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Alpine Lakes Fish Inventory: Stephens and Gipson

2003 ANNUAL REPORT

INVENTORY OF FISH IN ALPINE LAKES IN GRAND TETON NATIONAL

PARK, WYOMING

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Abstract: Fish in alpine lakes in Grand Teton National Park have not been widely surveyed and few anecdotal reports are found in the literature (Hazzard 1931). Twenty-five of these lakes have been surveyed over two short field seasons. The goal of this study is to expand the species list within the alpine lakes of Grand Teton National Park. During the 2003 field season, 11 lakes were surveyed. Sampling occurred in August, September, and October during the ice-free period. Sampling efforts consisted of setting 5' x 125' sinking gill nets with mesh sizes of 1.5-3.5" overnight in each lake. One to three nets were set in each lake depending on the size of the lake. Minnow traps were also set in each lake in an attempt to sample small, non-game fish species. Yellowstone cutthroat trout (*Oncorhynchus clarki bovieri*) were captured in Grizzly Bear Lake. The baseline information gathered through this study will provide a means to make better management decisions to ensure no impairment of fish populations in alpine lakes of Grand Teton National Park and determine future monitoring activities. Sampling of the remaining 2 lakes included in the survey will be completed in 2004.

Key words: alpine lakes, fish, Grand Teton National Park, inventory

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Grand Teton National Park contains more than 25 named lakes in the alpine zone and numerous others without names. Fish can be found in some of these lakes, however, due to differing environmental constraints, the species composition of these lakes is expected to be quite different from lower elevation waters where most sampling has taken place. Only anecdotal reports are present in the literature for these lakes from over seventy years ago (Hazzard 1931). Many environmental changes have occurred since then, including global climate change, increases in local and regional airborne pollutants, etc., which affect the physical and biological characteristics of these high elevation waters. Thus, anecdotes from seventy years ago do not reflect current conditions. Extinctions may have occurred, and new, perhaps non-native, species may be present and may threaten native species.

Literature Summary

A survey of streams and lakes in Grand Teton National Park was conducted in 1931 with the purpose of obtaining basic physical, chemical, and biological facts in order to carry out intelligent regulation and stocking. The numerous lakes scattered in the alpine zone were not included in the survey due to their small size and the difficulty of accessing them. Only anecdotal reports from Mr. Woodring, the Park Superintendent, were included in the report. According to Mr. Woodring, the alpine lakes were ice-locked during a greater part of the year and the report concludes it was inadvisable to attempt to introduce fish (Hazzard 1931).

Objective

Inventory alpine lakes to determine their species composition and obtain baseline information. Verify and expand the species list of fishes present by surveying under-sampled habitat.

STUDY AREA

Twenty-seven alpine lakes were selected for sampling (Table 1). Sampled lakes were targeted based on the following characteristics:

1. They are within the alpine zone (elevation > 7500 feet) of Grand Teton National Park;
2. They possess a history of containing fish populations;
3. They have a constant water exchange and connectivity to another water suspected of containing fish; or
4. They appear to have adequate depth to provide over-wintering habitat and have adequate invertebrate life.

METHODS

Sampling occurred for one overnight period per lake, with the exception of Cirque Lake, which was sampled for 3 hours during the day. A single 5' x 125' multiple mesh sinking Swedish gill net was used in lakes under 10 acres in size. Two sinking Swedish gill nets were used in lakes 10 acres and larger and three sinking Swedish gill nets were utilized in lakes greater than 35 acres. The nets have five panels of differing mesh sizes, 1.5-3.5 in, with the panels oriented from small to large mesh. Minnow traps were used to sample small, non-game fish. One minnow trap was used in lakes under 10 acres. Two minnow traps were utilized in lakes 10 acres and greater. Shoreline locations of each net

Table 1. Lakes to be sampled in Grand Teton National Park alpine lakes survey. All lakes are in zone 12.

Water ID	Water Name	Topo Map Name	Elevation		
			(feet)	Easting	Northing
JN1S0431TN	Amphitheatre Lake	Grand Teton	9698	517660	4841660
JN0S0415TN	Arrowhead Pool Lake	Mount Moran	9170	519465	4846745
JN1S0500TN	Cirque Lake	Mount Moran	9605	513230	4852760
JN0S0540TN	Coyote Lake	Grand Teton	10168	510500	4831610
JN0S0429TN	Delta Lake	Grand Teton	8800	518400	4842000
JN1S0455TN	Dudley Lake	Ranger Peak	8243	517640	4858370
JN0S0575TN	Forget-Me-Not Lakes	Grand Teton	9850	510550	4832850
JN1S0407TN	Grizzly Bear Lake	Mount Moran	9215	515280	4849850
JN1S0625TN	Hechtman Lake	Survey Peak	7850	516450	4876750
JN1S0409TN	Holly Lake	Mount Moran	9410	516280	4848680
JN0S0427TN	Icefloe Lake	Grand Teton	10652	514300	4841350
JN1S0545TN	Indian Lake	Mount Bannon	9805	509040	4830850
JN0S0400TN	Kit Lake	Grand Teton	10345	513400	4840000
JN1S0419TN	Lake Of The Crags	Mount Moran	9565	518500	4846750
JN1S0590TN	Lake Solitude	Mount Moran	9035	512550	4848600
JN1S0389TN	Lake Taminah	Grand Teton	9055	515700	4839200
JN0S0413TN	Laurel Lake	Jenny Lake	7720	520840	4847450

JN1S0550TN	Marion Lake	Rendezvous Peak	9240	505750	4829850
JN1S0600TN	Mica Lake	Mount Moran	9380	512600	4847650
JN1S0580TN	Mink Lake	Mount Moran	8860	512550	4850650
JN0S0570TN	Pass Lake	Mount Bannon	9500	507450	4832100
JN1S0417TN	Ramshead Lake	Mount Moran	9540	519050	4846880
JN1S0561TN	Rimrock Lake	Grand Teton	9916	512500	4833400
JN0S0387TN	Snowdrift Lake	Grand Teton	10006	514000	4839350
JN1S0450TN	Surprise Lake	Grand Teton	9600	518000	4841550
JN1S0510TN	Talus Lake	Ranger Peak	9670	515820	4860600
JN0S0505TN	Timberline Lake	Grand Teton	10310	514250	4836900

and minnow trap set were recorded with a GPS unit (NAD 83) for future reference of sampling sites. Individual fish collected were identified and lengths and weights were obtained. Depth measurements (feet) were obtained with a portable transducer to find the maximum depth of each lake and the depth of each gill net set.

Water and air temperatures were recorded when the nets were set. One 30 foot plankton tow was taken from each lake to determine the presence of any plankton. An 80 micron Wisconsin style plankton net with a 5 in mouth was used to collect the samples. Water chemistry samples were collected from all lakes. Dissolved oxygen, pH, and conductivity were measured. Digital pictures were taken of each lake and net site (see CD).

Collections

One voucher specimen, a Yellowstone cutthroat trout (*Oncorhynchus clarki bovieri*; YSC), was collected from Grizzly Bear Lake. The other fish collected in the gill nets were not suitable for voucher specimens. Digital pictures were taken of fish collected in the gill nets (see CD).

RESULTS

Eleven lakes were surveyed during the 2003 field season (Table 2). Only Grizzly Bear Lake contained fish. No non-game fish were collected. Rimrock Lake was observed from above and not physically sampled as access was too technical for the abilities of the crew and there were concerns with returning to camp over high elevations late in the afternoon. Rimrock Lake appeared to be very shallow as the bottom and boulders were visible throughout. Information on water quality may be available from the National Park Service for Rimrock Lake. Several lakes were changed from suitable for fish to unsuitable

Table 2. Grand Teton National Park alpine lakes sampled during the 2003 field season.

Water Name	Elevation (feet)	Total Acres	Max Depth (feet)	Fish
				species present
Cirque Lake	9605	61.64	196	
Forget-Me-Not Lakes	9850	6.00	6	
Grizzly Bear Lake	9215	14.33	31	YSC
Icefloe Lake	10652	23.57	111	
Kit Lake	10345	3.15	14	
Lake Taminah	9055	13.15	58	
Marion Lake	9240	6.46	26	
Mink Lake	8860	8.54	32	
Pass Lake	9500	1.05	2	
Rimrock Lake	9916	17.01		
Timberline Lake	10310	4.61	68	

and vice versa based on water quality, plankton, and depth. Water chemistry, sample event, and individual fish information is included in the Appendices and Access database (see CD).

Two Swedish gill nets were set overnight in Grizzly Bear Lake for an average of 15.3 hours. Fish were collected in Grizzly Bear Lake that more closely resembled the larger spotted YSC than the fine spotted Snake River cutthroat trout (*O. clarki* ssp.). Fifty-eight YSC were netted with an average length of 19.6 inches (4.5-18.0 inches). Weights were not taken because the scale broke. No non-game fish were observed in any of the lakes.

DISCUSSION

Management Implications

This study has provided baseline information regarding species presence and absence in the alpine lakes of Grand Teton National Park. This information will enable better management decisions to be made to ensure no impairment of fish populations in alpine lakes and determine future monitoring activities. Continued sampling in 2004 will add to the species information.

Many public contacts were made while traveling and conducting sampling. Visitors in Grand Teton National Park were very interested in the project. The Backcountry Rangers at the Jenny Lake Ranger Station provided assistance through the use of cache sites, historical information, personal anecdotes, and route planning. The Jenny Lake Boating Concessionaire provided assistance through use of the lake shuttle. This provided another public contact point.

Planning for 2004 Field Season

Two lakes will be sampled in 2004 (Table 3). Access is difficult to many of these lakes so more time planning routes may be needed. Sampling will be conducted using the same methods as 2002 and 2003 sampling.

Table 3. Alpine lakes in Grand Teton National Park that will be sampled during the 2004 field season.

Water Name	Easting	Northing	Elevation	Total
			(feet)	Acres
Dudley Lake	518400	4842000	8243	8.80
Talus Lake	515820	4860600	9670	19.17

Budget

This project is being funded through the National Park Service. All of the funds (\$5,500) allocated for the 2003 sampling season were spent. The project has no funds remaining for the 2004 field season.

LITERATURE CITED

Hazzard, A.S. 1931. Preliminary report of a biological survey of the streams and lakes of Grand Teton National Park and Jackson Lake, Wyoming. U.S. Bureau of Fisheries.

APPENDICES

Appendix A.-- General information for alpine lakes in Grand Teton National Park surveyed during 2003.

Water Name	Elevation (feet)	UTM Easting	UTM Northing	Acres	Maximum	Dissolved			Air	Water	
					Depth (feet)	Plankton Present	Oxygen (mg/l)	pH	Conductivity (ms)	Temp (°F)	Temp (°F)
Cirque Lake	9605	513230	4852760	61.6	196	yes				71	56
Forget-Me- Not Lake	9850	510550	4832850	66.0	6	yes	22			65	58
Grizzly Bear Lake	9215	515280	4849850	14.3	31	yes	24	8.9	0.01	40	57
Icelfloe Lake	10652	514300	4841350	23.6	111	no	22	9.0	0.04	55	47
Pass Lake	9500	507450	4832100	1.1	2	no				68	66
Kit Lake	10345	513400	4840000	3.2	14	yes	23	10.2	0.03	58	58
Lake Taminah	9055	515700	4839200	13.2	58	yes	26	8.4	0.01	71	55
Marion Lake	9240	505750	4829850	6.5	26	yes				62	59

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Mink Lake	8860	512550	4850650	8.5	32	Yes	28	7.3	0.03	60	58
Rimrock Lake	9916	512500	4833400	17.0							
Timberline Lake	10310	514250	4836900	4.6	68	no	26	8.2	0.00	80	36

Appendix B.-- Summary of all Swedish gill net sets during the 2003 survey of alpine lakes in Grand Teton National Park. YSC=Yellowstone cutthroat trout. TS=Tracy Stephens, ML=Miguel Licona, GS=Garry Sanders, ES=Elizabeth Scriven, , SK=Steve Kilpatrick, MG=Mark Gocke, PB=Paul Bailey, RB=Robert Bush, and DL=Don Lingle.

Water Name	Sample Date	Number of nets set	Average		Fish Present	Data collected by
			length of net sets (hours)			
CIRQUE LAKE	15 Aug	3	2.6		No	TS ML RB SK DL
FORGET-ME-NOT LAKES	29 Aug	1	14		No	TS ML ES MG DL
GRIZZLY BEAR LAKE	10 Sept	2	15.3		YSC	TS ML PB MG
ICEFLOE LAKE	8 Aug	2	16.7		No	TS ES ML
KIT LAKE	8 Aug	1	14.6		No	TS ES ML
LAKE TAMINAH	7 Aug	2	15		No	TS ES ML
MARION LAKE	4 Sept	1	16		No	ML GS
MINK LAKE	2 Oct	1	16		No	ML GS
PASS LAKE	5 Sept	1	21		No	ML GS
RIMROCK LAKE	28 Aug				No	TS ML ES MG DL
TIMBERLINE LAKE	19 Aug				No	ES GS

Appendix C.-- Summary of all minnow trap sets during the 2003 survey of alpine lakes in Grand Teton National Park. TS=Tracy Stephens, ML=Miguel Licona, GS=Garry Sanders, ES=Elizabeth Scriven, , SK=Steve Kilpatrick, MG=Mark Gocke, PB=Paul Bailey, RB=Robert Bush, and DL=Don Lingle.

Water Name	Sample Date	Number of nets set	Average		Fish Present	Data collected by
			length of net sets (hours)			
CIRQUE LAKE	15 Aug	2	2.6		No	TS ML RB SK DL
FORGET-ME-NOT LAKES	29 Aug	1	14		No	TS ML ES MG DL
GRIZZLY BEAR LAKE	10 Sept	2	15.3		No	TS ML PB MG
ICEFLOE LAKE	8 Aug	2	16.7		No	TS ES ML
KIT LAKE	8 Aug	1	14.6		No	TS ES ML
LAKE TAMINAH	7 Aug	2	15		No	TS ES ML
MARION LAKE	4 Sept	1	16		No	ML GS
MINK LAKE	2 Oct	1	16		No	ML GS
PASS LAKE	5 Sept	1	21		No	ML GS
RIMROCK LAKE	28 Aug				No	TS ML ES MG DL
TIMBERLINE LAKE	19 Aug	1	18		No	ES GS

Appendix D.-- Summary of Yellowstone cutthroat trout captured in Swedish gill nets in Grizzly Bear Lake during the 2003 survey of alpine lakes in Grand Teton National Park.

Water Name	Sample Date	Number of Fish Captured	Average Length (in)	Minimum Length (in)	Maximum Length (in)
Grizzly Bear Lake	10 Sept	48	9.6	4.5	18.0

Appendix E.-- Length and weight of individual fish collected in Swedish gill nets in
Grizzly Bear Lake, 10 September 2003.

Fish	Net	Length	Fish	Net	Length
Species	Number	(in)	Species	Number	(in)
YSC	1	17.3	YSC	2	17.3
YSC	1	15.5	YSC	2	14.5
YSC	1	13.8	YSC	2	18.0
YSC	1	14.0	YSC	2	9.8
YSC	1	14.6	YSC	2	9.3
YSC	1	8.5	YSC	2	9.5
YSC	1	10.4	YSC	2	8.8
YSC	1	9.1	YSC	2	9.5
YSC	1	10.5	YSC	2	9.8
YSC	1	10.5	YSC	2	6.8
YSC	1	7.0	YSC	2	9.3
YSC	1	4.5	YSC	2	8.5
YSC	1	10.3	YSC	2	4.5
YSC	1	9.8	YSC	2	9.8
YSC	1	8.0	YSC	2	9.0
YSC	1	11.5	YSC	2	8.5
YSC	1	6.0	YSC	2	5.5
YSC	1	8.8	YSC	2	8.0

YSC	1	7.8	YSC	2	9.5
YSC	1	8.5	YSC	2	7.8
YSC	1	8.8	YSC	2	9.0
YSC	1	9.5	YSC	2	5.0
			YSC	2	5.8
			YSC	2	7.8
			YSC	2	6.5
			YSC	2	7.8

Appendix G.-- Description of the Access Database included with the 2003 Annual Report.

Table Name	Description
GTNP Lakes	27 lakes included in the survey, location, size, depth, and water quality information where available
Individual Fish	Species, net number, length, and weight for all fish captured during 2002 and 2003 surveys
Picture Information	Description of pictures included on the CD
Sample Event	Length of time, location, and result of all Swedish gill net and minnow trap sets during the 2002 and 2003 surveys
Query Name	Description
2003 Fish Averages	Length and weight averages for fish captured during the 2003 survey
2003 Sample Event Summary	Summary of length of time and result of all Swedish gill net and minnow trap sets during the 2003 survey
2003 Lakes	Summary of water quality sampling
2003 Gill Nets	Summary of Swedish gill net sets during the 2003 survey
2003 Minnow Traps	Summary of minnow trap sets during the

2003 survey

Report Name

General Information for 2003 Alpine Lakes	Lake location and water quality parameters for all lakes surveyed during 2003
2003 Sample Event Summary	Summary of net locations, hours, and results for 2003 survey
2003 Summary of Fish Captured	Length and weight averages for fish captured during the 2003 survey
