Fisheries Investigations in the Upper Clark Fork River Drainage, 1980-81

Montana Department of Fish,
Wildlife, and Parks

Fisheries Division

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Introduction

The upper Clark Fork River basin has long been manipulated by man. The area is heavily mineralized and mining was one of the earliest activities in the region, carrying on into the present. In addition, agricultural uses have spread over much of the fertile valley bottoms while the timbered slopes have sustained heavy timber harvest over the past few decades. The river has been subjected to pollutants from industrial and mining wastes, municipal sewage, agricultural nutrients and sediments, and has sustained channel alterations to facilitate railroad and highway construction. Substantial amounts of water are withdrawn in the drainage for agricultural and industrial uses.

Contaminants from copper mining and smelting operations in the Butte-Anaconda area dominated the character of the main river into the early 1970's. Industrial discharges wiped out or seriously reduced trout populations in major portions of the river with impacts being observed as far as 120 miles downstream. Improvements in water treatment programs have since moderated those impacts, allowing trout to repopulate the river.

The Department of Fish, Wildlife and Parks (DFWP) has surveyed the upper river regularly since 1969. Early investigations were aimed at monitoring water quality, using brown trout as bioindicators. With the addition of a project biologist to the area, fisheries work was expanded to include population surveys in Clark Fork River tributaries, Georgetown Lake, and other lakes in the Pintler and Flint Creek mountain ranges. Cuts in manpower and funding as mandated by the state legislature have seriously reduced the number of temporary personnel hired over the past few years, thereby directly reducing the amount of basic stream and lake surveys being conducted. A financial grant from the Anaconda Minerals Company (AMC) to the Department in 1980 made it possible to hire five temporary personnel over an 18 month period to assist in work in the upper drainage.

Study Area

The Clark Fork of the Columbia River headwaters along the continental divide in western Montana and flows in a northwesterly direction for 520 miles to its mouth on Lake Pend Oreille. This study concerns the upper Clark Fork above the mouth of the Big Blackfoot River and more specifically examines lakes and streams in the Butte-Anaconda area (Figure 1). There are more than 100 lakes in the region, ranging from 2 acres to 3,000 acres in size. Major streams in the drainage are Silver Bow, Warm Springs, Racetrack, Flint, and Rock Creeks and the Little Blackfoot River. These tributaries to the Clark Fork drain the Pintler, Sapphire, Flint Creek, John Long, and Garnet mountain ranges.

Water is diverted within the drainage for industrial cooling and processing, irrigation, and municipal use. Discharges to the river include municipal sewage, wastes from a copper smelter, mine drainage, and agricultural run-off. The Water Quality Bureau rates Silver Bow Creek as "E" (suitable for agricultural and industrial use) while the Clark Fork

River is rated C-2 (suitable for bathing, swimming, and recreation and marginal propagation of salmonids) from Warm Springs Creek to Cottonwood Creek and is rated C-1 (suitable for bathing, swimming, recreation, and the growth and propagation of salmonids) from Cottonwood Creek to the Little Blackfoot River.

A 1975-76 mail survey estimated that DFWP's Region 2 (Clark Fork drainage) sustained 386,000 man-days of fishing pressure, about 14% of the state-wide total. The Clark Fork River above the Blackfoot River sustained about 29,000 man-days of fishing while Georgetown Lake supported 68,000 man-days of fishing. The lakes and streams in the area also provide opportunities for boating, picnicking, hunting, swimming, and fish and wildlife habitat.

Procedures

Small streams were sampled with a Smith-Root, D.C. backpack shocker with a 12 volt power source. Larger streams were sampled from a 14 foot Boston Whaler with a portable electrode using a Coffelt WP-15 electroshocker powered by a 220 volt generator. Fish populations were estimated using Chapman's modification of the Peterson index as described by Vincent (1971).

Lakes were sampled with sinking and floating nylon gillnets with graduated mesh or with sinking monofilament mountain lake gillnets with graduated mesh. Estimates of fisherman effort and success were gathered through a random creel census. Spawning kokanee salmon in Georgetown Lake were captured in an upstream funnel trap constructed of hardware cloth.

Findings

Clark Fork River

Spring and fall population estimates were conducted in the pH Shack section just below the mouth of Warm Springs Creek and in the Williams-Tavenner section at the Clark Fork Veterinary Clinic below Deer Lodge in 1980 and 1981 (Table 1). In addition summer estimates were made at the Phosphate section above Gold Creek and a new section, Sager Lane, was sampled above the mouth of Dempsey Creek (Table 1). Trout populations generally decrease in a downstream direction. The river generally broadens and flattens with a corresponding decrease in trout habitat. Problems with sediments, low streamflows, low dissolved oxygen, high temperatures, and high nutrients are also more evident below Deer Lodge. The Little Blackfoot River provides a diluting effect and trout populations generally increase downstream, however, runoff on the order of a 300-500 year flood in the spring of 1981 appears to have substantially reduced trout numbers in the Phosphate section (Table 1).

The pH Shack section continues to show an influx of brown trout during the fall spawning migration (Table 1). For comparative purposes the spring population estimates over the past decade will be used as being more indicative of resident populations (Table 2). This section of river received major discharges of smelting and mining wastes in the 1960's from the Warm Springs settling ponds and the river appeared to be barren of trout in a 1969 survey.

Minor spills were further reported up to 1972 but the system has been managed without incident since that time. Trout populations responded dramatically, increasing to a maximum of 1405 trout per mile. Fishing pressure increased correspondingly and in the late 1970's it became apparent that the average size of fish in the creel was decreasing. A technician hired in 1981 analyzed population data to show that while overall numbers were high, the percentage of large trout (≥14") in the population had steadily decreased (Table 2). It was felt that this was a region-wide occurrence related to increasing fishing pressure. Five public meetings were held with the result that region-wide limits were reduced to 5 trout per day with only 1 over 14 inches. In addition, a special trout management area was created between the Warm Springs Pond 2 spillway and the Perkins Lane bridge. Under a so-called "slot" limit anglers will be restricted to artificial lures and will be allowed to keep 5 trout per day under 14 inches or 4 under 14 inches and one over 18 inches. The Warm Springs settling ponds have already been managed as a catch-and-release trophy fishery for the past two years.

Georgetown Lake

Georgetown Lake was the third most heavily fished lake in the state in the 1975-76 mail creel census and on a per-acre basis is probably still the most heavily fished lake in the state. Although catch rates remain very high, average sizes of trout have declined over the past 20 years to the dissatisfaction of anglers. A technician hired under the AMC grant was used to conduct a creel census of fisherman effort and success (Table 3) and also helped conclude a survey of fishermen preference for future management options. The cause of the decline in sizes was identified as overharvest by anglers. Fishermen were given the options of 1) maintaining the present fishery, 2) reducing daily limits to 3 trout to increase average sizes, or 3) a catch-and-release fishery to produce trophy trout. Sixty-eight percent of the respondents favored maintaining the present fishery despite the small sizes while twenty-six percent favored a reduced limit and only five percent voted for a catch-and-release fishery. Due to the majority opinion, no changes in trout management on the lake are planned in the future.

Kokanee salmon were introduced into the lake in the 1930's and maintained low numbers into the 1970's. Populations then exploded and quickly stunted out (Table 4). Limits were removed in 1979 with some success but the salmon are already stunted by the time they are recruited to the fishery. It was felt that the best solution was to reduce initial production of year classes. A barrier was installed in Stuart Mill Creek in 1979 and 1980 to block 60 percent of the spawning grounds but vandalism and equipment failure impaired the success of the project. A technician was hired in 1981 to maintain the barrier and to operate a fish trap at the mouth of the creek to enumerate the total size of the spawning run. Between 12 November, 1981 and 30 December, 1981 a total of 1097 kokanee were trapped, 398 females and 699 males. Assuming an average fecundity of 300 eggs/female this group of salmon had the potential to produce more than 100,000 juveniles. Since the annual sport catch already exceeds that number, it is evident that as much or more spawning takes place on spring areas in the lake. However, it may be possible to develop a stock-recruitment curve for Stuart Mill Creek and therefore manipulate the spawning to produce the desired number and size of salmon.

Lake Surveys

Fifteen lakes were surveyed in the Flint Creek and Pintler Mountain ranges in 1981 (Table 5). The majority of the lakes have stable and varied trout populations. However, Echo, Bohn, and Fish Lakes show a decrease in the numbers and sizes of trout present, primarily due to overfishing. Bohn Lake received a supplemental plant of cutthroat and the rainbow plant in Echo Lake was increased from 1000 to 4000 trout annually to compensate for the increased sportfishing harvest. Fish Lake will be stocked when the mountain lake air plants are reactivated.

Upper and Lower Twin Lakes carry sizable populations of small cutthroat, brook trout, and bull trout. Lower Twin Lake trout appear to be overpopulated and stunted. No changes in management are anticipated other than encouraging continued sportfishing harvest. Upper Twin Lake has only moderate numbers of trout. A breached water control structure (dam) exists at the outlet. However, the lake already has a moderate amount of littoral area (0-15 feet in depth) and a sufficient maximum depth (41 feet) to prevent winterkill so it does not appear that reconstruction of the dam would have any real benefit. The small size of the trout is probably due in part to short growing seasons.

Silver and Duck Lakes received introductory plants of trout species not native to the area. Silver Lake was planted with 5,004 lake trout averaging 3 inches in length on 13 June, 1978. Food and habitat requirements for lake trout are similar to the bull trout which are common in the lake. Lake trout have the potential for a much larger maximum size, however. After three years the lake trout averaged 11.6 inches and are starting to show in the sportfishing catch. It is hoped that the trout will reproduce in the lake to form a self-sustaining population. Silver Lake has been managed as a water storage and supply reservoir for AMC in the past with seasonal fluctuations in excess of 20 feet. Stabilization of lake levels at near full pool should maximize littoral areas (shallow areas 0-15 feet in depth) and maximize production of fish food organisms. This in turn would maximize the growth of the lake and bull trout.

Duck Lake was planted with 2,400 3-inch golden trout on 3 August, 1976. After five years the trout averaged 11.6 inches in length. The lake shows potential for producing large golden trout, however, numbers and catch rates are declining rapidly. No signs of natural reproduction were observed and it appears that it will be necessary to plant on a regular basis to sustain the fishery.

Stream Surveys

Four sections on three streams were sampled in 1981 (Table 6). Racetrack Creek is one of the major tributaries to the upper Clark Fork River. The stream generally contains good trout populations, however, it is severely dewatered in its lower stretches. The lower section sampled was situated just above the main irrigation diversion structure on the stream. The section is in a glacial moraine system and consists of a high gradient stream with a gravel, rubble, boulder substrate. Numbers of trout were good but productivity appeared to be low and the sizes of the brown, brook, and cutthroat trout were small. The upper section samples were about 1.5 miles above the forest service

campground. The stream still has a high gradient but pool development is excellent and dense growths of willows provide an abundance of cover. Flows are excellent (estimated 40-50 cfs) but the stream appears to be sterile with a rubble, gravel substrate and the average size of the cutthroats was small.

Twin Lakes Creek is a high gradient stream draining out of the Pintler range. The sampling section ran for 150 yards upstream from the AMC diversion structure for the Silver Lake aqueduct. The substrate was boulder, rubble with little pool development. The stream provides little habitat and only 4 small trout were captured in 150 yards with few other trout observed. A Forest Service timber sale is planned for the area and precautions will have to be taken to protect the erosive soils in the area.

Warm Springs Creek was sampled approximately 1.5 miles above highway 10A. The stream holds a goood mixed trout population in high densities. However, average and maximum sizes appear to have decreased from past years. Signs of regular fishing use were evident. The recent region-wide reduction in creel limits should at least maintain the present quality of the fishery. Sampling was attempted on Warm Springs Creek immediately below Meyers Dam but high flows and low conductivities negated any effective sampling.

Waters Referred to:

Clark Fork River 04	06-1140
Racetrack Creek	06-5073
Twin Lakes Creek	06-6726
Warm Springs Creek	06-6859
Bohn Lake	06-7410
Caruthers Lake	06-7524
Duck Lake	06-7680
Echo Lake	06-7733
Fish Lake	06-7805
Georgetown Lake	06-7961
Goat Lake	06-8037
Little Fish Lake	06-8436
Little Goat Lake	06-8037
Lower Elliot Lake	06-8540
Lower Twin Lake	06-8588
Mountain Ben Lake	06-8778
Upper Elliot Lake	06-8797
Upper Twin Lake	06-9652

Table 1. Population estimates for brown trout in the upper Clark Fork River, 1980–81.

Section	Date	Size Range	Trout/Mile	80% Confidence Interval
pH	9/2/80	6.0–22.4	1514	1241–1787
	3/24/81	6.0–18.5	987	875–1099
	9/2/81	6.0–20.9	1610	preliminary estimate
Williams–Tavenner	9/3/80	6.0–17.2	249	198– 300
	3/25/81	6.5–17.1	245	175– 315
	9/3/81	6.0–16.4	278	preliminary estimate
Phosphate	7/29/80	5.0–17.6	315	272– 358
	8/10/81	6.0–18.9	224	preliminary estimate
Sager Lane	8/11/81	6.0–17.4	418	preliminary estimate

Table 2. Spring population estimates of brown trout in the pH Shack section, Clark Fork River, and the percentage of trout larger than 14 inches in the population.

Year	Trout/Mile	Trout $\geq$14"	% $\geq$14"
1977	318	139	44
1978	802	155	19
1979	1405	203	14
1980	1303	99	8
1981	987	68	7

Table 3. Rates of angler effort and success on Georgetown Lake, 1980-81.

Season	No. Interviewed	Fish Creeled	Fish/hour	Avg. Trip Length (hours)	Avg. Fish/day
Summer, 1980	600	1873	1.1	3.5	3.7
Summer, 1981	106	154	0.5	4.9	3.4
Winter, 1980-81	223	2133	2.2	5.6	14.7
Winter, 1981-82	138	1530	2.7	4.6	13.2

Table 4. Average length in inches of spawning kokanee in Georgetown Lake, 1975-1981.

Year	Sample Size	Average Length	Std. deviation
1975	185	11.7	0.76
1976	175	12.2	0.51
1977	51	12.0	0.67
1978	73	10.2	0.77
1979	118	9.3	0.39
1980	101	10.3	0.36-limits removed
1981	87	10.7	0.40

Table 5. Lake surveys in the upper Clark Fork River drainage, 1981.

Lake	Date	Species[1/]	Number	Size Range (In.)	Avg. Length (In.)
Georgetown	6/11/81	Rb	64	5.4-18.0	10.4
		Kok	2	9.3-9.9	9.6
		Eb	23	5.5-15.5	11.5
	8/14/81	Rb	17	7.5-13.4	10.9
		Kok	35	6.7-10.5	7.9
		Eb	2	7.4-11.9	9.7
	9/24/81	Rb	13	7.4-13.8	10.7
		Kok	29	6.5-11.2	8.4
Silver	7/30/81	DV	4	8.9-10.7	10.1
		LT	2	9.2-13.9	11.6
		LnSu	11	6.9-11.3	8.1
Echo	7/30/81	Rb	14	8.8-12.3	10.1
		Eb	2	9.9-11.8	10.9
		RSS	3	5.5-5.6	5.6
Bohn	8/7/81	Ct	8	6.6-14.2	8.9
		Eb	3	11.6-16.5	14.8
Caruthers	8/6/81	Ct	62	3.7-9.4	7.9
Duck	8/26/81	GT	9	10.2-13.0	11.6
Fish	8/27/81	Ct	2	8.3-12.4	10.4
Goat	8/5/81	Ct	18	6.1-10.3	7.7
Little Fish	8/27/81	Ct	13	8.0-11.6	9.4
Little Goat	8/6/81	Ct	6	4.4-10.6	7.1
Lower Elliot	8/7/81	Ct	16	5.7-9.6	7.6
Lower Twin	8/26/81	Ct	3	6.0-7.0	6.5
		Eb	1		10.7
Mountain Ben	8/6/81	RbXCt	2	15.4-17.7	16.6
Upper Elliot	8/7/81	Ct	17	4.5-10.9	7.8
Upper Twin	8/26/81	Ct	7	5.3-9.4	7.0
		DV	1		10.7

1/ Species Code Abbreviations

Ct - cutthroat trout
DV - Dolly Varden (Bull trout)
Eb - Brook trout
GT - Golden trout
Kok - Kokanee salmon
LL - Brown trout
LnSu - Longnose Sucker
LT - Lake trout
Rb - Rainbow trout
RbXCt - Rainbow-cutthroat hybrid
RSS - Redside Shiner

Table 6. Stream surveys in the Clark Fork River drainage, 1981.

Stream	Location	Section Length	Species[1/]	Number	Size Range	Average Length
Racetrack	T6N,R11W,S16	225 yards	Ct	9	4.6-7.5	5.8
	T6N,R10W,S21	200 yards	Ct	4	7.4-9.1	8.6
			Eb	5	5.0-7.4	6.1
			LL	18	3.1-9.0	5.5
Twin Lakes	T5N,R13W,S35	150 yards	Ct	3	5.8-6.6	6.2
			Eb	1		5.9
Warm Springs	T5N,R12W,S18	300 yards	Ct	20	4.1-11.0	6.9
			Eb	15	4.9-8.6	6.8
			DV	11	4.9-16.3	10.2

1/ Species codes are the same as Table 6.

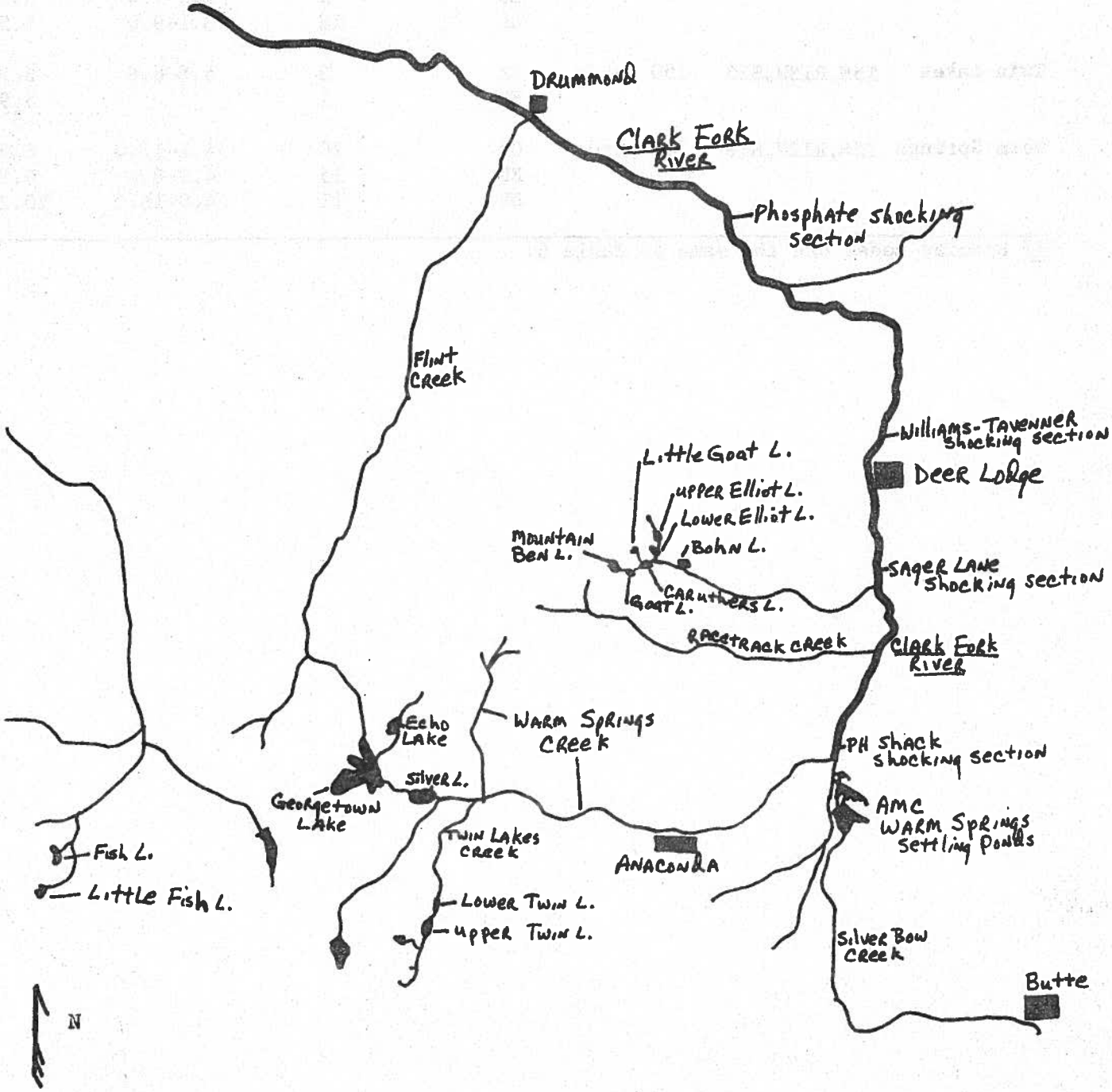

Figure 1. Upper Clark Fork River Sampling Area.

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