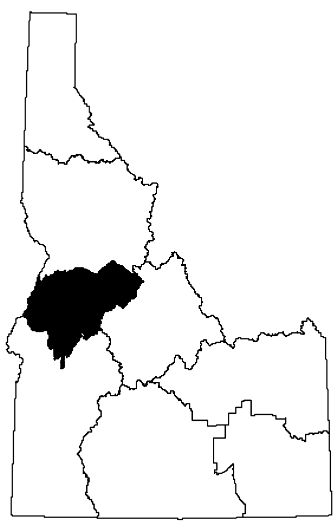
FISHERY MANAGEMENT INVESTIGATIONS

IDAHO DEPARTMENT OF FISH AND GAME

FISHERY MANAGEMENT ANNUAL REPORT

Steven M. Huffaker, Director



SOUTHWEST REGION – McCALL

2002

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TABLE OF CONTENTS

Page

LIST OF TABLES

LIST OF APPENDICES

TABLE OF CONTENTS (Continued)

LIST OF TABLES

<u>Lowland Lakes Investigations: Lake Cascade, Yellow Perch Investigations</u>

TABLE OF CONTENTS (Continued)

LIST OF TABLES

LIST OF FIGURES

<u>Southwest Region (McCall) Rivers and Streams Investigations</u>

TABLE OF CONTENTS (Continued)

Page

LIST OF FIGURES

TABLE OF CONTENTS (Continued)

Page

LIST OF TABLES

LIST OF APPENDICES

<u>Southwest Region (McCall) – Rivers and Streams Investigations – Gold Fork River</u>

TABLE OF CONTENTS (Continued)

Page

LIST OF TABLES

LIST OF FIGURES

TABLE OF CONTENTS (Continued)

LIST OF APPENDICES

McCALL REGION

MOUNTAIN LAKES INVESTIGATIONS

2002

ABSTRACT

We completed Idaho Department of Fish and Game (Department) standard mountain lake surveys on 11 lakes in 2002 to assess physical habitat parameters and stocking strategies. We collected only rainbow trout *Oncorhynchus mykiss* from Upper Jungle Lake (07-374), and Loon Creek Lake #3 (07-394) and only Westslope cutthroat trout *O. clarki lewisi* from Jungle Lake #1 (07-373), Enos Lake #3 (07-378), Enos Lake #5 (07-380), and Enos Lake #6 (07-384). We collected only brook trout *Salvelinus fontinalis* from Loon Creek Lake # 3. We collected no fish from Loon Creek Lake # 1. The remaining lakes sampled contained a mix of salmonid species.

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OBJECTIVES

To obtain current information for fishery management decisions on mountain lakes, including angler use and success, fish population characteristics, spawning potential, stocking success, limnology, morphology, and notes on other aquatic life and develop appropriate management recommendations.

INTRODUCTION

The Idaho Department of Fish and Game (Department) conducts standard mountain lake surveys each year to evaluate and adjust the mountain lakes fish-stocking program and to document fish species presence in lakes that are not stocked. Two lakes were surveyed and fish tissue samples collected in 2002 as part of the US Environmental Protection Agencies; National Study of Chemical Residues in Lake Fish Tissue.

METHODS

We examined fish populations and habitats in 11 lakes using Department standard mountain lake survey methods. We set gill nets (125-ft sinking) in the afternoon and pulled them the next morning. All fish collected were weighed to the nearest g and total length was measured to the nearest mm.

Fish tissue samples were collected from Enos Lake #1 (07-375) and Loon Creek Lake #3 (07-394) using the EPA National Study of Chemical Residues in Lake Fish Tissue field sampling plan protocol.

RESULTS

We completed fish population and habitat data surveys on 11 mountain lakes in 2002. Length frequencies and average condition factors of fish collected from each lake are listed in Table 1. Salmonids were found in all but Loon Creek Lake #1. We collected only rainbow trout *Oncorhynchus mykiss* from Upper Jungle Lake (07-374), and Loon Creek Lake #3 (07-394) and only Westslope cutthroat trout *O. clarki lewisii* from Jungle Lake #1 (07-373), Enos Lake #3 (07-378), Enos Lake #5 (07-380), and Enos Lake #6 (07-384). We collected only brook trout *Salvelinus fontinalis* from Loon Creek Lake # 3 and we collected no fish from Loon Creek Lake # 1. Completed survey forms are presented in Appendices A through K.

Table 1. Total number and average condition factors (Ktl) by length group of each species of fish sampled in mountain lakes in 2002.

Lake	Catalog No.	Species Ktl/Wr	Total length (mm)									
			0-49	50-99	100-149	150-199	200-249	250-299	300-349	350-399	400-449	450-499
Jungle #1	07-373	WCT	1	1	2	0	3	0	11	6	0	0
Upper Jungle	07-374	RBT	0	0	0	0	0	0	1	0	1	0
Enos #1	07-375	WCT	0	1	1	1	1	5	4	0	0	0
		RBT	0	0	1	3	3	3	0	0	0	0
		RBT/WCT	0	0	0	0	0	2	3	0	0	0
Enos #2	07-377	WCT	0	0	0	1	1	1	2	2	0	0
		RBT	0	0	0	0	0	0	1	1	0	0
Enos #3	07-378	WCT	0	0	0	0	4	7	7	0	0	0
Enos #5	03-380	WCT	0	0	0	0	0	20	0	0	0	0
Enos #6	03-384	WCT	0	0	0	2	1	0	1	0	0	0
Loon Creek #1	07-390	None	0	0	0	0	0	0	0	0	0	0
Loon Creek #2	07-393	RBT	0	0	0	0	1	1	1	1	1	0
Loon Creek #3	07-394	BRK	0	0	2	6	5	9	1	0	0	0
Tule	07-519	WCT	0	0	0	0	0	0	2	0	0	1
		Ktl	0	0	0	0	0	0	0.87	0	0	1.05
		RBT/WCT	0	0	0	0	0	0	0	0	1	2
		Ktl	0	0	0	0	0	0	0	0	0.70	0.98

APPENDICES

Appendix A. Jungle Lake #1 Survey Form.

Lake Name: Jungle Lake #1 Date: 9/11/02
IDFG Catalog #: 07:0373 EPA #:
Major Drainage: Secesh River Minor Drainage: Jungle Creek
County: Valley Region: McCall
USFS Ranger District: Krassel Wilderness Area:
Section: 3 Township: 20N Range: 5E Elevation: 2,284 m

Physical:

Lake Type: 2 1. Cirque 2. Moraine 3. Slump 4. Caldera 5. Beaver
Total Surface Area: 15 ha

Depth Profile: 2
1. deep (75% of lake >6m deep)
2. moderate (50% of lake >6m deep)
3. shallow (25% of lake >6m deep)
Maximum Depth: m
Average Depth: 8-10m

Aspect: 1
1. Lake has north facing exposure
2. Lake has south facing exposure
3. Lake has east facing exposure
4. Lake has west facing exposure
5. Lake is exposed on all directions

Chemical:

Alkalinity: mg/l
Conductivity: µmhos/cm
Secchi depth: 4.0 m

pH:
Temp (surface): F
Temp (bottom): F

Spawning Potential:

Inlet(s): 2
Length accessible for spawning: m
Inlet spawning suitability: 4

Outlet(s):
Length accessible for spawning: m
Outlet spawning suitability: 4

1. excellent (abundant)
2. adequate (enough to maintain suitable spawning populations)
3. fair (not enough to maintain population)
4. poor (not suitable for successful spawning)

Use:

Campsites: 2 Fire Pits: 2 Litter: L☒ M☐ H☐
Trail around lake: ☐ complete ☒ partial ☐ none trampled: ☐Y ☒N
Access: ☐ good trail ☐ poor trail ☒ cross country

Access directions: Take Duck Lake/Loon Lake Trail off Lick Cr. road past Duck Lake and up over ridge and back down past upper Loon Lakes. Then cross country and hit N. F. Lick Cr. trail and take fork that goes to South Loon Mtn. Cut east below S. Loon Mtn. peak and go to saddle (this trail is burned and hard to find). Follow trail of saddle to Enos Lake. From Enos Lake you must go cross country to Jungle Lake #1.

Biological:

Zooplankton Composition and Density

Genera Identified	% of sample	Size	Density(g/l)
			µ

Appendix A. Continued.

Insect Composition and Abundance:

Aquatic Genera	Relative Abundance	Terrestrial Genera	Relative Abundance
	L☐M☐H☐		L☐M☐H☐
	L☐M☐H☐		L☐M☐H☐
	L☐M☐H☐		L☐M☐H☐

Fish Survey:

Fisherman: 2 (numbers) Hours Fished: 3
Fish Caught: 50 Fish/hour: 16.7 Abundance: L☐M☐H☒

Length Frequency:

Total Length (mm)

Species	0-49	50-99	100-149	150-199	200-249	250-299	300-349	350-399	400+
WCT	1	1	2		3		11	6	
Total									

Fish Condition:

	Total Length (mm)		Weight (g)		Condition (k or Wr)	
Species	Mean	Range	Mean	Range	Mean	Range

Stocking History:

Year	Species	Number	Comments

Comments:
no trail in; fishing very good, fat fish

Appendix B. Upper Jungle Lake Survey Form.

Lake Name: Upper Jungle Lake Date: 9/11/02
IDFG Catalog #: 07:0375 EPA #:
Major Drainage: Secesh River Minor Drainage: Jungle Creek
County: Valley Region: McCall
USFS Ranger District: Krassel Wilderness Area:
Section: 3 Township: 20N Range: 5E Elevation: 2,200 m

Physical:
Lake Type: 1 1. Cirque 2. Moraine 3. Slump 4. Caldera 5. Beaver
Total Surface Area: 1.5 ha

Depth Profile: 3
1. deep (75% of lake >6m deep)
2. moderate (50% of lake >6m deep)
3. shallow (25% of lake >6m deep)
Maximum Depth: 15m
Average Depth: 7m

Aspect: 1
1. Lake has north facing exposure
2. Lake has south facing exposure
3. Lake has east facing exposure
4. Lake has west facing exposure
5. Lake is exposed on all directions

Chemical:
Alkalinity: mg/l
Conductivity: µmhos/cm
Secchi depth: . m
pH:
Temp (surface): F
Temp (bottom): F

Spawning Potential:
Inlet(s): 0
Length accessible for spawning:
m
Inlet spawning suitability:

Outlet(s):
Length accessible for spawning:
m
Outlet spawning suitability:

1. excellent (abundant)
2. adequate (enough to maintain suitable spawning populations)
3. fair (not enough to maintain population)
4. poor (not suitable for successful spawning)

Use:
Campsites: 0 Fire Pits: 0 Litter: L☐ M☐ H☐
Trail around lake: ☐ complete ☐ partial ☐ none trampled: ☐ Y ☒ N
Access: ☐ good trail ☐ poor trail ☒ cross country
Access directions: Take Duck Lake/Loon Lake Trail off Lick Cr. road past Duck Lake and up over ridge and back down past upper Loon Lakes. Then cross country and hit N. F. Lick Cr. trail and take fork that goes to South Loon Mtn. Cut east below S. Loon Mtn. peak and go to saddle (this trail is burned and hard to find). Follow trail of saddle to Enos Lake. From Enos Lake you must go cross country to Upper Jungle Lake.

Biological:
Zooplankton Composition and Density

Genera Identified	% of sample	Size	Density(g/l)

Appendix B. Continued.

Insect Composition and Abundance:

Aquatic Genera	Relative Abundance	Terrestrial Genera	Relative Abundance
	L☐M☐H☐		L☐M☐H☐
	L☐M☐H☐		L☐M☐H☐
	L☐M☐H☐		L☐M☐H☐

Fish Survey:

Fisherman: 2
Fish Caught: 2

Hours Fished: 1
Fish/hour: 2 Abundance: L☐M☐H☐

Length Frequency:

Total Length (mm)

Species	0-49	50-99	100-149	150-199	200-249	250-299	300-349	350-399	400+
RBT							1		1
Total									

Fish Condition:

	Total Length (mm)		Weight (g)		Condition (k or Wr)	
Species	Mean	Range	Mean	Range	Mean	Range
RBT						

Stocking History:

Year	Species	Number	Comments

Comments:
very small - fish probably pretty old: lots of fish hitting mayflies; but fishing was slow

Appendix C. Enos Lake #1 survey form.

Lake Name: Enos Lake #1 Date: 9/11/02
IDFG Catalog #: 07:0375 EPA #:
Major Drainage: Secesh Minor Drainage: Enos Creek
County: Valley Region: McCall
USFS Ranger District: Krassel Wilderness Area:
Section: 4 Township: 20N Range: 5E Elevation: 2,255 m

Physical:
Lake Type: 1 1. Cirque 2. Moraine 3. Slump 4. Caldera 5. Beaver
Total Surface Area: 5. ha
Depth Profile: 1
1. deep (75% of lake >6m deep)
2. moderate (50% of lake >6m deep)
3. shallow (25% of lake >6m deep)
Maximum Depth: 20m
Average Depth: 10m

Aspect: 1
1. Lake has north facing exposure
2. Lake has south facing exposure
3. Lake has east facing exposure
4. Lake has west facing exposure
5. Lake is exposed on all directions

Chemical:
Alkalinity: mg/l
Conductivity: µmhos/cm
Secchi depth: . m
pH:
Temp (surface): F
Temp (bottom): F

Spawning Potential:
Inlet(s): 1
Length accessible for spawning:
0 m
Inlet spawning suitability: 4

Outlet(s): 1
Length accessible for spawning:
0 m
Outlet spawning suitability: 4

1. excellent (abundant)
2. adequate (enough to maintain suitable spawning populations)
3. fair (not enough to maintain population)
4. poor (not suitable for successful spawning)

Use:
Campsites: 1 Fire Pits: 1 Litter: L☒ M☐ H☐
Trail around lake: ☐ complete ☒ partial ☐ none trampled: ☐Y ☒N
Access: ☐ good trail ☐ poor trail ☒ cross country
Access directions: Take Duck Lake/Loon Lake Trail off Lick Cr. road past Duck Lake and up over ridge and back down past upper Loon Lakes. Then cross country and hit N. F. Lick Cr. trail and take fork that goes to South Loon Mtn. Cut east below S. Loon Mtn. peak and go to saddle (this trail is burned and hard to find). Follow trail of saddle to Enos Lake. From Enos Lake you must go cross country to Enos Lake #1.

Biological:
Zooplankton Composition and Density

Genera Identified	% of sample	Size	Density(g/l)

Appendix C. Continued.

Insect Composition and Abundance:

Aquatic Genera	Relative Abundance	Terrestrial Genera	Relative Abundance
	L☐M☐H☐		L☐M☐H☐
	L☐M☐H☐		L☐M☐H☐
	L☐M☐H☐		L☐M☐H☐

Fish Survey:

Fisherman: 2
Hours Fished: 2
Fish Caught: 40
Fish/hour: 20
Abundance: L☐M☐H☒

Length Frequency:

Total Length (mm)

Species	0-49	50-99	100-149	150-199	200-249	250-299	300-349	350-399	400+
WCT		1	1	1	1	5	4		
RBT			1	3	3	3			
cut/bow						2	3		
Total		1	2	4	4	10	7		

Fish Condition:

	Total Length (mm)		Weight (g)		Condition (k or Wr)	
Species	Mean	Range	Mean	Range	Mean	Range

Stocking History:

Year	Species	Number	Comments

Comments:
Spotted Frog adult; EPA sample lake; National Fish Tissue Study; brought out 6 RBT for sample caught angling

Appendix D. Enos Lake #2 survey form.

Lake Name: Enos Lake #2 Date: 9/11/02
IDFG Catalog #: 07:0377 EPA #:
Major Drainage: Secesh R Minor Drainage: Enos Creek
County: Valley Region: McCall
USFS Ranger District: Krassel Wilderness Area:
Section: 4 Township: 20N Range: 5E Elevation: 2,365 m

Physical:
Lake Type: 2 1. Cirque 2. Moraine 3. Slump 4. Caldera 5. Beaver
Total Surface Area: ha

Depth Profile: 1
1. deep (75% of lake >6m deep)
2. moderate (50% of lake >6m deep)
3. shallow (25% of lake >6m deep)

Maximum Depth: 22m
Average Depth: 18m

Aspect: 1-3
1. Lake has north facing exposure
2. Lake has south facing exposure
3. Lake has east facing exposure
4. Lake has west facing exposure
5. Lake is exposed on all directions

Chemical:
Alkalinity: mg/l pH: 9.5
Conductivity: µmhos/cm Temp (surface): 14.0 F
Secchi depth: 10.0 m Temp (bottom): F

Spawning Potential:
Inlet(s): 2
Length accessible for spawning:
m
Inlet spawning suitability:

Outlet(s): 1
Length accessible for spawning:
m
Outlet spawning suitability:

1. excellent (abundant)
2. adequate (enough to maintain suitable spawning populations)
3. fair (not enough to maintain population)
4. poor (not suitable for successful spawning)

Use:
Campsites: 2 Fire Pits: 2 Litter: L☐ M☒ H☐
Trail around lake: ☐ complete ☐ partial ☐ none trampled: ☐Y ☐N
Access: ☐ good trail ☒ poor trail ☒ cross country
Access directions: Take Duck Lake/Loon Lake Trail off Lick Cr. road past Duck Lake and up over ridge and back down past upper Loon Lakes. Then cross country and hit N. F. Lick Cr. trail and take fork that goes to South Loon Mtn. Cut east below S. Loon Mtn. peak and go to saddle (this trail is burned and hard to find). Follow trail of saddle to Enos Lake. From Enos Lake you must go cross country to Enos Lake #3.

Biological:
Zooplankton Composition and Density

Genera Identified	% of sample	Size	Density(g/l)

Appendix D. Continued.

Insect Composition and Abundance:

Aquatic Genera	Relative Abundance	Terrestrial Genera	Relative Abundance
	L☐M☐H☐		L☐M☐H☐
	L☐M☐H☐		L☐M☐H☐
	L☐M☐H☐		L☐M☐H☐

Fish Survey:

Fisherman: 3
Hours Fished: 6
Fish Caught: 20
Fish/hour: 3.3
Abundance: L☐M☐H☐

Length Frequency:

Total Length (mm)

Species	0-49	50-99	100-149	150-199	200-249	250-299	300-349	350-399	400+
WCT				1	1	1	2	2	
RBT							1	1	
Total				1	1	1	3	3	

Fish Condition:

	Total Length (mm)		Weight (g)		Condition (k or Wr)	
Species	Mean	Range	Mean	Range	Mean	Range

Stocking History:

Year	Species	Number	Comments

Comments:
spotted frog adults, heavier trail around lake than expected, need to increase stocking numbers in some

Appendix E. Enos Lake #3 survey form.

Lake Name: Enos Lake #3 Date: 9/11/02
IDFG Catalog #: 07:0378 EPA #:
Major Drainage: Secesh R Minor Drainage: Enos Cr
County: Valley Region: McCall
USFS Ranger District: Krassel Wilderness Area:
Section: 5 Township: 20N Range: 20E Elevation: 2,377 m

Physical:
Lake Type: 2 1. Cirque 2. Moraine 3. Slump 4. Caldera 5. Beaver
Total Surface Area: . ha
Depth Profile: 2
1. deep (75% of lake >6m deep)
2. moderate (50% of lake >6m deep)
3. shallow (25% of lake >6m deep)
Maximum Depth: m
Average Depth: m

Aspect: 1,3
1. Lake has north facing exposure
2. Lake has south facing exposure
3. Lake has east facing exposure
4. Lake has west facing exposure
5. Lake is exposed on all directions

Chemical:
Alkalinity: mg/l
Conductivity: µmhos/cm
Secchi depth: . m
pH:
Temp (surface): F
Temp (bottom): F

Spawning Potential:
Inlet(s): 2
Length accessible for spawning:
>200 m
Inlet spawning suitability: 2

Outlet(s): 1
Length accessible for spawning:
m
Outlet spawning suitability: 2

1. excellent (abundant)
2. adequate (enough to maintain suitable spawning populations)
3. fair (not enough to maintain population)
4. poor (not suitable for successful spawning)

Use:
Campsites: 2 Fire Pits: 2 Litter: L☒ M☐ H☐
Trail around lake: ☐ complete ☒ partial ☐ none trampled: ☒Y ☐N
Access: ☐ good trail ☐ poor trail ☒ cross country
Access directions: Take Duck Lake/Loon Lake Trail off Lick Cr. road past Duck Lake and up over ridge and back down past upper Loon Lakes. Then cross country and hit N. F. Lick Cr. trail and take fork that goes to South Loon Mtn. Cut east below S. Loon Mtn. peak and go to saddle (this trail is burned and hard to find). Follow trail of saddle to Enos Lake. From Enos Lake you must go cross country to Enos Lake #3.

Biological:
Zooplankton Composition and Density

Genera Identified	% of sample	Size	Density(g/l)

Appendix E. Continued.

Insect Composition and Abundance:

Aquatic Genera	Relative Abundance	Terrestrial Genera	Relative Abundance
	L☐M☐H☐		L☐M☐H☐
	L☐M☐H☐		L☐M☐H☐
	L☐M☐H☐		L☐M☐H☐

Fish Survey:

Fisherman: 1
Hours Fished: 1
Fish Caught: 18
Fish/hour: 18
Abundance: L☐M☐H☐

Length Frequency:

Total Length (mm)

Species	0-49	50-99	100-149	150-199	200-249	250-299	300-349	350-399	400+
WCT					4	7	7		
WCT	Observed								
Total					4	7	7		

Fish Condition:

	Total Length (mm)		Weight (g)		Condition (k or Wr)	
Species	Mean	Range	Mean	Range	Mean	Range

Stocking History:

Year	Species	Number	Comments

Comments:
Columbia Spotted Frog present, natural WCT reproduction, 1 inch fry observed in creek inlet, Black Ant, fly fishing, sand beaches, large boulders. Very fast fishing, about a fish a cast.

Appendix F. Enos Lake #5 Survey form.

Lake Name: Enos Lake #5 Date: 9/11/02
IDFG Catalog #: 07:0380 EPA #:
Major Drainage: Secesh R Minor Drainage: Enos Creek
County: Valley Region: McCall
USFS Ranger District: Krassel Wilderness Area:
Section: 4 Township: 20N Range: 5E Elevation: 2,377 m

Physical:
Lake Type: 2 1. Cirque 2. Moraine 3. Slump 4. Caldera 5. Beaver
Total Surface Area: . ha
Depth Profile: 1
1. deep (75% of lake >6m deep)
2. moderate (50% of lake >6m deep)
3. shallow (25% of lake >6m deep)
Maximum Depth: m
Average Depth: m

Aspect: 2,3
1. Lake has north facing exposure
2. Lake has south facing exposure
3. Lake has east facing exposure
4. Lake has west facing exposure
5. Lake is exposed on all directions

Chemical:
Alkalinity: mg/l
Conductivity: µmhos/cm
Secchi depth: . m
pH:
Temp (surface): F
Temp (bottom): F

Spawning Potential:
Inlet(s): 0
Length accessible for spawning: m
Inlet spawning suitability:

Outlet(s): 0
Length accessible for spawning: m
Outlet spawning suitability:

1. excellent (abundant)
2. adequate (enough to maintain suitable spawning populations)
3. fair (not enough to maintain population)
4. poor (not suitable for successful spawning)

Use:
Campsites: 1 Fire Pits: 1 Litter: L☒ M☐ H☐
Trail around lake: ☐ complete ☒ partial ☐ none trampled: ☒Y ☐N
Access: ☐ good trail ☐ poor trail ☒ cross country
Access directions: Take Duck Lake/Loon Lake Trail off Lick Cr. road past Duck Lake and up over ridge and back down past upper Loon Lakes. Then cross country and hit N. F. Lick Cr. trail and take fork that goes to South Loon Mtn. Cut east below S. Loon Mtn. peak and go to saddle (this trail is burned and hard to find). Follow trail of saddle to Enos Lake. From Enos Lake you must go cross country to Enos Lake #5.

Biological:
Zooplankton Composition and Density

Genera Identified	% of sample	Size	Density(g/l)

Appendix F. Continued.

Insect Composition and Abundance:

Aquatic Genera	Relative Abundance	Terrestrial Genera	Relative Abundance
	L☐ M☐ H☐		L☐ M☐ H☐
	L☐ M☐ H☐		L☐ M☐ H☐
	L☐ M☐ H☐		L☐ M☐ H☐

Fish Survey:

Fisherman: 1 Hours Fished: 1
Fish Caught: 0 Fish/hour: Abundance: L☐ M☐ H☒

Length Frequency:

Total Length (mm)

Species	0-49	50-99	100-149	150-199	200-249	250-299	300-349	350-399	400+
WCT						20			
Total						20			

Fish Condition:

	Total Length (mm)		Weight (g)		Condition (k or Wr)	
Species	Mean	Range	Mean	Range	Mean	Range

Stocking History:

Year	Species	Number	Comments

Comments:
Fish have large heads

Appendix G. Enos Lake #6 Survey form.

Lake Name: Enos Lake #6 Date: 9/11/02
IDFG Catalog #: 07:0384 EPA #:
Major Drainage: Secesh Minor Drainage: Enos Creek
County: Valley Region: McCall
USFS Ranger District: Krassel Wilderness Area:
Section: 32 Township: 21N Range: 5E Elevation: 2,438 m

Physical:
Lake Type: 2 1. Cirque 2. Moraine 3. Slump 4. Caldera 5. Beaver
Total Surface Area: . ha

Depth Profile: 3
1. deep (75% of lake >6m deep)
2. moderate (50% of lake >6m deep)
3. shallow (25% of lake >6m deep)
Maximum Depth: m
Average Depth: m

Aspect: 2
1. Lake has north facing exposure
2. Lake has south facing exposure
3. Lake has east facing exposure
4. Lake has west facing exposure
5. Lake is exposed on all directions

Chemical:
Alkalinity: mg/l
Conductivity: µmhos/cm
Secchi depth: . m
pH:
Temp (surface): F
Temp (bottom): F

Spawning Potential:
Inlet(s): 4
Length accessible for spawning:
100 m
Inlet spawning suitability: 3

Outlet(s): 1
Length accessible for spawning:
m
Outlet spawning suitability: 0

1. excellent (abundant)
2. adequate (enough to maintain suitable spawning populations)
3. fair (not enough to maintain population)
4. poor (not suitable for successful spawning)

Use:
Campsites: 0 Fire Pits: 0 Litter: L☒ M☐ H☐
Trail around lake: ☐ complete ☐ partial ☐ none trampled: ☐Y ☐N
Access: ☐ good trail ☐ poor trail ☒ cross country
Access directions: Take Duck Lake/Loon Lake Trail off Lick Cr. road past Duck Lake and up over ridge and back down past upper Loon Lakes. Then cross country and hit N. F. Lick Cr. trail and take fork that goes to South Loon Mtn. Cut east below S. Loon Mtn. peak and go to saddle (this trail is burned and hard to find). Follow trail of saddle to Enos Lake. From Enos Lake you must go cross country to Enos Lake #6.

Biological:
Zooplankton Composition and Density

Genera Identified	% of sample	Size	Density(g/l)

Appendix G. Continued.

Insect Composition and Abundance:

Aquatic Genera	Relative Abundance	Terrestrial Genera	Relative Abundance
	L☐M☐H☐		L☐M☐H☐
	L☐M☐H☐		L☐M☐H☐
	L☐M☐H☐		L☐M☐H☐

Fish Survey:

Fisherman: 1
Hours Fished: 1
Fish Caught: 4
Fish/hour: 3
Abundance: L☐M☐H☒

Length Frequency:

Total Length (mm)

Species	0-49	50-99	100-149	150-199	200-249	250-299	300-349	350-399	400+
WCT				2	1		1		
Total				2	1		1		

Fish Condition:

	Total Length (mm)		Weight (g)		Condition (k or Wr)	
Species	Mean	Range	Mean	Range	Mean	Range

Stocking History:

Year	Species	Number	Comments

Comments:
Lots of shallow marshy areas, Columbia Spotted Frogs abundant, small pond SE of lake, 4' deep max, full of CS frogs, flat areas to camp on SE side of lake, fish too small to catch in Enos #6.

Appendix H. Loon Creek Lake #1 Survey form.

Lake Name: Loon Creek Lake #1 Date: 8/22/02
IDFG Catalog #: 07: 0390 EPA #:
Major Drainage: Secesh Minor Drainage: Loon Creek
County: Valley Region: McCall
USFS Ranger District: Krassel Wilderness Area:
Section: 1 Township: 20N Range: 4E Elevation: 2,432 m

Physical:
Lake Type: 2 1. Cirque 2. Moraine 3. Slump 4. Caldera 5. Beaver
Total Surface Area: 3.0 ha

Depth Profile: 2
1. deep (75% of lake >6m deep)
2. moderate (50% of lake >6m deep)
3. shallow (25% of lake >6m deep)
Maximum Depth: m
Average Depth: m

Aspect: 3
1. Lake has north facing exposure
2. Lake has south facing exposure
3. Lake has east facing exposure
4. Lake has west facing exposure
5. Lake is exposed on all directions

Chemical:
Alkalinity: mg/l
Conductivity: µmhos/cm
Secchi depth: . m
pH:
Temp (surface): F
Temp (bottom): F

Spawning Potential:
Inlet(s): 0
Length accessible for spawning: m
Inlet spawning suitability: 4

Outlet(s): 1
Length accessible for spawning: m
Outlet spawning suitability: 4

1. excellent (abundant)
2. adequate (enough to maintain suitable spawning populations)
3. fair (not enough to maintain population)
4. poor (not suitable for successful spawning)

Use:
Campsites: 0 Fire Pits: 0 Litter: L☒ M☐ H☐
Trail around lake: ☐ complete ☐ partial ☒ none trampled: ☐Y ☒N
Access: ☐ good trail ☐ poor trail ☒ cross country
Access directions: Take Duck Lake/Loon Lake Trail off Lick Cr. road past Duck Lake and up over ridge and back down to Loon Lakes.

Biological:
Zooplankton Composition and Density

Genera Identified	% of sample	Size	Density(g/l)

Appendix H. Continued.

Insect Composition and Abundance:

Aquatic Genera	Relative Abundance	Terrestrial Genera	Relative Abundance
	L☐M☐H☐		L☐M☐H☐
	L☐M☐H☐		L☐M☐H☐
	L☐M☐H☐		L☐M☐H☐

Fish Survey:

Fisherman: 2
Hours Fished: 1
Fish Caught: 0
Fish/hour: 0
Abundance: L☐M☐H☐

Length Frequency:

	Total Length (mm)								
Species	0-49	50-99	100-149	150-199	200-249	250-299	300-349	350-399	400+
Total									

Fish Condition:

	Total Length (mm)		Weight (g)		Condition (k or Wr)	
Species	Mean	Range	Mean	Range	Mean	Range

Stocking History:

Year	Species	Number	Comments

Comments:
saw no fish rising no trail

Appendix I. Loon Creek Lake #2 Survey form.

Lake Name: Loon Creek Lake #2 Date: 8/21/02
IDFG Catalog #: 07:0393 EPA #:
Major Drainage: Secesh R Minor Drainage: Loon Creek
County: Valley Region: McCall
USFS Ranger District: Krassel Wilderness Area:
Section: 1 Township: 20N Range: 4E Elevation: 2,347 m

Physical:

Lake Type: 1 1. Cirque 2. Moraine 3. Slump 4. Caldera 5. Beaver
Total Surface Area: 4.0 ha

Depth Profile: 1
1. deep (75% of lake >6m deep)
2. moderate (50% of lake >6m deep)
3. shallow (25% of lake >6m deep)

Maximum Depth: 12m
Average Depth: 5m

Aspect: 1
1. Lake has north facing exposure
2. Lake has south facing exposure
3. Lake has east facing exposure
4. Lake has west facing exposure
5. Lake is exposed on all directions

Chemical:

Alkalinity: mg/l
Conductivity: µmhos/cm
Secchi depth: . m

pH:
Temp (surface): F
Temp (bottom): F

Spawning Potential:

Inlet(s): 0
Length accessible for spawning: m
Inlet spawning suitability: 4

Outlet(s): 1
Length accessible for spawning: m
Outlet spawning suitability: 4

1. excellent (abundant)
2. adequate (enough to maintain suitable spawning populations)
3. fair (not enough to maintain population)
4. poor (not suitable for successful spawning)

Use:

Campsites: 1 Fire Pits: 2 Litter: L☒ M☐ H☐
Trail around lake: ☐ complete ☒ partial ☐ none trampled: ☐Y ☒N
Access: ☐ good trail ☐ poor trail ☒ cross country
Access directions: Take Duck Lake/Loon Lake Trail off Lick Cr. road past Duck Lake and up over ridge and back down to Loon Lakes.

Biological:

Zooplankton Composition and Density

Genera Identified	% of sample	Size	Density(g/l)

Appendix I. Continued.

Insect Composition and Abundance:

Aquatic General	Relative Abundance	Terrestrial General	Relative Abundance
	L☐M☐H☐		L☐M☐H☐
	L☐M☐H☐		L☐M☐H☐
	L☐M☐H☐		L☐M☐H☐

Fish Survey:

Fisherman: 3
Hours Fished: 6
Fish Caught: 0
Fish/hour: 0
Abundance: L☐M☐H☐

Length Frequency:

Total Length (mm)

Species	0-49	50-99	100-149	150-199	200-249	250-299	300-349	350-399	400+
RBT					1	1	1	1	1
Total					1	1	1	1	1

Fish Condition:

	Total Length (mm)		Weight (g)		Condition (k or Wr)	
Species	Mean	Range	Mean	Range	Mean	Range

Stocking History:

Year	Species	Number	Comments

Comments:
Gill net, fish only caught in gill net.

Appendix J. Loon Creek Lake #3 Survey form.

Lake Name: Loon Creek Lake #3 Date: 8/21/02
IDFG Catalog #: 07:0394 EPA #:
Major Drainage: Secesh R Minor Drainage: Loon Cr
County: Valley Region: McCall
USFS Ranger District: Krassel Wilderness Area:
Section: 12 Township: 20N Range: 4E Elevation: 2,426 m

Physical:
Lake Type: 2 1. Cirque 2. Moraine 3. Slump 4. Caldera 5. Beaver
Total Surface Area: 2.0 ha
Depth Profile: 3
1. deep (75% of lake >6m deep)
2. moderate (50% of lake >6m deep)
3. shallow (25% of lake >6m deep)
Maximum Depth: 10m
Average Depth: 3m

Aspect: 1
1. Lake has north facing exposure
2. Lake has south facing exposure
3. Lake has east facing exposure
4. Lake has west facing exposure
5. Lake is exposed on all directions

Chemical:
Alkalinity: mg/l
Conductivity: µmhos/cm
Secchi depth: . m
pH:
Temp (surface): F
Temp (bottom): F

Spawning Potential:
Inlet(s): 1
Length accessible for spawning:
300 m
Inlet spawning suitability: 2

Outlet(s): 1
Length accessible for spawning:
20 m
Outlet spawning suitability: 3

1. excellent (abundant)
2. adequate (enough to maintain suitable spawning populations)
3. fair (not enough to maintain population)
4. poor (not suitable for successful spawning)

Use:
Campsites: 2 Fire Pits: 2 Litter: L☒ M☐ H☐
Trail around lake: ☒ complete ☐ partial ☐ none trampled: ☐ Y ☒ N
Access: ☒ good trail ☐ poor trail ☐ cross country
Access directions: Take Duck Lake/Loon Lake Trail off Lick Cr. road past Duck Lake and up over ridge and back down to Loon Lakes.

Biological:
Zooplankton Composition and Density

Genera Identified	% of sample	Size	Density(g/l)

Appendix J. Continued.

Insect Composition and Abundance:

Aquatic Genera	Relative Abundance	Terrestrial Genera	Relative Abundance
	L☐M☐H☐		L☐M☐H☐
	L☐M☐H☐		L☐M☐H☐
	L☐M☐H☐		L☐M☐H☐

Fish Survey:

Fisherman: 3
Hours Fished: 3
Fish Caught: 23
Fish/hour: 5.6
Abundance: L☐M☐H☒

Length Frequency:

Total Length (mm)

Species	0-49	50-99	100-149	150-199	200-249	250-299	300-349	350-399	400+
BRK			2	6	5	9	1		
Total			2	6	5	9	1		23

Fish Condition:

	Total Length (mm)		Weight (g)		Condition (k or Wr)	
Species	Mean	Range	Mean	Range	Mean	Range

Stocking History:

Year	Species	Number	Comments

Comments:
6 spotted frog adults

Appendix K. Tule Lake Survey form.

Lake Name: Tule Lake Date: 6/20/02
IDFG Catalog #: 07:0519 EPA #:
Major Drainage: South Fork Salmon River Minor Drainage:
County: Valley Region: McCall
USFS Ranger District: Cascade Wilderness Area:
Section: 23,24 Township: 15N Range: 6E Elevation: 1,632 m

Physical:
Lake Type: 1 1. Cirque 2. Moraine 3. Slump 4. Caldera 5. Beaver
Total Surface Area: 3.7 ha
Depth Profile: 2
1. deep (75% of lake >6m deep)
2. moderate (50% of lake >6m deep)
3. shallow (25% of lake >6m deep)
Maximum Depth: 5.6m
Average Depth: 3.4m

Aspect: 5
1. Lake has north facing exposure
2. Lake has south facing exposure
3. Lake has east facing exposure
4. Lake has west facing exposure
5. Lake is exposed on all directions

Chemical:
Alkalinity: mg/l
Conductivity: 10 µmhos/cm
Secchi depth: 3.1 m
pH:
Temp (surface): 14.0 F
Temp (bottom): F

Spawning Potential:
Inlet(s): 0
Length accessible for spawning:
0 m
Inlet spawning suitability:
Outlet(s): 0
Length accessible for spawning:
0 m
Outlet spawning suitability:
1. excellent (abundant)
2. adequate (enough to maintain suitable spawning populations)
3. fair (not enough to maintain population)
4. poor (not suitable for successful spawning)

Use:
Campsites: 2 Fire Pits: 2 Litter: L☒ M☐ H☐
Trail around lake: ☐ complete ☒ partial ☐ none trampled: ☐Y ☐N
Access: ☒ good trail ☐ poor trail ☐ cross country
Access directions: 1/8 mile west of warm lake road that joins Stolle Meadows road.

Biological:
Zooplankton Composition and Density

Genera Identified	% of sample	Size	Density(g/l)

Appendix K. Continued.

Insect Composition and Abundance:

Aquatic Genera	Relative Abundance	Terrestrial Genera	Relative Abundance
	L☐M☐H☐		L☐M☐H☐
	L☐M☐H☐		L☐M☐H☐
	L☐M☐H☐		L☐M☐H☐

Fish Survey:

Fisherman: 0 Hours Fished: 1
Fish Caught: 0 Fish/hour: 0 Abundance: L☐M☐H☐

Length Frequency:

Total Length (mm)

Species	0-49	50-99	100-149	150-199	200-249	250-299	300-349	350-399	400+
cut/bow									3
cutt							2		1
Total							2		4

Fish Condition:

	Total Length (mm)		Weight (g)		Condition (k or Wr)	
Species	Mean	Range	Mean	Range	Mean	Range
cut/rbt	454	441-471	842	600-1050	0.89	0.70-1.00
cutt	377	327-464	567	250-1050	0.93	0.71-1.05

Stocking History:

Year	Species	Number	Comments
1996	cut/bow	500	
1998	cut/bow	500	
2000	cutt	500	

Comments:
Set gill net overnight at north end of lake, lots of lily pads, dark water, heavy mud, did not catch fish with fishing gear.

McCALL REGION

LOWLAND LAKES INVESTIGATIONS

2002

ABSTRACT

We completed holiday shore angler and boat counts on Lake Cascade again recording very low angler use.

We gillnetted Corral Creek Reservoir, which revealed a large population of yellow perch *Perca flavescens* in addition to the stocked rainbow trout *Oncorhynchus mykiss*.

Fish Lake was drained and the outlet gate and control structure were repaired.

We estimated the kokanee *O. nerka* population in Payette Lake using hydroacoustic survey techniques.

Authors:

Paul Janssen
Regional Fisheries Biologist

Dale Allen
Regional Fisheries Manager

OBJECTIVES

To obtain current information for fishery management decisions on lowland lakes and reservoirs, including angler use, success, harvest and opinions, fish population characteristics, stocking success, return-to-the-creel for hatchery trout, limnology and develop appropriate management recommendations.

INTRODUCTION

Lake Cascade Angler Counts

Annual angler counts have been made since 1996 on Memorial Day, July 4th and Labor Day to monitor angling pressure trends (Janssen et al. *In review*). These counts were made again in 2002.

Corral Creek Reservoir

Anglers in Corral Creek Reservoir reportedly caught yellow perch *Perca flavescens* in 2001. There is no history of yellow perch presence in this small reservoir. The reservoir was gillnetted in 2002 to determine fish species presence and abundance.

Fish Lake

The Idaho Department of Water Resources (IDWR) inspected the Fish Lake outlet gate in 2002. The outlet gate was opened for the inspection and they experienced problems closing the gate. Subsequently, we drained the lake to inspect the gate structure and correct the problem.

Payette Lake

Kokanee *O. nerka* are the primary forage for lake trout *Salvelinus namaycush* in Payette Lake and kokanee eggs are usually in high demand by Idaho Department of Fish and Game (Department) hatcheries for statewide stocking requests. Therefore, kokanee population estimates have been made on Payette Lake since 1990 to monitor this important lake trout forage and to predict kokanee surpluses in the lake for egg taking opportunities for state hatchery needs. To continue this monitoring a population estimate was made again in 2002.

METHODS

Lake Cascade Angler Counts

We completed angler counts on Lake Cascade on Memorial Day, Fourth of July and Labor Day. We conducted counts using a fixed-wing airplane at 1000, 1400 and 1800 hrs on each day. All shore anglers and fishing boats were counted.

Corral Creek Reservoir

We set one sinking and one floating standard lowland lake experimental gill net. The nets were set in the afternoon, fished all night, and pulled the next morning. All fish collected were measured to the nearest mm and weighed to the nearest 5 grams.

Fish Lake

In October 2002, we drained the lake as low as possible until only a small outflow remained. The lake did not drain completely as there was a 0.3 m high sediment berm approximately 2 m in front of the outlet gate. Inspection of the structure revealed that the gate had come off the slide rail it moves up and down on. The rail structure had been bowed out making the gap too wide for the gate when lifted up, allowing it to come off the rail. In addition, the gate control rod was badly bent.

Payette Lake

We utilized the Department hydroacoustics fish survey crew to estimate kokanee numbers in the lake. Butts (2003) gives a description of the equipment and methodology used.

RESULTS

Lake Cascade Angler Counts

The declining angler pressure trend on Lake Cascade seems to have leveled off. Average number of fishing boats and shore anglers per count in 2002 was 16.5 and 12, respectively (Table 1). We made counts on only two holidays this year, missing Labor Day. Yellow perch fishing on the lake was virtually non-existent as the yellow perch population remained at historic low levels.

Table 1. Average boat and shore angler counts on Lake Cascade on three major holidays: Memorial Day, July 4th and Labor Day, in 1982, 1991, 1992 and 1996 through 2002 with corresponding intensive creel survey angler hour estimates for 1982, 1991 and 1992.

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

[a.] Does not include ice-fishing hours.

Corral Creek Reservoir

We collected 68 yellow perch and 45 hatchery-stocked rainbow trout *O. mykiss*. It appears that yellow perch have been present in the lake for several years. Yellow perch ranged in size from 112 to 228 mm and averaged 194 mm. Three of the 45 trout collected appeared to be holdovers from last years stocking. They ranged from 324 to 362 mm in length.

Fish Lake

In November 2002, angle iron framing was constructed and installed on the two bowed slide rails to secure the rails at the proper width. This prevented the gate slide grooves from coming off the rails. A new gate control rod, wheel and bearing were purchased and installed, the gate was closed and the lake refilled overwinter.

Payette Lake

The survey at Payette Lake took place on the night of August 15, 2002. Kokanee generally enter the NF Payette River by mid-August; the survey may have been conducted later than what would have been optimal, given the objective. Although kokanee were not observed in the NF Payette by the survey date, fish may have been staging near the inlet, which was not sampled by sonar gear.

Butts (2003) estimated 205,194 ± 160,513 age-0 kokanee, 132,490 ± 97,349 age-1 fish, and 28,281 ± 13,371 age-2 and older kokanee (Table 15). An estimated 15,937 ± 7,993 kokanee were age-3 and older and therefore could have participated in the 2002 spawning escapement. Interestingly, age-3+ kokanee densities increased dramatically in transect units closest to the NF Payette mouth. This may suggest that spawners were indeed staging at or near the inlet of the NF Payette River. Butts (2003) presents a more detailed report of the results.

LITERATURE CITED

Butts, Arthur E. Lake and reservoir research. 2003 Job performance report. Program F-73-R-25. Project 5. Report period July 1, 2002 to June 30, 2003. Idaho Department of Fish and Game, Boise.

Janssen, P.J., D. Allen and K. Apperson. In review. Regional fishery management investigations. Federal aid in fish restoration. 2001 Job performance report, Program F-71-R-26. Idaho Department of Fish and Game, Boise.

McCALL REGION

LAKE CASCADE YELLOW PERCH INVESTIGATIONS

2002

ABSTRACT

A fish weir and trap were constructed on the North Fork Payette River and Lake Fork Creek to intercept spawning northern pikeminnow *Ptychocheilus oregonensis* in the spring of 2002. The trapping efforts were focused on reducing adult northern pikeminnow numbers, thereby reducing predation on yellow perch *Perca flavescens*. We collected an estimated 4,200 northern pikeminnow and 20,500 adult spawning largescale sucker *Catostomus macrocheilus*.

We continued yellow perch population monitoring in Lake Cascade. Sampling indicated that yellow perch continued to disappear by August of their second year.

Zooplankton quality indices monitored from late spring through late summer averaged 0.54, 0.66, and 0.45 at the Poison Creek, Sugarloaf Island, and Cabarton sample sites, respectively.

Authors:

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INTRODUCTION

The yellow perch *Perca flavescens* fishery in Lake Cascade was described and its decline documented by Janssen et al. (*In review*). Reasons for the decline were investigated from 1998 through 2000, and results were presented in Anderson et al. (2001, 2002, and *In review*). The investigations examined several possible causes for the dramatic decline and suggested that northern pikeminnow *Ptychocheilus oregonensis* predation and/or disease were the probable causes. Post-decline studies failed to find any problematic disease agents in yellow perch *Perca flavescens* and indicated that northern pikeminnow predation on yellow perch was preventing yellow perch recovery.

Work in 2002 continued the northern pikeminnow removal efforts begun in 2001 and the northern pikeminnow hydroacoustic population estimate work. We also continued monitoring the yellow perch population. We repeated the plankton abundance work completed in 1999 and we composed a yellow perch studies overview and fishery recovery plan for in-house use.

OBJECTIVES

1. Trap northern pikeminnow to reduce predation on yellow perch.
2. Complete another hydroacoustic survey to estimate northern pikeminnow population size.
3. Continue monitoring yellow perch population.
4. Repeat zooplankton quality index work completed in 1999.
5. Write a synopsis of Lake Cascade yellow perch studies since 1998 and present yellow perch fishery recovery options.

METHODS

Northern Pikeminnow Spawner Trapping

We installed two adult fish traps in 2002, one on the North Fork Payette River and one on Lake Fork Creek. The North Fork Payette River trap was located just downstream of the Hartsell Bridge on Smylie Lane. The Lake Fork Creek trap was located just below the bridge on Scheline Lane.

The Lake Fork trap and weir was constructed using angle iron frames with 12.7 mm electrical metal tubing pickets. Frames were 3.0 to 3.6 m in length. Four frames were used to block approximately one-half of the stream width. Pickets used in the frames were 1.52 m tall. The holding pen was constructed and connected to the upstream side of the weir along the west bank of the creek using the same type of frames and pickets. Floating picket weir panels 1.52 m wide, were built using 1.52 m long, 31.75 mm wide, electrical PVC conduit. Three panels were used to span the remaining half of the stream width. Fish entered the holding pen via a V-shaped entrance attached to the metal picket frames.

The North Fork Payette River weir and trap was constructed using an electric fish barrier built by Smith-Root Inc., floating picket weir panels and the trap holding cage.

The electric barrier consisted of two plastic canvas sheets, one 6.1 m x 9.1 m and one 6.1 m x 15.2 m with wire arrays on them. The sheets had six bare cables lying on top of the canvas, spaced equidistant from each other and running the entire width of the canvas. Each of five of the wires was connected to a single pulsator located in an enclosed trailer on the road. The sixth wire was a ground for the wire array. Both arrays were connected end-to-end and placed in the North Fork Payette River perpendicular to river flows and in the thalweg of the stream.

The electric barrier blocked approximately one-half of the stream width to fish migration and forced fish to either side of the river to try to pass it. The electric barrier lay on and was anchored to the stream bottom. The canvas array was positioned so that the wire array angled upstream toward the west bank to help haze fish to the west side where the trap entrance and holding pen were located. The advantage of the electric barrier was its ability to pass high volumes of water and debris during snow runoff and still block upstream fish migration.

The gap between the electric barrier array and the East stream bank was blocked with 12.2 m of floating picket weir panels. The gap between the array and the West stream bank was blocked with a 3 m floating picket weir panel connected on one end to the array and the other end connected to the downstream, thalweg corner of the 12.2 m downstream side of the holding pen. The downstream side of the holding pen completed the weir.

Two V-entrances were installed on the downstream side of the holding pen. The holding pen was constructed out of 3 m horizontal angle iron frames with holes drilled every 27 mm to hold electrical metal tubing measuring 19 mm wide and 3 m long.

Northern Pikeminnow Population Estimates

We utilized the Idaho Fish and Game Department (Department) hydroacoustics fish survey crew to estimate northern pikeminnow numbers in the lake. Butts (2003) gives a description of the equipment and methodology used. We completed two hydroacoustic surveys in 2002, one daytime and one nighttime estimate.

Yellow Perch Population Monitoring

We repeated the trawling effort and methodology developed in 1998 and 1999 and described by Janssen et al. (2001 and 2002). All yellow perch collected were counted and a representative sample of yellow perch from each sample area was measured in total length and weighed to the nearest 0.1 g.

Zooplankton Quality Index Monitoring

We monitored zooplankton quality and abundance using the Zooplankton Quality Index (ZQI) technique described by Teuscher (1999).

Lake Cascade Yellow Perch Studies Synopsis and Fishery Recovery Plan

We compiled Lake Cascade yellow perch study objectives and results since 1998 and summarized them. We then presented Lake Cascade yellow perch fishery recovery options with associated costs and probabilities of success. We then presented the perceptual plan of the preferred option of draining the reservoir to eliminate all fish and then restocking with yellow perch, rainbow trout *Oncorhynchus mykiss*, and Coho salmon *O. kisutch.*

RESULTS

Adult Fish Trapping

We installed the fish weirs and traps on both Lake Fork Creek and the North Fork Payette River during the week of April 9, 2002. The Lake Fork trap sustained some damage on April 13 and 14 from a strong, rain on snow event but was repaired and fishing again within three days. Many area bridges and roads were washed out. The North Fork Payette River trap escaped damage. The electric fish barrier on the North Fork Payette River was activated on April 22, 2002 and ran nearly continuously through the end of July. On May 20, 2002, a large tree floating down the river tore out approximately 14.25 m of the floating weir picket panels from the North Fork Payette River trap. The panels were retrieved from 1.5 km downriver, repaired and reinstalled in three days.

The largescale sucker spawning run was over by June 5, 2002 on Lake Fork Creek and by June 11, 2002 on the North Fork Payette River. Northern pikeminnow showed up at the North Fork Payette River trap on June 13, 2002 and appeared to be over by June 24, 2002.

Similar to the 2001 trapping effort, large numbers of adult northern pikeminnow spawners were never observed in either Lake Fork Creek or the North Fork Payette River traps. We collected and removed an estimated total 4,200 northern pikeminnow and 20,500 largescale sucker *Catostomus macrocheilus* from both traps. The electric weir performed well but during high flows the connecting weir failed once.

Removal of the stream spawning segment of the population in the 1950s, 1960s and 1970s may have shifted spawning site preference from streams to the lake shoreline.

Northern Pikeminnow Population Estimates

The hydroacoustic surveys population estimate of northern pikeminnow was 79,537 and 69,035 for day and night estimates, respectively Table 1 (Butts 2003). An in-depth report of methods and results is presented in Butts (2003).

Hydroacoustic estimates of northern pikeminnow abundance have fluctuated greatly since begun in 2000. Estimates have ranged from a low of 24,000 to a high of 240,000 in June and August of 2000 while estimates in 2001 and 2002 ranged between these values. Even the highest estimate of 240,000 northern pikeminnow is thought to represent only one-half of the actual number present because one-half the fish were sampled with gill nets in the bottom 2 m of the lake (Anderson et al. 2002). Northern pikeminnow appear to use different habitats on any given day in a given year. Problems identified with the estimates include fish associated with the lake bottom (2 m or less from the bottom) and fish in weed beds and/or littoral areas of the reservoir. The hydroacoustic equipment cannot sample these areas of the lake. More work is needed to predict when northern pikeminnow are most pelagic and therefore more visible to the hydroacoustic sampling equipment.

Table 1. Night and day abundance estimates for individual species from data collected from hydroacoustic surveys during September 2-5, 2002 at Lake Cascade. Abundance was estimated as the product of a species proportion from gillnetting data and the total abundance estimate from hydroacoustics. The 95% CI for species abundance was calculated from the variance of each product (Butts 2003).

	Species	Proportion ± 95% CI	Abundance	95% CI
Day	Northern Pikeminnow	58% ± 20%	79,537	35,793
	Rainbow Trout	23% ± 10%	31,123	14,877
	Largescale Sucker	10% ± 10%	13,832	6,440
Night	Northern Pikeminnow	43% ± 12%	69,035	29,610
	Rainbow Trout	24% ± 3%	39,267	16,548
	Largescale Sucker	26% ± 11%	41,801	18,376

Yellow Perch Population Monitoring

We completed 68 trawling transects in 2002, fishing the trawl for 338 minutes, collecting 481 yellow perch. We averaged 0.6, 2.0 and 14.7 yellow perch per five minute transect in June, August and October, respectively. Trawling transect locations in 2002 were established in 1998 and 1999 and are presented in Janssen et al. (*In review*). Catch rates in June were very low and dominated by age-1 yellow perch. Age-0 yellow perch dominated trawl catches in August and October 2002 (Figures 1, 2, and 3). As in the past three years, age-1 yellow perch (2001 cohort) had virtually disappeared by the August trawling sample.

Yellow perch catch rates were highest in October, 98.6% of which were age-0. We collected more fish in the East and West sections during October than in the other areas and months sampled. However, due to large variability in catch per trawl transect none of the values were significantly different (95% CI) (Table 2). Catches/trawl transect were widely variable in all months and areas. Trawling in the north area was difficult due to the large number of submerged stumps and low water conditions which resulted in fewer transects being completed.

Table 2. Total and mean catch of yellow perch with 95% confidence intervals (+/-) by area in June, August and October 2002.

Sample Month	AREA											
	South			East			West			North		
	N	Average Catch (+/- 95% CI)	# Transects	N	Average Catch (+/- 95% CI)	# Transects	N	Average Catch (+/- 95% CI)	# Transects	N	Average Catch (+/- 95% CI)	# Transects
June	3	0.43(1.2)	7	6	0.85(4.5)	7	5	0.71(2.5)	7	0	-	3
August	25	3.6(12.5)	7	4	0.67(2.1)	6	9	1.3(7.3)	7	6	3(484.0)	2
October	223	31.9(92.3)	7	20	2.9(9.6)	7	70	10.5(39.35)	7	4	4(n/a)	1

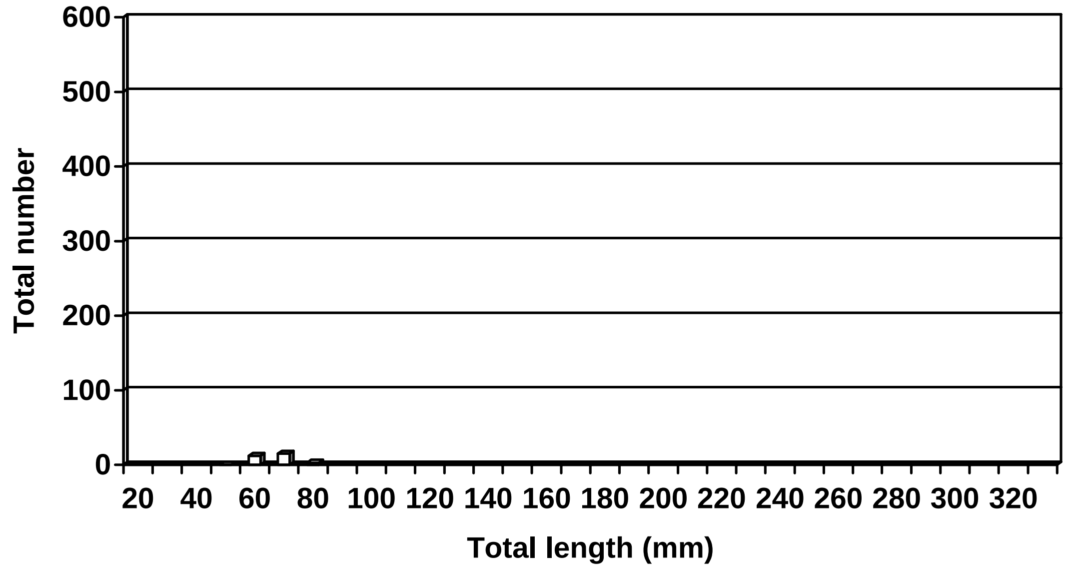
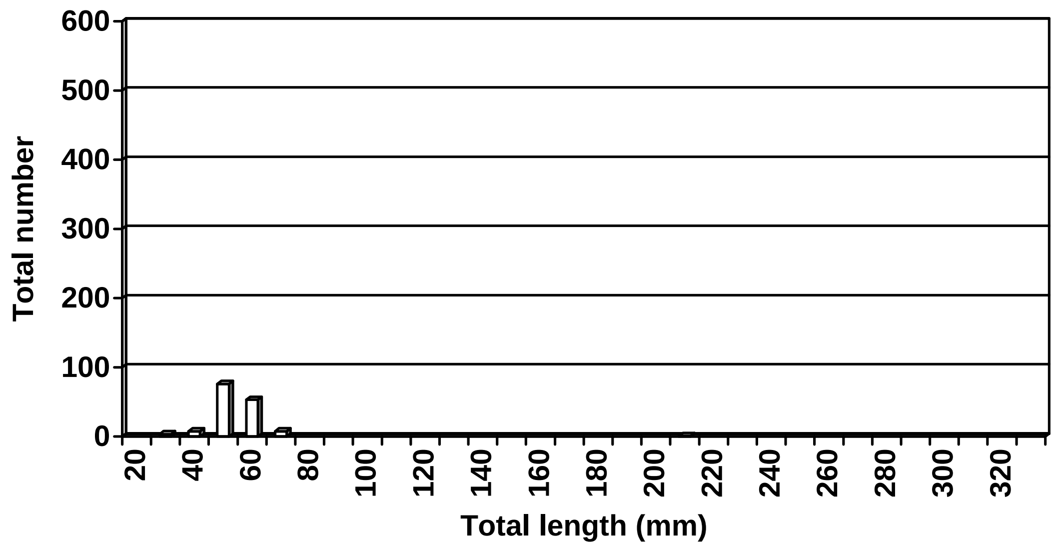


Figure 1. Length frequencies (catch /370 minutes of effort) of yellow perch collected with a bottom trawl from Lake Cascade, June 2002.



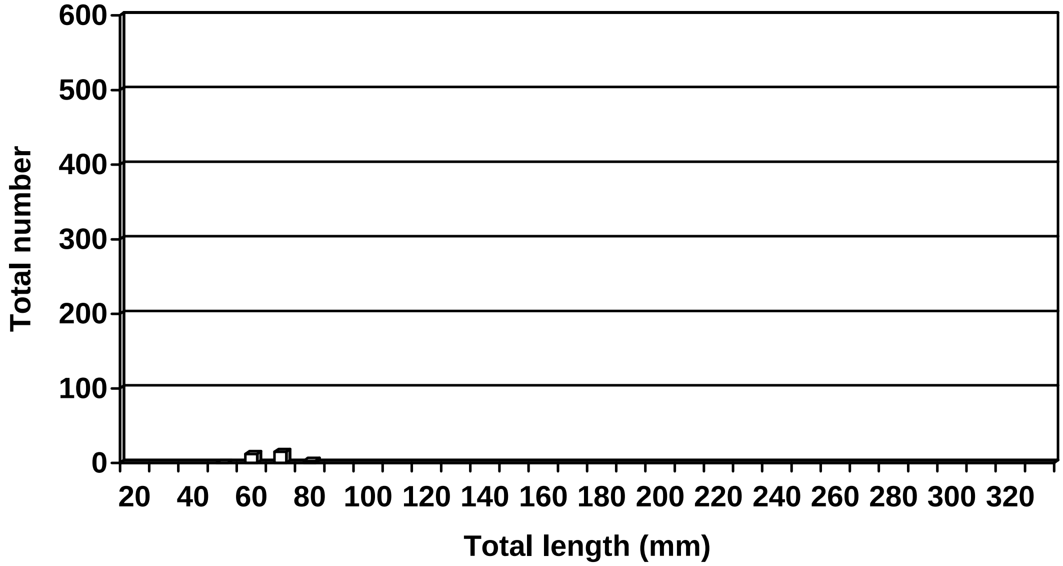


Figure 1. Length frequencies (catch/370 minutes of effort) of yellow perch collected with a bottom trawl from Lake Cascade, June 2002.

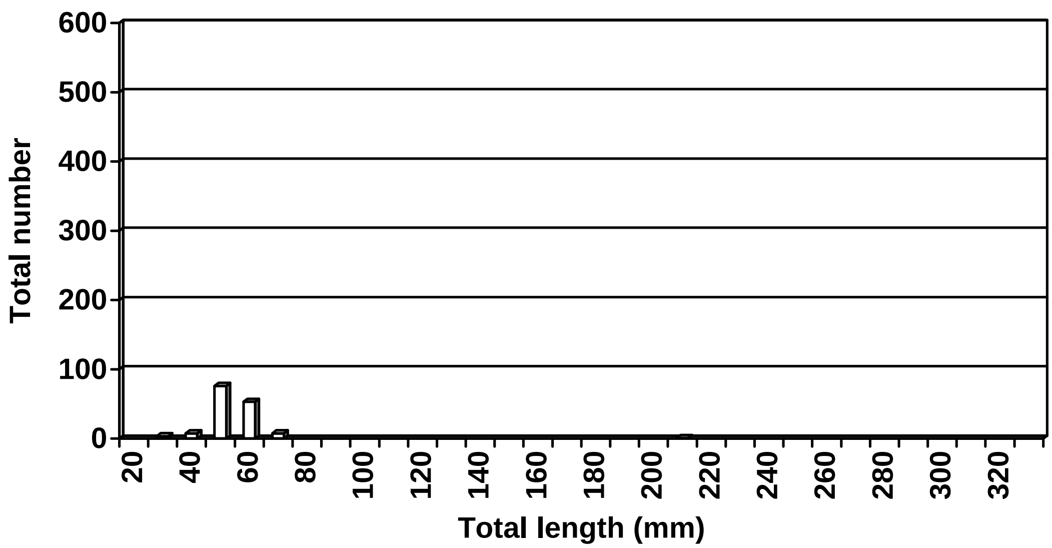


Figure 2. Length frequencies (catch/370 minutes of effort) of yellow perch collected with a bottom trawl from Lake Cascade, August 2002.

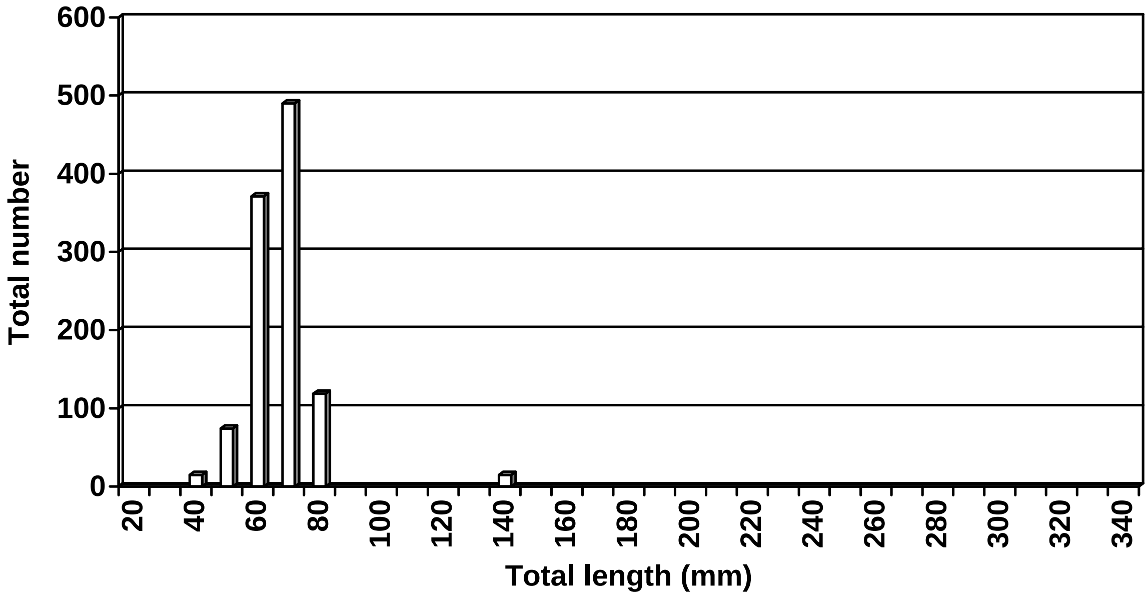


Figure 3. Length frequencies (catch/370 minutes of effort) of yellow perch collected with a bottom trawl from Lake Cascade, October 2002.

Zooplankton Quality Index Monitoring

Zooplankton sampling was completed in June, July, August and September 2002. The zooplankton quality index values ranged from 0.02 to 1.30. Index values peaked in July and October in the Poison Creek area and in July and August in the Sugarloaf Island area. Zooplankton quality index values in the Cabarton area started very low in June at 0.02, rose significantly to 0.52 by the end of July and stayed high through July, August and September.

The values recorded were very similar to those recorded in 1999 with the exception of the August 20, 2002 value at Sugarloaf Island which was approximately 10 times higher than that found in 1999 (Janssen et al. *In review*). The ZQI values presented in Table 3 rank in the top 0% to 25% of Idaho waters sampled and reported by Teuscher (1999). The average of the values in Table 3 of 0.54 would rank #5 of the waters sampled in 1998 in the state.

Table 3. Zooplankton quality index values for Lake Cascade by sample area and date collected in 2002.

Sample Area	ZQI Value					
	Date					
	6/27	7/10	7/29	8/20	9/20	9/30
Poison Creek	0.395	0.63	0.22	--	0.35	0.82
Sugarloaf Island	0.38	0.62	0.29	1.30	0.76	0.645
Cabarton	0.02	--	0.52	0.40	0.54	0.77

Lake Cascade Yellow Perch Studies Synopsis and Fishery Recovery Plan

The resulting paper, Lake Cascade Fishery Restoration: *Where Have We Been? Where Do We Go From Here?* is presented in Appendix A.

DISCUSSION

The yellow perch population size and structure remained similar to that found annually since 1998. Only yearling yellow perch are found in June, and by August these fish have virtually disappeared with only age-0 remaining in the lake. October trawling samples have remained constant from 1998 to present.

Although we removed a large number of spawning largescale sucker with the tributary fish traps, we did not remove sufficient numbers of northern pikeminnow to reduce predation on yellow perch. As noted above, yearling yellow perch continue to disappear by August.

Even though we had some problems keeping the trap running during high snow runoff periods, we never observed large numbers of spawning northern pikeminnow in either the North Fork Payette River or Lake Fork Creek. Northern pikeminnow in Lake Cascade are suspected of spawning both on the lake's shoreline as well as in the main tributaries. It is possible that the nearly complete removal of tributary spawning runs of northern pikeminnow in the 1950s, 1960s, and 1970s removed the tributary spawning segment of the population, leaving the shoreline-spawning segment of the population to repopulate the reservoir. Therefore, the majority of northern pikeminnow spawning in Lake Cascade may take place on the shoreline making the tributary spawning, northern pikeminnow trapping effort inefficient.

RECOMMENDATIONS

1. Discontinue trapping spawning adult northern pikeminnow and largescale sucker in the tributaries.

2. Pursue the fishery recovery option of draining the reservoir.

3. Continue yellow perch population monitoring via the trawl sampling.

4. Continue adult northern pikeminnow population monitoring with hydroacoustic gear.

5. Estimate northern pikeminnow numbers using mark and recapture estimate techniques to verify and calibrate hydroacoustic estimates.

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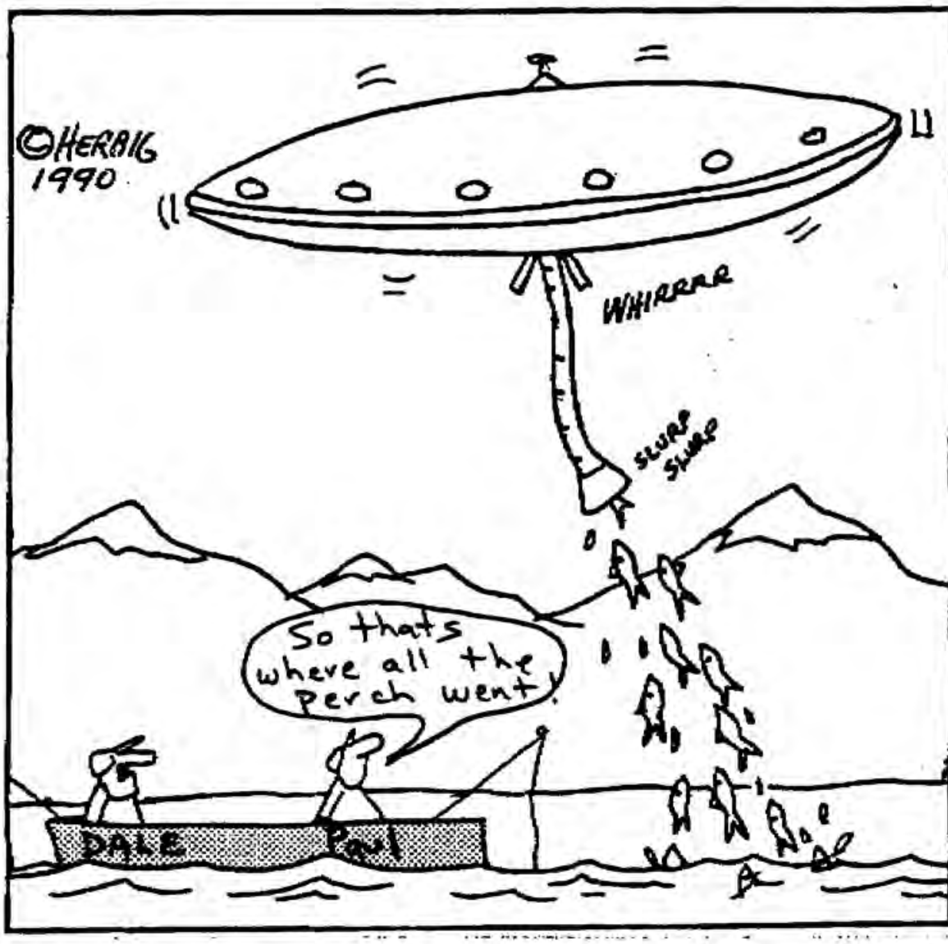
APPENDIX

LAKE CASCADE
FISHERY RESTORATION:

Where have we been?
Where do we go from here?



By:

Dale Allen, Regional Fisheries Manager
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LAKE CASCADE FISHERY RESTORATION

The goals of this paper are to provide a synopsis of the past sport fishery in Lake Cascade, provide current economic information and to provide possible alternatives for sport fish restoration. Regional fishery staff advocates that the sport fishery in Lake Cascade has collapsed and strong actions need to be taken to recover this fishery. In the past, Lake Cascade was a year-round yellow perch (YLP) fishery and to a lesser extent a stocked salmonids fishery. The YLP fishery collapsed by 1997 and fishing pressure and fishermen interest has plummeted. A decrease of an estimated $5,900,000.00 of annual revenue created by the Lake Cascade YLP fishery no longer flows through the City of Cascade, Valley County Idaho or the Treasure Valley. The Department has studied the disappearance of the YLP since 1997 and while a combination of factors contributed to the YLP crash, we believe predation from northern pikeminnow (NPM) will prevent the YLP population from recovering. It has been seven years since the loss of this substantial sport fishery in southwestern Idaho.

The Southwest Region has developed the needed fishery goal and defined the problem statements for the situation we face. We provide options for restoration of the YLP sport fishery with our best estimates of costs and chances of success and estimates of time.

GOAL: Create a fishery in Lake Cascade with a catch rate of greater than 0.75 fish/hour with the emphasis on the catch of YLP and salmonids.

PROBLEM STATEMENT: Low game fish densities in Lake Cascade do not support the sport fishery goal.

1. Adult YLP densities fail to support the fishery goal.
2. Stocked salmonids are not surviving in numbers to meet the sport fishery goal.
3. Wild salmonid recruitment is not at potential and thus not meeting the sport fishery goal.

Economics of the Lake Cascade Fishery

The economic impact of the loss of the YLP fishery from Lake Cascade is considerable. The reservoir fishery that had an estimated 383,242 angler hours in 1992 (Janssen et al. 1994) now is estimated at 74,000 angler hours in 2001 (file data, percentage change). The *2001 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation* (USFWS 2002) calculates an estimated $76.38 per Idaho angler day total expenditure figure. The estimated dollar difference between an YLP fishery in Lake Cascade and the current fishery is $5,904,976.00 in 2001 dollars. These figures do not include economic multipliers as the angler monies spent move through a local economy. This estimate also does not include the lost wages, sales/fuel taxes, Idaho State Income Tax and Federal Taxes lost. Many of the anglers went elsewhere and contributed to some other economy, but did not contribute to the local economy of the City of Cascade and Valley County.

Salmonid Stocking

The Department has stocked the reservoir since the early 1950s relying on cultured rainbow trout, Coho salmon and kokanee to create a sport fishery. Like many western reservoirs, Cascade's salmonid fishery program was very successful but declined over time. The numbers of salmonids stocked generally increased over time. In the early 1960s the Department stocked about 10,000 rainbow trout annually and Gebhards (1966) recommended increasing to 25,000 rainbow trout per year. In a 1968 creel survey Lindland (1971) documented a spring-to-fall fishing effort of 59,795 hours to catch 13,244 rainbow trout and 183 Coho. In 1969, 15,511 rainbow trout were caught from a 1968 stocking of 51,000 catchable rainbow trout and 278,000 fingerling rainbow trout (Lindland 1971). In 1972, 128,730 angler hours were expended on Lake Cascade resulting in 30,485 rainbow trout being caught; approximately 52,000 rainbow trout were stocked that year (Lindland 1973). By 1983, stocking had increased to 80,000 catchable rainbow trout with spring releases more successful than fall, and fingerling releases almost nonexistent in the catch (Reininger et al. 1983). A 1991 to 1992 creel survey (Janssen et al. 1994) estimated 383,242 angler hours were spent on the reservoir. An estimated 43,396 rainbow trout were caught during this period. A fingerling vs. catchable size evaluation was conducted and fingerling return cost to the angler was up to 33 times the cost of planting a catchable rainbow trout (Janssen et al. 1994). By 2002, an average of 210,000 catchable rainbow trout are stocked into Lake Cascade annually. The stocking of rainbow trout has been increased lately to help compensate for the loss of the YLP fishery, but the fishing pressure has steadily decreased since the decline of the YLP fishery. It is now obvious that the majority of fishermen that utilized Lake Cascade were coming because of the YLP fishery and the stocking of large numbers of salmonids will not bring them back to the reservoir.

In 2001 the Department stocked 187,840 catchable rainbow trout, 359,000 Coho salmon sub-catchables, and 253,000 kokanee fingerlings at a total cost of $171,000.00 (Tom Frew, Resident Hatchery Manager). We also stocked approximately 50,000 rainbow trout from Hagerman National Fish Hatchery. This investment of license dollars for the stocking program is becoming increasingly expensive as fishing pressure declines.

Success of Stocked Salmonids

The survival and return to the angler of stocked salmonids has been variable but generally poor. Predation by NPM and water quality problems, specifically low dissolved oxygen and high water temperature consistently impact the salmonid fishery. Research by the Department led to the 300,000 acre-foot (AF) conservation pool being administratively set by the USBOR in 1984 (USBOR 2002). The conservation pool function was to limit the chance of winterkill at an estimated 10% risk from dissolved oxygen level decreases (Reininger et al. 1983). This same research also recommended that the Department only stock rainbow trout catchables because of the almost nonexistent returns of fingerling rainbow trout. In a companion study in the early 1990s (Janssen et al. 1994) documented poor survival of different strains of stocked fingerlings. The only cost-effective stocked trout were catchable sized rainbow trout (>250 mm) due presumably to NPM predation. Years with hot, dry summers as in 1994 can result in near total salmonid summer die offs (Janssen et al. 1997). Overall, Lake Cascade has habitat constraints imposed by poor water quality and predation by NPM on salmonids that greatly reduce the salmonids potential contribution to the fishery.

Northern Pikeminnow and Yellow Perch Management History

Beginning in 1958, efforts were made to reduce NPM numbers to improve rainbow trout fishing. From 1958 through 1962 and 1968 through 1974 tributary spawning runs of NPM were eradicated using rotenone and squoxin. A total of 825,000 and 428,500 NPM were estimated killed during the 1958 through 1962 and 1968 through 1974 treatments, respectively.

The first YLP documented in the creel from Lake Cascade was in 1957. These YLP were thought to have originated from downstream migrants from an established population in Payette Lake.

There were 17,103 YLP reported caught in 17,312 angler hours in 1959 (Fill and Keating 1960). Catch rates declined in the late 1960s and early 1970s while total harvest was relatively constant at 15,000 to 18,000 YLP annually and angling pressure increased to around 70,000 hours (Irrizarry 1970, Lindland 1973).

Total angling pressure, YLP harvest, and catch rates all increased dramatically in the mid 1970s presumably in response to eradication of the predatory NPM. Total angler hours and YLP harvest were 158,422 and 268,000, respectively in 1975 (Welsh 1976). Yellow perch catch rates remained high through the 1980s and early 1990s. Angler pressure and harvest peaked in 1982 at 414,287 hours and 403,677 YLP (Reininger et al. 1983) and fluctuated at or near that level through 1992 (Anderson et al. 1987b and Janssen et al. 1994).

Water Quality and TMDL

Under section 303(d) of the Clean Water Act, Lake Cascade has been identified as water-quality limited due to excessive phosphorus loading to the reservoir from the surrounding watershed. Nuisance algae growth resulting from excess phosphorus loading has impaired beneficial uses of the reservoir, specifically, fishing, swimming, boating and agricultural water supply. The Lake Cascade Watershed Management Plan (Phases I and II) (DEQ 1996, 1998) was developed for achieving water-quality improvements in Lake Cascade.

As detailed in the Phase I and II Watershed Management Plans, a 37% TP reduction has been identified for the watershed in order to improve the water quality in Lake Cascade. To meet the total reduction goal, a 30% reduction has been assessed for all non-point sources, and a nearly 100% reduction for the major point source (which contributes ~7% of the total phosphorus load to the reservoir). The achievement of the 37% source reduction is anticipated to result in water-quality improvements that attain the desired water-quality objectives of 0.025 mg/L total phosphorus and 10 mg/L chlorophyll A in the reservoir. The 37% reduction is based on an evaluation of the maximum in-reservoir load that can be sustained without beneficial use impairment.

Review of Recent Lake Cascade Yellow Perch Investigations

We estimate 267,629 fish were caught in 383,342 angler hours on Lake Cascade in 1992 (Janssen, et al. 1994). The YLP made up the largest percentage of the overall harvest at 68%, or 183,152 fish. Rainbow trout and Coho salmon made up 17% and 3% of the total harvest, respectively.

The YLP population appeared to be strong in 1991 with multiple age-classes present and strong age-1 and age-2 cohorts (Figure 1).

Idaho Department of Fish and Game (Department) biologists expected very good perch fishing from 1994 through 1998 as the strong 1989 and 1990 age-classes of perch grew to preferred harvest size (Janssen, et al. 1994). This fishery never materialized. The YLP numbers in Lake Cascade appeared to have declined sharply by 1996. While no structured creel surveys were conducted in recent years, anglers reported generally poor YLP fishing in 1996 and 1997 and virtually no YLP harvest since 1997. Historic angler counts on Memorial Day, July 4th and Labor Day dropped to recorded lows in 1996 and have continued to drop dramatically ever since (Table 1).

Table 1. Average boat and shore angler counts on Lake Cascade on three major holidays: Memorial Day, July 4th and Labor day, in 1982, 1991, 1992 and 1996 through 2002; with corresponding intensive creel survey angler hour estimates for 1982, 1991 and 1992.

Year	Holiday Counts		Estimated Angler Hours (Hours[a] 1000)		
	Ave. # Boats	Ave. # Shore Anglers	Boat Anglers	Shore Anglers	Total Pressure[1]
1982	154	85	255.6	129.8	385.4
1991	41.5	32	135.2	102	237.2
1992	52.5	116	144.2	177.3	321.5
1996	35	27	--	--	--
1997	36.5	19	--	--	--
1998	58	39.5	--	--	--
1999	27	31	--	--	--
2000	15	12	--	--	--
2001	11	12	--	--	--
2002	16.5	12	--	--	--

[a]Does not include ice-fishing hours.

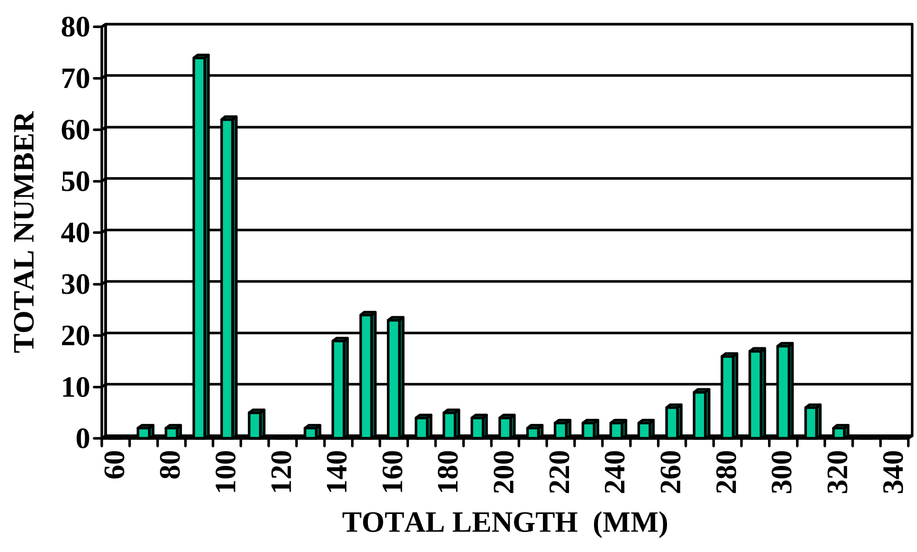

Figure 1. Representative sample of length frequencies of YLP collected with gill nets from Lake Cascade in 1991.

Due to the very large losses of YLP from Lake Cascade, poor YLP fishing, and an apparent void of strong age classes since 1990, Department biologists initiated investigations in 1998 to determine the status of the YLP population in the reservoir, determine the causes of the population decline and identify possible remedies. These investigations included the following objectives and results:

1998 Objectives (Janssen et al. 2001a)

Describe present YLP population structure in Lake Cascade. Establish trawling transects to monitor YLP population trends. Determine if a strong age class was produced in 1995, 1996 or later.

Monitor the extent, timing and significance of YLP entrainment.

Investigate perch migration and movement patterns within the reservoir to determine when fish are vulnerable to entrainment or environmental impacts.

Compare water quality and YLP distribution to determine if, when, and why YLP vacate specific areas of the lake. Current literature suggested that YLP could move out of and avoid areas with less than 3 mg/l dissolved oxygen (Suthers and Gee 1986).

Compare reservoir pool levels, water release timing, and water release rates and methods to changes in YLP populations.

1998 Results (Janssen et al. 2001a)

Suspected causes for the declining YLP numbers in Lake Cascade changed a great deal from our initial perception of the problem early in 1998. Emigration and entrainment appeared to be symptoms of a healthy YLP population and not the cause for declining numbers. Results of each specific objective were:

Age-0 and age-1 YLP dominated trawl catches. Only 10 YLP between 100 and 250 mm and nine greater than 250 mm were collected. In comparison, the average catch per trawling transect in 1986 and 1987 was 73 and 94.5 perch, with 74.5% and 95.7%, respectively being age-2+ and age-3+ (Griswold and Bjornn 1989).

We collected a significant number of sick, moribund and dead age-0 and age-1 YLP in all three collection months and in all four sample areas. We also observed a high infestation rate of a small, white, 1-mm in diameter, encysted parasite. This organism was found randomly distributed throughout the musculature on and around the gills and on and around organs in the viscera. Cursory examination of YLP caught in the trawl in August and October revealed that 86% and 68%, respectively had at least one cyst with some fish having a heavy infestation.

We observed virtually no entrainment during the summer and fall months of 1998.

Not enough adult YLP were collected to evaluate migration patterns.

Dissolved oxygen (DO) levels were found to be greater then 6 ppm at all sites sampled in July. Dissolved oxygen levels in August were greater than 6 ppm at depths up to 6 m, and were generally less than 3 ppm within 1 m of the bottom.

Flows in the North Fork Payette River fluctuate greatly from month to month and from year to year. No obvious changes were detected in outflow patterns since 1980, particularly since 1991 when perch numbers began dropping.

We found reservoir pool elevations to be fairly consistent from year to year. Reservoir pool elevations had fluctuated approximately 6 m, from a high of 1,472 m above mean sea level (msl) to a low of 1,466 msl in the past 19 years. No significant patterns in reservoir pool level management were found that helped explain the drastic drop in the YLP population and poor juvenile YLP survival since 1991.

1999 Objectives (Janssen et al. in review)

We focused studies in 1999 on age-0 and age-1 YLP to determine when and why these fish die. Water quality and disease interactions appeared to have played a role in the YLP decline, therefore one of the major objectives of investigations in 1999 focused on water quality investigations in YLP habitat. Specific objectives of the 1999 investigations included:

Continue to monitor the YLP population structure in the reservoir.

Monitor reservoir water quality throughout 1999 and examine historical water quality data for changes since 1990.

Make a positive identification of the trematode metacercariae that infected large numbers of YLP in 1998 and monitor infection rate in 1999. Test YLP for other diseases. Determine effects of trematode metacercariae on condition of age-0 fish.

Monitor extent and timing of YLP spawning in 1999.

Determine when the 1999 age class of YLP experiences significant mortalities and/or declines in condition in 1999.

Monitor food habits of young-of-year YLP through the fall of 1999.

Monitor and measure zooplankton.

Monitor and measure benthic organism abundance on two cross-lake transects before and after lake stratification.

1999 Results (Janssen et al. in review)

Age-0 YLP densities increased significantly in 1999 with a 6.8 fold increase in trawl catches over 1998. We documented gradual declines in age-0 YLP densities and significant declines in age-1 and age-2 densities in 1999. Length frequency data indicated that the June trawl catch was virtually all age-1 and age-2 YLP. Virtually all age-1 and age-2 YLP present in June had disappeared by August. Age-0 fish dominated trawl catches in August and October.

We observed DO levels below 3.0 ppm in the hypolimnion beginning on July 19 at Poison Creek, on August 3 at the Sugarloaf site and on August 19 at the Cabarton Site. The DO levels remained greater than 5 ppm in the top 6 m of the water column during the strong stratification period from late summer to early fall.

We found no water chemistry values that would seriously inhibit or stress YLP. All ammonia, nitrite, and nitrate levels were found to be low. Historic dissolved oxygen levels, chlorophyll A, and orthophosphate data did not reveal any significant trend changes that would explain the total loss of YLP

The Department's Eagle Fish Health Lab identified the trematode as *Neascus ellipticus*. Very little literature describing life histories of this bug were available. However, Larson (1969) reported the same trematode in YLP in Minnesota lakes. Pathologists also found the parasites (frequency)*, Gyrodactylus* (7/10), *Ligula* (1/22), *and Trichodina* (4/10). Yellow perch were also examined for IHN, IPN, Furunculosis, and *Aeromonas sobria*. Only *Aeromonas* (12/20) was found.

The extensive trematode *Neascus ellipticus* infection of YLP did not appear to be a direct cause of mortality in 1999. We examined the impacts of the trematode infestation on relative weights of juvenile YLP and found no difference between heavily infected, lightly infected, and non-infected YLP.

We also noted that the tapeworm *Ligula spp.*, which infected approximately 1 in 20 fish, appeared to have severe impacts on fish health and condition.

Adult YLP spawned on 8 of 12 Christmas trees placed around the reservoir. Spawning peaked around May 17 and all eggs had hatched by June 4. The only mortality noted was the predation on eggs by sculpin (*Cottus spp.)*.

Larval YLP catches peaked June 16 when we averaged 4.85 YLP per tow. We collected no larval YLP after June 16, as fish got large enough to avoid the net and/or began moving out of pelagic areas. We collected YLP that ranged from 7 mm to 13 mm.

We examined fish stomachs from June 15 through October 7, 1999. We found plankton to be the most common food item for age-0 YLP in all but three sample dates and locations. Chironomids became increasingly more common in stomachs later in the year and plankton occurrence decreased.

We found chironomids to be the most abundant of the benthic organisms counted at most sample sites. Other major families of benthic organisms collected included; leaches, clams, and snails.

We monitored the Zooplankton Quality Index (ZQI) (Teuscher 1998) bi-monthly beginning in May and continuing into November. We recorded three peaks in the ZQI, one in late June/early July, one in mid-September, and one in mid- to late-October. ZQI peaks ranged from 0.9 to 1.55.

Causes of the severe decline of YLP numbers in Lake Cascade remained unclear after the 1999 studies. None of the data collected in 1999 nor any of the historical data examined pointed to a specific habitat problem. It is clear that the problem is lake-wide and not just in isolated areas. None of the habitat and food parameters examined in 1999 explained the extremely high mortality rates of juvenile YLP observed in 1998 and 1999.

It appeared that the cause of the severe decline might have corrected itself in 1999, evidenced by large increases in catch/trawl of age-0 YLP.

We hypothesize that predation may explain why the small number of age-1 and age-2 juvenile YLP observed in June had virtually disappeared by August. We proposed to shift focus of the study to further investigate the predator prey relationships of these two species in 2000.

2000 Objectives (Janssen et al. 2002)

Investigations in 2000 focused on evaluating NPM predation potential on YLP. We also continued YLP population trend work and followed the fate of the 1999 YLP cohort.

Specific objectives included:

Examine predatory potential of NPM on YLP.

Examine historical data of YLP catch rates, historical data from NPM removal efforts in the 1950s, 1960s and 1970s and historical gill net catch rates of NPM.

Place YLP in net pens to protect them from predation and monitor survival.

Examine NPM stomachs to determine percent YLP occurrence.

Complete a YLP population estimate.

Complete an NPM population estimate.

Complete a bioenergetics model of NPM predation on YLP.

Continue tracking the fate of the 1999 YLP cohort.

Continue to monitor the YLP population structure in the reservoir.

2000 Results (Janssen et al. 2002)

To examine the possible predator-prey interactions of NPM and YLP we collected historical YLP harvest data, angling pressure data and NPM chemical removal estimates data and graphically plotted this data with Figure 2 as the result. This data suggests that the YLP population in the reservoir has responded to changes in NPM abundance since the filling of the reservoir.

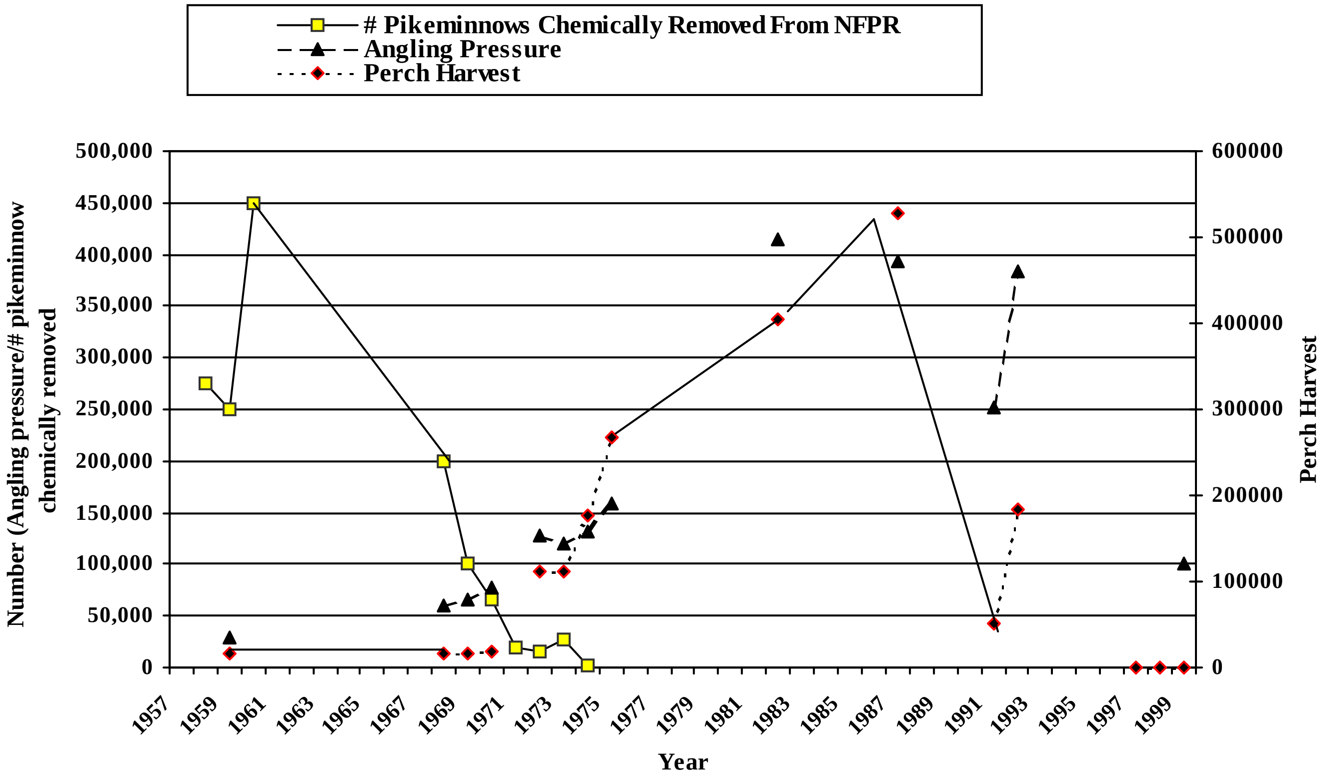

Figure 3. Historical YLP catch rates, estimates of numbers of northern pikeminnow chemical removed from the North Fork Payette River above Lake Cascade and projected northern pikeminnow numbers from gill net catch rates.

The data of Figure 3 suggests a possible predator-prey relationship between NPM and YLP. To further evaluate NPM predation influence on YLP we placed age-1 YLP in net pens in the Cabarton Bay, Boulder Creek arm, and Lake Fork Creek arm on June 18, 2000.

At the conclusion of the net pen experiments on November 11, 2002, 75% of the YLP were alive and well. During this same period, trawl sampling of YLP in the reservoir indicated that virtually all yearling YLP had vanished by August 2002.

We documented YLP predation by NPM by documenting YLP in NPM stomachs. Two percent of the NPM stomachs examined contained YLP remains.

We made a population estimate, using the October 1999 trawl results, of 1,607,116 YLP or 4,259 kg (2.65 g average weight/YLP), 97.7% of which were age-0 and 2.3% were age-1.

The NPM population was estimated to be 240,000 in August 2000. The estimate did not include any fish in the bottom six feet of the reservoir, where gill net sampling showed that approximately half of the NPM population was located. We did not sample any of the bays or sections with heavy weed-cover; therefore, our August population estimate was a conservative 500,000 NPM.

The bioenergetics modeling revealed that one NPM with either a 1% or a 10% YLP diet would consume 24.8 g or 239.7 g of YLP in the 483 days (days from hatch to August of the second year). Using the average weight of 2.65 g per YLP in the lake in October 1999 and a 1% and 10% YLP diet, this equates to 12,400,000 g and 119,850,000 g of YLP potentially consumed by 500,000 NPM in 483 days or 4,679,000 and 45,226,000 YLP. Roughly, we calculated there were only 3.2 juvenile YLP for every adult NPM in Lake Cascade.

Catch rates in the June 2000 YLP trawl sampling were very low and dominated by age-1 fish. Age-0 YLP dominated the trawl catches in August 2000. As in the past two years, age-1 YLP (1999 cohort) had virtually disappeared by the August trawling sample.

Study results in 2000 suggested that the recovery of the YLP population was dependent on the significant reduction in predation pressure by NPM. Historical data in the 1950s, 1960s and early 1970s indicated that significant reductions in the NPM spawning population resulted in large improvements in YLP angler catch rates in subsequent years.

Study results from the last three years do not answer the question of why the YLP crash. It appears that disease; predation, or both, brought YLP numbers down drastically. It is clear that NPM predation is preventing the recovery of the YLP population.

2001 Objectives (Janssen et al. in review)

To focus on NPM predation we proposed to, in essence, repeat the reduction efforts on NPM in the main tributaries. The use of chemicals was considered unacceptable by IDEQ because of concerns of releasing phosphorus into Lake Cascade. Therefore, we built picket weirs and traps on Lake Fork Creek (LFC) and North Fork Payette River (NFPR) to remove spawning adult NPM. We also continued documenting YLP numbers with the trawl sampling.

2001 Results (Janssen et al. in review)

We collected an estimated 14,208 NPM and 33,988 largescale sucker (LSS) adult spawners using a picket weir and V-entrance trap. A contractor operated the trap, removed fish and sold them to a fish wholesaler in Iowa. Low stream flows and warm water temperatures in 2001 appeared to prevent large runs of NPM up the tributaries to spawn.

YLP population monitoring indicated that YLP continued to disappear by August of their second year. We did not document any changes in YLP survival.

2002 Objectives

To build on results of 2001, the tributary weir traps were modified to better handle high water flows. An electric fish barrier and floating weir panels were utilized in the NFPR and steel pickets and floating weir panels were utilized in Lake Fork Creek. Again, a contractor was utilized to run the weir and market nongame fish. The Department obtained funding to look at NPM movements with radio telemetry and define the bioenergetics of NPM; this work was contracted with the University of Idaho. We continued to follow the YLP population.

2002 Results

We removed an estimated 4,500 NPM in 2002. The weirs, which were modified to better handle higher flows, still experienced problems with flood events. Catastrophic failures of the weir live holding cages probably resulted in several thousand more NPM deaths (removed). The electric weir performed well, but it was not long enough to span the NFPR and during high flows the connecting weirs failed. Telemetry studies were inconclusive but some NPM movement was documented into the NFPR in June. Stomachs were taken during the ice-free season to quantify the diet of NPM and define parameters for bioenergetics studies by the university. Large numbers of adult NPM were never observed in the NFPR. The NPM may not be able to ascend tributaries in the numbers they did in the 1950, 1960s and 1970s. Removal of the stream-spawning segment of the population in the 1950s, 1960s and 1970s may have shifted spawning site preference from streams to lake shoreline. Figure 4 presents the probable success of river trapping operations after two years of operation.

Figure 4. River weirs are management tools for reduction of Northern pikeminnow but not likely effective enough to control a spawning run.

Fishery Recovery Options

1. Continue stocking salmonids at the current level. This is basically a NO ACTION option. The current stocking strategy costs the Department approximately $171,000.00. We do not believe that a YLP fishery will reestablish.
COST: $171,000 per year.
PROBABILITY OF ACHIEVING FISHERY GOAL: NONE

2. Continue with the current management strategy of salmonid stocking and NPM trapping on the North Fork Payette River. The current management strategy costs the IDFG $230,000 per year.

Northern pikeminnow do not appear to ascend tributaries in the numbers they did in the 1950s, 1960s and 1970s. Removal of the stream-spawning segment of the population in the 1950s, 1960s and 1970s may have shifted spawning site preference from streams to lake shoreline. The probability of recovering the YLP fishery is near zero if this is the case. Regardless of the reasons for the poor trapping success, catches need to improve by 20 to 30 fold to affect an YLP recovery.
COST: $230,000/year
PROBABILITY OF ACHIEVING FISHERY GOAL: LOW

3. Increase salmonid stocking in the reservoir to boost fishery. This option would increase the costs of fishery management to over $400,000 with minimal gains in fishery improvement. It has been shown that salmonid stocking alone does not provide a significant fishery on Lake Cascade. With the current stocking strategies of near-record numbers of salmonids we have seen angling pressure dwindle to 20-year lows. There would be virtually no chance of YLP recovery.
COST: $400,000
PROBABILITY OF ACHIEVING FISHERY GOAL: NONE

4. Continue with current management strategy and hire commercial fishermen to remove NPM and largescale suckers (LSS) from the reservoir. This option would be partially funded for one to four years by the Clean Water Act as a method of mining phosphates from the reservoir while at the same time helping to recover the YLP fishery. The commercial fisherman portion of this option would cost approximately $70,000 in addition to stocking and NPM trapping for a total option cost of $300,000. Extended funding for this option is doubtful.

Probability of YLP recovery with this option could be very high and hinges on the success of the commercial fishermen in capturing NPM. Recovery time could be as short as 5 to 8 years.
COST: $300,000/year
PROBABABILTY OF ACHIEVING FISHERY GOAL: LOW to MODERATE if commercial catches of NPM exceed 100,000/year.

5. Continue with current management strategy of salmonid stocking and stock large numbers of exotic predators such as tiger muskie. Such predators would prey on both juvenile and adult NPM. Cost estimates of for tiger muskie are around $200,000 a year. Chances for an YLP recovery with this option are probably low and would take an estimated 10 to 15 years. If preferred prey items for tiger muskie in the reservoir were NPM and not LSS, or YLP or our salmonid stockings chances for success would increase greatly.

Predation on the salmonids stockings and the YLP population that we are trying to recover would be a significant problem. A significant tiger muskie fishery would probably develop but would not equal a recovered YLP and salmonid fishery. A tiger muskie fishery would also be restricted primarily to boat anglers.
COST: $370,000
PROBABILITY OF ACHIEVING FISHERY GOAL: LOW

6. Drain the Reservoir. We can show that the reservoir can be drained to very low levels and then treated or not treated with rotenone to renovate the fishery. There is high probability (97.8%) that the year following the action the irrigation contracts can be met and a good probability that the reservoir would completely fill the next year. That said, there are also many concerns that will be expressed by various parties about the proposal. First, the physical aspects of draining, treating and refilling will be discussed followed by problems we have identified that will have to be resolved. Second, the Department will have to meet very soon with the USBOR Snake River Office to ascertain if they can or will take this action.

Lake Cascade Water Facts:

Surface area 26,307 acres

Full Pool 4,828' msl

Penstock inlet centerline elev. 4,756.75'

Mean inflow to reservoir 732,550 AF

One cfs/24 hours is equal to two AF/day

200 cfs year-round water right to Idaho Power Company

Penstock max outflow 2,500 cfs

Power plant max flow 2,300 cfs

Max spill through spillway 12,500 cfs

Storage

Total Storage 693,123 AF at normal high water elev. 4,828'

Irrigation Contracts 310,450 AF

Uncontracted Space 88,717 AF

Conservation pool 293,956 AF

Congressionally Authorized Minimum Pool 46,662 AF (also included in Cons. Pool)

The Actual Draining

The reservoir could be drained in a normal snowpack year from approximately February to November 1. It would be easier to drain down over a fall-to-fall period i.e., drain down the Conservation Pool in the fall to a much lower than normal elevation. Then drain as the next spring runoff hits and through the summer and fall aiming for a November 1 or earlier completion. Average annual inflow is 732,550 AF; this can be passed in 147 days at 2,500 cfs. The penstock outlet passes 2,500 cfs; the radial gates higher in the dam can pass up to 12,500 cfs. With active management the reservoir can be drained down rather quickly. There are constraints such as a maximum of 12,000 cfs flood rule at Horseshoe Bend downstream on the Payette River. Also, flows from Cascade have to be adjusted with the SF Payette runoff, flows from Deadwood Reservoir and flows downriver of the Hells Canyon Dam complex. The USBOR will need to model different scenarios and look for problems and concerns, but the actual draining can be accomplished.

How Low Can We Drain

The penstock inlet centerline is elevation 4,756' which is below the zero capacity line of the reservoir capacity charts, so the reservoir should drain all the way. The penstock has an excavated channel, which lies lower than the NF Payette River bed. No one knows if the channel is completely clear of debris out into the forebay, but the penstock operates everyday. From looking at the construction of the dam as built, we cannot identify any major obstacles to prevent draining. Even if we discover some slumping into the penstock channel from the old NFPR channel, the storage remaining is likely fairly small, well less than 1,000 AF, likely just a few 100 AF.

Refill or Where's My Irrigation Water

The storage water in this reservoir all comes from snowpack runoff and the reservoir usually fills by the end of June. The two main components that effect water management are satisfying the irrigation contracts out of Cascade and water to have minimum flows in the NFPR below Cascade Dam during non-irrigation season. Secondly, the refill will need to be managed with other storage such as Upper Payette and Payette lakes and Deadwood Reservoir. The Conservation Pool at 293K AF will likely have to be forgone for one to two years to make sure that irrigation contracts can be satisfied. The loss of the Conservation Pool should not affect the rebuilding fishery if we can keep a pool for fish (perhaps a minimum of 40,000 AF).

To look at the probability of satisfying the irrigation contracts we added the irrigation contracts (310,450 AF), stream flow (200 cfs for 6 months = 72,000 AF) and a 40,000 AF pool remaining for fish; we get a total of 423,000 AF needed the year after drain to make this work. The mean annual inflow is 723,550 AF. We looked at water data from 1950 to 1995 (46 years) and only four years did not meet this criterion. Only one year (1977) was really bad, the other three years could be managed around to supply irrigation needs. In other words we calculated only 2.2% of the time in this data set would there be a serious irrigation shortage. In 8.7% of the time, the water demand would not be met. The reservoir would completely fill approximately 61% of the time the spring after draining. Still this issue will be the biggest sticking point for different publics to understand and deal with.

Treatment Options

A. Drain Lake Cascade without a rotenone treatment. With the probability of draining the reservoir almost empty maybe we do not need to use rotenone. Most of the fish will die or leave the reservoir as it finishes draining. There will still likely be NPM that would not be killed in the system (lakes above and tributaries) even with rotenone. If we don't use rotenone it is one less ecological, social, and cost issue to deal with.

COST: Staff time, cost of restocking the next year. No big-ticket items to pay for. Estimate $30,000 of staff time.

B. Drain Lake Cascade and treat small pool and treat NF Payette River from McCall to Cascade Dam and Lake Fork Creek from Little Payette Lake and Gold Fork River from diversion dam to NFPR. We will assume 500 AF pool in front of dam and a total inflow in all tributaries at 200 cfs. At this point we will not include a detoxification treatment. Assume rotenone price at $60.00 per gallon emulsified. Some more work would be needed on toxicity to NPM and LSS but (Keating 1958) used 1.0 ppm in tributaries to Lake Cascade and was very successful.

COST calculation: 500 AF x 0.34 gallon rotenone equals $10,200.00 for res.
200 cfs x .03 gal/cfs @2ppm for 3 hours equals $1080.00 for tribs
$13,000.00 for rotenone
$10,000.00 for labor for treatment
<u>$30,000.00</u> staff time for whole project
$53,000.00 total project

C. Drain Lake Cascade and treat as in Option B with the additional treatment of Little Payette Lake. Little Payette Lake is no longer a trophy trout fishery, the roughfish biomass is about 96% in the lake and in worse shape than when the lake was renovated in 1987 (Anderson et al. 1987a, Janssen et al. in review). We would also be treating Lake Fork Creek, which connects to Lake Cascade in either option A or B. Little Payette Lake has 18,000 AF deadpool by fall. In 1987, a 1.0-ppm treatment of powder rotenone treatment was conducted with successful results.

COST calculation:18,000 AF x 0.34 gal rotenone = $367,000.00
$1,000.00 for tributaries
$368,000.00 for rotenone
$20,000.00 labor for treatment
$30,000.00 staff time
<u>$50,000.00</u> install fish barrier on LPL.
$418,000.00 total project

PROBABILITY OF ACHIEVING FISHERY GOAL FOR ALL DRAINING OPTIONS IS VERY HIGH.

Identified Problems with Draining

Lake Cascade Bald Eagle Population

The population of bald eagles, an ESA-listed species, that utilizes Lake Cascade is a major concern identified with draining. The Cascade bald eagle population lies within Zone 15 of the Pacific Bald Eagle Recovery Plan (Lake Cascade Bald Eagle Management Plan, [CRBEMP]), USFWS 1990. The bald eagles that utilize Lake Cascade and the surrounding habitats are an important population to the ESA Recovery Plan. The USBOR will be required to consult with the USFWS on major water management issues such as our request to drain the reservoir.

The identified concern about bald eagles is the lack of a reservoir pool and its food resources in the February through April timeframe after the fall draining. The bald eagles arrive in the Lake Cascade area generally by mid- to late-February and egg laying is documented in March and April (CRBEMP and Jeff Rohlman, personal communication). The lack of a reservoir pool and short food supply may affect the nesting and fledging success of this local bald eagle population. The Department will begin stocking the reservoir directly after ice-out but food resources will likely be less than average.

The Department proposes to develop a short-term plan with the USFWS to address the less than average forage conditions that likely will be present. One option may be to operate feed sites in the bald eagle foraging areas, stocking them with deer carcasses and/or fresh or frozen fish. Bald eagle activities will be monitored to adaptively manage this program and to document responses. This can be supervised by McCall Office staff and paid for by the Department. We estimate this will cost approximately $10,000 in temporary time and expenses. If operated properly, there is a high probability of success using the feed site operation. The true effect on bald eagle production for one spring is unknown.

Salmon Flow Augmentation from Un-contracted Storage Space

Varying amounts of storage are released annually out of Lake Cascade for Salmon Flow Augmentation. The USBOR consults annually with other federal agencies as to the availability of un-contracted storage in their reservoirs. The draining year will supply over 300,000 AF of un-contracted water downstream. By our calculations, the refill year has a 61% chance of complete fill, thus water from un-contracted space could be available the next year.

Lake Cascade Watershed TMDL

The Lake Cascade Watershed Management Plan (Phases I and II) created the TMDL and identified the water quality goals for reduction of nutrient input to the reservoir (IDEQ 1996, 1998). This proposal at first view may be viewed as in opposition to the TMDL goals, but it is not. The goals identified in the TMDL will likely take decades to achieve. Excellent progress has been made in nutrient management and IDEQ should be commended. The current restoration efforts in the watershed will achieve the TMDL goals, but the resulting sport fishery will not change from its current undesirability. We view it as impossible to create a quality sport fishery in this reservoir by just addressing the water quality concerns and not aggressively changing the species composition and biomass status. Water quality data points will fluctuate wildly for awhile during and after the evacuation of the reservoir, but we think the data will prove that draining Lake Cascade was a good water quality, sport fishery and economically rejuvenating action.

Reservoir Productivity

Reservoir renovations are a proven fishery management technique with numerous examples of success. We are confident that a Cascade renovation can create a destination trout fishery for several years. We also believe that the fecundity and production of YLP will again create a YLP fishery in Lake Cascade. We must caution that the fish production potential will be lower than in the past. We likely will never achieve the YLP fishery of the mid 1980s because of the nutrient management changes in the Cascade watershed. Currently the excess phosphorus in the reservoir is creating poor N:P ratios that favor the dominance of the blue green algae species and thus the lowering of quality zooplankton. Our proposal will likely change the water quality data trend for a while, but we will again create a sport fishery in the reservoir. After draining and refill, the objective will be to create and maintain a productive fishery with fishery management actions.

We will provide an independent review of the water quality implications of the draining action by mid-March.

Positive Maintenance Benefit to USBOR

Lake Cascade has never been drained since construction. The ability to inspect the upstream end of the penstock, trash rack, and the earthen fill dam should be viewed as extremely desirable by USBOR staff. Maintenance could be completed by the USBOR before spring refill.

Loss of Power Production

Idaho Power Company (IPC) holds a year-round water right for 200 cfs on the NFPR. The typical winter flow is 200 cfs and stays at that amount from October 15 to about the end of May, depending on flood rules. At these flows, the one operable turbine produces 1.5 megawatts of electricity/hour. With draining of the reservoir, the turbines would have to be shut down for some amount of time. We do not know the minimum cfs and hydraulic head that is necessary at this facility. Even with this shutdown, there really is very little lost power production. It is reasonable to argue that IPC will create more revenue than usual because of the passing of 300,000 AF of water through their Cascade Dam turbines during the drawdown and also with the passing of the extra water through the high head power facilities at Brownlee, Oxbow and Hells Canyon dams. The USBOR will also benefit from increased power flows at Black Canyon Dam near Emmett.

The worst case would be that the Department would have to purchase the lost wholesale cost of 1.5 megawatts/hr at approximately $35.00/megawatt (BPA wholesale price) for however long the Cascade Dam turbines were shut down due to this action.

Minimum Pool

The reservoir contains a 46,662 AF Congressionally-set minimum pool. Likely we would have to have this temporarily removed by Congress to complete draining. We assume that this was set to protect fish and wildlife values many years ago. We have not found this paperwork yet. This should not be a major hurdle, but will take time and support to get accomplished.

Water Quality Standards during Draining

The recent draining (fall 2002) of Black Canyon Dam on the lower Payette River serves as a good model of what may happen at Cascade. Idaho DEQ placed the following Turbidity Standards on the project: <50 NTU above background instantaneously, and <25 NTU above background for 10 consecutive days. A twice-weekly monitoring was required. The project at Black Canyon did not violate the WQ Standards.

Obviously the two situations aren't exactly alike and estimates would have to be made by USBOR to model the outflow water quality. The USBOR completed a whole reservoir sediment survey in 1995 (Ferrari 1998) that showed the majority of the sediment lies in the upper portion of the pool basin. We feel that likely these water quality standards can be meet.

Flushing of Sediments into the NF Payette River

We do not feel that sediments will be a major concern. The river segment below the dam for about ten miles is now almost 100% sand substrate. This project will add to this sediment but will be of the same material. The sediment will deposit in the places that sediment deposits currently. From their sediment survey data of 1995 the USBOR should be able to make an estimate of sediment release.

Irrigation Storage Management above Lake Cascade

There is 56,000 AF of storage above Lake Cascade in Payette Lake, Upper Payette, and Granite Lake that is controlled by the Lake Irrigation District for contracts downstream of the reservoir. With agreement from the irrigation company water could be positively managed to help with refill shortages, power generation and detoxification of rotenone. A possible scenario would be to satisfy the Lake Irrigation Companies contracts with the excess Conservation Pool storage in the draining summer and reserve the upper basin storage until after rotenone treatment. Then, if the irrigation company agrees, release the storage into Lake Cascade; this would accomplish two things, detoxify the outflow waters by dilution and create 40,000 to 50,000 AF of almost instant storage that could make or break irrigation water supplies the next year depending on snowpack. This upper basin storage water could be transferred in three to four weeks. We have not identified major problems from this later transfer of water. This would have to be negotiated with all parties.

Deadwood Reservoir Storage Management

The water management of Deadwood Reservoir would be critical to the success of this project. Deadwood Reservoir releases are currently managed in close coordination with Lake Cascade releases for flood control, irrigation contracts and Salmon Flow Augmentation purposes. During Lake Cascade drawdown, Deadwood Reservoir could be managed conservatively to ensure that Deadwood would be full the following spring. This could provide approximately 50,000 AF to help supply irrigation contracts from Lake Cascade, if needed. This water management would not be out of character with normal water operations for Deadwood Reservoir.

Impacts to Cascade State Park Operations

The draining operation will likely reduce visitation to Cascade State Park in the fall of the draining. Estimates of reservoir elevation by date will be available from the USBOR after water modeling is complete and should be reviewed against the visitor use by date to help predict loss of use. Positive public information will be important as to what a park visitor could expect for reservoir use at any given time. While the reservoir is low, it would be appropriate to address the many boat ramp extension needs. A major marina and breakwater has been proposed near the city of Cascade and possibly this draining should be used as a catalyst for the marina construction.

Impacts to River Recreation of the North and South Forks Payette River

Whitewater rafting is by far the largest river recreational use. The NFPR rafting should have a longer season of use during the draining year. During the refill year the rafting season will largely depend on snowpack conditions and it likely will be reduced. The river segment from Cascade Dam to Banks would be the most affected. The SFPR rafting is supported slightly by Deadwood Reservoir releases in late summer. If Deadwood Reservoir irrigation contracts are fulfilled with Cascade waters during the draining year, the flows out of Deadwood Reservoir could be shaped mostly for rafting. During the refill year it is likely that Deadwood Reservoir would be heavily drafted and thus more rafting flows would be available. Again USBOR water modeling scenarios should define this further.

We predict little impact to fishing in the river systems due to flows from water management. Catch rates in the NFPR should increase during and after draining Lake Cascade.

Impacts of Reservoir Draining to Businesses in the City of Cascade

We can identify several businesses that will be affected by the draining. We will have to identify other concerns with public scoping of this project. Waters Edge RV Park lies just below the tailwater of the dam and will receive the brunt of the mortality of fish along their property lines. The Department should have a plan to dispose of fish carcasses found here. Tackle shops will be affected for Cascade tackle sales. Possibly there are some state economic fund programs to assist here. These interests will be in the forefront of receiving the benefits of a restored fishery.

Fate of Fish Flushed out of Lake Cascade

During the act of draining, large numbers of fish will begin to entrain through the outlet. Mortality will be significant but likely a majority will survive and now be below the dam in the NFPR. We estimate that 50,000 to 100,000 salmonids will survive the draining and entrainment and now be below Cascade Dam. We will actually create a trout fishery in the NFPR that does not exist currently. The salmonids will likely stay within 20 miles of the dam or just slightly below and into the Cabarton area in the canyon. We expect the NPM will begin to redistribute all throughout the NFPR eventually down to Black Canyon Reservoir. The LSS may act similar but probably not to the same extent. Other species will be in much lower numbers and probably not noticeable. There will be no introductions of fish into pristine waters. The NFPR does not produce a lot of trout and is not a significant fishery to the State. Actually, the fishing may improve because of the addition of large numbers of fish looking for a new home. Past experience with draining water bodies is that fish first pile up below the dam but then quickly redistribute themselves downstream. The system below the dam settles back into equilibrium rather quickly.

Source of Fish for Restocking Lake Cascade

The stocking of salmonids will be completed by the Department hatchery system. Aggressive stocking will commence after ice-out (mid-April) after the draining. This will depend on water volume and total detoxification of rotenone. This first pool could be created by the late release of Payette Lake if we can make an agreement with the irrigation company. Stocking of the warm and cool water species YLP, smallmouth bass, bluegill, crappie, and mountain whitefish will all have to come from natural stocks. This will take more financial and time commitment to accomplish than just the McCall Regional fish management staff can provide. Other regional fish management staffs have committed to assist in restocking efforts. The current concerns with New Zealand mud snails will be carefully addressed and likely some of our brood sources may become off limits. The early stocking of YLP will be critical to success of this program; first because this species as the major focus of the project and secondly the early (low temperature) spawning of YLP. Sources of fish will have to be identified with Department fish health lab cooperation.

Water Source for the City of Cascade

The source of drinking water for the City of Cascade is three ground water wells directly adjacent to the reservoir's south end. A rotenone treatment would have no effect on ground water quality. The draining should have negligible impacts on water supply because the reservoir is usually dry at the south end annually.

Lake Cascade Post Treatment Fishery Expectations

Fishery restoration work will begin soon after outlet discharge is reduced and the reservoir begins to refill. Rainbow trout, both harvestable sized and fingerlings, along with coho salmon fingerlings and adult yellow perch will be stocked as soon as there is a pool of sufficient size (approximately 25,000 acres) to hold and support fish without flushing them out the penstock. In addition, fish stocking cannot take place until concentrations of rotenone, if used in the remaining storage pool, have been adequately diluted or dissipated.

An excellent rainbow trout fishery for 8-inch to 10-inch fish is expected almost immediately after stocking. Rainbow trout and coho salmon growth should be excellent and within two years of the initial stocking, rainbow trout from two to five pounds should be common. An excellent rainbow trout and coho salmon fishery is expected to persist for a minimum of seven to ten years until the northern pikeminnow population recovers and predation may again impact trout survival.

Adult yellow perch brood stock will come from wild stocks collected from Idaho lakes and reservoirs. We expect these fish to produce a strong cohort within one to two years. The fish of this cohort should reach four inches in 1.5 years and reach a harvestable size of eight inches in three to four years or five to seven years from beginning of refill.

Once yellow perch are well established (large numbers of multiple age-classes), additional warmwater fish species will be stocked. These species include: smallmouth bass, largemouth bass, bluegill, and white and black crappie. Smallmouth bass recovery is expected to be relatively quick, with strong numbers of 12-inch fish, four to six years after reintroduction. Success of other introduced species is somewhat of an unknown and experimental in nature.

Rainbow trout flushed out of the dam into the NF Payette River during the drawdown are expected to take up residence in available trout habitat. We expect dramatically improved trout fishing for one to three years in the river from below the dam downstream through the Cabarton section and through the canyon section to Smiths Ferry.

RECOMMENDATIONS

We recommend that the Department proceed to work with the USBOR and other federal and state agencies to complete the draining of Lake Cascade as early as possible. We believe a rotenone renovation immediately after draining the Cascade pool is the best course of action. We also recommend that the Department include the renovation of Little Payette Lake if the funds can be identified.

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McCALL REGION

RIVERS AND STREAMS INVESTIGATONS

2002

ABSTRACT

Temperature recorders monitored the upper Little Salmon River drainage throughout the summer of 2002. Mean daily temperatures peaked in mid-July at 22°C to 23°C. Stream temperature monitored in the North Fork Payette River upstream from Payette Lake recorded mean daily temperatures that exceeded 20°C on only seven days throughout the summer.

Standard stream surveys were conducted in Bear Creek, tributary to Wildhorse River, and in the North Fork Lake Fork Creek, tributary to the North Fork Payette River. The purpose of these surveys was to document presence of bull trout and to track trends in salmonid populations. No bull trout *Salvelinus confluentus* were found in these streams. Resident redband trout *Oncorhynchus mykiss gairdneri* and brook trout *Salvelinus fontinalis* were present in all stream reaches sampled.

Standard stream surveys were conducted in upper Boulder Creek, tributary to the Little Salmon River, in the vicinity of general parr monitoring sites. The purpose of these surveys was to positively identify presence of juvenile bull trout and document any hybridization with brook trout. Surveys were conducted in cooperation of Payette National Forest biologists. Bull trout, brook trout, and possible hybrids *Salvelinus confluentus X Salvelinus fontinalis* were sampled. Redband trout were also present.

The 2002 kokanee *O. nerka kennerlyi* spawning run in the North Fork Payette River above Payette Lake was estimated to be 16,314 fish.

A stand-alone section of the 2000 report was accidentally omitted from Anderson et al. (2002), and is included as an appendix to this report. Trends in stream temperature in the Little Salmon River and angler diary information from the South Fork Salmon River are reported in Appendix B.

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OBJECTIVE

To conduct investigations in rivers and streams to enhance, maintain, and protect McCall area fisheries.

INTRODUCTION

Temperature Monitoring

The upper Little Salmon River (LSR) drainage is the focus of ongoing riparian habitat improvement projects, and some improvements in agricultural land use practices. Debate has risen among stakeholders regarding what specific factors limit salmonid populations throughout the drainage. The effect of high summer water temperature as a factor limiting salmonid abundance and distribution in the drainage is unknown. Summer stream temperature monitoring began in 1994 to establish baseline data and to track changes that may be influenced by recovery of riparian habitat.

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

Standard Stream Surveys

Standard stream surveys were conducted in Bear Creek, a tributary to Wildhorse River, which drains to the Snake River below Brownlee Dam. The survey was at the request of the NRCS to document the presence or absence of bull trout *Salvelinus confluentus* at the proposed site of new stream diversion structure.

North Fork Lake Fork Creek, tributary to North Fork Payette River was surveyed to attempt to document the status of bull trout. One Bull trout was sampled from the stream in 1998 (Meyer 1999).

Electrofishing surveys were used to validate observations made by snorkeling in upper Boulder Creek, near the headwaters upstream from a natural falls. Surveys were conducted in the vicinity of sites that are monitored annually by snorkeling as part of the General Parr Monitoring project. Recent snorkel surveys reported presence of bull trout fry and juveniles sympatric with brook trout.

North Fork Payette River above Payette Lake

The spawning run of kokanee *O. nerka kennerlyi* in the North Fork Payette River (NFPR) from Payette Lake has been enumerated since 1988 to assess spawning escapement and to serve as a method of validating kokanee population/density estimates and survival estimates from in-lake population work. (See Lowland Lakes section of this report). This estimate was completed again in 2002.

METHODS

Temperature Monitoring in the Little Salmon River Drainage and North Fork Payette River

Hobo temperature recorders (Onset model HTI, -5°C to +35°C) were deployed to monitor water temperature, continuously recording a temperature every 2.4 hours from May 20 to October 14, 2002. All recorders were in waterproof Onset model containers and secured by cable to a cinder block. The cinder block was placed in the stream and cabled to shore. Protocol described by Zaroban (2000) was followed to calibrate recorders prior to use.

Little Salmon River Drainage

The upstream recorder, Station 1, was placed under the Highway 95 bridge west of New Meadows. This location was approximately ¼ mile downstream from prior years. It was moved because it had been vandalized at the prior site under Hubbard Lane Bridge. Station 2 was approximately 50 m downstream from Meadow Creek Subdivision Bridge, adjacent to Highway 95 road mile 163.4 and at 45° N latitude. The third recorder was placed in Mud Creek, a headwater tributary to the LSR, immediately below the confluence with Little Mud Creek, under the Highway 95 Bridge.

North Fork Payette River

One temperature recorder was secured to the steel staff gauge that is associated with the USGS station in the NFPR approximately ¼ mile downstream from Fisher Creek.

Standard Stream Surveys

Standard stream surveys were conducted following protocols outlined by Horton (8/15/1994 memo). Figures 1, 2, and 3 and Table 1 show locations of surveyed stream reaches in Bear Creek, North Fork Lake Fork Creek, and Boulder Creek.

North Fork Payette River above Payette Lake

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

Table 1. Estimated total kokanee spawning run size and biomass from 1988 through 2002 from Payette Lake.

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

[a]Estimate made from stream and weir counts (Frost and Bennett, 1994)
[b]From gill net data of captured spawners in Payette Lake during lake survey.
[c]From trawling collections made in September 1996.
[d]Includes 2,092 fish spawned and killed by Nampa Fish Hatchery.
[e]Does not include 3,000 fish spawned and killed by Nampa Fish Hatchery.
[f]Includes 3,000 fish spawned and killed by Nampa Fish Hatchery.

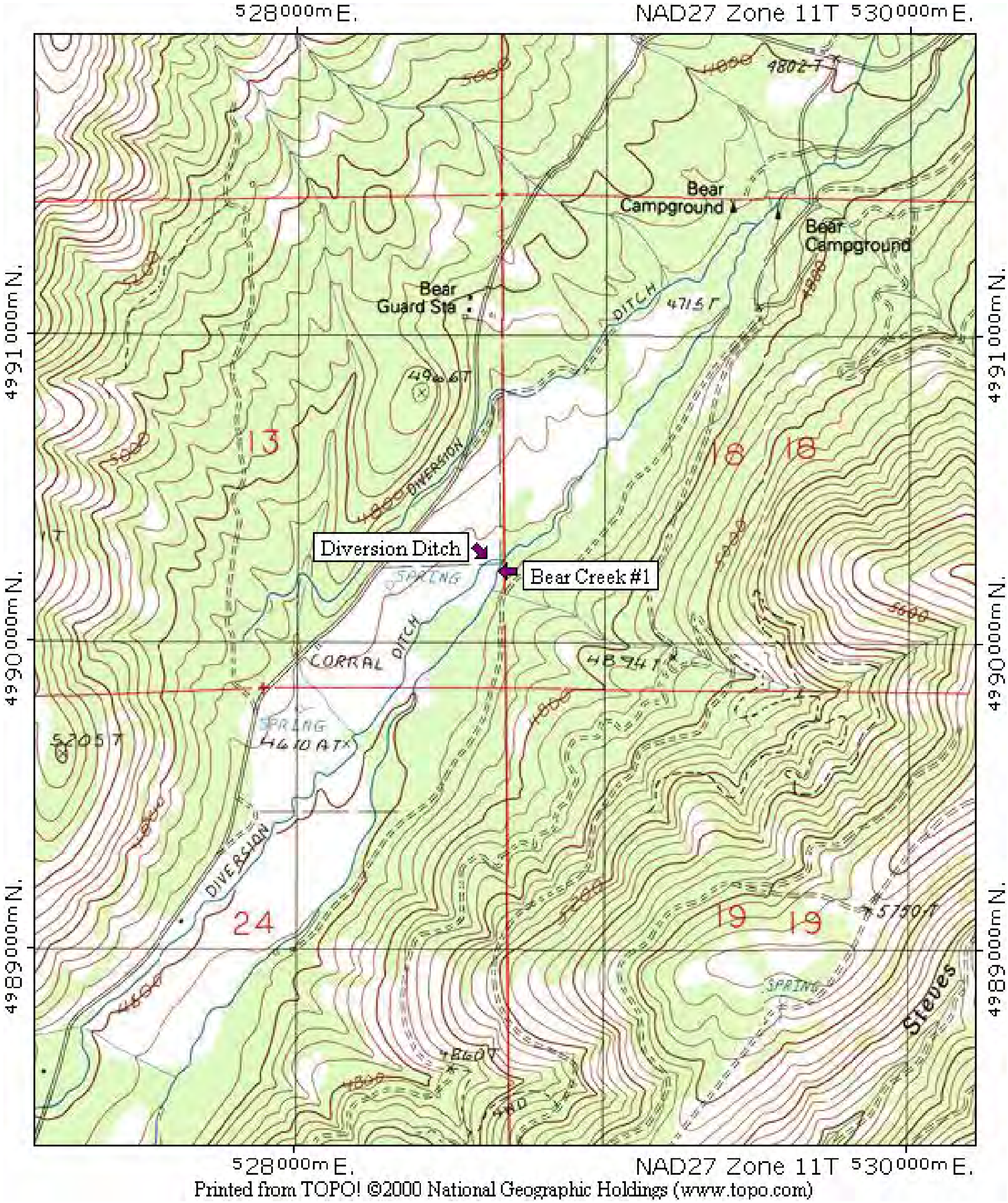


Figure 1. Locations of stream surveys completed in Bear Creek drainage, 2002.

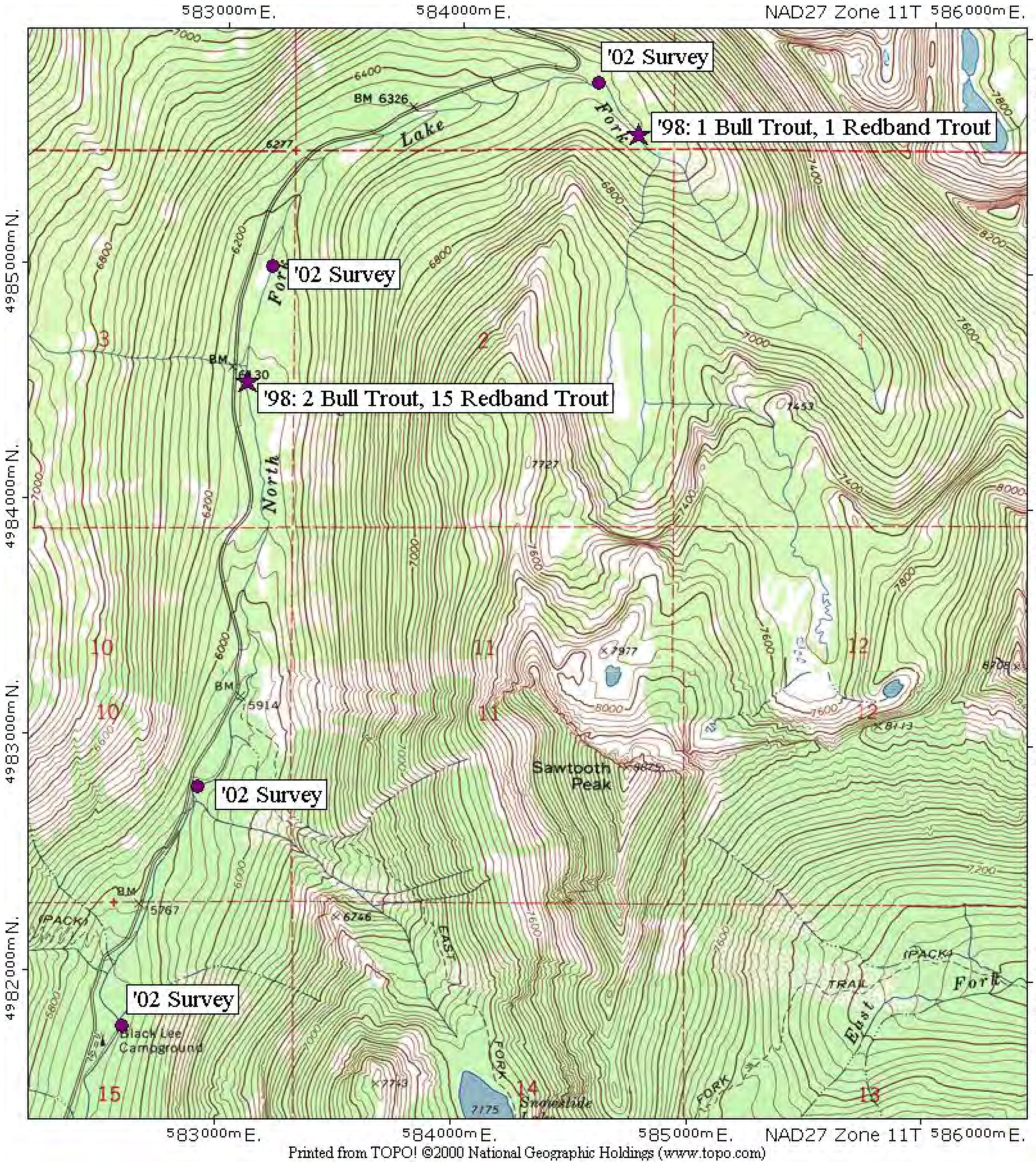


Figure 2. A comparison of fish population surveys that were completed in North Fork Lake Fork Creek (tributary to North Fork Payette River) by IDFG in 1998 and 2002. All sites surveyed in 2002 supported redband trout and brook trout only.

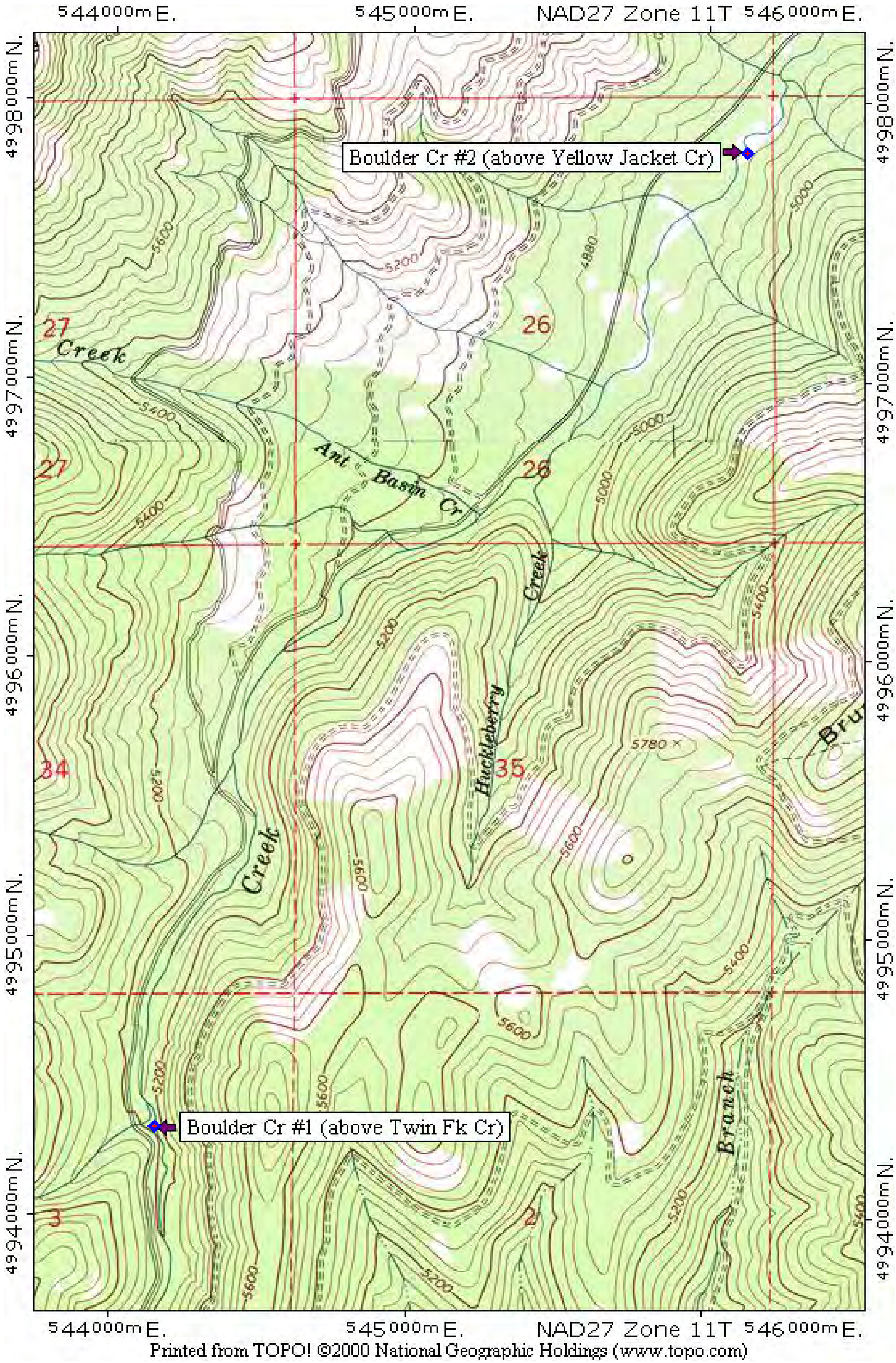


Figure 3. Locations of stream surveys completed in Boulder Creek, 2002

RESULTS

Temperature Monitoring in the Little Salmon River Drainage and North Fork Payette River

The LSR temperature recorder at Station 1, that was placed under the Highway 95 bridge was either taken or came loose. Figure 4 shows daily mean, minimum, and maximum stream temperatures for the remaining Station 2 in LSR and the station in Mud Creek. Figure 5 shows temperature data for the NFPR station. Appendix A shows each daily mean, minimum, and maximum temperature for all three stations.

Summer stream temperatures in the LSR continue to be high, with daily mean temperatures exceeding 20^{o}C consistently throughout July. High temperatures in Mud Creek were less severe with daily means exceeding 20^{o}C on ten days. Summer stream temperatures in the NFPR remain adequate for rainbow trout rearing. Daily mean temperature reached a high of 21^{o}C on one day only.

Standard Stream Surveys

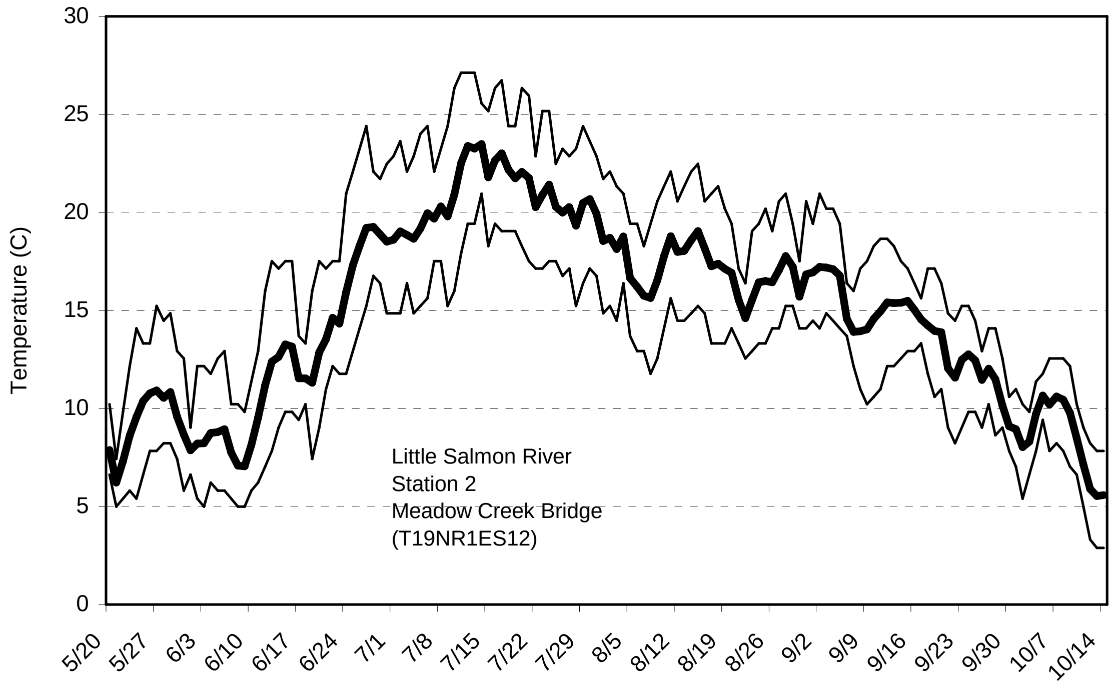
Both redband trout *O. mykiss gairdneri* and brook trout *X Salvelinus fontinalis* were sampled in all sites surveyed in Bear Creek and North Fork Lake Fork Creek (Tables 2, 3, 4). Bull trout were not found during these surveys.

Meyer (1999) documented three bull trout in the North Fork Lake Fork Creek in two sample sites. The sites also contained brook trout in abundance and redband trout. The capture of bull trout in 1998 has not been repeated by sampling in 2000 (Dave Burns PNF; pers. comm.) and this survey. The sites in 2002 were not identical to the 1998 sites.

Resident rainbow trout and brook trout were abundant in both sites surveyed in upper Boulder Creek. We sampled bull trout in the downstream site only. Fin samples were collected from two possible bull trout x brook trout hybrids *Salvelinus confluentus X Salvelinus fontinalis*, two bull trout, and two unknown salmonid fry. These samples will be analyzed through the Payette National Forest (Dale Olson, personal communication).

North Fork Payette River above Payette Lake

Kokanee spawners were counted three times from September 1 through September 9, 2002. The peak count of 9,430 live fish was made on September 9, 2002 (Table 1). The total spawning run estimate was 16,314 (9,430*1.73) fish. This was the second lowest spawner count since 1989 and 1990. No weights or lengths were recorded but size of fish was noted to be significantly larger than the past several years.



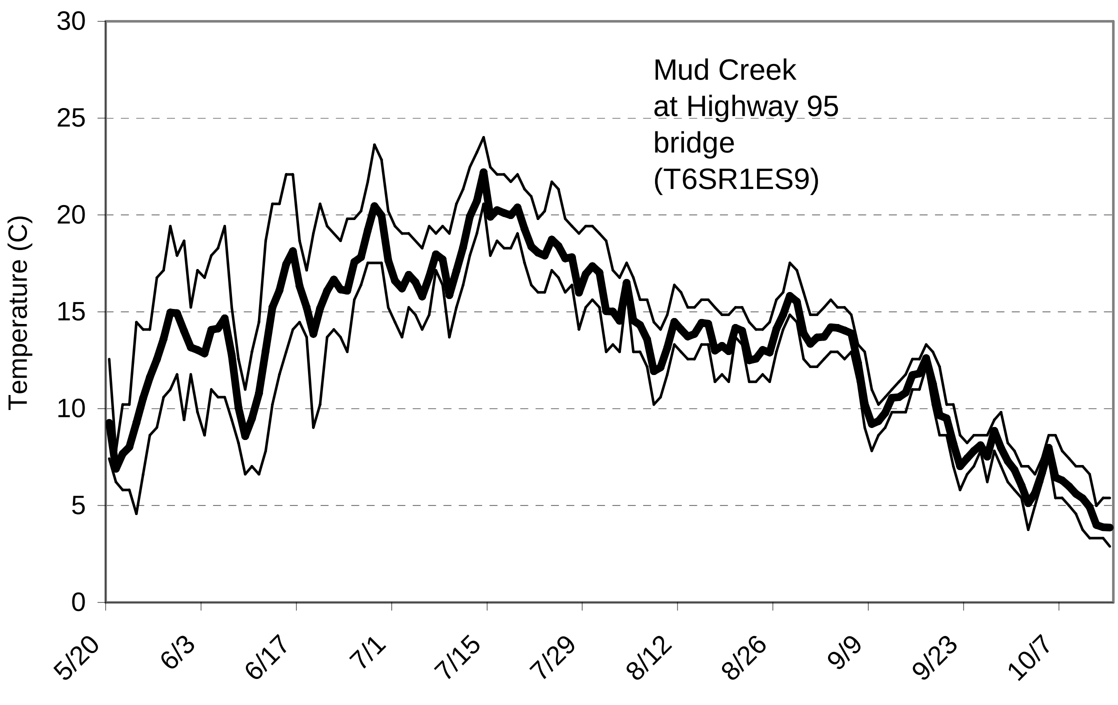


Figure 4. Mean, maximum, and minimum daily water temperatures in the upper Little Salmon River drainage, 2002.

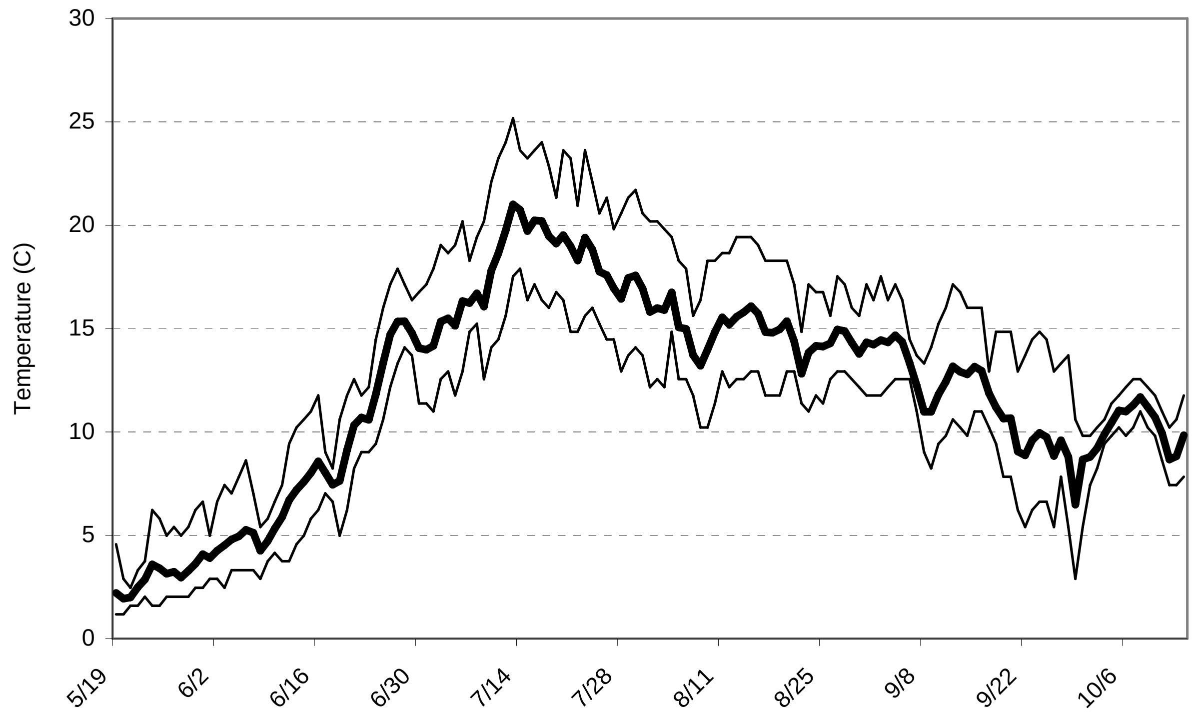


Figure 5. Mean, maximum, and minimum daily water temperatures in the upper North Fork Payette River, at the USGS gauge downstream from Fishery Creek, 2002.

Table 2. Locations and species documented in stream sections surveyed, 2002.

Stream	Site Name	Location (UTM E/N, NAD27)	Species Presence		
			Bull trout	Rainbow trout	Brook trout
Bear Creek	Bear Creek #1	528669/4990258		X	X
	Bear Diversion Ditch	528646/4990268		X	X
North Fork Lake Fork Creek	N Fork Lake Fork#1	582598/4981755		X	X
	N Fork Lake Fork#2	582896/4982780		X	X
	N Fork Lake Fork#3	583225/4984986		X	X
	N Fork Lake Fork#4	584563/4985785		X	X
Boulder Creek	Boulder Cr #1	544147/4994317	X	X	X
	Boulder Cr #2	546120/4997820		X	X

Table 3. Estimates of salmonid abundance in streams surveyed by McCall staff, 2002.

Transect site	Transect length (m)	Fish species	Estimated #/transect +/- 95% CI	Estimated #/m^2
Bear Creek #1	55.79	Rainbow	11	.20
Bear Creek #1	55.79	Brook	64.8+/- 102.14	1.17
Bear Diversion Ditch	36.59	Rainbow	3 [a]	.08 [a]
Bear Diversion Ditch	36.59	Brook	11 [a]	.30 [a]
N Fork Lake Fork#1	66.5	Rainbow	11 [a]	.17 [a]
N Fork Lake Fork#1	66.5	Brook	7 [a]	.11 [a]
N Fork Lake Fork#2	72.6	Rainbow	25 [a]	.34 [a]
N Fork Lake Fork#2	72.6	Brook	5 [a]	.07 [a]
N Fork Lake Fork#3	72	Rainbow	12 [a]	.17 [a]
N Fork Lake Fork#3	72	Brook	10 [a]	.14 [a]
N Fork Lake Fork#4	72.9	Rainbow	12 [a]	.16 [a]
N Fork Lake Fork#4	72.9	Brook	11 [a]	.15 [a]
Boulder Cr #1	74.9	Rainbow	156 +/- 436	.40
Boulder Cr #1	74.9	Brook	210 +/- 653	.54
Boulder Cr #2	77.0	Rainbow	29 +/- 29	.07
Boulder Cr #2	77.0	Bull	16 +/- 62	.04
Boulder Cr #2	77.0	Brook	48 +/- 11	.12

[a] One pass

Table 4. Length frequencies of salmonids collected from streams surveyed in 2002.

Stream	Species	Number of fish collected per length group (mm)																						
		30-39	40-49	50-59	60-69	70-79	80-89	90-99	100-109	110-119	120-129	130-139	140-149	150-159	160-169	170-179	180-189	190-199	200-209	210-219	220-229	230-239	240-249	250-259
Bear Creek #1	RBT	0	0	0	0	0	0	2	3	0	0	1	2	1	0	0	1	0	0	0	0	0	0	1
	BRK	0	0	0	0	0	0	2	4	3	4	2	4	7	0	2	0	2	1	0	0	0	0	0
Bear Diversion Ditch	RBT	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0
	BRK	0	0	2	1	0	0	0	0	5	0	1	1	0	0	0	0	1	0	0	0	0	0	0
NF Lake Fork Cr #1	RBT	0	0	0	0	0	1	1	1	2	1	1	0	3	1	0	0	0	0	0	0	0	0	0
	BRK	0	0	0	1	0	0	0	0	0	1	2	1	1	1	0	0	0	0	0	0	0	0	0
NF Lake Fork Cr #2	RBT	0	0	0	0	5	2	3	1	5	3	1	2	1	0	0	1	1	0	0	0	0	0	0
	BRK	0	0	0	0	0	1	0	0	0	0	0	1	1	2	0	0	0	0	0	0	0	0	0
NF Lake Fork Cr #3	RBT	0	0	0	0	1	1	2	1	2	0	0	0	4	0	0	0	0	0	1	0	0	0	0
	BRK	0	0	1	0	0	1	2	1	2	0	1	1	0	0	0	1	0	0	0	0	0	0	0
NF Lake Fork Cr #4	RBT	0	0	1	0	0	2	4	2	0	0	1	1	0	0	0	0	1	0	0	0	0	0	0
	BRK	0	0	0	0	0	1	1	0	1	1	3	1	0	1	0	1	1	0	0	0	0	0	0
Boulder Cr #1	RBT	1	2	1	1	5	10	4	7	4	4	3	2	1	0	0	1	0	0	0	0	0	0	0
	BKT	0	1	30	12	0	0	1	3	2	0	0	2	2	0	0	1	0	0	0	0	0	0	0
Boulder Cr #2	RBT	0	0	0	0	0	2	1	1	4	2	1	3	0	2	0	2	0	0	0	0	0	0	1
	BULL	0	0	0	0	0	0	0	1	2	0	0	1	1	1	0	1	0	0	0	0	0	0	0
	BKT	0	0	8	12	2	0	0	3	3	5	2	0	1	0	1	1	0	0	2	0	0	0	0

RECOMMENDATIONS

1. Continue temperature monitoring of McCall sub-regional waters.

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

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

4. Conduct stream surveys in the North Fork Lake Fork Creek to document the presence of bull trout every five years to comply with the “Bull Trout Plan” of the USFWS.

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

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APPENDICES

Appendix A. Daily mean, minimum, and maximum stream temperatures, 2002.

Little Salmon River at Meadow Creek Bridge, 2002											
Date	Mean	Min	Max	Date	Mean	Min	Max	Date	Mean	Min	Max
				7/8	20.3	17.5	23.2	8/27	17.1	14.1	20.6
5/20	7.9	6.6	10.2	7/9	19.8	15.2	24.4	8/28	17.8	15.2	21.0
5/21	6.2	5.0	7.4	7/10	20.9	16.0	26.3	8/29	17.2	15.2	19.4
5/22	7.3	5.4	9.8	7/11	22.5	17.9	27.1	8/30	15.7	14.1	17.5
5/23	8.6	5.8	12.2	7/12	23.4	19.4	27.1	8/31	16.8	14.1	20.6
5/24	9.6	5.4	14.1	7/13	23.3	19.4	27.1	9/1	16.9	14.5	19.4
5/25	10.4	6.6	13.3	7/14	23.5	21.0	25.6	9/2	17.2	14.1	21.0
5/26	10.8	7.8	13.3	7/15	21.8	18.3	25.2	9/3	17.2	14.9	20.2
5/27	10.9	7.8	15.2	7/16	22.6	19.4	26.3	9/4	17.1	14.5	20.2
5/28	10.5	8.2	14.5	7/17	23.0	19.0	26.7	9/5	16.8	14.1	19.4
5/29	10.8	8.2	14.9	7/18	22.2	19.0	24.4	9/6	14.6	13.7	16.4
5/30	9.6	7.4	12.9	7/19	21.7	19.0	24.4	9/7	13.9	12.2	16.0
5/31	8.7	5.8	12.6	7/20	22.1	18.3	26.3	9/8	13.9	11.0	17.1
6/1	7.9	6.6	9.0	7/21	21.8	17.5	26.0	9/9	14.0	10.2	17.5
6/2	8.2	5.4	12.2	7/22	20.3	17.1	22.9	9/10	14.6	10.6	18.3
6/3	8.2	5.0	12.2	7/23	20.9	17.1	25.2	9/11	15.0	11.0	18.7
6/4	8.7	6.2	11.8	7/24	21.4	17.5	25.2	9/12	15.4	12.2	18.7
6/5	8.8	5.8	12.6	7/25	20.3	17.5	22.5	9/13	15.4	12.2	18.3
6/6	8.9	5.8	12.9	7/26	20.0	16.8	23.2	9/14	15.4	12.6	17.5
6/7	7.8	5.4	10.2	7/27	20.3	17.1	22.9	9/15	15.5	12.9	17.1
6/8	7.1	5.0	10.2	7/28	19.3	15.2	23.2	9/16	15.0	12.9	16.4
6/9	7.0	5.0	9.8	7/29	20.5	16.4	24.4	9/17	14.5	13.3	15.6
6/10	8.1	5.8	11.4	7/30	20.7	17.1	23.6	9/18	14.2	11.8	17.1
6/11	9.5	6.2	12.9	7/31	19.9	16.8	22.9	9/19	13.9	10.6	17.1
6/12	11.2	7.0	16.0	8/1	18.5	14.9	21.7	9/20	13.9	11.0	16.4
6/13	12.4	7.8	17.5	8/2	18.7	15.2	22.1	9/21	12.1	9.0	14.9
6/14	12.6	9.0	17.1	8/3	18.1	14.5	21.3	9/22	11.6	8.2	14.5
6/15	13.3	9.8	17.5	8/4	18.8	16.4	21.0	9/23	12.5	9.0	15.2
6/16	13.1	9.8	17.5	8/5	16.7	13.7	19.4	9/24	12.8	9.8	15.2
6/17	11.5	9.4	13.7	8/6	16.2	12.9	19.4	9/25	12.5	9.8	14.5
6/18	11.5	10.2	13.3	8/7	15.8	12.9	18.3	9/26	11.5	9.0	12.9
6/19	11.3	7.4	16.0	8/8	15.6	11.8	19.4	9/27	12.0	10.2	14.1
6/20	12.9	9.0	17.5	8/9	16.5	12.6	20.6	9/28	11.5	8.6	14.1
6/21	13.5	11.0	17.1	8/10	17.8	14.1	21.3	9/29	10.2	9.0	12.6
6/22	14.6	12.2	17.5	8/11	18.8	15.6	22.1	9/30	9.1	7.8	10.6
6/23	14.3	11.8	17.5	8/12	18.0	14.5	20.6	10/1	8.9	7.0	11.0
6/24	15.9	11.8	21.0	8/13	18.0	14.5	21.3	10/2	8.0	5.4	10.2
6/25	17.3	12.9	22.1	8/14	18.6	14.9	22.1	10/3	8.3	6.6	9.8
6/26	18.3	14.1	23.2	8/15	19.0	15.2	22.5	10/4	9.7	7.8	11.4
6/27	19.2	15.2	24.4	8/16	18.2	14.9	20.6	10/5	10.7	9.4	11.8
6/28	19.3	16.8	22.1	8/17	17.3	13.3	21.0	10/6	10.2	7.8	12.6
6/29	18.9	16.4	21.7	8/18	17.4	13.3	21.3	10/7	10.6	8.2	12.6
6/30	18.5	14.9	22.5	8/19	17.1	13.3	20.2	10/8	10.4	7.8	12.6
7/1	18.6	14.9	22.9	8/20	16.9	14.1	19.4	10/9	9.8	7.0	12.2
7/2	19.0	14.9	23.6	8/21	15.5	13.3	17.1	10/10	8.5	6.6	10.2
7/3	18.8	16.4	22.1	8/22	14.6	12.6	16.4	10/11	7.1	5.0	9.0
7/4	18.6	14.9	22.9	8/23	15.5	12.9	19.0	10/12	5.9	3.3	8.2
7/5	19.2	15.2	24.0	8/24	16.4	13.3	19.4	10/13	5.5	2.9	7.8
7/6	20.0	15.6	24.4	8/25	16.5	13.3	20.2	10/14	5.6	2.9	7.8

Appendix A. Continued.

Mud Creek, at Hwy 95 bridge (tributary to Little Salmon River), 2002														
Date	Mean	Min	Max		Date	Mean	Min	Max		Date	Mean	Min	Max
5/20	9.3	7.4	12.6		7/12	19.9	17.9	22.5		9/3	14.2	12.9	15.6
5/21	6.9	6.2	7.8		7/13	20.7	19.0	23.2		9/4	14.2	12.9	15.2
5/22	7.7	5.8	10.2		7/14	22.2	20.6	24.0		9/5	14.0	12.6	15.2
5/23	8.0	5.8	10.2		7/15	19.9	17.9	22.5		9/6	13.9	12.9	14.9
5/24	9.3	4.6	14.5		7/16	20.2	18.7	22.1		9/7	12.4	11.4	13.3
5/25	10.5	6.6	14.1		7/17	20.1	18.3	22.1		9/8	10.2	9.0	12.9
5/26	11.6	8.6	14.1		7/18	20.0	18.3	21.7		9/9	9.2	7.8	11.0
5/27	12.5	9.0	16.8		7/19	20.4	19.0	22.1		9/10	9.3	8.6	10.2
5/28	13.6	10.6	17.1		7/20	19.3	17.5	21.3		9/11	9.8	9.0	10.6
5/29	15.0	11.0	19.4		7/21	18.4	16.4	21.0		9/12	10.6	9.8	11.0
5/30	14.9	11.8	17.9		7/22	18.1	16.0	19.8		9/13	10.6	9.8	11.4
5/31	14.0	9.4	18.7		7/23	17.9	16.0	20.2		9/14	10.8	9.8	11.8
6/1	13.2	11.8	15.2		7/24	18.7	17.1	21.7		9/15	11.7	11.0	12.6
6/2	13.0	9.8	17.1		7/25	18.4	16.8	21.3		9/16	11.8	11.0	12.6
6/3	12.9	8.6	16.8		7/26	17.8	16.0	19.8		9/17	12.6	12.2	13.3
6/4	14.1	11.0	17.9		7/27	17.8	16.4	19.4		9/18	11.3	10.2	12.9
6/5	14.1	10.6	18.3		7/28	16.0	14.1	19.0		9/19	9.7	8.6	12.2
6/6	14.7	10.6	19.4		7/29	16.9	15.2	19.4		9/20	9.5	8.6	10.2
6/7	12.8	9.4	15.2		7/30	17.4	15.6	19.4		9/21	8.2	7.0	10.2
6/8	10.0	8.2	12.6		7/31	17.0	15.2	19.0		9/22	7.0	5.8	8.6
6/9	8.6	6.6	11.0		8/1	15.0	12.9	18.7		9/23	7.4	6.6	8.2
6/10	9.5	7.0	12.9		8/2	15.0	13.3	17.1		9/24	7.8	7.0	8.6
6/11	10.8	6.6	14.5		8/3	14.5	12.9	16.8		9/25	8.1	7.8	8.6
6/12	13.0	7.8	18.7		8/4	16.5	16.0	17.5		9/26	7.5	6.2	8.6
6/13	15.2	10.2	20.6		8/5	14.5	12.9	16.8		9/27	8.9	7.8	9.4
6/14	16.1	11.8	20.6		8/6	14.3	12.9	15.6		9/28	8.0	7.0	9.8
6/15	17.5	12.9	22.1		8/7	13.6	12.2	15.6		9/29	7.3	6.2	8.2
6/16	18.1	14.1	22.1		8/8	11.9	10.2	14.5		9/30	6.8	5.8	7.8
6/17	16.3	14.5	18.7		8/9	12.1	10.6	14.1		10/1	6.0	5.4	7.0
6/18	15.2	13.7	17.1		8/10	13.2	11.8	14.9		10/2	5.1	3.7	7.0
6/19	13.9	9.0	19.0		8/11	14.5	13.3	16.4		10/3	5.6	5.0	6.6
6/20	15.2	10.2	20.6		8/12	14.1	12.9	16.0		10/4	6.7	6.2	7.4
6/21	16.1	13.7	19.4		8/13	13.7	12.6	15.2		10/5	8.0	7.4	8.6
6/22	16.7	14.1	19.0		8/14	13.9	12.6	15.2		10/6	6.5	5.4	8.6
6/23	16.2	13.7	18.7		8/15	14.4	13.3	15.6		10/7	6.3	5.4	7.8
6/24	16.1	12.9	19.8		8/16	14.4	13.3	15.6		10/8	6.0	5.0	7.4
6/25	17.6	15.6	19.8		8/17	13.0	11.4	15.2		10/9	5.6	4.6	7.0
6/26	17.8	16.4	20.2		8/18	13.3	11.8	14.9		10/10	5.4	3.7	7.0
6/27	19.2	17.5	21.7		8/19	13.0	11.4	14.9		10/11	4.9	3.3	6.6
6/28	20.5	17.5	23.6		8/20	14.2	13.7	15.2		10/12	4.0	3.3	5.0
6/29	20.0	17.5	22.9		8/21	14.0	13.3	15.2		10/13	3.9	3.3	5.4
6/30	17.7	15.2	20.2		8/22	12.5	11.4	14.5		10/14	3.9	2.9	5.4
7/1	16.6	14.5	19.4		8/23	12.6	11.4	14.1					
7/2	16.2	13.7	19.0		8/24	13.0	11.8	14.1					
7/3	16.9	15.2	19.0		8/25	12.9	11.4	14.5					
7/4	16.5	14.9	18.7		8/26	14.1	12.9	15.6					
7/5	15.8	14.1	18.3		8/27	14.8	14.1	16.0					
7/6	16.8	14.9	19.4		8/28	15.8	14.9	17.5					
7/7	18.0	17.1	19.0		8/29	15.5	14.5	17.1					

Appendix A. Continued.

North Fork Payette River, at gauging station downstream from Fisher Creek, 2002														
Date	Mean	Min	Max		Date	Mean	Min	Max		Date	Mean	Min	Max
5/20	1.9	1.2	2.9		7/9	16.1	12.6	20.2		8/27	15.0	12.9	17.5
5/21	2.0	1.6	2.5		7/10	17.8	14.1	22.1		8/28	14.9	12.9	17.1
5/22	2.5	1.6	3.3		7/11	18.6	14.5	23.2		8/29	14.3	12.6	16.0
5/23	2.9	2.0	3.7		7/12	19.7	15.6	24.0		8/30	13.8	12.2	15.6
5/24	3.6	1.6	6.2		7/13	21.0	17.5	25.2		8/31	14.3	11.8	17.1
5/25	3.4	1.6	5.8		7/14	20.7	17.9	23.6		9/1	14.2	11.8	16.4
5/26	3.1	2.0	5.0		7/15	19.7	16.4	23.2		9/2	14.4	11.8	17.5
5/27	3.2	2.0	5.4		7/16	20.2	17.1	23.6		9/3	14.3	12.2	16.4
5/28	3.0	2.0	5.0		7/17	20.2	16.4	24.0		9/4	14.7	12.6	17.1
5/29	3.3	2.0	5.4		7/18	19.5	16.0	22.9		9/5	14.3	12.6	16.4
5/30	3.6	2.5	6.2		7/19	19.1	16.8	21.3		9/6	13.3	12.6	14.5
5/31	4.1	2.5	6.6		7/20	19.5	16.4	23.6		9/7	12.2	11.0	13.7
6/1	3.9	2.9	5.0		7/21	19.0	14.9	23.2		9/8	11.0	9.0	13.3
6/2	4.3	2.9	6.6		7/22	18.3	14.9	21.0		9/9	11.0	8.2	14.1
6/3	4.5	2.5	7.4		7/23	19.4	15.6	23.6		9/10	11.8	9.4	15.2
6/4	4.8	3.3	7.0		7/24	18.8	16.0	22.1		9/11	12.4	9.8	16.0
6/5	5.0	3.3	7.8		7/25	17.8	15.2	20.6		9/12	13.2	10.6	17.1
6/6	5.3	3.3	8.6		7/26	17.6	14.5	21.3		9/13	12.9	10.2	16.8
6/7	5.1	3.3	7.0		7/27	17.0	14.5	19.8		9/14	12.8	9.8	16.0
6/8	4.3	2.9	5.4		7/28	16.4	12.9	20.6		9/15	13.2	11.0	16.0
6/9	4.7	3.7	5.8		7/29	17.4	13.7	21.3		9/16	13.0	11.0	16.0
6/10	5.3	4.2	6.6		7/30	17.6	14.1	21.7		9/17	11.9	10.2	12.9
6/11	5.9	3.7	7.4		7/31	16.9	13.7	20.6		9/18	11.2	9.4	14.9
6/12	6.7	3.7	9.4		8/1	15.8	12.2	20.2		9/19	10.6	7.8	14.9
6/13	7.2	4.6	10.2		8/2	16.0	12.6	20.2		9/20	10.7	7.8	14.9
6/14	7.6	5.0	10.6		8/3	15.9	12.2	19.8		9/21	9.1	6.2	12.9
6/15	8.0	5.8	11.0		8/4	16.7	14.9	19.4		9/22	8.9	5.4	13.7
6/16	8.6	6.2	11.8		8/5	15.1	12.6	18.3		9/23	9.6	6.2	14.5
6/17	8.0	7.0	9.0		8/6	15.0	12.6	17.9		9/24	9.9	6.6	14.9
6/18	7.4	6.6	8.2		8/7	13.7	11.8	15.6		9/25	9.7	6.6	14.5
6/19	7.6	5.0	10.6		8/8	13.2	10.2	16.4		9/26	8.8	5.4	12.9
6/20	9.1	6.2	11.8		8/9	14.0	10.2	18.3		9/27	9.6	7.8	13.3
6/21	10.3	8.2	12.6		8/10	14.8	11.4	18.3		9/28	8.8	5.4	13.7
6/22	10.7	9.0	11.8		8/11	15.5	12.9	18.7		9/29	6.5	2.9	10.6
6/23	10.6	9.0	12.2		8/12	15.2	12.2	18.7		9/30	8.7	5.4	9.8
6/24	11.8	9.4	14.5		8/13	15.6	12.6	19.4		10/1	8.8	7.4	9.8
6/25	13.3	10.6	16.0		8/14	15.8	12.6	19.4		10/2	9.2	8.2	10.2
6/26	14.7	12.2	17.1		8/15	16.1	12.9	19.4		10/3	9.9	9.4	10.6
6/27	15.3	13.3	17.9		8/16	15.7	12.9	19.0		10/4	10.5	9.8	11.4
6/28	15.4	14.1	17.1		8/17	14.8	11.8	18.3		10/5	11.0	10.2	11.8
6/29	14.8	13.7	16.4		8/18	14.8	11.8	18.3		10/6	11.0	9.8	12.2
6/30	14.0	11.4	16.8		8/19	15.0	11.8	18.3		10/7	11.3	10.2	12.6
7/1	14.0	11.4	17.1		8/20	15.4	12.9	18.3		10/8	11.7	11.0	12.6
7/2	14.2	11.0	17.9		8/21	14.4	12.9	17.1		10/9	11.2	10.2	12.2
7/3	15.3	12.6	19.0		8/22	12.8	11.4	14.9		10/10	10.7	9.8	11.8
7/4	15.5	12.9	18.7		8/23	13.8	11.0	17.1		10/11	9.9	8.6	11.0

Appendix B. A segment of the 2000 annual report that was mistakenly omitted from Anderson et al. 2002. Little Salmon River drainage temperatures in 2000 and South Fork Salmon River Guided Fisheries (pages 90-106)

ABSTRACT

Temperature recorders monitored the upper Little Salmon River drainage throughout the summer of 2000. Mean daily temperatures peaked at 22.8°C in early August. The highest daily temperature recorded was 26.7°C. The highest minimum daily temperature was 19.6°C, with only one occurrence. Summer river temperatures were noticeably higher than in 1999. A summary is presented of temperature data collected since 1994.

Wapiti Meadows Ranch Outfitters guided anglers in a three-mile section of the South Fork Salmon River below the confluence with the Secesh River. All fishing was catch-and-release. Steelhead/redband trout, cutthroat trout, bull trout, and juvenile Chinook salmon were reported in the catch. Catch rates for all species combined are reported. A summary is presented of this guided angling activity since 1994.

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OBJECTIVES

The objective of this project is to maintain information for fishery management of rivers and streams.

INTRODUCTION

Temperature Monitoring in the upper Little Salmon Drainage

The upper Little Salmon River (LSR) drainage is the focus of ongoing riparian habitat improvement projects, and some improvements in agricultural land use practices. Debate has risen regarding what specific factors limit salmonid populations within the drainage. The effect of high summer water temperature, as a factor limiting salmonid abundance and distribution in the drainage is unknown. Monitoring began in 1994.

South Fork Salmon River Guided Fishery

Since 1994, Wapiti Meadows Ranch has guided catch-and-release-fishing trips on a section of the South Fork Salmon River (SFSR) from Hamilton Creek to Three-Mile Creek, downriver from the confluence with the Secesh River, along with the East Fork of the South Fork (EFSFSR) and Johnson Creek. The Outfitter is required to report effort and catch. Annual reports will allow us to track trends within this fishery.

METHODS

Stream Temperature Monitoring in the upper Little Salmon River

Three Hobo temperature recorders (Onset model HTI –5°C to +35°C) monitored water temperature continuously, recording a temperature every 2.4 hours from June 10, through September 28, 2000. The upstream recorder, Station 1, was placed under the bridge on Hubbard Lane, approximately 500 m upstream from the irrigation diversion and Highway 95 (Figure 1). Station 2 was approximately 50 m downstream from Meadow Creek Subdivision Bridge, adjacent to Highway 95 road mile 163.4 and at 45° N latitude. The third recorder was placed in Mud Creek, a headwater tributary to the LSR, immediately below the confluence with Little Mud Creek, under the Highway 95 bridge.

All recorders were in waterproof Onset model containers and secured by cable to a cinder block. The cinder block was placed in the stream and cabled to the shore. Recorders were checked monthly. Protocol described by Zaroban (1999) was followed to calibrate readers prior to use. Air temperature data collected at New Meadows Ranger Station was obtained to further evaluate stream temperatures.

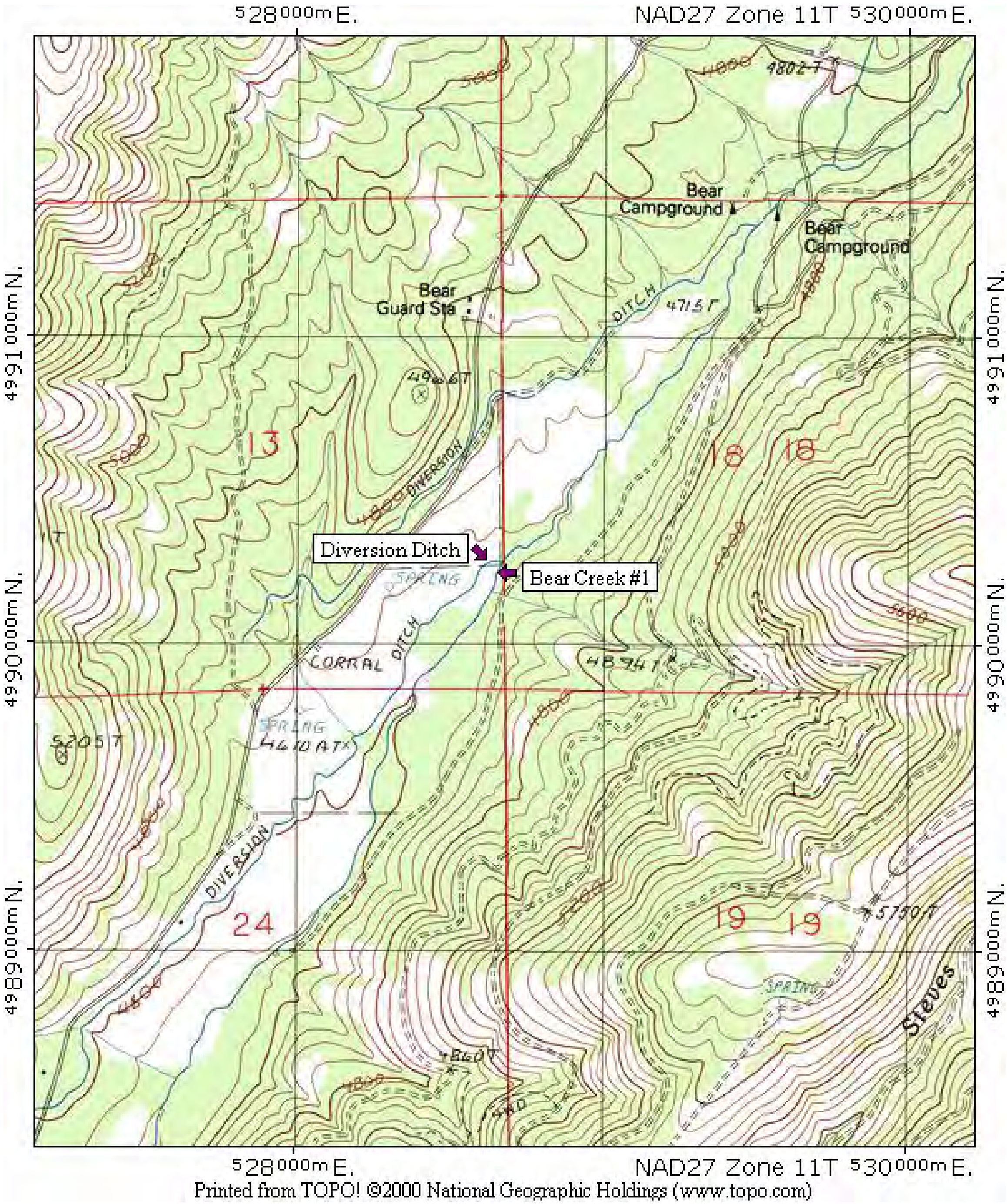

Figure 1. Locations of stream surveys completed in Bear Creek drainage, 2002.

South Fork Salmon River Guided Fishery

We provided Wapiti Meadows Ranch with angler diaries made specifically for monitoring this fishery. Guides were asked to have clients record hours fished, species caught, and fish length to the nearest inch. There was space provided for comments, and an opportunity for the anglers to have his or her diary returned after analysis.

RESULTS

Stream Temperature Monitoring in the upper Little Salmon River drainage

Temperature summaries for upper LSR and Mud Creek, from June through September are shown in (Table 1). Daily means, maximums and minimums are shown, with daily minimum and maximum air temperatures in Figure 2 and Appendix A. Temperatures exceeding 20°C for more than six hours per-day occurred from June 22 through August 25. In 2000, only data from LSR Station 2 and Mud Creek were obtained. Station 1 was vandalized.

South Fork Salmon River Guided Fishery

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Idaho Fish and Game received information from guided fishing trips that took place from July through September in 1994 through 1999. Steelhead/redband trout *Oncorhynchus mykiss gairdneri*, westslope cutthroat trout *Oncorhynchus clarkii lewisi*, and mountain whitefish *Prosopium williamsoni* were reported in the catch (Tables 2 and 3). Catch rates for all species combined are calculated and reported in Table 4. Steelhead/redband trout ≤254 mm continued to dominate the catch through all years sampled. Data for the year 2000 had not been received by the writing of this report.

DISCUSSION

Stream Temperature Monitoring in the upper Little Salmon River

Little Salmon River temperatures in 2000 were comparable to 1998, with high temperatures starting in June, continuing through July, and into late August (Figures 3 and 4). Mean temperatures were higher in 2000 and 1998, than in 1994, 1995, 1996, and 1999 (Janssen et al. 2000a, 2000b, 2000c, and 2001a, 2001b). Figure 5 describes the among year and between site comparisons by showing the percent of days stream temperature exceeded 20°C for six hours or longer.

Mud Creek is a headwater tributary to the LSR. Our temperature recorder is located within a riparian enclosure on land owned by Boise Cascade Corporation. Average temperatures in summer 2000 were lower than in 1999, 1998, and 1996. Air and water temperatures for Mud Creek and LSR were graphed to show possible trends. Mean temperatures for both streams are very similar from 1996-1999. In 2000, however, Mud Creek was consistently several degrees cooler than LSR. This decrease in temperature occurred in a year when air temperatures were relatively high and water levels were relatively low.

Table 1. Average monthly temperature range, number of days in excess of 20°C for more than 6 hrs, maximum, and highest minimum summer temperatures observed in the Little Salmon River and Mud Creek, 2000.

Month	Little Salmon		Mud Creek	
	Highest daily mean temperature	Highest daily minimum temperature	Highest daily mean temperatur e	Highest daily minimum temperature
June	20.4	16.3	19.0	15.2
July	22.2	19.0	19.9	17.8
August	22.8	19.6	20.6	19.0
September	16.9	15.6	16.2	15.2
Percent of days in June, July, and August that temperature exceeded 20°C for more than or equal to 6 hrs.	83%		59%	
Summer maximum temperature °C	26.7		23.6	
Summer high minimum temperature °C	19.6		19	

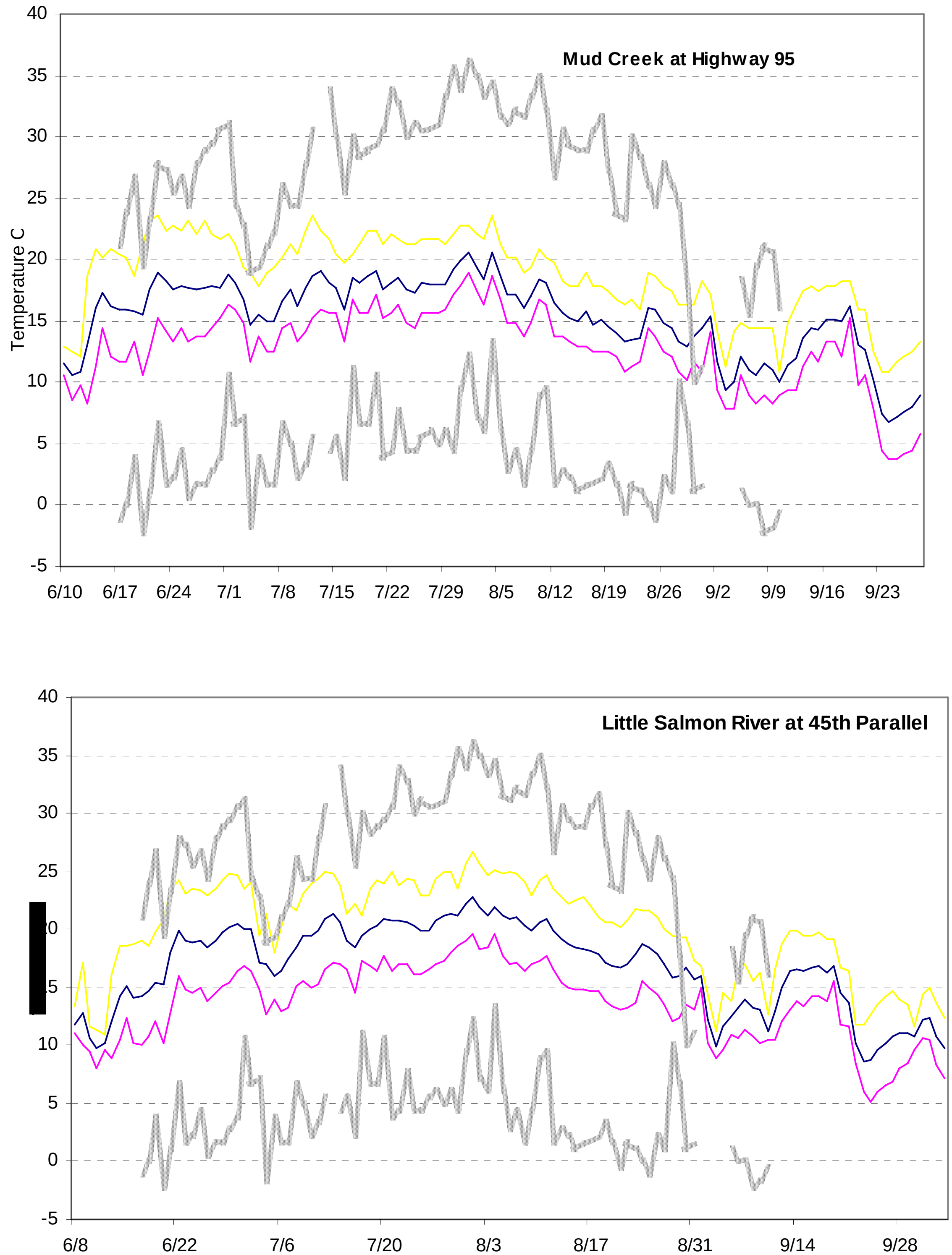


Figure 2. Daily minimum, mean and maximum water temperatures (black lines) in Little Salmon River and Mud Creek, 2000. Gray lines illustrate minimum and maximum air temperatures taken at New Meadows Ranger Station.

Table 2. Numbers of steelhead trout and redband trout caught during guided fly-fishing trips on the South Fork, East Fork South Fork, and Johnson Creek. Length groups were developed to separate larger redband trout from steelhead parr. Data for the year 2000 has not been received from Wapiti Outfitters, therefore is not available

Year	South Fork		East Fork South Fork		Johnson Creek	
	Total Length		Total Length		Total Length	
	≤ 254 mm	≥ 255 mm	≤ 254 mm	≥ 255 mm	≤ 254 mm	≥ 255 mm
1994	15	6	---	---	---	---
1995	186	25	71	5	---	---
1996	220	44	98	4	23	3
1997	222	14	29	4	2	0
1998	56	12	---	---	---	---
1999	48	11	---	---	---	---
2000	---	---	---	---	---	---

Table 3. Numbers of westslope cutthroat trout caught during guided fly-fishing trips on the South Fork and East Fork of the South Fork Salmon River, and Johnson Creek. Data for the year 2000 has not been received from Wapiti Out-fitters, therefore is not available

Year	South Fork		East Fork South Fork		Johnson Creek	
	Total Length		Total Length		Total Length	
	≤ 254 mm	≥ 255 mm	≤ 254 mm	≥ 255 mm	≤ 254 mm	≥ 255 mm
1994	3	22	---	---	---	---
1995	50	61	6	7	---	---
1996	34	14	8	7	2	32
1997	22	24	14	4	2	0
1998	18	12	---	---	---	---
1999	4	12	---	---	---	---
2000	---	---	---	---	---	---

Table 4. Catch rates were derived from fish caught during guided fly-fishing trips on the South Fork Salmon River, East Fork of the South Fork Salmon River, and Johnson Creek. Catch rates were derived from an overall catch steelhead/ redband trout, westslope cutthroat trout, bull trout, and mountain whitefish. Steelhead/redband trout comprised 30-50% of the catch.

Year	South Fork	East Fork South Fork	Johnson Creek
	Fish/hour	Fish/hour	Fish/hour
1994	2.275	---	---
1995	1.16	1.15	---
1996	1.21	1.65	1.12
1997	2.13	2.11	0.15
1998	1.8	---	---
1999	1.6	---	---
2000	---	---	---

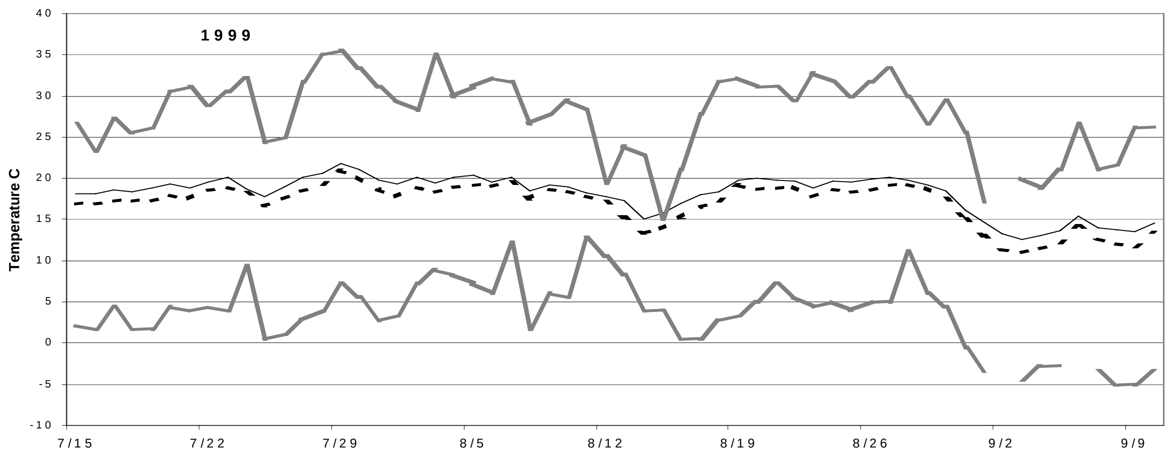


Figure 3. Mean daily temperature for Little Salmon River and Mud Creek, 1998 to 2000. Gray line illustrates maximum and minimum air temperature taken at New Meadows Ranger Station.

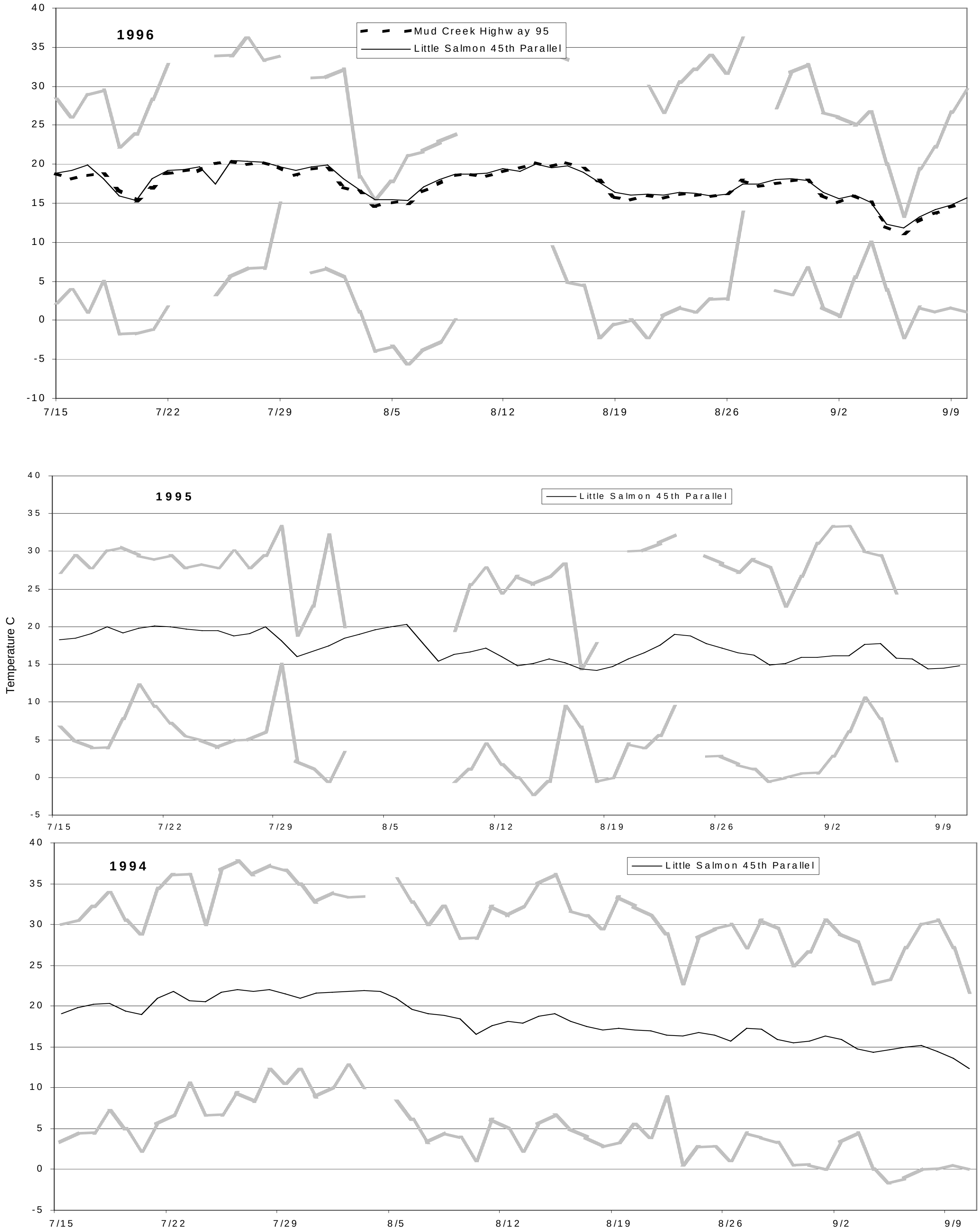
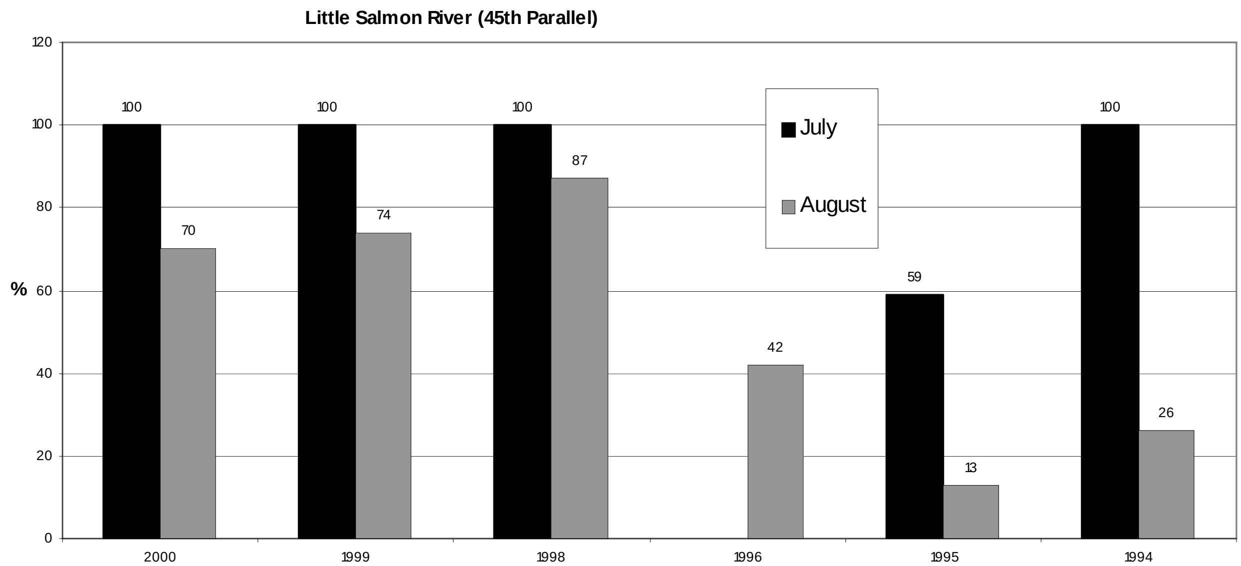


Figure 4. Mean daily temperatures for Little Salmon River and Mud Creek, 1994 to 1996. Gray lines illustrate maximum and minimum air temperatures taken at New Meadows Ranger Station.



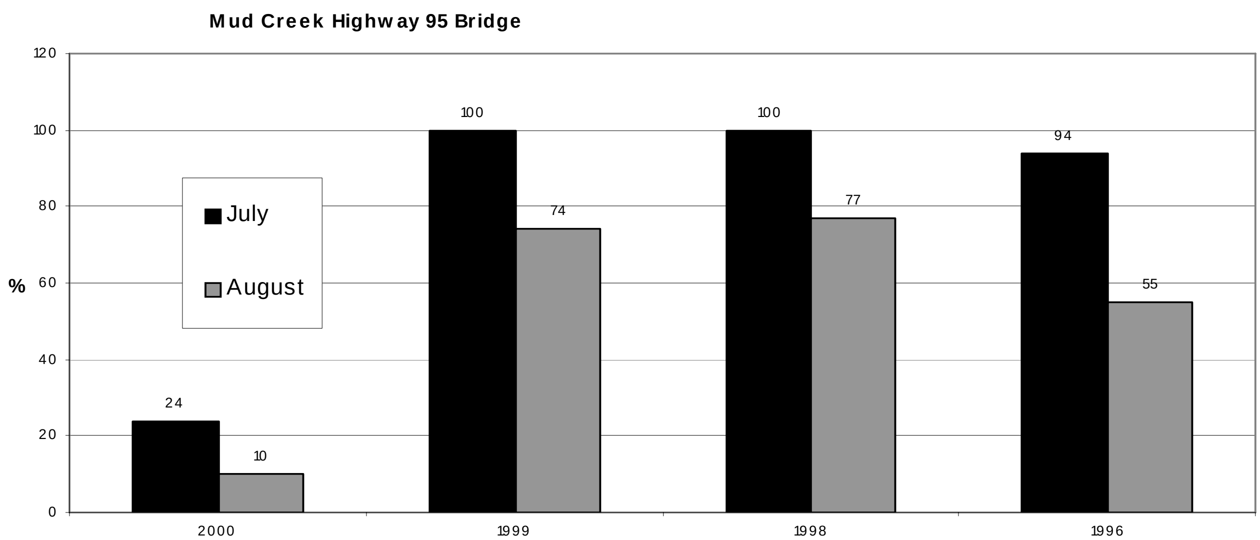


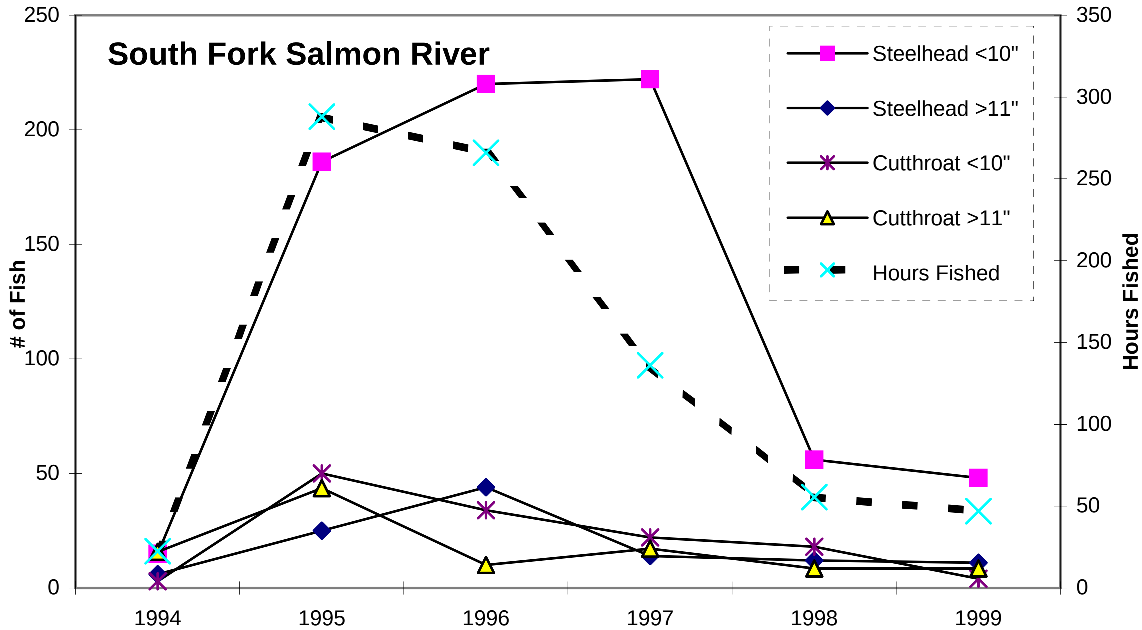
Figure 5. Percent of days that daily high temperatures remained above 20°C for more than six hours within a 24-hour period. Data for the first thirteen days of July were incomplete for all years and therefore omitted. There were no data for July 1996 in Little Salmon River (Meadow Creek Site).

It will be interesting to see if a trend toward lower summer water temperatures develops within Mud Creek. There have been several efforts to improve water quality within the Mud Creek drainage. A two pasture deferred grazing plan has been in effect on Mud Creek for fifteen years. This grazing plan is designed to allow plants to reach maturity by rotating cattle from the Mud Creek allotment to an adjacent allotment prior to seed ripe (John Kwader, personal communication). In 1990, a 3/8-mile section of Mud Creek upstream from our temperature station was fenced to exclude cattle (Figure 1). Jon Kwader has kept a photo record of recovery within the riparian community at Boise Cascade Corporation. We will continue to monitor this station annually to identify trends in stream temperatures with varying weather, flow regime, and recovery of the riparian community.

The Bureau of Land Management maintains temperature recorders in the Little Salmon River from near Round Valley Creek downstream to the confluence with the Salmon River (Craig Johnson personal communication). No additional sites should be needed to characterize river temperatures throughout the mainstream of the LSR. Annual summer temperature monitoring will continue, to identify trends with weather, flow regime, and recovery of the riparian community.

South Fork Salmon River Guided Fishery

More years of angler efforts will be necessary to develop a visible trend in the data. Data from the 2000 season will be reported in the 2001 report. Tables 2, 3, and 4 show a decline in fishing activity from a high in the middle 1990s. Total catch for cutthroat and larger redband were only slightly affected by change in effort. Catch of steelhead/redband less than 254 mm tracks angling effort, but catch of bull trout and westslope cutthroat trout are constant among years, and independent of effort (Figure 6). The majority of catch remains composed of steelhead parr and small redband trout.



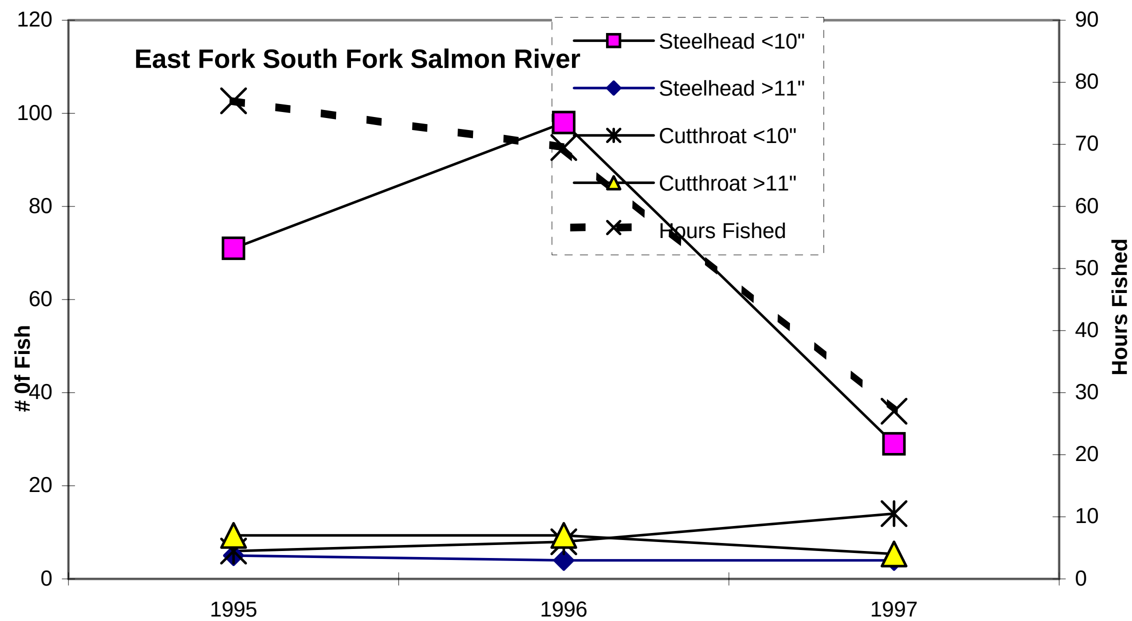


Figure 6. Numbers of fish caught by Wapiti Outfitter during guided fly fishing trips on the South Fork and East Fork of the Salmon River 1994 through 1999. Fishing effort is indicated by dashed line.

RECOMMENDATIONS

1. We should continue to monitor summer river temperature in the upper Little Salmon River on an annual basis. This will create a long-term database to evaluate changes in river temperatures with recovery of riparian community and changes in discharge. Our monitoring compliments that conducted by other agencies.

2. Habitat measures should be made on Mud Creek to demonstrate further recovery of riparian zones.

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APPENDIX

Appendix A. Daily mean, maximum, and minimum stream temperatures (C°) in Mud Creek (tributary to Little Salmon River) and Little Salmon River, 2000.

Mud Creek, tributary to Little Salmon River, 2000														
	Temperature C					Temperature C					Temperature C			
Date	Mean	Min.	Max.		Date	Mean	Min.	Max.		Date	Mean	Min.	Max.
6/10	11.59	10.60	12.90		7/26	18.05	15.60	21.70		9/10	10.00	9.00	10.90
6/11	10.60	8.60	12.50		7/27	17.95	15.60	21.70		9/11	11.35	9.40	14.80
6/12	10.82	9.80	12.10		7/28	18.03	15.60	21.70		9/12	12.03	9.40	16.30
6/13	13.09	8.20	18.60		7/29	18.04	15.90	21.30		9/13	13.67	11.30	17.40
6/14	16.04	11.30	20.90		7/30	19.23	17.10	22.10		9/14	14.47	12.50	17.80
6/15	17.35	14.40	20.20		7/31	19.84	17.80	22.80		9/15	14.31	11.70	17.40
6/16	16.23	12.10	20.90		8/1	20.59	19.00	22.80		9/16	15.13	13.30	17.80
6/17	15.87	11.70	20.50		8/2	19.35	17.40	22.10		9/17	15.06	13.30	17.80
6/18	15.99	11.70	20.20		8/3	18.42	16.30	21.70		9/18	14.93	12.10	18.20
6/19	15.79	13.30	18.60		8/4	20.51	18.60	23.60		9/19	16.22	15.20	18.20
6/20	15.58	10.60	21.30		8/5	18.63	16.70	21.30		9/20	13.11	9.80	15.90
6/21	17.61	12.50	23.20		8/6	17.11	14.80	20.20		9/21	12.62	10.60	15.90
6/22	18.97	15.20	23.60		8/7	17.13	14.80	20.20		9/22	10.14	7.80	12.50
6/23	18.25	14.10	22.40		8/8	16.09	13.70	19.00		9/23	7.40	4.50	10.90
6/24	17.53	13.30	22.80		8/9	17.00	14.80	19.40		9/24	6.79	3.70	10.90
6/25	17.90	14.40	22.40		8/10	18.35	16.70	20.90		9/25	7.21	3.70	11.70
6/26	17.70	13.30	23.20		8/11	18.17	16.30	20.20		9/26	7.57	4.10	12.10
6/27	17.53	13.70	22.10		8/12	16.50	13.70	19.80		9/27	7.95	4.50	12.50
6/28	17.70	13.70	23.20		8/13	15.61	13.70	18.20		9/28	8.97	5.80	13.30
6/29	17.90	14.40	22.10		8/14	15.26	13.30	17.80					
6/30	17.73	15.20	21.70		8/15	14.96	12.90	17.80					
7/1	18.81	16.30	22.10		8/16	15.74	12.90	19.00					
7/2	18.12	15.90	21.30		8/17	14.71	12.50	17.80					
7/3	16.75	14.80	19.40		8/18	15.13	12.50	17.80					
7/4	14.75	11.70	19.00		8/19	14.57	12.50	17.40					
7/5	15.54	13.70	17.80		8/20	14.05	12.10	16.70					
7/6	15.01	12.50	19.00		8/21	13.33	10.90	16.30					
7/7	14.93	12.50	19.40		8/22	13.51	11.30	16.70					
7/8	16.66	14.40	20.20		8/23	13.63	11.70	15.90					
7/9	17.57	14.80	21.30		8/24	16.01	14.40	19.00					
7/10	16.19	13.30	20.50		8/25	15.99	13.70	18.60					
7/11	17.65	14.10	22.40		8/26	14.78	12.50	17.80					
7/12	18.72	15.20	23.60		8/27	14.41	12.10	17.40					
7/13	19.01	15.90	22.40		8/28	13.35	10.90	16.30					
7/14	18.13	15.60	21.70		8/29	12.89	10.20	16.30					
7/15	17.64	15.60	20.50		8/30	13.81	11.70	16.30					
7/16	15.88	13.30	19.80		8/31	14.46	10.90	18.20					
7/17	18.53	16.70	20.50		9/1	15.44	14.10	17.10					
7/18	18.08	15.60	21.30		9/2	11.75	9.40	14.10					
7/19	18.73	15.60	22.40		9/3	9.31	7.80	11.30					
7/20	19.06	17.10	22.40		9/4	10.03	7.80	14.10					
7/21	17.57	15.20	21.30		9/5	12.15	10.60	14.80					
7/22	18.18	15.60	22.10		9/6	11.05	9.00	14.40					
7/23	18.56	16.30	21.70		9/7	10.58	8.20	14.40					
7/24	17.62	14.80	21.30		9/8	11.57	9.00	14.40					
7/25	17.29	14.40	21.30		9/9	10.94	8.20	14.40					

Appendix A. Continued.

Little Salmon River at 45th parallel, 2000											
	Temperature C				Temperature C				Temperature C		
Date	Mean	Min	Max	Date	Mean	Min	Max	Date	Mean	Min	Max
6/8	11.77	11.08	13.41	7/25	19.90	16.07	22.89	9/10	11.18	10.46	12.63
6/9	12.79	9.99	17.18	7/26	19.87	16.54	22.89	9/11	12.90	10.46	16.54
6/10	10.59	9.53	11.69	7/27	20.68	17.02	24.43	9/12	14.96	12.01	18.79
6/11	9.79	7.98	11.38	7/28	21.13	17.34	24.96	9/13	16.35	13.09	19.92
6/12	10.22	9.68	10.92	7/29	21.41	17.98	24.96	9/14	16.61	13.87	19.92
6/13	12.08	8.91	16.07	7/30	21.23	18.63	23.57	9/15	16.41	13.41	19.43
6/14	14.20	10.46	18.63	7/31	22.15	18.95	25.65	9/16	16.67	14.18	19.43
6/15	15.09	12.32	18.63	8/1	22.78	19.59	26.70	9/17	16.78	14.18	19.76
6/16	14.06	10.15	18.79	8/2	21.97	18.31	25.65	9/18	16.32	13.87	19.11
6/17	14.23	9.99	18.95	8/3	21.18	18.47	24.61	9/19	16.92	15.59	19.11
6/18	14.72	10.77	18.63	8/4	21.91	19.59	25.13	9/20	14.48	11.85	16.70
6/19	15.46	12.01	19.76	8/5	21.25	17.66	24.78	9/21	13.63	11.69	16.38
6/20	15.30	10.15	20.89	8/6	20.90	17.02	24.96	9/22	10.13	8.44	11.85
6/21	18.03	12.78	23.40	8/7	20.98	17.18	24.78	9/23	8.59	5.97	11.85
6/22	19.84	15.91	24.26	8/8	20.36	16.38	24.09	9/24	8.71	5.18	12.63
6/23	19.08	14.80	23.06	8/9	19.95	17.02	22.89	9/25	9.60	5.97	13.56
6/24	18.84	14.49	23.57	8/10	20.68	17.34	24.26	9/26	10.22	6.59	14.18
6/25	19.08	14.96	23.40	8/11	20.93	17.66	24.61	9/27	10.71	6.90	14.64
6/26	18.38	13.87	22.89	8/12	19.94	16.54	23.57	9/28	11.02	7.98	14.02
6/27	18.98	14.49	23.57	8/13	19.18	15.43	22.73	9/29	11.08	8.44	13.56
6/28	19.67	15.12	24.26	8/14	18.76	14.96	22.23	9/30	10.82	9.68	11.69
6/29	20.22	15.43	24.78	8/15	18.48	14.80	22.56	10/1	12.16	10.62	14.33
6/30	20.43	16.38	24.61	8/16	18.35	14.80	22.73	10/2	12.30	10.46	14.96
7/1	20.05	16.86	23.57	8/17	18.16	14.64	22.06	10/3	10.84	8.29	13.71
7/2	19.96	16.38	24.09	8/18	17.90	14.64	21.06	10/4	9.75	7.21	12.32
7/3	17.20	14.80	19.43	8/19	17.07	13.87	20.57				
7/4	16.93	12.63	21.39	8/20	16.84	13.41	20.57				
7/5	16.01	14.02	17.98	8/21	16.72	13.09	20.24				
7/6	16.38	12.94	20.24	8/22	16.98	13.25	20.73				
7/7	17.44	13.25	22.23	8/23	17.79	13.71	21.73				
7/8	18.38	15.12	21.56	8/24	18.77	15.59	21.56				
7/9	19.41	15.59	23.06	8/25	18.50	14.96	21.56				
7/10	19.38	14.96	23.92	8/26	17.83	14.33	21.06				
7/11	19.84	15.27	24.43	8/27	17.02	13.56	20.08				
7/12	20.88	16.54	24.96	8/28	15.87	12.01	19.43				
7/13	21.29	17.18	24.78	8/29	15.99	12.32	19.27				
7/14	20.60	17.02	23.74	8/30	16.74	13.56	19.27				
7/15	18.97	16.54	21.39	8/31	15.74	13.09	17.34				
7/16	18.40	14.49	22.23	9/1	15.98	14.96	16.86				
7/17	19.41	17.34	21.23	9/2	12.15	10.15	14.33				
7/18	20.05	16.86	23.57	9/3	9.89	8.91	11.23				
7/19	20.37	16.38	24.26	9/4	11.68	9.68	14.49				
7/20	20.89	17.66	23.92	9/5	12.47	10.92	13.87				
7/21	20.77	16.38	24.96	9/6	13.23	10.62	16.54				
7/22	20.73	17.02	23.74	9/7	13.97	11.38	17.02				
7/23	20.65	17.02	24.43	9/8	13.27	10.77	15.59				
7/24	20.26	16.07	24.26	9/9	13.04	10.15	16.22				

McCALL REGION

GOLD FORK RIVER

2002

ABSTRACT

Fish population, stream habitat, and temperature surveys, were conducted throughout the Gold Fork River watershed in 2002. Surveys were coordinated among Idaho Fish and Game department (Department), Boise National Forest, and Payette National Forest. Specific focus of this coordinated effort was to document distribution and abundance of bull trout *Salvelinus confluentus* and suitable habitat for bull trout. Sixty sites throughout the watershed were sampled for fish. Most streams are dominated by redband trout *Oncorhynchus mykiss gairdneri* and/or brook trout *S. fontinalis*, with cutthroat trout *O. clarkii* found in three localized areas. One, individual bull trout was sampled that was 190mm, in the upper North Fork Gold Fork River. Summer stream temperatures were very adequate to support salmonids. Habitat was generally in less than optimal condition. We conclude that ability to recover the bull trout 'population' in the Gold Fork River drainage is extremely unlikely; and that the goal to recover this local population be removed from the bull trout recovery plan as necessary for recovery of the Southwest Idaho Recovery Unit.

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INTRODUCTION

The Gold Fork River drainage is within the North Fork Payette River watershed, and drains into Cascade Reservoir. The Gold Fork drainage covers 96,189 acres with elevation ranging from 4,820 feet to more than 8,900 feet. The watershed contains lands owned or managed by the US Forest Service ((USFS) 64%), Bureau of Land Management (BLM) (3%), Idaho Department of Lands (IDL) (5%), Boise Corporation (25%), and private ranches and residences (4%) (Boise Cascade Corporation 1996). The Gold Fork watershed is primarily forested, with the land managed for timber production, grazing, and recreation.

Fisheries management is focused on providing general trout fisheries and conservation of bull trout (IDFG 2001). Need for habitat improvements, especially in the lower watershed are noted as important to achieving fishery management goals.

The draft recovery plan for bull trout *Salvelinus confluentus* identifies the Gold Fork River watershed as supporting one local population of bull trout, in the drainage upstream from the confluence with Kennally Creek; and identifies the Kennally Creek sub-watershed as providing potential spawning and rearing habitat for bull trout (USFWS 2002a, 2002b).

Fish population and habitat surveys conducted by various entities since 1990 have provided the foundation for developing bull trout recovery goals. Agency efforts in 2002 focused on identifying trends in stream reaches that were surveyed in the past, and to collect baseline data in reaches that have never before been surveyed.

METHODS

Biologists from the Department, PNF, and BNF coordinated fish population and habitat surveys to be completed by each agency during 2002. Each agency conducted surveys according to its own protocols. Standard stream surveys conducted by the Department followed protocols outlined by Horton (8/15/1994 memo). Boise National Forest biologists followed the standard R1/R4 Fish and Fish Habitat Standard Inventory Procedures Handbook (Rosgen 1996). Payette National Forest biologists followed an abbreviated R1/R4 protocol, described in Appendix A.

Stream temperatures were monitored continuously through the summer with Hobo temperature recorders.

RESULTS

Table 1 summarizes survey activities, by agency, throughout the GFR drainage in 2002.

Table 1. Summary of surveys completed by Idaho Department of Fish and Game (Department), Payette National Forest (PNF), and Boise National Forest (BNF), in the Gold Fork River drainage, 2002.

Agency and Survey Type	Stream	Site Name	Location (UTM E/N, NAD27)	Species Presence			
				Bull trout	Redband trout	Brook trout	Cutthroat trout
IDFG Fish and Habitat	Gold Fork R.	Upper	587394/4946997		X	X	
	Gold Fork R.	Lower	584207/4946884		X	X	
	Spruce Cr.	#1	589489/4948800			X	
	Spruce Cr.	#2	590358/4948124				
	Lodgepole Cr.	#1	589885/4949015		X	X	
	Lodgepole Cr.	#2	590503/4950138				
	Lodgepole Cr.	#3	590719/4951800				
	N Fork Gold Fork R.	#1	588263/4947498		X	X	X
	N Fork Gold Fork R.	#2	588765/4948321		X	X	
	N Fork Gold Fork R.	#3	588958/4948625	X	X	X	
	N Fork Gold Fork R.	#4	589784/4948972		X	X	
	N Fork Gold Fork R.	#5	590908/4949169		X		
	N Fork Gold Fork R.	#6	591854/4949859		X		
	N Fork Gold Fork R.	#7	593879/4951282		X		
	N Fork Gold Fork R.	#8	594656/4951976				
	N Fork Gold Fork R.	#9	595965/4953591				
	N Fork Gold Fork R.	"A"	593391/4950770		X		
	Foolhen Cr.	#1	588916/4948633		X	X	X
	Foolhen Cr.	#2	588831/4949805		X	X	
	Foolhen Cr.	#3	588487/4951686		X	X	
	NFGF Trib.3	"K"	593768/4949660				
	NFGF Trib.3	"I"	593504/4950816		X		
	NFGF Trib.3	"J"	593603/4950725				
	NFGF Trib.3	#4	593644/4950626				
	NFGF Trib.4	#1	593922/4951619				
	NFGF Trib.4	#2	593999/4952521		X		
	NFGF Trib.4	#3	594001/4954063				
	NFGF Trib.5	#1	592446/4950513		X		
	NFGF Trib.5	#2	592488/4950795		X		
	NFGF Trib.5	#3	592096/4952054				
	NFGF Trib.6	#1	593141/4949983				
	NFGF Trib.7	#1	594857/4951806				
	EF Kennally Cr.	#1	591010/4959305				X
	EF Kennally Cr.	#2	592098/4960420				X
	EF Kennally Cr.	#3	593083/4961084				X
	NF Kennally Cr.	#1	589925/4959047		X	X	
	NF Kennally Cr.	#2	590623/4962443			X	
	NF Kennally Cr.	#3	591805/4964768		X	X	

Table 1. Continued

	NF Kennally Cr.	#4	591354/4965448			X	
	Rapid Cr.	#1	583082/4957941		X	X	
	Rapid Cr.	#2	583738/4958544		X	X	
	Rapid Cr.	#3	584741/4959872		X	X	
	Rapid Cr.	#4	584659/4962058		X	X	
	Rapid Cr.	#5	584376/4963086		X	X	
	Rapid Cr.	#6	584693/4965483		X	X	
	Rapid Cr.	#7	584695/4966802			X	
	Powelson Cr.	#1	586468/4958660			X	
	Powelson Cr.	#2	587202/4959001			X	
	Powelson Cr.	#3	587745/4961049				
	Kennally Cr.	#1	582708/4950942		X	X	
	Kennally Cr.	#2	589365/4959092		X	X	
	SF Kennally Cr.	#1	590790/4958887				
IDFG Temperature	Gold Fork R.						
	Gold Fork R.						
	Gold Fork R.						
	Kennally Cr						
	Flat Cr	#1?					
PNF Fish	Powelson Cr.	#1	588030/4959775				
	Powelson Cr. Trib 1	#1	587267/4959117				
	Camp Cr.	#1	583971/4960421				
	Camp Cr.	#2	584131/4961105				
	Kennally Cr.	#1	586383/4958687		X	X	
	Rapid Cr. Trib 1	#1	585137/4961196				
	Andrew's Cr.	#1	586775/4958920			X	
	Andrew's Cr.	#2	586594/4960422			X	
PNF Habitat	Andrew's Cr.	1C	586785/4958912				
	Andrew's Cr.	1B	586594/4959913				
	Andrew's Cr.	2B	586526/4960293				
	Andrew's Cr.	3B	586722/4960816				
	Kennally Cr.	1B	585812/4958274				
	Kennally Cr.	2B	586322/4958718				
	Kennally Cr.	3B	590795/4958905				
	Kennally Cr.	4B	591016/4959307				
	Powelson Cr.	1C	586458/4958649				
	Powelson Cr.	2B	587211/4958974				
	Powelson Cr.	3A	587644/4959251				
	Rapid Cr.	1B	583570/4958415				
	Rapid Cr.	2B	584193/4959073				
	Rapid Cr.	3B	584732/4959881				
	Rapid Cr.	4B	585068/4961181				
	Rapid Cr.	5B	584775/4961759				
	Rapid Cr.	6B	584353/4962664				
	Rapid Cr.	7B	584342/4963262				
	Rapid Cr.	8B	584496/4963597				

Table 1. Continued

	Rapid Cr. Trib	1A	585146/4961201	
	Camp Cr.	1C	582671/4958760	
	Camp Cr.	2B	583292/4959559	
	Camp Cr.	3B	583900/4960337	
	Reference 1	1B	584579/4964584	
	Reference 2	2B	584691/4964003	
	Reference 3	3B	591039/4958984	
PNF Temperature	NF Kennally Cr	W204	589996/4959170	
	SF Kennally Cr	W214	590597/4958856	
	EF Kennally Cr	W201	591037/4958989	
	Rapid Cr	W200	583583/4958264	
	Rapid Cr	W202	584326/4963245	
	Powelson Cr	W206	586434/4958629	
	Kennally Cr	W207	586539/4958492	
BNF Fish and Habitat	S Fk Gold Fk R	meadow 1	591726/4944164	
	S Fk Gold Fk R	meadow 2	592259/4945229	
	French Cr	at mouth	585729/4946544	
	Grouse Cr	1(wooded)	585462/4944995	
	Grouse Cr	2(meadow)	585273/4945318	
BNF Temperature	S Fk Gold Fk R	meadow	591748/4944783	
	S Fk Gold Fk R	Gold Fk R confluence	587652/4947077	
	N Fk Gold Fk R	Selby cmpgrnd	593336/4950721	
	Lodgepole Cr.	below 402A bridge	590442/4950048	

Stream Temperature

Locations of stream temperature recorders are shown in Figure 1. Figures 2 through 10 show daily mean, minimum, and maximum stream temperatures for each location monitored in 2002; and Appendix B provides the same, tabulated data. All sites monitored indicated adequate summer water temperatures for salmonid rearing, with colder temperatures recorded in the upper drainage.

Fish Abundance and Distribution

Using electrofishing equipment, Department crews surveyed 52 stream sites throughout the GFR drainage, identifying species presence, estimates of abundance and population size, and developing length frequencies for each species of salmonid sampled (Figures 11a, 11b; Tables 2 and 3). Crews from PNF snorkeled nine stream sites, estimating abundance of salmonids by species and length class (Appendix C). Crews from BNF sampled five sites by electrofishing, with only one documented "unidentified individual fish" observed.

Of the 66 sites surveyed for fish, 50% of the stream reaches supported redband trout *Oncorhynchus mykiss gairdneri* and/or brook trout *Salvelinus fontinalis*. Another 33% of the surveys documented no fish presence. Cutthroat trout *O. clarkii* were present in five surveyed reaches, predominately found in East Fork Kennally Creek, where they comprised the only salmonid species found. One individual bull trout was sampled in the upper North Fork Gold Fork River.

Redband trout and brook trout were sympatric in 21 sites. In eight sites only redband trout were observed; and in another eight sites only brook trout were observed. Sites in which cutthroat trout and the lone bull trout were observed were all sympatric with both brook trout and redband trout. No stream or sub-watershed displayed a dominance of either redband trout or brook trout.

Habitat

Instream habitat was inventoried at each of the 52 sites surveyed by the Department (IDFG files and database). Habitat data from surveys conducted by PNF and BNF are summarized in Tables 4 and 5. Reaches surveyed by PNF displayed "less than optimal" habitat conditions (Caleb Zurstadt, personal communication). Detailed survey data and analyses may be obtained from Caleb Zurstadt (PNF) and Don Newberry (BNF). A summary of Department surveys will be presented in the annual Federal Aid report.

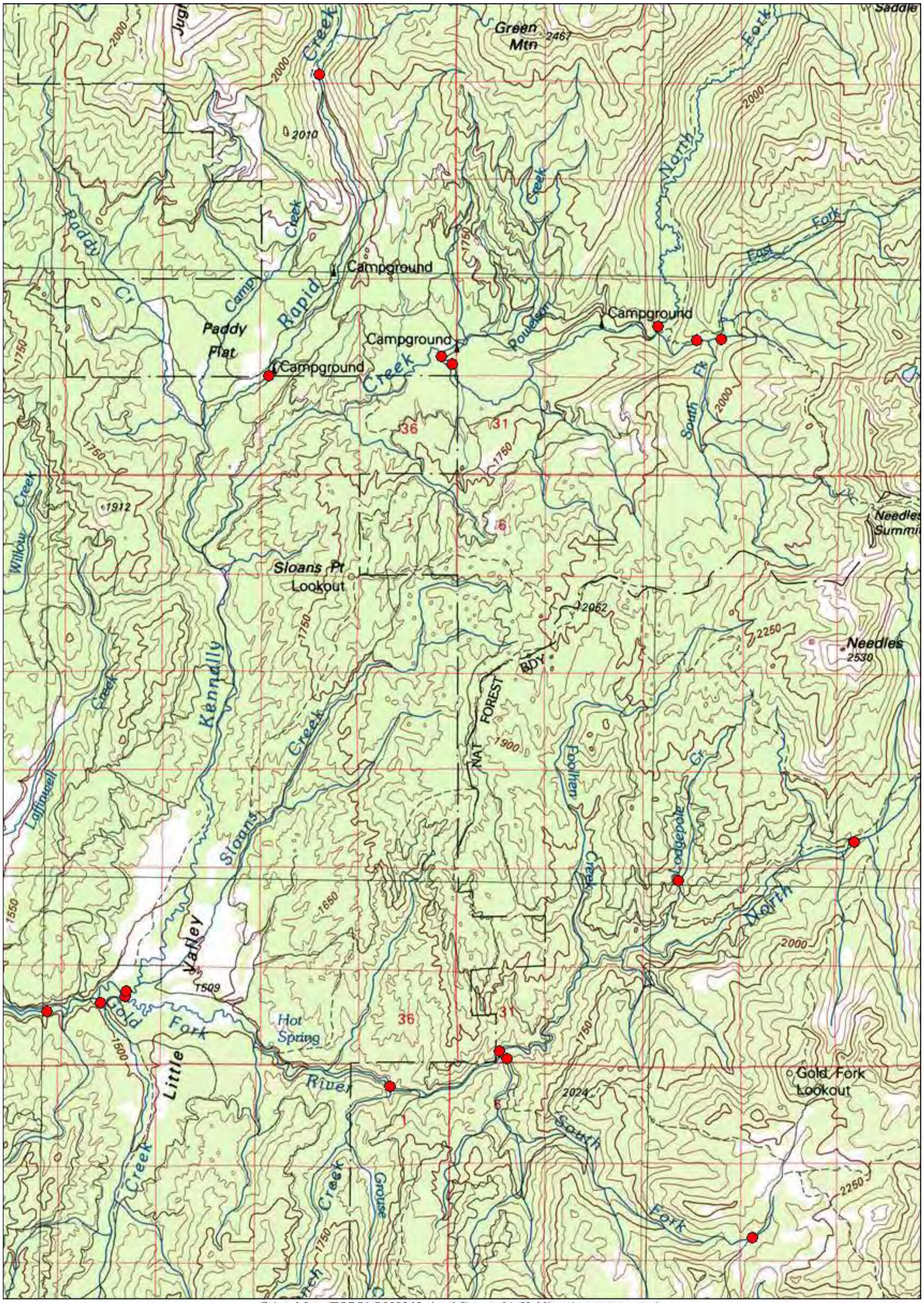
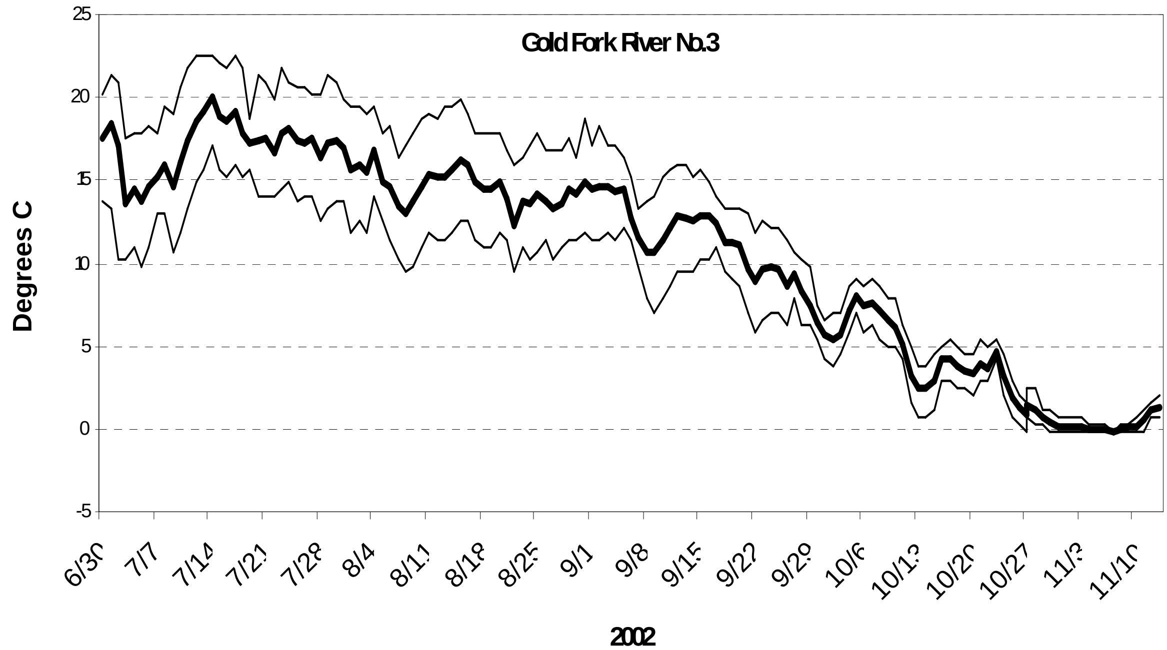


Figure 1. Locations of stream temperature monitoring sites, Gold Fork River drainage, 2002.

Figure 2. Stream temperatures monitored by Idaho Department of Fish and Game, Gold Fork River drainage, 2002.



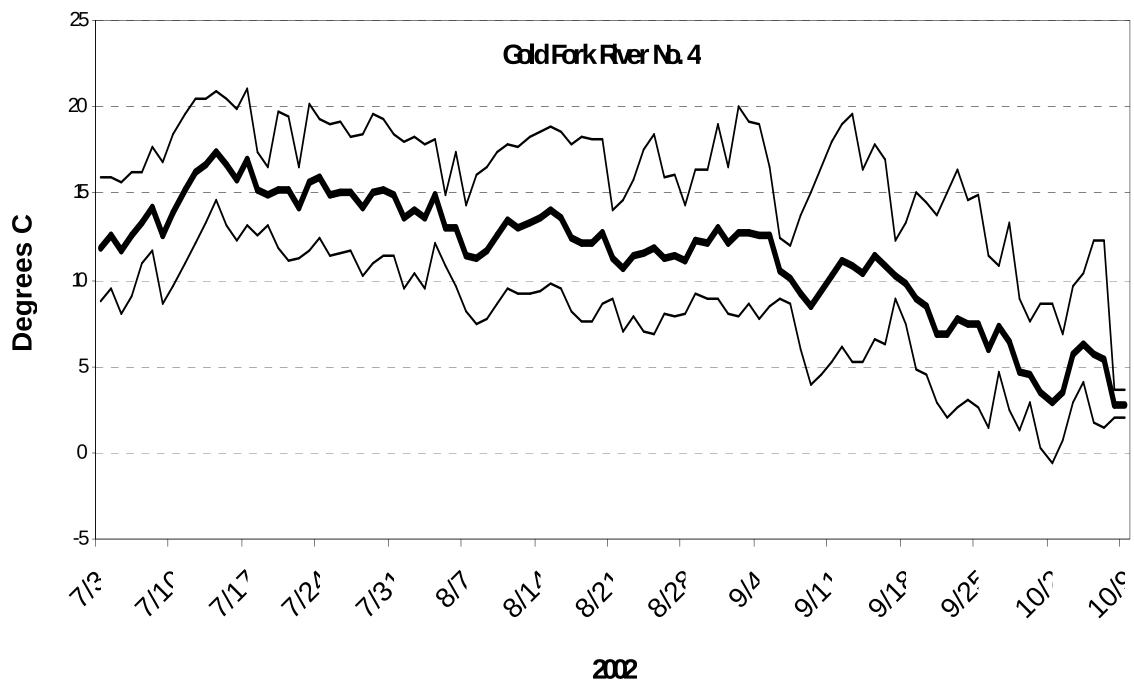


Figure 3. Stream temperatures monitored by Idaho Department of Fish and Game, Gold Fork River, 2002.

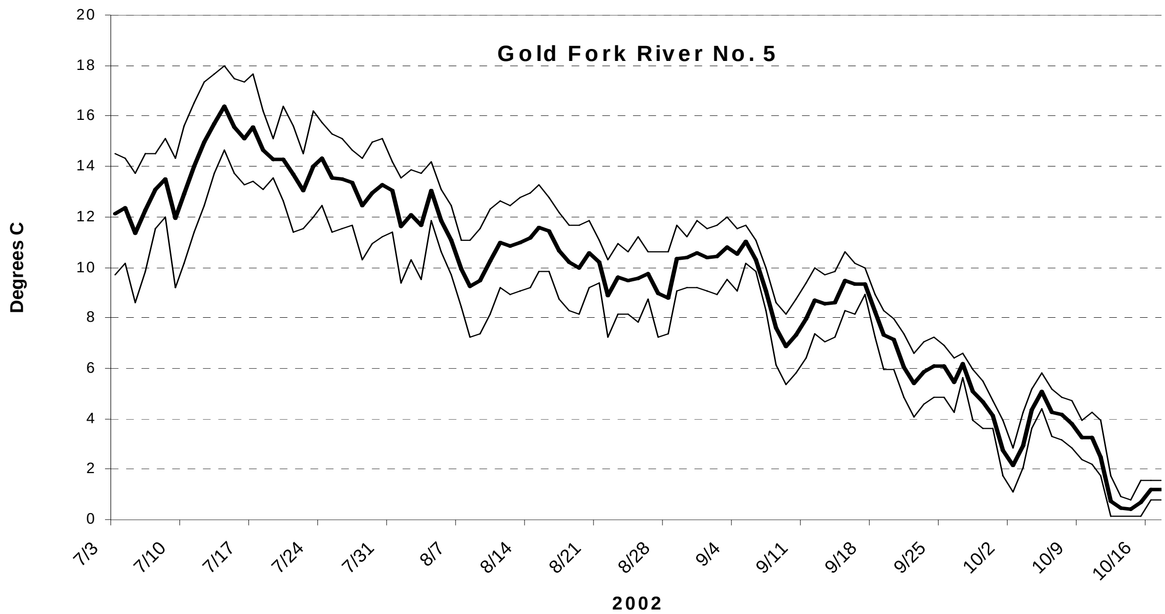
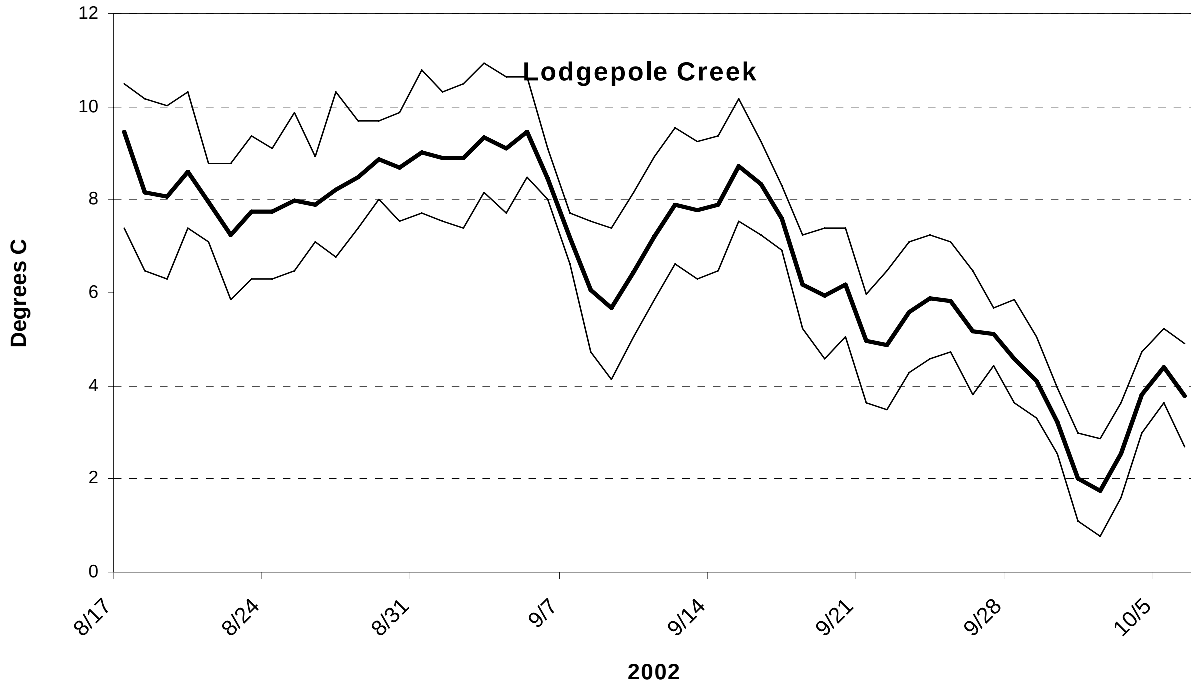


Figure 4. Stream temperatures monitored by Idaho Department of Fish and Game, Gold Fork River drainage, 2002.



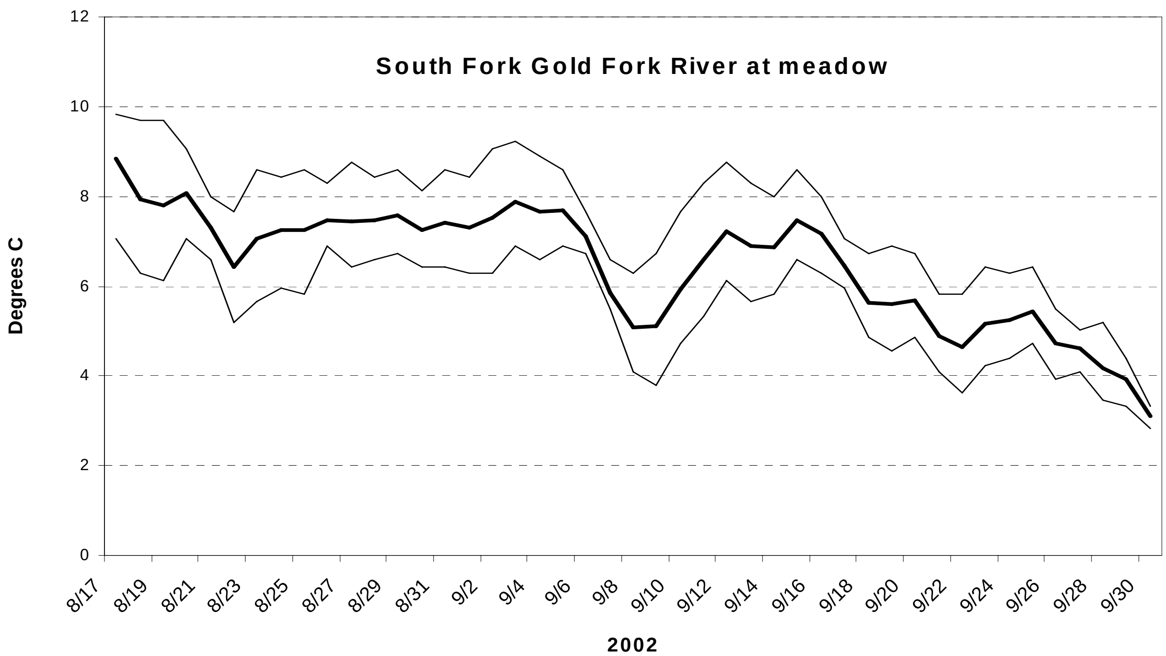
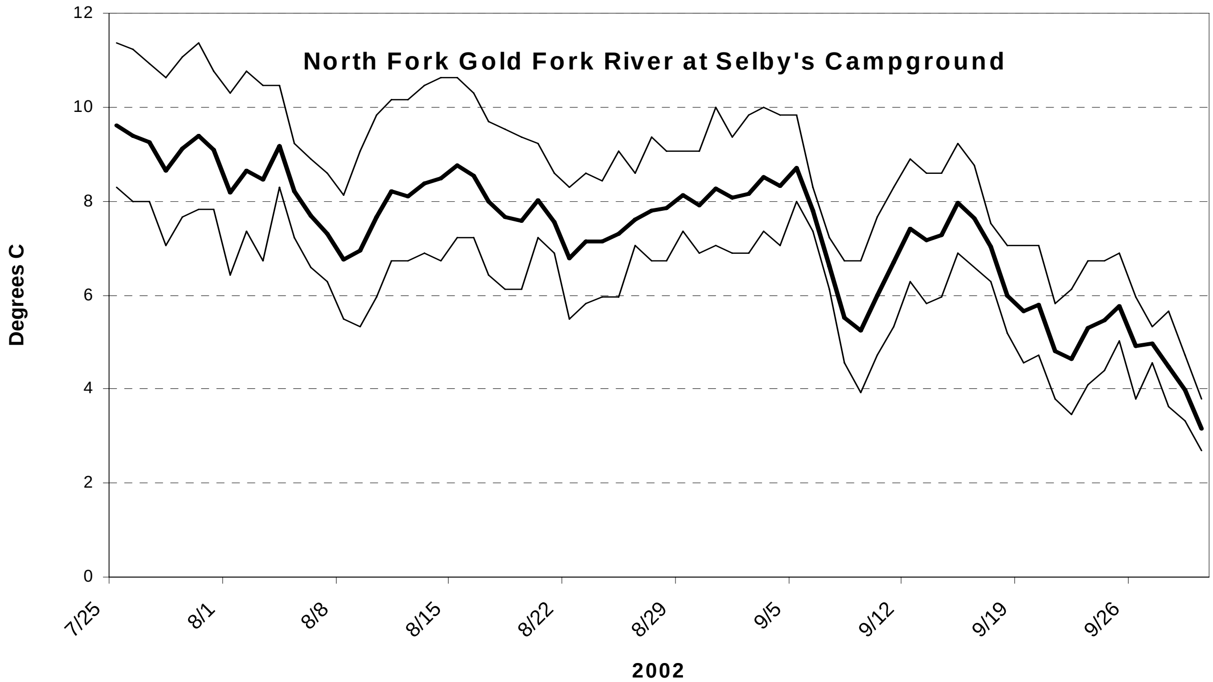


Figure 5. Stream temperatures monitored by Boise National Forest, Gold Fork River drainage, 2002.



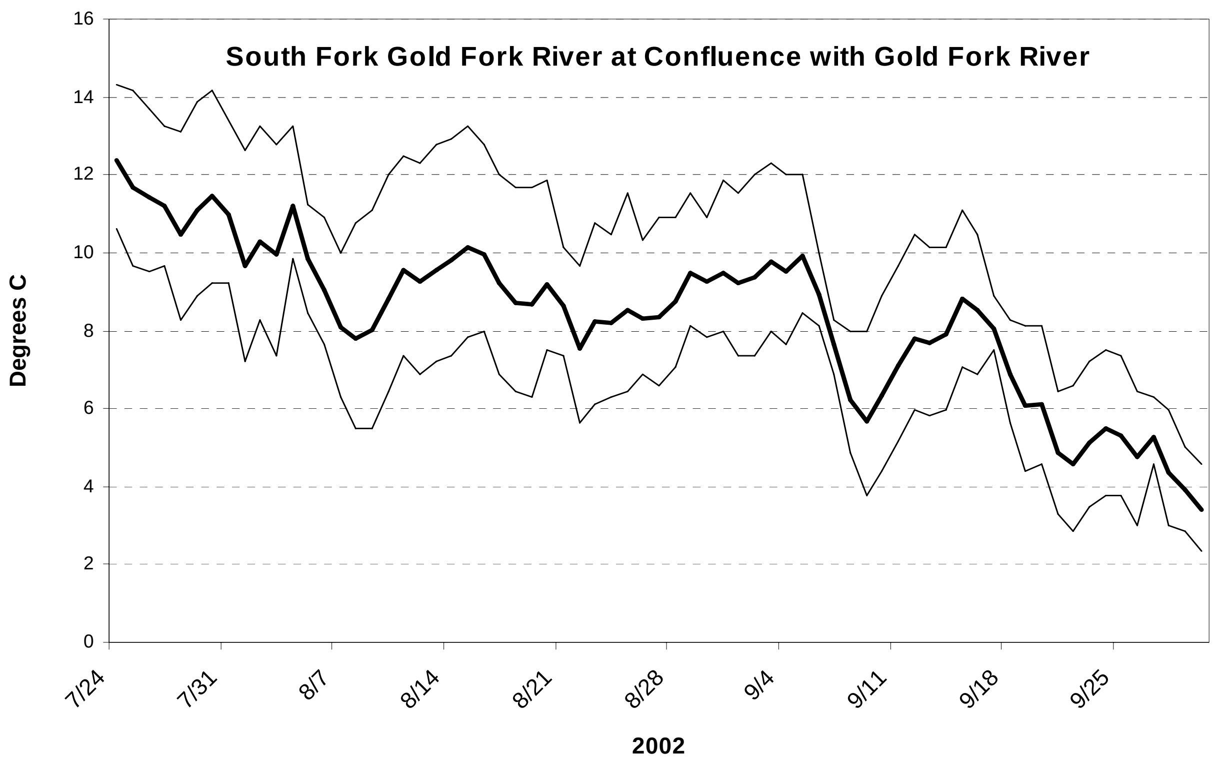
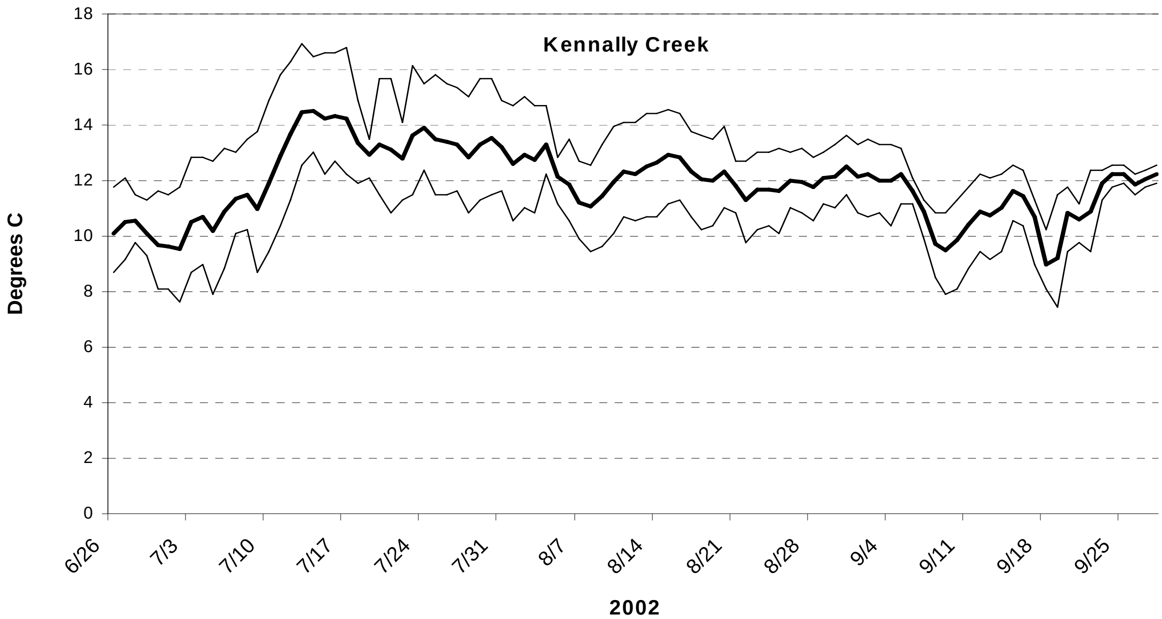


Figure 6. Stream temperatures monitored by Boise National Forest, Gold Fork River drainage, 2002.



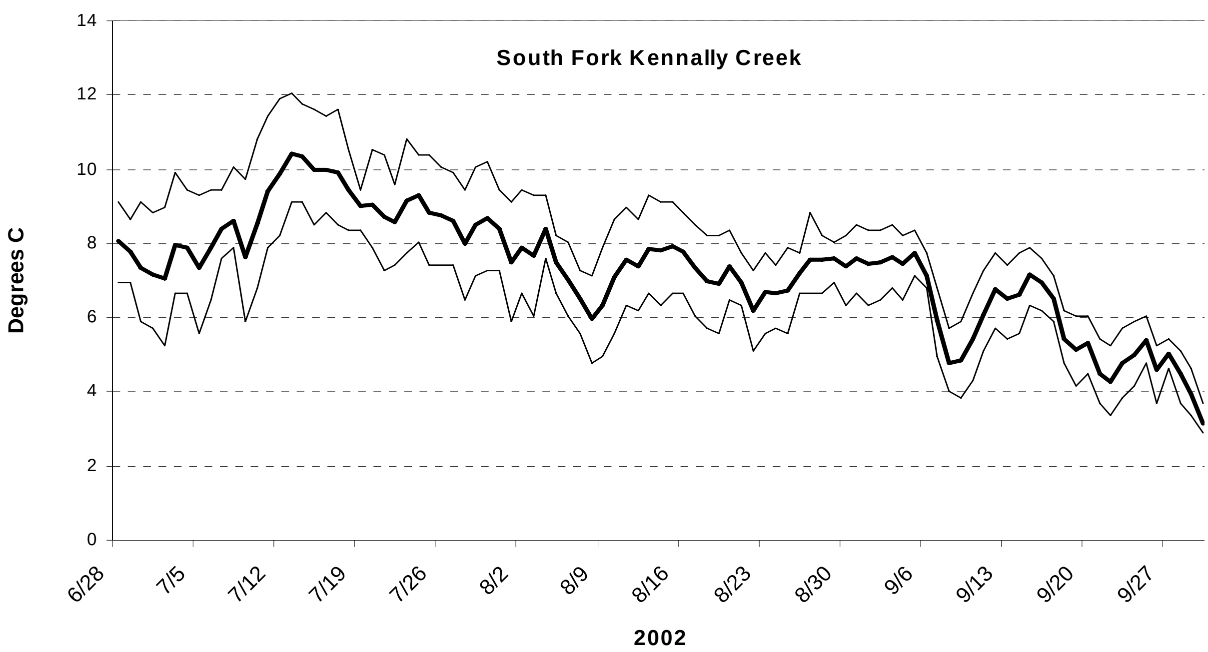
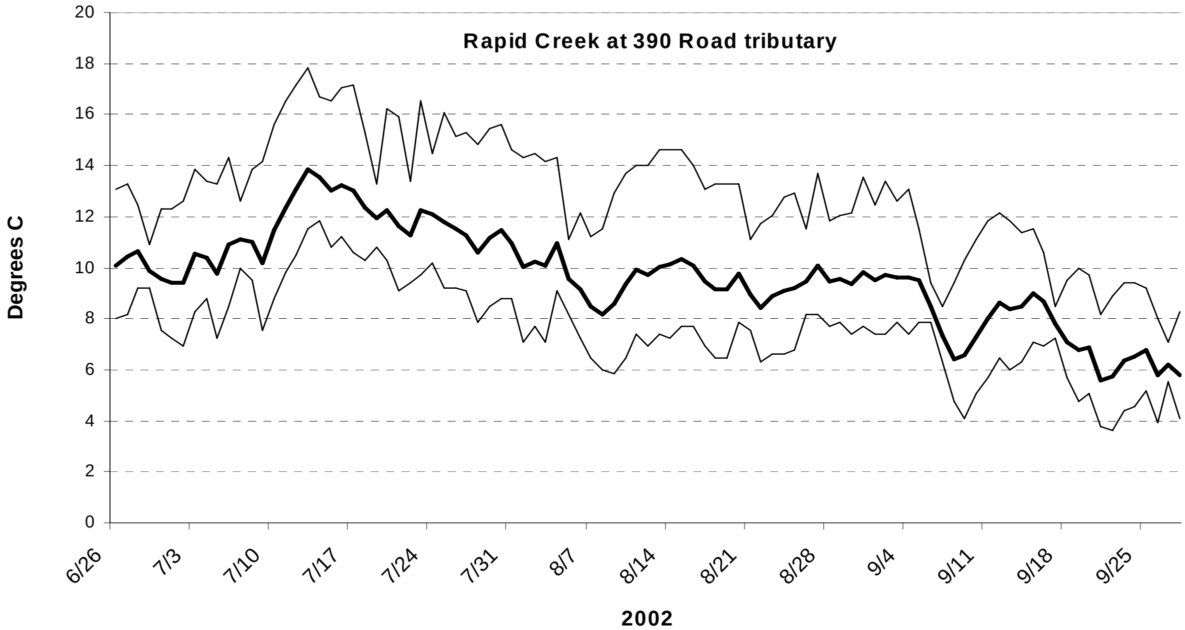


Figure 7. Stream temperatures monitored by Payette National Forest, Gold Fork River drainage, 2002**.**



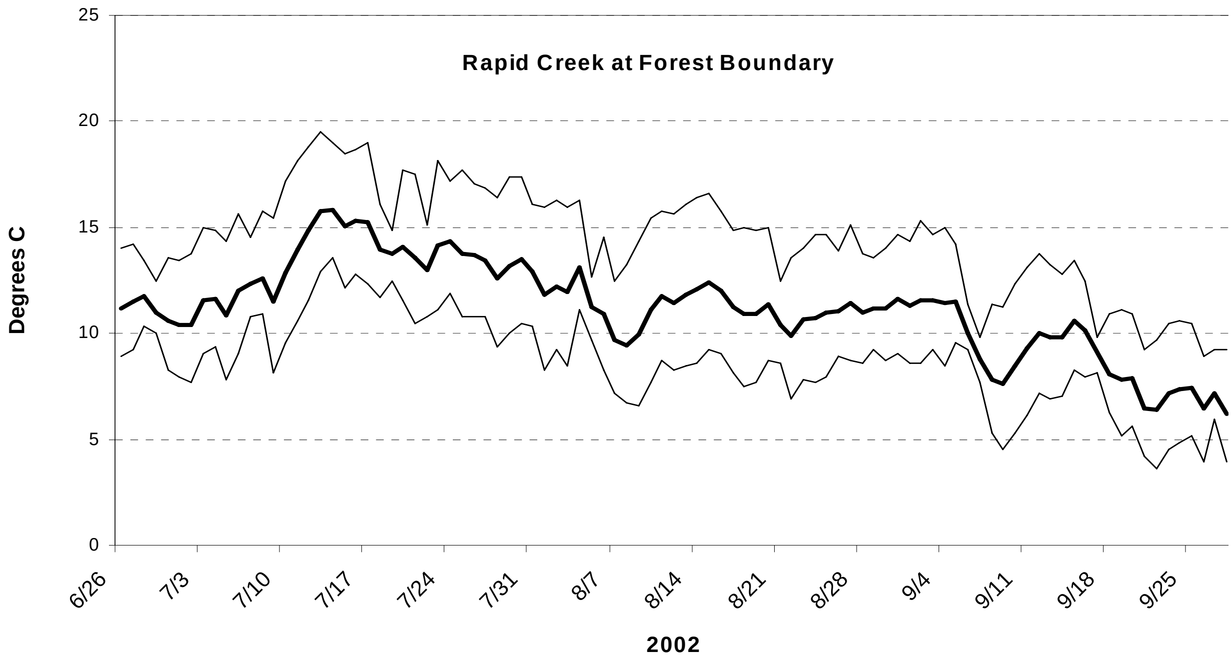
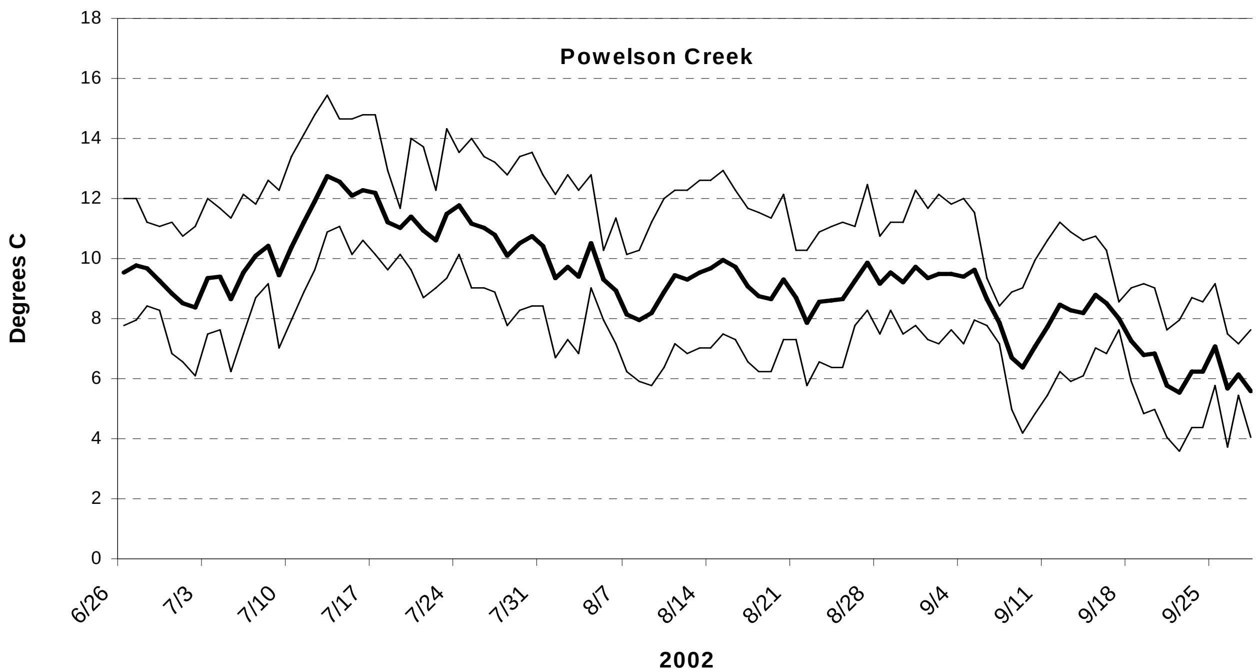


Figure 8. Stream temperatures monitored by Payette National Forest, Gold Fork drainage, 2002.



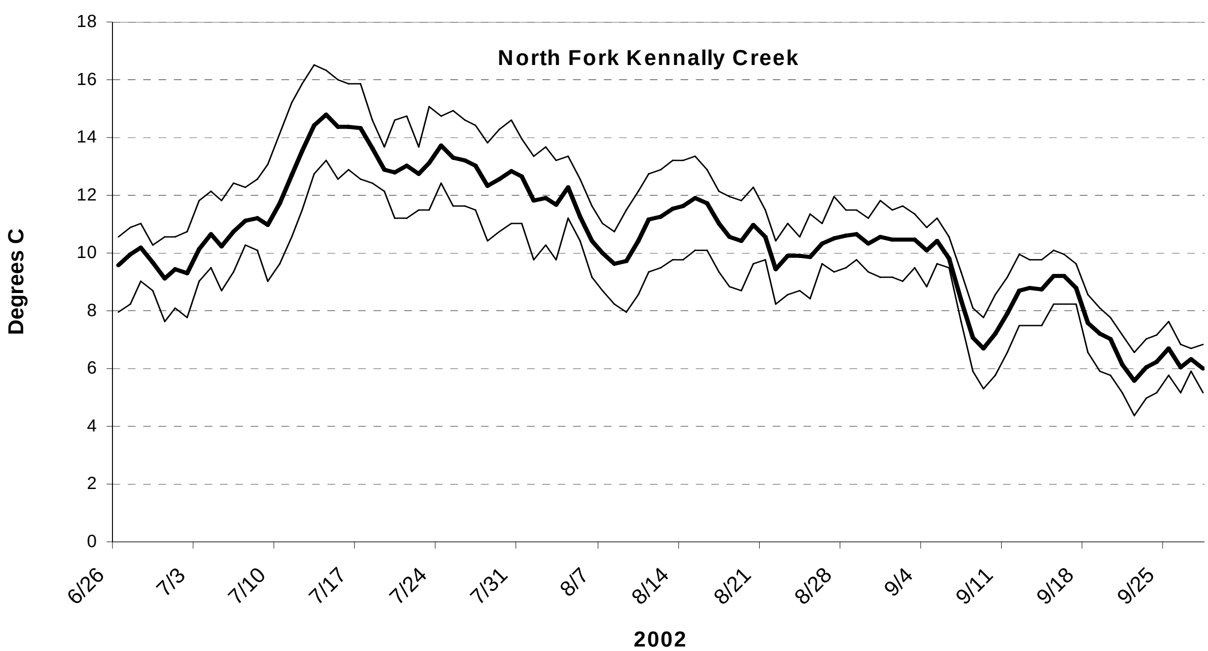


Figure 9. Stream temperatures monitored by Payette National Forest, Gold Fork River drainage, 2002.

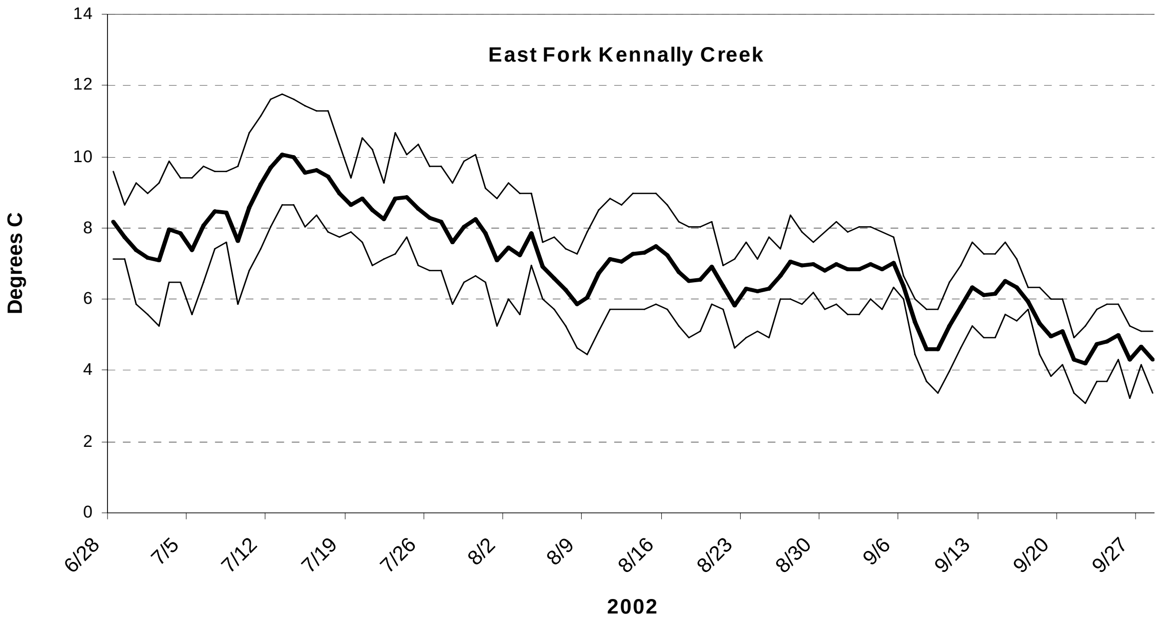


Figure 10. Stream temperatures monitored by Payette National Forest, Gold Fork River drainage, 2002.

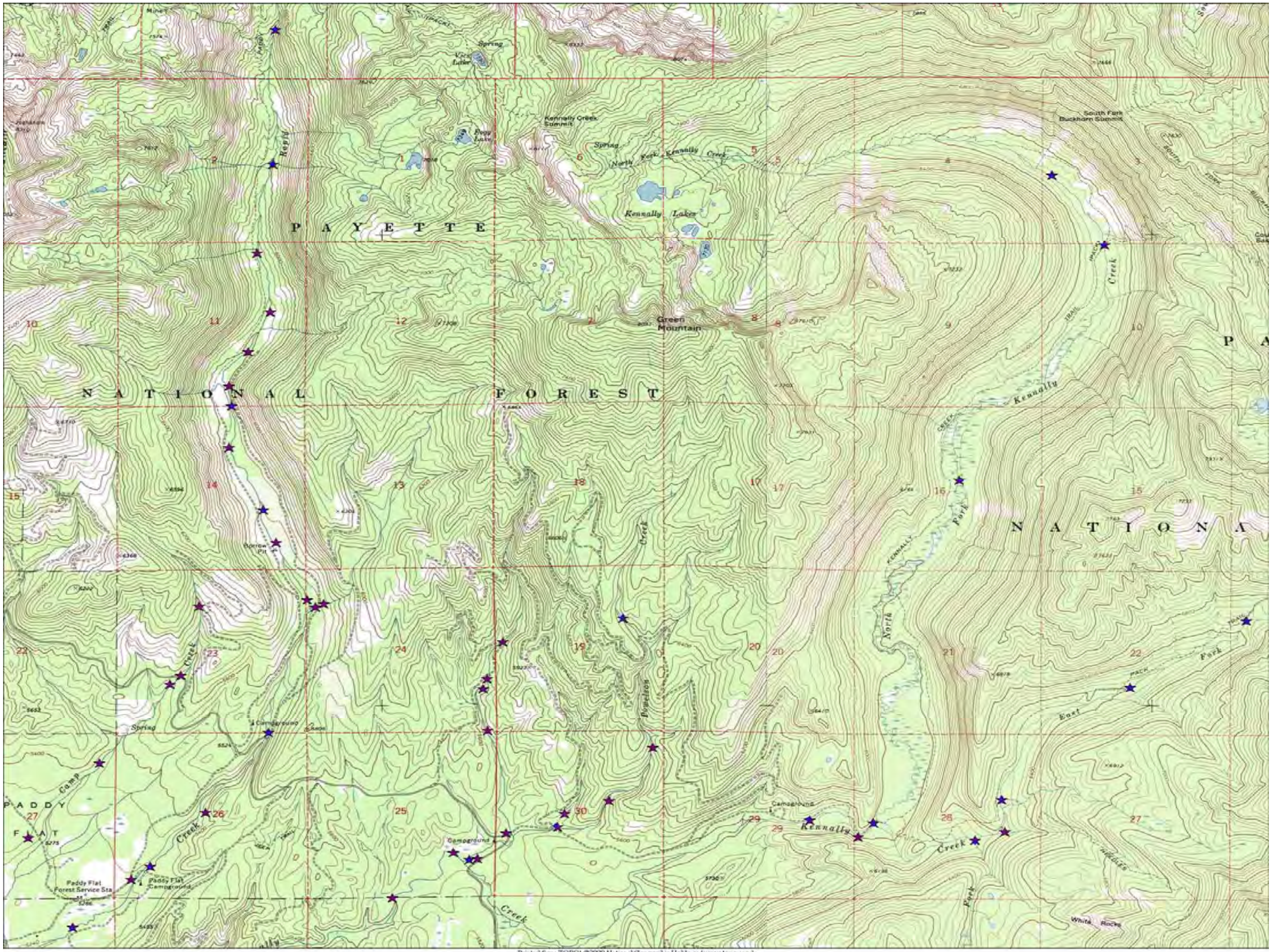


Figure 11a. Fish and habitat surveys completed in Kennally Creek drainage, Gold Fork River, 2002.

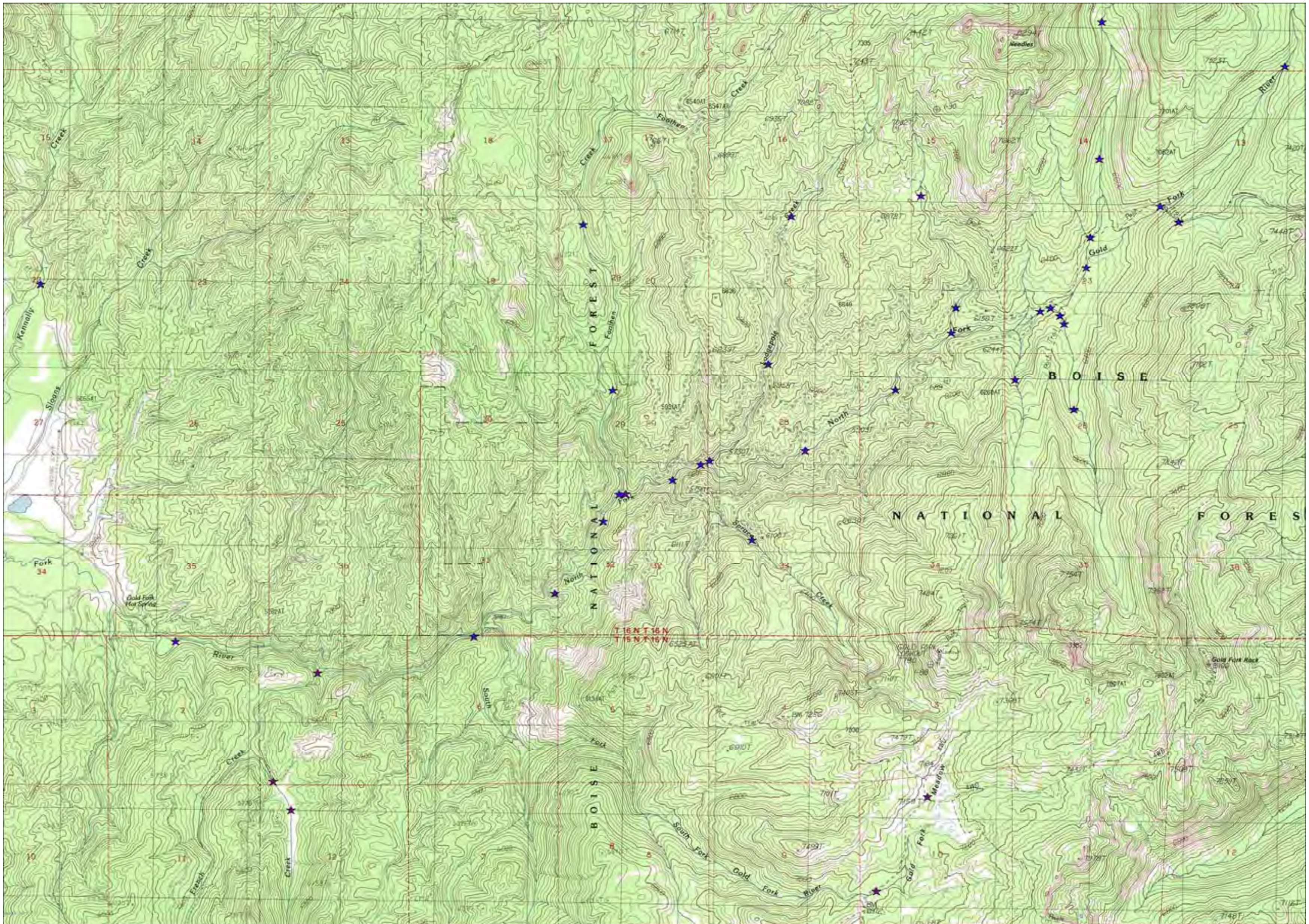


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Figure 11b. Fish and habitat surveys completed in the southern Gold Fork River drainage, 2002.

Table 2. Estimates of salmonid fish abundances in Gold Fork River drainage, Idaho Department of Fish and Game, 2002.

Transect site	Transect length (m)	Fish species	Estimated #/transect +/- 95% CI	Estimated #/m^2
Gold Fork R. (upper)	160.98	Redband	6[a]	.0040[a]
Gold Fork R. (upper)	160.98	Brook	2[a]	.0013[a]
Gold Fork R. (lower)	160.98	Redband	6[a]	.0005[a]
Gold Fork R. (lower)	160.98	Brook	14[a]	.0069[a]
Spruce Cr. #1	50.5	Brook	9[a]	.0604[a]
Spruce Cr. #2	32.3	None	0	0
Lodgepole Cr. #1	75.7	Redband	8[a]	.0353[a]
Lodgepole Cr. #1	75.7	Brook	4[a]	.0177[a]
Lodgepole Cr. #2	64.4	None	0	0
Lodgepole Cr. #3	105.85	None	0	0
N Fork Gold Fork R #1	84	Redband	12[a]	.0161[a]
N Fork Gold Fork R #1	84	Brook	7[a]	.0094[a]
N Fork Gold Fork R #1	84	Cutthroat	1[a]	.0013[a]
N Fork Gold Fork R #2	139.7	Redband	15[a]	.0098[a]
N Fork Gold Fork R #2	139.7	Brook	4[a]	.0026[a]
N Fork Gold Fork R #3	137	Redband	20[a]	.018[a]
N Fork Gold Fork R #3	137	Brook	9[a]	.008[a]
N Fork Gold Fork R #3	137	Bull	1[a]	.0009[a]
N Fork Gold Fork R #4	117.6	Brook	1[a]	.001[a]
N Fork Gold Fork R #4	117.6	Redband	52[a]	.054[a]
N Fork Gold Fork R #5	117	Redband	56[a]	.0811[a]
N Fork Gold Fork R #6	102.1	Redband	38[a]	.051[a]
N Fork Gold Fork R #7	57.1	Redband	14.29+/- 4.33	.075
N Fork Gold Fork R #8	54	None	0	0
N Fork Gold Fork R #9	51.2	None	0	0
N Fork Gold Fork R "A"	104.7	Redband	25[a]	.041[a]
Foolhen Cr. #1	125.8	Brook	12[a]	.0016[a]
Foolhen Cr. #1	125.8	Redband	5[a]	.0081[a]
Foolhen Cr. #1	125.8	Cutthroat	1[a]	.0016[a]
Foolhen Cr. #2	126.5	Brook	24[a]	.0457[a]
Foolhen Cr. #2	126.5	Redband	8[a]	.0152[a]
Foolhen Cr. #3	109.85	Brook	4[a]	.0105[a]
Foolhen Cr. #3	109.85	Redband	3[a]	.0079[a]
NFGF Trib.3 "K"	76.4	None	0	0
NFGF Trib.3 "I"	55.7	Redband	16+/- 62.23	.078
NFGF Trib.3 "J"	61.6	None	0	0
NFGF Trib.3 #4	58.8	None	0	0

Table 2. Continued

Transect site	Transect length (m)	Fish species	Estimated #/transect +/- 95% CI	Estimated #/m^2
NFGF Trib.4 #1	32.7	None	0	0
NFGF Trib.4 #2	68.4	Redband	36.45+/- 5.40	.144
NFGF Trib.4 #3	65.4	None	0	0
NFGF Trib.5 #1	135.05	Redband	72.76+/- 11.38	.096
NFGF Trib.5 #2	34.25	Redband	10.13+/- 0.87	.09
NFGF Trib.5 #3	56.55	None	0	0
NFGF Trib.6 #1	32.4	None	0	0
NFGF Trib.7 #1	29.8	None	0	0
EF Kennally Cr. #1	50	Cutthroat	12+/- 11.76	.067
EF Kennally Cr. #2	68	Cutthroat	7+/- 0	.033
EF Kennally Cr. #3	56	Cutthroat	16.33+/- 20.22	.097
NF Kennally Cr. #1	52.3	Brook	64.65+/- 13.34	.123
NF Kennally Cr. #1	52.3	Redband	2 (I per pass)	.004
NF Kennally Cr. #2	42.75	Brook	69.33+/- 7.02	.173
NF Kennally Cr. #3	59.2	Brook	54 (27per pass)	.141
NF Kennally Cr. #3	59.2	Redband	2 (1 per pass)	.005
NF Kennally Cr. #4	67.7	Brook	52.94+/- 17.34	.153
Rapid Cr. #1	64.85	Brook	23 [b]	.052
Rapid Cr. #1	64.85	Redband	2 (1 per pass)	.005
Rapid Cr. #2	92	Redband	10 [b]	.016
Rapid Cr. #2	92	Brook	14 [b]	.022
Rapid Cr. #3	50.9	Redband	40.33+/- 83.54	.121
Rapid Cr. #3	50.9	Brook	4 (2 per pass)	.003
Rapid Cr. #4	98.7	Brook	58.91+/- 14.43	.083
Rapid Cr. #4	98.7	Redband	20.64+/- 2.28	.028
Rapid Cr. #5	51.85	Redband	2 (1 per pass)	.006
Rapid Cr. #5	51.85	Brook	88.17+/-134.64	.248
Rapid Cr. #6	82.75	Redband	44.46+/- 5.11	.089
Rapid Cr. #6	82.75	Brook	20+/- 15.18	.040
Rapid Cr. #7	64.85	Brook	23.21+/- 1.09	.091
Powelson Cr. #1	56	Brook	35.58+/- 5.68	.179
Powelson Cr. #2	52	Brook	12.1+/- 0.75	.083
Powelson Cr. #3	51	None	0	0
Kennally Creek #1	160.98	Brook	8 [a]	.003 [a]
Kennally Creek #1	160.98	Redband	1 [a]	.0003 [a]

Table 2. Continued

Transect site	Transect length (m)	Fish species	Estimated #/transect +/- 95% CI	Estimated $\#/m^2$
Kennally Creek #2	51.95	Redband	25+/- 117.6	.062
Kennally Creek #2	51.95	Brook	18+/- 5.88	.044
SF Kennally Cr. #1	50	None	0	0

[a] One pass
[b] More fish in second pass than in first, therefore combined pass 1 and 2

Table 3. Length frequencies of salmonids sampled by Idaho Department of Fish and Game (Department), Gold Fork River drainage, 2002.

Stream	Species	Number of fish collected per length group (mm)																						
		30-39	40-49	50-59	60-69	70-79	80-89	90-99	100-109	110-119	120-129	130-139	140-149	150-159	160-169	170-179	180-189	190-199	200-209	210-219	220-229	230-239	240-249	250-259
Gold Fork R (upper)	RBT	0	0	0	0	0	0	0	0	0	0	2	0	1	0	0	0	0	0	0	1	1	1	0
	BRK	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0
Gold Fork R (lower)	RBT	0	0	0	0	1	0	1	0	1	1	0	1	0	0	0	0	0	0	0	0	1	0	0
	BRK	0	0	0	0	0	1	0	3	1	0	1	2	0	0	3	2	0	1	0	0	0	0	0
Spruce Cr. #1	BRK	0	0	0	0	1	0	2	4	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Spruce Cr. #2	None	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lodgepole Cr. #1	BRK	0	0	1	0	0	0	0	0	1	1	0	0	0	1	0	0	0	0	0	0	0	0	0
	RBT	0	0	0	1	1	0	1	1	2	0	1	0	1	0	0	0	0	0	0	0	0	0	0
Lodgepole Cr. #2	None	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lodgepole Cr. #3	None	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NF Gold Fork #1	RBT	0	0	1	0	1	1	0	0	1	1	1	1	1	1	0	1	1	0	0	0	0	0	1
	BRK	0	0	0	0	0	0	1	0	1	2	0	1	2	0	0	0	0	0	0	0	0	0	0
	WCT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
NF Gold Fork #2	RBT	0	0	0	0	1	4	0	0	3	3	0	1	0	2	0	0	0	1	0	0	0	0	0
	BRK	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NF Gold Fork #3	RBT	0	0	0	1	3	2	1	4	2	1	1	2	1	1	1	0	0	0	0	0	0	0	0
	BRK	0	0	0	0	1	1	2	1	0	1	1	0	0	1	0	0	0	1	0	0	0	0	0
	BULL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
NF Gold Fork #4	RBT	0	0	0	1	4	7	7	2	3	4	7	3	3	5	3	2	1	0	0	0	0	0	0
	BRK	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NF Gold Fork #5	RBT	1	1	4	8	1	1	6	7	6	3	2	6	3	2	2	0	1	1	0	1	0	0	0
NF Gold Fork #6	RBT	0	1	2	5	3	1	0	2	2	2	2	4	2	7	3	2	0	0	0	0	0	0	0
NF Gold Fork #7	RBT	0	0	1	2	0	1	0	0	1	0	1	1	5	0	0	0	0	0	1	0	0	0	0
NF Gold Fork #8	None	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NF Gold Fork #9	None	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NF Gold Fork "A"	RBT	0	0	1	1	0	1	2	1	0	1	3	2	3	3	2	1	4	0	0	0	0	0	0
Foolhen Cr. #1	BRK	0	1	0	1	4	2	1	0	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0
	RBT	0	0	2	2	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	WCT	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 3. Continued

Stream	Species	Number of fish collected per length group (mm)																						
		30-39	40-49	50-59	60-69	70-79	80-89	90-99	100-109	110-119	120-129	130-139	140-149	150-159	160-169	170-179	180-189	190-199	200-209	210-219	220-229	230-239	240-249	250-259
Foolhen Cr. #2	RBT	0	1	1	0	0	1	0	1	1	2	0	0	0	0	1	0	0	0	0	0	0	0	0
	BRK	0	0	2	0	1	4	4	0	3	4	0	0	4	0	2	0	0	0	0	0	0	0	0
Foolhen Cr. #3	RBT	0	0	0	0	0	0	1	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0
	BRK	0	1	0	0	0	0	0	0	0	0	0	2	1	0	0	0	0	0	0	0	0	0	0
NFGF Trib.3 "I"	RBT	0	1	1	1	0	0	0	3	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
NFGF Trib.3 "J"	None	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NFGF Trib.3 "K"	None	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NFGF Trib.3 #4	None	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NFGF Trib.4 #1	None	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NFGF Trib.4 #2	RBT	0	2	8	5	1	2	3	4	2	4	0	1	0	0	1	1	0	0	0	0	0	0	0
NFGF Trib.4 #3	None	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NFGF Trib.5 #1	RBT	0	0	0	6	5	7	2	5	8	3	3	2	4	8	2	3	2	1	2	0	2	0	0
NFGF Trib.5 #2	RBT	0	1	1	0	1	2	1	0	0	2	2	2	1	0	0	0	0	0	0	0	0	0	0
NFGF Trib.5 #3	None	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NFGF Trib.6 #1	None	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NFGF Trib.7 #1	None	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SF Kennally #1	None	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Kennally Cr #1	RBT	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
	BRK	0	0	0	0	0	0	0	0	0	0	2	0	2	1	1	0	1	0	0	1	0	0	0
Kennally Cr #2	RBT	0	0	0	0	0	2	0	0	1	2	0	1	1	1	0	1	0	0	0	0	0	0	0
	BRK	0	1	0	0	0	0	2	4	2	3	3	0	1	0	0	0	0	0	0	0	0	0	0
Powelson Cr #1	BRK	0	13	13	1	1	2	0	0	1	0	1	1	0	0	1	0	0	0	0	0	0	0	0
Powelson Cr #2	BRK	0	1	0	0	0	1	2	2	2	1	1	1	1	0	0	0	0	0	0	0	0	0	0
Powelson Cr #3	None	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rapid Cr #1	BRK	0	0	2	5	2	0	0	1	3	3	0	0	3	0	2	2	0	0	0	0	0	0	0
	RBT	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Rapid Cr #2	BRK	0	0	0	0	0	0	0	3	1	2	3	0	1	1	2	0	1	0	0	0	0	0	0
	RBT	0	0	0	0	0	0	1	2	1	0	2	0	1	1	1	1	0	0	0	0	0	0	0
Rapid Cr #3	BRK	0	0	1	0	0	1	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	RBT	0	0	0	0	0	3	0	1	0	3	3	3	2	1	1	2	0	0	0	0	0	0	0
Rapid Cr #4	BRK	0	0	5	3	0	0	5	12	5	3	0	4	7	1	2	3	0	0	0	0	0	0	0
	RBT	0	0	0	0	0	2	6	0	0	3	0	2	2	0	1	1	1	0	0	0	0	0	2

Table 3. Continued

Stream	Species	Number of fish collected per length group (mm)																						
		30-39	40-49	50-59	60-69	70-79	80-89	90-99	100-109	110-119	120-129	130-139	140-149	150-159	160-169	170-179	180-189	190-199	200-209	210-219	220-229	230-239	240-249	250-259
Rapid Cr #5	BRK	0	1	2	0	0	0	2	5	5	3	3	3	3	2	3	3	1	3	1	0	0	0	0
	RBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0
Rapid Cr #6	BRK	0	0	0	0	0	0	3	1	2	1	1	1	0	2	2	0	1	1	0	0	0	0	0
	RBT	0	1	1	5	10	3	2	6	4	0	4	2	1	1	1	1	0	0	0	0	0	0	0
Rapid Cr #7	BRK	0	0	2	0	0	1	2	2	3	1	1	3	1	2	1	3	1	0	0	0	0	0	0
NF Kennally #1	BRK	0	0	5	3	0	8	12	10	4	6	5	2	0	1	0	0	0	0	0	0	0	0	0
	RBT	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
NF Kennally #2	BRK	0	6	21	2	2	7	10	3	0	5	4	1	0	0	1	0	0	0	0	0	0	0	0
NF Kennally #3	BRK	0	3	8	0	0	3	13	7	6	8	4	0	1	1	0	0	0	0	0	0	0	0	0
	RBT	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
NF Kennally #4	BRK	0	1	2	1	1	8	11	1	5	5	3	2	1	0	1	1	0	0	0	0	0	0	0
EF Kennally #1	WCT	0	0	0	0	0	0	0	0	1	2	3	1	1	0	1	0	0	0	0	0	0	0	0
EF Kennally #2	WCT	0	0	1	0	0	0	0	1	0	1	1	1	1	0	0	0	0	1	0	0	0	0	0
EF Kennally #3	WCT	0	0	0	0	0	0	1	1	0	1	2	2	2	0	2	0	0	0	0	0	0	0	0

Table 4. Stream habitat surveys completed by Payette National Forest in the Gold Fork River drainage, 2002.

Site	UTM at bottom of reach (E/N)	Reach number (letters indicate channel type)	Total site length	Mean unit length	Mean unit width	Mean unit depth	Mean width/depth	Mean width/max depth	Mean % fines	R1/R4 LWD per mile	R1/R4 LWD per 100 m	PACFISH LWD per mile	Mean % stable bank	Mean max depth	Pools per mile	Pools per 100 m	Large pools per mile
Rapid Cr	585146/4961201	1A	101.1	6.3	1.9	0.1	18.7	6.2	55	222.9	13.8	31.8	100	0.3	143.3	8.9	0
	583570/4958235	1B	136.9	27.4	5	0.1	38.5	7.6	14.5	423.3	26.3	0	N/A	0.6	23.5	1.5	0
	584193/4959073	2B	147.3	21	4.9	0.2	29.2	6.9	3	131.1	8.1	65.6	98.6	0.6	43.7	2.7	0
	584732/4959881	3B	91.6	15.3	6.5	0.2	34.4	8.1	20	193.3	12	439.3	100	0.8	87.9	5.5	18.1
	585068/4961181	4B	100	33.3	6.5	0.1	45.9	13.8	17.5	96.6	6	177.1	100	0.5	32.2	2	0
	584775/4691759	5B	105.8	14.3	5.7	0.2	40.7	9.8	11.5	152.2	9.5	76.1	100	0.7	60.9	3.8	0
	584353/4962664	6B	137.2	22.9	6	0.2	46.6	9	90	129.1	8	58.7	100	0.6	35.2	2.2	0
	584342/4963262	7B	108.2	15.2	4.8	0.2	54.8	7.4	38.5	29.8	1.8	29.8	95	0.6	59.5	3.7	0
	584496/4963597	8B	111.8	18.6	6.8	0.2	42.6	10.6	28	144	8.9	144	100	0.7	43.2	2.7	0
	B Channel Summary		951.9	19	5.7	0.2	40.5	8.7	28	130.2	8.1	108.2	98.9	0.7	47.4	2.9	1.7
Powelson Cr	586458/4958649	1C	112	11.2	2.8	0.2	15.4	5	100	402.4	25	14.4	100	0.6	71.9	4.5	0
	587211/4958974	2B	118.8	11.9	2.3	0.1	22.5	6.1	32.5	433.6	26.9	40.7	100	0.5	67.8	4.2	0
	587644/4959251	3A	87.4	9.7	2.6	0.2	16.4	5.1	55.5	349.9	21.7	36.8	100	0.6	92.1	5.7	0
Kennally Cr	585812/4958274	1B	105	52.5	10.3	0.2	54.9	N/A	55	168.6	10.5	0	100	N/A	0	0	0
	586322/4958718	2B	105	52.5	7	0.3	27.9	10.3	34	245.3	15.2	0	100	0.7	15.3	1	0
	590795/4958905	3B	110.7	10.1	4.2	0.9	30.7	6.7	58	319.9	19.9	116.3	100	0.6	101.8	6.3	0
	591016/4959307	4B	100.2	10	3.4	0.1	28.9	8.9	54	241	15	96.4	100	0.4	80.3	5	0
	B Channel Summary		420.9	16.8	6.2	0.3	35.6	8.3	49.6	244.8	15.2	53.5	100	0.5	49.7	3.1	0
Andrews Cr	586785/4958912	1C	100.5	3.8	1.8	0.2	10.6	3.1	98	432.5	26.9	16	100	0.6	208.2	12.9	0
	586594/4959913	1B	104.1	6.1	1.6	0.1	32.5	6.3	63.8	711.3	44.2	15.5	100	0.3	139.2	8.6	0
	586526/4960293	2B	99.2	4.1	1.1	0.1	29.4	4.9	61.2	438.1	27.2	0	100	0.3	227.2	14.1	0
	586722/4960816	3B	112.8	6.3	1.8	0	57.1	6.8	39.3	228.3	14.2	14.3	100	0.2	128.4	8	0
	B Channel Summary		316.1	5.4	1.5	0.1	26.7	5.8	55.2	341.2	21.2	10.2	100	0.3	163	10.1	0
Camp Cr	582671/4958760	1C	89.2	5.9	1.5	0.1	13.7	5	92.7	288.7	17.6	0	100	0.3	144.4	9	0
	583292/4959559	2B	109.5	5.8	1.5	0.1	18.9	5.6	52.5	382.2	23.7	0	99.7	0.3	147	9.1	0
	583900/4960337	3B	101.4	8.5	1.5	0	45.4	6.8	23.3	174.6	10.8	47.6	100	0.2	95.3	5.9	0
	B Channel Summary		210.9	6.8	1.5	0.1	31.6	5.9	42.8	282.4	17.5	22.9	99.8	0.3	122.1	7.6	0
Rapid Cr reference[a]	584579/4964584	1B	93.6	7.2	1.5	0.1	35.8	6.1	53.8	189.2	11.8	86	100	0.3	120.4	7.5	0
	584691/4964003	2B	100	5	1.8	0.1	35.4	7.2	23	193.2	12	16.1	75.8	0.3	177.1	11	0
Kennally Cr reference[a]	591039/4958984	3B	102.9	8.6	1.3	0.1	15.2	4.8	75	453.7	28.2	140.8	100	0.3	93.9	5.8	0
	B Channel Summary		296.5	6.6	1.5	0.1	28.5	6.3	50.6	282.3	17.5	81.4	89.2	0.3	130.3	8.1	0

[a] reference sites were outside of Payette National Forest project area, and under different land management than other surveyed sites.

Table 5. Fish habitat surveys completed by Boise National Forest, Gold Fork River drainage, 2002.

Stream Reach	Rosgen Channel type	Total Habitat Length measured (m)	Pool Length Measured (m)	Number of Pools	Measured Reach Gradient %	Average channel Width (m)	Avg. pool width (m)	Average Pool Depth (m)	Average W:D ratio	Average Max pool depth (m)	% Pools >/= .5m	Average W: MaxD ratio	Average % Visual Fines < 8 mm (Modal Value)
SFGR mdw 1 (wooded)	C	203	127.5	12	0.26	2.98	3.8	0.29	13.6	0.78	62.8%	5.2	28.5 (15)
SFGR mdw 2 (meadow)	C	221.3	131.3	15	0	2.26	2.27	0.42	5.6	1.11	59.3%	2.1	9.1 (15)
French (at mouth)		145	5	2		3.36	2.35	0.16	14.9	0.52	3.4%	4.5	12.5 (na)
Grouse 1 (wooded)	C	105.4	47.6	5	0.95	2.37	2.68	0.3	9.2	0.76	45.2%	3.6	13.2 (na)
Grouse 2 (meadow)	C	103.9	36.6	8	0.4	2.74	2.98	0.2	16.4	0.5	35.2%	5.9	8.9 (10)

	Modified WPC Fines <8.0 mm	% sites <= 30% fines	Average stable BANKS % (Modal value)	LWD /100m	LWD/ mile	Pools /100m	Pools /mi	Flood Prone Width (m)	Bankfull Width (m)	Bankfull Depth (m)	Reach Discharge (m3/sec)	Shade Density (%)	Channel Condition (avg. pool width /Max D) ratio
SFGR mdw 1 (wooded)	76.27	67	63.4 (70)	3.14	50.26	6.25	100.09	20.9	6.98	0.29		1.5	0.730769231
SFGR mdw 2 (meadow)	92.06	100	84 (85)	1.87	30	6.23	99.86	25.2	8.3	0.7		0	1.080952381
French (at mouth)	53.51	100	93 (95)	42.14	675.13	6.24	99.99	11.1	4.4	0.3		15	0.522222222
Grouse 1 (wooded)	100	100	89.4 (90)	9.76	156.4	6.24	99.97	200	2.2	0.8		0	0.744444444
Grouse 2 (meadow)	100	100	92.2 (95)	18.12	290.26	6.24	100.01	5.4	3.4	0.4		29	0.505084746

DISCUSSION

Fish Abundance and Distribution

Monitoring activities over the past 20 years throughout the Gold Fork River drainage describe first a sparse distribution of resident bull trout that have been extirpated from the lower drainage, and virtually extirpated from the headwaters (Table 6). In 1998, surveys completed in the NFGF drainage documented resident bull trout in an unnamed tributary (Tributary 3), and in the NFGF in near proximity to that tributary. The 1998 surveys consisted of qualitative electrofishing and both qualitative and quantitative snorkeling (Janssen et al. 2001). Where bull trout were found in 1998, snorkel surveys measured between 0.5 to 2.1 bull trout/100m^2. Surveys conducted by the Department in 2002 in the same stream reaches were more intensive, employing standardized quantitative electrofishing methods; and more extensive, surveying many more sites throughout the upper drainage, than in 1998. No bull trout were documented in 2002 in the same stream reaches in which bull trout were documented in 1998. The single bull trout sampled in 2002 was found in the main NFGF approximately 4 km downstream from the 1998 observations. The 1998 surveys were conducted in mid-July; and the 2002 surveys were conducted in mid-September.

Our findings in 2002 did not diverge from the qualitative fish sampling conducted throughout the drainage in 1985 (Anderson and Robertson 1985).

Habitat

Changes in habitat over time may be evaluated by comparing 2002 data with R1/R4 surveys that were conducted in the Gold Fork River drainage from 1991 through 1994 (PNF 1999; PNF and BNF data files), and with surveys conducted by the Department in 1985 (Anderson and Robertson 1985).

Temperature

The proposed Critical Habitat for bull trout (USFWS 2002b) identifies that among the primary habitat constituents for bull trout are: “water temperatures ranging from 2°C to 15°C, with adequate thermal refugia available for temperatures at the upper end of this range.” We observed summer temperatures that generally met these specifications throughout the Kennally Creek drainage, in the South Fork Gold Fork River, and in the upper North Fork Gold Fork River drainage. Average daily stream temperatures in the mainstem Gold Fork River, however, often ranged between 15°C and 20°C, with diurnal fluctuation around the daily mean of approximately plus to minus 5°C, from daytime to nighttime. More evaluation in the lower watershed could identify if adequate thermal refugia exist to support bull trout during summer in this reach.

Table 6. Summary of survey findings relative to presence and distribution of bull trout in the Gold Fork River drainage.

Year	Activity	Findings	Reference
2002	Surveys of identical sites sampled in 1998, plus numerous additional stream reaches sampled	One bull trout, 190mm	This report
1998	Cooperative surveys by IDFG, BNF, and PNF	Resident bull trout found in very localized area in upper North Fork Gold Fork River and “tributary #3”; no bull trout found upstream from this reach of NFGF, nor throughout Kennally Creek	Janssen et al. 2001
1993	BNF bull trout spawning surveys	Bull trout spawning documented in “tributary #3” of NFGF; no bull trout documented in SFGF	Newberry 2000
1992	BNF surveys	One bull trout, <200mm, observed in SFGF	Newberry 2000
1991	BNF snorkeling and R1/R4 surveys	Documented presence of bull trout in SFGF and Spruce Cr	Boise Cascade Corporation 1996
1985	Surveys of lower drainage by IDFG	No bull trout documented	Anderson and Robertson 1985

RECOMMENDATIONS

Given the findings that resident redband trout and brook trout strongly dominate the salmonid populations of the Gold Fork River and its tributaries, our Department management goal to continue to provide general angling opportunity is appropriate.

Bull trout are functionally extinct in the Gold Fork River drainage. Draconian effort would be required to attempt to "recover" the "population" of bull trout that remain in the headwaters of the North Fork Gold Fork River. We recommend that emphasis be placed on conserving the habitat within the range of stream reaches where bull trout have been found within the past decade. However, we believe that "recovery" of this population is very unlikely.

Idaho Department of Fish and Game has requested that USFWS remove the entire North Fork Payette River Core Area and its associated Critical Habitat from the draft Bull Trout Recovery Plan. We believe that the Gold Fork River bull trout population is functionally extinct, and will never connect with other populations in the Payette Basin.

ACKNOWLEDGEMENTS

This report summarizes an interagency collaborative effort to survey fish populations and habitat throughout the Gold Fork River drainage in 2002. We thank Caleb Zurstadt, Don Newberry, and Gary Harris of USFS for contributing their data, data summaries, and providing a review of this report. Ben Cadwallader summarized the Department survey data. Laurie Janssen and Nicki Warburton drafted several report tables.

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APPENDICES

Appendix A. Protocols and definitions used by Payette National Forest, during surveys conducted in Gold Fork River drainage, 2002.

2002 EAST ZONE PNF FISH AND FISH HABITAT INVENTORY

**This inventory is based off of the R1/R4 Fish and Fish Habitat Standard Inventory Procedures Handbook.*

HABITAT DATA:

Stream name: (e.g. Grouse Creek)

Reach #: Number consecutively upstream. The furthest downstream reach should be one and reachs further upstream should be numbered 2, 3, 4, …etc.

Tributary of: Give the name of the major drainage (i.e. Secesh R., SFK. Salmon R., ESFK. Salmon R., or MFK. Salmon R.)

Date: month, day, year

Observer and recorder: First and last name. For any given reach the diver and recorder should remain the same.

Reach delineation: For continuous surveys (i.e., > 100 m) reaches are delineated based on several features. Break a reach when there is a change in Rosgen channel type (see below), cover group (i.e., wooded vs. meadow riparian zone), and at confluences with tributaries that significantly alter habitat characteristics (i.e., temperature, > 10 % change in discharge).

Start elevation: taken from 7.5 minute topo map, you can also record elevation from GPS unit.

Rosgen channel type: A, B, C (A>4.0% gradient, B=1.5 - 4.0% gradient, C<1.5% gradient)

Cover group: For each survey reach record either wooded (forested) or meadow to characterize the dominant vegetative cover type.

Wooded: Stream side or up-slope tree stands that have the potential to supply large woody debris to the stream channel.

Meadow: Stream side or floodplain vegetation types--grass, forbs, and shrubs (including willows), that have no potential to contribute large woody debris to the stream channel.

Average gradient: Gradient is calculated using a clinometer and stadia rod. Choose a relatively straight section of stream at least 20 to 30 m in length. The observer first determines where their eye level is by measuring the height of eye level with a stadia rod (such as 1.6 m). The recorder walks upstream as far as possible while still in sight of the observer and holds the stadia road at the water surface, while placing a hand at the height on the stadia rod equal to the observer's eye level. Looking through the clinometer, the observer lines up the clinometer zero mark with the recorders hand and reads the percent gradient that lines up with the zero mark. In reaches > 100 m in length gradient should be calculated approximately every 200-300 meters or when it appears a channel type change may have occurred.

Discharge: Discharge is collected at the beginning of each reach. Record to the nearest 0.01 cubic m per second (cm/s) using the first straight 10 m of low gradient riffle encountered in each survey reach.

- Find a 10 m section of low gradient riffle in the main channel that is relatively straight and has few channel obstructions.
- Place a neutrally buoyant rubber ball in the thalweg above the beginning point so that it will be at stream velocity before it enters the measured stretch.
- Record the time in seconds it takes the ball to float the 10 meters.
- Float the ball at least three times and average the three measures.

Rubber balls are used because they float almost entirely submerged and provide for consistent measurements. Use the following variables and formula to calculate discharge:

$$Q = \frac{W \times D \times 0.85 \times L}{T}$$

Q = Discharge (m^3/s)
W = Average width (m). Measure wetted widths at the three transects perpendicular to the thalweg. These transects should be one-fourth, one-half, and three-fourths of the way from the bottom to the top of the habitat unit. Calculate the average of these three wetted widths.
D = Average depth (m). Measure depths at one-fourth, one-half and three-fourths across each of the above transects. Sum all nine depths and divide by 12 (to compensate for “0” depths at each bank) to calculate average depth.
L = Length (m) of the low gradient riffle. L = 10.
T = Time (seconds)

Northing and Easting: Taken from GPS unit set to give UTM coordinates using the NAD27 CONUS datum.

Photograph: Take one photograph from the bottom of the reach looking upstream, and one photograph from the top of the reach looking downstream. Also take photo’s of anything that is pertinent inside and outside of the survey reaches. (e.g. culverts that have washed out, areas of apparent overgrazing, etc.)

General comments: Record general comments about the stream. Include any comments about the abiotic and biotic characteristics of the stream that will help paint a mental image of the stream and riparian area. Comments may include describing reach features, riparian flora, valley shape, stream channel confinement, substrate composition, off channel habitat, woody debris, fish passage barriers, stream impacts, or unique features. **Make note of the general abundance of adult and larval tailed frogs, Idaho giant salamanders and other amphibians.** Be sure and note all visible natural and human influences such as fire, camping, grazing, logging, and road and trail crossings. This information will be recorded on the paper data sheet.

SAMPLE UNIT INFORMATION:

Habitat type: Record the habitat type of the main channel. A habitat type is a discrete channel unit based on fluvial geomorphic descriptors--flow patterns, channel bed shape, etc. Habitat type boundaries are recognized by identifying the breaks in stream channel slope along the thalweg of the channel bottom. Habitat units are classified as either Fast (F) or Slow (S).

FAST WATER HABITAT TYPES: Channel units with moderate to fast current velocity (generally > 0.3 meters per second). Fast water includes turbulent rapids (whitewater), riffles, runs, glides, bedrock chutes and waterfalls.

SLOW WATER HABITAT TYPES: Habitat units in which scouring water has carved out a non-uniform hole in the channel bed or has been dammed. Surface velocities may range from low to fast depending on channel shape and formative feature, but sub-surface velocities tend to be low.

LENGTH:

The length of a habitat unit is measured along the middle of the channel. First locate habitat unit boundaries, then measure with stadia rod to the nearest 0.1m. **LENGTH IS A REQUIRED MEASUREMENT FOR ALL UNITS.** If hazardous conditions prevent you from measuring the length, estimate the length and place an "E" next to the estimated.

AVERAGE WETTED WIDTH:

Measure the average wetted width across a transect of the habitat unit where the width appears to be representative of the unit. Record the width to the nearest 0.1m. If the channel is separated by a gravel or sand bar, and the habitat type is the same on both sides of the bar, measure the width of the channel and subtract the width of the bar or unwetted portion. If the channel width is highly variable measure several points and take an average. **Measure width in every unit.**

AVERAGE WETTED DEPTH:

Fast water habitat types: Measure the depth at 1/4, 1/2, and 3/4 of the way across the average width cross-sectional transect. Sum the three depths and divide by four (to compensate for "0" depth at the banks). Record the average depth to 0.05 meters. **Measure depth of every habitat unit.**

Slow water habitat types: Calculate (but don't record) the average of the maximum pool depth and pool crest depth and find a thalweg depth equal to the calculated value. Measure the depth at 1/4, 1/2, and 3/4 of the way across at a transect located at this thalweg depth. Sum the three depths and divide by four. **Record the average depth of every habitat unit** to 0.05 meters.

Maximum Pool Depth for all slow water habitat units:

The maximum depth is the deepest point of a pool. It is located by probing in the deep part of the pool until the deepest spot is located. Use a 2.0m stadia rod to measure the maximum depth and record to 0.01 meters. For step pool complexes, find and record the highest maximum depth out of all the pools. Make sure that the maximum depth is recorded as a greater value than the average depth and crest depth. **Measure in every slow water habitat unit.**

Pool Crest Depth of Slow Water Habitat Units:

The crest of a given habitat unit is the break or transition in stream channel slope between habitat units. Each slow water habitat type has both a tail crest and head crest. Crest depth is the maximum depth located at the crest. Record the tail crest depth for scour pools and head crest depth for dammed pools. Do not record a crest depth for step pool complexes. Be sure that the value of the crest depth being recorded is LESS THAN that of the maximum depth. **Measure in every slow water habitat unit.**

<u>PERCENT SURFACE FINES</u>:
Percent surface fines (particles < 6 mm) are recorded for the wetted substrate area of pool tails (except for dam pools). **Use a 100-section grid to measure fines at least twice per inventory page within scour pool crests (don't measure fines in dam pools) and low gradient riffles.** Within scour pool tails and low gradient riffles randomly toss the grid three times. Count the number of grid intersections where the substrate is smaller than 6 mm. A Plexiglas viewer can be used to break the surface agitation and glare. Total up all counts and average. It is recommended that tape, permanent markers or some other method is used to mark 6mm sections on the grid.

<u>BANK STABILITY:</u>
Identify the amount of stable bank in all habitat units at the steepest portion of the bank between bankfull and existing water level. A stable streambank shows no evidence of active erosion, breakdown, tension cracking, or shearing. Undercut banks are considered stable unless tension fractures Show on the ground surface at the back of the undercut. Record estimated bank stability as a percentage of total bank length. **Record in every habitat unit.**

<u>LARGE WOODY DEBRIS (LWD)</u>:
All LWD (including spanners) that is within the bankfull channel (both wood that is submerged now and wood that is potentially submerged at high water) is counted and tallied for all habitat types. LWD is defined as any of the following. **Record in all habitat units.** If a piece, root wad, or aggregate spans two or more habitat units record the LWD under the unit which appears to be influenced most by the presence of the LWD. For example if the LWD spans two units record it under the unit it appears to provide the most fish cover in.

Single piece - must be 3 meters in length or 2/3rds the wetted stream width (whichever is smaller) and 0.1 meter in diameter (3 inches) 1/3rd of the way up from the base.

Root wads - attached to logs less than 3 meters in length. Each root wad represents one piece.

Aggregate - a group of TWO or more pieces, each of which qualifies as a single piece (see above); each aggregate is counted and recorded as a LWD Aggregate. Count or estimate the number of individual pieces in the aggregate.

PACFISH/INFISH LWD

Record any LWD as identified above **except** it must be 10.6 m (35 feet) in length and 0.3 m (12 inches) in diameter.

<u>FISH POPULATION SAMPLING</u>:
The frequency with which habitat units are snorkeled will be survey specific (e.g., snorkel every habitat unit or every 5th habitat unit). Your supervisor will provide you with instructions.
The observer counts all fish in the entire habitat unit or that portion of the habitat unit that is snorkeled using one of three approaches depending on the characteristics of the habitat unit: (1) the snorkeler can proceed up the center of the habitat unit and count fish by zigzagging outward to both banks. Care should be taken to search for fish throughout the habitat unit, including the margins, and to inspect all cover components; (2) if the water is too deep or

turbulent to zigzag and visibility is adequate, the observer moves up one bank of the habitat unit and counts all fish to the other bank; and (3) in water too deep to count upstream, the observer floats down the center of the habitat unit and counts all fish from bank to bank, remaining as motionless as possible. Use the ruler marked on your PVC cuff to measure the fish. If you cannot get close enough to measure the fish directly then compare the length of the fish to a nearby rock or other substrate and measure that substrate. Identify the species of fish and estimate the fish's length to the nearest 10 mm. Record the fish lengths in the appropriate size class on the data sheet. For example if you observe a 150 and 140 mm brook trout record both of them in the 100-150 category. Keep your eye calibrated by periodically measuring rocks or other underwater objects with your PVC cuff.

WATER TEMPERATURE:
Record the water temperature to the nearest 0.5ºC on each fish and habitat inventory form.

AIR TEMPERATURE:
Record the air temperature to the nearest 0.5ºC on each fish and habitat inventory form.

TIME OF TEMPERATURE:
Record the time at which the air and water temperature was taken.

QUALITY CONTROL: At the end of the day, and periodically throughout the day, check the data for errors. (e.g., look for missing values or decimal places in the wrong place.)

002 EAST ZONE PNF FISH SNORKEL INVENTORY

**This inventory is based off of the R1/R4 Fish and Fish Habitat Standard Inventory Procedures Handbook. The primary objective of this inventory is to update our fish species distribution database.*

HEADER DATA:

Stream name: Stream name (e.g. Grouse Creek)

Tributary of: Give the name of the major drainage (i.e. Secesh R., SFK. Salmon R., ESFK. Salmon R., or MFK. Salmon R.)

Reach #: Number consecutively upstream. The furthest downstream reach should be one and reaches further upstream should be numbered 2, 3, 4, …etc.

Diver and recorder: First and last name. For any given reach the diver and recorder should remain the same.

Date: month, day, year

Water temperature: **Record the water temperature to the nearest 0.5ºC at each reach inventoried.**

Air temperature: **Record the air temperature to the nearest 0.5ºC on each reach inventoried.**

Time of temperature: **Record the time at which the air and water temperature was taken.**

Average gradient: Gradient is calculated using a clinometer and stadia rod. Choose a relatively straight section of stream at least 20 to 30 m in length. The observer first determines where their eye level is by measuring the height of eye level with a stadia rod (such as 1.6 m). The recorder walks upstream as far as possible while still in sight of the observer and holds the stadia road at the water surface, while placing a hand at the height on the stadia rod equal to the observer's eye level. Looking through the clinometer, the observer lines up the clinometer zero mark with the recorders hand and reads the percent gradient that lines up with the zero mark. In reaches > 100 m in length gradient should be calculated approximately every 200-300 meters or when it appears a channel type change may have occurred.

GPS start: Taken at the beginning of the reach from a GPS unit set to give UTM coordinates using the NAD27 CONUS datum.

GPS end: Taken at the end of the reach from a GPS unit set to give UTM coordinates using the NAD27 CONUS datum.

Photographs: Take a photograph from the top of the reach looking downstream and a photograph from the bottom of the reach looking upstream. Also take photographs of anything that is pertinent inside and outside of the survey reaches, (e.g., culverts that have washed out, areas of apparent overgrazing, etc.).

General comments: Record general comments about the stream. Include any comments about the abiotic and biotic characteristics of the stream that will help paint a mental image of the stream and riparian area. Comments may include describing reach features, riparian flora, valley shape, stream channel confinement, substrate composition, off channel habitat, woody debris, fish passage barriers, stream impacts, or unique features. **Make note of the general abundance of adult and larval tailed frogs, Idaho giant salamanders and other amphibians.** Be sure and note all visible natural and human influences such as fire, camping, grazing, logging, and road and trail crossings. This information will be recorded on the paper data sheet.

REACH LOCATION

Reach location and length will be survey specific. Your supervisor will provide you with instructions. Reaches should be located in sections of stream that are representative of the stream near the area that the reach is located.

SAMPLE UNIT INFORMATION:

Habitat type: Record the habitat type of the main channel. A habitat type is a discrete channel unit based on fluvial geomorphic descriptors--flow patterns, channel bed shape, etc. Habitat type boundaries are recognized by identifying the breaks in stream channel slope along the thalweg of the channel bottom. Habitat units are classified as either Fast (F) or Slow (S).

Fast water habitat types: Channel units with moderate to fast current velocity (generally > 0.3 meters per second). Fast water includes turbulent rapids (whitewater), riffles, runs, glides, bedrock chutes and waterfalls.

Slow water habitat types: Habitat units in which scouring water has carved out a non-uniform hole in the channel bed or has been dammed. Surface velocities may range from low to fast depending on channel shape and formative feature, but sub-surface velocities tend to be low.

Length: **The length of a habitat unit is measured along the middle of the channel. First locate habitat unit boundaries, then measure with stadia rod to the nearest 0.1m. If hazardous conditions prevent you from measuring the length, estimate the length and place an "E" next to the estimated.**

Average wetted width: Measure the average wetted width across a transect of the habitat unit where the width appears to be representative of the unit. Record the width to the nearest 0.1m. If the channel is separated by a gravel or sand bar, and the habitat type is the same on both sides of the bar, measure the width of the channel and subtract the width of the bar or unwetted portion. If the channel width is highly variable measure several points and take an average.

Average wetted depth: Fast water habitat types: Measure the depth at 1/4, 1/2, and 3/4 of the way across the average width cross-sectional transect. Sum the three depths and divide by four (to compensate for "0" depth at the banks). Record the average depth to 0.05 meters.

Slow water habitat types: Calculate (but don't record) the average of the maximum pool depth and pool crest depth and find a thalweg depth equal to the calculated value. Measure the depth at 1/4, 1/2, and 3/4 of the way across at a transect located at this thalweg depth. Sum the three depths and divide by four. Record the average depth of every habitat unit to 0.05 meters.

Maximum Pool Depth for all slow water habitat units: The maximum depth is the deepest point of a pool. It is located by probing in the deep part of the pool until the deepest spot is located. Use a 2.0m stadia rod to measure the maximum depth and record to 0.01 meters. For step pool complexes, find and record the highest maximum depth out of all the pools. Make sure that the maximum depth is recorded as a greater value than the average depth and crest depth.

FISH POPULATION SAMPLING:

Snorkel all habitat units in the reach. The observer counts all fish in the entire habitat unit or that portion of the habitat unit that is snorkeled using one of three approaches depending on the characteristics of the habitat unit: (1) the snorkeler can proceed up the center of the habitat unit and count fish by zigzagging outward to both banks. Care should be taken to search for fish throughout the habitat unit, including the margins, and to inspect all cover components; (2) if the water is too deep or turbulent to zigzag and visibility is adequate, the observer moves up one bank of the habitat unit and counts all fish to the other bank; and (3) in water too deep to count upstream, the observer floats down the center of the habitat unit and counts all fish from bank to bank, remaining as motionless as possible. Use the ruler marked on your PVC cuff to measure the fish. If you cannot get close enough to measure the fish directly then compare the length of the fish to a nearby rock or other substrate and measure that substrate. Identify the species of fish and estimate the fish's length to the nearest 10 mm. Record the fish lengths in the appropriate size class on the data sheet. For example if you observe a 150 and 140 mm brook trout record both of them in the 100-150 category. Keep your eye calibrated by periodically measuring rocks or other underwater objects with your PVC cuff.

QUALITY CONTROL: At the end of the day, and periodically throughout the day, check the data for errors. (e.g. look for missing values or decimal places in the wrong place.)

Calculations for fish species inventory and fish and fish habitat inventory summaries

Total site length = sum of all habitat unit lengths
Mean unit length = total site length/total number of habitat units
Mean unit width* = sum(unit width * unit length)/total site length
Mean unit depth** = sum(unit avg. depth * unit length * unit width)/sum(unit length * unit width)
Mean width/depth*** = [sum(unit width/unit avg. depth)*unit length]/total site length
Mean width/max depth = [sum(pool width * pool length)/Sum(pool length)]/ [sum pool max depths/total number of pools]

Mean % fines = sum(avgerage % fines)/total number of % fines counts

R1/R4 LWD per mile = [sum(LWD singles, aggregates, rootwads)/(total site length * 3.28)]*5280
R1/R4 LWD per 100 m = [sum(LWD singles, aggregates, rootwads)/total site length]*100
PACFISH LWD per mile = [sum(PACFISH LWD peices/total site length * 3.28)]*5280

Mean % stable bank = sum(% unit stable bank)/total number of % stable bank estimates

Mean max depth = sum(maximum pool depth)/total number of maximum pool depth measurements
Pools per mile = [total number of pools/(total site length * 3.28)]*5280
Pools per 100 m = (total number of pools/total site length)*100
Large pools per mile = [total number of pools with maximum depth >= 1 m/(total site length *3.28)]*5280

Total fish = sum of all fish observed within the site
Density 100 m^2 = [sum(fish observed within the site)/sum(snorkel unit length*snorkel unit width)]*100

* Mean unit width is weighted by unit length
**Mean unit depth is weighted by unit length and width
***Mean width/depth is weighted by unit length

Appendix B. Daily mean, minimum, and maximum stream temperatures, Gold Fork River drainage, 2002.

South Fork Gold Fork River at meadow, monitored by Boise National Forest, 2002							
Date	Mean	Min	Max	Date	Mean	Min	Max
8/17	8.85	7.06	9.84	9/9	5.11	3.78	6.74
8/18	7.95	6.28	9.68	9/10	5.94	4.72	7.67
8/19	7.81	6.12	9.68	9/11	6.59	5.34	8.29
8/20	8.07	7.06	9.06	9/12	7.21	6.12	8.75
8/21	7.30	6.59	7.98	9/13	6.90	5.65	8.29
8/22	6.44	5.18	7.67	9/14	6.88	5.81	7.98
8/23	7.05	5.65	8.60	9/15	7.46	6.59	8.60
8/24	7.25	5.97	8.44	9/16	7.17	6.28	7.98
8/25	7.24	5.81	8.60	9/17	6.44	5.97	7.06
8/26	7.46	6.90	8.29	9/18	5.63	4.87	6.74
8/27	7.45	6.43	8.75	9/19	5.60	4.56	6.90
8/28	7.46	6.59	8.44	9/20	5.68	4.87	6.74
8/29	7.58	6.74	8.60	9/21	4.90	4.09	5.81
8/30	7.25	6.43	8.13	9/22	4.64	3.62	5.81
8/31	7.41	6.43	8.60	9/23	5.17	4.24	6.43
9/1	7.31	6.28	8.44	9/24	5.25	4.40	6.28
9/2	7.53	6.28	9.06	9/25	5.45	4.72	6.43
9/3	7.87	6.90	9.22	9/26	4.72	3.93	5.49
9/4	7.65	6.59	8.91	9/27	4.61	4.09	5.03
9/5	7.69	6.90	8.60	9/28	4.16	3.47	5.18
9/6	7.11	6.74	7.67	9/29	3.94	3.31	4.40
9/7	5.85	5.49	6.59	9/30	3.10	2.84	3.31
9/8	5.08	4.09	6.28				

Appendix B. Continued.

Lodgepole Creek, monitored by Boise National Forest, 2002							
Date	Mean	Min	Max	Date	Mean	Min	Max
8/17	9.45	7.39	10.49	9/12	7.88	6.61	9.55
8/18	8.16	6.47	10.18	9/13	7.76	6.30	9.24
8/19	8.08	6.30	10.02	9/14	7.91	6.47	9.38
8/20	8.59	7.39	10.32	9/15	8.72	7.53	10.18
8/21	7.95	7.09	8.77	9/16	8.33	7.23	9.24
8/22	7.23	5.84	8.77	9/17	7.59	6.92	8.32
8/23	7.74	6.30	9.38	9/18	6.19	5.22	7.23
8/24	7.75	6.30	9.09	9/19	5.93	4.59	7.39
8/25	7.97	6.47	9.87	9/20	6.17	5.05	7.39
8/26	7.88	7.09	8.94	9/21	4.97	3.64	5.98
8/27	8.23	6.78	10.32	9/22	4.88	3.48	6.47
8/28	8.47	7.39	9.70	9/23	5.58	4.28	7.09
8/29	8.87	8.02	9.70	9/24	5.88	4.59	7.23
8/30	8.70	7.53	9.87	9/25	5.81	4.74	7.09
8/31	9.00	7.70	10.79	9/26	5.16	3.81	6.47
9/1	8.90	7.53	10.32	9/27	5.11	4.43	5.68
9/2	8.89	7.39	10.49	9/28	4.57	3.64	5.84
9/3	9.34	8.15	10.93	9/29	4.12	3.32	5.05
9/4	9.10	7.70	10.63	9/30	3.22	2.54	3.95
9/5	9.46	8.47	10.63	10/1	2.02	1.10	3.00
9/6	8.45	8.02	9.09	10/2	1.75	0.77	2.86
9/7	7.19	6.61	7.70	10/3	2.54	1.59	3.64
9/8	6.06	4.74	7.53	10/4	3.82	3.00	4.74
9/9	5.67	4.13	7.39	10/5	4.39	3.64	5.22
9/10	6.43	5.05	8.15	10/6	3.78	2.69	4.91
9/11	7.23	5.84	8.94				

Appendix B. Continued.

South Fork Gold Fork River at Confluence with Gold Fork River, monitored by Boise National Forest, 2002

Date	Mean	Min	Max	Date	Mean	Min	Max
7/24	12.38	10.62	14.33	8/28	8.73	7.06	10.92
7/25	11.70	9.68	14.18	8/29	9.47	8.13	11.54
7/26	11.43	9.53	13.71	8/30	9.27	7.83	10.92
7/27	11.20	9.68	13.25	8/31	9.49	7.98	11.85
7/28	10.48	8.29	13.09	9/1	9.24	7.37	11.54
7/29	11.08	8.91	13.87	9/2	9.36	7.37	12.01
7/30	11.44	9.22	14.18	9/3	9.79	7.98	12.32
7/31	11.00	9.22	13.41	9/4	9.53	7.67	12.01
8/1	9.67	7.21	12.63	9/5	9.92	8.44	12.01
8/2	10.28	8.29	13.25	9/6	8.92	8.13	9.99
8/3	9.97	7.37	12.78	9/7	7.64	6.90	8.29
8/4	11.22	9.84	13.25	9/8	6.21	4.87	7.98
8/5	9.85	8.44	11.23	9/9	5.69	3.78	7.98
8/6	9.06	7.67	10.92	9/10	6.35	4.40	8.91
8/7	8.09	6.28	9.99	9/11	7.09	5.18	9.68
8/8	7.80	5.49	10.77	9/12	7.80	5.97	10.46
8/9	8.01	5.49	11.08	9/13	7.69	5.81	10.15
8/10	8.83	6.43	12.01	9/14	7.90	5.97	10.15
8/11	9.54	7.37	12.47	9/15	8.83	7.06	11.08
8/12	9.27	6.90	12.32	9/16	8.52	6.90	10.46
8/13	9.56	7.21	12.78	9/17	8.07	7.52	8.91
8/14	9.82	7.37	12.94	9/18	6.88	5.65	8.29
8/15	10.15	7.83	13.25	9/19	6.09	4.40	8.13
8/16	9.96	7.98	12.78	9/20	6.12	4.56	8.13
8/17	9.24	6.90	12.01	9/21	4.89	3.31	6.43
8/18	8.73	6.43	11.69	9/22	4.57	2.84	6.59
8/19	8.66	6.28	11.69	9/23	5.13	3.47	7.21
8/20	9.18	7.52	11.85	9/24	5.49	3.78	7.52
8/21	8.62	7.37	10.15	9/25	5.32	3.78	7.37
8/22	7.56	5.65	9.68	9/26	4.75	2.99	6.43
8/23	8.23	6.12	10.77	9/27	5.26	4.56	6.28
8/24	8.21	6.28	10.46	9/28	4.36	2.99	5.97
8/25	8.52	6.43	11.54	9/29	3.92	2.84	5.03
8/26	8.32	6.90	10.31	9/30	3.39	2.36	4.56
8/27	8.35	6.59	10.92				

Appendix B. Continued.

North Fork Gold Fork River at Selby's campground, monitored by Boise National Forest, 2002							
Date	Mean	Min	Max	Date	Mean	Min	Max
7/25	9.61	8.29	11.38	8/28	7.87	6.74	9.06
7/26	9.40	7.98	11.23	8/29	8.14	7.37	9.06
7/27	9.25	7.98	10.92	8/30	7.90	6.90	9.06
7/28	8.66	7.06	10.62	8/31	8.26	7.06	9.99
7/29	9.13	7.67	11.08	9/1	8.07	6.90	9.37
7/30	9.40	7.83	11.38	9/2	8.17	6.90	9.84
7/31	9.10	7.83	10.77	9/3	8.51	7.37	9.99
8/1	8.19	6.43	10.31	9/4	8.33	7.06	9.84
8/2	8.66	7.37	10.77	9/5	8.71	7.98	9.84
8/3	8.45	6.74	10.46	9/6	7.80	7.37	8.29
8/4	9.17	8.29	10.46	9/7	6.62	6.12	7.21
8/5	8.21	7.21	9.22	9/8	5.52	4.56	6.74
8/6	7.70	6.59	8.91	9/9	5.24	3.93	6.74
8/7	7.32	6.28	8.60	9/10	5.99	4.72	7.67
8/8	6.76	5.49	8.13	9/11	6.71	5.34	8.29
8/9	6.96	5.34	9.06	9/12	7.43	6.28	8.91
8/10	7.66	5.97	9.84	9/13	7.17	5.81	8.60
8/11	8.21	6.74	10.15	9/14	7.27	5.97	8.60
8/12	8.11	6.74	10.15	9/15	7.97	6.90	9.22
8/13	8.37	6.90	10.46	9/16	7.64	6.59	8.75
8/14	8.48	6.74	10.62	9/17	7.02	6.28	7.52
8/15	8.75	7.21	10.62	9/18	6.00	5.18	7.06
8/16	8.55	7.21	10.31	9/19	5.66	4.56	7.06
8/17	7.99	6.43	9.68	9/20	5.79	4.72	7.06
8/18	7.67	6.12	9.53	9/21	4.81	3.78	5.81
8/19	7.59	6.12	9.37	9/22	4.63	3.47	6.12
8/20	8.01	7.21	9.22	9/23	5.29	4.09	6.74
8/21	7.56	6.90	8.60	9/24	5.47	4.40	6.74
8/22	6.79	5.49	8.29	9/25	5.77	5.03	6.90
8/23	7.14	5.81	8.60	9/26	4.92	3.78	5.97
8/24	7.14	5.97	8.44	9/27	4.96	4.56	5.34
8/25	7.30	5.97	9.06	9/28	4.48	3.62	5.65
8/26	7.60	7.06	8.60	9/29	3.97	3.31	4.72
8/27	7.81	6.74	9.37	9/30	3.16	2.68	3.78

Appendix B. Continued.

Kennally Creek, monitored by Payette National Forest, 2002

Date	Mean	Min	Max	Date	Mean	Min	Max
6/26	10.11	8.68	11.78	8/13	12.52	10.70	14.41
6/27	10.49	9.14	12.08	8/14	12.64	10.70	14.41
6/28	10.54	9.76	11.47	8/15	12.95	11.16	14.56
6/29	10.10	9.30	11.32	8/16	12.84	11.32	14.41
6/30	9.68	8.07	11.62	8/17	12.34	10.70	13.78
7/1	9.64	8.07	11.47	8/18	12.03	10.23	13.63
7/2	9.55	7.61	11.78	8/19	11.99	10.39	13.48
7/3	10.50	8.68	12.86	8/20	12.34	11.01	13.94
7/4	10.70	8.99	12.86	8/21	11.80	10.86	12.71
7/5	10.20	7.92	12.71	8/22	11.31	9.76	12.71
7/6	10.88	8.84	13.17	8/23	11.65	10.23	13.02
7/7	11.34	10.08	13.02	8/24	11.68	10.39	13.02
7/8	11.47	10.23	13.48	8/25	11.64	10.08	13.17
7/9	10.96	8.68	13.78	8/26	11.98	11.01	13.02
7/10	11.91	9.45	14.88	8/27	11.95	10.86	13.17
7/11	12.89	10.39	15.83	8/28	11.77	10.54	12.86
7/12	13.66	11.32	16.30	8/29	12.08	11.16	13.02
7/13	14.49	12.55	16.93	8/30	12.15	11.01	13.32
7/14	14.53	13.02	16.46	8/31	12.53	11.47	13.63
7/15	14.25	12.24	16.61	9/1	12.16	10.86	13.32
7/16	14.31	12.71	16.61	9/2	12.24	10.70	13.48
7/17	14.25	12.24	16.77	9/3	12.01	10.86	13.32
7/18	13.36	11.93	14.88	9/4	12.00	10.39	13.32
7/19	12.91	12.08	13.48	9/5	12.21	11.16	13.17
7/20	13.29	11.47	15.67	9/6	11.64	11.16	12.08
7/21	13.11	10.86	15.67	9/7	10.87	9.92	11.32
7/22	12.81	11.32	14.09	9/8	9.71	8.53	10.86
7/23	13.62	11.47	16.14	9/9	9.47	7.92	10.86
7/24	13.90	12.39	15.51	9/10	9.88	8.07	11.32
7/25	13.50	11.47	15.83	9/11	10.41	8.84	11.78
7/26	13.40	11.47	15.51	9/12	10.90	9.45	12.24
7/27	13.30	11.62	15.35	9/13	10.75	9.14	12.08
7/28	12.84	10.86	15.03	9/14	11.03	9.45	12.24
7/29	13.32	11.32	15.67	9/15	11.63	10.54	12.55
7/30	13.52	11.47	15.67	9/16	11.46	10.39	12.39
7/31	13.23	11.62	14.88	9/17	10.68	8.99	11.32
8/1	12.59	10.54	14.72	9/18	8.99	8.07	10.23
8/2	12.91	11.01	15.03	9/19	9.20	7.45	11.47
8/3	12.77	10.86	14.72	9/20	10.83	9.45	11.78
8/4	13.30	12.24	14.72	9/21	10.62	9.76	11.16
8/5	12.15	11.16	12.86	9/22	10.90	9.45	12.39
8/6	11.85	10.54	13.48	9/23	11.91	11.32	12.39
8/7	11.21	9.92	12.71	9/24	12.22	11.78	12.55
8/8	11.06	9.45	12.55	9/25	12.22	11.93	12.55
8/9	11.45	9.61	13.32	9/26	11.88	11.47	12.24
8/10	11.93	10.08	13.94	9/27	12.04	11.78	12.39
8/11	12.31	10.70	14.09	9/28	12.25	11.93	12.55
8/12	12.24	10.54	14.09				

Appendix B. Continued.

South Fork Kennally Creek, monitored by Payette National Forest, 2002

Date	Mean	Min	Max	Date	Mean	Min	Max
6/28	8.05	6.96	9.12	8/15	7.94	6.65	9.12
6/29	7.76	6.96	8.66	8/16	7.79	6.65	8.82
6/30	7.34	5.88	9.12	8/17	7.33	6.03	8.51
7/1	7.17	5.72	8.82	8/18	6.97	5.72	8.20
7/2	7.06	5.26	8.97	8/19	6.92	5.57	8.20
7/3	7.97	6.65	9.90	8/20	7.38	6.49	8.35
7/4	7.89	6.65	9.43	8/21	6.95	6.34	7.73
7/5	7.35	5.57	9.28	8/22	6.19	5.10	7.27
7/6	7.90	6.49	9.43	8/23	6.68	5.57	7.73
7/7	8.39	7.58	9.43	8/24	6.66	5.72	7.42
7/8	8.60	7.89	10.06	8/25	6.74	5.57	7.89
7/9	7.64	5.88	9.74	8/26	7.20	6.65	7.73
7/10	8.54	6.81	10.83	8/27	7.57	6.65	8.82
7/11	9.40	7.89	11.44	8/28	7.56	6.65	8.20
7/12	9.88	8.20	11.91	8/29	7.61	6.96	8.04
7/13	10.42	9.12	12.06	8/30	7.37	6.34	8.20
7/14	10.34	9.12	11.76	8/31	7.58	6.65	8.51
7/15	9.97	8.51	11.60	9/1	7.44	6.34	8.35
7/16	10.00	8.82	11.44	9/2	7.48	6.49	8.35
7/17	9.90	8.51	11.60	9/3	7.64	6.81	8.51
7/18	9.43	8.35	10.52	9/4	7.44	6.49	8.20
7/19	9.00	8.35	9.43	9/5	7.75	7.12	8.35
7/20	9.05	7.89	10.52	9/6	7.14	6.81	7.73
7/21	8.71	7.27	10.37	9/7	5.92	4.94	6.81
7/22	8.58	7.42	9.59	9/8	4.79	4.01	5.72
7/23	9.15	7.73	10.83	9/9	4.86	3.85	5.88
7/24	9.28	8.04	10.37	9/10	5.44	4.32	6.65
7/25	8.82	7.42	10.37	9/11	6.09	5.10	7.27
7/26	8.74	7.42	10.06	9/12	6.75	5.72	7.73
7/27	8.59	7.42	9.90	9/13	6.50	5.41	7.42
7/28	8.00	6.49	9.43	9/14	6.60	5.57	7.73
7/29	8.49	7.12	10.06	9/15	7.16	6.34	7.89
7/30	8.69	7.27	10.21	9/16	6.95	6.19	7.58
7/31	8.39	7.27	9.43	9/17	6.52	5.88	7.12
8/1	7.49	5.88	9.12	9/18	5.44	4.79	6.19
8/2	7.89	6.65	9.43	9/19	5.13	4.16	6.03
8/3	7.66	6.03	9.28	9/20	5.31	4.47	6.03
8/4	8.40	7.58	9.28	9/21	4.47	3.69	5.41
8/5	7.47	6.65	8.20	9/22	4.28	3.38	5.26
8/6	7.01	6.03	8.04	9/23	4.78	3.85	5.72
8/7	6.53	5.57	7.27	9/24	4.99	4.16	5.88
8/8	5.95	4.79	7.12	9/25	5.38	4.79	6.03
8/9	6.34	4.94	7.89	9/26	4.58	3.69	5.26
8/10	7.09	5.57	8.66	9/27	5.02	4.63	5.41
8/11	7.58	6.34	8.97	9/28	4.47	3.69	5.10
8/12	7.39	6.19	8.66	9/29	3.96	3.38	4.63
8/13	7.84	6.65	9.28	9/30	3.16	2.91	3.69
8/14	7.83	6.34	9.12				

Appendix B. Continued.

Rapid Creek at 390 Road tributary, monitored by Payette National Forest, 2002

Date	Mean	Min	Max	Date	Mean	Min	Max
6/26	10.07	7.99	13.10	8/13	10.04	7.37	14.65
6/27	10.43	8.14	13.26	8/14	10.12	7.22	14.65
6/28	10.67	9.22	12.48	8/15	10.36	7.68	14.65
6/29	9.89	9.22	10.93	8/16	10.09	7.68	14.03
6/30	9.56	7.52	12.32	8/17	9.46	6.91	13.10
7/1	9.38	7.22	12.32	8/18	9.15	6.44	13.26
7/2	9.40	6.91	12.63	8/19	9.14	6.44	13.26
7/3	10.55	8.29	13.87	8/20	9.79	7.83	13.26
7/4	10.37	8.76	13.41	8/21	8.94	7.52	11.09
7/5	9.76	7.22	13.26	8/22	8.44	6.28	11.71
7/6	10.88	8.45	14.34	8/23	8.88	6.59	12.02
7/7	11.11	10.00	12.63	8/24	9.07	6.59	12.79
7/8	11.03	9.53	13.87	8/25	9.22	6.75	12.94
7/9	10.17	7.52	14.18	8/26	9.45	8.14	11.55
7/10	11.46	8.76	15.60	8/27	10.07	8.14	13.72
7/11	12.37	9.84	16.55	8/28	9.48	7.68	11.86
7/12	13.07	10.47	17.18	8/29	9.57	7.83	12.02
7/13	13.83	11.55	17.82	8/30	9.36	7.37	12.17
7/14	13.56	11.86	16.71	8/31	9.83	7.68	13.56
7/15	13.04	10.78	16.55	9/1	9.53	7.37	12.48
7/16	13.24	11.24	17.03	9/2	9.70	7.37	13.41
7/17	13.05	10.62	17.18	9/3	9.63	7.83	12.63
7/18	12.34	10.31	15.28	9/4	9.62	7.37	13.10
7/19	11.96	10.78	13.26	9/5	9.50	7.83	11.55
7/20	12.23	10.31	16.23	9/6	8.50	7.83	9.38
7/21	11.65	9.07	15.92	9/7	7.36	6.28	8.45
7/22	11.29	9.38	13.41	9/8	6.43	4.73	9.38
7/23	12.25	9.69	16.55	9/9	6.54	4.10	10.31
7/24	12.10	10.16	14.49	9/10	7.31	5.04	11.09
7/25	11.78	9.22	16.07	9/11	8.01	5.66	11.86
7/26	11.54	9.22	15.12	9/12	8.61	6.44	12.17
7/27	11.29	9.07	15.28	9/13	8.38	5.97	11.86
7/28	10.58	7.83	14.81	9/14	8.50	6.28	11.39
7/29	11.15	8.45	15.44	9/15	9.00	7.06	11.55
7/30	11.46	8.76	15.60	9/16	8.70	6.91	10.62
7/31	10.95	8.76	14.65	9/17	7.82	7.22	8.45
8/1	10.01	7.06	14.34	9/18	7.08	5.66	9.53
8/2	10.23	7.68	14.49	9/19	6.77	4.73	10.00
8/3	10.09	7.06	14.18	9/20	6.86	5.04	9.69
8/4	10.98	9.07	14.34	9/21	5.56	3.78	8.14
8/5	9.56	8.14	11.09	9/22	5.71	3.63	8.91
8/6	9.13	7.22	12.17	9/23	6.37	4.41	9.38
8/7	8.46	6.44	11.24	9/24	6.52	4.57	9.38
8/8	8.16	5.97	11.55	9/25	6.76	5.19	9.22
8/9	8.60	5.82	12.94	9/26	5.80	3.94	7.99
8/10	9.35	6.44	13.72	9/27	6.19	5.51	7.06
8/11	9.91	7.37	14.03	9/28	5.79	4.10	8.29
8/12	9.71	6.91	14.03				

Appendix B. Continued.

Rapid Creek at Forest boundary, monitored by Payette National Forest, 2002							
Date	Mean	Min	Max	Date	Mean	Min	Max
6/26	11.20	8.91	14.04	8/13	11.80	8.44	16.09
6/27	11.51	9.22	14.20	8/14	12.10	8.59	16.42
6/28	11.78	10.31	13.42	8/15	12.43	9.22	16.57
6/29	11.00	9.99	12.48	8/16	12.04	9.06	15.78
6/30	10.57	8.28	13.57	8/17	11.27	8.13	14.83
7/1	10.39	7.97	13.42	8/18	10.89	7.51	14.99
7/2	10.39	7.66	13.73	8/19	10.90	7.66	14.83
7/3	11.59	9.06	14.99	8/20	11.40	8.75	14.99
7/4	11.64	9.37	14.83	8/21	10.38	8.59	12.48
7/5	10.82	7.82	14.36	8/22	9.86	6.88	13.57
7/6	12.03	9.06	15.62	8/23	10.68	7.82	14.04
7/7	12.34	10.78	14.52	8/24	10.71	7.66	14.67
7/8	12.61	10.93	15.78	8/25	10.98	7.97	14.67
7/9	11.48	8.13	15.46	8/26	11.03	8.91	13.89
7/10	12.86	9.53	17.21	8/27	11.43	8.75	15.14
7/11	13.93	10.62	18.17	8/28	10.99	8.59	13.73
7/12	14.83	11.55	18.82	8/29	11.20	9.22	13.57
7/13	15.76	12.95	19.48	8/30	11.17	8.75	14.04
7/14	15.81	13.57	18.99	8/31	11.60	9.06	14.67
7/15	15.07	12.17	18.49	9/1	11.28	8.59	14.36
7/16	15.31	12.79	18.66	9/2	11.56	8.59	15.30
7/17	15.25	12.33	18.99	9/3	11.57	9.22	14.67
7/18	13.97	11.71	16.09	9/4	11.44	8.44	14.99
7/19	13.79	12.48	14.83	9/5	11.52	9.53	14.20
7/20	14.08	11.55	17.69	9/6	10.05	9.22	11.40
7/21	13.54	10.47	17.53	9/7	8.77	7.66	9.84
7/22	12.98	10.78	15.14	9/8	7.82	5.32	11.40
7/23	14.18	11.09	18.17	9/9	7.59	4.54	11.24
7/24	14.34	11.86	17.21	9/10	8.44	5.32	12.33
7/25	13.73	10.78	17.69	9/11	9.29	6.11	13.11
7/26	13.70	10.78	17.05	9/12	10.02	7.19	13.73
7/27	13.47	10.78	16.89	9/13	9.80	6.88	13.26
7/28	12.59	9.37	16.42	9/14	9.81	7.04	12.79
7/29	13.20	9.99	17.37	9/15	10.58	8.28	13.42
7/30	13.53	10.47	17.37	9/16	10.15	7.97	12.48
7/31	12.93	10.31	16.09	9/17	9.10	8.13	9.84
8/1	11.82	8.28	15.94	9/18	8.10	6.26	10.93
8/2	12.20	9.22	16.26	9/19	7.79	5.17	11.09
8/3	11.95	8.44	15.94	9/20	7.87	5.63	10.93
8/4	13.13	11.09	16.26	9/21	6.44	4.22	9.22
8/5	11.25	9.68	12.64	9/22	6.37	3.59	9.68
8/6	10.90	8.28	14.52	9/23	7.18	4.54	10.47
8/7	9.70	7.19	12.48	9/24	7.34	4.85	10.62
8/8	9.45	6.73	13.26	9/25	7.41	5.17	10.47
8/9	9.97	6.57	14.36	9/26	6.43	3.91	8.91
8/10	11.13	7.66	15.46	9/27	7.15	5.94	9.22
8/11	11.74	8.75	15.78	9/28	6.23	3.91	9.22
8/12	11.46	8.28	15.62				

Appendix B. Continued.

Powelson Creek, monitored by Payette National Forest, 2002

Date	Mean	Min	Max	Date	Mean	Min	Max
6/26	9.52	7.79	11.98	8/13	9.54	7.01	12.61
6/27	9.76	7.94	11.98	8/14	9.66	7.01	12.61
6/28	9.68	8.41	11.21	8/15	9.95	7.48	12.92
6/29	9.28	8.26	11.06	8/16	9.72	7.32	12.29
6/30	8.84	6.86	11.21	8/17	9.08	6.54	11.67
7/1	8.51	6.54	10.74	8/18	8.74	6.23	11.52
7/2	8.35	6.07	11.06	8/19	8.63	6.23	11.36
7/3	9.34	7.48	11.98	8/20	9.31	7.32	12.14
7/4	9.41	7.63	11.67	8/21	8.69	7.32	10.28
7/5	8.67	6.23	11.36	8/22	7.86	5.76	10.28
7/6	9.54	7.48	12.14	8/23	8.55	6.54	10.90
7/7	10.07	8.72	11.83	8/24	8.60	6.39	11.06
7/8	10.41	9.18	12.61	8/25	8.67	6.39	11.21
7/9	9.43	7.01	12.29	8/26	9.25	7.79	11.06
7/10	10.35	7.94	13.39	8/27	9.87	8.26	12.45
7/11	11.22	8.87	14.16	8/28	9.15	7.48	10.74
7/12	11.90	9.65	14.79	8/29	9.54	8.26	11.21
7/13	12.75	10.90	15.43	8/30	9.22	7.48	11.21
7/14	12.57	11.06	14.63	8/31	9.72	7.79	12.29
7/15	12.10	10.12	14.63	9/1	9.37	7.32	11.67
7/16	12.29	10.59	14.79	9/2	9.47	7.17	12.14
7/17	12.19	10.12	14.79	9/3	9.50	7.63	11.83
7/18	11.23	9.65	12.92	9/4	9.39	7.17	11.98
7/19	11.01	10.12	11.67	9/5	9.61	7.94	11.52
7/20	11.37	9.65	14.01	9/6	8.64	7.79	9.34
7/21	10.94	8.72	13.70	9/7	7.84	7.17	8.41
7/22	10.58	9.03	12.29	9/8	6.68	4.97	8.87
7/23	11.47	9.34	14.32	9/9	6.39	4.19	9.03
7/24	11.77	10.12	13.54	9/10	7.05	4.82	9.96
7/25	11.16	9.03	14.01	9/11	7.73	5.44	10.59
7/26	11.02	9.03	13.39	9/12	8.45	6.23	11.21
7/27	10.81	8.87	13.23	9/13	8.26	5.92	10.90
7/28	10.11	7.79	12.77	9/14	8.21	6.07	10.59
7/29	10.53	8.26	13.39	9/15	8.81	7.01	10.74
7/30	10.76	8.41	13.54	9/16	8.52	6.86	10.28
7/31	10.40	8.41	12.77	9/17	7.99	7.63	8.56
8/1	9.35	6.70	12.14	9/18	7.23	5.92	9.03
8/2	9.70	7.32	12.77	9/19	6.79	4.82	9.18
8/3	9.38	6.86	12.29	9/20	6.84	4.97	9.03
8/4	10.50	9.03	12.77	9/21	5.79	4.03	7.63
8/5	9.28	7.94	10.28	9/22	5.51	3.56	7.94
8/6	8.92	7.17	11.36	9/23	6.23	4.35	8.72
8/7	8.13	6.23	10.12	9/24	6.25	4.35	8.56
8/8	7.93	5.92	10.28	9/25	7.05	5.76	9.18
8/9	8.19	5.76	11.21	9/26	5.68	3.72	7.48
8/10	8.89	6.39	11.98	9/27	6.16	5.44	7.17
8/11	9.45	7.17	12.29	9/28	5.57	4.03	7.63
8/12	9.30	6.86	12.29				

Appendix B. Continued.

North Fork Kennally Creek, monitored by Payette National Forest, 2002

Date	Mean	Min	Max	Date	Mean	Min	Max
6/26	9.56	7.94	10.57	8/13	11.55	9.79	13.21
6/27	9.95	8.24	10.88	8/14	11.64	9.79	13.21
6/28	10.16	9.02	11.03	8/15	11.89	10.11	13.36
6/29	9.68	8.71	10.26	8/16	11.72	10.11	12.89
6/30	9.14	7.63	10.57	8/17	11.03	9.33	12.12
7/1	9.43	8.09	10.57	8/18	10.56	8.86	11.96
7/2	9.29	7.78	10.73	8/19	10.41	8.71	11.81
7/3	10.12	9.02	11.81	8/20	10.96	9.64	12.27
7/4	10.64	9.48	12.12	8/21	10.57	9.79	11.49
7/5	10.21	8.71	11.81	8/22	9.45	8.24	10.42
7/6	10.73	9.33	12.43	8/23	9.92	8.56	11.03
7/7	11.13	10.26	12.27	8/24	9.90	8.71	10.57
7/8	11.19	10.11	12.58	8/25	9.85	8.40	11.34
7/9	10.96	9.02	13.05	8/26	10.35	9.64	11.03
7/10	11.74	9.64	14.13	8/27	10.53	9.33	11.96
7/11	12.72	10.57	15.23	8/28	10.61	9.48	11.49
7/12	13.56	11.49	15.87	8/29	10.65	9.79	11.49
7/13	14.42	12.74	16.49	8/30	10.35	9.33	11.19
7/14	14.77	13.21	16.34	8/31	10.57	9.17	11.81
7/15	14.35	12.58	16.02	9/1	10.46	9.17	11.49
7/16	14.39	12.89	15.87	9/2	10.44	9.02	11.65
7/17	14.31	12.58	15.87	9/3	10.46	9.48	11.34
7/18	13.64	12.43	14.59	9/4	10.10	8.86	10.88
7/19	12.89	12.12	13.67	9/5	10.41	9.64	11.19
7/20	12.81	11.19	14.59	9/6	9.80	9.48	10.57
7/21	13.01	11.19	14.76	9/7	8.39	7.63	9.33
7/22	12.74	11.49	13.67	9/8	7.05	5.92	8.09
7/23	13.13	11.49	15.07	9/9	6.71	5.29	7.78
7/24	13.71	12.43	14.76	9/10	7.19	5.76	8.56
7/25	13.31	11.65	14.91	9/11	7.92	6.54	9.17
7/26	13.22	11.65	14.59	9/12	8.72	7.48	9.95
7/27	13.02	11.49	14.44	9/13	8.77	7.48	9.79
7/28	12.31	10.42	13.82	9/14	8.73	7.48	9.79
7/29	12.54	10.73	14.28	9/15	9.20	8.24	10.11
7/30	12.83	11.03	14.59	9/16	9.22	8.24	9.95
7/31	12.66	11.03	13.97	9/17	8.81	8.24	9.64
8/1	11.80	9.79	13.36	9/18	7.59	6.54	8.56
8/2	11.91	10.26	13.67	9/19	7.21	5.92	8.09
8/3	11.65	9.79	13.21	9/20	7.01	5.76	7.78
8/4	12.29	11.19	13.36	9/21	6.16	5.14	7.17
8/5	11.27	10.42	12.58	9/22	5.59	4.36	6.54
8/6	10.44	9.17	11.65	9/23	6.04	4.98	7.01
8/7	9.99	8.71	11.03	9/24	6.22	5.14	7.17
8/8	9.62	8.24	10.73	9/25	6.68	5.76	7.63
8/9	9.73	7.94	11.49	9/26	6.06	5.14	6.86
8/10	10.41	8.56	12.12	9/27	6.33	5.92	6.70
8/11	11.14	9.33	12.74	9/28	5.99	5.14	6.86
8/12	11.28	9.48	12.89				

Appendix B. Continued.

East Fork Kennally Creek, monitored by Payette National Forest, 2002

Date	Mean	Minimum	Maximum	Date	Mean	Minimum	Maximum
6/28	8.17	7.11	9.58	8/14	7.32	5.71	8.96
6/29	7.75	7.11	8.66	8/15	7.48	5.87	8.96
6/30	7.38	5.87	9.27	8/16	7.24	5.71	8.66
7/1	7.17	5.56	8.96	8/17	6.77	5.24	8.19
7/2	7.10	5.24	9.27	8/18	6.50	4.93	8.04
7/3	7.95	6.49	9.89	8/19	6.54	5.09	8.04
7/4	7.85	6.49	9.42	8/20	6.91	5.87	8.19
7/5	7.37	5.56	9.42	8/21	6.36	5.71	6.96
7/6	8.07	6.49	9.73	8/22	5.82	4.62	7.11
7/7	8.45	7.42	9.58	8/23	6.28	4.93	7.58
7/8	8.43	7.58	9.58	8/24	6.23	5.09	7.11
7/9	7.62	5.87	9.73	8/25	6.30	4.93	7.73
7/10	8.57	6.80	10.67	8/26	6.65	6.02	7.42
7/11	9.23	7.42	11.14	8/27	7.04	6.02	8.35
7/12	9.68	8.04	11.60	8/28	6.94	5.87	7.89
7/13	10.06	8.66	11.76	8/29	6.99	6.18	7.58
7/14	9.98	8.66	11.60	8/30	6.80	5.71	7.89
7/15	9.55	8.04	11.44	8/31	6.98	5.87	8.19
7/16	9.62	8.35	11.29	9/1	6.83	5.56	7.89
7/17	9.46	7.89	11.29	9/2	6.83	5.56	8.04
7/18	8.99	7.73	10.36	9/3	6.98	6.02	8.04
7/19	8.66	7.89	9.42	9/4	6.84	5.71	7.89
7/20	8.83	7.58	10.52	9/5	7.01	6.33	7.73
7/21	8.50	6.96	10.21	9/6	6.35	6.02	6.64
7/22	8.24	7.11	9.27	9/7	5.34	4.46	6.02
7/23	8.83	7.27	10.67	9/8	4.61	3.68	5.71
7/24	8.88	7.73	10.05	9/9	4.59	3.37	5.71
7/25	8.55	6.96	10.36	9/10	5.23	3.99	6.49
7/26	8.30	6.80	9.73	9/11	5.79	4.62	6.96
7/27	8.18	6.80	9.73	9/12	6.31	5.24	7.58
7/28	7.59	5.87	9.27	9/13	6.11	4.93	7.27
7/29	8.03	6.49	9.89	9/14	6.15	4.93	7.27
7/30	8.26	6.64	10.05	9/15	6.53	5.56	7.58
7/31	7.84	6.49	9.12	9/16	6.33	5.40	7.11
8/1	7.09	5.24	8.81	9/17	5.92	5.71	6.33
8/2	7.46	6.02	9.27	9/18	5.32	4.46	6.33
8/3	7.23	5.56	8.96	9/19	4.97	3.84	6.02
8/4	7.86	6.96	8.96	9/20	5.10	4.15	6.02
8/5	6.93	6.02	7.58	9/21	4.29	3.37	4.93
8/6	6.60	5.71	7.73	9/22	4.19	3.06	5.24
8/7	6.26	5.24	7.42	9/23	4.73	3.68	5.71
8/8	5.88	4.62	7.27	9/24	4.81	3.68	5.87
8/9	6.04	4.46	7.89	9/25	5.01	4.31	5.87
8/10	6.72	5.09	8.51	9/26	4.30	3.21	5.24
8/11	7.14	5.71	8.81	9/27	4.68	4.15	5.09
8/12	7.05	5.71	8.66	9/28	4.32	3.37	5.09
8/13	7.25	5.71	8.96				

Appendix B. Continued.

Gold Fork River, Site #1 (Flat Creek), monitored by Idaho Department of Fish and Game, 2002.

Date	Mean	Min	Max	Date	Mean	Min	Max	Date	Mean	Min	Max
6/19	12.33	7.80	17.10	7/27	17.16	14.80	19.80	9/3	13.57	10.90	16.30
6/20	13.89	9.40	18.60	7/28	15.86	12.50	19.40	9/4	13.24	10.20	15.90
6/21	14.76	11.30	18.60	7/29	16.74	13.30	20.50	9/5	13.42	10.90	15.20
6/22	15.26	13.30	16.70	7/30	16.96	13.70	20.50	9/6	11.66	10.60	12.50
6/23	15.41	11.30	19.80	7/31	16.18	13.30	19.00	9/7	10.84	9.40	12.50
6/24	16.94	12.50	21.70	8/1	14.73	10.90	18.60	9/8	9.89	7.00	12.50
6/25	18.10	13.30	22.80	8/2	15.18	12.10	19.00	9/9	9.66	6.20	12.50
6/26	18.65	14.40	22.80	8/3	14.68	10.90	18.60	9/10	10.41	7.00	13.70
6/27	18.86	14.80	22.80	8/4	16.56	14.10	19.40	9/11	11.19	7.80	14.40
6/28	18.99	16.30	21.30	8/5	14.74	12.90	16.30	9/12	11.74	8.60	14.80
6/29	17.39	15.20	19.80	8/6	14.11	11.30	17.40	9/13	11.31	7.80	14.40
6/30	16.48	12.10	20.50	8/7	12.78	10.20	15.20	9/14	11.36	8.20	14.10
7/1	16.26	11.70	20.20	8/8	12.28	9.00	15.90	9/15	12.09	9.40	14.40
7/2	15.96	10.90	20.50	8/9	12.87	9.40	16.70	9/16	11.49	8.60	13.70
7/3	16.67	12.90	20.50	8/10	13.78	10.20	17.80	9/17	11.54	10.60	12.50
7/4	17.16	13.30	20.90	8/11	14.44	11.30	18.20	9/18	10.95	8.60	13.30
7/5	16.07	11.30	20.20	8/12	14.03	10.60	17.80	9/19	10.06	7.00	12.90
7/6	17.31	13.30	20.90	8/13	14.26	10.60	18.20	9/20	9.93	7.00	12.10
7/7	17.69	15.20	19.80	8/14	14.44	10.60	18.60	9/21	8.17	5.30	10.20
7/8	18.28	15.60	21.70	8/15	14.91	11.30	18.60	9/22	7.70	4.50	10.60
7/9	16.52	12.10	20.90	8/16	14.47	10.90	18.20	9/23	8.56	5.30	11.30
7/10	17.91	13.30	22.40	8/17	13.46	9.80	16.70	9/24	8.65	5.80	10.90
7/11	18.92	14.80	23.20	8/18	13.04	9.40	16.70	9/25	8.39	5.30	10.60
7/12	20.03	15.90	24.00	8/19	13.11	9.40	17.10	9/26	7.25	4.50	9.00
7/13	20.53	17.10	24.00	8/20	13.67	10.60	17.10	9/27	8.43	7.00	9.80
7/14	21.45	19.00	24.40	8/21	12.85	10.90	14.10	9/28	7.13	4.10	9.40
7/15	20.06	16.70	23.20	8/22	11.55	8.20	14.40	9/29	5.94	3.70	7.40
7/16	19.74	16.30	22.80	8/23	13.03	9.80	15.90	9/30	5.58	4.10	7.00
7/17	19.97	16.30	23.60	8/24	12.72	9.40	16.30	10/1	4.04	1.10	6.20
7/18	18.04	15.60	20.20	8/25	12.94	9.40	16.70	10/2	4.12	1.60	6.20
7/19	18.33	16.30	19.80	8/26	12.51	10.20	14.40	10/3	4.98	2.80	7.00
7/20	18.69	15.60	22.10	8/27	12.35	9.00	15.20	10/4	6.72	4.50	8.60
7/21	17.65	14.10	21.30	8/28	13.49	10.60	16.30	10/5	7.25	5.80	8.60
7/22	16.51	14.10	18.60	8/29	14.24	11.30	17.10	10/6	6.03	3.30	8.20
7/23	18.36	15.20	22.10	8/30	13.69	10.90	15.60	10/7	6.11	3.30	8.20
7/24	18.21	15.20	20.90	8/31	14.29	10.90	17.40	10/8	6.20	5.80	6.60
7/25	17.04	14.10	20.50	9/1	13.46	10.60	15.60	10/9	6.20	5.80	6.60
7/26	17.20	14.10	20.20	9/2	13.53	10.20	16.70				

Appendix B. Continued.

Gold Fork River, Site #2, monitored by Idaho Department of Fish and Game, 2002											
Date	Mean	Min	Max	Date	Mean	Min	Max	Date	Mean	Min	Max
6/30	17.66	13.71	20.4	8/3	16.58	11.08	22.06	9/6	12.87	11.38	14.49
7/1	18.73	13.71	21.56	8/4	17.66	13.87	22.06	9/7	12.43	10.15	15.75
7/2	18.11	13.87	20.73	8/5	15.31	12.63	17.98	9/8	11.73	7.67	16.7
7/3	14.54	10.15	19.92	8/6	15.49	10.92	20.57	9/9	12.12	7.06	17.66
7/4	15.35	10.77	20.57	8/7	14.15	9.84	17.82	9/10	12.94	7.83	18.63
7/5	14.74	9.53	20.4	8/8	14.20	8.91	19.92	9/11	13.61	8.6	19.27
7/6	15.67	10.62	21.23	8/9	14.95	9.22	20.4	9/12	14.21	9.37	19.92
7/7	15.70	12.47	19.59	8/10	15.84	10.15	21.39	9/13	13.97	8.91	19.59
7/8	16.77	12.78	22.23	8/11	16.34	11.23	21.73	9/14	13.59	9.22	18.14
7/9	15.84	9.99	22.06	8/12	15.98	10.77	21.39	9/15	14.17	10.31	18.47
7/10	17.37	11.38	23.74	8/13	16.31	10.92	22.06	9/16	13.70	9.84	18.47
7/11	18.63	12.78	24.78	8/14	16.61	11.08	22.23	9/17	12.74	11.23	15.75
7/12	19.71	14.02	26	8/15	17.14	11.85	22.73	9/18	12.12	8.44	16.86
7/13	20.37	15.12	26.35	8/16	16.75	11.69	22.39	9/19	12.11	7.52	17.5
7/14	20.67	16.86	26	8/17	15.89	10.77	20.89	9/20	12.02	7.83	17.02
7/15	19.84	14.96	25.3	8/18	15.69	10.31	21.73	9/21	10.37	6.43	14.64
7/16	20.07	15.91	25.65	8/19	15.70	10.46	21.73	9/22	10.31	5.65	15.59
7/17	20.38	15.27	26.17	8/20	16.11	11.69	22.06	9/23	11.08	6.59	16.22
7/18	17.82	14.49	20.89	8/21	14.40	11.38	17.98	9/24	10.82	6.74	15.91
7/19	17.80	15.27	20.4	8/22	13.75	9.22	19.27	9/25	10.60	6.43	15.43
7/20	18.95	14.18	24.78	8/23	14.78	10.77	19.43	9/26	9.30	5.81	12.94
7/21	18.56	12.94	24.43	8/24	15.10	10.31	20.89	9/27	10.17	7.83	13.87
7/22	17.03	13.25	20.4	8/25	15.73	10.46	21.89	9/28	9.51	5.34	14.33
7/23	19.12	13.87	24.96	8/26	14.39	11.23	18.63	9/29	7.63	5.18	10.15
7/24	19.02	14.33	23.06	8/27	14.71	10.46	20.73	9/30	6.84	4.87	10.62
7/25	18.31	13.25	24.61	8/28	15.18	11.69	19.92	10/1	6.40	2.68	11.08
7/26	18.59	13.71	23.74	8/29	15.84	11.85	21.06	10/2	6.29	2.36	11.08
7/27	18.41	13.71	23.57	8/30	15.07	11.38	19.11	10/3	6.42	3.62	9.22
7/28	17.61	12.01	23.06	8/31	16.41	11.54	22.23	10/4	8.29	5.18	12.16
7/29	18.55	12.94	24.43	9/1	15.46	11.38	19.76	10/5	8.37	6.28	11.69
7/30	18.50	13.25	23.92	9/2	16.16	11.08	22.06	10/6	8.19	4.24	12.78
7/31	17.81	13.09	22.73	9/3	15.69	11.85	20.4	10/7	8.13	4.4	12.47
8/1	16.73	11.08	22.23	9/4	15.34	11.08	20.89	10/8	6.67	6.28	7.06
8/2	17.11	12.01	22.73	9/5	15.26	11.85	19.43	10/9	6.67	6.28	7.06

Appendix B. Continued.

Gold Fork River, Site #3, monitored by Idaho Department of Fish and Game, 2002											
Date	Mean	Min	Max	Date	Mean	Min	Max	Date	Mean	Min	Max
6/30	17.52	13.7	20.19	8/15	16.16	12.55	19.81	9/30	6.42	5.4	7.43
7/1	18.38	13.32	21.33	8/16	15.90	12.55	19.04	10/1	5.68	4.15	6.62
7/2	17.11	10.21	20.95	8/17	14.91	11.38	17.9	10/2	5.39	3.74	7.03
7/3	13.52	10.21	17.52	8/18	14.43	10.99	17.9	10/3	5.70	4.57	7.03
7/4	14.46	10.99	17.9	8/19	14.46	10.99	17.9	10/4	7.10	5.81	8.63
7/5	13.69	9.82	17.9	8/20	14.84	11.77	17.9	10/5	8.03	7.03	9.03
7/6	14.58	10.99	18.28	8/21	13.89	11.38	16.76	10/6	7.45	5.81	8.63
7/7	15.21	12.93	17.9	8/22	12.29	9.42	16	10/7	7.63	6.22	9.03
7/8	15.99	12.93	19.42	8/23	13.72	10.99	16.38	10/8	7.07	5.4	8.63
7/9	14.64	10.6	19.04	8/24	13.62	10.21	17.14	10/9	6.54	4.99	7.83
7/10	16.04	11.77	20.57	8/25	14.12	10.6	17.9	10/10	6.06	4.99	7.83
7/11	17.35	13.32	21.71	8/26	13.74	11.38	16.76	10/11	5.09	4.15	6.22
7/12	18.52	14.85	22.48	8/27	13.31	10.21	16.76	10/12	3.17	1.6	4.99
7/13	19.09	15.62	22.48	8/28	13.62	10.99	16.76	10/13	2.51	0.73	3.74
7/14	20.02	17.14	22.48	8/29	14.46	11.38	17.52	10/14	2.51	0.73	3.74
7/15	18.90	15.62	22.09	8/30	14.15	11.38	16.38	10/15	2.96	1.17	4.57
7/16	18.59	15.23	21.71	8/31	14.84	11.77	18.66	10/16	4.18	2.89	4.99
7/17	19.21	16	22.48	9/1	14.49	11.38	17.14	10/17	4.25	2.89	5.4
7/18	17.85	15.23	21.71	9/2	14.58	11.38	18.28	10/18	3.81	2.46	4.99
7/19	17.28	15.62	18.66	9/3	14.68	11.77	17.14	10/19	3.49	2.46	4.57
7/20	17.35	14.09	21.33	9/4	14.37	11.38	17.14	10/20	3.36	2.03	4.57
7/21	17.59	14.09	20.95	9/5	14.51	12.16	16.38	10/21	3.97	2.89	5.4
7/22	16.59	14.09	19.81	9/6	12.74	11.38	15.23	10/22	3.68	2.89	4.99
7/23	17.76	14.47	21.71	9/7	11.55	9.82	13.32	10/23	4.67	4.15	5.4
7/24	18.19	14.85	20.95	9/8	10.71	7.83	13.7	10/24	3.20	2.03	4.57
7/25	17.35	13.7	20.57	9/9	10.68	7.03	14.09	10/25	1.81	0.73	2.89
7/26	17.21	14.09	20.57	9/10	11.43	7.83	15.23	10/26	1.25	0.29	2.03
7/27	17.52	14.09	20.19	9/11	12.17	8.63	15.62	10/27	0.89	-0.16	1.6
7/28	16.37	12.55	20.19	9/12	12.87	9.42	16	10/27	1.38	0.73	2.46
7/29	17.21	13.32	21.33	9/13	12.70	9.42	16	10/28	1.19	0.29	2.46
7/30	17.38	13.7	20.95	9/14	12.56	9.42	15.23	10/29	0.73	0.29	1.17
7/31	17.02	13.7	19.81	9/15	12.92	10.21	15.62	10/30	0.48	-0.16	1.17
8/1	15.63	11.77	19.42	9/16	12.80	10.21	14.85	10/31	0.18	-0.16	0.73
8/2	15.94	12.55	19.42	9/17	12.35	10.99	14.09	11/1	0.09	-0.16	0.73
8/3	15.51	11.77	19.04	9/18	11.25	9.42	13.32	11/2	0.09	-0.16	0.73
8/4	16.76	14.09	19.42	9/19	11.28	9.03	13.32	11/3	0.06	-0.16	0.73
8/5	14.92	12.55	17.9	9/20	11.15	8.63	13.32	11/4	-0.05	-0.16	0.29
8/6	14.56	11.38	18.28	9/21	9.65	7.03	12.93	11/5	-0.02	-0.16	0.29
8/7	13.40	10.21	16.38	9/22	8.91	5.81	11.77	11/6	-0.02	-0.16	0.29
8/8	12.99	9.42	17.14	9/23	9.70	6.62	12.55	11/7	-0.16	-0.16	-0.16
8/9	13.71	9.82	17.9	9/24	9.80	7.03	12.16	11/8	0.01	-0.16	0.29
8/10	14.67	10.99	18.66	9/25	9.63	7.03	12.16	11/9	0.09	-0.16	0.29
8/11	15.39	11.77	19.04	9/26	8.57	6.22	11.38	11/10	0.18	-0.16	0.73
8/12	15.13	11.38	18.66	9/27	9.29	7.83	10.6	11/11	0.51	-0.16	1.17
8/13	15.20	11.38	19.42	9/28	8.37	6.22	10.21	11/12	1.17	0.73	1.6
8/14	15.63	11.77	19.42	9/29	7.50	6.22	9.82	11/13	1.28	0.73	2.03

Appendix B. Continued.

Gold Fork River, Site #4, monitored by Idaho Department of Fish and Game, 2002

Date	Mean	Min	Max	Date	Mean	Min	Max	Date	Mean	Min	Max
7/3	11.90	8.75	15.91	8/5	13.04	10.77	14.96	9/7	10.06	8.6	12.01
7/4	12.51	9.53	15.91	8/6	12.97	9.68	17.34	9/8	9.12	5.97	13.71
7/5	11.62	7.98	15.59	8/7	11.35	8.13	14.33	9/9	8.50	3.93	15.12
7/6	12.57	9.06	16.22	8/8	11.21	7.37	16.07	9/10	9.30	4.56	16.54
7/7	13.36	10.92	16.22	8/9	11.75	7.67	16.54	9/11	10.24	5.18	17.98
7/8	14.22	11.69	17.66	8/10	12.63	8.6	17.34	9/12	11.07	6.12	18.95
7/9	12.57	8.6	16.86	8/11	13.39	9.53	17.82	9/13	10.75	5.18	19.59
7/10	13.83	9.68	18.47	8/12	13.07	9.22	17.66	9/14	10.36	5.18	16.38
7/11	15.13	10.92	19.59	8/13	13.27	9.22	18.31	9/15	11.36	6.59	17.82
7/12	16.17	12.16	20.4	8/14	13.60	9.37	18.63	9/16	10.74	6.28	17.02
7/13	16.69	13.25	20.4	8/15	14.01	9.84	18.79	9/17	10.25	8.91	12.32
7/14	17.43	14.64	20.89	8/16	13.62	9.53	18.63	9/18	9.85	7.37	13.25
7/15	16.68	13.09	20.4	8/17	12.49	8.13	17.82	9/19	8.83	4.87	15.12
7/16	15.80	12.32	19.92	8/18	12.18	7.52	18.31	9/20	8.53	4.56	14.49
7/17	16.89	13.09	21.06	8/19	12.09	7.52	18.14	9/21	6.88	2.84	13.71
7/18	15.27	12.63	17.34	8/20	12.67	8.6	18.14	9/22	6.88	2.04	15.12
7/19	14.84	13.09	16.54	8/21	11.22	8.91	14.02	9/23	7.69	2.68	16.38
7/20	15.26	11.85	19.76	8/22	10.59	7.06	14.64	9/24	7.39	2.99	14.64
7/21	15.17	11.08	19.43	8/23	11.46	7.83	15.75	9/25	7.40	2.68	14.96
7/22	14.11	11.23	16.54	8/24	11.58	7.06	17.5	9/26	6.02	1.4	11.38
7/23	15.60	11.69	20.24	8/25	11.89	6.9	18.47	9/27	7.30	4.72	10.77
7/24	15.94	12.47	19.27	8/26	11.23	7.98	15.91	9/28	6.44	2.52	13.25
7/25	14.95	11.38	18.95	8/27	11.38	7.83	16.07	9/29	4.72	1.24	8.91
7/26	15.10	11.54	19.11	8/28	11.07	7.98	14.33	9/30	4.48	2.84	7.52
7/27	15.06	11.69	18.31	8/29	12.29	9.22	16.38	10/1	3.53	0.28	8.6
7/28	14.22	10.15	18.47	8/30	12.06	8.91	16.38	10/2	2.93	-0.68	8.6
7/29	15.03	10.92	19.59	8/31	13.07	8.91	18.95	10/3	3.52	0.76	6.9
7/30	15.23	11.38	19.27	9/1	12.12	7.98	16.54	10/4	5.74	2.84	9.68
7/31	14.91	11.38	18.47	9/2	12.76	7.83	20.08	10/5	6.20	4.09	10.31
8/1	13.62	9.53	17.98	9/3	12.75	8.6	19.11	10/6	5.65	1.72	12.32
8/2	13.99	10.31	18.31	9/4	12.59	7.67	18.95	10/7	5.34	1.4	12.32
8/3	13.60	9.53	17.82	9/5	12.52	8.44	16.54	10/8	2.78	2.04	3.62
8/4	14.89	12.16	18.14	9/6	10.54	8.91	12.47	10/9	2.78	2.04	3.62

Appendix B. Continued.

Gold Fork River, Site #5, monitored by Idaho Department of Fish and Game, 2002

Date	Mean	Min	Max	Date	Mean	Min	Max	Date	Mean	Min	Max
7/3	12.12	9.68	14.49	8/7	9.92	8.44	11.08	9/12	8.70	7.37	9.99
7/4	12.34	10.15	14.33	8/8	9.24	7.21	11.08	9/13	8.54	7.06	9.68
7/5	11.36	8.6	13.71	8/9	9.49	7.37	11.54	9/14	8.62	7.21	9.84
7/6	12.25	9.84	14.49	8/10	10.25	8.13	12.32	9/15	9.49	8.29	10.62
7/7	13.09	11.54	14.49	8/11	11.01	9.22	12.63	9/16	9.32	8.13	10.15
7/8	13.50	12.01	15.12	8/12	10.84	8.91	12.47	9/17	9.34	8.91	9.99
7/9	11.95	9.22	14.33	8/13	10.97	9.06	12.78	9/18	8.24	7.21	8.91
7/10	12.90	10.15	15.59	8/14	11.16	9.22	12.94	9/19	7.30	5.97	8.29
7/11	14.01	11.38	16.54	8/15	11.57	9.84	13.25	9/20	7.15	5.97	7.98
7/12	14.95	12.47	17.34	8/16	11.44	9.84	12.78	9/21	6.06	4.87	7.37
7/13	15.71	13.71	17.66	8/17	10.67	8.75	12.16	9/22	5.41	4.09	6.59
7/14	16.38	14.64	17.98	8/18	10.19	8.29	11.69	9/23	5.86	4.56	7.06
7/15	15.55	13.71	17.5	8/19	9.97	8.13	11.69	9/24	6.11	4.87	7.21
7/16	15.11	13.25	17.34	8/20	10.55	9.22	11.85	9/25	6.09	4.87	6.9
7/17	15.57	13.41	17.66	8/21	10.21	9.37	11.08	9/26	5.44	4.24	6.43
7/18	14.66	13.09	16.22	8/22	8.89	7.21	10.31	9/27	6.18	5.65	6.59
7/19	14.26	13.56	15.12	8/23	9.63	8.13	10.92	9/28	5.10	3.93	5.97
7/20	14.28	12.63	16.38	8/24	9.48	8.13	10.62	9/29	4.66	3.62	5.49
7/21	13.67	11.38	15.59	8/25	9.55	7.83	11.23	9/30	4.14	3.62	4.72
7/22	13.05	11.54	14.49	8/26	9.73	8.75	10.62	10/1	2.73	1.72	3.93
7/23	14.01	12.01	16.22	8/27	8.97	7.21	10.62	10/2	2.14	1.08	2.84
7/24	14.32	12.47	15.75	8/28	8.78	7.37	10.62	10/3	2.91	2.04	4.24
7/25	13.54	11.38	15.27	8/29	10.34	9.06	11.69	10/4	4.34	3.62	5.18
7/26	13.50	11.54	15.12	8/30	10.40	9.22	11.23	10/5	5.07	4.4	5.81
7/27	13.36	11.69	14.64	8/31	10.59	9.22	11.85	10/6	4.28	3.31	5.18
7/28	12.45	10.31	14.33	9/1	10.40	9.06	11.54	10/7	4.17	3.15	4.87
7/29	12.97	10.92	14.96	9/2	10.45	8.91	11.69	10/8	3.79	2.84	4.72
7/30	13.26	11.23	15.12	9/3	10.79	9.53	12.01	10/9	3.25	2.36	3.93
7/31	13.02	11.38	14.18	9/4	10.51	9.06	11.54	10/10	3.24	2.2	4.24
8/1	11.65	9.37	13.56	9/5	11.02	10.15	11.69	10/11	2.48	1.72	3.93
8/2	12.06	10.31	13.87	9/6	10.32	9.84	11.08	10/12	0.73	0.12	1.72
8/3	11.69	9.53	13.71	9/7	9.07	8.29	9.99	10/13	0.44	0.12	0.92
8/4	13.02	11.85	14.18	9/8	7.60	6.12	8.6	10/14	0.42	0.12	0.76
8/5	11.86	10.62	13.09	9/9	6.86	5.34	8.13	10/15	0.70	0.12	1.56
8/6	11.08	9.68	12.47	9/10	7.32	5.81	8.75	10/16	1.21	0.76	1.56
				9/11	7.97	6.43	9.37	10/17	1.21	0.76	1.56

Appendix C. Fish inventories completed by Payette National Forest, Gold Fork River drainage, 2002.

Stream name:	Andrew's Creek		Tributary of:	Powelson/Kennally
Reach #:	1		Diver and recorder:	Rayton/Harris
Water temp:	8 C		Air temp:	
Average gradient:	1%		Photos:	
GPS start (UTM):	586775/4958920		GPS end (UTM):	586780/4958995
Page #	1 of 1			
Date:	8/28/2002			
Time of temp:	1030			
Reach length:	100			

	Total	Density 100m2
CHIN 0 (50-80)	0.0	0.0
CHIN 1 (>100)	0.0	0.0
ADULT CHIN	0.0	0.0
Total	0.0	0.0
ST1 (70-130)	0.0	0.0
ST2 (130-200)	0.0	0.0
ST3 (200-250)	0.0	0.0
Total	0.0	0.0
RB >250	0.0	0.0
Total	0.0	0.0
BT <50	0.0	0.0
BT 50-100	0.0	0.0
BT 100-150	0.0	0.0
BT 150-200	0.0	0.0
BT 200-250	0.0	0.0
BT 250-300	0.0	0.0
BT 300-350	0.0	0.0
BT 350-400	0.0	0.0
BT >400	0.0	0.0
Total	0.0	0.0
CT <50	0.0	0.0
CT 50-100	0.0	0.0
CT 100-150	0.0	0.0
CT 150-200	0.0	0.0
CT 200-250	0.0	0.0
CT >250	0.0	0.0
Total	0.0	0.0
BK <50	0.0	0.0
BK 50-100	14.0	9.3
BK 100-150	0.0	0.0
BK 150-200	0.0	0.0
BK 200-250	0.0	0.0
BK 250-300	0.0	0.0
BK >300	0.0	0.0
Total	14.0	9.3
Overall Total	14.0	9.3

Total site length	100
Mean unit length	20.0
Mean unit width	1.5
Mean unit depth	0.2
Mean max depth	0.5

CHIN (chinook) ST (steelhead) RB (rainbow) RD (redband) CT (cutthroat) BT (bull trout)
BK (brook trout) YOY (young of the year)

Appendix C. Continued.

Stream name:	Andrew's Creek	Tributary of:	Powelson/Kennally
Reach #:	2	Diver and recorder:	Rayton/Harris
Water temp:	8 C	Air temp:	
Average gradient:	3%	Photos:	
GPS start (UTM):	586594/4960422	GPS end (UTM):	
Page #	1 of 1		
Date:	8/28/2002		
Time of temp:	1145		
Reach length:	77		

	Total	**Density 100m2**
CHIN 0 (50-80)	0.0	**0.0**
CHIN 1 (>100)	0.0	**0.0**
ADULT CHIN	0.0	**0.0**
Total	0.0	**0.0**
ST1 (70-130)	0.0	**0.0**
ST2 (130-200)	0.0	**0.0**
ST3 (200-250)	0.0	**0.0**
Total	0.0	**0.0**
RB >250	0.0	**0.0**
Total	0.0	**0.0**
BT <50	0.0	**0.0**
BT 50-100	0.0	**0.0**
BT 100-150	0.0	**0.0**
BT 150-200	0.0	**0.0**
BT 200-250	0.0	**0.0**
BT 250-300	0.0	**0.0**
BT 300-350	0.0	**0.0**
BT 350-400	0.0	**0.0**
BT >400	0.0	**0.0**
Total	0.0	**0.0**
CT <50	0.0	**0.0**
CT 50-100	0.0	**0.0**
CT 100-150	0.0	**0.0**
CT 150-200	0.0	**0.0**
CT 200-250	0.0	**0.0**
CT >250	0.0	**0.0**
Total	0.0	**0.0**
BK <50	1.0	**0.8**
BK 50-100	10.0	**8.1**
BK 100-150	2.0	**1.6**
BK 150-200	2.0	**1.6**
BK 200-250	0.0	**0.0**
BK 250-300	0.0	**0.0**
BK >300	0.0	**0.0**
Total	15.0	**12.2**
Overall Total	15.0	**12.2**

Total site length	**77**
Mean unit length	**7.7**
Mean unit width	**1.6**
Mean unit depth	**0.1**
Mean max depth	**0.3**

CHIN (chinook) ST (steelhead) RB (rainbow) RD (redband) CT (cutthroat) BT (bull trout)
BK (brook trout) YOY (young of the year)

Appendix C. Continued.

Stream name:	Andrew's Creek	Tributary of:	Powelson/Kennally
Reach #:	1, 2	Diver and recorder:	Rayton/Harris

Andrew's Creek summary

	Total	Density 100m2
CHIN 0 (50-80)	0.0	**0.0**
CHIN 1 (>100)	0.0	**0.0**
ADULT CHIN	0.0	**0.0**
Total	0.0	**0.0**
ST1 (70-130)	0.0	**0.0**
ST2 (130-200)	0.0	**0.0**
ST3 (200-250)	0.0	**0.0**
Total	0.0	**0.0**
RB >250	0.0	**0.0**
Total	0.0	**0.0**
BT <50	0.0	**0.0**
BT 50-100	0.0	**0.0**
BT 100-150	0.0	**0.0**
BT 150-200	0.0	**0.0**
BT 200-250	0.0	**0.0**
BT 250-300	0.0	**0.0**
BT 300-350	0.0	**0.0**
BT 350-400	0.0	**0.0**
BT >400	0.0	**0.0**
Total	0.0	**0.0**
CT <50	0.0	**0.0**
CT 50-100	0.0	**0.0**
CT 100-150	0.0	**0.0**
CT 150-200	0.0	**0.0**
CT 200-250	0.0	**0.0**
CT >250	0.0	**0.0**
Total	0.0	**0.0**
BK <50	1.0	**0.4**
BK 50-100	24.0	**8.8**
BK 100-150	2.0	**0.7**
BK 150-200	2.0	**0.7**
BK 200-250	0.0	**0.0**
BK 250-300	0.0	**0.0**
BK >300	0.0	**0.0**
Total	29.0	**10.6**
Overall Total	29.0	**10.6**

Total site length	**177**
Mean unit length	**11.8**
Mean unit width	**1.5**
Mean unit depth	**0.2**
Mean max depth	**0.4**

CHIN (chinook) ST (steelhead) RB (rainbow) RD (redband) CT (cutthroat) BT (bull trout)
BK (brook trout) YOY (young of the year)

Appendix C. Continued.

Stream name:	Camp Creek			Tributary of:		Kennally Cr		Page #	1 of 1	
Reach #:	1			Diver and recorder		Adams/Hellhake		Date:	8/29/2002	
Water temp:	8 C			Air temp:	14 C			Time of t	1000	
Average gradient:				Photos:				Reach length:		
GPS start (UTM):	583971/4960421			GPS end (UTM):						
Habitat Unit #	1	2								
Habitat type (F/S)	F	S								
Length (m)	8	0.5								
Ave. width (m)	1	1.2								
Ave. depth (m)	0.03	0.04								
Pool max depth	no data	0.07								
CHIN 0 (50-80)	0	0								
CHIN 1 (>100)	0	0								
ADULT CHIN	0	0								
ST1 (70-130)	0	0								
ST2 (130-200)	0	0								
ST3 (200-250)	0	0								
RB >250	0	0								
BT <50	0	0								
BT 50-100	0	0								
BT 100-150	0	0								
BT 150-200	0	0								
BT 200-250	0	0								
BT 250-300	0	0								
BT 300-350	0	0								
BT 350-400	0	0								
BT >400	0	0								
CT <50	0	0								
CT 50-100	0	0								
CT 100-150	0	0								
CT 150-200	0	0								
CT 200-250	0	0								
CT >250	0	0								
BK <50	0	0								
BK 50-100	0	0								
BK 100-150	0	0								
BK 150-200	0	0								
BK 200-250	0	0								
BK 250-300	0	0								
BK >300	0	0								
YOY (<70 x=yes)		X								
NO FISH (x=yes)	X									
Comments	stream channel was extremely narrow and shallow. Dense vegetation within the stream channel; too shallow to snorkel. One YOY identified									
	Culvert is not currently a fish barrier									
CHIN (chinook) ST (steelhead) RB (rainbow) RD (redband) CT (cutthroat) BT (bull trout)										
BK (brook trout) YOY (young of the year)										

Appendix C. Continued.

Stream name:	Camp Creek			Tributary of:		Kennally Cr		Page #	1 of 1	
Reach #:	2			Diver and recorder		Adams/Hellhake		Date:	8/29/2002	
Water temp:	9 C			Air temp:	14 C			Time of t	1100	
Average gradient:	11%			Photos:				Reach length:		
GPS start (UTM):	584131/4961105			GPS end (UTM):						
Habitat Unit #										
Habitat type (F/S)										
Length (m)										
Ave. width (m)										
Ave. depth (m)										
Pool max depth										
CHIN 0 (50-80)										
CHIN 1 (>100)										
ADULT CHIN										
ST1 (70-130)										
ST2 (130-200)										
ST3 (200-250)										
RB >250										
BT <50										
BT 50-100										
BT 100-150										
BT 150-200										
BT 200-250										
BT 250-300										
BT 300-350										
BT 350-400										
BT >400										
CT <50										
CT 50-100										
CT 100-150										
CT 150-200										
CT 200-250										
CT >250										
BK <50										
BK 50-100										
BK 100-150										
BK 150-200										
BK 200-250										
BK 250-300										
BK >300										
YOY (<70 x=yes)										
NO FISH (x=yes)										
Comments	stream channel was extremely narrow and shallow. Dense vegetation within the stream channel; too shallow to snorkel.									
	No fish observed above or below culvert									
	0.4m drop on lower end of culvert.									
	Signs of cattle along banks									
CHIN (chinook) ST (steelhead) RB (rainbow) RD (redband) CT (cutthroat) BT (bull trout)										
BK (brook trout) YOY (young of the year)										

Appendix C.   Continued.

Stream name:	Powelson Creek	Tributary of:	Kennally Cr
Reach #:	1	Diver and recorder:	Adams/Hellhake
Water temp:	9 C	Air temp:	12 C
Average gradient:		Photos:	
GPS start (UTM):	588030/4959775	GPS end (UTM):	
Page #	1 of 1		
Date:	8/28/2002		
Time of temp:	1015	*No fish observed at the site	
Reach length:	100		

	Total	Density 100m2
CHIN 0 (50-80)	0.0	**0.0**
CHIN 1 (>100)	0.0	**0.0**
ADULT CHIN	0.0	**0.0**
Total	0.0	**0.0**
ST1 (70-130)	0.0	**0.0**
ST2 (130-200)	0.0	**0.0**
ST3 (200-250)	0.0	**0.0**
Total	0.0	**0.0**
RB >250	0.0	**0.0**
Total	0.0	**0.0**
BT <50	0.0	**0.0**
BT 50-100	0.0	**0.0**
BT 100-150	0.0	**0.0**
BT 150-200	0.0	**0.0**
BT 200-250	0.0	**0.0**
BT 250-300	0.0	**0.0**
BT 300-350	0.0	**0.0**
BT 350-400	0.0	**0.0**
BT >400	0.0	**0.0**
Total	0.0	**0.0**
CT <50	0.0	**0.0**
CT 50-100	0.0	**0.0**
CT 100-150	0.0	**0.0**
CT 150-200	0.0	**0.0**
CT 200-250	0.0	**0.0**
CT >250	0.0	**0.0**
Total	0.0	**0.0**
BK <50	0.0	**0.0**
BK 50-100	0.0	**0.0**
BK 100-150	0.0	**0.0**
BK 150-200	0.0	**0.0**
BK 200-250	0.0	**0.0**
BK 250-300	0.0	**0.0**
BK >300	0.0	**0.0**
Total	0.0	**0.0**
Overall Total	0.0	**0.0**

Total site length	**39.5**
Mean unit length	**4.4**
Mean unit width	**3.0**
Mean unit depth	**0.2**
Mean max depth	**0.3**

CHIN (chinook) ST (steelhead) RB (rainbow) RD (redband) CT (cutthroat) BT (bull trout)
BK (brook trout) YOY (young of the year)

Appendix C. Continued.

Stream name:	Powelson Creek Trib 1	Tributary of:	Kennally Cr
Reach #:	1	Diver and recorder:	Adams/Hellhake
Water temp:	8 C	Air temp:	18 C
Average gradient:	10-15%	Photos:	
GPS start (UTM):	587267/4959117	GPS end (UTM):	
Page #	1 of 1		
Date:	8/28/2002		
Time of temp:	1230		
Reach length:	100		

*One YOY observed at the site

	Total	Density 100m2
CHIN 0 (50-80)	0.0	**0.0**
CHIN 1 (>100)	0.0	**0.0**
ADULT CHIN	0.0	**0.0**
Total	0.0	**0.0**
ST1 (70-130)	0.0	**0.0**
ST2 (130-200)	0.0	**0.0**
ST3 (200-250)	0.0	**0.0**
Total	0.0	**0.0**
RB >250	0.0	**0.0**
Total	0.0	**0.0**
BT <50	0.0	**0.0**
BT 50-100	0.0	**0.0**
BT 100-150	0.0	**0.0**
BT 150-200	0.0	**0.0**
BT 200-250	0.0	**0.0**
BT 250-300	0.0	**0.0**
BT 300-350	0.0	**0.0**
BT 350-400	0.0	**0.0**
BT >400	0.0	**0.0**
Total	0.0	**0.0**
CT <50	0.0	**0.0**
CT 50-100	0.0	**0.0**
CT 100-150	0.0	**0.0**
CT 150-200	0.0	**0.0**
CT 200-250	0.0	**0.0**
CT >250	0.0	**0.0**
Total	0.0	**0.0**
BK <50	0.0	**0.0**
BK 50-100	0.0	**0.0**
BK 100-150	0.0	**0.0**
BK 150-200	0.0	**0.0**
BK 200-250	0.0	**0.0**
BK 250-300	0.0	**0.0**
BK >300	0.0	**0.0**
Total	0.0	**0.0**
Overall Total	0.0	**0.0**

Total site length	**48**
Mean unit length	**5.3**
Mean unit width	**1.4**
Mean unit depth	**0.1**
Mean max depth	**0.3**

CHIN (chinook) ST (steelhead) RB (rainbow) RD (redband) CT (cutthroat) BT (bull trout)
BK (brook trout) YOY (young of the year)

Stream name:	Powelson Creek Trib 1			Tributary of:		Kennally Cr		Page #	1 of 1	
Reach #:	1			Diver and recorder		Adams/Hellhake		Date:	8/28/2002	
Water temp:	8 C			Air temp:	18 C			Time of t	1230	
Average gradient:	10-15%			Photos:				Reach le	100	
GPS start (UTM):	587267/4959117			GPS end (UTM):						
Habitat Unit #	1	2	3	4	5	6	7	8	9	
Habitat type (F/S)	F	S	S	F	S	F	S	S	F	
Length (m)	9.5	3	6	7.5	1.5	8	3	2	7.5	
Ave. width (m)	1.2	1.7	1.8	1.5	1.4	1.2	0.9	1.2	1.6	
Ave. depth (m)	0.05	0.16	0.13	0.07	0.11	0.04	0.08	0.13	0.07	
Pool max depth	no data	0.34	0.28	no data	0.19	no data	0.21	0.3	no data	
CHIN 0 (50-80)	0	0	0	0	0	0	0	0	0	
CHIN 1 (>100)	0	0	0	0	0	0	0	0	0	
ADULT CHIN	0	0	0	0	0	0	0	0	0	
ST1 (70-130)	0	0	0	0	0	0	0	0	0	
ST2 (130-200)	0	0	0	0	0	0	0	0	0	
ST3 (200-250)	0	0	0	0	0	0	0	0	0	
RB >250	0	0	0	0	0	0	0	0	0	
BT <50	0	0	0	0	0	0	0	0	0	
BT 50-100	0	0	0	0	0	0	0	0	0	
BT 100-150	0	0	0	0	0	0	0	0	0	
BT 150-200	0	0	0	0	0	0	0	0	0	
BT 200-250	0	0	0	0	0	0	0	0	0	
BT 250-300	0	0	0	0	0	0	0	0	0	
BT 300-350	0	0	0	0	0	0	0	0	0	
BT 350-400	0	0	0	0	0	0	0	0	0	
BT >400	0	0	0	0	0	0	0	0	0	
CT <50	0	0	0	0	0	0	0	0	0	
CT 50-100	0	0	0	0	0	0	0	0	0	
CT 100-150	0	0	0	0	0	0	0	0	0	
CT 150-200	0	0	0	0	0	0	0	0	0	
CT 200-250	0	0	0	0	0	0	0	0	0	
CT >250	0	0	0	0	0	0	0	0	0	
BK <50	0	0	0	0	0	0	0	0	0	
BK 50-100	0	0	0	0	0	0	0	0	0	
BK 100-150	0	0	0	0	0	0	0	0	0	
BK 150-200	0	0	0	0	0	0	0	0	0	
BK 200-250	0	0	0	0	0	0	0	0	0	
BK 250-300	0	0	0	0	0	0	0	0	0	
BK >300	0	0	0	0	0	0	0	0	0	
YOY (<70 x=yes)			X							
NO FISH (x=yes)	X	X		X	X	X	X	X	X	
Comments	Reach is approx 300m upstream from confluence with Powelson Cr									
	Difficult to find locations to snorkel. Very little water. Lots of overgrown vegetation in stream channel									
	Approx 45m upstream from start snorkeling abandoned due to stream channel flowing through small crevasses in boulders and logjams. No accessable pools									
	Went upstream about 300m from reach #1 to investigate old FS road culvert. No fish found in accessable pools.									
CHIN (chinook) ST (steelhead) RB (rainbow) RD (redband) CT (cutthroat) BT (bull trout)										
BK (brook trout) YOY (young of the year)										

Appendix C. Continued.

Stream name:	Rapid Creek Trib 1	Tributary of:	Kennally Cr
Reach #:	1	Diver and recorder:	Adams/Hellhake
Water temp:	8 C	Air temp:	15 C
Average gradient:	10-15%	Photos:	
GPS start (UTM):	585137/4961196	GPS end (UTM):	
Page #	1 of 1		
Date:	8/29/2002		
Time of temp:	1215	* One YOY observed	
Reach length:	100		

	Total	Density 100m2
CHIN 0 (50-80)	0.0	**0.0**
CHIN 1 (>100)	0.0	**0.0**
ADULT CHIN	0.0	**0.0**
Total	0.0	**0.0**
ST1 (70-130)	0.0	**0.0**
ST2 (130-200)	0.0	**0.0**
ST3 (200-250)	0.0	**0.0**
Total	0.0	**0.0**
RB >250	0.0	**0.0**
Total	0.0	**0.0**
BT <50	0.0	**0.0**
BT 50-100	0.0	**0.0**
BT 100-150	0.0	**0.0**
BT 150-200	0.0	**0.0**
BT 200-250	0.0	**0.0**
BT 250-300	0.0	**0.0**
BT 300-350	0.0	**0.0**
BT 350-400	0.0	**0.0**
BT >400	0.0	**0.0**
Total	0.0	**0.0**
CT <50	0.0	**0.0**
CT 50-100	0.0	**0.0**
CT 100-150	0.0	**0.0**
CT 150-200	0.0	**0.0**
CT 200-250	0.0	**0.0**
CT >250	0.0	**0.0**
Total	0.0	**0.0**
BK <50	0.0	**0.0**
BK 50-100	0.0	**0.0**
BK 100-150	0.0	**0.0**
BK 150-200	0.0	**0.0**
BK 200-250	0.0	**0.0**
BK 250-300	0.0	**0.0**
BK >300	0.0	**0.0**
Total	0.0	**0.0**
Overall Total	0.0	**0.0**

Total site length	**49.5**
Mean unit length	**5.0**
Mean unit width	**2.0**
Mean unit depth	**0.1**
Mean max depth	**0.3**

CHIN (chinook) ST (steelhead) RB (rainbow) RD (redband) CT (cutthroat) BT (bull trout)
BK (brook trout) YOY (young of the year)

Appendix C. Continued.

Stream name:	Kennally Creek	Tributary of:	Gold Fork
Reach #:	1	Diver and recorder:	Rayton/Harris
Water temp:	12 C	Air temp:	22 C
Average gradient:	3%	Photos:	
GPS start (UTM):	586383/4958687	GPS end (UTM):	586294/4958747
Page #	1 of 1		
Date:	8/28/2002		
Time of temp:	1340		
Reach length:	135		

Total site length	135
Mean unit length	22.5
Mean unit width	7.4
Mean unit depth	0.2
Mean max depth	0.6

	Total	**Density 100m2**
CHIN 0 (50-80)	0.0	**0.0**
CHIN 1 (>100)	0.0	**0.0**
ADULT CHIN	0.0	**0.0**
Total	0.0	**0.0**
ST1 (70-130)	0.0	**0.0**
ST2 (130-200)	0.0	**0.0**
ST3 (200-250)	0.0	**0.0**
Total	0.0	**0.0**
RB >250	1.0	**0.1**
Total	1.0	**0.1**
BT <50	0.0	**0.0**
BT 50-100	0.0	**0.0**
BT 100-150	0.0	**0.0**
BT 150-200	0.0	**0.0**
BT 200-250	0.0	**0.0**
BT 250-300	0.0	**0.0**
BT 300-350	0.0	**0.0**
BT 350-400	0.0	**0.0**
BT >400	0.0	**0.0**
Total	0.0	**0.0**
CT <50	0.0	**0.0**
CT 50-100	0.0	**0.0**
CT 100-150	0.0	**0.0**
CT 150-200	0.0	**0.0**
CT 200-250	0.0	**0.0**
CT >250	0.0	**0.0**
Total	0.0	**0.0**
BK <50	0.0	**0.0**
BK 50-100	49.0	**4.9**
BK 100-150	15.0	**1.5**
BK 150-200	4.0	**0.4**
BK 200-250	1.0	**0.1**
BK 250-300	0.0	**0.0**
BK >300	0.0	**0.0**
Total	69.0	**6.9**
Overall Total	70.0	**7.0**

CHIN (chinook) ST (steelhead) RB (rainbow) RD (redband) CT (cutthroat) BT (bull trout)
BK (brook trout) YOY (young of the year)

McCALL REGION

TECHNICAL GUIDANCE

2002

ABSTRACT

McCall Subregion fishery management personnel responded to numerous requests and opportunities for technical input. Comments were provided to state and federal agencies on proposed activities for which they have regulatory authority. Advice and technical assistance were provided to private businesses and the public on activities associated with fish, or having impacts on fish populations or fish habitat. The major topics of involvement included stream channel alterations, Idaho Outfitters and Guides licensing, private pond permits, and land management planning. We provided data and technical advice to an increased number of fisheries consultants. The listing of three native salmonids under the Endangered Species Act has increased the number of request for technical input.

Regional fishery personnel continued participation on a technical advisory committee for the Big Payette Lake Water Quality Council.

Regional fishery personnel attended quarterly meetings of the Weiser River Watershed Advisory Group as the group develops the TMDL document for the Weiser River.

Fishery personnel continued participation on a technical advisory committee for the Cascade Restoration Project to improve water quality in Lake Cascade. Lake Cascade is listed as a water quality limited water by the Idaho Division of Environmental Quality, not fully supporting beneficial uses including coldwater biota.

Regional fishery personnel developed an internal document proposing to restore Lake Cascade by first draining to a very low pool and conducting a rotenone treatment. The Department has asked the US Bureau of Reclamation to drain Lake Cascade. The federal action of draining the Conservation pool will require NEPA at an Environmental Impact Statement (EIS) level document. The Department will complete an EIS to proceed with the fishery renovation.

We also gave numerous presentations to schools, sportsperson groups, and civic organizations. We answered many questions from the angling public on fishing opportunities, regulations, techniques, and specific waters. We maintained fishing reports for the Department's Internet Homepage and 1-800-ASK-FISH.

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