	ND	108.0
Pigtail Trib.	L	07/31/2005	ND	ND	102	ND	155.0
Pigtail Trib.	M	07/31/2005	ND	ND	104	ND	149.0
Pony	L	07/11/2005	ND	8.9	100	2.18	218.0
Rapps	L	07/14/2005	ND	ND	100	2.90	290.0
Sage	M	08/10/2005	ND	11.7	ND	ND	--
Salzer	L	08/25/2005	ND	7.2	100	2.06	206.0
S. Fk. Big	L	07/27/2005	ND	6.4	100	3.00	300.0
Squaw	L	07/18/2005	ND	ND	100	1.76	176.0
Tobias	L	08/01/2005	ND	12.2	100	1.25	125.0
Twin	L	07/18/2005	ND	8.9	100	4.62	462.0
Wagonhammer	L	06/29/2005	ND	10.0	ND	ND	--
Wagonhammer	M	10/03/2005	ND	7.8	100	0.76	76.0
Wagonhammer	M	10/03/2005	ND	6.7	100	0.88	88.0
Wagonhammer	M	09/22/2005	ND	7.2	100	1.16	116.0
Wagonhammer	M	09/22/2005	ND	6.7	100	1.46	146.0
Wimpey	U	09/13/2005	ND	4.4	100	2.30	230.0
Withington	U	08/11/2005	ND	ND	100	2.20	220.0
Woods Fk. Horse	L	07/20/2005	ND	10.0	100	2.01	201.0

[a] L = transect's lower reach, M = middle reach, and U = upper reach.

Appendix B. Upper Salmon River basin tributary streams surveyed in 2005

Stream	Transect[a]	Sample Date	Subbasin	Zone	UTM Easting	UTM Northing
Allan	L	08/10/2005	North Fork Salmon	11	731843	5044811
Arnett	L	07/07/2005	Salmon-Horse Cr. to North Fork	11	725139	5009608
Bear Valley	M	08/11/2005	Lemhi River	12	282683	4961918
Big Bear	M	07/05/2005	Lemhi River	12	331955	4948785
Big Casino	L	08/30/2005	Salmon-North Fork to Headwaters	12	671372	4902350
Big Casino	L	08/30/2005	Salmon-North Fork to Headwaters	12	671807	4901136
Big Casino	M	08/12/2005	Salmon-North Fork to Headwaters	12	673285	4898979
Big Casino	M	08/12/2005	Salmon-North Fork to Headwaters	12	672875	4899667
Big Casino	M	08/12/2005	Salmon-North Fork to Headwaters	12	673208	4898108
Big Casino	U	08/11/2005	Salmon-North Fork to Headwaters	12	673892	4896599
Big Casino	U	08/11/2005	Salmon-North Fork to Headwaters	12	674040	4894879
Big Deer	L	07/26/2005	Salmon-Horse Cr. to North Fork	11	710576	5005300
Big Eightmile	U	07/05/2005	Lemhi River	12	296748	4944349
Big Lake	L	07/13/2005	Salmon-North Fork to Headwaters	11	706008	4893555
Big Lake	M	07/12/2005	Salmon-North Fork to Headwaters	11	703570	4893089
Big Lake	M	07/12/2005	Salmon-North Fork to Headwaters	11	703732	4893066
Big Lake	M	07/13/2005	Salmon-North Fork to Headwaters	11	704553	4893323
Big Lake	U	07/11/2005	Salmon-North Fork to Headwaters	11	697591	4892726
Big Lake	U	07/11/2005	Salmon-North Fork to Headwaters	11	698935	4892962
Big Lake	U	07/11/2005	Salmon-North Fork to Headwaters	11	700616	4892918
Big Lake	U	07/12/2005	Salmon-North Fork to Headwaters	11	702075	4892904
Big Timber	M	08/02/2005	Lemhi River	12	310139	4942012
Boulder	M	07/06/2005	Salmon-Horse Cr. to North Fork	11	707640	5032456
Boundary	L	07/27/2005	Middle Fork Salmon	11	670128	4891029
Boundary	M	07/27/2005	Middle Fork Salmon	11	670905	4891855
Camp	L	06/30/2005	Salmon-Horse Cr. to North Fork	11	726489	5011649
Carmen	M	08/30/2005	Salmon-North Fork to Headwaters	12	277679	5016174
Carmen	U	08/05/2005	Salmon-North Fork to Headwaters	12	282317	5026017
Cleveland	L	07/27/2005	Salmon-North Fork to Headwaters	11	670734	4890741
Crooked	L	07/18/2005	Salmon-North Fork to Headwaters	11	658646	4898406
Crooked	L	07/20/2005	Salmon-North Fork to Headwaters	11	659159	4899378
Crooked	M	07/18/2005	Salmon-North Fork to Headwaters	11	658347	4897964
Crooked	M	07/18/2005	Salmon-North Fork to Headwaters	11	658607	4898256
Crooked	M	07/19/2005	Salmon-North Fork to Headwaters	11	657946	4897790
Crooked	U	07/19/2005	Salmon-North Fork to Headwaters	11	656341	4896375
Crooked	U	07/19/2005	Salmon-North Fork to Headwaters	11	656553	4896844
Deep	L	07/26/2005	Salmon-Horse Cr. to North Fork	11	719101	5000500
Ditch	L	08/10/2005	North Fork Salmon	12	266059	5043945
Dump	L	07/27/2005	Salmon-Horse Cr. to North Fork	11	729996	5029322

Appendix B. Continued.

Stream	Transect[a]	Sample Date	Subbasin	Zone	UTM Easting	UTM Northing
E. Fk. Hayden	M	07/19/2005	Lemhi River	12	288533	4956149
Eighteenmile	L	11/04/2005	Salmon-North Fork to Headwater	12	319944	4945447
Eighteenmile	L	11/04/2005	Salmon-North Fork to Headwater	12	316740	4948735
Ellis	L	06/29/2005	Salmon-North Fork to Headwaters	12	731542	4952941
Everson	M	07/05/2005	Lemhi River	12	297000	4946915
Fourth of July	M	07/21/2005	Salmon-North Fork to Headwaters	12	276312	5032334
Fourth of July	U	08/03/2005	Salmon-North Fork to Headwaters	12	278312	5034213
Fourth of July	L	09/21/2005	Salmon-North Fork to Headwaters	11	676287	4877277
Fourth of July	U	09/20/2005	Salmon-North Fork to Headwaters	11	687902	4879641
Frenchman	L	08/12/2005	Salmon-North Fork to Headwaters	11	679063	4859947
Frenchman	L	08/12/2005	Salmon-North Fork to Headwaters	11	679220	4860800
Frenchman	L	08/12/2005	Salmon-North Fork to Headwaters	11	679084	4859530
Frenchman	M	08/11/2005	Salmon-North Fork to Headwaters	11	677974	4857095
Frenchman	M	08/09/2005	Salmon-North Fork to Headwaters	11	677628	4855354
Frenchman	U	08/11/2005	Salmon-North Fork to Headwaters	11	677593	4854746
Frenchman	U	08/11/2005	Salmon-North Fork to Headwaters	11	677564	4854090
Frenchman	U	08/11/2005	Salmon-North Fork to Headwaters	11	677497	4853480
Gold	L	07/21/2005	Salmon-North Fork to Headwaters	11	671183	4885963
Gold	L	07/21/2005	Salmon-North Fork to Headwaters	11	672121	4886167
Gold	L	07/21/2005	Salmon-North Fork to Headwaters	11	672467	4886583
Gold	M	07/20/2005	Salmon-North Fork to Headwaters	11	673704	4888395
Gold	M	07/20/2005	Salmon-North Fork to Headwaters	11	672958	4887889
Hat	U	09/01/2005	Salmon-North Fork to Headwaters	11	726830	4971720
Hawley	M	07/05/2005	Lemhi River	12	324595	4947192
Hawley	M	07/06/2005	Lemhi River	12	327064	4948607
Hawley	M	07/06/2005	Lemhi River	12	328821	4949141
Hawley	M	07/06/2005	Lemhi River	12	326000	4947868
Hawley	U	07/06/2005	Lemhi River	12	331225	4948729
Hawley	U	07/07/2005	Lemhi River	12	329796	4948474
Hawley	U	07/07/2005	Lemhi River	12	329592	4950533
Hawley	U	07/07/2005	Lemhi River	12	329796	4948474
Hawley	U	07/25/2005	Lemhi River	12	333206	4947159
Hawley	U	07/25/2005	Lemhi River	12	332567	4948391
Hawley	U	07/25/2005	Lemhi River	12	334167	4945757
Hawley	U	07/26/2005	Lemhi River	12	335262	4944592
Hawley	U	07/26/2005	Lemhi River	12	329954	4955289
Hawley	U	07/26/2005	Lemhi River	12	331570	4952526
Hawley	U	07/26/2005	Lemhi River	12	329693	4951595
Hawley	U	07/26/2005	Lemhi River	12	330161	4953580
Hawley	U	07/27/2005	Lemhi River	12	331667	4953764
Hawley	U	07/28/2005	Lemhi River	12	334052	4947666

Appendix B. Continued.

Stream	Transect[a]	Sample Date	Subbasin	Zone	UTM Easting	UTM Northing
Hawley	U	07/28/2005	Lemhi River	12	333197	4946610
Haynes	L	06/07/2005	Lemhi River	12	288231	4988037
Haynes	L	06/07/2005	Lemhi River	12	288941	4989005
Haynes	L	06/07/2005	Lemhi River	12	288963	4989722
Haynes	M	06/08/2005	Lemhi River	12	286025	4986426
Haynes	M	06/08/2005	Lemhi River	12	287471	4987043
Haynes	U	06/09/2005	Lemhi River	12	284755	4986187
Hoodoo	L	07/19/2005	Middle Fork Salmon	11	690767	4980381
Horse	U	07/20/2005	Salmon-Horse Cr. to North Fork	11	704744	5040252
Hughes	M	08/032005	North Fork Salmon	11	729879	5046385
Jefferson	L	07/07/2005	Salmon-Horse Cr. to North Fork	11	726195	5011422
Lee	L	06/27/2005	Lemhi River	12	303423	4956641
Lee	L	06/28/2005	Lemhi River	12	301356	4954551
Lee	M	06/28/2005	Lemhi River	12	298979	4948674
Lee	M	06/30/2005	Lemhi River	12	297670	4949756
Lee	U	06/23/2005	Lemhi River	12	296085	4947532
Lee	U	06/30/2005	Lemhi River	12	296549	4949676
Lee	U	07/20/2005	Lemhi River	12	297539	4949130
Lee	U	07/20/2005	Lemhi River	12	295468	4949853
Lee	U	08/22/2005	Lemhi River	12	294587	4947066
Little Casino	L	07/06/2005	Salmon-North Fork to Headwaters	11	671202	4901330
Little Casino	L	07/06/2005	Salmon-North Fork to Headwaters	11	670990	4900305
Little Casino	M	07/06/2005	Salmon-North Fork to Headwaters	11	670894	4898777
Little Casino	U	07/06/2005	Salmon-North Fork to Headwaters	11	669527	4896803
Little Casino Trib.	L	07/07/2005	Salmon-North Fork to Headwaters		670964	4897993
Little Casino Trib.	L	07/07/2005	Salmon-North Fork to Headwaters		670980	4898178
Little Casino Trib.	M	07/07/2005	Salmon-North Fork to Headwaters		671166	4897197
Little Deep	M	08/08/2005	Salmon-Horse Cr. to North Fork	11	723591	4993476
Little Deer	L	07/142005	Salmon-Horse Cr. to North Fork	11	712431	5004567
Little Eightmile	L	08/01/2005	Lemhi River	12	307161	4960228
Little Eightmile	L	08/02/2005	Lemhi River	12	308493	4961683
Little Eightmile	M	08/02/2005	Lemhi River	12	309590	4962835
Little Eightmile	U	08/15/2005	Lemhi River	12	310196	4963827
Little Eightmile	U	08/15/2005	Lemhi River	12	310332	4964949
Martin	L	07/30/2005	Salmon-North Fork to Headwaters	11	680798	4889268
Martin	M	07/29/2005	Salmon-North Fork to Headwaters	11	679429	4890007
Martin	U	07/29/2005	Salmon-North Fork to Headwaters	11	676830	4889091
Mill	L	06/20/2005	Lemhi River	12	299393	4958441

Appendix B. Continued.

Stream	Transect[a]	Sample Date	Subbasin	Zone	UTM Easting	UTM Northing
Mill	L	06/20/2005	Lemhi River	12	299473	4958763
Mill	M	06/16/2005	Lemhi River	12	294461	4953906
Mill	M	06/22/2005	Lemhi River	12	293332	4952387
Mill	M	07/12/2005	Lemhi River	12	293890	4951015
Mill	M	07/12/2005	Lemhi River	12	294732	4952270
Mill	M	09/29/2005	Lemhi River	12	295646	4954732
Mill	U	06/15/2005	Lemhi River	12	290255	4948311
Mill	U	06/15/2005	Lemhi River	12	290072	4948112
Mill	U	07/18/2005	Lemhi River	12	292743	4950000
Mill	U	07/18/2005	Lemhi River	12	291701	4949108
Moose	L	07/13/2005	North Fork Salmon	12	268598	5059715
Moose	L	07/27/2005	Salmon-Horse Cr. to North Fork	11	728135	5028511
Otter	L	07/12/2005	Salmon-Horse Cr. to North Fork	11	714214	4970866
Panther	U	08/04/2005	Salmon-Horse Cr. to North Fork	11	713177	4972011
Phelan	L	07/07/2005	Salmon-Horse Cr. to North Fork	11	723381	5005334
Pigtail	L	07/30/2005	Salmon-North Fork to Headwaters	11	680348	4887586
Pigtail	M	07/30/2005	Salmon-North Fork to Headwaters	11	678473	4886482
Pigtail Trib.	L	07/31/2005	Salmon-North Fork to Headwaters		681208	4887438
Pigtail Trib.	M	07/31/2005	Salmon-North Fork to Headwaters		680469	4885890
Pony	L	07/11/2005	Salmon-North Fork to Headwaters	11	724867	5008182
Rapps	L	07/14/2005	Salmon-Horse Cr. to North Fork	11	722689	5010383
Sage	M	08/10/2005	Salmon-Horse Cr. to North Fork	11	727720	5032614
Salzer	L	08/25/2005	North Fork Salmon	11	729996	5046431
S. Fk. Big	L	07/27/2005	Pahsimeroi River	12	293238	4923987
Squaw	L	07/18/2005	Salmon-Horse Cr. to North Fork	11	718213	5034452
Tobias	L	08/01/2005	Lemhi River	12	286105	4957679
Twin	L	07/18/2005	North Fork Salmon	12	267495	5054918
Wagonhammer	L	06/29/2005	Salmon-North Fork to Headwaters	12	270052	5031232
Wagonhammer	M	10/03/2005	Salmon-North Fork to Headwaters	12	270479	5031882
Wagonhammer	M	10/03/2005	Salmon-North Fork to Headwaters	12	270335	5031867
Wagonhammer	M	09/22/2005	Salmon-North Fork to Headwaters	12	270335	5031867
Wagonhammer	M	09/22/2005	Salmon-North Fork to Headwaters	12	270565	5032134
W. Fk. Wimpey	U	09/13/2005	Lemhi River	12	292541	5006058
Withington	U	08/11/2005	Lemhi River	12	279026	4990097
Woods Fk. Horse	L	07/20/2005	Salmon-Horse Cr. to North Fork	11	698791	5042095
Yankee Fork	M	07/25/2005	Salmon-North Fork to Headwaters	11	689120	4920755

[a] L = transect's lower reach, M = middle reach, and U = upper reach.

SALMON REGION - 2005 MANAGEMENT REPORT

LOWLAND LAKE INVESTIGATIONS

Carlson Lake
Herd Lake
Jimmy Smith Lake
McDonald Lake
Mosquito Flat Reservoir
Wallace Lake
Williams Lake
Yellowbelly Lake

July 1, 2005 to June 30, 2006

ABSTRACT

Carlson Lake

In 2002, tiger muskellunge *Esox lucius x E. masquinongy* were stocked in Carlson Lake in an effort to manipulate the size structure of a stunted brook trout *Salvelinus fontinalis* population. In 2005, three years after tiger muskellunge introduction, the brook trout population was estimated to be 6,024 fish (3,757 – 8,291, 95% CI) compared with the 2002 population estimate of 9,900 (9,829 – 10,007, 95% CI). Survey results in 2005 demonstrated that total lengths of brook trout ranged from 145-290 mm, and the mean total length was 231 mm. Comparison of the range of total lengths and mean total lengths following tiger muskellunge introduction indicate that brook trout are getting significantly longer and weights of individuals are increasing. The mean relative weight of brook trout increased from 89.6 in 2002 to 98.5 in 2005. Length at age increased for all observed age classes of brook trout since the introduction of tiger muskellunge.

Herd Lake

The fish community in Herd Lake was surveyed on June 27-28, 2005 using experimental variable mesh gillnets. Species composition consisted entirely of rainbow trout *Oncorhynchus mykiss.* Four gillnets were fished a total of 65.2 overnight hours and had a capture rate of 4.18 fish/gillnet hour, representing the highest catch per unit effort for the last six Herd Lake surveys dating back to 1994. The mean fork length and average weight of fish collected in the sample were 194.2 mm and 82.7 grams, respectively. Twenty-two rainbow trout and 8 redds were observed in Lake Creek, the inlet tributary to Herd Lake.

Jimmy Smith Lake

On June 7 and 8, 2005 the fish community in Jimmy Smith Lake was surveyed with four experimental variable mesh gillnets. Rainbow trout made up 100% of the catch. The nets were fished a total of 65.23 overnight hours and had a capture rate of 5.49 fish/hour. Total lengths of rainbow trout ranged in size from 138-412 mm and had a mean of 238 mm.

McDonald Lake

The fish community in McDonald Lake was surveyed on June 16-17, 2005 using variable mesh experimental gillnets. Species sampled consisted entirely of brook trout. Two gillnets were

fished a total of 33.9 overnight hours and had a capture rate of 0.35 fish/gillnet hour. The captured brook trout had a mean fork length of 207.0 mm and had a mean weight of 99.2 grams.

Mosquito Flat Reservoir

On August 17, 2005, Mosquito Flat Reservoir was sampled to assess zooplankton resources available for fish forage. The average values for zooplankton ratio (ZPR) and zooplankton quality index (ZQI) were 0.33 and 0.20, respectively. These values indicate that zooplankton resources are limiting as a forage resource for trout production in the lake.

Wallace Lake

On June 8, 2005, a survey of Wallace Lake was conducted following a report of a fish kill. Gillnet sampling produced 83 fish, of which seven were rainbow trout and the remainder was redside shiners *Richardsonius balteatus*. A total of 82 dead rainbow trout were counted along the lake perimeter. Dissolved oxygen levels taken decreased rapidly between four and five meters in lake depth, from 7.2 mg/liter to 2.1 mg/l.

Williams Lake

The zooplankton community in Williams Lake was sampled in August 2005 following methods outlined by Teuscher, 1999. Average ZPR and ZQI values of 0.71 and 0.56 were observed, respectively, indicating that forage competition may be occurring. ZPR and ZQI indices have decreased 54% and 22% respectively since the last zooplankton survey in 2003.

Lake Creek, an inlet tributary to Williams Lake, was electrofished and 22 rainbow trout were collected for spawning. Eggs were incubated at a facility downstream of the lake and approximately 40,000 fry were subsequently released back into Lake Creek as part of an on-going program contributing to the Williams Lake fishery.

Yellowbelly Lake

The fish community in Yellowbelly Lake was surveyed with experimental variable mesh eight gillnets on June 16, 2005. A total of 240 fish were netted, comprised of brook trout, westslope cutthroat trout *Oncorhynchus clarkii lewisi*, bull trout *S. confluentus*, northern pikeminnow *Ptychocheilus oregonensis*, rainbow/cutthroat hybrid *O. mykiss x O. clarkii lewisi*, apparent brook/bull trout hybrid *S. fontinalis x S. confluentus*, and suckers *Catostomus sp*. Salmonids comprised 16% of the catch and non-game species 84%. Of the salmonids, brook trout comprised 8%, bull trout 5%, cutthroat trout 2%, and apparent hybrid rainbow/cutthroat trout and apparent hybrid brook/bull each tallied 0.4% of the total catch, respectively. Suckers and northern pikeminnow comprised 69% and 15% of the total catch, respectively.

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INTRODUCTION

Carlson Lake

Carlson Lake is a two hectare, sub-alpine lake located in the Pahsimeroi River drainage (UTM coordinates 12T 280334mE, 4906829mN, NAD27), and is situated about 2,438 m in elevation. Subterranean flow from the lake drains into Double Springs Creek, a tributary of the Pahsimeroi River. There appears to be a historical surface outlet. However, there has been no indication of surface flow in the outlet channel for 31 years (Armbruster, pers. communication). Historically, Idaho Department of Fish and Game (IDFG) stocked brook trout *Salvelinus fontinalis* in Carlson Lake. Additionally, lake stocking records indicate rainbow trout *Oncorhynchus mykiss* were stocked in 1975 and 1993. Brook trout is the only naturally reproducing fish species currently found in Carlson Lake.

The 1996 survey revealed a stunted brook trout population in Carlson Lake (Liter et al. 1997). Beginning in 1993, Salmon Region staff initiated various population control measures to manipulate the brook trout population and its size structure. Efforts included removal by gillnet, use of explosives, and introduction of salmonid predators. By 2002, no measurable response had been observed in the brook trout population (Brimmer et al. 2003). In 2002, 41 tiger muskellunge *Esox lucius x E. masquinongy* were introduced into Carlson Lake in an effort to increase the size structure of the brook trout population.

Herd Lake

Herd Lake is a landslide lake located in Custer County at 2,187m elevation (UTM coordinates 11T 726324mE, 4885654mN, NAD 27). The surface area is 6.9 hectares. It is a coldwater rainbow trout fishery under general management regulations. The inlet to Herd Lake is Lake Creek, a tributary to Herd Creek, in the East Fork Salmon River drainage.

There were repeated reports that the rainbow trout population in Herd Lake was dense and stunted. In an effort to limit reproduction in the lake in the mid-1990s, IDFG constructed a fish barrier in Lake Creek to limit upstream migration.

Jimmy Smith Lake

Jimmy Smith Lake is a landslide lake located in north central Custer County at 1,948 m elevation with a surface area of 26 hectares (UTM coordinates 11T 707474mE, 4894112mN, NAD 27). The lake has one outlet and two inlet streams. The outlet stream is located at the north end of the lake and two inlet streams are located at the west and south ends of the lake.

The lake supports a naturally reproducing population of rainbow trout that may have originated from 184,600 rainbow trout stocked from Mackay Hatchery between 1927 and 1938. The lake has not been stocked since.

McDonald Lake

McDonald Lake is a 5.6 hectare lake located in Custer County at 2,163 meters elevation (UTM coordinates 11T 669290mE, 4873821mN, NAD 27). The lake supports a naturally reproducing population of brook trout and the fishery is managed under general fishing regulations. McDonald Lake is upstream of Yellowbelly Lake on Yellowbelly Creek, which

drains into Alturas Lake Creek, a tributary of the Salmon River. The lake is situated in the Sawtooth National Recreation Area (SNRA) and is approximately 550 m west and 6.4 m in elevation higher than Yellowbelly Lake.

Mosquito Flat Reservoir

Mosquito Flat Reservoir is located on Challis Creek, a tributary to the Salmon River. The reservoir is 16.1 km west of Challis, Idaho (UTM coordinates 11T 703768mE, 4932646mN, NAD 27) at an elevation of 2,112 m. The reservoir was built during 1949-1950 and stores 793 acre-feet of water at full pool for irrigation, fish propagation, and recreation. IDFG has water rights to 28% of the storage reserved as a minimum pool. This represents a 222 acre-foot pool with a surface area of approximately 8.5 hectares. Mosquito Flat Reservoir is a popular fishery with local anglers.

Recently, an average of 5,500 catchable-sized rainbow trout has been stocked annually. Based on low zooplankton quality index (ZQI) results in 2000, stockings of rainbow trout fry and fingerling were discontinued that year. The fry and fingerling stocking reduction was attempted to determine if a response in ZQI values could be quantified (Brimmer et al. 2003). Regional fisheries staff undertook annual ZQI monitoring project beginning in 2000.

Wallace Lake

Wallace Lake, a small 3.8 hectare lake with a maximum depth of 12.6 m, is located in west-central Lemhi County at 2,462 m elevation. There is no inlet and the outlet drains into Wallace Creek. The lake was classified as having no natural spawning potential in 1978 (Jeppson and Ball, 1979) and has been stocked annually for the last 37 years. Stocking has primarily consisted of catchable-sized rainbow trout and cutthroat trout *O.* clarkii fry and fingerlings (Appendix A). Redside shiners *Richardsonius balteatus* have been recently been observed in the lake. In the spring of 2005, there were reports of dead fish along the perimeter of Wallace Lake suggesting a fish kill.

Williams Lake

Williams Lake, an early eutrophic lake, is located in central Lemhi County (UTM coordinates 12T 265427mE, 4989077mN, NAD27) at 1,600 m elevation. The lake has a surface area of 73 hectares, a maximum depth of 58 m, and a mean depth of 23 m. The principle in-flow is provided by Lake Creek, with other water sources originating from springs and intermittent streams. The lake supports a naturally reproducing rainbow trout population that includes trophy sized fish. Bull trout is the only other fish species recorded from the lake.

During the winter, regional fisheries staff has measured dissolved oxygen (DO) concentrations as low as 0.0 ppm within 2-4 m of the surface. During low DO levels, the available fish habitat is limited and subsequently may be limiting the fish production potential of the lake. Furthermore, these low oxygen levels have been responsible for past fish kills in the lake. Poor water quality is caused by nutrient input in the form of phosphorous, eroded sediments from the watershed, and the leaching of human waste from private septic systems around the lake. During 2000 and 2001, private landowners renovated their septic systems to reduce septic inputs (Idaho Department of Environmental Quality 2001).

A rainbow trout spawning project has been implemented annually in Lake Creek since 2002 in an effort to address the concern of Williams Lake property owners that stocking is needed to increase the lake's fish population.

Yellowbelly Lake

Yellowbelly Lake, an oligotrophic lake, is located in southern Custer County at 690 m elevation. It is 82 hectares with a maximum depth of 24.5 m. The lake also has 8.42 km of shoreline. The principle in-flow is provided by Yellowbelly Lake Creek. Yellowbelly Lake is managed as a catch and release westslope cutthroat trout fishery. Fish species historically present in the lake are brook trout, westslope cutthroat trout, rainbow trout, bull trout, northern pikeminnow *Ptychocheilus oregonensis*, and suckers *Catostomus sp.* In an effort to reestablish native fish populations, this lake was treated with rotenone in 1990. Additionally, a fish barrier located at the outlet of Yellowbelly Lake was removed in 2000 by the SNRA to reestablish connectivity with the main stem Salmon River.

OBJECTIVES

Carlson Lake

Assess the effects of a tiger muskellunge introduction on the brook trout population.

Herd Lake

Monitor the rainbow trout population status in Herd Lake to determine whether management action is necessary to improve the size structure of rainbow trout.

Jimmy Smith Lake

Monitor Jimmy Smith Lake's rainbow trout population to determine whether management action is necessary to improve the size structure.

McDonald Lake

Characterize the fish community present in McDonald Lake.

Mosquito Flat Reservoir

Monitor the lake's zooplankton community to determine if the zooplankton ratio (ZPR) and ZQI values have improved due to the elimination of rainbow trout fry and fingerling stocking in 2000.

Wallace Lake

Investigate and evaluate the impacts of a reported fish kill in Wallace Lake.

Williams Lake

Sample the zooplankton community in Williams Lake for ZPR and ZQI values to determine the zooplankton forage base.

Spawn rainbow trout collected from Lake Creek, the inlet tributary to Williams Lake, and release progeny back into Lake Creek to alleviate public pressure to stock Williams Lake from an outside source.

Yellowbelly Lake

Monitor the population to determine the success of recent westslope cutthroat trout introductions.

METHODS

Carlson Lake

Between June 20, 2005 and June 22, 2005, brook trout were angled, their upper caudal fins clipped, and returned to the lake.

On the afternoon of June 22, 2005, four experimental variable mesh gillnets were set, fished overnight, and checked the following morning. All brook trout were measured to the nearest total length (mm), weighed (g), and examined for caudal fin clips. Captured tiger muskellunge were measured in fork and total length (mm), and then released. An additional 10 experimental variable mesh gillnets were deployed the afternoon of June 23 and fished overnight. All 14 nets were checked and removed the next day. Total fishing time for each net was recorded. A sub-sample of brook trout from the first gillnet was measured in total length (mm) and checked for caudal fin clips. Fish collected from gillnets two through fourteen were identified by species; brook trout were enumerated (but not measured) and checked for caudal fin clips.

Brook trout length and weight data was used to calculate relative weights using formulas developed by Murphy et al. 1991. Relative weights from 2002 and 2005 were compared using a separate variance T-test to determine if there was a significant difference between years.

Data collected were also used to calculate a population estimate for brook trout. An adjusted Petersen mark-recapture population estimate, standard error, and 95% confidence interval were calculated following Ricker (1975):

$$N = \frac{(M + 1)(C + 1)}{R + 1}$$

Where,

N = the population estimate
M = the number of fish marked
C = the number of fish caught
R = the number of marked fish recaptured

Otolith samples were collected from brook trout in 2005 and stored in individually labeled vials of alcohol. In 2002, otolith samples were collected from brook trout and stored in individual scale envelopes. For aging analysis, otoliths were cleared in saline and viewed whole (Boxrucker 1986) with a variable power dissecting microscope set on 2 to 4 power. Aging was conducted by two independent, trained viewers. If an age consensus was not reached, the structures were re-examined collaboratively to determine a final age estimate.

Herd Lake

Four experimental variable mesh gill nets, two sinking and two floating, were deployed the evening of June 27, 2005. Gillnets were set perpendicular to the shore and removed the next day. Captured fish were identified, measured to fork length (mm), and weighed (g). For comparative analysis, the 2005 rainbow trout fork lengths were converted to total lengths using a regression developed from 143 rainbow trout captured at Williams Lake in 2003 (Brimmer et al. 2003). Comparisons could then be made with previous years' data. Rainbow trout lengths and weights were used to calculate relative weights using formulas developed by Murphy et al., 1991, and Simpkins and Hubert, 1996. Otolith samples were taken from 30 fish for later age and growth analysis. Water temperature and DO measurements were taken in one meter increments from 1 m to 10.7 m depth. A Secchi disc reading was also taken.

Project personnel walked from the mouth of the inlet upstream to determine the number of fish and document the presence of redds above and below the migration barrier.

Jimmy Smith Lake

Four experimental variable mesh gillnets two floating and two sinking, were set up the evening of June 7, 2005 and removed the next day. Gillnets were set perpendicular to the shore at four locations approximately equidistant from each other. Captured fish were identified by species, measured for total length (mm) and weighed (g). Additionally, otoliths were collected from a 40-fish sub-sample, and DNA samples were collected from a 30-fish sub-sample for later analysis.

McDonald Lake

Two experimental variable mesh gillnets, one floating and one sinking, were deployed the afternoon of June 16, 2005 for approximately 17 hours and removed the next day. Captured fish were identified, measured for fork length (mm), and weighed (g).

Mosquito Flat Reservoir

Zooplankton was sampled at the inlet and at mid-reservoir on August 17, 2005, using methods outlined by Teuscher (1999). Due to low reservoir water levels, one variation from Teuscher's methods was that the zooplankton tows were taken at 7.5 m at the inlet and at 5.5 m at mid-lake instead of the standardized 9.1 meters.

Zooplankton abundance and quality were analyzed using ZPR and ZQI methods developed by the Wyoming Game and Fish Department (Yule, unpublished data) and Teuscher (1999). An average was calculated using the ZPR and ZQI results from the two sampling sites.

Wallace Lake

0n June 8, 2005, four experimental variable mesh gillnets, two sinking and two floating, were used to sample the fish community in Wallace Lake following a reported fish kill that became visible when the ice started to recede from the lake. Gillnets were set perpendicular to the shoreline in the following pattern: a floating net in the SW corner, a sinking net in the SE corner, a floating net in the NW corner, and a sinking net in the NE corner. The nets were pulled the following morning. Fish were identified by species, measured for total length (mm), and weighed (g). Water temperatures and DO profiles were measured at one meter increments to a depth of 11 m. A Secchi disc reading was also recorded. The perimeter of the lake was surveyed and fish mortalities were recorded.

Williams Lake

Zooplankton Sampling

On August 19, 2005, zooplankton was sampled in Williams Lake at three locations: the inlet, mid-lake, and at the outlet following methods outlined by Teuscher (1999). Zooplankton abundance and quality were analyzed using ZPR and ZQI methods developed by the Wyoming Game and Fish Department (Yule, unpublished data) and Teuscher (1999). An average zooplankton size was calculated for ZPR and ZQI results from the three sample sites.

DO Sampling

On January 20, 2006, DO measurements were taken in Williams Lake in one meter increments from the surface to a depth of 20 m.

Spawning Project

Each spring, approximately twenty pairs of adult rainbow trout from Lake Creek are electrofished and spawned. To accurately represent the spawning run, two spawning sessions utilize approximately ten pairs of fish during each event. Fish are spawned and the embryos are transported to a small facility below the lake's outlet, incubated, and the resultant fry are released back into Lake Creek. Ovarian fluid samples are collected from all female rainbow trout and sent to the Department's Eagle Fish Health Lab for pathogen testing.

Yellowbelly Lake

On June 16, 2005, eight experimental variable mesh gillnets, four sinking and four floating, were used to sample the fish community in Yellowbelly Lake. Project personnel set gillnets perpendicular to the shoreline with the large mesh end positioned towards the middle of the lake. Nets were set in the afternoon and pulled the next day. All fish captured were identified to species, measured for fork length (mm), and weighed (g.

RESULTS AND DISCUSSION

Carlson Lake

Seven anglers expended 119 total hours to catch, mark, and release 250 brook trout prior to gillnet operations. A total of 607 fish were captured during 369.5 overnight hours of

gillnetting effort. Brook trout comprised 599 (99%) of the gillnetted fish with an incidental catch of eight tiger muskellunge. Of the 599 brook trout caught, 24 were recaptured from the caudal fin clip marking effort. Additionally, 14 other brook trout were recaptured with clips from previous marking efforts; 7 had left ventral fin clips and 7 had adipose fin clips (Brimmer et al. 2002, 2003.

In 2005, catch per unit effort (CPUE) for brook trout was 1.6 fish/gillnet hour, compared to 3.7 fish/gillnet hour in 2002 (Table 1). Since the introduction of tiger muskellunge, there has been a general decline in CPUE values.

Table 1. Comparison of brook trout sampling efforts in Carlson Lake, 1998 to 2000, 2002 to 2005.

	Year						
	1998	1999	2000	2002	2003	2004a	2005
Sample Dates	5/22-23	5/27-29	10/8-9	6/13-14	6/13-14	6/15-16	6/22-24
No. of Fish Removed	818	1,151	665	546	562	48	599
Size Range	120-292	112-300	108-270	102-266	96-270	156-251	145-290
Mean Total Length (mm)	196.0	198.0	191.0	191.8[b]	209.0	223.9	230.5
Mean Weight (g)	ND	ND	ND	77.3	78.1	96.1	127.3
Total Gillnet Hours	483.3	386.1	270.9	147.8	416.9	60.5	369.5
Fish/Net Hour (CPUE)	1.7	3.0	2.5	3.7	1.4	0.4	1.6
Relative Weight	ND	ND	ND	89.6	89.8	85.9	98.5
Population Estimate	ND	ND	ND	9,900	9,064	ND	6,024

[a] Hoop net survey.
[b] Mean total fork length (mm) recorded in 2002.

Relative weight calculations of 153 brook trout collected in 2005 resulted in a mean relative weight of 98.5, compared to a mean relative weight of 89.6 in 2002 (Table 1). A value of 100 is considered average for North American populations. We compared the relative weights of Carlson Lake brook trout for 2002 and 2005 using a T-test. The results indicated a significant difference between years ($p = 0.000$; $\alpha = 0.05$) with the 2005 brook trout relative weight value being higher than 2002.

The mean total length of brook trout sampled in 2005 was 231 mm compared with a mean fork length of 192 mm in 2002 (Table 1 and Figure 1). Comparison of the three post-introduction years of tiger muskellunge (2003 to 2005) with the four pre-introduction years shown in Table 1 indicates that brook trout mean total lengths and relative weights are increasing. Anecdotally, fisheries crews have found that anglers are now targeting Carlson Lake because of the increased size in the brook trout population.

In 2005, we estimated the brook trout population to be 6,024 fish (3,757 – 8,291, 95% CI), which represents a 39% decrease from the initial 2002 population estimate of 9,900 (9.829 – 10,007, 95% CI). The 2002 population estimate was derived from sampling prior to tiger muskellunge introduction. The 2005 population decrease suggests that the tiger muskellunge population has had a measurable effect on the brook trout population in Carlson Lake.

Analysis of length at age data from otoliths collected in 2002 (N=63) and 2005 (N=39) indicated that brook trout grew relatively rapidly to age 4, but growth subsequently slowed after that. In 2005, mean total length at ages 1, 2, 3, 4, 5, 6, and 7 equaled 156, 219, 253, 263, 263, 242, and 275 mm, respectively (Figure 2 and Table 2). In 2002, mean total length (mm) at ages 2, 3, 4, 5, and 6 were 175, 203, 212, 201, and 199, respectively (Figure 2 and Table 2). In comparing 2002 and 2005, mean total lengths increased in all age classes in 2005 since the tiger muskellunge introduction (Figure 2 and Table 2). Additionally, a broader range of fish ages were sampled in 2005 than in 2002. Ages one through seven were represented in the 2005 sample compared to ages two through six in 2002 (Figure 2). The increased survival of older fish (ages 6 and 7) detected in 2005 may be due to better forage conditions or size selection by a predator. Another explanation might be that large brook trout are better at predator avoidance.

Length at age for all age classes increased in 2005 relative to length at age for age classes sampled in 2002 (Table 2). Age 1 fish were encountered in the 2005 sample, but were not detected in 2002. The increased size (length and relative weight) of age 1 fish in 2005 is likely due to increased forage availability and a decrease in intra-specific competition due to reduced overall population size (Figure 2).

Table 2. Comparison of brook trout length at age from Carlson Lake otolith samples in 2002 (prior to tiger muskellunge introduction) and 2005 (post tiger muskellunge introduction).

	Mean total length (mm)		Total length (mm) range in sample		Difference in mean total length (mm)
Age	2002	2005	2002	2005	
1		156		150-180	
2	175	219	160-199	154-282	+44
3	203	253	160-228	220-281	+50
4	212	263	202-228	218-296	+51
5	201	263	198-206	232-283	+62
6	199	242	199	229-264	+43
7		275		258-292	

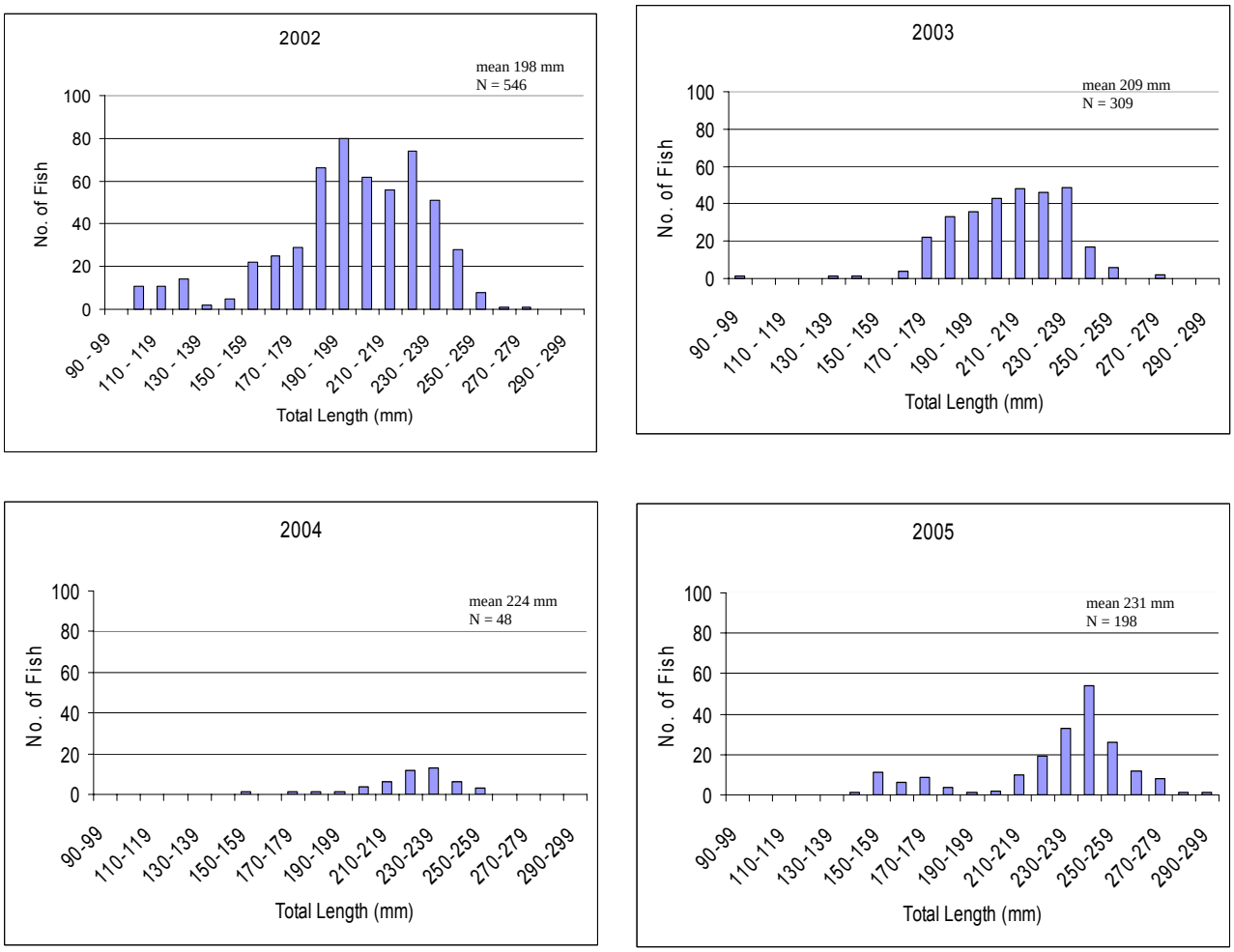

Figure 1. Length frequency histograms for Carlson Lake brook trout, 2002 to 2005.

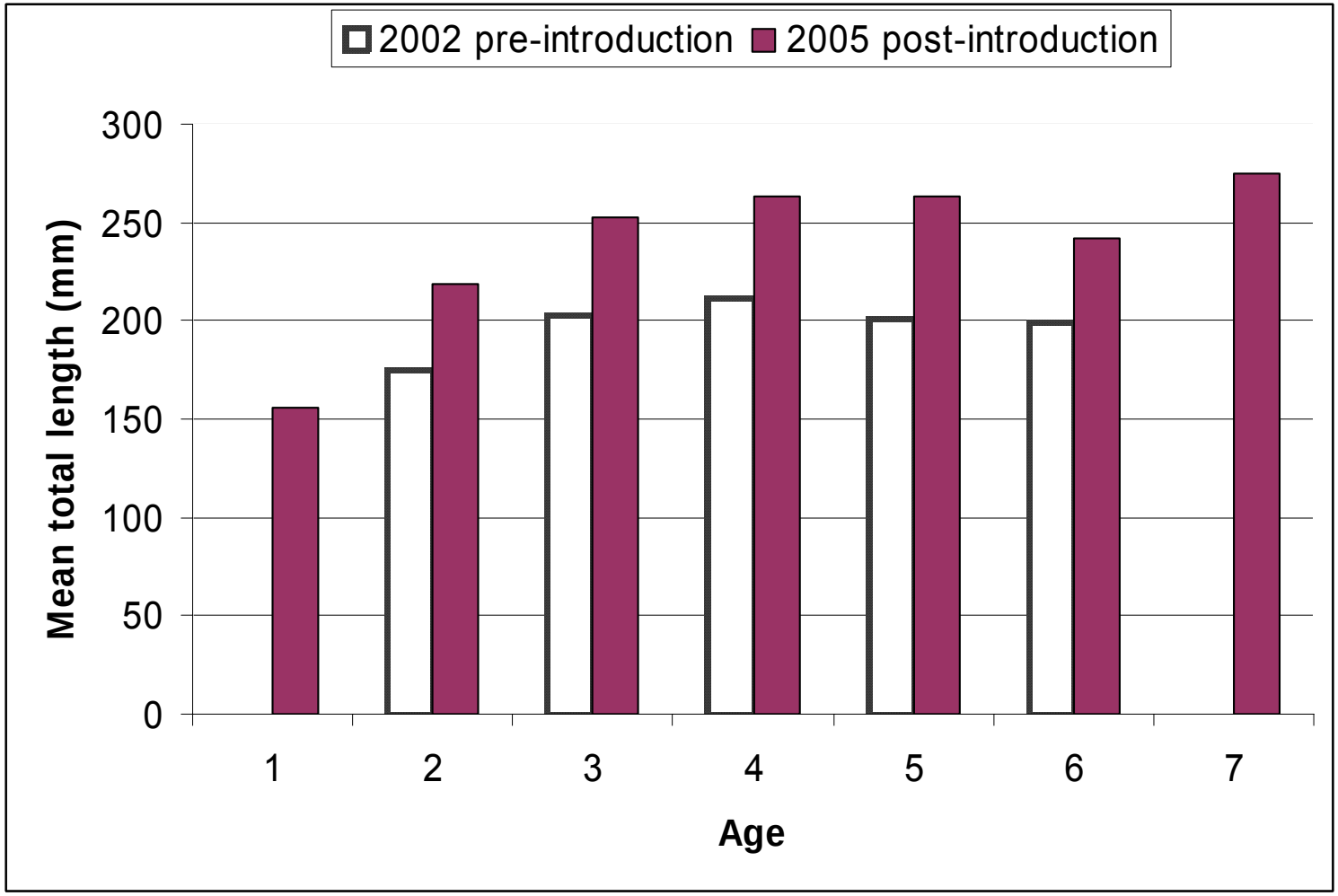

Figure 2. Comparison of Carlson Lake brook trout length at age from otolith samples in 2002, prior to tiger muskellunge introduction, and in 2005, three years after introduction.

Herd Lake

We encountered 272 fish during 65.2 gillnet overnight hours on Herd Lake with rainbow trout comprising 100% of the species netted. After adjustments from fork to total length were calculated, sizes ranged from 163-292 mm total length and had a mean total length of 207 mm. This compares to a size range of 107-308 mm total length and a mean total length of 212 mm in 2003 (Figure 3 and Table 3). Fish lengths greater than 160 mm total length were common in the 2005 sample. However, an absence of smaller fish in the sample was observed. This absence could be due to a year class failure, seasonal variation, or net location. The mean CPUE for the gillnets was 4.18 fish/hour. Including 2005, this represents a trend of increasing catch rates in the last five sample years: 0.94, 0.92, 1.58, and 1.88 in 1996, 2001, 2002, and 2003, respectively (Table 3). The CPUE increase of 2.30 fish/gillnet hour between 2003 and 2005 suggest that the population may have doubled in the last two years.

A relative weight value of 72.3 in 2005 indicates a continued poor weight to length relationship for rainbow trout in Herd Lake (Table 3). The low relative weights observed in Herd Lake rainbow trout may be a function of density dependent factors and limited available forage. Previous studies (Brimmer et al. 2002, 2003) suggested that zooplankton resources were likely limited. The lake currently meets the first objective of IDFGs Five-Year Management Plan of maintaining a fishery with natural reproduction.

DO was measured at an acceptable level for rainbow trout in the first six m of depth, ranging from 8.6 mg/l to 13.2 mg/l (Table 4). Below six m, DO levels decreased below the commonly accepted threshold of 5 mg/l needed for rainbow trout survival. The Secchi disc reading of 1.5 m suggested reduced water clarity.

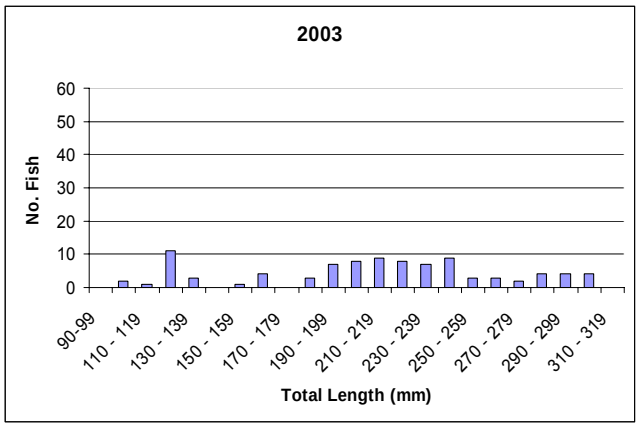

Figure 3. Comparison of rainbow trout length frequencies in Herd Lake, 2003 and 2005.

Table 3. Comparison of rainbow trout sampling efforts at Herd Lake, 1994, 1996, 2001, 2003, and 2005.

	Year					
	1994	1996	2001	2002	2003	2005
Survey Dates	8/1-2	6/11-12	6/21-22	6/6-7	7/31-8/1	6/27-28
Sample Size	113	15	30	81	93	272
Size Range (total length mm)	140-260	160-292	95-280	97-350	107-308	163-292
Mean total length (mm)	199	258	178	200	212	207
Mean weight (g)	N/A	N/A	49.1	106.7	101.6	82.7
gillnets	2	N/A	2	2	2	4
Total gillnet hours	30	16.0	32.6	51.2	49.3	65.2
Fish/Net hour (CPUE)	3.76	0.94	0.92	1.58	1.88	4.18
Relative Weight	N/A	N/A	N/A	N/A	73.8	72.3

Table 4. Dissolved oxygen and temperature measurements taken at Herd Lake, June 27, 2005.

Depth (meters)	Dissolved oxygen (mg/l)	Temperature (^{o} C)
1	9.3	11.0
2	13.2	10.2
3	13.2	8.5
4	10.8	8.0
5	8.6	7.0
6	8.8	6.5
7	4.6	6.2
8	4.4	6.2
9	3.6	6.2
10	3.4	6.0
10.7	3.4	6.0

On June 28, 2005, during a walk 640 m in length up Lake Creek from Herd Lake, a fishery crew counted 10 fish and 6 redds below the migration barrier, and 12 fish and 2 redds above the barrier. It is unclear as to the origin of the rainbow trout above the barrier; they could be resident fish.

Jimmy Smith Lake

We captured 351 rainbow trout during 65.2 gillnet hours. Catch rates averaged 7.26 fish/hour for the sinking nets and 3.91 fish/hour for the floating nets. The 2005 overall catch rate of 5.49 fish/hour was double the 2003 rate of 2.3 fish/hour (Brimmer et al. 2003) and down from 6.85 fish/hour reported in 2001 (Brimmer et al. 2001). Total lengths of rainbow trout sampled

ranged in size from 138-412 total length (mm) with a mean of 238 mm (Figure 4), compared to a size range of 112-368 total length (mm) and a mean of 277 mm recorded in 2003 (Table 5). The mean length noted in 2003 represents the largest measurement observed for Jimmy Smith Lake in Salmon Region records dating back to 1964. The mean total length and apparent demonstration of multiple year classes of rainbow trout shown in Figure 4 suggest that the population is stabilizing after a severe fish kill in July 2000 (Brimmer 2000). Mean relative weight increased to 107.8 compared to 105.5 in 2003. Both values are above the established average identified by Simpkins and Hubert, 1996.

Jimmy Smith Lake continues to meet the direction of the Fish Management Plan, which is to provide a fishery of larger sized fish supported by natural production.

McDonald Lake

Twelve fish were encountered during 33.9 overnight hours of gillnetting. Brook trout comprised 100% of the catch. The fish size ranged from 152-304 fork length (mm) and had a mean length of 207 mm. The fish sampled had a mean weight of 99 g. The CPUE for the gillnets was 0.35 fish/hour compared to a hook and line CPUE of 0.30 fish/hour in 2000 (Larkin et al. 2001) which suggests the overall population has not changed.

During 2005, brook trout measured in Yellowbelly Lake, which is connected to McDonald Lake, ranged in size from 162-375 fork length (mm) and had a mean length of 252 mm. There is no physical barrier between the two lakes which allows for free exchange of fish species between the two lakes.

An unspecified strain of cutthroat trout was planted in McDonald Lake through the 1970's. Henry's Lake cutthroat trout were stocked through the mid-1980s and westslope cutthroat trout were stocked from the late 1980's to the late 1990's. No cutthroat trout were found in this year's gillnetting effort. Likely, these fish were displaced by other fish or did not survive. The lake was treated with rotenone in August of 1990. The 2005 gillnetting effort demonstrated that the chemical treatment was not effective in long-term population control of brook trout.

The lake currently meets the objective of the Fish Management Plan of maintaining a fishery with natural reproduction.

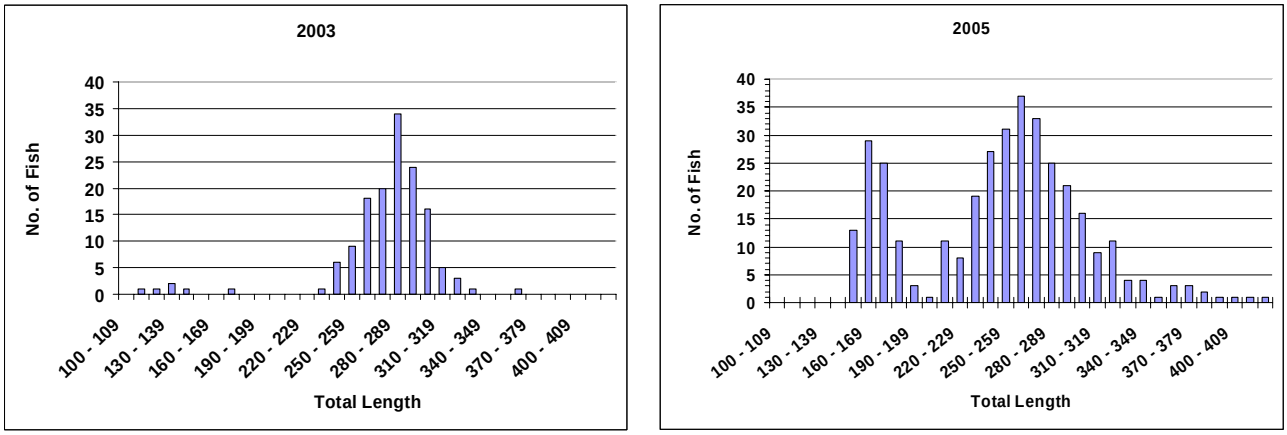

Figure 4. Comparison of rainbow trout length frequencies in Jimmy Smith Lake, 2003 and 2005.

Table 5. Comparison of recent rainbow trout sampling efforts in Jimmy Smith Lake, 1996, 2001, 2003, and 2005

	Year			
	1996	2001	2003	2005
Survey dates	6/11	6/21-22	7/21	6/7-8
Sample size	157	113	144	351
Size range (Total length mm)	155-332	110-370	112-368	138-412
Mean total length (mm)	213	203	277	238
Mean weight (g)	ND[a]	ND	283.3	311.4
No. gillnets	1	1	4	4
Total gillnet hours	15.0	16.5	62.2	65.2
Fish/Net hour (CPUE)	10.1	6.9	2.3	5.5
Relative weight	ND	ND	105.5	107.8

[a] ND = No data.

Mosquito Flat Reservoir

Results of the zooplankton tows provided ZPR and ZQI values of 0.34 and 0.27 at mid-lake and 0.31 and 0.14 near the outlet, respectively. These values suggest that competition for food resources may be occurring (Table 6). This year's ZPR and ZQI values decreased 59% and 56% respectively from the 2003 sample (Figure 5). A likely explanation for the reduced values could be water quality changes due to the reduced volume of water sampled in the zooplankton tows. Another explanation could be the low reservoir water level at the time of sampling. The recent decrease in ZPR and ZQI values demonstrates the need for continual sampling to determine if this is a trend or an anomaly.

For years 2000 through 2005, rainbow trout fry and fingerlings were not stocked to determine if zooplankton numbers or size structure would increase accordingly. Given the ZQI values from 2000 through 2003, the elimination of fry and fingerling stocking may have caused an improvement in ZQI values (Figure 5).

Wallace Lake

A total of 83 fish were encountered in the gillnet survey on Wallace Lake. Rainbow trout comprised 8% (N=7) of the catch and redside shiners *Richardsonius balteatus* constituted the remaining 92% (N=76). The largest rainbow trout encountered was 286 mm, with a size range of 250-286 mm. The mean total length was 272.3 mm. Redside shiners ranged in size from 90-156 total length (mm) and had a mean length of 112.9 mm. The nets were fished for a total of 82.1 overnight hours and had a capture rate of 1.01 fish/hour.

Eighty-two rainbow trout mortalities were observed during a survey around the lake perimeter. It is likely that the fish observed were only a small percentage of the mortalities that occurred in Wallace Lake. The fishery crew observed fry (0-76.1 mm total length) of unknown species during the shoreline patrol. Based on the timing of the observation, the fry were likely redside shiners. No amphibians were observed.

Table 6. Zooplankton ratio (ZPR), and zooplankton quality index (ZQI) from Teuscher, 1999.

ZQI > 0.60	Competition for food unlikely; stock fingerlings from 150 to 300 per acre
0.60 > ZQI > 0.10	Competition for food may be occurring; stock fingerlings from 75 to 150 per acre
ZQI < 0.10	Forage resources are limiting; stock less than 75 fingerlings per acre or catchables

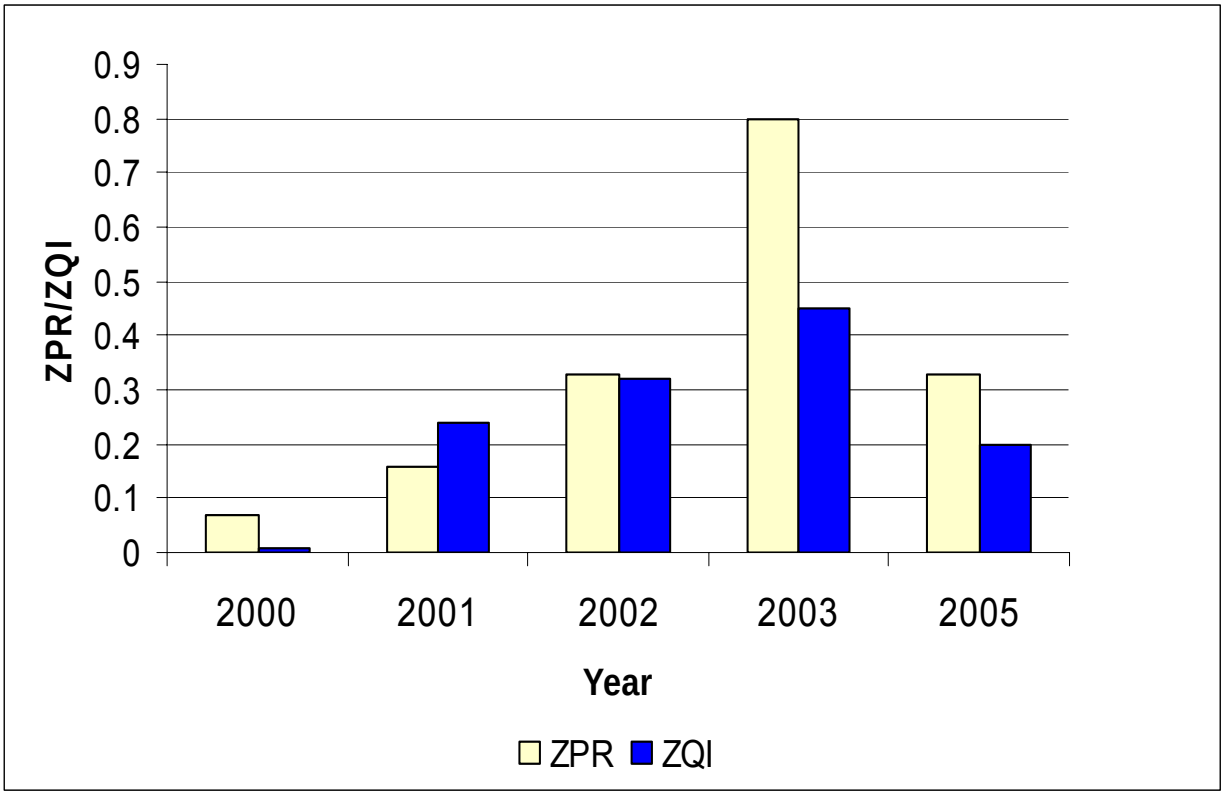

Figure 5. Zooplankton ratio (ZPR) and zooplankton quality index (ZQI) indices from Mosquito Flat Reservoir, 2000, 2001, 2002, 2003, and 2005.

DO measurements demonstrated a major shift between four and five meters in depth, dropping from 7.2 mg/l to 2.1 mg/l (Table 7). According to Piper et al. 1982, 5 mg/l DO is the accepted minimum DO level for salmonids. The surface water temperature was 4 degrees C on June 8 and the temperature profile displayed a nearly uniform temperature (within 0.5 degrees C) from top to bottom (Table 7). The crew obtained a Secchi disc reading of 3.45 m. The observed fish mortality likely resulted from low oxygen levels during the winter months.

Table 7. Dissolved oxygen and temperature measurements at Wallace Lake, June 8, 2005.

Depth (m)	Dissolved oxygen (mg/l)	Water temperature (^{o} C)
1	7.4	6.0
2	7.5	6.0
3	7.6	6.0
4	7.2	5.75
5	2.1	5.75
6	1.8	5.75
7	1.4	5.75
8	1.1	5.75
9	1.0	5.5
10	0.6	5.5
11	0.4	5.5

Williams Lake

Zooplankton Sampling

Zooplankton tows resulted in ZPR values of 0.53, 0.78, and 0.82 at the inlet, mid-lake, and outlet sample sites, respectively. ZQI values of the same three sites were 0.15, 0.60, and 0.92, respectively. The highest values for both ZPR and ZQI were from the outlet samples and the lowest were from the inlet samples. Averaged ZPR and ZQI values were 0.71 and 0.56, respectively (Figure 6), representing a decrease of 0.84 (54%) and 0.16 (22%), respectively, since 2003. The 2005 ZQI value suggests that forage competition may be occurring (Tables 6 and 8). The average ZQI value of 0.56 falls below the 0.60 level measured in previous samples by a slight margin (Table 8). The low value of the inlet sample reduced the 2005 average. However, the inlet ZQI values have consistently been the lowest of the three sample sites in Williams Lake for the last four years (Table 8). ZQI's will be monitored in the future if the stocking rate is changed, dramatic changes in water quality are detected, or a change in the fish population occurs.

DO Sampling

DO measurements demonstrated a gradual decrease in the water column from the surface to 14 m in depth, dropping from 12.8 mg/l to 4 mg/l (Table 9). The gradual drop represents an average decrease of 0.59 mg/l for each one meter increment in depth. In comparison, the 2005 DO measurements were 6.2 mg/l at the surface, but quickly dropped to 4.4 mg/l in the first one meter depth increment (Table 9). The gradual decrease in DO levels in 2006 suggests that there was more habitable space in the water column for salmonids during the winter months when compared to 2005.

Spawning Project

On April 29, 2005, 11 female and 11 male rainbow trout were collected and spawned. On May 6, 2005, an additional 10 females and 10 male rainbows were collected and spawned.

An IDFG cooperator tended the fertilized eggs until "button up." Approximately 40,000 fry were released into Lake Creek on June 10 and 17, 2005. The ovarian fluid samples tested negative for all tested pathogens. Of note, this is the second season of negative test results for pathogens from the Lake Creek rainbow trout female samples.

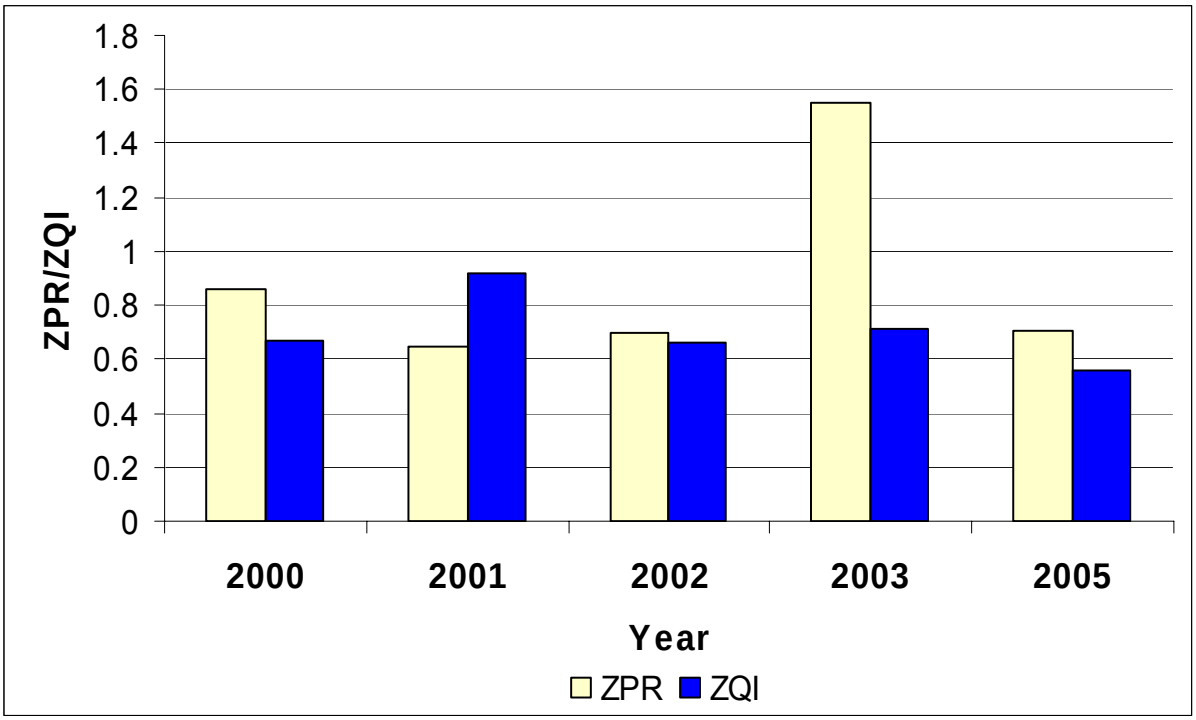

Figure 6. Zooplankton ZPR and ZQI indices from Williams Lake, 2000, 2001, 2002, 2003, and 2005.

Table 8. Zooplankton quality index (ZQI) values derived from three sample sites at Williams Lake, 2000 to 2003, and 2005.

Sample site	Year				
	2000	2001	2002	2003	2005
Inlet	ND	0.65	0.29	0.50	0.15
Mid-lake	ND	0.71	0.98	0.80	0.60
Outlet	ND	1.40	0.71	0.80	0.92
Average	0.67	0.92	0.66	0.72	0.56

Table 9. Comparison of dissolved oxygen measurements (mg/l) taken in Williams Lake, February 15, 2005 and January 20, 2006.

	Year	
Depth (m)	2005	2006
0	12.8	6.2
1	10.8	4.4
2	10.1	3.2
3	10.0	2.4
4	10.0	2.2
5	9.7	2.1
6	9.4	2.1
7	9.2	1.9
8	9.0	1.9
9	8.6	1.7
10	8.2	1.2
11	6.0	1.2
12	6.0	1.1
13	5.1	0.9
14	4.6	0.6
15	2.3	0.6
16	1.7	--
17	1.2	--
18	1.1	--
19	1.0	--
20	1.0	--

Yellowbelly Lake

A total of 240 fish were captured in the gillnet effort (Table 10). Salmonids comprised 16% (N=39) of the catch and non-game species 84% (N=201). Brook trout comprised over 50% (N=20) of the salmonids netted. The largest game fish encountered was a bull trout at 415 mm. The brook trout sample had a mean fork length of 252 mm, cutthroat trout 355 mm, bull trout 332 mm, northern pikeminnow 222 mm, and suckers 293 mm.

The 4 experimental sinking gill nets captured 9 brook trout, 2 cutthroat trout, 7 bull trout, 10 northern pikeminnow, and 112 large scale suckers. The nets were fished a total of 70.4 overnight hours and had a capture rate of 1.99 fish/hour.

The 4 experimental floating gill nets captured 11 brook trout, 3 cutthroat trout, 5 bull trout, 25 northern pikeminnow, 1 apparent rainbow trout/cutthroat hybrid trout, 1 apparent bull/brook hybrid trout, and 54 large scale suckers. The nets were fished a total of 71.4 overnight hours and had a capture rate of 1.40 fish/hour.

The results in Table 10 indicated a slight increase in the number of salmonids (16% to 14%) compared to 2004 (Esselman et al. 2004). Of note this year was the appearance of 12 bull trout for the first time since the 1961 sample. Likewise, rainbow trout were completely absent in this year's gillnet samples compared to nine rainbow trout encountered in 2004 (Table 10). Cutthroat trout numbers remained stable with five fish counted this year compared to four in 2004. As noted by Esselman et al. (2004), the removal of the migration barrier at the outlet

may be contributing to the movement and/or colonization of different species from the main stem Salmon River. Survey efforts should be continued to determine if observed changes persist over time.

Survey results in Table 10 show the continued dominance of non-game species, particularly sucker species, despite chemical renovations applied in 1961 and 1990. Opening of the migration barrier in 2000 and the subsequent stocking of westslope cutthroat trout fry and fingerlings every year since then (Table 11) have been unsuccessful in establishing a dominant salmonid population in Yellowbelly Lake. The above efforts help illustrate the serious challenge of attempting manipulation of species composition of this lake system.

RECOMMENDATIONS

Carlson Lake

Fisheries staff requests an additional 30 tiger muskellunge for introduction in 2006.

Continue evaluation of tiger muskellunge introduction on the brook trout population in the future.

Due to considerable effort and investment to date, we consider additional evaluation necessary to determine whether tiger muskellunge introduction is an effective predator tool.

Table 10. Summary of gillnetting efforts from Yellowbelly Lake, 1961, 1978, 2001, 2004, and 2005.

			Salmonid species[a]						Other species			
Date	No. Nets	Total Catch	RBT	CT	Hybrids	EBT	BU	Total No. Salmonids (%)	RSS	SUC	NPM	MWF
June 2005	8	240	0	5	2	20	12	39 (16)	0	166	35	0
July 2004	8	376	9	4	4	36	0	53 (14)	0	296	27	0
June 2001	4	96	0	1	0	56	0	57 (59)	0	39	0	0
October 1978	2	58	0	1	0	4	0	5 (9)	2	50	1	0
Year 1961	1	57	0	0	0	0	2	2 (3)	0	43	9	3

[a] Salmonids: RBT = Rainbow trout, CT = Cutthroat trout, EBT = Brook trout, and BU = Bull trout.

[b] Other species: RSS = Redside shiner, SUC = Sucker, NPM = Northern pikeminnow, and MWF = Mountain whitefish.

Table 11. Yellowbelly Lake fish stocking history from 1968 to 2005, listing most recent to earliest.

Date Stocked	Species Type	Size[a]	Number Stocked
09/07/05	Westslope cutthroat	Fingerling	2,492
09/06/04	Westslope cutthroat	Fry	6,640
09/02/03	Westslope cutthroat	Fry	2,500
07/15/03	Unspecified cutthroat	Fry	1,256
08/10/02	Westslope cutthroat	Fry	384
06/25/02	Westslope cutthroat	Fry	1,084
09/03/99	Westslope cutthroat	Fry	5,000
07/26/95	Westslope cutthroat	Fry	3,000
07/20/93	Westslope cutthroat	Catchable	2,025
07/01/92	Westslope cutthroat	Fingerling	5,015
08/30/87	Golden trout	Fingerling	2,750
08/27/86	Henrys Lake cutthroat	Fry	9,959
09/18/76	Unspecified cutthroat	Fry	16,848
08/29/72	Unspecified cutthroat	Fry	73,899
09/13/71	Unspecified cutthroat	Fry	52,896
09/04/69	Unspecified cutthroat	Fry	76,000
08/14/68	Unspecified cutthroat	Fry	79,640

[a] Fry = 0-76.1 mm total length, fingerling => 76.2-152.3 mm total length, and catchable => 152.4 mm total length.

In the event that lake levels reach bank full condition, hoop nets or electrofishing will be utilized to determine the effects of tiger muskellunge on brook trout populations.

Herd Lake

Based on recent relative weights and CPUEs in Herd Lake, we suggest additional methods be implemented to manipulate the size structure of rainbow trout. These methods might include design and installation of a more effective barrier, promoting increased angler use, and/ or introduction of tiger muskellunge.

Explore opportunities, such as tiger muskellunge introduction, for population control in Herd Lake to improve the mean length and relative weight of rainbow trout. The Department is currently experimenting with tiger muskellunge introductions in several mountain lakes in the Clearwater and Salmon Regions. Results suggest these introductions have been successful in significantly reducing brook trout numbers (Cochnauer et al. 2001, Esselman et al. 2004).

Jimmy Smith Lake

Monitor Jimmy Smith Lake's population status to determine whether management action is necessary to improve size structure.

McDonald Lake

Sample McDonald Lake to monitor the size structure and relative weight of the fish population in five to ten years. Results show that brook trout have reestablished themselves in McDonald Lake since the rotenone treatment in 1990 and stocking is unlikely to reestablish a westslope cutthroat trout fishery.

Mosquito Flat Reservoir

Continue elimination of rainbow trout fry and fingerling stockings to maintain appropriate forage conditions for catchable-sized rainbow trout being stocked in Mosquito Flat Reservoir.

Continue monitoring the zooplankton population to ensure forage conditions remain optimal.

Future management should consider monitoring zooplankton over time prior to further stocking alterations.

Wallace Lake

Wallace Lake is a popular regional fishery. Continue annual stocking of 2,000 catchable sized rainbow trout and cutthroat trout as available.

Williams Lake

Participate in collaborative efforts with interested parties to develop a long term strategy for improving water quality in Williams Lake.

Continue to monitor DO levels and water temperatures at specified locations and depths on a three year cycle to provide a long term dataset of water quality parameters in Williams Lake.

Continue rainbow trout trapping and spawning operations in Lake Creek. Stock the resulting fry in Lake Creek. Positive public relations are resulting in support for the Department through this project.

Yellowbelly Lake

The goal of a wild, quality westslope cutthroat trout fishery is proving difficult to achieve at Yellowbelly Lake. The drainage is dominated by brook trout, the lake is primarily populated with non-game species, and the species composition continues to favor non-game species primacy over time despite past chemical treatments. Future management direction should be focused on one of three options: determine the cost versus benefit ratio of continuing to stock fry and fingerling sized westslope cutthroat trout, consider the introduction of a biological predator to reduce non-game fish biomass, or do nothing.

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SALMON REGION - 2005 ANNUAL MANAGEMENT REPORT

Middle Fork Salmon River Snorkeling Transects

July 1, 2005 to June 30, 2006

ABSTRACT

During July 2005, Idaho Department of Fish and Game personnel snorkeled 32 of 35 main stem transects and eight of 10 tributary transects to sample for fish presence and density. Mean snorkel densities of age one and older westslope cutthroat trout *Oncorhynchus clarkii lewisi*, rainbow trout/steelhead *O. mykiss*, and juvenile Chinook salmon *O. tshawytscha* counted in Middle Fork Salmon River main stem traditional transects were 1.1, 0.7, and 0.9 fish/100 m^2, respectively. In Middle Fork Salmon River tributary transects, mean westslope cutthroat trout densities averaged 1.1/100 m^2, rainbow trout/steelhead averaged 2.2/100 m^2, and Chinook salmon averaged 1.2/100 m^2. The main stem Middle Fork Salmon River historical transects showed a mean density of 2.1 fish/100 m^2 for westslope cutthroat trout. No rainbow trout/steelhead or Chinook salmon were observed in the historical transects.

Department anglers caught 390 fish in the Middle Fork Salmon River. The species composition was 61% westslope cutthroat trout and 39% rainbow trout. Additionally, seven bull trout were caught.

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INTRODUCTION

The Middle Fork Salmon River (MFSR), part of the Wild and Scenic Rivers System, flows through the Frank Church River of No Return Wilderness, a remote area in east central Idaho. The MFSR originates at the confluence of Bear Valley and Marsh creeks near Cape Horn Mountain. It flows 171 km to its confluence with the Salmon River, 92 km downstream from Salmon, Idaho (Figure 1).

Primitive roads access Dagger Falls, the traditional boating ingress to the MFSR, and the headwaters of some MFSR tributaries. Access to the lower 156 km of the river is limited to aircraft, float boats, or horse/foot trails.

The MFSR is a major recreational river offering a wide variety of outdoor and backcountry experiences. The number of people floating the river during the permit season has increased substantially in the past 40 years, from 625 in 1962 to 10,959 floaters in 2005. The U.S. Forest Service estimated total use days to be 64,520 days in 2005, down slightly from the 67,000 use days in 2004 (S. Hughes, U.S. Forest Service, personal communication).

The earliest MFSR fishery study, conducted in 1959 and 1960, evaluated the life history and seasonal movements of westslope cutthroat trout *Oncorhynchus clarkii lewisi* (Mallet 1963). In 1971 the Idaho Department of Fish and Game initiated studies to monitor MFSR westslope cutthroat trout abundance and to evaluate catch-and-release regulations established by the Idaho Fish and Game Commission in 1972. The Commission adopted similar regulations for major MFSR tributaries in the early and mid-1980s.

The 1971 study established snorkeling transects to be surveyed periodically (Corley 1972; Jeppson and Ball 1977, 1979). In this report, these transects will be described as historical sites (N=6). Since then, the Department has begun additional studies within the MFSR drainage. In 1981, using traditional steelhead transects established that year; we began to evaluate wild steelhead trout populations *O. mykiss* on the MFSR (Thurow 1982, 1983, 1985). In 1985 the Department added additional sites to enumerate cutthroat trout and Chinook salmon. In the same year, the Department started measuring juvenile steelhead, Chinook salmon *O. tshawytscha*, and westslope cutthroat trout densities in the MFSR and its tributaries (Reingold and Davis 1987a, 1987b, 1988; Lukens and Davis 1989; Davis et al. 1992; Schrader and Lukens 1992; Liter and Lukens 1992). All study sites established since 1981 are known in this report as traditional transects.

This report, a continuation of the 1985 study, presents data collected in July 2005 on fish densities in the MFSR drainage.

OBJECTIVES

Monitor juvenile rainbow trout/steelhead trout, Chinook salmon, and westslope cutthroat trout densities within the MFSR and its tributaries to evaluate long-term trends in population status.

Monitor the effects of catch-and-release regulations on resident fish populations in the MFSR drainage, particularly on westslope cutthroat trout.

Collect fish genetic samples in select MFSR tributaries for future analysis to compare salmonid genetic profiles in wilderness settings to genetic profiles of populations in non-wilderness systems.

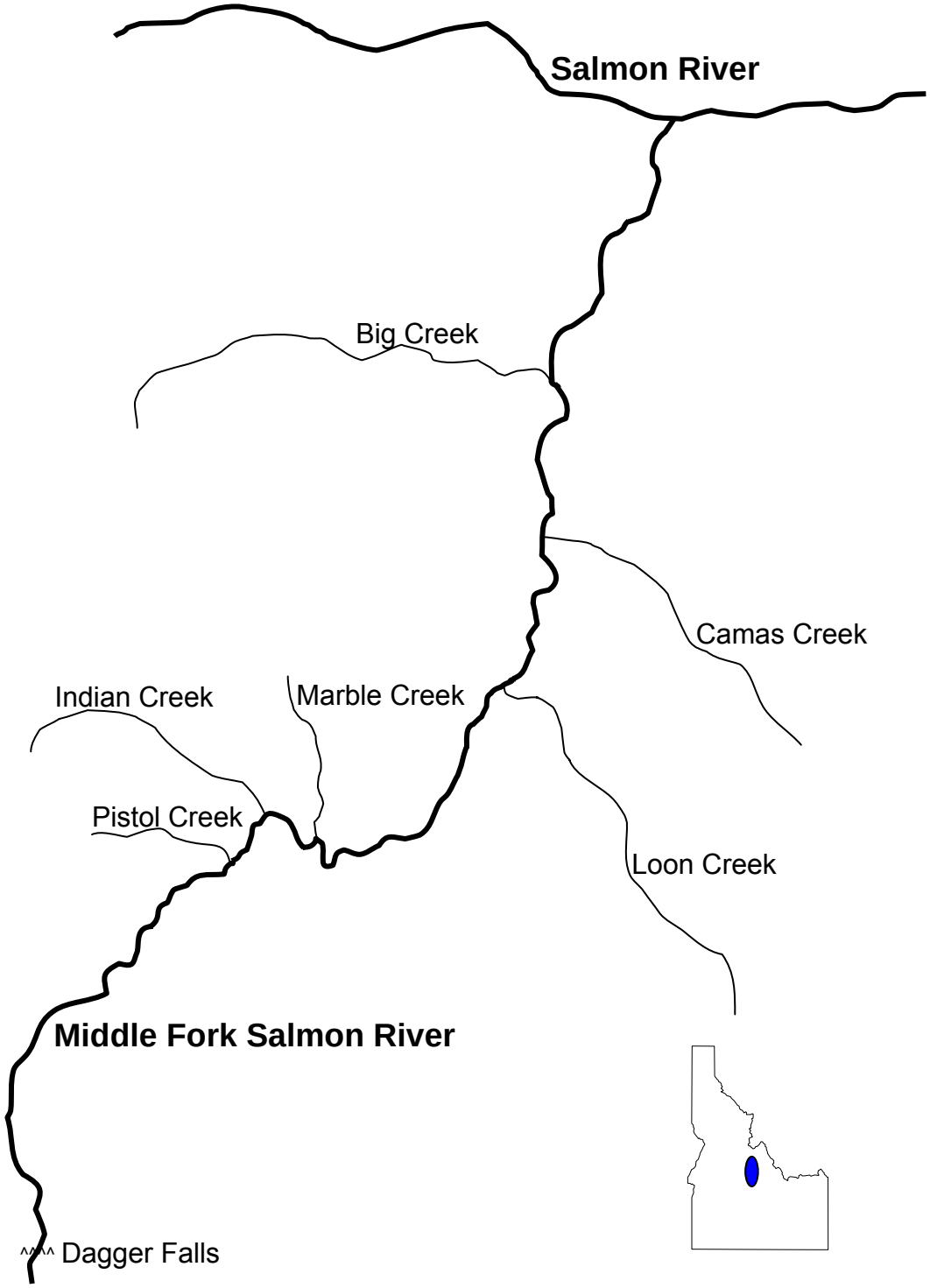

Figure 1. Map of the Middle Fork Salmon River and major tributaries, Idaho.

METHODS

Middle Fork Salmon River Snorkeling Transects – Main stem and Tributaries

From July 13-18, 2005, Department personnel snorkeled 28 of 29 traditional main stem MFSR transects (Table 1), eight of 10 MFSR traditional tributary transects (Table 2), and four of six MFSR historical transects (Table 3) using snorkeling techniques described by Thurow (1994). The historical transects on the main stem were established prior to 1985. Traditional transects were established since 1985.

Project Angling

Project anglers used conventional fly-fishing and spin cast gear to capture fish species on the MFSR from Boundary Creek, 0.3 km downstream of Dagger Falls (Figure1) to the mouth of the Middle Fork. Fish were identified by species and measured to the nearest 10 mm total length.

RESULTS AND DISCUSSION

Middle Fork Salmon River Snorkeling Transects

In the main stem MFSR traditional snorkeling transects, Department personnel counted 344 westslope cutthroat trout, 132 rainbow trout/steelhead, and 127 juvenile Chinook salmon (Table 4). In 2004, 150 westslope cutthroat trout, 88 rainbow trout/steelhead, and 2,095 juvenile Chinook salmon were counted in main stem MFSR traditional snorkeling transects. Although the numbers of westslope cutthroat trout and rainbow trout/steelhead counted in 2005 were higher than a year ago, juvenile Chinook salmon counts were significantly lower than 2004. Survey counts this year included 28 of 29 transects sampled compared to 10 of 29 transects surveyed in 2004. No comparisons were made with 2004 due to 19 survey sites being blown out in the main stem MFSR.

Comparing 2005 with 2003, the total number of westslope cutthroat trout and rainbow trout/steelhead counted appeared similar, but the 2005 count of juvenile Chinook salmon was far lower than the number observed in 2003. There were 42 more westslope cutthroat trout and 45 more rainbow trout/steelhead in 2005 than 2003. However, the number of juvenile Chinook salmon declined to 127 fish this year compared to 1,659 counted in 2003 (Curet et al. 2004).

In 2005, mean densities in the main stem MFSR were 1.1, 0.7, and 0.9 fish/100 m^2 (2004: 1.7, 1.1, and 25.3 fish/100 m^2) for westslope cutthroat trout, rainbow trout/steelhead, and juvenile Chinook salmon, respectively (Table 5). Mean densities in 2003 consisted of 1.2, 0.5, and 8.7 fish/100 m^2 for westslope cutthroat trout, rainbow trout/steelhead, and juvenile Chinook salmon, respectively (Curet et. al 2003). The 2005 mean density for westslope cutthroat trout was slightly lower than 2003, while the mean density of rainbow trout/steelhead was slightly higher this year than 2003. Figure 2 suggests that westslope cutthroat trout densities in MFSR transects have remained relatively stable the last 20 years with the exception of 1989 and 1999 when higher densities were observed.

Table 1. Locations and dimensions of main stem Middle Fork Salmon River traditional transects sampled in July 2005.

Transect Name	River km [a]	Transect Length (m)	Visibility (m)	Visibility Corridor (m)	Area (m^2)	Traditional Species[b]
Boundary	0.3	78	2.8	11.2	873.6	SB
Gardells Hole	4.3	127	2.2	8.8	1117.6	C2, ck
Velvet	8.8	37	1.5	6.0	222.0	C2, ck
Elkhorn	13.6	66	3.2	12.8	844.8	SB
Sheepeater	21.3	106	2.7	10.8	1144.8	SB
Greyhound	24.5	99	3.5	14.0	1386.0	C2, ck
Rapid River	29.6	74	3.0	12.0	888.0	SB
Indian	40.0	137	3.0	12.0	1644.0	SB
Pungo	44.3	77	2.4	9.6	739.2	C2, ck
Marble Pool	51.0	142	3.2	12.8	1817.6	C2, ck
Skijump	52.3	155	3.2	12.8	1984.0	SB
Lower Jackass	60.6	111	3.0	12.0	1332.0	C2, ck
Cougar	64.6	74	3.0	12.0	888.0	SB
Whitey Cox	73.9	102	4.8	19.2	1958.4	C2, ck
Rock Island	74.1	122	3.5	14.0	1708.0	SB
Hospital Pool	82.9	80	2.2	8.8	704.0	C2, ck
Hospital Run	84.3	66	2.2	8.8	580.8	SB
Tappan Pool	92.6	137	2.2	8.8	1205.6	C2, ck
Tappan Run[c]	92.8	--	--	--	--	SB
Flying B	106.6	75	2.5	10.0	750.0	C2, ck
Airstrip	108.6	110	2.5	10.0	1100.0	SB
Survey	119.7	72	2.5	10.0	720.0	SB
Big Creek Bridge	124.6	185	2.5	10.0	1850.0	C2, ck
Love Bar	127.8	100	2.5	10.0	1000.0	SB
Ship Island	135.8	126	2.2	8.8	1108.8	C2, ck
Little Ouzel	144.0	87	2.2	8.8	765.6	SB
Otter Bar	144.6	143	2.3	9.2	1315.6	C2, ck
Goat Creek Pool	151.5	134	2.3	9.2	1232.8	C2, ck
Goat Creek Run	151.8	122	2.2	9.2	1122.4	SB

[a] River km starts at Dagger Falls.

[b] Traditional steelhead transects established in 1981: SB = Steelhead B-run. Traditional cutthroat trout and Chinook transects established in 1985: C2 = Westslope cutthroat trout and ck = Chinook salmon.

[c] Not surveyed in 2005.

Table 2. Middle Fork Salmon River traditional tributary snorkeling transects surveyed in July 2005.

Transect Name	River Location[a] (km)	Transect Length (m)	Visibility (m)	Visibility Corridor (m)	Area (m^2)	Traditional Species[a]
Loon Creek Lower[b]	Below pack bridge	--	--	--	--	SB,C2, ck
Loon Creek Upper[b]	360 m above pack bridge	--	--	--	--	SB,C2, ck
Big Creek	360 m above mouth	86	2.7	10.8	928.8	SB,C2
Pistol Creek Lower	At mile marker 16	28	2.7	10.8	302.4	SB,C2, ck
Pistol Creek Upper	Above mile marker 16	40	2.7	10.8	432.0	SB,C2, ck
Indian Creek Lower	75 m above mouth	76	2.4	9.6	729.6	SB,C2, ck
Indian Creek Upper	300 m above mouth	50	2.4	9.6	480.0	SB,C2, ck
Marble Creek	Above pack bridge	64	2.3	9.2	588.8	SB,C2, ck
Camas Creek Lower	From pack bridge downstream	75	2.2	8.8	660.0	SB,C2
Camas Creek Upper	Above pack bridge	37	2.2	8.8	325.6	SB,C2, ck

[a] SB = Steelhead B-run, C2 = Westslope cutthroat trout, and ck = Chinook salmon.
[b] Not surveyed in 2005.

Table 3. Middle Fork Salmon River historical (Corley) snorkeling transects sites surveyed in July 2005.

Transect Name	River Location[a] (km)	Transect Length (m)	Visibility (m)	Visibility Corridor (m)	Area (m^2)	Traditional Species[a]
Hancock Rapids Hole[b]	Directly below Hancock Rapids	--	--	--	--	C2
Cliffside Rapids Hole[b]	Directly below Cliffside Rapids	--	--	--	--	SB,C2
Bernard Airstrip	Site below airstrip site	100	2.5	10.0	1000	SB,C2
Mahoney Camp	Downstream Cougar Cr.	50	2.8	9.2	460	SB,C2, ck
White Creek Pack Bridge	Above Loon Creek sites	300	2.8	9.2	2760	SB,C2, ck
Little Ck Guard Station	Above pack bridge	85	3.2	12.8	1088	C2, ck

[a] SB = Steelhead B-run, C2 = Westslope cutthroat trout, and ck = Chinook salmon.
[b] Not surveyed in 2005.

Table 4. Numbers of westslope cutthroat trout and rainbow trout/steelhead by length group (mm), Chinook salmon by age group, and other fish by species, main stem Middle Fork Salmon River snorkel counts, July 2005.

Transect	Westslope Cutthroat Trout						Rainbow Trout/ Steelhead					Chinook			Other Species[a]					Total
Name	<75	75-150	150-230	230-300	>300	Total	75-150	150-230	230-300	>300	Total	Age 0	Age 1	Total	BU	WF	NPM	SUC	RSS	Fish
Boundary	0	0	11	6	4	21	15	5	9	0	29	0	0	0	0	26	0	1	0	77
Gardells Hole	0	0	3	3	3	9	0	8	0	0	8	30	0	30	2	13	0	3	0	65
Velvet	0	0	4	2	1	7	0	19	1	0	20	30	0	30	1	10	0	0	0	68
Elkhorn	0	0	1	1	0	2	0	2	2	0	4	0	0	0	0	1	0	0	0	7
Sheepeater	0	0	4	11	8	23	0	7	0	0	7	0	0	0	0	30	0	0	0	60
Greyhound	0	0	4	0	5	9	0	5	0	0	5	0	0	0	0	7	0	0	0	21
Rapid River	0	0	20	2	4	26	0	8	0	0	8	7	0	7	1	17	0	0	0	59
Indian	0	0	22	0	24	46	0	9	0	0	9	0	0	0	5	22	0	2	0	84
Pungo	0	0	2	9	7	18	0	5	2	0	7	47	0	47	2	1	4	3	0	82
Marble Pool	0	1	20	2	17	40	0	8	0	0	8	0	0	0	0	15	0	0	0	63
Skijump	0	0	3	1	1	5	1	1	0	0	2	0	0	0	0	3	0	0	0	10
Lower Jackass	0	0	12	9	7	28	0	0	0	0	0	0	0	0	0	9	6	28	0	71
Cougar	0	0	0	0	0	0	1	1	0	0	2	1	0	1	0	4	0	0	0	7
Whitey Cox	0	0	2	14	2	18	1	2	0	0	3	0	0	0	0	2	0	27	0	50
Rock Island	0	0	1	2	0	3	0	0	0	0	0	0	0	0	0	7	0	0	0	10
Hospital Pool	0	0	3	0	2	5	0	0	0	0	0	3	0	3	0	2	2	1	0	13
Hospital Run	0	0	0	0	1	1	0	0	0	0	0	1	0	1	0	1	4	1	0	8
Tappan Pool	0	0	6	0	11	17	0	0	0	0	0	0	0	0	0	7	21	40	0	85
Tappan Run	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Flying B	0	0	0	4	10	14	0	0	0	0	0	0	0	0	0	2	25	22	0	63
Airstrip	0	0	0	0	0	0	0	2	2	2	6	0	0	0	0	4	0	11	0	21
Survey	0	0	1	2	3	6	0	0	0	0	0	0	0	0	0	0	6	0	0	12
Big Creek Bridge	0	0	0	3	7	10	2	3	0	0	5	0	0	0	0	3	0	2	2	22
Love Bar	0	0	0	0	5	5	0	0	0	0	0	0	0	0	0	0	0	1	0	6
Ship Island	0	0	2	4	4	10	0	2	0	0	2	0	0	0	0	0	12	13	0	37
Little Ouzel	0	0	0	0	4	4	0	2	0	0	2	7	0	7	0	3	0	6	0	22
Otter Bar	0	0	0	3	3	6	0	5	0	0	5	0	0	0	0	0	2	0	42	55
Goat Creek Pool	0	0	0	1	1	2	0	0	0	0	0	1	0	1	0	0	0	1	30	34
Goat Creek Run	0	0	3	3	3	9	0	0	0	0	0	0	0	0	0	32	6	6	0	53
Total	0	1	124	82	137	344	20	94	16	2	132	127	0	127	11	221	88	168	74	1,165

[a] BU=Bull trout, WF=Mountain whitefish, NPM=Northern pikeminnow, SUC=all Sucker species, RSS=Redside shiner.

Table 5. Densities (fish/100 m^2) of westslope cutthroat trout, rainbow trout/steelhead, and Chinook salmon in main stem Middle Fork Salmon River snorkel transects, July 2005.

			Densities (fish/100m^2)			
Transect Name	River km	Area (m^2)	Westslope Cutthroat Trout	Rainbow Trout/Steelhead	Chinook Salmon	Total Fish[a]
Boundary	0.3	873.6	2.4	3.3	0.0	8.8
Gardells Hole	4.3	1117.6	0.8	0.7	2.7	5.8
Velvet	8.8	222.0	3.2	9.0	13.5	30.6
Elkhorn	13.6	844.8	0.2	0.5	0.0	0.8
Sheepeater	21.3	1144.8	2.0	0.6	0.0	5.2
Greyhound	24.5	1386.0	0.7	0.4	0.0	1.5
Rapid River	29.6	888.0	2.9	0.9	0.8	6.6
Indian	40.0	1644.0	2.8	0.6	0.0	5.1
Pungo	44.3	739.2	2.4	1.0	6.4	11.1
Marble Pool	51.0	1817.6	2.2	0.4	0.0	3.5
Skijump	52.3	1984.0	0.3	0.1	0.0	0.5
Lower Jackass	60.6	1332.0	2.1	0.0	0.0	5.3
Cougar	64.6	888.0	0.0	0.2	0.1	0.8
Whitey Cox	73.9	1958.4	0.9	0.2	0.0	2.6
Rock Island	74.1	1708.0	0.2	0.0	0.0	0.6
Hospital Pool	82.9	704.0	0.7	0.0	0.4	1.9
Hospital Run	84.3	580.8	0.2	0.0	0.2	1.4
Tappan Pool	92.6	1205.6	1.4	0.0	0.0	7.1
Tappan Run[b]	92.8	--	--	--	--	--
Flying B	106.6	750.0	1.9	0.0	0.0	8.4
Airstrip	108.6	1100.0	0.0	0.6	0.0	1.9
Survey	119.7	720.0	0.8	0.0	0.0	1.7
Big Creek Bridge	124.6	1850.0	0.5	0.3	0.0	1.2
Love Bar	127.8	1000.0	0.5	0.0	0.0	0.6
Ship Island	135.8	1108.8	0.9	0.2	0.0	3.3
Little Ouzel	144.0	765.6	0.5	0.3	0.9	2.9
Otter Bar	144.6	1315.6	0.5	0.4	0.0	4.2
Goat Creek Pool	151.5	1232.8	0.2	0.0	0.1	2.8
Goat Creek Run	151.8	1122.4	0.8	0.0	0.0	4.7
Total		31,954.8				
Mean			1.1	0.7	0.9	3.7

[a] Total fish includes Bull trout, Mountain whitefish, Northern pikeminnow, all Sucker species and Redside shiner.
[b] Not surveyed in 2005.

The Idaho Fish and Game Commission established catch-and-release regulations for westslope cutthroat trout in the MFSR in 1972. The number of fish appeared to increase after this date and peaked in 1989 (Figures 2 and 3). During the early 1990's, the trend showed a general decline with lower numbers observed. However, Figure 3 suggests that westslope cutthroat trout are slowly increasing in number and size in recent years.

Figure 4 shows rainbow trout/steelhead densities sampled from 1985 to 2005. Densities have remained fairly constant in the last 20 years at approximately 0.5 fish/100 m^2 with the exception of 1999 when slightly higher numbers were observed. An anomaly in Figure 4 is the 2004 dataset which represents only those sites surveyed in the upper portion of the MFSR (above Loon Creek) which typically have higher numbers of rainbow trout/steelhead, likely biasing the density estimates.

Juvenile Chinook salmon densities have ranged from 0.01 to 8.2 fish/100 m^2 during the past 20 years (Figure 5). Densities for Chinook salmon in 2005 were 0.4 fish/100 m^2 in all transects and 0.7 fish/100 m^2 in Chinook salmon/cutthroat trout-only transects. This year's observations follow a decline in MFSR Chinook salmon numbers after a brief increase in 2003 when densities of 5.6 fish/100 m^2 in all transects and 8.2 fish/100 m^2 in Chinook salmon/cutthroat trout-only transects were observed. Very high Chinook salmon densities were also observed in 2004 (28.0 mean density fish/100 m^2 in all transects, 22.1 fish/100 m^2 mean density in Chinook salmon/cutthroat trout-only transects). However, as reported earlier, the 2004 data was biased for higher density levels of salmonids counted in 10 upper Middle Fork transects and is not directly comparable with more complete data from other years. Yearly downriver migration conditions for juvenile Chinook salmon, upriver migration conditions for adults, and spawning escapement continue to have a profound influence on Chinook salmon densities. Low juvenile Chinook salmon numbers observed in 2005 will likely impact future juvenile Chinook counts for many years.

Middle Fork Salmon River Tributary Snorkeling Transects

In MFSR tributary transects snorkeled in 2005, Department personnel counted 42 westslope cutthroat trout, 91 rainbow trout/steelhead, and 49 juvenile Chinook salmon (Table 6). Westslope cutthroat trout densities in the tributaries ranged from 0.0 to 4.0 fish/100 m^2 with a mean density of 1.1 fish/100 m^2 (Table 6, Figure 6). Rainbow trout/steelhead densities ranged from 0.3 to 3.4 fish/100 m^2 with a mean of 2.2 fish/100 m^2. Juvenile Chinook salmon densities ranged from 0.0 to 7.1 fish/100 m^2 with a mean density of 1.2 fish/100 m^2. Eight of 10 tributary transects were surveyed this year. Loon Creek's upper and lower transects were not snorkeled due to low visibility.

Almost 400 genetic samples were taken on 10 MFSR tributaries in 2005 for analysis at the Department's Eagle Genetics Laboratory (Table 7).

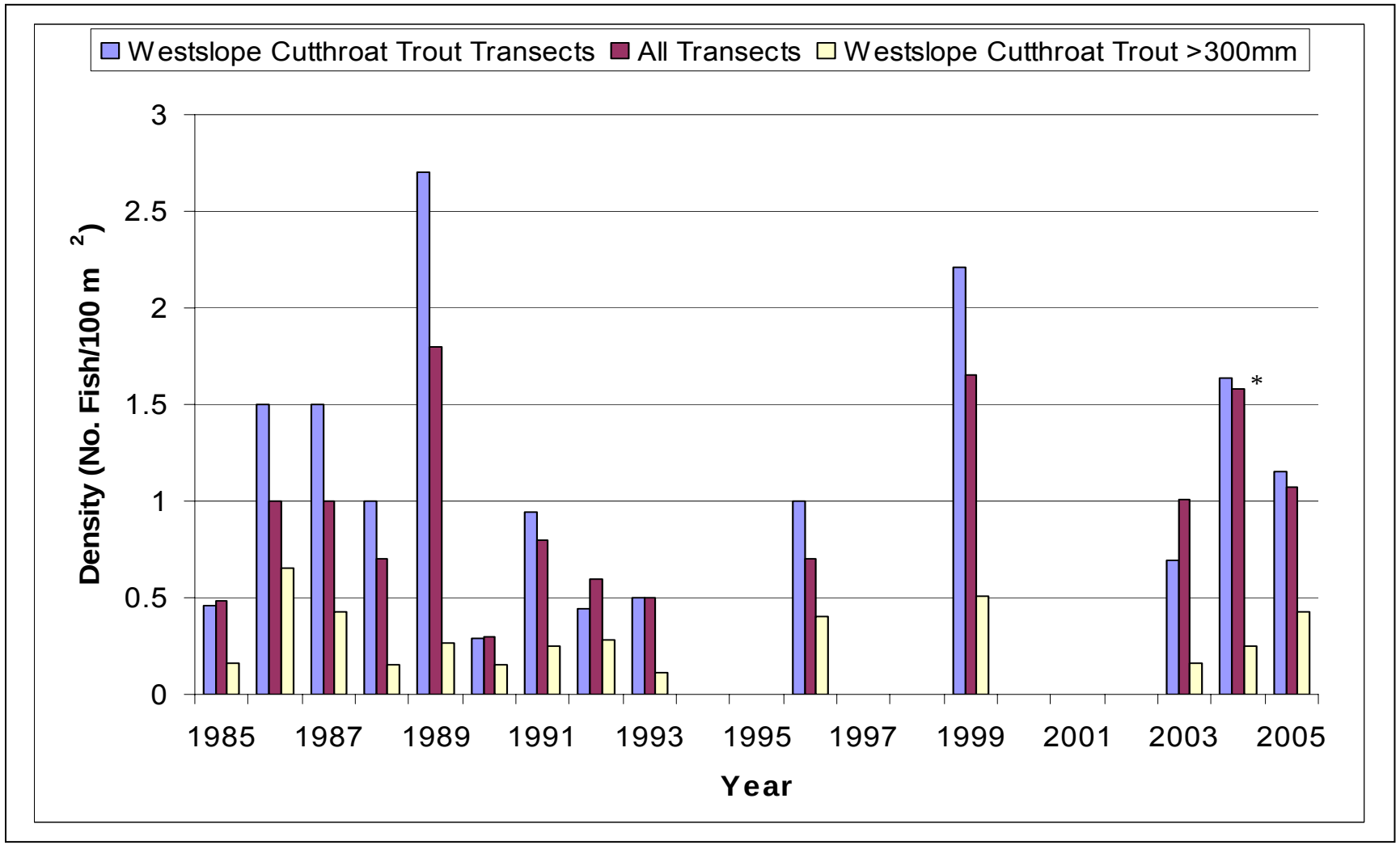

Figure 2. Densities of westslope cutthroat trout counted in westslope cutthroat trout/Chinook salmon-only transects (see Table 1) and in all transects, and westslope cutthroat trout greater than 300 mm counted in all transects during main stem Middle Fork Salmon River snorkeling surveys, 1985 to 1993, 1996, 1999, and 2003 to 2005. Not all transects were sampled in all years. * 2004 data includes only survey sites upriver of Loon Creek.

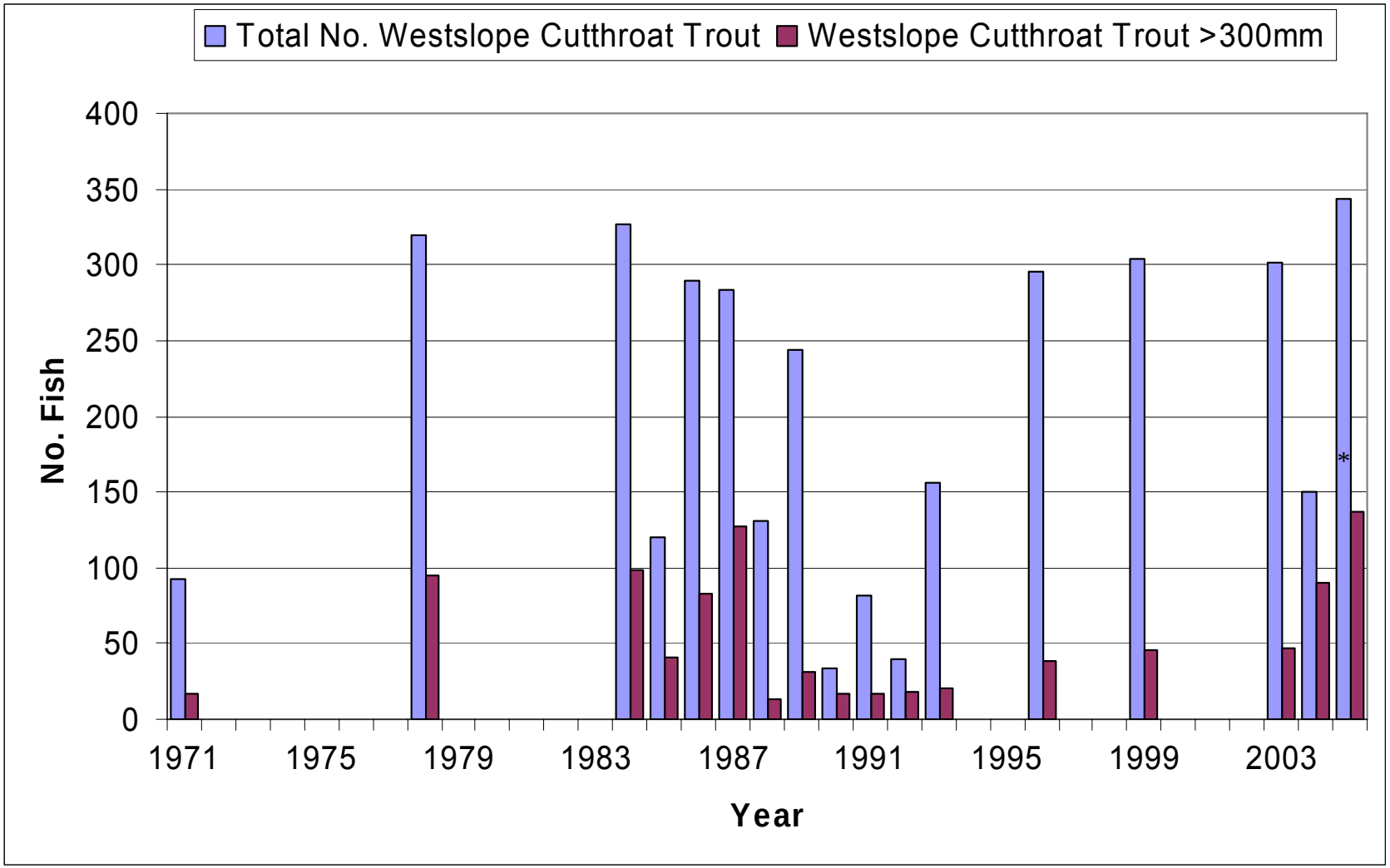

Figure 3. Number of westslope cutthroat trout counted in main stem Middle Fork Salmon River snorkeling transects, 1971, 1978, 1984 to 1993,1996, 1999, and 2003 to 2005. * 2004 data includes only survey sites upriver of Loon Creek.

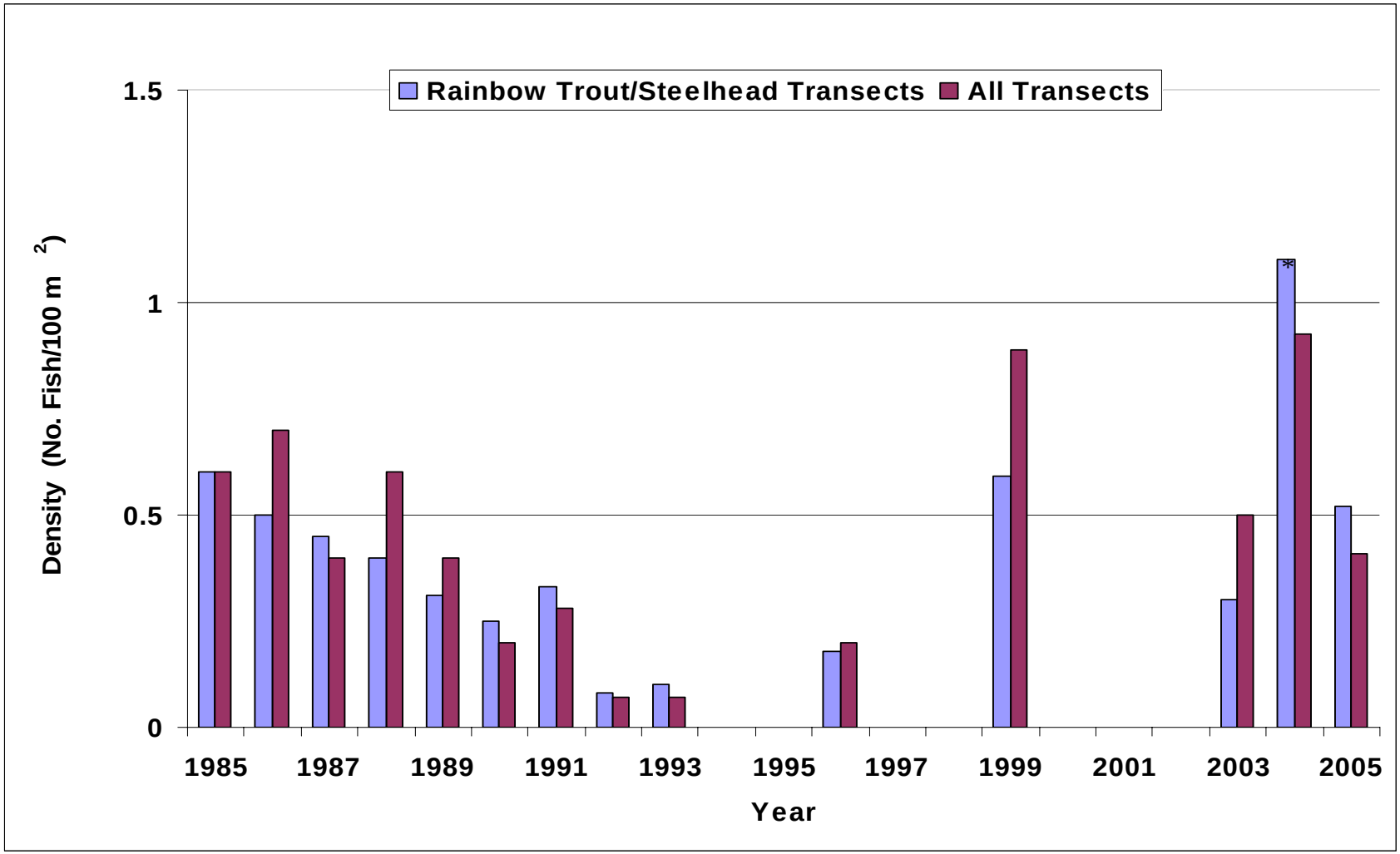

Figure 4. Densities of rainbow trout/steelhead counted in rainbow trout/steelhead-only transects (see Table 1) and in all transects during main stem Middle Fork Salmon River snorkeling surveys in 1985 to1993, 1996, 1999, and 2003 to 2005. Not all transects were sampled in all years. * 2004 data includes only survey sites upriver of Loon Creek.

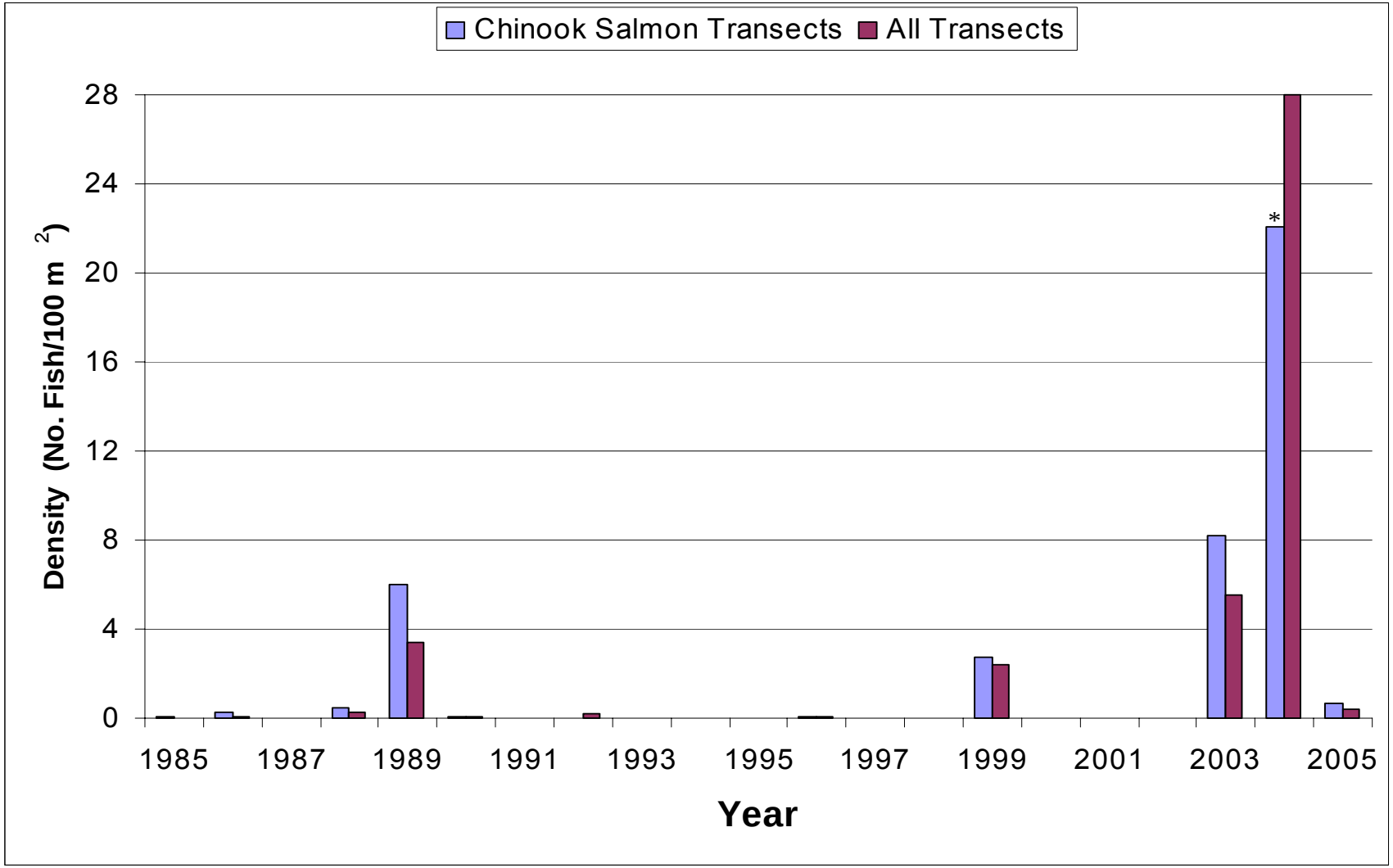

Figure 5. Densities of Chinook salmon in westslope cutthroat trout/Chinook salmon-only transects (see Table 1) and in all transects during main stem Middle Fork Salmon River snorkeling surveys, 1985 to1993, 1996,1999 , and 2003 to 2005. Not all transects were sampled in all years. * 2004 data includes only survey sites upriver of Loon Creek.

Table 6. Numbers of westslope cutthroat trout and rainbow trout/steelhead by length group (mm), Chinook salmon by age group, and other fish species counted in Middle Fork Salmon River tributaries, July 2005.

	Westslope Cutthroat Trout						Rainbow Trout/ Steelhead					Chinook				Other Species[a]					
Transect Name	<75	75-150	150-230	230-300	>300	Density	75-150	150-230	230-300	>300	Density	Age 0	Age 1	Total	Density	BU	WF	NPM	SUC	RSS	Total Fish
Loon Creek Lower[b]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Loon Creek Upper[b]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Big Creek	0	0	3	1	1	0.5	9	23	0	0	3.4	1	0	1	0.1	0	18	0	0	0	56
Pistol Creek Lower	0	0	0	4	8	4.0	0	6	2	1	3.0	0	0	0	0.0	1	10	0	0	0	32
Pistol Creek Upper	0	0	0	1	0	0.2	2	9	0	0	2.5	1	0	1	0.2	0	2	0	0	0	15
Indian Creek Lower	0	5	3	1	1	1.4	3	2	1	0	0.8	10	0	10	1.4	0	2	0	0	0	28
Indian Creek Upper	0	0	3	1	1	1.0	8	10	0	0	3.8	34	0	34	7.1	0	0	0	1	0	58
Marble Creek	0	0	0	0	0	0.0	1	1	0	0	0.3	1	0	1	0.2	0	1	0	0	0	4
Camas Creek Lower	0	0	0	3	5	1.2	0	2	0	0	0.3	2	0	2	0.3	2	24	0	8	0	46
Camas Creek Upper	0	0	0	0	1	0.3	1	10	0	0	3.4	0	0	0	0.0	1	11	0	2	0	26
Total	0	5	9	11	17		24	63	3	1		49	0	49		4	68	0	11	0	265
Mean						1.1					2.2				1.2						

[a] BU=Bull trout, WF=Mountain whitefish, NPM=Northern pikeminnow, SUC=all Sucker species, and RSS=Redside shiner.

[b] Not surveyed in 2005.

Table 7. Salmonid genetic samples taken from Middle Fork Salmon River tributaries, 2004 and 2005.

Stream	Sample Date	Datum	Zone	UTM Coordinates Easting	Northing	No. and Species of Samples Taken
Aparejo	7/18/2004	NAD27	11	679230	4976386	29 cutthroat trout
Bernard	7/18/2004	NAD27	11	678574	4982482	26 cutthroat trout
Bernard	7/18/2004	NAD27	11	678574	4982482	1 bull trout
Big Bear	7/18/2004	NAD27	11	679101	4974936	29 cutthroat trout
Bobtail	7/19/2004	NAD27	11	678996	4993857	8 rainbow trout/ steelhead
Brush	7/17/2004	NAD27	11	678751	4980330	5 cutthroat trout
Brush	7/17/2004	NAD27	11	678751	4980330	10 rainbow trout/ steelhead
Brush	7/17/2004	NAD27	11	678751	4980330	1 hybrid
Camas	7/17/2004	NAD27	11	679908	4973262	25 cutthroat trout
Camas	7/17/2004	NAD27	11	679908	4973262	10 rainbow trout/steelhead
Camas	7/17/2004	NAD27	11	679908	4973262	1 bull trout
Cougar	7/16/2004	NAD27	11	664595	4955861	41 cutthroat trout
Cub	7/17/2004	NAD27	11	675895	4967522	6 cutthroat trout
Cub	7/17/2004	NAD27	11	675895	4967522	14 rainbow trout/ steelhead
Cub	7/17/2004	NAD27	11	675895	4967522	10 hybrid
Elkhorn	7/14/2004	NAD27	11	638242	4941741	71 cutthroat trout and rainbow trout/steelhead
Elkhorn	7/14/2004	NAD27	11	638242	4941741	7 bull trout
Elkhorn	7/12/2005	NAD27	11	638321	4941533	47 cutthroat trout and rainbow trout/steelhead
Garden	7/15/2004	NAD27	11	647552	4955838	44 cutthroat trout
Garden	7/13/2005	NAD27	11	647520	4955839	40 cutthroat trout and rainbow trout/steelhead
Golden	7/19/2004	NAD27	11	678392	500209	3 cutthroat trout
Indian	7/13/2005	NAD27	11	651164	4958990	30 cutthroat trout and rainbow trout/steelhead
Little Loon	7/16/2004	NAD27	11	663877	4954032	6 cutthroat trout
Little Loon	7/16/2004	NAD27	11	663877	4954032	32 rainbow trout/ steelhead
Little Loon	7/16/2004	NAD27	11	663877	4954032	2 unknown
Loon	7/17/2004	NAD27	11	673095	4963759	5 cutthroat trout
Loon	7/17/2004	NAD27	11	673095	4963759	13 rainbow trout/ steelhead
Loon	7/17/2004	NAD27	11	673095	4963759	1 bull trout
Loon	7/17/2004	NAD27	11	673095	4963759	1 hybrid
Loon	7/15/2005	NAD27	11	673055	4963790	37 cutthroat trout and rainbow trout/steelhead
Loon	7/15/2005	NAD27	11	673055	4963790	7 bull trout and brook trout
Marble	7/16/2004	NAD27	11	657061	4956198	1 cutthroat trout

Table 7. Continued.

Stream	Sample Date	Datum	UTM Coordinates Zone	Easting	Northing	No. and Species of Samples Taken
Marble	7/16/2004	NAD27	11	657061	4956198	39 rainbow trout/ steelhead
Marble	7/16/2004	NAD27	11	657061	4956198	1 bull trout
Marble	7/14/2005	NAD27	11	657061	4956198	50 cutthroat trout and rainbow trout/steelhead
Norton	7/17/2004	NAD27	11	674394	4965864	1 cutthroat trout
Norton	7/17/2004	NAD27	11	674394	4965864	38 rainbow trout/ steelhead
Papoose	7/19/2004	NAD27	11	679155	5004634	1 cutthroat trout
Papoose	7/19/2004	NAD27	11	679155	5004634	45 rainbow trout/ steelhead
Papoose	7/17/2005	NAD27	11	679136	5004639	42 cutthroat trout and rainbow trout/steelhead
Papoose	7/17/2005	NAD27	11	679136	5004639	4 bull trout
Pine	7/17/2004	NAD27	11	666551	4958816	40 cutthroat trout
Pungo	7/15/2004	NAD27	11	652497	4958435	43 cutthroat trout and rainbow trout/steelhead
Rams	8/26/2004	NAD27	11	701045	4971356	63 rainbow trout/ steelhead
Roaring	7/20/2004	NAD27	11	684813	5014246	8 cutthroat trout
Roaring	7/20/2004	NAD27	11	684813	5014246	23 rainbow trout/ steelhead
Roaring	7/20/2004	NAD27	11	684813	5014246	3 bull trout
Roaring	7/18/2005	NAD27	11	684842	5014224	14 cutthroat trout and rainbow trout/steelhead
Roaring	7/18/2005	NAD27	11	684842	5014224	2 bull trout
Sheep	7/18/2004	NAD27	11	679329	4978894	16 rainbow trout/ steelhead
Sheep	7/18/2004	NAD27	11	679329	4978894	1 unknown
Ship Island	7/19/2004	NAD27	11	679193	5004798	4 cutthroat trout
Ship Island	7/19/2004	NAD27	11	679193	5004798	36 rainbow trout/ steelhead
Ship Island	7/17/2005	NAD27	11	679198	5004796	46 cutthroat trout and rainbow trout/steelhead
Ship Island	7/17/2005	NAD27	11	679198	5004796	3 bull trout
Silver	8/26/2004	NAD27	11	701418	4970526	67 rainbow trout/ steelhead
Soldier	7/16/2005	NAD27	11	641823	4942724	29 cutthroat trout and rainbow trout/steelhead
Soldier	7/16/2005	NAD27	11	641823	4942724	2 bull trout
Stoddard	7/20/2004	NAD27	11	683127	5011578	40 rainbow trout/ steelhead
Stoddard	7/20/2004	NAD27	11	683127	5011578	1 bull trout
Thomas	7/16/2004	NAD27	11	657558	4952968	40 cutthroat trout
Tumble	7/19/2004	NAD27	11	682148	5010028	7 rainbow trout/ steelhead

Table 7. Continued.

Stream	Sample Date	Datum	UTM Coordinates Zone	Easting	Northing	No. and Species of Samples Taken
Warm Spring	7/18/2004	NAD27	11	679187	4979503	30 cutthroat trout and rainbow trout/steelhead
Wilson	7/18/2004	NAD27	11	679362	4988990	3 cutthroat trout
Wilson	7/18/2004	NAD27	11	679362	4988990	38 rainbow trout/ steelhead
Wilson	7/16/2005	NAD27	11	679338	4988957	40 cutthroat trout and rainbow trout/steelhead
Wilson	7/16/2005	NAD27	11	679338	4988957	1 bull trout

Westslope cutthroat trout had a mean density of 1.8 fish/100 m^2 in 2003, while the rainbow trout/steelhead mean density was 2.2 fish/100 m^2. The mean juvenile Chinook salmon density was 8.8 fish/100 m^2 in 2003. Westslope cutthroat trout and rainbow trout/steelhead mean densities were very similar for the last three years. A between-year comparison of 2003 and 2005 showed a 1.1 fish/100 m^2 difference in westslope cutthroat trout means and a smaller density difference of 0.3 fish/100 $m^2$for rainbow trout/steelhead. Westslope cutthroat trout densities have varied little in tributary transects snorkeled since 1981 (Figure 6). Although there have been some slight variations in densities among tributary streams, mean westslope cutthroat trout densities have ranged from 0.1 to 2.95 fish/100 m^2 and averaged 1.2 fish/100 m^2 for years 1981 to 2005. In 2003, westslope cutthroat densities were the highest recorded since 1983.

During the 1980's, rainbow trout/steelhead densities approached 6.0 fish/100 m^2. After 1990, densities decreased from approximately 6.0 fish/100 m^2 to a mean density of 1.8 fish/100 m^2 for 1991 through 2005. Curet et al. (2003) noted that yearly adult spawning escapement can heavily influence juvenile steelhead densities. Likewise, the relationship between resident rainbow trout, residual steelhead, and migratory steelhead make data interpretation difficult. Survey dates, stream visibility, and other environmental factors also affect the number of fish species observed and counted.

Juvenile Chinook salmon densities in MFSR tributaries have shown the widest variation of the three salmonid groups from 1981 to the present (Figure 6). Densities have ranged from 0.01 fish/100 m^2 to 8.7 fish/100 m^2 with the lowest level shared by 1993 and 1996 and the highest density recorded in 2003 at 8.7 fish/100 m^2. This year's mean density of 0.1 fish/100 m^2 reflects poor adult spawning escapement to the MFSR and its tributaries and equals the lowest density level observed in MFSR tributaries in the past 25 years.

Middle Fork Salmon River Historical (Corley) Snorkeling Transects

Four of the six historical (Corley) sites on the main stem MFSR were snorkeled in 2005. Westslope cutthroat trout densities in these transects ranged from 0.0 to 4.0 fish/100 m^2 in 2005 and had a mean density of 1.1 fish/100 m^2 (Table 8). No rainbow trout/steelhead or juvenile Chinook salmon were observed during this year's snorkeling surveys. Hancock Rapids Hole and Cliffside Rapids Hole were not surveyed in 2005. As more data points are added from historical transect surveys in future years, this report will address these additional historical snorkeling sites.

Project Angling

Department anglers caught 401 fish from the main stem MFSR (Figure 7), consisting of 226 westslope cutthroat trout (57%), 157 rainbow trout/steelhead (39%), 7 bull trout *Salvelinus confluentus* (2%), 5 northern pikeminnow *Ptychocheilus oregonensis* (1%), 4 rainbow trout-cutthroat trout hybrid *O. mykiss x O. clarkii lewisi* (1%), and 2 mountain whitefish *Prosopium williamsoni* (0.5%). The 2005 mean total length for westslope cutthroat trout and rainbow trout/steelhead were 272.4 mm and 173.0 mm, respectively (Figure 8). Bull trout lengths ranged from 300-380 total length mm with a mean of 337.1 total length mm.

Catch-and-release regulations have been in effect since 1972. Before this date, approximately 20% of the westslope cutthroat trout caught by project anglers were. Since the regulation change, this proportion has fluctuated yearly, ranging from 32% to 53% and has averaged 43% (Figure 9). The proportion of large westslope cutthroat trout larger than 300 mm caught in 2005 was 29% (N=65) compared to 33% (N=80) in 2004. This slight fluctuation is probably due to variation in sample timing, gear type, number and skill level of anglers, and fish migration patterns.

RECOMMENDATIONS

Continue monitoring densities of westslope cutthroat trout, rainbow trout/steelhead, and juvenile Chinook salmon in all main stem, 10 tributary sites, and six historical main stem MFSR sites by snorkeling between the second week of July and the third week of August annually. This information demonstrates population trends over time. The main stem westslope cutthroat trout snorkel counts on the Middle Fork Salmon, St. Joe, Coeur d'Alene, and Selway rivers, along with the General Parr Monitoring snorkel counts for anadromous fish, likely comprise the best trend dataset for two salmonid subspecies in America (D. Schill, Idaho Department of Fish and Game, personal communication.

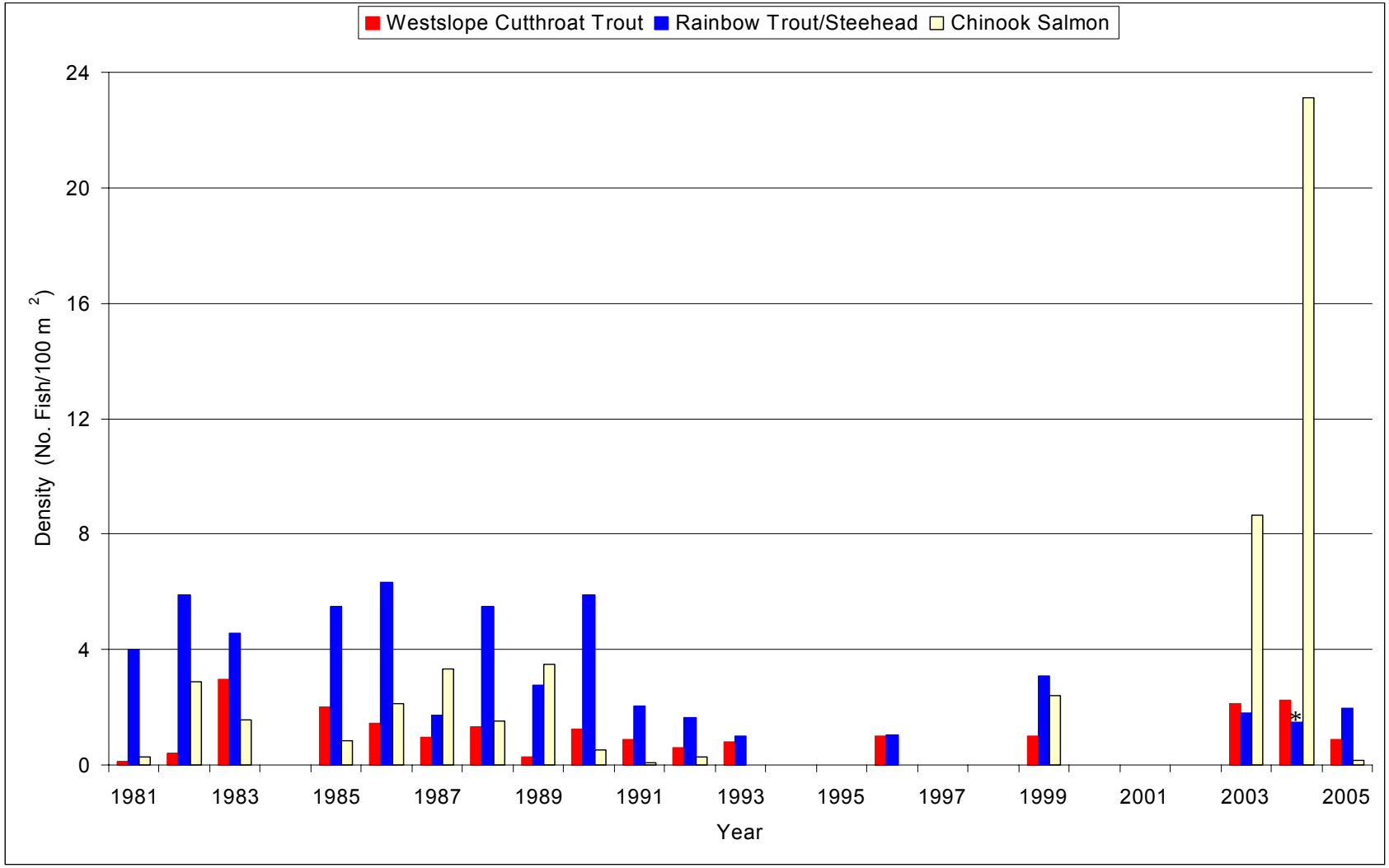

Figure 6. Mean densities of westslope cutthroat trout, rainbow trout/steelhead, and Chinook salmon counted in Middle Fork Salmon River tributary transects, 1981 to 1983, 1985 to 1993, 1996, 1999, 2003 to 2005. Not all transects were sampled in all years. * 2004 data includes only survey sites upriver of Loon Creek.

Table 8. Number of westslope cutthroat trout and rainbow trout/steelhead by length group (mm), Chinook salmon by age group, and other fish species counted in the main stem Middle Fork Salmon River historical (Corley) transects, July 2005.

	Westslope Cutthroat Trout						Rainbow Trout/ Steelhead					Chinook				Other Species[a]					
Transect Name	<75	75-150	150-230	230-300	>300	Density	75-150	150-230	230-300	>300	Density	Age 0	Age 1	Total	Density	BU	WF	NPM	SUC	RSS	Total Fish
Cliffside Rapids Hole[b]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	.	--	--
Hancock Rapids Hole[b]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	.	--	--
Mahoney Camp	0	0	12	2	8	2.2	0	0	0	0	0.0	0	0	0	0.0	0	10	5	3	0	40
White Cr. Pack Bridge	0	0	21	4	42	14.6	0	0	0	0	0.0	0	0	0	0.0	0	25	0	27	0	119
Bernard Airstrip	0	0	0	2	4	0.2	0	0	0	0	0.0	0	0	0	0.0	0	0	14	2	3	25
Little Cr. Guard Station	0	0	5	4	8	1.6	0	0	0	0	0.0	0	0	0	0.0	0	5	13	15	0	50
Total	0	0	38	12	62		0	0	0	0		0	0	0		0	40	32	47	3	234
Mean						2.1					0.0				0.0						

[a] BU=Bull trout, WF=Mountain whitefish, NPM=Northern pikeminnow, SUC=all Sucker species, and RSS=Redside shiner.

[b] Not surveyed in 2005.

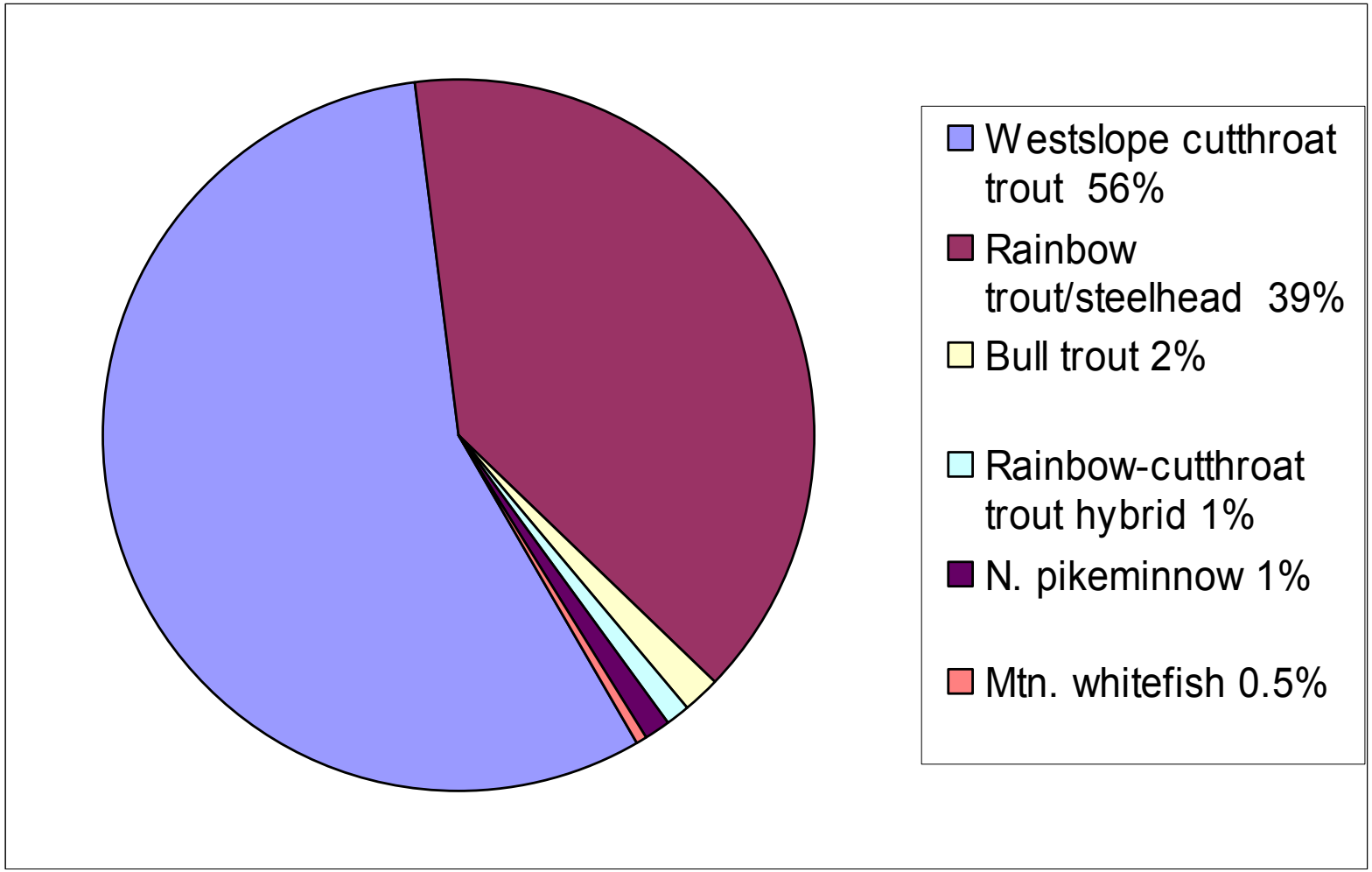

Figure 7. Species composition of fish caught by project anglers in the main stem Middle Fork Salmon River, July 2005.

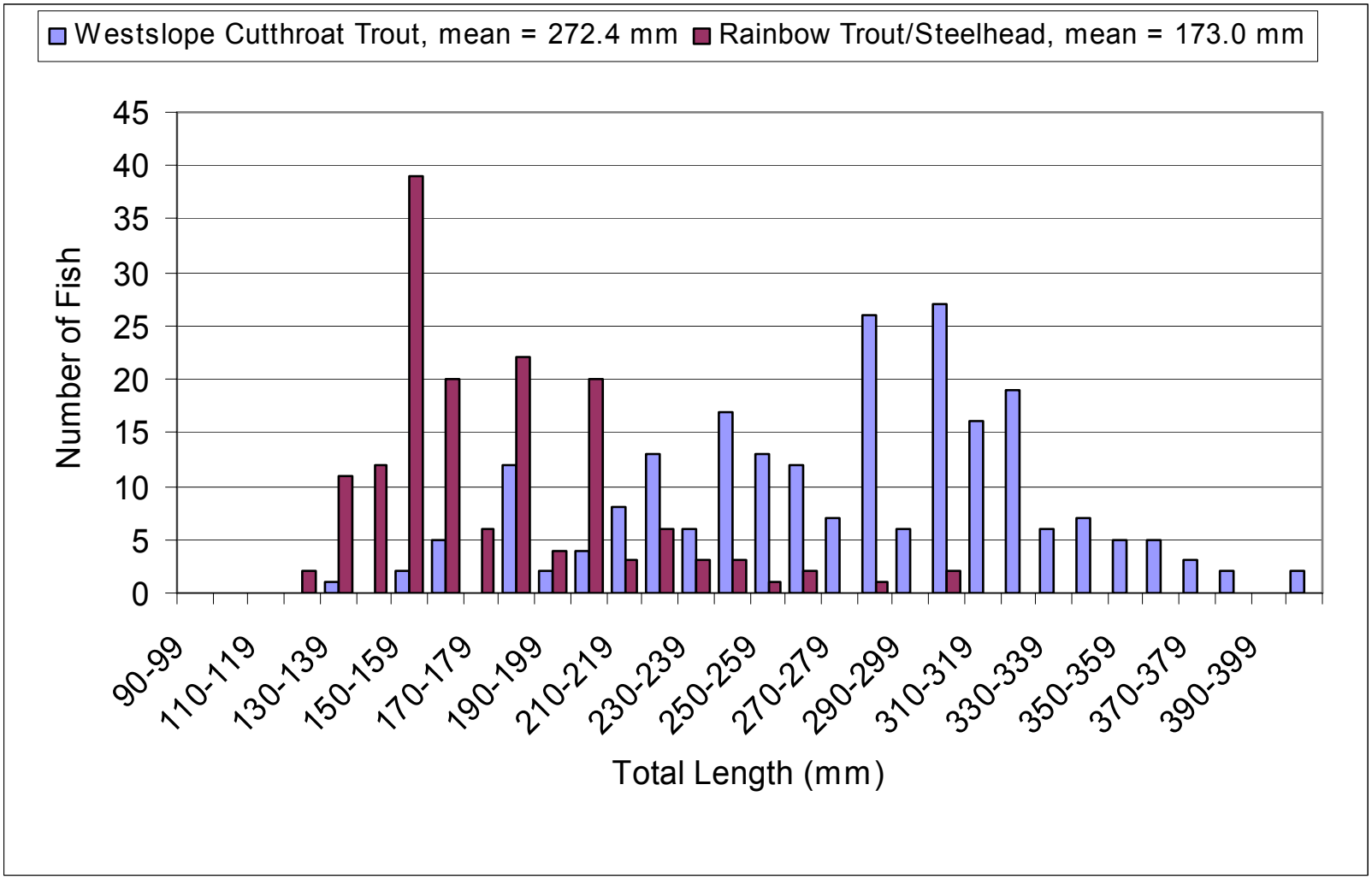

Figure 8. Length frequency of westslope cutthroat trout and rainbow trout/steelhead caught by project anglers in the Middle Fork Salmon River, July 2005.

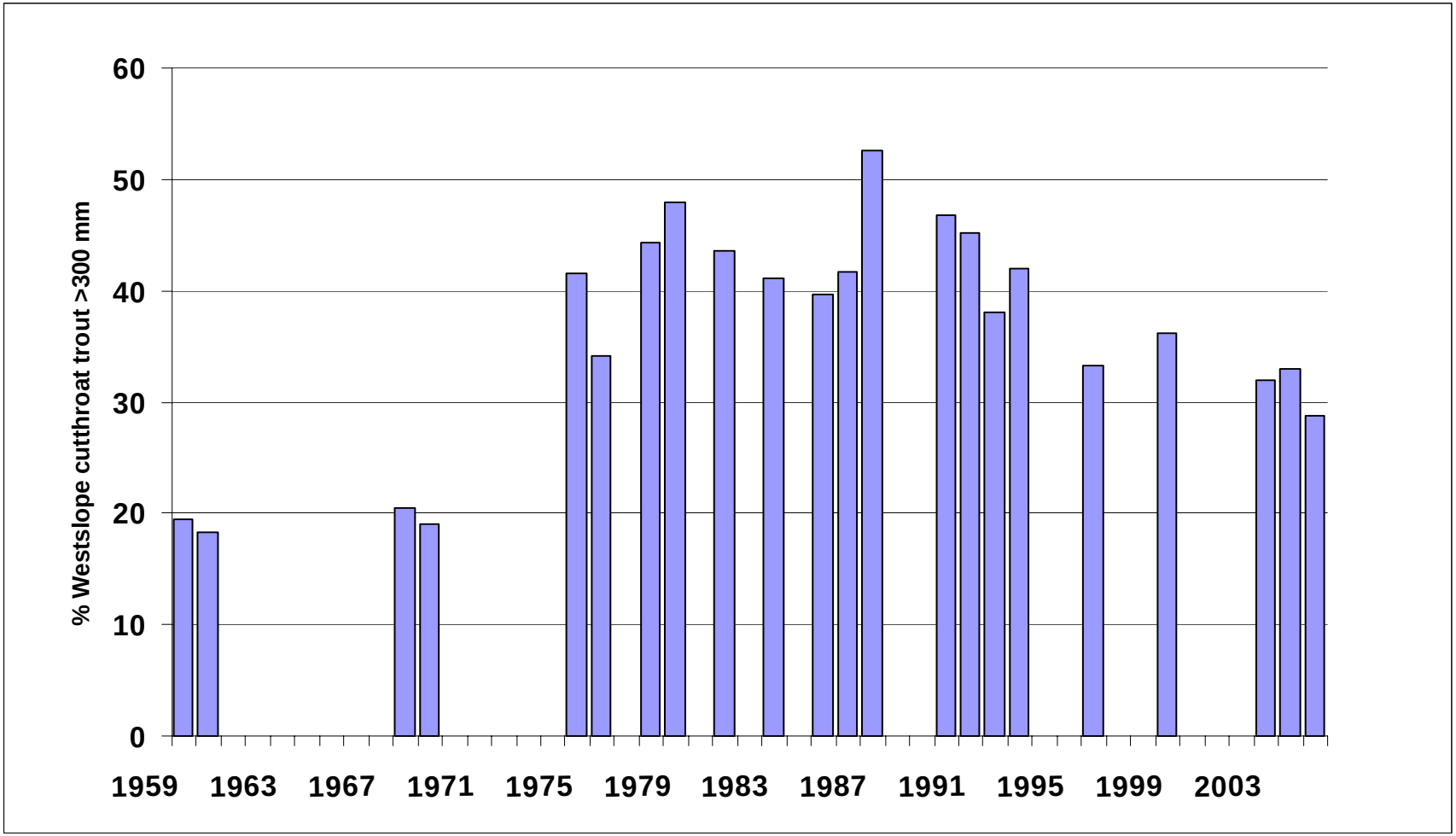

Figure 9. Percentage of westslope cutthroat trout larger than 300 mm total length sampled by project angling in the Middle Fork Salmon River in 1959, 1960, 1968, 1969, 1975, 1976, 1978, 1979, 1981, 1983, 1985 to 1987, 1990 to 1993, 1996, 1999, and 2003 to 2005.

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SALMON REGION - 2005 MANAGEMENT REPORT

Technical Guidance

July 1, 2005 to June 30, 2006

ABSTRACT

Technical guidance was provided to federal, state, county, municipal, and private agencies/entities upon request. Technical guidance was also provided to sportsmen's groups, conservation organizations, and private citizens in the form of fish pond development, stocking and management advice, funding requests and project feasibility opinions, and various conservation and educational programs.

Salmon Region fishery management staff provided technical assistance and guidance to the following government agencies and private groups:

US Army Corps of Engineers
Idaho Department of Water Resources
Idaho Department of Lands
USDA Forest Service
Idaho Division of Environmental Quality
US Fish and Wildlife Service
Governor's Office of Species Conservation
NOAA Fisheries
Shoshone-Bannock Indian Tribes
US Bureau of Reclamation
Private consultants
Idaho Outfitters and Guides Licensing Board
Mining Companies
Department of Transportation
State of Idaho Attorney General's Office
Custer County
Bureau of Land Management
General Public
Upper Salmon Basin Model Watershed Project
Lemhi Agreement
Private Landowners
Snake River Basin Adjudication
Environmental Protection Agency
Upper Salmon Basin Habitat Conservation Plan
Blackbird/Panther Creek Reclamation Project

During this reporting period, project staff provided technical assistance as time allowed, to private landowners, irrigation districts, and all requesting state, federal and tribal agencies. We submitted comments to agencies and private entities concerning outfitter/guide special use permits, inquiries regarding stream habitat conditions on private lands, private pond permits, grazing allotments, applications for installation of instream structures, bank stabilization, stabilization and treatment of mine tailings, fish screening, applications for irrigation diversions, permits for discharging materials into streams, consultations concerning Endangered Species Act (ESA) issues, bridge construction, applications for stream restoration projects and water right applications. Department staff also spent considerable time assisting with the development of the Lemhi Habitat Conservation Plan, and the update of a region wide tributary prioritization plan.

Regional personnel were an integral part of the collaboration effort with the Upper Salmon Basin Watershed Project to implement on the ground habitat improvement measures, potential stream reconnects and fish migration flows. We also conducted on-site inspections of proposed, on-going and completed projects.

Of the estimated 45,000 anglers that fish in the Salmon Region, approximately 90% live outside the area. Because these anglers are not familiar with regional waters, we respond to over 500 requests for basic information on fishing opportunities, techniques, regulations and area specifics.

SALMON REGION - 2005 ANNUAL MANAGEMENT REPORT

Upper Salmon Summer Chinook Fishery

July 1, 2005 to June 30, 2006

ABSTRACT

Anglers spent 10,418 hours to harvest 152 hatchery-origin summer Chinook salmon *Oncorhynchus tshawytscha* during a sport fishery in the upper Salmon River July 9 through August 7, 2005. This was the first sport fishery allowed in this stretch of river since 1978. Anglers caught and released an additional 104 Chinook salmon comprised of 37 hatchery and 67 wild/natural fish. Females comprised 51% (N=78) of the harvest, males added another 45% (N=68), and six (4%) unsexed fish rounded out the harvest. Both sexes averaged 78 cm fork length and ranged from 68-98 cm fork length for females and 56-92 cm fork length for males. The age composition of harvested fish was 4 three-year-old fish (2.6%), 133 four-year-olds (87.5%), and 15 five-year-olds (9.9%). The season's catch rate averaged 41 hours per fish caught and 69 hours per fish kept.

A total of 2,138 anglers were interviewed at two check stations during the fishery. In a sample of 1,566 (73.2%) anglers queried for their residency origin at the check stations, 94% of the anglers were from Idaho while 6% were non-residents. Lemhi and Custer County residents participated the most heavily among in-state anglers sampled. Custer County anglers topped the list with 489 anglers (33.2%) counted, followed by 258 Lemhi County anglers (17.5%).

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INTRODUCTION

In late winter 2005, preliminary summer Chinook salmon *Oncorhynchus tshawytscha* adult return estimates based on cohort analysis indicated a possible surplus return of hatchery Chinook salmon returning to the Snake River, including the upper Salmon River. These preliminary predictions were of special interest to upper Salmon River anglers, many of whom had not participated in a Chinook salmon season in these waters since 1978. The Idaho Department of Fish and Game (IDFG) engaged National Oceanic and Atmospheric Administration's Fisheries Service (NOAA Fisheries) in discussions for the State to secure a permit to direct a fishery on these surplus fish. After extended dialogue, IDFG acquired permission to target a fishery on Pahsimeroi Fish Hatchery (PFH) and/or Sawtooth Fish Hatchery origin Chinook salmon stocks in the upper Salmon River. However, fish counts over Columbia and Snake river dams lagged behind preseason predictions it became apparent that the overall run had been overestimated by at least 40%. As a result, the likelihood of a fishery in the upper Salmon River rapidly diminished.

During the last week of June and the first week of July adult Chinook salmon counts at the Pahsimeroi Hatchery weir increased steadily. By July 6, 500 hatchery Chinook salmon had already been intercepted in the trap and hatchery personnel were confident that they'd meet hatchery escapement goals. Using historic arrival timing of adult Chinook salmon to the hatchery it appeared that a modest surplus of summer Chinook salmon would return to the Pahsimeroi Hatchery. On July 8, 2005 the IDFG Fisheries Bureau presented the status of this developing fisheries opportunity to the Idaho Fish and Game Commission and proposed a one-month fishing season. The Commission adopted the recommendation of a fishery opener the next day, July 9, beginning at ½ hour before sunrise. This was the first Chinook salmon season offered in the upper Salmon River in 27 years and public reaction to the fisheries varied initially from skepticism to great excitement. Without any lead time prior to the fisheries, many anglers, IDFG vendors, and Department personnel were caught unprepared. However, Salmon Region staff quickly developed a monitoring plan for the month-long season that met harvest and enforcement objectives.

This report summarizes the fishery monitoring project and outlines recommendations for future management of a Chinook salmon fishery focused on PFH stock.

METHODS

FISHERY MONITORING

On Friday, July 8, 2005 the Department announced its approval of a Chinook salmon season. Limits were set at one fish per day, 3 in possession, and 10 per season. The season limit was statewide and included limits from previous Chinook salmon fisheries during the 2005 season. Only hatchery origin Chinook salmon, including jack salmon (fish under 51 cm; listed as 20 inches in the regulations), with a clipped adipose fin as evidenced by a healed scar, could be kept. All salmon with a non-clipped adipose fin were defined as wild and were to be immediately released.

Fishing hours were set at one-half hour before sunrise until 1900 hours to provide anglers with ample opportunity to check their harvested fish and allow Department personnel sufficient daylight conditions to safely process the fish.

All salmon harvested during the fishery were required to be checked at an IDFG check station by 2030 hours on the day of capture. All successful and unsuccessful anglers that left the fishery during check station operation times (0600-2030 hours) were required to stop at a check station.

Two mandatory harvest check stations were located on either end of the 27.4 km stretch of Salmon River open for the fishery. Fishing was allowed from the Iron Creek Bridge (near Elk Bend, Idaho) upstream to a posted line near the mouth of the Pahsimeroi River (Figure 1). Briney Check Station was located at mile post 287.2 on U.S. Highway 93 near Briney Creek and the Cottonwood Check Station was located at mile post 261.9 (near the Bureau of Land Management's Cottonwood Campground, Figure 1). Ideally, the check stations would have been positioned at either end of the actual fishery boundaries. However, the aforementioned locations were selected due to a lack of safe ingress and egress sites near the boundaries. IDFG check stations located on major highways have specific requirements for approach, ingress, and egress distances designed for public and Department personnel safety.

Creel information collected during angler interviews at the check stations included the number of anglers per fishing party, total hours of effort for each fishing party, number of Chinook salmon harvested, number of Chinook salmon caught and released with vs. without an adipose fin. Check station personnel also recorded biological data on each harvested fish, including sex, length (fork length (cm)), and the presence of external marks, tags, and radio transmitters. All fish observed at the check stations were scanned for the presence of coded wire tags (CWTs).

Age class determination followed the same criteria used at the Pahsimeroi Fish Hatchery in 2005 (Garlie and Engemann 2005). An age/length criterion, applied to sexes combined, is shown in Table 1. Chinook salmon less than 44 cm fork length were classifieds as mini jacks, those between 45 and 65 cm fork length were classified as age-3, those between 66 and 85 cm fork length were classified as age-4, and those fish greater than 85 cm fork length were classified as age-5 (Garlie and Engemann 2005).

Table 1. Fork length (cm) criteria used in 2005 to determine age of hatchery-origin summer Chinook salmon at the Pahsimeroi Hatchery and in the upper Salmon River.

Summer chinook salmon	
Age classification (sexes together)	Fork length (cm)
Mini jack	<= 44 cm
3-year-old	45 – 65 cm
4-year-old	66 – 85 cm
5-year-old	> 85 cm

Check station clerks recorded the Idaho County of residence or non-resident state of most anglers. The clerks also recorded the Chinook salmon permit number and the tagged fish number on the permit of all successful anglers to closely monitor the fishery and ensure all fish were properly checked and processed.

The Salmon Regional fishery staff monitored the Chinook salmon fishery in the upper Salmon River to meet the following objectives:

1. Determine the number of Chinook salmon harvested by day in the fishery.

2. Determine the number of listed Chinook salmon caught and released each day in the fishery in adherence to NOAA Fisheries' limits established for incidental take.

3. Maintain an adequate enforcement presence to ensure compliance with a mandatory check of harvested Chinook salmon at check stations operated 14.5 hours per day during the fishery.

The season opened July 9, 2005 and continued until a notice of closure, triggered by one of four occurrences, took place:

- The State reached its harvestable share of 370 surplus hatchery fish,

- Anglers reached the 27 "incidental take" limit allotted by NOAA Fisheries (270 releases of listed W/N Chinook salmon),

- River conditions (i.e. temperatures) degraded to a level unacceptable for fishing,

- The fishery reached the August 7, 2005 expiration date mandated in the NOAA Fisheries permit.

SURPLUS

During the course of the fishery, Pahsimeroi Hatchery personnel periodically transported hatchery origin summer Chinook salmon to the Elk Bend boat ramp, 33.4 km downstream of the trap, and released back into the Salmon River. Prior to transportation, the fish were marked with a right opercle punch to determine if these fish were able to provide recruitment to the fishery and/or return to the hatchery. Several fish were transported several times, receiving additional right opercle punches prior to release to measure their performance.

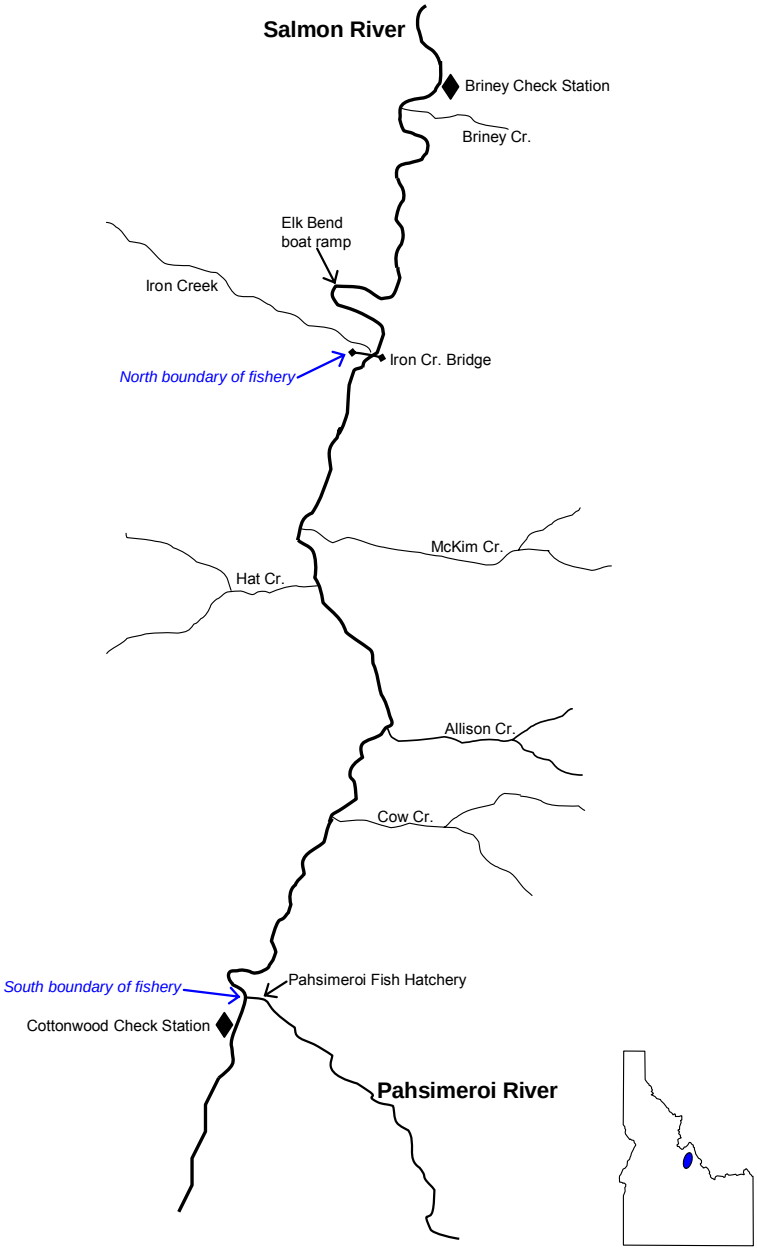

Figure 1. Map of the summer Chinook salmon fishery area in the upper Salmon River, 2005.

ENFORCEMENT

Throughout the duration of the fishery, daily enforcement patrols and angler checks occurred in the fishery. Typically, conservation officers focused on areas of angler concentration at daylight and then proceeded to contact anglers throughout the day within the fishery boundaries. Evening patrols were likewise conducted to ensure compliance with the daily 1900 hour fishery closure.

RESULTS AND DISCUSSION

FISHERY MONITORING

A total of 2,138 anglers spent 10,418 hours to harvest 152 Chinook salmon during the fishery. An additional 104 fish, comprised of 37 hatchery and 67 listed W/N fish, were caught and released. Catch rates for the season averaged 41 hours per fish caught and 69 hours per fish kept. Females comprised 52.6% (n=78) of the harvest, averaging 78 cm fork length and ranging in length from 68-98 cm fork length. Males comprised 44.7% (n=68) also averaged 78 cm fork length and ranged in size from 56-92 cm fork length. An additional four fish (2.6%) were unsexed. The proportion of male to female fish taken in the fishery remained relatively balanced throughout the month-long fishery. Using the age/length criteria outlined by Garlie and Engemann (2005), anglers harvested zero mini jacks, 4 three-year-old fish (2.6%), 133 four-year-olds (87.5%), and 15 five-year-olds (9.9%). A length frequency of the 152 harvested Chinook salmon is illustrated in Figure 2.

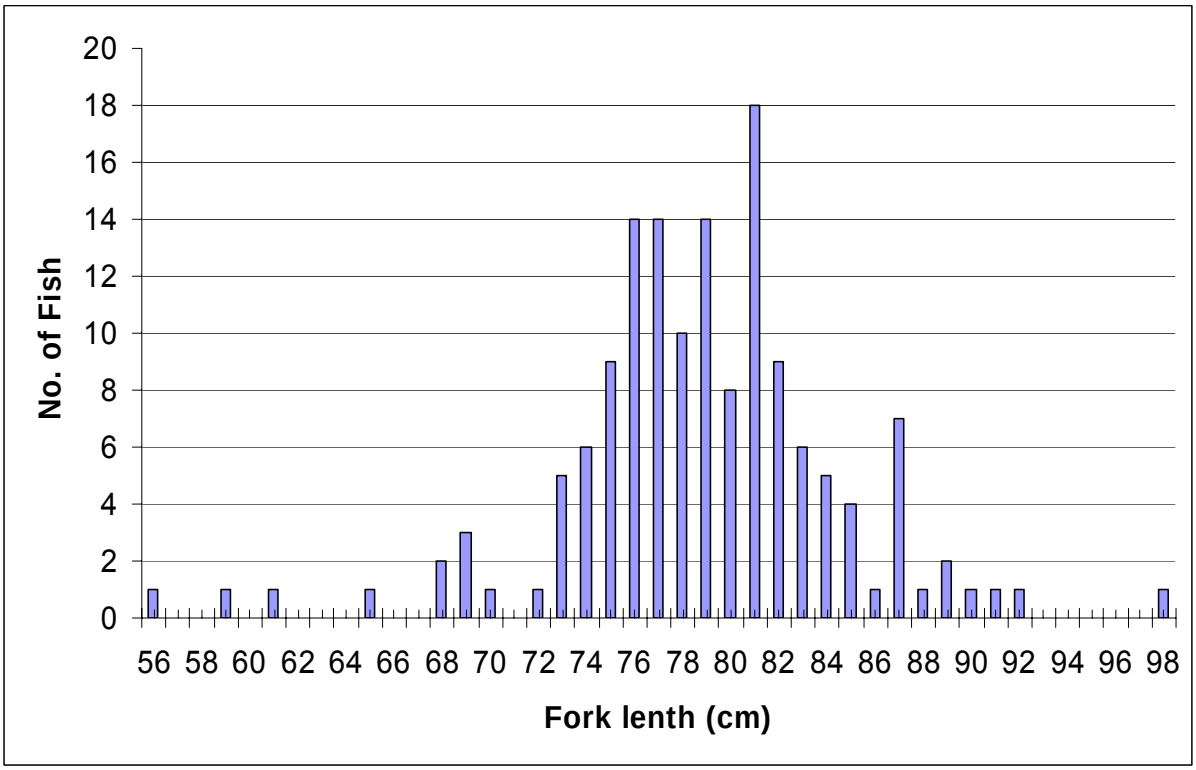

Figure 2. Length frequency of summer Chinook salmon (sexes combined) harvested during the upper Salmon River fishery in 2005.

No snouts with coded wire tags (CWT) were detected or collected during the fishery. The PFH mark rate, expressed as the number of CWTs recovered (N=110) divided by the sum of the number of hatchery origin Chinook salmon returns (N=1,840) minus the number of CWT returns, was 6.4%. Applying this mark rate to the fishery harvest, it is estimated that the fishery should have produced 9.7 CWTs. The absence of CWTs in the harvest may be due to the co-mingling of Pahsimeroi, East Fork Salmon, and Sawtooth Chinook salmon stocks in the river. However, the East Fork facility trapped only listed W/N stock, and Sawtooth had a 2.4% mark rate from Chinook salmon returns in 2005. It is extremely unlikely that anglers could harvest only hatchery origin non-CWT salmon during the fishery. Another possible explanation may be that CWTs were missed at the check station through improper CWT detector use, on-site interference, or both/or some other unknown cause. The lack of CWTs from the fishery is unfortunate in that CWTd fish would have helped illuminate run timing of hatchery stocks as they migrate upriver and helped identify the contribution of Pahsimeroi and Sawtooth stocks to the fishery. Questions about the movement patterns and stock components of the fishery will continue in the absence of CWT recoveries.

Angler participation was quite brisk opening weekend and participation on subsequent weekends remained relatively constant throughout the fishery. Most anglers participating in the fishery were Idaho residents, with the majority from Custer, Lemhi, Bannock, and Bonneville counties (Table 2). A residency survey at the check stations sampled 1,566 (73.2%) anglers of 2,138 total anglers interviewed. Idaho residents comprised 94% of the sample and out-of-state

Table 2. Idaho county of residence and non-resident states sampled during the Salmon River Chinook salmon fishery from interviews at two check stations, July 9 – August 7, 2005.

Idaho County or Non-resident State	No. of Anglers	% of Anglers
Ada	59	4.0
Bannock	139	9.4
Bear Lake	6	0.4
Bingham	74	5.0
Blaine	33	2.2
Boise	3	0.2
Bonneville	154	10.5
Butte	62	4.2
Camas	3	0.2
Canyon	19	1.3
Caribou	2	0.1
Cassia	3	0.2
Clark	1	0.1
Custer	489	33.2
Franklin	12	0.8
Fremont	7	0.5
Gem	4	0.3
Jefferson	3	0.2
Jerome	26	1.8
Kootenai	2	0.1
Lemhi	258	17.5
Lincoln	3	0.2
Madison	11	0.7
Minidoka	4	0.3
Payette	1	0.1
Power	4	0.3
Twin Falls	57	3.9
Valley	5	0.3
Idaho specialized[a]	29	2.0
Idaho subtotal	1,473	94.1
Non-resident state:		
Arizona	13	14.0
California	15	16.1
Colorado	3	3.2
Florida	2	2.2
Montana	20	21.5
New Mexico	2	2.2
Oregon	2	2.2
Utah	16	17.2
Virginia	5	5.4
Washington	2	2.2
Wisconsin	3	3.2
Wyoming	10	10.8
Non-resident subtotal	93	5.9
Total	1,566	

[a] Includes commercial, handicapped, and various vanity license plates with no county designation.

anglers added the remaining 6%. Not surprisingly, angler participation appeared heaviest from those areas adjacent to the fishery boundaries. The most in-state angler participation was from Custer County with 489 (33.2%) of 1,473 Idaho anglers sampled, followed by Lemhi County with 258 anglers (17.5%). Bonneville and Bannock County anglers contributed an additional 10.5% and 9.4% of sampled angling effort during the fishery.

Although the check stations were open until 2030 hours each evening, very few anglers were checked after 2000 hours, indicating that in future management operations either the check stations could close earlier or the fishery and check stations could remain open later to afford anglers additional fishing opportunity

Because the fishery fell short of the goal of harvesting 370 surplus fish, it is likely that when future fisheries are conducted that the Region may suggest the bag limit be raised to two fish per day. The Region took a conservative approach this year recommending a daily limit of one fish based on perceived/possible angler success, angler effort, and distribution of anglers throughout the fishery. If the Region had been able to plan the fishery with more lead-in time/a month prior to opening day, the Region would have recommended opening the fishery the second or third week of June so that anglers could have had more fishing opportunity. It is unknown how angler success and/or effort would have affected the fishery had there been adequate prior public notification and a fishery opening date in June instead of July. In the 1978 fishery started June 10 to July 16 for this stretch of the river suggesting that fishing pressure historically was active during June. Using the summer Chinook salmon fisheries on the South Fork Salmon River as a reference, it is likely that fishing in the upper Salmon River could have been successful in June. For the two seasons, 2001 and 2002, when the South Fork Salmon River fisheries began in mid-June, the percent of fish harvested in the first 14 days of the season were 36.2% and 8.8, respectively (Apperson 2003). Such differences in harvest rates from one year to the next underscore the difficulty of drawing comparisons between the South Fork Salmon River and the upper Salmon River. The lack of known fishery data in the upper Salmon River on migration timing of Pahsimeroi and Sawtooth stocks, the influence of water temperatures, and other environmental factors exacerbates the problem

SURPLUS

During the fishery, PFH personnel recycled 469 surplus hatchery fish into the fishery during 16 trips downriver. These fish were released at the Elk Bend boat ramp (Figure 1), 33.4 km downstream of the hatchery, thereby forcing the fish to migrate back upstream through the fishery. Of the 469 recycled fish, 41 (8.7%) were subsequently captured and kept by anglers, and 275 (58.6%) returned to the Pahsimeroi Hatchery. Forty-one (14.9%) of the 275 returnees recycled a second time through the fishery returned to the Pahsimeroi trap. Six of these fish, marked with three opercle punches, were released downriver again. Three (50%) of the six were counted for the fourth and final time at the Pahsimeroi trap. The Department received a great deal of public support for its recycling effort to benefit angling opportunity and based on 26% of the harvested fish being recycled fish the effort appeared to be worthwhile.

Apperson (2003) reported that anglers harvested 25-38%of the recycled summer Chinook salmon from the South Fork Salmon River in 2000, 2001, and 2002. Additionally, she reported that only 1-3% of the recycled fish returned to the South Fork trap. The 2000-2002 fisheries on the South Fork Salmon River and the 2005 fishery on upper Salmon River followed approximately the same method of operation whereby each fishery was open daily for about the same number of hours per day (daylight until dark). The fisheries were run about the same

length of time (23-30 days for each fishery except for the 2000 South Fork Salmon fishery which ran only six days). The one variable is that the 2000, 2001, and 2002 South Fork fisheries began on June 30, June 10, and June 19, respectively, while the 2005 upper Salmon fishery started July 9. By opening day of the 2005 season on the upper Salmon, 37% of hatchery origin fish had already entered the Pahsimeroi trap (Garlie and Engemann 2005). One week later, 51% of the hatchery origin fish run component had been counted at the rack. It is unknown if the later starting date for the upper Salmon fishery could account for the low harvest of first-time and recycled fish, as well as the high return rate of recycled fish to the Pahsimeroi rack.

ENFORCEMENT

Enforcement personnel logged approximately 300 man hours patrolling the fishery during July and August 2005. The Salmon Regional Conservation Officer reported a very low violation detection rate (Sommerfeld (pers. communication 2005). Officers issued one citation and seven warnings. The citation was for littering, five warnings were for possession of wild rainbow trout, one warning was for using barbed hooks, and one warning was for fishing with no license. Anglers were most concentrated in a 1.0 km stretch of the Salmon River below the mouth of the Pahsimeroi River and, as such, the fishery became relatively self-policing. Only one angler was checked during the fishery with a full Chinook salmon permit (10 harvested fish). The woman angler, a resident of Custer County, validated her tenth Chinook salmon permit notch on the final day of the fishery, August 7, 2005.

RECOMMENDATIONS

Open the fishery beginning in early to mid-June to optimize angling opportunity and harvest of known surplus hatchery Chinook salmon.

Provide adequate advance notice to the public of the fishery season dates, times, and bag limits at least two weeks prior to the season opener if feasible.

Expand the downstream boundary of the fishery to Shoup Bridge/Salmon City Bridge (11.3/1.3 km south of the mouth of the Lemhi River) to include more water available for fishing without conflicting with wild Chinook salmon adults returning to the Lemhi River. An expanded fishery area would also increase spatial distribution of anglers and help to alleviate angler congestion at popular fishing holes.

If check stations are used, extend the evening fishing time to 2000 hours to afford anglers additional fishing opportunity. If evening fishing hours close at 1900 hours, close check stations earlier than 2030 hours if using a mandatory harvest check-in.

If numbers allow, raise the daily bag limits to two fish per day and four in possession, while retaining a mandatory harvest check-in.

Provide sufficient CWT detector training to IDFG personnel working the check stations to avoid missing CWTs.

Provide PIT tag detectors capable of reading newer frequency PIT tags in Chinook salmon to check station personnel and provide adequate prior training in their use.

Provide a reduced level of uniformed enforcement presence on the river in future fisheries and focus on undercover patrols.

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