Report 3 Section III

Many Glacier Mgmt Area

UNITED STATES GOVERNMENT

Memorandum

TO : Paul T. Quick, Regional Director, Portland DATE: Nov. 15, 1961

FROM : Z. E. Parkhurst, Regional Supervisor
Branch of Fishery Management Services, Portland

SUBJECT: Glacier National Park Fishery Management Review Report No. 3: A Review of Fishery Data Obtained from Waters of Many Glaciers Sub-district A of the Hudson Bay (East Slope) District of Glacier National Park. (1-FMS)

Attached is Section III of Review Report No. 3 dealing with waters of the Many Glaciers Management Area, to be attached to Section II which was transmitted from this office on August 31, 1961.

Explanation of New Classification Column to be added to the Tabled Outline of Waters in Area Reports to follow.

Since Section I of this report was issued, we have had the privilege of reviewing a copy of O. L. Wallis', "An Evaluation of the Fishery Resources of Rocky Mountain National Park and Needs for Interpretation, Research, and Management" issued May 1961. We found his "Classification of Lakes and Streams" on p.13 very applicable to our inventory needs, and we will include in forthcoming reports of this series another Column "D" - under Fishing Data in the Table outlining the waters of that area - in which the following designations will appear:

Class I - Waters Unsuitable for Fishing because:-

a) of unfavorable environmental factors;
b) fishing activity would be considered detrimental to other park values of higher priority from the Park Service viewpoint.

Class II - Waters Suitable for Fishing:-

a) Native Wild Fish Waters - such lakes, streams or reservoirs that maintain a sport fishery on native endemic species without regular periodic stocking.

b) Natural Wild Trout Waters - such lakes and streams in which wild trout populations have developed from stocked fish which are supporting the present fishing pressure without regular periodic stocking.

c) Stocked Waters - such lakes and streams in which natural reproduction is limited or totally absent, and which have to be stocked periodically to support the present fishing pressure.

SECTION III - THE MANY GLACIER MANAGEMENT AREA

GENERAL DESCRIPTION

The Many Glacier Management Area consists primarily of all the headwaters and upper portions of the Swiftcurrent Creek Drainage Basin; and of the upper half of the Kennedy Creek drainage basin. Swiftcurrent Creek empties into Lower St. Mary Lake outside of the park. Kennedy Creek also joins the St. Mary River outside the park approximately five miles north of, or downstream from, the Swiftcurrent's confluence. St. Mary River, in turn, flows into the Oldman River of Canada whose waters eventually reach Hudson Bay. (See Fig. 3 and Table 7).

In contrast to the Waterton (I) and Belly River (II) Management Areas in which the Ranger Station buildings constituted the only human habitation in those areas, Many Glaciers (III) Management Area is one of the more heavily populated areas in the park. World famous Many Glaciers Chalet or Hotel and its nearby Swiftcurrent Motel and Coffee shop, and the recently enlarged Park Service Campground, with combined accommodations for several thousand people, are located on or adjacent to Swiftcurrent Lake. The management area covers 68,842 acres of very rugged terrain - most of it in sight of Many Glaciers Hotel. These rugged peaks are frequently referred to as the "American Alps".

ACCESSIBILITY

There are three main hard-top highways into the Hudson Bay District of Glacier National Park; 1) The most northern is a 13-mile stretch of black-top from U. S. Highway 89 at Babb, Montana to Many Glacier Hotel, 2) The center one is the well-known "Going-to-the-Sun" Highway that takes off from U. S. Highway 89 at St. Mary, Montana and extends for 53 miles over the continental divide at Logan Pass to Park Headquarters, and joins U. S. Highway No. 2 at West Glacier (formerly Belton, Montana), 3) The southern highway is an 8-mile stretch of blacktop that leaves State Highway No. 49 about 4 miles north of East Glacier Park and terminates at Two Medicine Lake Chalet. The former brings in many thousands of tourists to the picturesque Many Glaciers Area each year. Many Glaciers Hotel seems to be the chief social center of the Park with saddle horses available and mounted tours taking place almost every day. Motor launches travel on two-hour schedules or oftener across the Swiftcurrent Lake to a portage to Josephine, and by another launch to the upper end of Josephine Lake. The area is supplied with well-used trails along every body of water of any consequence, and good trails reach all surrounding areas over Pregan Pass to St. Mary Area, Swiftcurrent Pass to MacDonald area, through Ptarmigan Tunnel or over Redgap Pass to the Belly River Area.

HISTORICAL BACKGROUND

As was the case in the previous two areas described, both Kennedy Creek and Swiftcurrent Creeks have impassable falls in them which, before the advent of the white man, prevented any fish from moving upstream to inhabit the upper lakes in the basin. Lake Sherburne and Cracker Lake are the only lakes in the area known to possess native species.. The rest were all barren apparently. There are no known impassable falls in Boulder Creek, and it may therefore possess some native species, but no records are available to support or deny this supposition.

Although this entire eastern slope was originally part of the Blackfeet Indian Reservation (they sold the mountainous area to the U. S. Government shortly before it was set aside as a park), the Blackfeet never lived in the mountains. They were plains Indians who hunted in the mountains in the daytime but never stayed overnight as they feared the spirits that lurked there at night. Stories are plentiful of hunting but none of fishing by the Indians. They knew there was better fishing in the lower parts of all these streams on what is still their reservation.

The Many Glacier Area was settled before the turn of the century by miners who developed quite an industry, on a small scale, working out of the village of Altyn (ruins still remain around the mouth of Appekunny Creek) and signs of their diggings and trails and roadways can still be found and are alluded to in the following descriptions when related to accessibility or fishing.

REVIEW OF THE INDIVIDUAL WATERS OF THE ST. MARY RIVER DRAINAGE (III)

Within the borders of Glacier National Park, the St. Mary River Drainage System has its headwaters in three major tributary systems in addition to the main stem of the river itself. These rather distinct water areas extending from north to south along the east slope of the continental divide are discussed in this report under the following headings:

1. Lee Creek is discussed in Section II (The Belly River Area) of this report.

2. The North Fork of Kennedy Creek (renamed Otatso Creek) drains the southeastern portion of the Belly River Management Area and is discussed in Section II. Kennedy Creek is discussed in this Section III as it drains the northern portion of Many Glaciers Management Area.

3. Swiftcurrent Creek Drainage Basin forms the major part of the Many Glaciers Management Area (III). This basin is easily separated into two distinct and different biotopes - or biological environments - by the natural falls at the outlet of Swiftcurrent Lake. In this report the basin is discussed in three parts as lower Swiftcurrent waters (D) below these falls; Upper Swiftcurrent waters (E) above these falls; and Boulder Creek; (F) which enters Lower Swiftcurrent Creek outside the Park.

4. The rest of the St. Mary River Drainage Basin in the park below the Swiftcurrent Creek Basin, is designated as the St. Mary Management Area (See map of management areas in memo dated July 14, 1961 - IV).

Detailed descriptions of the various waters of Kennedy and Swiftcurrent Creeks, and all of the known information on fish and fishing in them are presented below. In this section III of Review Report No. 3, the streams and lakes are treated in their order from the Eastern Park Boundary line, up each of the two major streams to their headwaters.

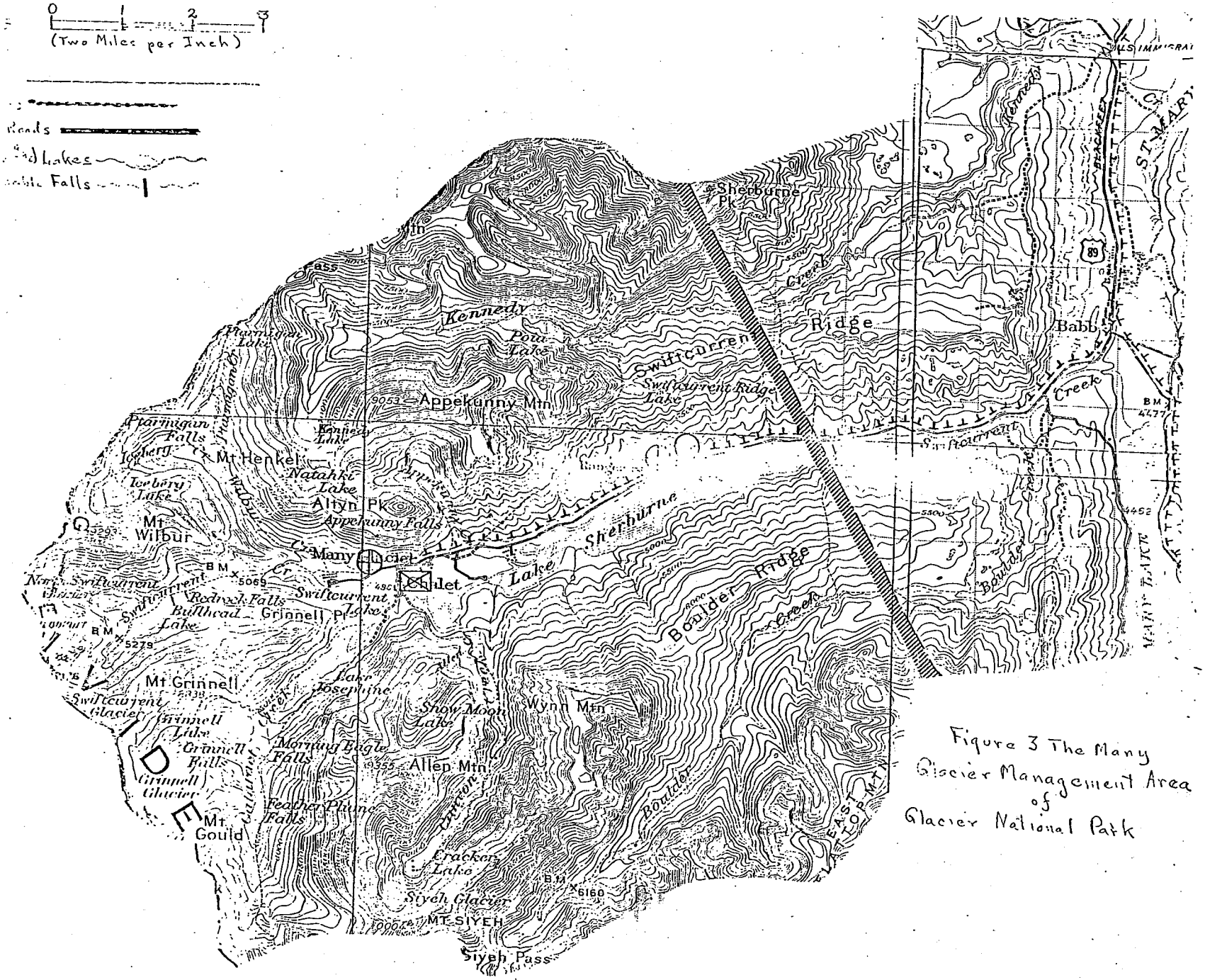


Figure 3 The Many Glacier Management Area of Glacier National Park

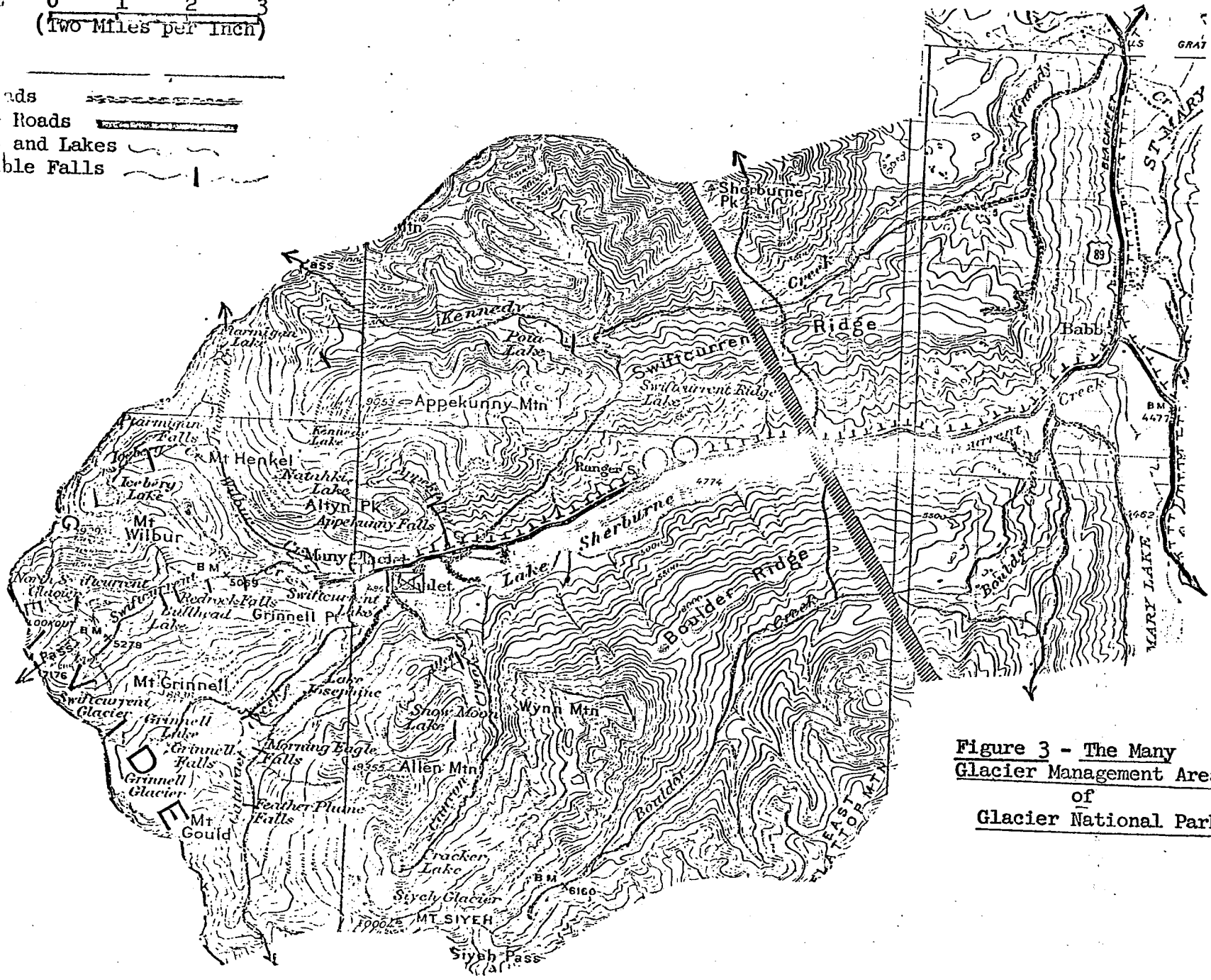


Figure 3 - The Many Glacier Management Area of Glacier National Park

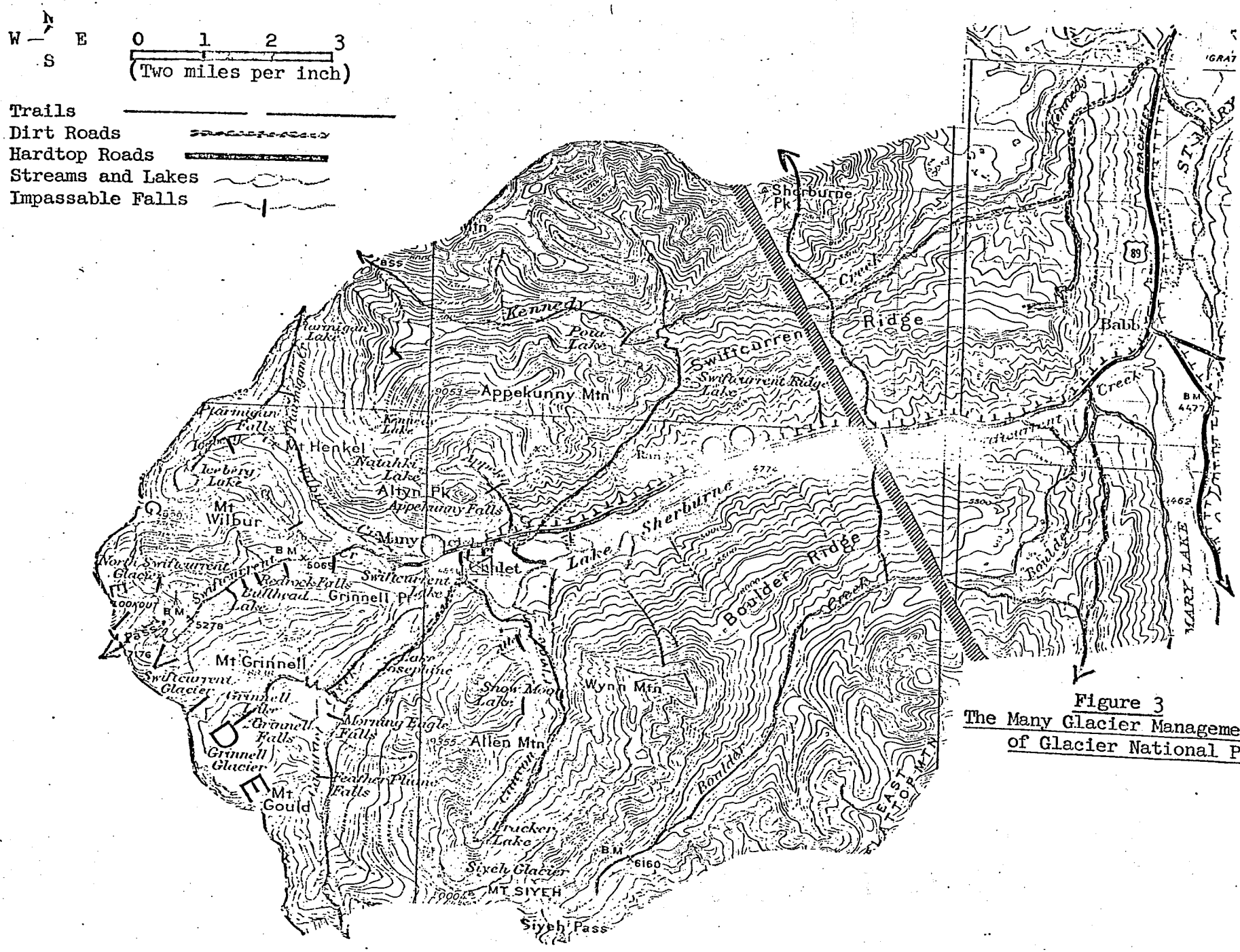


Figure 3
The Many Glacier Management
of Glacier National Pa

Legend: LAKES — A- Est. Surface Acres; B- Est. Miles Shoreline; C- Est. Maximum Depth
STREAMS — A- Total Miles Long; B- Est. Fishable Miles; C- Est. Avge Width in Feet
FISHING DATA — A- Est. No. Angler-days in 1960; B- Est. Quality Index; C- Sport Species Present; D- Management Classification

Designated Waters	LAKES A	LAKES B	LAKES C	Elevation	STREAMS A	STREAMS B	STREAMS C	FISHING DATA A	FISHING DATA B	FISHING DATA C	FISHING DATA D	Comments
III The St. MARY RIVER DRAINAGE												
A. Lee Creek (See previous report)												(See Section II)
B. North Fork Kennedy Creek (Oldatso Creek - see previous report)												(" " ")
C. Kennedy Creek				6000'	7	7	40	100	16	CtRbDV	IIb	Needs Survey
1. Unnamed Trib. L.B.				6500	3	0	6	0		none	Ia	too steep and small
2. Poia Lake	30	0.8	?	5970				100	?	Rb; Gr.	IIb	Needs Survey
3. Unnamed Tribs (2 LB)				6500	2	0.5	-5	0		none	Ia	Too steep & small
4. Kennedy Lake	40	1.2	?	6970				0		none	Ib	Inaccessible
D. Lower Swiftcurrent Creek (Below the falls)				4800	0.5	0.2	50	10	55	Rb; EB; LWh; Su.	IIb	Needs Census + Survey
1. Lake Sherbourne	1400	13.0	?	4775			~~200~~	200	29	NP; Su; LWh.	IIab	Needs Survey
a. Unnamed Tribs. (2 LB)				5500	3	0	-5	0		none	Ia	Too Steep & small
b. " " (2 RB)				5250	3	0.5	-5	0		"	Ia	" " " "
2nd Pond	5	0.1	?	"				0		"	Ia	Too small
c. Swiftcurrent Ridge Lake	30	1.0	25	6050				10	5	Su	Ia	(see Notes)
d. Boulder Ridge Lake	15	0.5	?	6050				0		none	Ib	To be left barren.
e. Appekunny Creek				5750	3	1.5	15	0		none	Ia	Needs survey in lower end.
ad. Natahki Lakes (2)	1 3/8	0.6 0.3	? ?	6250				0		none	Iab	Inaccessible. Survey.
f. Canyon Creek				5500	4	1	20	0	?	Ct; Wh.	IIab	Needs Survey
aa Cracker Lake	50	1.6	?	5750				200	75	Rb; DV	IIab	" "
Upper Lake Sherburne	120	1.8	8	4775				100	50	EB	IIab	" "
a. Allen Creek				6000	1	0	-5	0		none	Ia	Too small + steep
aa Snow Moon L (Ice)	20	0.7	?	6550				0		none	Ia	Inaccessible
bb Falling Leaf L	20	0.7	?	"				0		Ct	IIb	Too small + shallow
cc Unnamed Pond	5	0.1	?	6150				0		none	Ia	" " " "
b Governor's Pond	-3	-0.1	-5	4950				25	25	Rb	Ia	" " " "
E. Upper Swiftcurrent Creek (Above the Falls)				5100	3	1.5	20	25	25	EB	IIb	Needs Survey
1. Swiftcurrent Lake	130	2.5	36	4860				1500	32	Rb; EB; K;	IIc	Needs Intensive Mgt.
a. Cataract Creek				5000	6	0.3	10	10	50	Rb; EB	IIbc	Needs Survey
aa Josephine Lake	180	4.5	50	4870				800	45	EB; Rb; K	IIbc	Needs Intensive Mgt
bb Bullhead Creek and				5000	0.5	0.5	10	10	50	Rb; EB	IIbc	Needs Survey
" Lake	120	1.5	80	5050				150	30	EB; Rb	IIb	Needs Mgt. Study
cc Unnamed Tribs 2 RB				6000	3	0	-5	0		none	Ia	Too small + steep
" Ponds (2)	5	0.1	-5	6000				0		none	Ia	" "
dd " Trib RB				6350	0.2	0	-5	0		none	Ia	" "
" Pond	5	0.1	-5	6350				0		none	Ia	" probably too cold!
2. Wilbur Creek				5350	3	2	20	10	15	EB; Rb	IIb	Needs Survey
a. Ptarmigan Creek				6550	2	0	-5	0		none	Ia	Too small + steep
a. " Lake	10	0.5	?	6550				150	80	EB; Ct	IIb	Needs Survey
b. Iceberg Lake	50	1.5	?	6050				0		none	IIa	" "
b. " Creek				6050	2	0	-5	0		none	Ia	Too small + steep
3. Fishercap Lake	25	1.0	80	4870				300	25	EB	IIc	Needs Intensive Mgt
4. Unnamed Trib LB				6550	2	0	-5	0		none	Ia	Too small + steep
and " Lake	10	0.5	?	6550				0		none	Ia	Needs Survey
5. Redrock Lake	40	1.3	30	5050				250	28	EB; Rb	IIb	Needs Intensive Mgt
Unnamed Trib LB				6000	1	0	-5	0		none	Ia	Too small + steep
" Lower Bullhead Lake	18	0.5	8	5250				0		?	IIb	Very shallow. Alf
7a. Middle " "	20	0.5	20	5270				0		?	IIb	need Intensive
8 Upper " "	52	2.0	30	5280				200	20	EB	IIb	Management.

Table 1 Continued/

	LAKES A	LAKES B	LAKES C	Elevation	STreams A	STreams B	STreams C	Fishing Data A	Fishing Data B	Fishing Data C	Fishing Data D	Comments
III- The St. Mary River Drainage (Continued)												
a Windmaker Creek				5200	0.5	0.3	15	0		none	Ia	Too steep + small
and " Lake	30	1.0	25	5280	~~0.5~~	~~0.5~~	~~15~~	10	15	EB	IIb	Needs Stocking
a a Unnamed Tribs (2)				5800	3	0	-5	0		none	Ia	Too steep + small
and Pond	5	-0.1	10	5650				0		none	Ia	Too cold + shallow
9. Unnamed Pond (Above Bullhead)	5	-0.1	-5	5290				0		none	Ia	Needs Survey
10. Unnamed Tribs (5) at head				6000	2.5	0	-5	0		none	Ia	Too steep + cold
F. Boulder Creek (actually a Trib. of Swiftcurrent Cr.)				5700	9	7	30	10	50	Ct; Wh	IIa	Needs Survey
1. Unnamed Tribs (2 on RB)				5900	4	0	-5	0		none	Ia	Too small + steep
2. " Trib and Lake RB	18	0.7		6750	3	0.5	-8	0		none	Ia	Too high + cold
3. " " LB				6500	2	0	-5	0		none	Ia	Too small + steep
4. Unnamed Lake near Siyeh	20	0.7		6350				0		?	Ia	Leave it barren
a. " Trib LB Lake				7500	1.5	0	-5	0		none	Ia	Too small + steep
5. Unnamed Lake in Siyeh Pass	8	0.2		6950				0		?	Ia	Inaccessible

C. Kennedy Creek has its source in Upper Kennedy Lake and flows eastward through a fairly flat valley for 4 miles to Poia Lake, (formerly called lower Kennedy Lake). According to Brooks (1921) it pours over a 40-foot falls just below Poia Lake and flows 3 more miles to the park boundary and 8 miles further outside the park before it joins the St. Mary River in the Blackfeet Indian Reservation. Brooks (1921) also states that cutthroat trout and bull trout were native to the South Fork of the Kennedy River, and that they might occur in the unnamed lake above the falls and that the lake had been stocked with grayling in 1921. Hazzard (1935) felt that natural spawning was adequate at that time in the South Fork of Kennedy Creek. Schultz (1940:18,40) states:

> "The Dolly Varden or bull trout is abundant in the east side in the South Fork of Kennedy Creek and in other streams of the Saskatchewan River, but the survey did not take it in the Missouri system. No doubt the species is native to the Saskatchewan drainage as Jordan (1889) reported its occurrence in South Saskatchewan." Schultz offers further notes on spawning observations in South Kennedy Creek and states (;.40) that cutthroat trout, Dolly Varden charr and mountain whitefish were found in the South Fork.

Kinnie (1960:18) writes:

> "A 6.9 mile hike with a 1,200 ft. climb to the top of Swiftcurrent Ridge and then a 600 ft. descent to Kennedy Creek, on the Redgap Pass Trail. This trail starts from the Many Glacier Road at a point about 3 miles into the Park from the Many Glacier Entrance Station (1/4 mile east of the Appekunny Creek bridge). The best fishing on Kennedy Creek is on a stretch from Poia Lake to about 3 miles below the point where the above trail reaches Kennedy Creek. There are many beaver dams on the creek. Generally excellent large rainbow fishing after the high water has cleared in the early part of the summer."

Park Service records indicate the following fish have been stocked in Kennedy Creek:

1923	24,000	Rb
1924	120,000	Gr
1925	180,000	Gr
1937	39,600	CT Fry
1938	22,080	Ct

The following meager creel census has been obtained from Kennedy Creek in recent years:

Kennedy Creek

Census Dates	Home State	No. in Party	Hours Fishd	No Fish	Species	Size Distribution of the Catch 4-6	7-9	10-12	13-15"	16-18	19+	Total Catch	Comments
7/5/59	Colo.	2	4	0	DV				2			2	Daredevils. Water very high
7/31/59		4	12	3	Ct			1	2			3	Daredevil + spinner
7/5/60	Mont	1	5"	0	Rb	1	5"					6	Not as good as last year flies
3 days		7	21	3		1	5"	1	4			11	

Quality Index = 16 (Poor) (43%) Ave. L. = [illegible] Ave. Hrs/Day = 3.0 Catch/Hr. = 0.53 Catch per Day = 1.6

Ranger Dayton estimated approximately 100 man-days of angler-use on Kennedy Creek in 1960. As this stream and Poia Lake are easily accessible by a good trail from the Many Glaciers Hotel area, and as the quality of its fishery is in doubt at the present time, a management survey is needed and the development of a stocking program may be indicated.

C-1. An unnamed tributary entering the left bank of Kennedy Creek below Poia Lake appears from the topographic map to be too steep to afford any significant fishing areas.

C-2. Poia Lake. Very little information is available on this little 30-acre lake other than the notes from Brooks (1921) quoted above. Hazzard (1935) recommended that an experimental plant of 10,000 California Golden Trout eggs be made in lower Kennedy Lake. Schultz (1940:40) states only that rainbow and grayling had been planted in Lower Kennedy Lake. Kinnie (1960:20) states:

> "Go to the point where the trail described under Kennedy Creek reaches Kennedy Creek. Poia Lake is about 1/2 mile and a climb of 300 ft. farther up Kennedy Creek on the Redgap Trail. Generally excellent, good size rainbow and a reputation for good grayling fishing."

No known creel census has been collected from Poia Lake so we cannot evaluate the fishery as yet. Ranger Dayton estimated that 100 man-days of angler use may have occurred on Poia Lake in 1960. Park Service records indicate that the following fish have been stocked in Kennedy Lake

1921	360,000	Gr. fry
1926	390,000	Gr. "
1927	345,000	Gr. "
1930	50,000	Ct. "

It appears quite obvious that this Kennedy Lake is what we now call Poia Lake - since the lake we refer to now as Kennedy Lake (C-4) is quite inaccessible. As stated before, this lake and Kennedy Creek need a management survey.

C-3. Two unnamed tributaries entering the left bank of Kennedy Creek between Poia and Kennedy Lakes appear to be too small and steep to afford any fishing.

C-4. Kennedy Lake. No information seems to be available on this little 40-acre lake that lies in a 1,000-foot deep cirque and which forms the headwaters of Kennedy Creek. At its 7,000-foot elevation it is probably too cold for suitable fish growth. Redgap Trail is three miles away so it is quite inaccessible. There are no known records of any fish being planted or caught from this lake. It is probably a candidate for the "barren" lakes classification.

Ranger Dayton estimated 25 angler-days on Kennedy Lake in 1960.

GNP-R-30
5/15/63

Glacier National Park

Lake or Stream: KENNEDY LAKES & CREEKS[1/] Individual Fishery Stocking Record　　Management Area: ____________

Date Stocked	Source of Fish	Species	Number Stocked	Length (inches)	Number per lb.	Remarks and Results
1921		Grayling	800,000	Fry		Lake and Creek
1923		Rainbow	24,000	?		
1924		Grayling	120,000	?		
1925		"	180,000	?		
1926		"	390,000	Fry		
1927		"	345,000	"		
1937		Cutthroat	16,300	#1½		
1937		"	20,400	#1		Copy
1937		"	39,600	Fry		More complete stocking records for Kennedy / Poia drainage - Leo Marnell Jul. 1996
1938		"	58,800	?		
1938		"	22,080	Fry		

1/ This includes Poia Lake which used to be named Lower Kennedy Lake

D. Swiftcurrent Creek below Swiftcurrent Lake Falls is almost entirely submerged most of the time by Sherburne Reservoir (See D.1). When this reservoir is full, there is less than 1/2 mile of streambed left between the falls and the park border. This half-mile stretch of stream is quite torrential for the most part (See Fig. 4). However, it has a

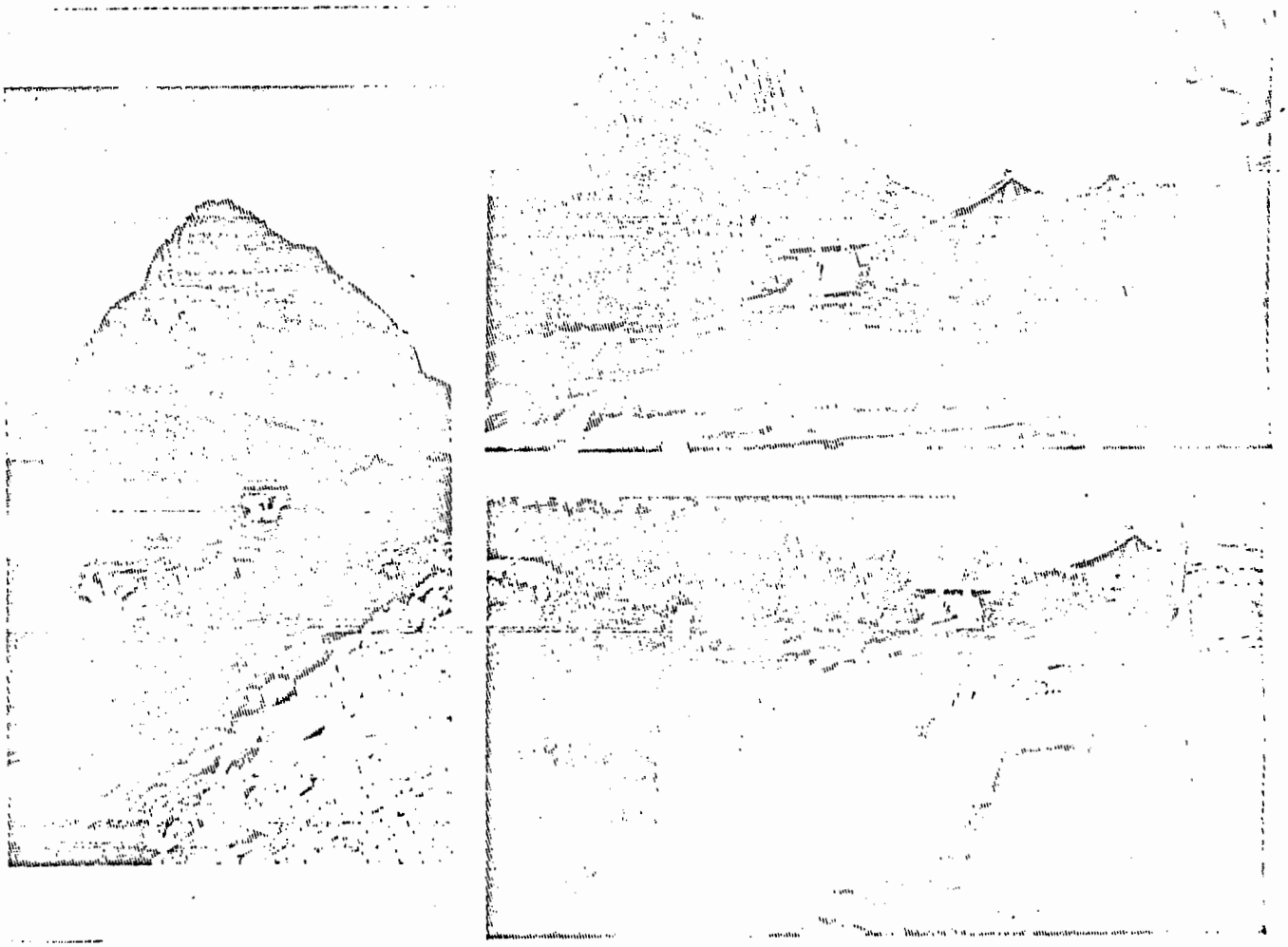


Figure 4. Left: General view of 90-foot falls at outlet of Swiftcurrent Lake. Upper Right: Upper falls and small fishing area of stream. Lower Right: Close-up of lower falls and rough canyon below.

few areas of fairly calm water in its upper part and flattens out above upper Lake Sherburne where a few rainbows, eastern brooks, and whitefish and many suckers are taken each year from the beaver ponds and pools in this lower stretch of stream. Only two creel census reports have been obtained from this area, (see census for Lake Sherburne). In 1959, 3 anglers fished 10 hours to catch 23 trout which averaged 8 inches in length. Assuming they fished the usual 3 hours per angler-day, this would give a quality index of 55 which is considered very good fishing. It was estimated that 50 angler-days of effort may have been spent in this area in 1960. This area needs a fishery management study and evaluation.

Before the invasion by the white man, the two natural falls shown in Figure 4 blocked any and all upstream migration of fish. Thus there were - nor are - no known "native" species of fish in the waters above these falls. It is quite a safe assumption that the many lakes above these falls had no fish until the Park Service, and its immediate predecessors - mostly mining prospectors - introduced them into these waters.

Ruhle (1957:60) describes Swiftcurrent Falls thus:

> "The ledge of rock over which the stream plunges is the lowest or oldest formation in the mountains of the park. The Lewis Overthrust fault is just below the ledge. The lake above occupies a basin scooped by glacial action out of the Altyn limestone whose dip is to the southwest. Formerly the lake was much larger, and the falls were higher, but as the stream cut back into the rim of the basin, it left the tilted ledge on which the hotel stands today."

On page 91 he adds:

> "The stream has cut a beautiful gorge in the yellow Altyn limestone. It can be seen that the beds dip to the west, and that the lake occupies a basin scooped out by a glacier which simply moved up the bedding planes."

Elrod (1912:11) states:

> "The outlet of this (McDermott) lake is a series of cascades with a total fall of 90 feet in a quarter of a mile. To the foot of this, fish from the streams below make their way, but none have ascended to the waters of the lake above. This cascade, with the mountains behind for a background, is one of the beauty spots of the park, and the portion of the lake here described is one where tourists will delight to linger."

Schultz (1941:40) lists cutthroat and brook trout, mountain whitefish, long-nosed sucker and long-nosed dace in Swiftcurrent Creek with rainbow trout known to have been planted there.

D-1. Lake Sherburne is the only artificial reservoir in the Park at this writing. At full pool the reservoir is over six miles long and about 3/4 of a mile wide at its widest point, with approximately 1,400 surface acres inside the park when full. This makes it the largest lake in the Glacier Park Management Area. However, by late summer the reservoir is usually completely drawn-down and presents a great expanse of void and empty space with only a tiny meandering stream channel in its muddy bottom, and a few ponds present at low pool or complete draw-down.

The dam was constructed just outside of the park boundary and the storage water is used as part of the extensive Milk River Irrigation Project in the Blackfeet Indian Reservation and northwestern Montana. According to Ruhle (1957:59) in its original condition there were two natural lakes in the valley and most of the valley floor was covered with heavy timber. The first oil well in the State of Montana was drilled in this basin over 50 years ago and, although they struck oil, it was not in sufficient quantities to pay off.

The following notes have been found on fish and fishing -

Brooks (1921) stated:

> "Pike or Great Northern Pike, Pickeral or Musculonge (it is possible that this is just one species of the pike or pickeral family and it has received some of these various names locally. However, I am of the opinion that there is but one kind or variety in these waters) Hudson Bay Whitefish, Black-spotted Trout (cutthroat), and possibly other varieties of native fish are found in Sherburne Lake and Swift Current Creek". He also indicated a 40-foot plus impassable falls on his map of Swift-current Creek just below Swiftcurrent Lake.

Muttkowski (1925:5) made some intensive studies of the food potential of Lake Sherburne and other waters. His results for Lake Sherburne will be summarized under the write-up for Swiftcurrent Lake.

Hazzard (1935) felt that natural spawning of northern pike was adequate for this lake.

Schultz (1941:35) states:

> "The pike was taken by the survey in Sherburne Lake where it is reported to attain a weight of 18 pounds. Numerous dead and decaying specimens were observed impaled on the large brush and tree jam at the irrigation dam near the outlet at the lower

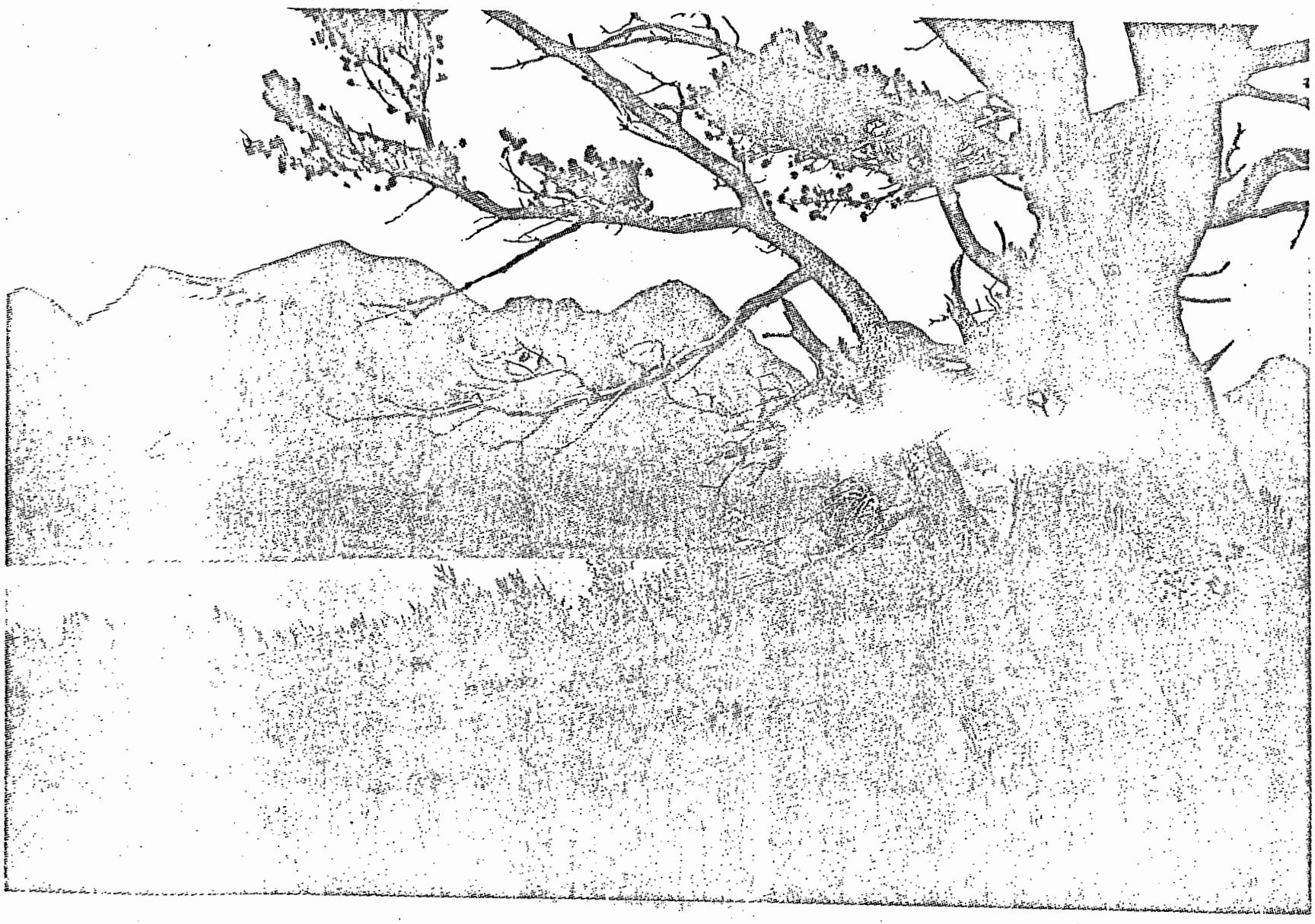


Figure 4a - View of Lake Sherburne from the highway into Many Glacier Hotel.

end of the lake. Esox lucius was taken by Dr. Coues in 1874 as reported by Jorden (1878a) from the Swiftcurrent River, where Eigenmann (1894) again reported it. The pike in Sherburne Lake feed mostly on whitefish (coregonus clupeaformis). Our specimens, weighing from 4 to 6 lbs. were caught in the experimental gill net by their teeth as they tried to eat the gilled whitefish". Schultz (1941:40) also found cutthroat trout and mountain whitefish present and noted that grayling had been planted.

Halloway (1945:8) states:

> "Gill nets were fished only one night in this lake, taking five pickerel ranging from 24-1/2 to 30-3/4 inches in length and three lake whitefish between 12 and 14 inches long. No stocking is recommended. Results from trout could not be expected in the presence of the pickerel. Excellent fishing for pickerel occurs here. Forage fish in the form of whitefish and suckers are available."

Kinnie (1960) states:

> "The Many Glacier Road parallels Lake Sherburne for about 6 miles starting from a point 5 miles into the Park from the town of Babb. Thirty-six inch Northern Pike are caught in this lake each year. The water level of Lake Sherburne often fluctuates during the summer. In general, the water is high in the spring and low in the fall. The fishing is poor while the water level is changing; fair when the water is high; and good when the lake is low. The best fishing is on the south side of the lake in an area which is west of the "narrows." In this area, there are many islands and canals, at low water, which are good places to fish. Spinners and plugs are best for Northern Pike.
>
> The circular lake immediately above Lake Sherburne becomes a mud f flat during low water and so has little fishing except in the deeper holes on Swiftcurrent Creek." The only record of any stocking in this lake was 176,000 Grayling fry in 1934 which apparently did not survive to spawn.

Ranger Dayton estimated 200 angler days of fishing effort were spent in 1960 on Upper Sherburne Lake (small circular lake on map) and 200 more on Lower Sherburne Lake.

The following creel census data were obtained in 1959 and 1960:

Lake Sherburne

	Census Dates	Home State	No. in Party	Hours Fished	No Fish	Species	Size Distribution of the Catch 4-6	7-9	10-12	13-15	16-18	19+	Total Catch	Comments
					Sherburne		Beaver Ponds (Upper Lake)							
	6/15/59	Mont	2	8	0	Rb		15					15	worms + flies
	7/9/59	Alta	1	2	0	EB	4	2	2	Appear to have			8	worms - Rainbow - flies
			3	10	0		4	17	2	appear			23	
						Lake	Proper							
	7/15/59	Mont	2	8	1	NP	The largest northern pike shown					2	2	(29" + 36") unseen. Spoons + plugs
	7/24/59	GNP	2	5	1	NP						1	1	(28") daredevils
	6/14/59	—	1	1	0	NP						1	1	(30" - 7 lbs)
	6/18/60	Mont	2	4	1	NP						3	3	(27½" - 31" - 31") on hotshot
	6/27/60	Ore	2	3	1	NP						1	1	(19" - 3 lbs) daredevil
	7/5/60	Ind	1	2	0	Rb		3					3	Filled sucker + released trout
						Su					1		1	Spoons + spinners
Totals	8 days		13	33	4	NP	4	20	2		1	8	35	Ave L = 13" Hrs/day = 2.
						Rb		18					18	Av. Catch/Hr = 1.1 Quality Index =
						EB	4	2	2				8	" " /Day = 2.2 29 (Poor to Fair)
						Su					1		1	
						NP						8	8	

Results of the above rather meager creel census indicate the existence of a fair fishery for northern pike (Esox lucius) in Sherburne Reservoir during the past two years. These fish averaged 29 inches long - which is a nice sized fish of good sporting quality, and probably poor eating quality. Sherburne Lake is the only body of water in the Park known to harbor this species of fish, and from all available records they are a native wild fish that is indigenous to lower Swiftcurrent Creek.

It would appear at first thought that no fishery management techniques could be employed effectively on a reservoir with such a violent fluctuating lake-level as Lake Sherburne has. However, it may be necessary at some future period to close the lake at low water to protect the surviving northern pike population at extremely low water. In the upper part of the reservoir, and in the creek below the falls, (the upper circular lake and beaver dam areas) a fishery survey is needed. Because of their accessibility, these waters should be stocked with larger rainbow fingerling to enhance the sport for campers and visitors in the area. There is very little chance for reproduction here, and the larger the fingerling used the better.

D-1a and b. - Two unnamed tributaries that empty into the left bank and two into the right bank of the reservoir (one has a small 5-acre pond) are believed to be too small to offer any significant fishing waters.

D-1.C - Swiftcurrent Ridge Lake (Moran's Bathtub). This 30-acre lake, located at 6,000-foot elevation atop Swiftcurrent Ridge, has no known inlet or outlet. It is also located beside the main trail from Many Glacier Hotel to Kennedy Creek and Poia Lake. Although it is probably the poorest fishing lake in the entire area, it is well-known and has received considerable publicity in the past as a shining example of the ruination of a good grayling fishing lake by the introduction of undesirable fish species.

Comparatively few people seem to know where Swiftcurrent Ridge Lake is - but almost everybody knows about Moran's Bathtub. The present horse-wrangler at Many Glaciers Hotel, Mr. George Moore, says that the later name was derived from the activities of Mr. George Moran, former horse wrangler at the hotel, who, in the early days, guided parties of swimmers to this little lake as its waters were always warmer than other lakes in the area. Mr. Ray L. Konley, assistant hotel manager who has resided at the hotel for over forty years had another story. He inferred that Mr. Moran was an unkempt individual who, about once a year, took an annual bath in this little lake - which, as legend has it, accounts for its perenially muddy appearance.

Regarding its fish and fishing, Brooks (1921) stated:

> "An unnamed lake on Swiftcurrent Ridge had grayling trout stocked in 1921 and no other varieties."

Hazzard (1935:7) states:

> "Continued prohibition of the use of live bait in Park waters is advised. The damage which can result from accidental plantings of fish in this manner is well illustrated by Swiftcurrent Ridge Lake (Moran's Bath Tub). A sucker and two species of minnows were brought in here, presumably by fishermen as bait for grayling (though grayling do not feed on fish to our knowledge). They have become extremely numerous in the past three years and the few grayling left are reduced to skin and bones presumably through starvation." Recommended that an experimental plant of 5,700 eastern brook fingerling be made in this lake.

Schultz (1941:27-34) states:

> "Unfortunately the grayling has been introduced into some lakes of the park which do not possess suitable conditions for its spawning. A notable example is the lake, Moran's Bath Tub (located above Sherburne Lake on a high ridge) which has neither inlet nor outlet and in which the grayling have been unable to spawn. This lake in 1934 was dominated by a sucker and two minnows, all of which were serious competitors for food. The

Figure 5 - General View of Swiftcurrent Ridge Lake - approaching from the Many Glaciers Hotel trail.

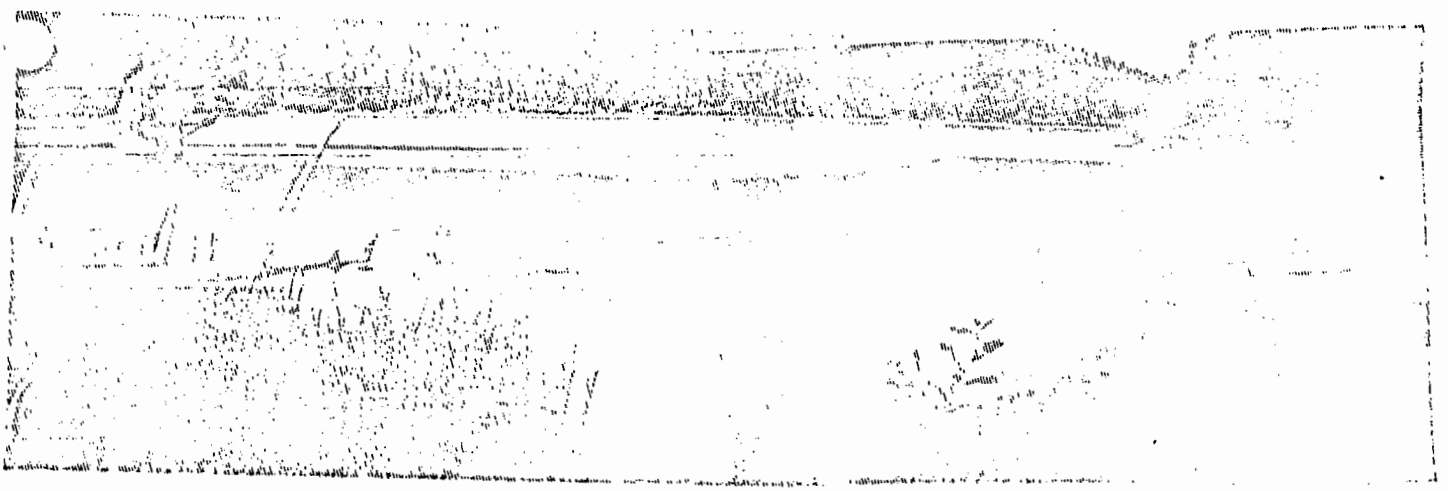


Figure 6 - Spraying liquid rotenone along shore to "spot poison" a small area for the collection of fish specimens.

grayling which remained were emaciated, merely a little flesh and skin covering their bones . . . . The occurrence of this sucker (Catostomus commersonii) and two minnows in Moran's Bath Tub, a lake lying on a high ridge with neither inlet nor outlet suggests it was brought there by man, perhaps as bait, because the lake appears never to have had any connection with an adjoining river . . . . In Glacier National Park the lake chub (Couesius dissimiis Girard) was taken by the survey in Moran's Bath Tub and in Waterton Lake. This lake chub was not found on the west side of the park although the area was carefully studied. This species was first taken by Coues in 1874 in the Milk River and by Eigenmann (1894) from the Swiftcurrent River. The northern dace (Margariscus margarieta ~~nadiriebi~~ nachtriebi (Cox) occurs in great abundance in Moran's Bath Tub where it was probably introduced accidentally as bait. . . . . In Moran's Bath Tub Margariscus and Couesis appear to have hybridized to a limited extent."

Ruhle (1957:95):

"Here, on the very top of the divide is Swiftcurrent Ridge Lake. Once called Moran's Bath Tub, it has no visible inlet or outlet. The water is clear and cold. It was the best lake in the park for grayling fishing until minnows were introduced accidentally as bait. As a result there is no longer any fishing in the lake."

Kinnie (1960:20-21):

"One day a group of fishermen decided to enjoy themselves by using live minnows to catch the numerous and large grayling in this lake. The fun they had was expensive for the rest of us. Some of the minnows escaped and in time forced all of the game fish out of the lake."

The strange feature about this theory is that there are very few indeed, if any, records of grayling ever feeding on minnows - so they were very poor bait!

Park Service records indicate the following stocking record for Swiftcurrent Ridge Lake:

1921	40,000	Grayling	1931	310,000	Grayling
1925	20,000	"	1935	4,200	Eastern Brook
1926	250,000	"	1941	5,540	" "
1928	7,500	"			

Under the prevailing conditions no creel census has been obtainable and although Ranger Dayton estimated 50 angler-days may have been spent on Swiftcurrent Lake in 1960, we doubt that it would exceed 10 angler-days. This opinion is based on our studies described below:

Field Notes and Observations on Moran's Bath Tub, July 19-20, 1961
by Wm. Markham Morton and Ernest J. (Steve) Kinnie.

Although much had been written and repeated about the conditions of this lake there had been no actual studies made of it in over a decade, so we decided to take a look at it. Accordingly, in July 18, 1961 I arranged with Mr. George Moore, the horse wrangler and packer at Many Glaciers Hotel, for a packer ($17.50) and a saddle horse ($4.00 per half day) to move our gear up the 3-1/2 mile trail to the lake. We left Moore's Ranch at 1:30 p.m. on July 19 and arrived at the lake at 3:15 p.m. Weather was clear and hot with s strong west wind blowing. Mr. Kinnie had arranged to be relieved from his duty station at the Park Entrance and had climbed the half-mile trail (that was almost straight up) in about a half hour to join us as we arrived.

As our studies progressed it became obvious that we would be there well into the evening so we dismissed the packer at 4:30 p.m. so he and the two girls would be home in time for dinner - after he had agreed to come up in the morning and pick up our gear about 10:00 a.m. After we had completed our work about 5:30, Steve and I hiked down the shorter trail to the Entrance Station, arriving there at 6:15 p.m. We met Ranger Giddings who asked to accompany Steve in the morning, and Ranger Hutton who reported he had just collected some creel census from Poia Lake and Kennedy Creek - where they had taken some big cutthroats.

At 3:30 p.m. on July 19, 1961 the air temperature was 90°F; the water surface near shore 74°F; pH 7.8; and the T.D.S. reading was 22 megaohms per cc or something less than 50 ppm, which is an indication of low-productivity. The water appeared fairly clear with a muddy bottom around the shore. Large schools of shiners and small suckers were visible in almost all of the shallow areas along the shore. Leopard frogs were very common.

After taking photos of the lake, we sprayed the west bay with rotenone (Figs. 3 and 4). We used about 1 qt. of emulsified rotenone in 5 gals. of water in a trombone back-pack sprayer (which promptly plugged.) This was to capture specimens of the schooled small fish very much in evidence. Steve and I took off in a rubber raft and took a plankton haul from the west to east end of the lake; temperatures, depths, et cetera at the east end, and to set two gill nets from opposite shores - the north and south shores at 5:00 p.m. - to see if we could recover any big fish from this little lake.

We had some trouble with the electric thermometer - couldn't align it properly; believe batteries were dead. It read 60.2 to 60.5 from bottom at 20 feet to surface at east end of lake at 3:45 p.m. Taylor pocket thermometer showed 68°F. at the surface at the same spot. The Secchi disk disappeared at 9 feet.

The gill nets were pulled at 10:30 a.m. on July 20, 1960 and contained 54 emaciated suckers from 4 to 9 inches long and a dozen large red-sided shiners (saved 8 large suckers and 2 large shiners in 3-gallon jar for later identification).

This lake is a typically shallow, warm-water, mud-bottomed pot-hole or mud-hole type of lake. The west shore is shallow and muddy and slopes off to 20-foot deep water off the east shore which is of sand, gravel, and boulders covered with piles of driftwood at present - evidence of prevailing stiff westerly wind action. A scattered growth of small conifers and shrubs surrounds the lake. (Figs. 3 & 4).

Although the suckers and the shiners collected are both native to east slope waters, there is no doubt but that they were introduced into this lake since 1931. The plankton haul has not been analyzed yet, but this lake has been "over-grazed" by too many fish for too long. It needs some aquatic plants, snails, et cetera to give it "life". It is a "dead" pond at present.

Recommendations for the future management of Swiftcurrent Ridge Lake:

Because this 30-acre lake is located on a well-traveled trail from the Many Glaciers Hotel area to Kennedy Creek, it is easily accessible and usable by fishing and hiking parties, and therefore should be considered for immediate management measures. As we see the picture at this writing, there are two courses open for consideration:

1. This lake could be left in its present condition and developed into a sanctuary for water birds such as fish ducks or loons or other fish-eating birds or mammals - like we intend to propose for Mud Lake on the west slope. We noted an osprey fishing the lake on July 19. The first step would be to restore or introduce the proper aquatic plants and animals to form a more balanced habitat for such native wildlife. It would greatly benefit the present over-population of cyprinids fishes to introduce a few large brown trout to help reduce this population. The browns could not reproduce in this lake and therefore could be easily controlled as far as numbers are concerned. They could not escape to "contaminate" any other waters, and they are the only species of predaceous trout that would survive in this type of water. They could also furnish a limited fishery and the lake could be used for swimming and fishing - or preserved as a "wilderness" sanctuary.

2. This lake could be "rehabilitated" for use as a fishing lake by applying rotenone 1/ to the water to kill off the cyprinids - restocking it with the necessary fish food organisms and giving them a year or so to become well established - and then finally stocking the lake carefully with young native stock cutthroat trout. This little lake might develop into one of the best cutthroat-fishing lakes in the area in about three years time. Such a procedure would be well within the Park Services's Policy of restoration of native conditions where they have been distrubed by man.

1/ Assuming the lake has a surface area of 30 acres and an average depth of 8 feet, there would be approximately 240 acre-feet of water to treat. Using 2-1/2 pints of Pro-noxfish per acre foot (1:1,000,000) we would need about 1 drum (55 gallons) of toxicant for the project which would cost something over $200.00 plus another $50.00 to pack it up the trail to the lake. This would indicate a cost of something less than $300.00 to carry out the project.

D-1.d - Boulder Ridge Lake. Nothing is known of this little 15-acre lake sitting on top of Boulder Ridge with no inlet nor outlet streams much like Swiftcurrent Ridge Lake across the Swiftcurrent Creek Valley. No access - no problem. To be left a "barren" lake for future study.

D-1.e - Appekunny Creek and D-1.e.aa - Natahki Lakes (2). The Creek is too small and steep to harbor any fish except in its lower mile below the highway which should be explored for fishing possibilities. The two small lakes (12 and 8 surface acres) are accessible only with difficulty, and are too small and cold to support much fish life. Two impassable falls in Appekunny Creek permit no upstream migration, and no fish have been stocked. To be left as "barren" lakes for future study, Kinnie (1960:20):

> "This lake has a reputation for large cutthroat, but it probably has no fish".

Ruhle 1957:60:

> "Appekunny Creek drains the cirque between Altyn Peak and Appekunny Mountain on the right. A lofty waterfall over the Altyn rock is visible from the road below. A foot trail leads from the bridge to the beautiful basin above the falls . . . . On the flat below the Many Glaciers Road and at the mouth of Canyon Creek on the opposite side sprawled the little mining village of Altyn a half century ago. Wild and lawless at one time, it boomed to a population of almost 200. The flat was the old lambing grounds of mountain sheep that still wander down there especially earlier or later in the year."
>
> Some of these old buildings are still on the property of George Moore - present horse wrangler at Many Glacier Chalet.

D-1.f - Canyon Creek, is the outlet stream for Cracker Lake and is also the largest tributary of lower Swiftcurrent Creek - excluding Boulder Creek which empties into Swiftcurrent Creek outside of the Park boundaries. Very little is known about its fish or fishing. No creel census is available, and nobody is known to have fished it in recent years. Brooks (1921) states:

> "Near the outlet Canyon Creek is used mostly as spawning grounds for Sherburne Lake whitefish and native cutthroat trout".

Ruhle (1957:94) states:

> "Canyon Creek is boulder strewn, with stretches of foaming water between deep pools. As it has no falls, fish can swim upstream, but it has claimed little acclaim for fishing.... ....Before the establishment of the Park, in the days of prospecting and mining, the Many Glacier area was a scene of much hustle and bustle. Besides the prospecting near Mt. Wilbur, there was much activity along Canyon Creek. A wagon road to Cracker Lake was built at a great expense, and a costly crusher was installed there. The venture died since it did not pay, but the wagon trail remained for those who came later in quest of Nature's richer beauty".

This little stream needs a survey badly to evaluate its potential fishery use and see what management techniques might be needed to improve or develop a fishery especially in those pools and lower spawning areas which are apparently available for fish use.

D-1.f.aa - Cracker Lake with its 50 surface acres at 5,750-foot elevation is the largest natural lake in the lower Swiftcurrent Creek Drainage Basin; yet very little is known of its fish and fishing potential. Brooks (1921) stated:

> "A small species of native trout, possibly the cutthroat, is present in this lake".

Hazzard (1935) recommended that 13,500 rainbow fry be planted annually in Cracker Lake. Schultz (1941:40) found rainbow and Dolly Varden present and noted they had been planted in this lake along with cutthroats.

Ruhle (1957:94) states:

> "Turquoise Cracker Lake extends from the top of an eroded moraine, built by a glacier that once filled the basin, to the profound north wall of Mt. Siyeh (10,004). The elevation of the lake is 5,800 feet. On the east side, above the outlet, is the abandoned shaft of the Cracker mine. Until the early thirties the ruins of a big ore crusher near the shaft were an attraction. One can walk all the way around the lake without difficulty".

Kinnie (1960:18) states:

> "A 7-mile hike and an 800-foot climb on a trail that starts from Many Glacier Hotel. Generally poor rainbow fishing."

Park Service records indicate the following fish have been stocked in Cracker Lake:

Cracker Creek		None	
Cracker Lake	1916	35,000	Rb
" "	1924	36,000	Ct
" "	1925	10,000	Ct
" "	1933	24,000	Rb
" "	1935	27,200	Rb
" "	1936	25,800	Rb
" "	1940	8,000	Rb
" "	1941	11,460	Rb

Ranger Dayton estimated that 200 angler-days of fishing may have been spent on Cracker Lake in 1960. Only one creel census report has been received from Cracker Lake in two years, viz; 8/28/60 - Montana residents fished 4 hours to catch 20 Dolly Varden 7 to 9 inches long with the comment: "Fish were very hungry, skinny and overstocked - lake needs more fishing pressure."

This 50-acre lake needs a careful analysis of its productive capacity and present fish population to consider intelligently what steps are needed to improve or develop its future fishery potential. It should be developed because of its easy access and nearness to the population center of the area.

D-2 - Upper Lake Sherburne. Because of the annual fluctuating level of Lake Sherburne, it is difficult to describe what is meant by Upper Sherburne. However, for the immediate purposes of the paper, we will define it as the circular 100+ surface acre body of water (at full pool) which has been fairly well described under the D.1 Lake Sherburne write-up. The upper end of this lake is reported to contain many beaver ponds which have a fair population of eastern brooks. The area needs a survey to ascertain its fishery management needs.

D-2.a - Allen Creek cascades down over 1,500 feet and through three lakelets in its course of less than one mile. It is too small and steep for fish life. Brooks (1921) shows a 40-foot plus falls below the lower pond on his map.

D-2.aa - Snow Moon and D-2.bb Falling Leaf Lake, according to Ruhle (1957:94) are gems tucked into a big cirque with the impassable falls of Allen Creek below them. Falling Leaf Lake had 10,800 cutthroat stocked in it in 1935. There are no records of stocking in Snow Moon or the small pond below Falling Leaf Lake. No creel census data have ever been collected from these lakes to date, so we do not know if they still have fish in them. A survey is needed to evaluate their fishery potentials or to decide (if they are inacessible) to leave them as barren lakes for future study.

Kinnie (1960:20): "Apparently no fish".

Dayton estimated no anglers got to Snow Moon Lake in 1960 as it is so hard to get to the pass.

D-2.b - Governor's Pond. This little two-acre pond (Fig. 7) located about one-half way between Upper Lake Sherburne and Swiftcurrent Lake was practically an unknown beaver pond before 1960 - and it has since been relegated to the former peace and tranquillity of its previous obscurity.

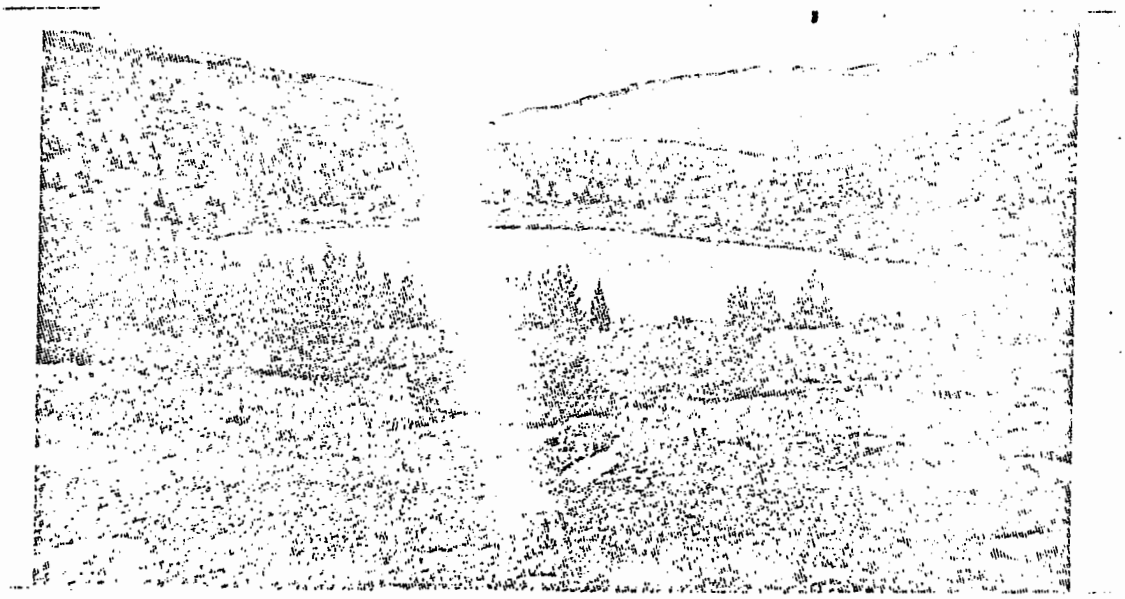


Figure 7 - View of Mary's Tear or Governor's Pond from hill back of Many Glacier Hotel looking "downstream" toward the beaver dam (light area along opposite shore just left of center).

It all started on September 5, 1958 when the public relations director of the Glacier Park Company wrote to Governor Aronson suggesting that "Swiftcurrent and Josephine Lakes be stocked with fingerlings so that we will have a couple of lakes full of big fish for the Governor's Conference at Many Glacier in 1960." Governor Aronson delegated the matter to his State Department of Fish and Game, to the Park Service and to the Bureau of Sport Fisheries and Wildlife for proper action. However, no meetings were called and Superintendent Hummel finally suggested in a letter dated November 17, 1958 that we might stock a small lake about a quarter of a mile from the Many Glacier parking lot with five to six inch cutthroat during the early spring of 1959 and keep it closed until the date of the conference. Our office suggested in a letter dated December 19, 1958 that we substitute 500 5-6 inch rainbows (as cutthroat were not available) for stocking the small lake in 1959, and replace with larger fish in 1960 if they failed to survive

the winter in the little pond. Our office also suggested that a fairly substantial stocking of rainbow trout be made in Swiftcurrent and Josephine Lakes in 1959 and 1960 to which the Park Service agreed in a letter December 31, 1958.

Subsequent results, indicated that no large fish developed in the two large lakes (which were known to be low in basic fertility). The first plant of rainbows in the little pond did not survive the winter in any numbers, so a supplementary plant of wild rainbow trout (averaging a pound a piece, and seined from a river near our Ennis Station) was made. These fish were stocked in Governor's Pond in fine shape just a week before the Governor's conference.

We had no way of collecting creel census from these governors, so we will never know what measure of success our efforts achieved. Rumor generally has it that a few visitors took a few trout out of the pond, but that most of the visitors were more inclined to try their luck at phenomenal Duck Lake on the adjacent Blackfeet Indian Reservation, which was at the height of production that year, producing more trophy rainbows than any other lake in the United States in 1960. In retrospective evaluation - under the prevailing conditions - it was probably a waste of time and effort on our part as less than 10% of the conferees were interested in going fishing and most of them had eyes on Duck Lake before they arrived.

The actual stocking record for Aranson Lake (Governor's Pond) was as follows: June 5, 1959, 504 rainbow (Winthrop yearlings) @ 3.6 fish per lb. or 140 lbs. were stocked from our Creston Hatchery. In late May of 1960, Billy Baker seined out about 50 large wild rainbow (from 1 to 2 lbs. each) from a stream near Ennis, Montana and brought them to Creston and Blendon Cook planted them in Aranson Pond just before the conference. No hatchery record is available as no production was involved.1/

1/ Our hatchery men did this as a special favor to our fishery management biologists, and we are especially grateful to Billy and Cookie for trying to help us over a rough spot.

Field Notes and Observations by Wm. Markham Morton on Governor's Pond on July 20, 1959 and again on May 11, 1960.

I left West Entrance Headquarters at 11:30 a.m. on July 20, 1959 and arrived at Many Glaciers Hotel on Swiftcurrent Lake at 2:00 p.m. Talked to Rangers Jacobson and Simonson about local problems. At the hotel I met Ray Kinley, assistant manager, and Ashby Stiff, Jr., manager of the hotel.

Mr. Kinley has lived at the hotel since it was built in 1916. In reply to my inquiry about examining nearby lakes he suggested I skip Moran's Bathtub as the scenery is very poor; the trail is 7 miles long with a shorter, but very steep one leading in from the East Entrance Gate which is 1-1/2 miles long; and he said it would probably get very little use. He would like to see us look into the development of the Redrock Lake series; Windmaker Lake should be studied as it has produced fishing before. Iceberg Lake, like Grinnell, is too cold. Fishercap is nil because you cannot get near it as beaver ponds flood its shores. Redrock is only fair and Bullhead Lake is not very good. They all have eastern brook only, although they used to have good rainbow fishing, 20 or 30 years ago. Look at Ptarmigan Lake, it used to be good rainbow lake and now is eastern brook only. He said Windmaker used to be Lake Elrod; Redrock was Bullhead; Bullhead was Ladyhead; Fishercap was Stump Lake until Dr. Ruhle changed them all around while he was at the University of Montana. He is now with the Park Service in Hawaii. Mr. Kinley said that Governor's Pond had always been called "Mary's Tear" in the past. Since the news got out that the governors of all the states would meet would meet at Many Glaciers chalet during the last week of June in 1960, this little pond has been referred to as Governor's Pond, Lake Hugo, Lake Aranson, No Name Lake, Governor's Hole and other misnomers.

This little pond of about 2 surface acres, was originally created by a series of beaver dams across the outlets of several springs. These dams still hold the pond at its present level. On July 20, 1959 at 8:00 p.m. I set a small 50' x 4' graduated gill net in the pond. I did not see a single fish. A female Goldeneye duck with 2 young, a red-winged blackbird and 2 beaver were all the living things I saw as I set the net. I pulled the net at 8:30 a.m. on July 21, and liberated the 6 large rainbow and measured 13 dead ones that were caught in the net:

Rb	Length in inches - weight in grams -		
6.8	54 g.	10.0	172 g.
9.1	150 g.	10.1	180 g.
9.6	140 g.	10.1	176 g.
9.8	160 g.	10.1	156 g.
9.8	150 g.	10.2	160 g.
9.9	155 g.	11.1	300 g.
10.0	184 g.		

Examined the bottom carefully - couldn't find any depth over 4 feet - mostly 3 feet; air temperature was 76°F. at 9:30 a.m. and water temperature read 73.2°F. from surface to bottom, which was visible everywhere and composed of mud covered with Chara. The pH was 8.4 with Phenol red and 8.6 with Thymol Blue. A plankton haul across the pond produced nothing but the same sparse collection of little organisms I seem to get everywhere in this park. I could find no evidence of any rich aquatic fauna that might serve as fish food.

On May 11, 1960 Ranger Al Hoover from St. Mary's helped me set a small gill net (75' x 4') in Governor's Pond at 1:00 p.m. We pulled it at 3:30 p.m. It had taken no fish although we saw two break water across the pond. Al said he had been sent over earlier to look at this pond, and had counted 14 dead rainbows around the shore. He also hooked one in about an hour's fishing. We decided the population was low and had suffered a severe winter mortality. The water had a surface temperature of 55° and 58°F. near the shore at 3:30 p.m. and a pH of 7.2. Total dissolved solids tested at approximately 170 parts per million (5.5 megaohms). Secchi disk read to 5 feet (bottom). The pond seemed to be about 1 foot higher than last summer. Fresh beaver work was observed at the dam, and along with the fish, a pair of mallards were the only wildlife we observed at the pond.

E. Swiftcurrent Creek (The Upper Basin above Swiftcurrent Lake falls). As stated earlier in this report, the uplifted and tilted layers of hardrock at Swiftcurrent Falls (see Fig. 4) divide the Swiftcurrent Drainage Basin into two quite distinct basins.

According to Ruhle (1957:60):

> "The ledge of rock over which the stream plunges is the lowest or oldest formation in the mountains in the park. The Lewis Overthrust fault is just below the ledge. The lake above occupies a basin scooped by glacial action out of the Altyn limestone whose dip is to the southwest. Formerly the lake was much larger, and the falls were higher, but as the stream cut back into the rim of the basin, it left dry the tilted ledge on which the hotel stands today."

In contrast to the dry, grass-covered hills with the comparatively few lakes and the seldom used trails of the lower basin, the upper basin contains many lakes surrounded by trees and majestic mountains, which by their melting glaciers provide a steady flow of cold water to these lakes. A maze of heavily used trails makes the upper basin very accessible to prowling humanity.

This upper basin of the Swiftcurrent River has received the most extensive fish plants and the heaviest angler-use over the longest period of time of all of the seven management areas in the park.

In its original condition before the establishment of the Park this part of the basin had no native species of fish of any kind. According to a letter from H. A. Noble, General Manager of Glacier Park Hotel Company, to Mr. J. R. Eakin, Superintendent, dated November 9, 1921:

> "The first fish to be planted in 1912 when brook trout were planted in Two Medicine Lake and rainbow trout in McDermott Lake. Every year since 1912 some fish have been planted in both of these bodies of water . . . . The Two Medicine, Gunsight, McDermott, Josephine, Grinnell and the Swift Current Lakes contained no fish until they were stocked with them by us. Lower Two Medicine, Red Eagle, St. Mary, Sherburne, and Cracker Lake all contained fish when the Park was created."

The following are all the references we have been able to find thus far on this subject - in this particular area (exclusive of the lakes.)

Hazard (1935) recommended that, "15,000 Rb be stocked annually in Swiftcurrent Creek above the lake".

Kinnie (1960:20):

> "This creek has many beautiful pools. The best fishing is on the stretches of the creek which connect Bullhead, Redrock, Fishercap, and Swiftcurrent Lakes. Generally fair and occasionally good Eastern Brook fishing."

Park Service records indicate that the following fish have been planted in Swiftcurrent Creek:

1926	68,750	Ct	fry	1939	30,000	Ct	fry
"	20,000	EB	"	1940	9,576	Ct	#1-1/2
1929	48,000	Rb	"	"	18,275	Rb	#2
1934	6,900	Rb	fing.	"	8,640	Rb	#2-1/2
1935	20,400	Rb	"	"	15,060	EB	#2-1/2
1936	25,800	Rb	"	"	15,000	Ct	#1
1937	20,000	Rb	fry	1941	15,000	Rb	#1-1/2
"	67,160	Ct	"	"	8,510	Rb	#2-1/2
1938	63,700	Ct	"				
"	11,820	Rb	"				

Swiftcurrent Creek

Census Date	Home State	Main Party	Hours Fishd	No Fish	Species	Distribution Size of Catch 4-6	7-9	10-12	13-15	16-18	19+	Total Catch	Comments
6/12/60	Ohio	2	12	0	Rb.	5	3					8	on black flies at Beaver pond above saddle ranch
7/1/60	Ore.	2	3	0	Wh.				13			13	worms
7/2/60	Ore.	4	8	0	Wh.				16			16	"
	Mont.	1	2	0	Wh				6			6	" (about 1lb. each)
7/6/60	Wis.	2	4	1	Rb	2	(released)					2	" & flies Below Redrock Lake
7/11/60	N.Y.	2	4	0	Rb	1	1					2	flies
7/16/60	Ore	1	2	0	EB		1						
					Rb		3						"
					Ct		4					8	
7/23/60	Wash.	2	6	0	EB	1	2					3	worms
7/31/60	Md.	1	3	0	EB	7	1	1				9	" . Below Redrock Lake
8/13/60	Mont.	1	4	0	EB		2	4				6	"
8/19/60	Ill.	3	15	1	EB		3					3	"
8/20/60	Mo.	1	10	0	EB		6	1				7	flies. Where are the big ones??
8/26/60	Wis.	1	1	1								0	Daredevil.
8/27/60	Miss.	2	8	0	EB	5	5	3				13	worm
s 13 days		25	82	3 (12%)	Rb	7	7	-	-			14	Ave. L.= 9.9" Ave. Hrs. per AD = 3.3
					Ct	-	4	-	-			4	
					EB	13	20	9	-			42	Ave. Catch per Hr. = 1.16 per AD = 3.8
					Wh	-	-	-	35			35	Quality Index = 37.6 which is Fair
						20	31	9	35			75	

In brief summary, the creel census for the first three days in the above table were collected below the falls and, if analyzed separately, would indicate an average length of 13.2 inches, which at 4.5 fish per angler-day indicates a quality index of 5x8 which is very good fishing for large white fish. In contrast the rest of the data taken from the upper basin, when analyzed separately, would indicate an average length of 7.7", which at 3.2 fish per angler-day would indicate a quality index of 24.6 or 25, which is poor fishing for small trout in the Swiftcurrent Creek above the lake. It is estimated that 25 angler-days of fishing may have taken place in upper Swiftcurrent Creek above Fishercap Lake

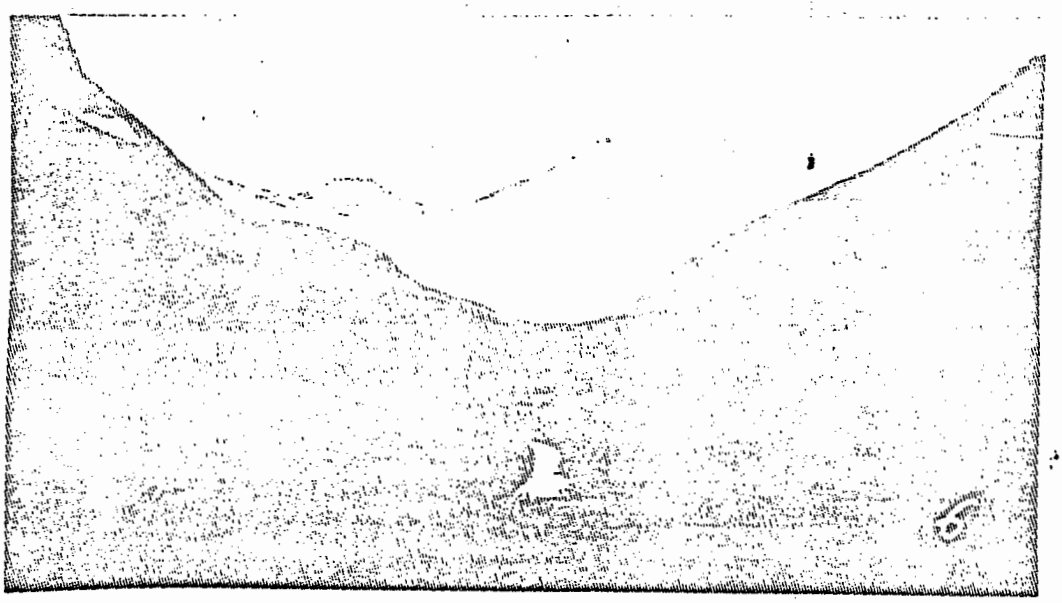


Figure 8 - Looking up the upper Swiftcurrent Creek Valley from Fishercap Lake.

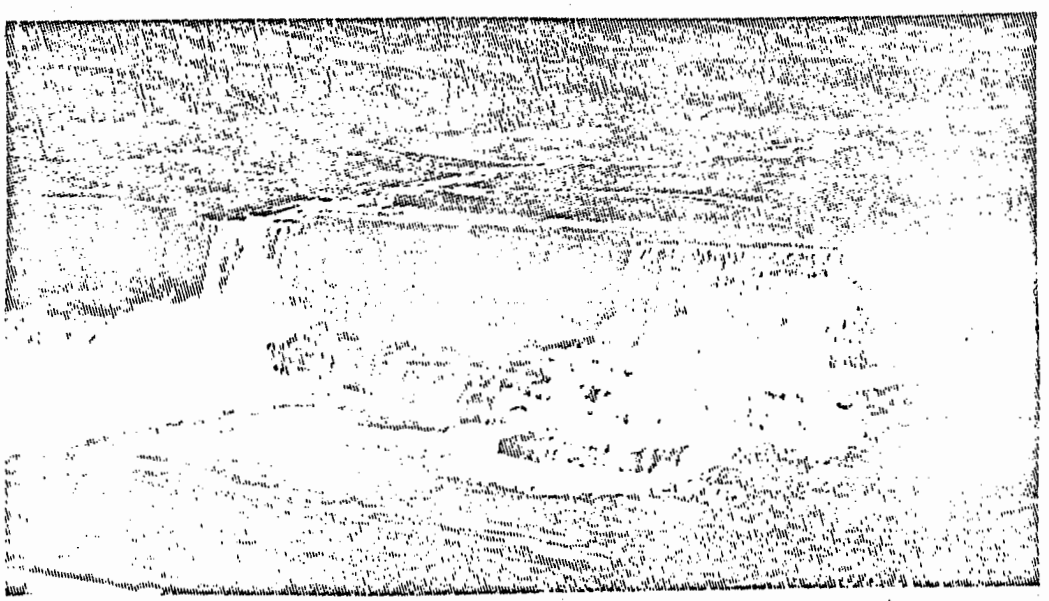


Figure 9 - Close up of falls in Swiftcurrent Creek just above the inlet to Red Rocks Lake.

Figure 10 - Looking downstream over falls at outlet of Bullshead Lake.

Recommendations

A series of impassable falls may be found between each of the lakes in upper Swiftcurrent Creek above Fishercap Lake. See Figures 9 and 10 for two of these. Although there are some pool and riffle areas between these falls and the lakes, the only technique known to us today for providing trout in such cascading waters would be to stock only large trout on a "put and take" basis which, of course, is not permitted under present Park Policy. If it were permitted, and the trout were not caught, they would probably die of starvation.

The extensive stocking of these waters in the past has probably been an almost complete loss as far as fish to the anglers creel is concerned. Although the stream may have produced (and apparently it did produce satisfactory fishing for the comparatively few anglers who visited it in the 1920's) some good fishing at one time, the present visitation to the park has reached such astronomical figures that it would be impossible to provide a stream fishery for this mob of anglers - in such unproductive water - without a "put and take" system.

The only fair thing to do is to tell the anglers the truth about the matter and either, 1) close the stream and set it aside as "barren" water for future scientific study, or 2) try to improve the food situation in the lakes of the drainage so that at some future period they might be able to produce some trout large enough to catch that might drop down or move up into some sections of the stream.

E-1. Swiftcurrent Lake (McDermott Lake) with its 130 surface acres and its 2.5 miles of shoreline at 4,860-foot elevation, is second only to Josephine in size in the upper Swiftcurrent Basin. It has probably been stocked and fished more intensively than any other lake in the park for almost fifty years. Ranger Dayton estimated about 2,000 angler-days of fishing effort may have taken place on this lake in 1960, which establishes it at present as still the most heavily fished lake in the entire Park.

A general description of the origin of this lake may be found in the immediately preceding paragraphs and the human habitation, tourist facilities, roads and trails have been described briefly in the introduction on page 1 of this Section III.

A panoramic view of Swiftcurrent Lake and Many Glacier Hotel is presented in Figure 10, and color shots from the brochure "Glacier Park in Natural Colors" in Figure 12.

In the earliest published description of this lake, Elrod (1912:11-13) combines his description of McDermott and Altyn Lakes as follows:

> "These lakes lie between Grinnell Mountain on the west and Allen Mountain on the east. They extend northeast and southwest for a distance of 3 or 4 miles, and are connected by a creek less than a quarter mile in length. The elevation of McDermott Lake is 4,861 feet; Altyn Lake is slightly higher. Whatever deductions or conclusions are made for one lake will apply to the other.
>
> Observations were made on McDermott Lake only. The shore of the lake is open, free, and easily accessible. The trail passes close to the lake at the lower end. A logging camp and sawmill was formerly located here, but are now abandoned. Fire has destroyed the timber so that there is a good, open site for camping with splendid views of the lake and mountains. The outlet of this lake is a series of cascades, with a total fall of about 90 feet in a quarter of a mile. To the foot of this cascade fish from the streams below make their way, but none have ascended to the waters of the lake above. This cascade, with the mountains behind for a background, is one of the beauty spots of the park, and the portion of the lake here described is one where tourists will delight to linger. At the upper portion of the lake the slopes are partly wooded and partly open. The outline is quite irregular, and there are many little sheltered coves, where game birds may hide, and where young fish may escape the larger ones. A sounding, 330 feet from the shore opposite the cabins, showed a depth of 16 feet. A second sounding, half way between the cabins

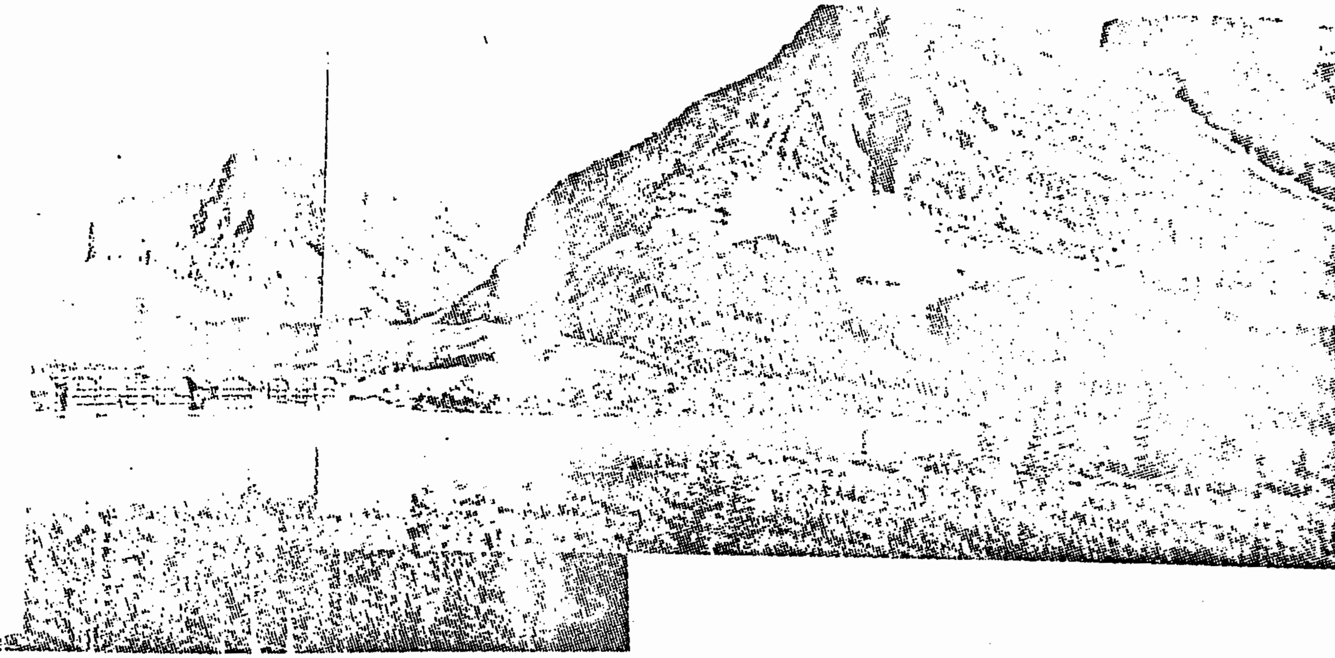


Figure 10a - Panoramic view of Swiftcurrent Lake and Many Glacier Hotel. The outlet is at the left, and the two inlet streams enter the lake at the right of this composite photograph.

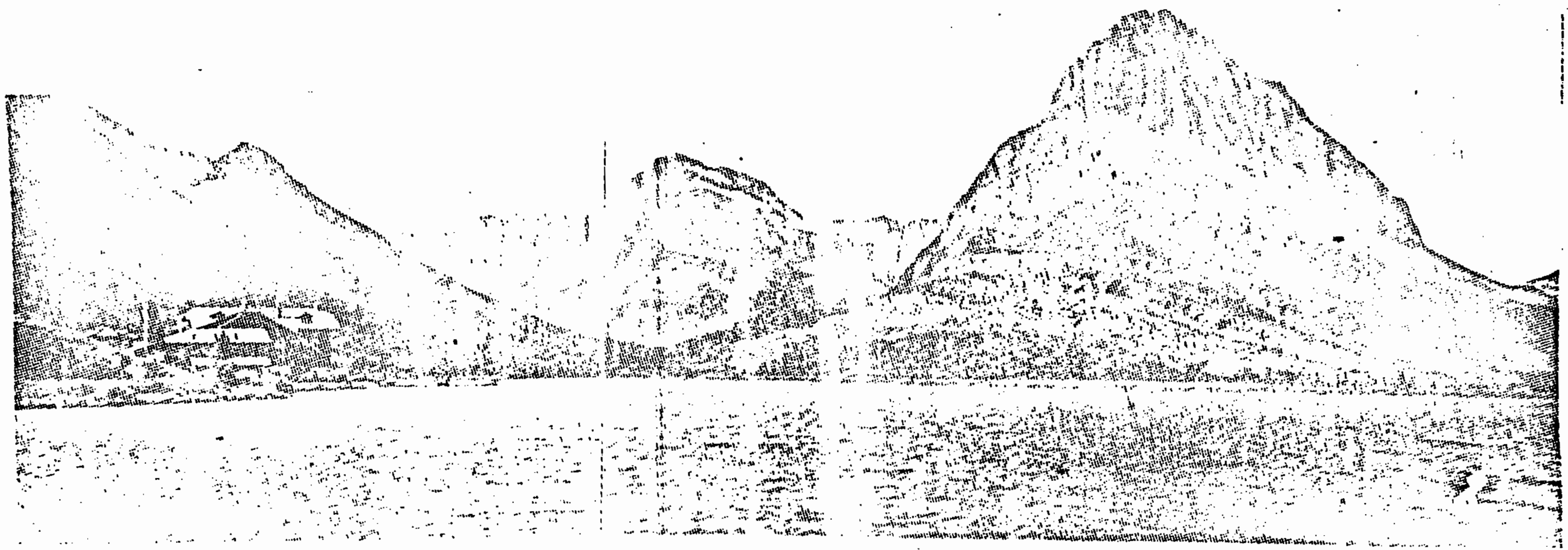
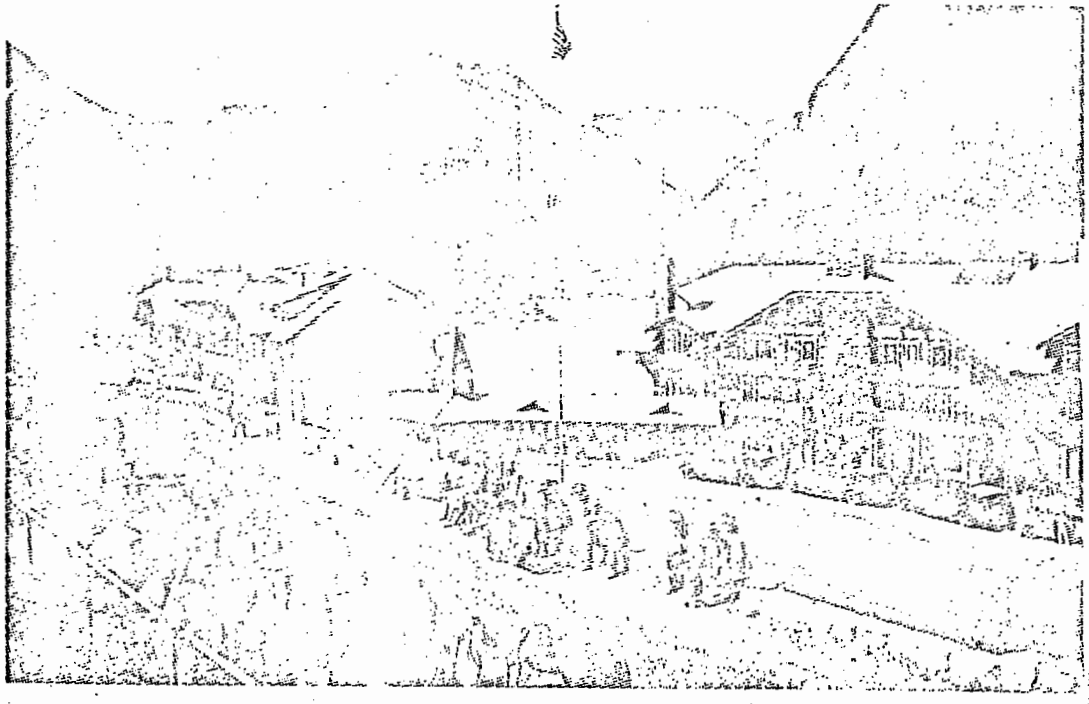


Figure 11 - View of Swiftcurrent Lake from the [illegible] Falls. Cataract Creek [illegible]



Many Glacier Hotel, the park's largest Alpine resort, rests on the shore of Swiftcurrent Lake. Swiftcurrent Peak and Mt. Gould rise in the background.

Color photo by Walt Dyke

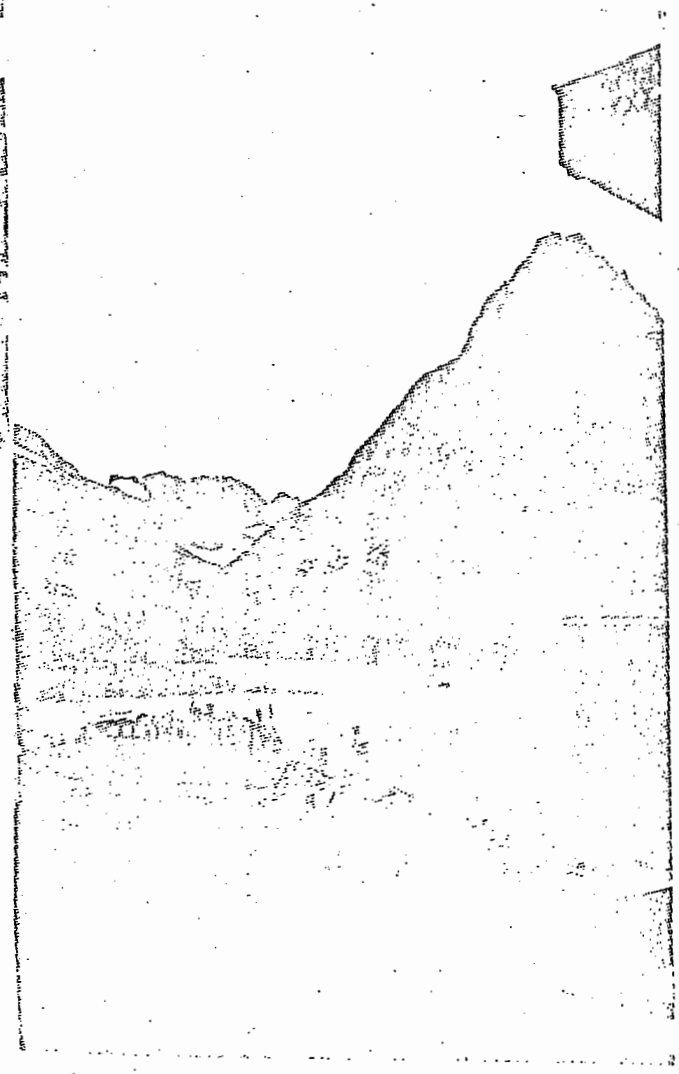


Figure 12.

Swiftcurrent Lake, viewed from the corner of Many Glacier Hotel, rests at the base of the peak bearing its name. Mt. Gould and the Garden Wall are visible in the background.

Color photo by Bob and Ira Spring

and the bare rock at the foot of the lake, showed 36 feet. One-third of the way up the lake the depth was 32 feet. In the narrow and shallow places the depth was only 4 feet; at the upper end it was 7 feet. No soundings were taken in Altyn Lake.

The temperature of the water was 58°F., and the temperature of the air 63°F. Collections with net and dredge produced a greater quantity of fish food than has been found in any of the lakes that have been studied in the park. Microscopic life upon which the small fish must feed was in great abundance. Everywhere on the bottom, among the weeds, and close to the mud were great numbers of fresh water shrimp, the adults being about 1 inch in length. With such an abundance of fish food, there is every reason why this lake should be stocked at an early date with a good supply of young fish.

The lake lies in a depression at the edge of the mountains. Its outlet is blocked by a layer of bedrock, which the waters of the lake are slowly wearing away from year to year. Immediately below the lake the plains country begins. Transportation of fish to the lake would be quite easy, as a good wagon road extends from Babb, at the mouth of Swiftcurrent Creek, to the lake.

McDermott Lake receives its waters from the Grinnell Glacier country, from Swiftcurrent Pass, including a glacier on either side of the pass, and from Iceberg Lake. If fishwere introduced into McDermott Lake, they would be given access to the streams leading up to the mountains in these three directions. Between McDermott Lake and Swiftcurrent Pass is a series of smaller and shallow lakes, which were not studied but which have a slightly greater elevation than McDermott Lake. Whether there are falls between McDermott Lake and these smaller lakes in the direction of Swiftcurrent Pass the writer does not know. If there are none fish will, of course, have several miles of creek and lakes where they could secure food. It would be only a short distance to transport fish to the upper lakes and stock them also. As they, too, are by the side of the trail, and as large numbers of people will doubtless wish to go over Swiftcurrent Pass and see the beautiful country adjacent thereto, it is highly desirable that fish be planted in these waters wherever they may be able to live."

Brooks (1921) indicated the presence of 40-foot plus falls below McDermott and stated that rainbow and brook trout were present in the lake, at that time.

Muttkowski (1925:5-6) made a brief study of fish foods in Lake McDonald, and the eastern slope lakes in the Swiftcurrent and St. Mary drainages. His findings in the east slope waters compared to Lake McDonald are reproduced here for general reference:

"Food of Eastern Slope Lakes.

For the eastern slope Middle and Lower Two Medicine, Upper and Lower Lakes, St. Mary's, Sherburne, McDermott, Iceberg, Josephine, et cetera, of the Swiftcurrent drainage are noted.

The fauna and flora of these lakes are practically all identical, except for the following points: (1) Small clams are numerous in all these lakes, (2) the insect fauna is slightly more abundant than in Lake McDonald, (3) the plankton is markedly less abundant, the quantity being about one third that of Lake McDonald, (4) the temperature of the lakes is slightly lower than on the west slope and neither plants nor animals are as far advanced by the middle of August as in Lake McDonald.

The most marked difference is the much smaller amount of plankton. This is most marked in McDermott Lake, where the plankton is perhaps only one fifth that of Lake McDonald. This difference may be accounted for on the basis of geographical distribution, perhaps, yet the eastern slope lakes are deficient when compared to alpine lakes of similar type in Idaho. It seems that the plankton, once normal, has been heavily reduced by the planting of fry, and the same applies to the insect feed.

Recommendations.

In presenting the following recommendations, the writer will be as brief as possible, giving only such explanations as will make the basis of the recommendation clear.

1. It is recommended that no fry be planted in any of the lakes and streams of Glacier Park until after the middle of August, in order to give the insect food and plankton their chance to develop. In Glacier Park most of the insects transform, i.e., emerge from the water and become adults, during July. The eggs are then laid and hatch during early August. Fry planted in July will eat many of these transforming insects before they can reproduce; thus the fry destroy their own potential food supply. The same holds true of the plankton. In early July and during the rest of that month one finds the plankton Crustacea with eggs (Daphnia, Cyclops, Diaptomus, Epischura). These develop during late July and early August. If fry were planted later these eggs will hatch. If fry are planted in July, they will eat these Plankton Crustacea together with their eggs, once more destroying their potential food supply. Planting of fry should therefore be delayed till after the natural food supply has a chance to develop properly. The lakes, in other words, should be given a chance to restock themselves with their natural food.

The paucity of food was particularly noticeable in Lake McDermott, where considerable planting of fry has been practiced. There the number of young insects, of small snails, and especially of plankton Crustacea was far below that of any other lake, including Lake Josephine nearby.

The temperature of the Glacier Park Lakes increases very slowly, and with it the plant growth is also very slow. The plants do not reach their fruiting and reproductive period until late summer, unlike the conditions of lower or plains lakes, where fruiting occurs early in July. As noted, the temperature also affects the animals, since these, too, do not reach their reproductive period until the summer is well advanced. Since it is virtually impossible to bring in natural food from other waters, or to provide artificial food, the only proper solution is to permit the natural food to develop."

E-1. Swiftcurrent Lake (continued).

Hazzard (1935:1-7) states:

> "From two season's experience in Glacier Park it is our opinion (based on rather wide acquaintance with other waters of the west and eastern trout waters) that fishing is unusually good in the lakes of Glacier Park. Nor is this statement true only of the more isolated waters; some of the best fly fishing enjoyed in the Park was found in the Medicine Lakes and in Swiftcurrent Lake which are centers of tourist concentration. The limot of 10 trout from 8 to 14 inches could be taken almost any evening by the use of fly or spinner. However, a boat is desirable because of the extreme coldness of the water and the greater ease of fishing. If more boats could be available for rent on such lakes at a nominal charge the opportunity for the general public to take satisfactory catches of trout would be greatly improved.
>
> It is our opinion that the great majority of the waters of Glacier Park are best adapted to the Native Cutthroat trout. This seems especially true of the lakes and streams west of the divide. Certain waters of the east side have been planted with exotic species and in a number of cases these are believed to have been wise introduction. The introduction of eastern brook trout into the Two Medicine and Swiftcurrent drainages may be deplored by some but this species furnishes the majority of the catch in these waters and requires relatively little assistance from man due to unusually successful natural spawning.
>
> A great number of lakes, particularly on the east side of the Park were, or at present are, lacking in fish life because falls or other barriers to fish migration have prevented the natural movement of fish into these waters. The stocking of such waters with the fish best adapted in order to add to the pleasure and appreciation of visitors might be considered as necessary as the trails which enable the visitors to reach them. A number of these, particularly in the Belly River and Waterton drainages are along rather heavily traveled trails and we believe should be planted at the earliest opportunity.

Fishing has not been good in the majority of the streams of Glacier Park in spite of generous stocking. This is particularly true of the higher streams. Many of these appear to the summer visitor as ideal trout streams. However, until they are studied and until winter conditions are considered the reason for their lack of productiveness is not understood.

As stated by Hancey's report the majority of these streams, fed by glaciers and lakes, dwindle to mere trickles or dry up entirely with the coming of winter. Apparently enough water is present in such streams to maintain a limited amount of fish food, particularly since this food is not subject to depredations by fish. Other streams which continue to flow (however in much reduced volume), during the winter months are believed to be worthless for stocking because the summer temperatures remain so low (usually ranging from 40° to 50° in July and August and rarely reaching 55° in July and August and on the hottest days) that trout cannot make satisfactory growth. These two findings are believed to explain poor stream fishing in Glacier Park waters.

However, such natural reproduction cannot meet the increasing demands of fishermen on the lower, readily accessible waters, particularly since the productive breeding stock is largely removed from such waters during the fishing season leaving few individuals to spawn. Either fishing in such waters must be severely curtailed or plantings must be continued. As the demand increases it may even be necessary to make several plantings of legal size trout during the summer in such waters as the Two Medicine Lake, lower Swiftcurrent drainage lakes and McDonald Creek. However, it is our opinion that at present this need not be done. The present demand can be supplied by plantings of fingerlings from 1 to 5 inches in length. Experienced anglers have no difficulty in making limit catches of good fish in the majority of Park waters and they are aware that trout cannot always be taken even though present in goodly numbers. The advent of an increasing army of neophytes who expect big catches every day with little display of skill or persistence often results in a false reputation for poor fishing ill deserved by the waters they visit."

Hazzard recommended further that;

"The Two Medicine and Swiftcurrent drainage should be closed to all fishing not later than September 15 to protect the Eastern Brook trout which are concentrating preparatory to spawning at this time, and that 45,000 Rb 1-1/2" fry and 10,000 EB fry be stocked annually in Swiftcurrent Lake".

Schultz (1941:40) lists rainbow and brook trout and kokanee present and grayling and cutthroat as having been planted in McDermott Lake and states (p.22):

> "The little redfish were introduced into Swiftcurrent Lake and during 1932 adults were taken which were nearly ready to spawn."

Halloway (1945:6) states:

> "Swiftcurrent Lake - This lake is one of the heaviest fished lakes examined and the only one that appeared to be stocked to capacity except Otokomi Lake, which is accessible only by a five-mile trail. A great amount of natural reproduction occurs as is shown by the presence of large numbers of trout under six inches in length. The crop of one-to-two-inch fingerlings was particularly abundant. Two excellent spawning streams enter the lake. There are approximately 2.5 miles of shore line with a "bench" averaging 100 feet in width. Vegetation is abundant and food conditions are excellent. Amphipods were found in the stomachs of several fish examined. the brook trout were in better condition than the rainbow. No stocking is recommended. It is believed that the natural reproduction is ample to keep the lake well stocked. This lake undoubtedly gets fish from downstream wash during the high waters at the time of the spring thaw."

Kinnie (1960:20) states that this brushy lake lies in front of the Many Glacier Hotel, near the end of the Many Glacier Road. Fair and occasionally good fishing for small to fair-size rainbow, brooks and kokanee.

Park Service Records indicate that the following fish have been planted in Swiftcurrent Lake:

1912	50,000	MBS	
1916	35.000	MBS	
	8,750	Sal. Tr.	
	42,000	Rb	
	38,500	Eb	
	26,250	MBS	
1919	62,500	Eb	
1919	60,000	Rb	
1919	40,000	BS	
1920	61,500	Rb	
1921	7,500	Eb	
	400,000	Gr	
	8,000	Eb	
1922	30,000	Rb	
1923	17,600	Eb	
	22,400	Eb	
	4,800	Eb	
	26,500	Rb	
1924	80,000	Eb	
	80,000	Gr	
	4,400	Eb	
	20,000	Gr	
	11,600	Eb	
1925	12,000	Eb	
	72,000	Rb	
1925	60,000	Gr	
	26,100	Eb	
1926	68,750	BS	fry
1927	6,000	EB	
1930	4,000	Rb	fing.
1931	17,640	Rb	fing.
	55,000	Rb	fing.
	37,625	Eb	fing.
	50,000	BS	BS
1932	40,450	Rb	
	7,515	Eb	
1933	16,000	Rb	
	35,950	Eb	
1934	14,020	Rb	
	6,020	EB	
1935	33,320	Rb	#1
	11,600	EB	#2
1936	4,500	Rb	#3-1/2
	10,445	Eb	#3
1937	18,000	Eb	#2-1/2
	27,000	Rb	fry
1938	44,460	Rb	fry
	3,750	Eb	
1939	3,500	Eb	#2
	3,800	Eb	#2-1/2
1942	51,890	#1-1/2	
	141	Eb	adults
1948	8,200	Rb	#3-1/2
1949	4,320	Rb	#4
1950	12,600	Rb	#3
1951	2,576	Eb	#4
1954	4,895	Eb	#4
1959	30,000	Rb	#6
1960	30,000	Rb	#6
1961	15,000	Rb	#6

Creel Census Analysis for 1959 and 1960.

Excellent creel census data - the most extensive in the entire Park - were collected in 1959-1961. The raw data for 1959 are presented in "Table 2, p. 10 and 11" and for 1960 in "Table 2, p. 17, 18 and 19" attached herewith. Data for 1961 have not been received at this writing. A summary of the pertinent data, calculations, and estimates for the two years is presented in Table 8.

Distribution of anglers who indicated their resident states.

	1959		1960		1961
Alberta	33	(25%)	98	(36%)	
Arizona	4		--		
British Columbia	1		--		
California	6		14	(5%)	
Colorado	8	(6%)	3		
Idaho	--		9		
Illinois	1		6		
Indiana	2		4		
Iowa	2		4		
Florida	3		--		
Georgia	--		--		
Kansas	5		2		
Maryland	--		1		
Massachusetts	6		1		
Michigan	--		12		
Minnesota	8	(6%)	12		
Missouri	4		2		
Montana	25	(18%)	67	(24%)	
Nebraska	4		--		
New York	--		2		
North Dakota	2		--		
Ohio	1		--		
Oregon	2		17	(6%)	
Pennsylvania	--		2		
South Dakota	--		3		
Texas	2		--		
Utah	5		2		
Virginia	1		--		
Washington	6		5		
Wisconsin	4		2		
	135		274		

Swiftcurrent Lake

Census Date	Home State	No. of Anglers	Hrs Fished	No. S	Spec. No. Relsd	4-6"	7-9"	10-12"	13-15"	16-18"	19"	Comments; Baits or Lures	Ave. Length	Species Distribution in Catch: Rb	EB	K		Total	/AD	/Hr
6/14/59		17	61	0	Rb	22	14	1						37	123					
					EB	21	53	35	5	6	3	worms + spinners								
6/15/59		18	107	1	Rb		39	6				worms		45	176					
					(?) DV			4												
					EB	12	23	35	2											
6/20/59		20	53	3	Rb		34	2				" + spinners		36	15					
					EB		7	8												
6/22/59		4	20	2	2 Rb	2						"		2	22					
					EB		22													
6/23/59		6	14	1	1 Rb	1	16					"		17	7					
					EB		7													
6/25	Minn	4	16	1	Rb		22	4				"		26						
6/26	Neb-Colo	2	6	0	Rb		7					" + flies		7						
6/28	" "	2	10	0	Rb		11					flies + spinners		12						
6/30/59	B.C.	1	1	0	Rb		1					Orange flat fish		2						
	"both fish returned to lake alive - enjoyed our first visit to this park which we think is one of the best operated we have visited."																			
Totals for June 1959, 9 days		74	288	8 (3%) (10.8%)	3 Rb	25	144	15						181				524	3.9	1.82
					EB	33	212	82	7	6	3				343	Ave. Catch per AD: 7.1 Fish				
						58	356	97	7	6	3		8.52"			Quality Index: 60.5 (Excellent)				
7/1/59	Ind.	2	10	0	Rb		2					worms		2	12					
					EB		5	3	4											
7/4/59	Mont + Alta	9	18	3	Rb		16	12				"		28						
	Ohio	1	2	0	3 Rb	3	3					fly		3	3					
					1 EB	1	1	2												
7/4/59	Mo	4	13	0	4 Rb	4	15					fly		15	3					
					EB		1	2												
7/7/59	Mont	2	6	0	Rb		4					worms		4	8					
					EB			7	1											
7/8/59	Ill.	1	2	0	Rb		7					flies		7	3					
					EB		2	1												
7/9/59	Va.	1	8	0	Rb		5		1			"		6	4					
					EB		3		1											
7/10/59	Wis	4	8	0	Rb		9					worms		9	4					
					EB		4													
7/11/59	Utah	3	9	1	Rb		4					"		4	2					
					EB		1		1											
7/12/59	Mont	4	12	0	Rb		10					" + [illegible] flies		10	19	1				
					EB		12	6	1											
					K			1												
	Alta	6	16	0	Rb		20	5				"		25	14	2				
					EB		[illegible]	9	2											
					K		1													
	Mont	4	14	0	Rb		16	5				"		21	2	1				
					EB		1	1												
					K			1				"								
	Alta	9	39	0	4 Rb	4	54	3						54	9	3				
					EB		2	6												
					K		2	1				"								
7/13/59	Utah	2	4	0	Rb		8							8	1					
					EB			1				"								

Swiftcurrent Lake (July 1959 Continued)

7/14/59	N. Dak	2	6	0		Rb		5					5			
	Iowa	2	6	0		Rb		5				" + flies	5			
						EB		3						3		
7/16/59	Alta	2	10	0		Rb		1	12			"	3			
						K		7	1 "Hotel pier was good in evening"						8	
7/17/59	Minn	2	4	0		Rb		11	3			"	14			
7/18/59	Mass.	3	3	1	2	Rb	2					" + lures	2			
						EB			1					1		
7/23/59	–	4	8	0		Rb		4				"	4			
						EB		1	1					2		
	Ariz.	1	2	0		EB		1				fly		1		
	Calif + Minn	3	12	0	4	Rb	4	8					8			
						EB		1						1		
7/25+26	Ore	2	18	0		Rb		43				flatfish	43			
						EB		4 "enjoyable time – wonderful scenery."						4		
7/29	Colo	2	6	0	2	Rb	2	4				flies	4			
						EB		4						4		
						K		5							5	
7/29-31	Texas	1	15	0	1	Rb	1	3	2 "need more trails into Red Rock + Bullhead Lakes – Thanks"							
						EB		5	6	1	2	flies.	5	14		
7/30	Wash.	1	4	0	4	Rb	4	6					6			
7/?	Kans.	3	20	0		Rb		9				warmo	9			
	Mont.	1	10	0		EB		6	4			flies		10		
Totals For July → 1959		81	285	5	24	Rb	24	272	32	1			305			449 3.5 1.50
20 days				~~[illegible]~~	1	EB	1	66	~~4?~~ 15	11	2			124		20 Ave Catch per AD = 5.6
				(6.2%)		K		16	4							
							25	354	81	12	2	Quality Index = 50.4 (Very Good)				

Swift current Lake

Date	Home State	No. of Anglers	Hrs. Fished	No Success	Species No. Relsd	Size Distribution of Catch 4-6	7-9	10-12	13-15	16-18	19+	Comments; or Lures	Baits	Ave Length	Species Distribution of Catch Rb	EB	K	Hrs/AD	Catch/
/59	Kans	2	4	0	Rb		4					worms; spin rig			4	1			
					EB			1											
	Ariz.	2	4	0	Rb		12	1				"			13				
	Calif	2	6	0	2 Rb	2	11					gray Hackle dry fly			11	2			
					(ovr) EB			2											
	"We really appreciated being able to fish without purchasing the expensive Out-of-state license for a two-day stay."																		
	Mont	4	12	0	7 Rb	11	14					-			18				
					EB		11	1	2							14			
	—	5	15	0	Rb		17					worms + flies			17				
					EB		10									10			
/2/59	Mont.	5	16	0	Rb		2					-			2				
					EB		31									31			
	Ariz	1	3	0	Rb		3	2				worms			5				
					EB			1								1			
												"					6		
/3/59	Alta	2	6	0	K		6												
/6/59	Texas	1	3	0	Rb		4					any fly			4				
					(ovr) EB		2									2			
/7/59	Nebr.	2	10	0	50+ Rb	50+	5	2				brown bug #16			7				
					EB		4	2				black ant #16				6			
	"Enjoyed this fishing, but would have liked to caught 1 or 2 larger fish. We kept 9 of the 60 or so we hooked. We failed some at trolling, but caught none there."																		
/ 59	-	3	6	0	Rb		1	1				worms			2				
					EB		2									2			
/14/59	Wash	5	16	0	1 Rb	1	25	1				worms			26				
					1 EB	1	1	4								5	1		
					K			1											
/15/59	Colo	4	16	0	Rb		11					worms			11				
	Alta	1	8	0	Rb		4								4				
					EB		2									2			
	"Very windy + unpleasant. Did as well as other anglers - lots of them on the Lake. Only fished west end where stream enters."																		
/16/59	Moss	3	12	1	Rb		3					deerdevils			3				
	"The two children could have caught more were it not for overanxiety."																		
	Fla	2	14	0	EB		7	6	5							18			
	Alta	5	35	0	7 Rb	7	32					-			32				
					EB		1		1							2			
					K		1										1		
	Alta	4	40	2 (females)	Rb	1	2	6				-			8	1			
					EB			1											
/18	Calif	3	9	0	Rb		5					susp. dun + fly			5				
/19/59	Fla.	1	2	0	EB			1	1	1		stone fly				3			
	"Best trout fishing I ever experienced."																		
ls for August 1959 days		57	237	1 (1.8%)	61 Rb	72	155	13						9.0"	179	100		287	4.2	1.2
					1 EB	1	71	19	9	1								Ave. Catch per AD = 5.08	
					K		7										8	Qual. Index 45.7 (Good)	
ls for the 9 Season oday:		212	810	14 (6.6%)	88 Rb	121	571	60	1						665				
					2 EB	35	349	146	27	9	3					567			
					K	0	23	5									28	1260	3.8	1.5
						156	943	211	28	9	3			8.9"				Ave Catch per AD = 5.9	
																		Quality Index = 52.5 (Very Good)	

Swift current Lake

Census Dates	Home State	No. in Party	Hours Fishd	No Fish	Species	Size Distribution of the Catch 4-6	7-9	10-12	13-15	16-18	19+	Total Catch	Comments
6/12/60	Alta.	2	9	0	EB			6	2			8	worms
	Mont.	2	10	0	EB		1					10	" + spinners
					Rb		9						
	Mass.	1	4	0	EB	1						11	wet flies
					Rb		8	2					
	—	2	10	0	EB			7				17	worms
					Rb			9					
					K				1				
	Alta	2	4	0	EB		10					11	worm + spinner
					Rb Ch(?)		1						
	"	12	96	0	EB		10					60	worms
					Rb		40						
					K wh?		10						
	"	3	24	0	EB			2				20	worms. Good Day!
					Rb	16	2						
	Mont.	2	10	0	EB			4	6			10	worms. Frozen Shrimp. Daredevil (small)
	"	4	12	0	EB				1			12	red+white spoon
					Rb		11						
	"	3	9	0	EB		1	5	1			27	worms + spinner
					Rb		20						
	Mo.	2	6	0	EB	20						20	worm
	Alta	2	10	0	EB		2	1	1			20	spinner + worm
					Rb		16						
	Ore.	5	10	3	EB			3				9	" " "
					Rb		5						
					K			1					
	Mont	2	6	0	EB			10	8			18	" " "
	Calif.	3	12	0	Rb Ch(?)		6	2				8	worms
6/14/60	Calif.	2	8	0	Rb	9	10					20	red+white daredevil
					K	1							
	Md.	1	1	0	EB	3						5	dry flies
					Rb	2							
6/15/60	Wis.	1	3	0	Rb		15					15	french spinner. Plant big Ones!!
	Idaho	2	2	0	Rb		15	5				20	worms
6/16/60	Mont	5	10	2	EB		3					14	"
					Rb		5	1					
					K		5						
	Alta	3	9	0	Rb		13					13	" . Enjoyed the day - Thanks!
6/17/60	"	2	6	0	EB			1				20	" and spinner
					Rb			2					
					K		14	3					
6/18/60	Mont	4	16	0	EB			15				25	"
					Rb			10					
	"	5	30	0	Rb		33					33	Mepps Spinner
	"	2	8	0	EB				1			9	worms + spinner
					Rb		8						
6/19/60	"	2	6	0	Rb		12		1			12	"
	Wash.	3	12	0	EB							28	"
					Rb		27						
	Mont	4	12	0	Rb		23					23	Rd+Wh Daredevil + flies
	Alta	2	4	0	EB		3					3	lures
	Mont.	2	8	0	EB		5					17	worms
					Rb		12						
	Alta	5	10	1	EB		15					16	"
					Rb		1						
	"	3	12	0	EB		4	2				26	"Somebody has been using " salmon eggs and minnows along
					Rb		20						the picnic-trail side of the lake"
	Mont	1	5	0	Rb	2	2					4	spinner
6/22/60	Alta	4	16	0	Rb		38			1		39	Mepps and black gnat
									"Good fishing - when compared to Alberta!"				
	Minn	1	2	0	EB				1			10	flies
					Rb		9						
	Ill.	2	8	0	EB		4					14	" + worms
					Rb		8	2					
	Calif	1	2	0	EB		4	3	1 (3½ lbs)			12	Super-duper red daredevil
					Rb			4					

Swiftcurrent Lake (Continued)

Census Dates	Home State	No. in Party	Hours Fished	No Fish	Species	Size Distribution of the Catch 4-6	7-9	10-12	13-15	16-18	19+	Total Catch	Comments
6/24/60	Alta.	4	24	0	Rb		40					40	lures
			"Enjoyed fishing very much. It would be nice if there were a few bigger ones. A lovely place indeed to take your family."										
	Idaho	4	8	2	EB		2					3	worm + daredevil
					Rb		1						
	Mont	2	5	0	EB		2					20	"
					Rb		16						
			"Fishing very good this time of year on this beautiful lake."										
	"	1	3	0	EB		1					10	worms
					Rb								
			"Very good fishing with rainbows almost too eager."										
6/25/60	Calif	1	4	0	EB DV(?)							11	worm. super-duper
					Rb			1/2	2				
					K								
6/26/60	Alta	13	39	2	EB	4						21	" flies, lures." Fishing only fair."
					Rb			2/3					
	"	2	14	0	EB							19	bait. Thanks! We had a nice day."
					Rb	10							
	Mont	3	24	0	Rb		18					18	worm + daredevil
			"We enjoyed the fishing and the courtesy of the Rangers."										
	"	5	25	1	Rb	11	2	2				15	worms
	Alta	2	12	1	EB		2					2	"
6/27/60	Wis.	1	1	0	EB		1					1	fly
	Calif	3	9	0	EB		14					14	Pop gear. "Good Fishing"
	Alta.	4	36	0	EB		20					40	worms, Mepps,
					Rb		20						
	Mont	1	3	0	Rb		8					8	dry flies. "Nice lake to fish in."
6/29/60	Kans	2	6	0	Rb		4					4	worms
6/30/60	Wash	2	12	0	Rb		16					16	" trolled.
Totals for June 1960					EB	28	119	72	23	-		242	Ave. Length 8.32" Ave Hrs. per Day = 3.3
	14 days		194	647	Rb	50	507	42	2	1		602	Ave. Catch per Hr = 1.36 per Day = 4.5
				(6%)	K	1	29	6	1	-		37	
						79	655	120	26	1		881	Quality Index = 37.4 which is Fair
7/2/60	Minn	2	3	0	EB DV(?)			3	2	2		7	Good Fishing!
	—	2	6	0	Wh				1	4		5	worms
	Alta.	3	9	0	Rb	2	7	1				10	"
	Idaho	3	3	2	EB		1					1	"
	Alta.	3	6	1	Rb	3	2	1				6	flies
7/4/60	"	3	15	2	Rb		1					1	worms
			"Plenty of fish - but we couldn't get them to bite."										
	"	2	6	0	EB			3	1			8	worms
					K			4					
	Ind.	1	2	0	EB			1				1	spoons
	Calif	1	2	0	EB		2					2	flies
7/5/60	Alta.	1	2	0	EB			1				5	worms
					Rb		4						
	Minn	1	3	0	EB			1	Lots of strikes			4	They like small dry flies.
					Rb		3						
7/6/60	Ind.	3	8	1	EB		12					15	flies and worms
					Rb		1	2					
7/7/60	Alta	1	4	0	Rb	3	4		Lots of fish jumping			7	Artificial worms - but where are the big ones?
7/9/60	Minn	4	12	0	Rb	4	8					12	flies and snowflies
7/10/60	Mont	2	6	0	EB	≠	1	" Hard to put boat in water--				5	flies + worms -- from the ramp "
					K		4						
	Alta	5	30	1	EB	10	3	1				14	flatfish and spoons
			"Lake is nice, but boat landing ramp is rotten to get in and out."										
7/11/60	Penna	2	5	2	-							0	flies
7/12/60	Mont	3	6	1	EB		4					4	" and worms

Swiftcurrent Lake (Continued)

Census Dates	Home State	No. in Party	Hours Fished	No Fish	Species	Size Distribution of the Catch 4-6	7-9	10-12	13-15	16-18	19+	Total Catch	Comments
7/15/60	Minn	4	64	1	EB		30					40	Spoons + worms
				"Very pleased with the fishing; had a very good time."	Rb			10					
	Calif	2	8	0	EB	2	3	2				7	Spinner + worms - "Good Fishing"
7/16/60	Colo.	3	6	2	K		1	3				4	Twirarens; Cherry Bobber "Delicious!"
7/18/60	Ill.	4	18	0	EB	3		2	1				
					Rb	6	24						Spinner + worms
					K		2					38	
7/22/60	Ore.	2	4	1	EB		3					3	worms
	Mich	5	10	3	EB	1							
					Rb Ct.	2						3	"
7/23/60	Mont.	2	2	0	EB			6					
					Rb		2	3				12	flies. One got his limit, but the other got only two fish - very windy.
					K		1						
	Mich	5	30	3	EB		4						
					Rb		3					8	worms
					K		1						
	Ore	2	4	1	EB		2						
					K		1					3	"
7/24/60	Mont	1	2	0	EB			5	1				flies. "Returned 12 fish to the lake - too small"
					Rb		3						
					K		1					10	
	Ore	2	4	1	EB		1	1				2	worms
7/25/60	Mont	2	6	0	EB	5	"Released - only small fish					5	seemed to strike" flies + worms
	"	1	2	0	EB		2	2					
					Rb			4				10	flies
					K								
	Ore.	4	8	2	EB		2						
					Rb		2					4	worms. "Lots of flies - fish all small"
					K		1						
7/27/60	Mont	2	8	0	EB		2						
					Rb		8					10	worms + flies
				"Eastern brooks not taking flies - just now around."									
7/28/60	N.Y.	2	6	1	EB				1			1	flies and spoons
7/30/60	Ore	2	4	0	Rb	3	4					7	worms. "Returned all fish under 7" long."
...ls					EB	19	69	28	6	2		124	Ave. Length = 8.84" Ave Hrs per AD = 3.6
...y	19 days		87	314	22	Rb	25	78	21	-	-		124	Ave Catch per Anglr-Hr. = 0.87 per AD = 3.13
...o					(25%)	K	-	14	7	-	-		21	
						Wh(?)	-	-	-	1	4		5	Quality Index = 27.7 (Poor)

Totals for the 1960 Fishing Season at Swiftcurrent Lake

32 Census Days		318	1088	41	EB	47	212	102	33	3		397	Ave length of fish caught = 8.4"
				(13%)	Rb	75	614	71	3	1		764	Ave. Hrs fished per AD = 3.4
					K	1	43	13	1	-		58	Ave Catch per Angler-Hr = 1.12
					Wh(?)	-	-	-	1	4		5	Ave Catch per Angler Day = 3.81
						123	869	186	38	8		1224	Quality Index = 32 (Fair)
	Iowa	2	3	1	Rb			2	1			3	" More fun!
8/15/60	"	2	4	0	EB		1		1			3	" Better fun!
8/16/60	Mich	2	6	0	Rb		2					2	"
9/5/60	Alta	6	12	0	EB		2						
					Rb		10					12	" + flatfish. Darned Cold!
9/9/60	Mont	3	9	0	Rb		5	1				6	" and a plain hook!
...s. + Sept '60	7 days		37	127	7	EB		24	2	4	1		31	Ave L = 8.86" Ave Hrs per Day = 3.4
						Rb		29	8	1	-		38	Ave Catch per Hr = 0.54 per Day = 1.83
					(19%)			53	10	5	1		69	Quality Index = 16.3 (Poor)

Totals for the 1960 Fishing Season at Swiftcurrent Lake:

Table 8 - A Summary of the 1959-1960 Creel Census Data from Swiftcurrent Lake.

	1959	1960	1961
No. of days censused	40	32	
No. of anglers interviewed	212	318	
Home states:			
Alberta	33 (25%)	98 (36%)	
Montana	25 (18%)	67 (24%)	
Colorado	8 (6%)	Oreg. 17 (6%)	
Minnesota	8 (6%)	Calif. 14 (5%)	
Other States	61 (45%)	78 (29%)	
Hours Fished	810	1,088	
Avg. Hrs. Fished per man-day	3.8	3.4	
No. of anglers with no fish	14 (6.6%)	41 (13%)	

Size and Species Distribution of the Catch:	1959 Rb	1959 Eb	1959 K	1959 Totals	1960 Rb	1960 EB	1960 K	1960 Wh(?)	1960 Totals
4 - 6"	121	35		156	75	47	1		123
7 - 9"	571	349	23	943	614	212	43		869
10 - 12"	60	146	5	211	71	102	13		186
13 - 15"	1	27		28	3	33	1	1	38
16 - 18"		9		9	1	3		4	8
19" plus		3		3					
Total each species -	665	567	28	1260	764	397	58	5	1224
Percent Composition -	(53%)	(43%)	(4%)		(62%)	(32%)	(6%)		

	1959	1960	1961
Avg. length of all species	8.9"	8.4"	
Avg. catch per angler-hour	1.56	1.12	
Avg. catch per angler-day	5.9	3.8	
Quality Index (Avg. length X Avg. catch 1 day)	52.5 (very good)	32. (fair)	
Calculated No. angler days (inaccurate)	1000	1500	
Estimated No. angler days	--	2000	

Estimated total catch: 3,180 Rb; 2,580 EB; 240 K::4,960 Rb; 2,560 EB; 480 K.

Summary of indications from fore-going census data.

(1) From the creel census collected, the following estimates of fishing effort were worked out on the basis of the number of anglers turning in creel census reports on the average Saturday, Sunday, and weekday of each month.

	June	July	August	September	Total
1959	110	150	185	75	520
1960	220	200	160	90	670

Assuming half of the anglers may have turned in census reports, the total fishing effort may have run around 1,000 man-days in 1959 and 1,500 man-days in 1960. However, under the present system of collecting creel census we have no way of knowing what percent of anglers turned in census reports. Ranger Dayton's estimate of 2,000 man-days for 1960 is probably a better figure.

(2) Although the census was taken on fewer days in 1960, more anglers turned in reports than in 1959.

(3) Approximately 20% of the anglers censused were from Montana and 30% were local anglers from Canada. Tourist anglers from other states decreased from 57% in 1959 to 40% in 1960, while the number of local anglers who turned in census reports increased from 40% in 1959 to 60% in 1960.

(4) The length of the average fishing day decreased slightly from 3.8 to 3.4 hours.

(5) The percentage of unsuccessful anglers increased from 7% to 13% in 1960 which is an indication of drop in quality.

(6) The average length of the fish caught declined from 9" to 8.5" which is another indication of drop in quality.

(7) The average catch per hour and per day declined in 1960 - another indication of drop in quality.

(8) Finally the quality index of 52.5 (very good) and 32 (fair) for 1959 and 1960 reflects the falling off of the fishery in 1960 from 1959. It is our belief from a cursory examination of the 1961 data that the index for 1961 will be poor.

Examination of the attached creel census tables will show a quality index of 60.5 (Excellent) for June; 50.4 (very good) for July; 45.7 (Good) for August of 1959 - 37.4 (Fair) for June, 27.7 (poor) for July, 16.3 (very poor)

for August of 1960. In other words, the decline in quality of fishing in Swiftcurrent Lake has been a constant one since we started the present series of plants with large rainbow fingerling trout in 1959.

(9) The species composition of the catch was quite similar for both years. The total catch of brook trout was about the same for both years, and the estimated catch of kokanee in 1960 was about double that of 1959.

(10) The estimated catch of approximately 3,000 rainbow in 1959 represents a 10% return on the 30,000 sub-legals stocked that spring. The estimated take of approximately 5,000 rainbow in 1960 indicates very little carry-over from the 1959 plant and, assuming no carryover, would represent a 15% return on the 30,000 sub-legals stocked early in 1960. This is a very low return. Under average conditions we would expect at least a 30% return on this size of fish. We have obtained 50% or more in other waters. This was one reason the stocking program was halved in 1961, and probably will be discontinued in 1962.

Field Observations by W. M. Morton from Brief Field Surveys of Swiftcurrent Lake in 1959 and 1960.

Considerable field data were collected from Swiftcurrent Lakes on two occasions; July 20, 1959 and May 10, 1960. Field notes on gill net sets and catches were as follows:

July 20, 1959 - 200' x 9' net set 7:00 p.m., Burch's Bay in 20 ft. of water. Pulled 11:00 a.m. July 21, 1959.
May 10, 1960 - 125' x 6' net set 7:00 p.m., Boat Ramp Campground in 12 ft. of water. Pulled 11:00 a.m. 5/11/60.
May 10, 1960 - 125' x 6' net set 8:00 p.m., Burch's Bay in 20 ft. of water. Pulled 12:30 p.m. May 11, 1960.

Size and Species Distribution of Gill Net Catches in Swiftcurrent Lake.

Species	4-6"	6-8"	8-10"	10-12"	12-14"	14-16"	16-18"	Total	Average Length 1/ Actual	Calculated
July 20, 1959 (In Burch's Bay)										
Brooks	5	11	11	8	4	1		40	8.8"	8.9"
Rainbows		26	33					59	7.9"	7.8"
May 10, 1960(Off the Boat Ramp at the Camp ground)										
Brooks		1	2	4	5	3	2	17	12.3	13.1
Rainbows			3					3	9.7	9.0
Kokanee			1					1	9.0	9.0
May 10, 1960 (In Burch's Bay)										
Brooks			4	7	6	2	1	20	11.6	11.9
Rainbows		2	7					9	8.6	8.6

1/ The actual average was obtained by averaging the lengths of individual fish; while the calculated average was obtained by averaging the number of fish in each size group times its middle number.

Comparison of Length, Weight, Condition Factor (C), Sex Ratio, Degree of Maturity and Flesh Color of Gill-net caught fish from Swiftcurrent Lake 1959-1960.

July 20, 1959

BURCH'S BAY

Brooks			Rainbows		
Length Inches	Weight Pounds	C.	Length Inches	Weight Pounds	C.
4.9	.04	34	7.2	.13	35
6.0	.09	41	7.4	.15	36
6.8	.12	38	7.4	.15	36
7.0	.13	38	7.5	.15	35
7.0	.13	38	7.8	.16	34
7.2	.13	35	8.0	.18	35
7.5	.18	42	8.0	.21	41
7.6	.15	35	8.0	.20	39
7.7	.16	35	8.1	.19	31
7.8	.19	40	8.1	.20	38
7.9	.18	37	8.2	.19	35
7.9	.18	37	8.2	.20	37
8.1	.21	40	8.2	.17	31
8.2	.17	31	(35.3)8.2	.19	31
8.3	.22	38	8.3	.21	36
8.4	.22	37	8.4	.23	38
(37.2)8.8	.25	37	8.4	.20	34
9.1	.27	36	8.4	.22	36
9.2	.32	39	8.5	.21	34
9.3	.32	39	8.6	.21	33
9.4	.31	37	8.7	.24	37
9.7	.34	37	8.7	.22	34
9.8	.31	33	8.8	.20	29
10.0	.40	40	8.8	.25	37
10.4	.40	36	8.9	.27	38
10.6	.46	38	9.0	.25	34
11.3	.55	39	(34.8)9.0	.23	32
11.6	.52	33		Average	35.0
12.2	.57	32			
12.3	.72	38			
12.8	.70	35			
(36.1)14.9	.97	30 (spawned out F.)			
Average		36.7			

Comparison of Length, Weight, Condition Factor (C), Sex Ratio, Degree of Maturity and Flesh Color of Gill-net caught fish from Swiftcurrent Lake 1959-1960.

(Continued)

May 10, 1960

Brooks					Burch's Bay				
Length Inches	Weight Pounds	C	Sex	Flesh Color	Length Inches	Weight Pounds	C	Sex	Flesh Color
8.5	.19	31	FC	Or	7.1	.11	31	FD	Wh
8.7	.20	30	FC	Fl (Or)	7.2	.11	30	FD	Wh
9.1	.24	32	FC	P.	8.5	.16	26	MD	Wh
10.2	.31	29	FC	Or	8.7	.17	26	MD	Wh
10.5	.34	29	FC	Fl	9.0	.18	25	MD	Wh
11.2	.51	36	Fl	Fl	9.1	.19	25	MD	Wh
11.2	.43	30	FC	Fl	9.1	.18	24	FC	Wh
11.6	.52	34	MC	Fl	9.1	.18	24	FC	Wh
13.6	.75	30	FC	Fl	9.3	.19	24	FC	Wh
14.6	1.50Est.		MD	Fl (1 fish in Stom.)	Average		26.1		
14.8	1.50 "		FZ	Yel(2 " " ")					
18.0	2.50 "		FZ	Or (Many loose eggs in body cavity)					
Average		31.2							

From the Campground

7.9	.14	31	MC	Wh	9.2	.25	32	MD	Wh
9.7	.31	34	FC	Fl	9.8	.25	27	MD	Wh
9.7	.27	30	MD	Or	10.0	.24	24	FD	Wh
10.3	.32	29	FC	Wh			27.7		
10.8	.40	32	FC	Fl					
11.1	.40	29	MC	Or					
12.2	.56	31	FC	Fl					
13.3	.77	30	MC	Wh (Snails and Hyallela)					
14.6	1.05 (Est)		FC	Yel.					
Average		30.8							

STOMACH CONTENTS OF GILL-NET-CAUGHT FISH FROM SWIFTCURRENT LAKE

May 10, 1960

Burch's Bay

Of 20 Eastern Brooks caught; 8 were released, and of remaining 12, two had empty stomachs and ten had at least some food in them as follows:

4 sculpins (7.9, 7.8, 7.7 and 5 cm. long).	12.0	cc
Pure culture of pink and green Chironomus larvae (estimated 1,450 individuals).	16.0	cc
8 large black caddis cases with pieces of red paint flakes.	2.5	cc
Unidentifiable (flesh, bones and pieces of chuonomies).	5.0	cc
	35.5	cc
Of 9 rainbow trout caught, one was empty - rest had(1,360) almost pure culture of green chuonomies larvae	15.0	cc

May 10, 1960

N.P.S. Campground Boat Landing

Of 17 eastern brook charrs caught; 8 were released and of the remaining 9 one had an empty stomach. The remaining 8 fish contained:

1 sculpin (3.5 cm)	1.0	cc
9 large black caddis cases-red gravel on them	2.8	cc
7 spotted pond snails; 7 tiny pea clams; and 3 Hyallela (or fresh water shrimp)	1.5	cc
30 terrestrial beetles with nematodes resembling cucullanus	1.7	cc
125 Pink and green chironomus (gnat) larvae	1.4	cc
Long, jointed, bony structures; pieces of flesh, etc.	2.0	cc
Unidentifiable debris mostly gnat pupal parts	5.0	cc
	15.4	cc

Rangers Arnie Simmons and Don Dalton assisted in setting the nets and making other studies of Swiftcurrent Lake on July 20, 1959. Thousands of small rainbow trout could be seen at that time jumping actively - as far as the eye could reach - feeding on emerging gnats (Chironomids). About a dozen sea gulls were observed feeding on these jumping fish. Ray Kinley, assistant manager of the hotel, informed us that several guests had spent considerable time taking color movies of this activity during the peak of their feeding periods. We felt a little guilty setting nets on them, but it was the only way we could get a cross-sectional sample of the fish population for study.

Ranger Al Hoover assisted in setting nets on May 10, 1960. The set at Burch's Bay was made through a layer of floating snow and ice crystals. A series of plankton hauls on each of the above dates yielded practically no organisms. Previous plankton studies are reviewed in more detail in the next section of this write-up.

The following physical data were collected on the above occasions:

> July 22, 1959 - off Burch's Cabin at 8:00 a.m.: Air 64°F; Surface 56°F. from 2 ft. depth to bottom at 14 ft. Temperature uniformity 55.6°F. Secchi disk at 11 ft. and pH was 7.6.
>
> May 10, 1960 - Boat Landing at Campground at noon: Air 75°F., water surface 46°F. At Burch's Cabin at 12:30 p.m. Air 72°F., water surface 39°F. At outlet bridge at 4:45 p.m: Air 60°F., water surface 45°F., secchi disk 10-1/2 ft., pH 7.4; resistance reading 20 megaohms/cc or about 62 p.p.m. of total dissolved solids which indicates low fertility.
>
> July 19, 1960 - Off Burch's boat ramp at 9:00 a.m. Air 80°F., surface 61°F., 4 ft. 58.7°, 6 ft. 58.3°, 10 ft. 57.7°, 16 ft. 57.5°, 18 ft. 57.0°F. (bottom) Secchi disk read 15 ft., electrical resistance 16 megaohms/cc or about 70 p.p.m. of total dissolved solids which is low.

Although the bottom of the lake has not been mapped for depth contours, the greatest depth found to date was 36 feet by Elrod in 1910.

Notes on the Plankton Hauls made in Swiftcurrent and nearby Lakes during 1959 by W. M. Morton

During the winter of 1959-1960 I sent the vials of plankters I had collected from various lakes in the Park during 1959 to Mr. Robert O. Megard at Indiana University for identification and comment. Mr. Megard, a former employee of Glacier Park Company at Many Glaciers, was working on his doctorate at the University that winter. Mr. Megard's comments on this material was as follows:

"The volume of plankton in these lakes was so small that it could not be measured. In most cases, the micro-crustacea were represented by only a few individuals in each collection, so I am not including any estimate of relative abundance in any of these collections. In addition to the information from your collections, I am including data from Swiftcurrent, Joseph[illegible]e and Grinnell Lakes that I obtained in 1957.

S[illegible]current Lake

"Date of collection - July 2[illegible]959 by W. M. Morton off Burch's Bay. Species present:

Daphnia pulex:- I did not collect this in 1957; only 1 specimen in your collection.

Bosmina longirostris:- In your collections, as well as mine, B. longirostris is the only true plankton crustacean that is very abundant.

"I collected the following species in 1957, most of which were associated with the Chara beds on the bottom.

Copepoda:
- Camptocamptus staphylinoides
- Eucyclops agilis
- * Macrocyclops albidus
- Cyclops vernalis
- Cyclops bicuspidatus

Cladocera:
- Eurycercus eamellatus
- Acroperus harpae
- Pleuroius denticulatus
- * Chydorus sphaericus
- * Bosmina longirostris
- Simocephalus vetuleus

* These three species are the only ones of any significance in the plankton.

Ostracoda:
- Cyclocypris ovum
- Cypria elegantula
- Cyclocypria kincaedia
- Candora sp

Lake Josephine

"Date of collection - July 21, 1959 by W. M. Morton:

Several Bosmina longirostris were present. There were a great number of diatoms, probably of the genera Syncdra, Tabellaria, and Astriondla.