MONTANA DEPARTMENT OF FISH, WILDLIFE AND PARKS
ECOLOGICAL SERVICES DIVISION

JOB PROGRESS REPORT

State Montana Title Lower Missouri River Basin

Project Number FW-2-R11 Investigations (Poplar R. seg.)

Job Number 1-b Title Planning Inventory, Fisheries

Period Covered July 1, 1981 through June 30, 1982

ABSTRACT

Measurement of walleye and northern pike population size was continued in the East and Middle Forks of the Poplar River. A recent International Joint Commission (IJC) report made recommendations for no additional water releases to maintain East Fork fish populations. Northern pike have done well, producing large numbers of YOY even in years of low springtime streamflow. However, no significant numbers of walleye YOY have been produced in the East Fork since 1979, when large amounts of water were spilled from the dam in April and May. Significant numbers of age 1+ and older walleye are now present in the East Fork only in the lowermost few miles. The walleye is very close to being eliminated in the East Fork.

BACKGROUND

A description of the Poplar River, the problems related to development in the drainage and aquatic work undertaken have been described in a previous report (Stewart 1978). Additional information is shown in later reports (Stewart 1979, 1980 and 1981).

The purpose of Poplar work in 1981 was continuation of walleye and northern pike population estimates to measure the status of these two species under decreased streamflow regimes in the East Fork Poplar River.

Poplar River work since 1979 has been largely confined to the East and Middle Forks (Figure 1). The Canadian dam (Cookson Reservoir) and electrical generating plants are located on the East Fork. The Middle Fork serves as a control, being unaffected by dams or power development.

A major development in the political processes influencing the Poplar River and the power generating complex in Canada occurred in 1981 with the release of a report, "Water Quality in the Poplar River Basin" (International Joint Commission 1981). This report includes the recommendations by the IJC to the United States and Canadian governments concerning water

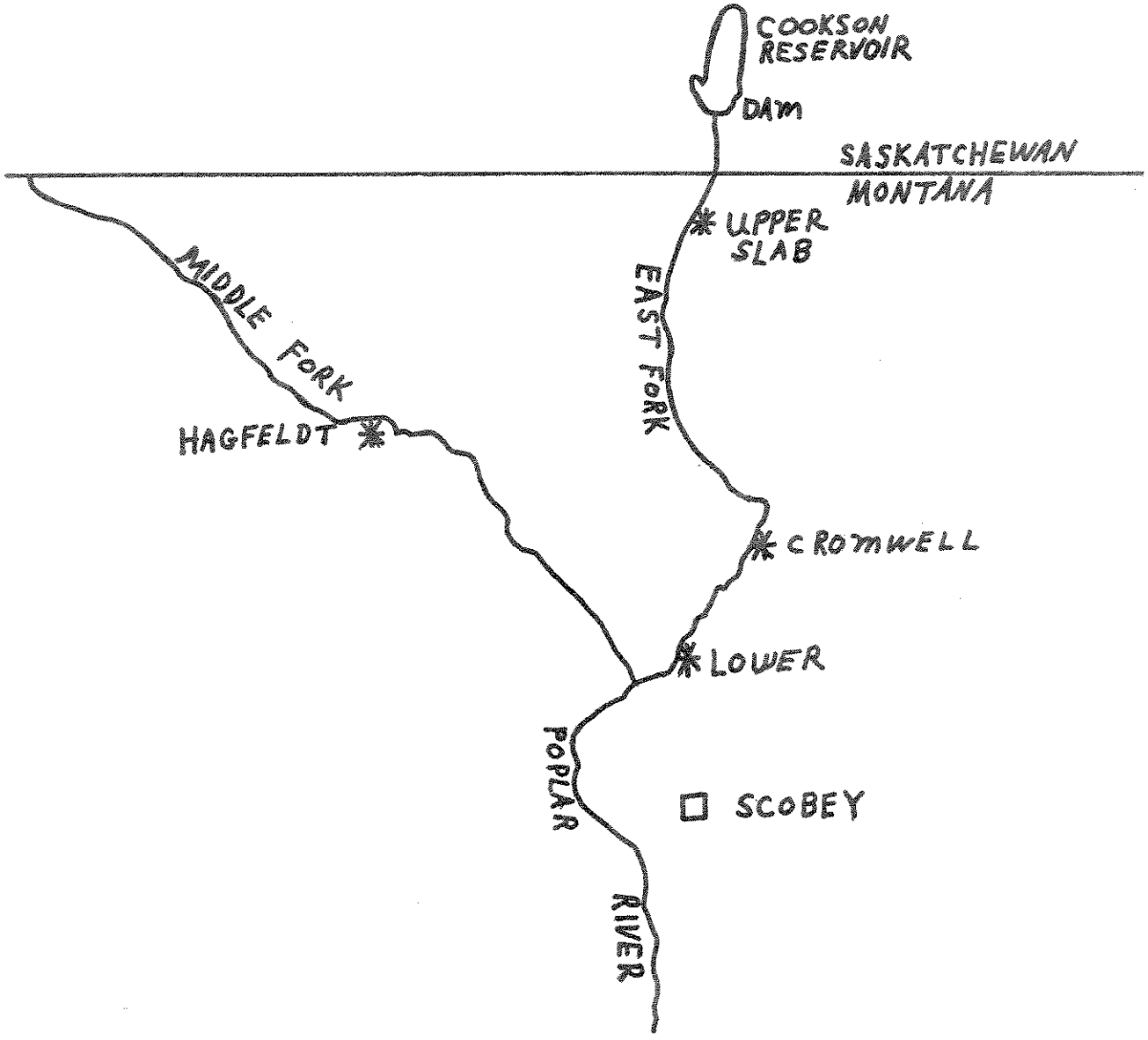

Figure 1. Approximate map of project area showing locations used for fish population estimates.

releases from Cookson Reservoir to maintain fish and aquatic life in the East Fork Poplar River in the United States. No concessions in terms of additional water releases from Cookson Reservoir to the East Fork Poplar River were recommended in this report.

The IJC report is based on a report by the International Poplar River Water Quality Board of the IJC (IPRWQB 1979). The latter report is a synthesis of the reports of several committees working under the IPRWQB. One of these committees indicated streamflows of 15 cubic feet per second (cfs) for April and 10 cfs for May in the East Fork Poplar River (Biological Resources Committee 1979) were required to maintain fish populations. This committee also recommended an annual two day discharge of 700 cfs during late March or early April. Similar recommendations were also made in another report (Montana Department of Fish and Game 1979).

The IJC in its 1981 report (IJC 1981) rejected these recommendations and instead accepted recommendations from its International Souris - Red Rivers Engineering Board, Poplar River Task Force (ISRREB, PRTF 1976), which were made without consideration for fish resident in the East Fork Poplar River. The accepted recommendations guarantee approximately 8% to 21% of the mean annual pre-dam flow of the East Fork Poplar River plus any spills necessary when Cookson Reservoir is full. Releases from Cookson Reservoir have operated under this plan since spring 1980.

OBJECTIVES

Specific 1981 objectives were the following:

A. Determine reproductive success of walleye and northern pike by measuring the population size of young of the year (YOY) in September;

B. Measure population size of walleye and northern pike age 1+ and older;

C. Obtain and organize USGS streamflow data related to Poplar River fish populations.

PROCEDURES

Methods and procedures used in 1981 are described in a previous report (Stewart 1978).

FINDINGS

April and May 1981 average streamflows are shown in Table 1 with streamflows for previous years. Very low winter snow accumulation in 1981 along with much below average April - May rain resulted in much below average streamflows during the April - May spawning and egg incubation period for walleye and northern pike. Water releases to the East Fork from Cookson Reservoir began April 25, 1981, but were too late and too small to bring streamflows above the recommended (Montana Department of Fish and

Game 1979) levels for April - May spawning and egg incubation. Streamflows on the Middle Fork were below recommended flows continuously during April and May in 1981.

Table 1. Mean streamflows (cfs) for the months of April and May from 1977 through 1981 in the East and Middle forks of the Poplar River.[a/]

	1977	1978	1979	1980	1981	Mean
	East Fork Poplar River Near International Boundary					
April	2.4	2.7	141.0	7.2	3.5	78.9[c/]
May	17.1[b/]	3.0	40.7	13.1	5.5	14.4[c/]
	Middle Fork Poplar River Near International Boundary					
April	11.1	75.4	325.3	47.8	6.7	93.1
May	12.4	25.6	59.7	5.3	4.3	17.7

a/ Data from USGS (1977, 1978, 1979, 1980) and USGS 1981 (in press).

b/ 2.2 cfs for the first 12 days of May 1977.

c/ Pre-dam.

There was a very localized fish die-off in September 1981 in the Hagfeldt population estimation section on the Middle Fork Poplar River. Dead northern pike, walleye and other species were found on September 23. This section has three pools. Dead fish were found only in the upper two pools and not at upstream or downstream locations. These fish had been dead no more than a few days. Electrofishing indicated there were no live northern pike or walleye remaining in the upper pool. Remaining live fish in the middle pool were apparently in a weakened condition, because many of them died following electrofishing and handling required for weighing, measuring and marking.

The cause of the die-off is unknown, but low dissolved oxygen is suspected because of an unusually heavy accumulation of aquatic plants in the section. Aquatic plant amounts were no more than usual, as determined by visual inspection, at upstream and downstream points. Dissolved oxygen measurements were made at the point of the fish die-off on September 24, one day after the die-off was discovered. Values measured were near saturation levels, but this does not exclude dissolved oxygen as a cause of the die-off because fish had died a few days previous to dissolved oxygen measurements and values can change rapidly in a shallow river.

Measurements of number per mile of YOY walleye and northern pike along with data for older age groups are shown in Table 2. More complete data for population estimates are shown in Appendix A. A strong 1981 year class of northern pike was found in the Middle Fork in spite of very low streamflows. Survey electrofishing in the Middle Fork several miles upstream and downstream of the Hagfeldt section indicated the presence of large numbers of northern pike YOY at both locations. In one hour of electrofishing over 20 northern pike YOY were captured at each location. The 103 YOY per mile in the Hagfeldt Section (Table 2) on the Middle Fork is near the average produced in the past five years and would have been higher before the die-off.

A strong year class of northern pike YOY was also found in the East Fork (Table 2). Numbers per mile were the largest measured in five years of estimates for both East Fork stream sections.

The large size of northern pike YOY populations in 1981, a year of very low April - May streamflows, suggests that spring streamflows may not be important in determining size of YOY populations for this species in the East and Middle Forks of the Poplar River.

The opposite conclusion is suggested for walleye YOY (Table 2). Regression and correlation analysis previously indicated that large streamflows during the walleye spawning and egg incubation period produced large YOY populations, and that low streamflows produced small populations (Stewart 1981). Data from 1981 (Table 2) reinforce this conclusion. Few walleye YOY were present in any part of the East and Middle Forks. Although no estimate was made for walleye YOY in the Hagfeldt section, only 14 were sampled in three days of electrofishing, whereas in some previous years 200 - 300 were sampled with a similar amount of electrofishing effort. The fish die-off in the Hagfeldt section may have reduced the number of walleye YOY present, although no dead YOY were found. Survey electrofishing several miles upstream and downstream of the Hagfeldt section indicated very few walleye YOY were present anywhere in the Middle Fork.

Survey electrofishing in September 1981 indicated few or no walleye YOY were present in the lower East Fork. In one hour of electrofishing, no walleye YOY were sampled in two pools of the East Fork approximately two miles upstream of the mouth.

Numbers showing age groups I+ through III+ and older walleye and northern pike per mile in Table 2 have been summed in Table 3 to indicate trends in numbers of older fish. There have been large fluctuations in numbers of northern pike age I+ and older since 1977, but if there is any trend it would appear to be upward. This appears to be true for both the East and Middle Forks.

Number trends in older age East Fork walleye since 1977 are clearly down (Table 3). Walleye in the East Fork, Cromwell section, recovered little in 1981 from the catastrophic die-off of July 1980 (Stewart 1981). The Upper Slab section on the East Fork, located near the Canadian border (Figure 1) has not supported large numbers of walleye since population estimates

Table 2. Number per mile of walleye and northern pike in Poplar River stream sections in fall 1977 - 1981[a].

Age Class	Walleye					Northern Pike				
	1977	1978	1979	1980	1981	1977	1978	1979	1980	1981
	East Fork Poplar River - Upper Slab Section - 6015 feet									
0+	11	0	0	0	0	0	415	533	6	692
I+	10	0	29	0	0	0	0	24	459	58
II+	3	0	4	8	0	0	0	0	0	20[b]
III+ and older	0	0	6	14	0	1	1	0	0	
	East Fork Poplar River - Cromwell Section - 7560 feet									
0+	3[c]	69	490	0[c]	5[c]	0	0	211	0[c]	374
I+	6	24	39	0[c]	0	74	5	74	0[c]	171
II+	100	87	9	0[c]	0	122[b]	44[b]	39	1[c]	58
III+ and older	55	59	12	1[c]	8[c]					
	Middle Fork Poplar River - Hagfeldt Section - 8240 feet									
0+	186	215	397	69	[e]	6[c]	101	115	184	103
I+	22	26	8	26	1	18[c,d]	18[c,d]	66[c,d]	199[d]	103[d]
II+	53	26	3	4	4					
III+ and older	15	28	12	14	8					

[a] Complete population data for 1981 are in Appendix A.

[b] Age II+ and older.

[c] Statistical criteria not met; number is approximate.

[d] Age I+ and older.

[e] Numbers sampled insufficient for estimate of any kind.

Table 3. Number per mile of Age I+ and older walleye and northern pike in Poplar River stream sections in fall 1977 - 1981.

Walleye					Northern Pike				
1977	1978	1979	1980	1981	1977	1978	1979	1980	1981
East Fork Poplar River - Upper Slab Section - 6015 feet									
13	0	39	22	0	1	1	24	459	78
East Fork Poplar River - Cromwell Section - 7560 feet									
161	170	60	1[a]	8[a]	196	49	103	1[a]	229
Middle Fork Poplar River - Hagfeldt Section - 8240 feet									
90	80	23	44	13	18[a]	18[a]	66[a]	199	103

[a] Statistical Criteria not met; number is approximate.

began. This area of the East Fork may never have been good walleye habitat. One hour of survey electrofishing in September 1981 in the East Fork approximately two miles upstream from the mouth yielded seven age I+ and older walleye. This is a much higher catch rate than in the Cromwell section where only eight age I+ and older walleye were sampled in 3 1/2 days in September 1981.

The East Fork Poplar River is very close to reaching a condition of having significant numbers of walleye only in the lowermost three or four miles. Significant numbers of YOY have not been produced since 1979. This allows for very little possibility of an upturn in adult walleye numbers in the near future.

The trend for older walleye in the Middle Fork Poplar River has been downward also, but not so drastically as in the East Fork. The numbers for 1981 in the Hagfeldt section would have been considerably higher before the September 1981 die-off.

Literature Cited

Biological Resources Committee. 1979. Biological resources committee final report. Canada-United States, International Joint Commission, International Poplar River Water Quality Board, Appendix C. 133 pp.

International Joint Commission 1981. Water Quality in the Poplar River Basin. 268 pp.

International Poplar River Water Quality Board 1979. International Poplar River Water Quality Study. Main Report. International Joint Commission. 113 pp.

International Souris - Red Rivers Engineering Board, Poplar River Task Force 1976. Poplar River Basin in Saskatchewan and Montana: Joint Studies for Flow Apportionment. Main Report. 43 pp.

Montana Department of Fish and Game. 1979. Instream Flow Evaluation for Selected Streams in the Upper Missouri River Basin. 254 pp.

Stewart, P.A. 1978. Lower Missouri River Basin Investigations, Planning Inventory, Fisheries. Fed. Aid in Fish & Wildl. Rest. Acts. Proj. No. FW-2-R-7, Job 1-b. 35 pp.

_____. 1979. Lower Missouri River Basin Investigations, Planning Inventory, Fisheries. Fed. Aid in Fish & Wildl. Rest. Acts. Proj. No. FW-2-R-8, Job 1-b. 44 pp.

_____. 1980. Poplar River Fisheries Study Progress Report. Ecol. Serv. Div., Mont. Dept. Fish, Wildl. & Parks. 13 pp.

_____. 1981. Poplar River Fisheries Study Progress Report. Ecol. Serv. Div., Mont. Dept. Fish, Wildl. & Parks. 11 pp.

USGS. 1977. Water Resources Data for Montana, Water Year 1977. US Dept. of Int. 751 pp.

_____. 1978. Water Resources Data for Montana, Water Year 1978. US Dept. of Int. 824 pp.

_____. 1979. Water Resources Data for Montana, Water Year 1979. US Dept. of Int. 842 pp.

_____. 1980. Water Resources Data for Montana, Water Year 1980. Vol. 1. US Dept. of Int. 651 pp.

_____. 1981. In Print.

List of Waters Referred To

6-16-2375-02 Poplar River (Middle Fork) - section 2.

6-16-1415-02 East Fork Poplar River.

Prepared by: P.A. Stewart
March 1982

Appendix A. Walleye and northern pike population data for stream sections in the Poplar River, September 1981.

Age Class	Mean Length (inches)	Mean Weight (pounds)	Estimated Number	Estimated Weight (pounds)	Fish Marked	Fish in Recapture Sample	Marked Fish in Recapture Sample
East Fork Poplar River - Upper Slab Section - 6,015 feet							
			Northern Pike				
0+	10.4	0.26	786	208.4			
I+	18.2	1.44	66	95.7			
II+ and older	20.6	2.09	22	46.9			
Totals			874 (±96)[a]	351.0 (±47)	350	209	83
East Fork Poplar River - Cromwell Section - 7,560 feet							
			Northern Pike				
0+	8.0	0.11	534	56.3			
I+	15.7	0.83	245	203.0			
II+ and older	18.7	1.43	83	118.0			
Totals			862 (±150)	377.3 (±74)	194	204	46
Middle Fork Poplar River - Hagfeldt Section - 8,240 feet							
			Northern Pike				
0+	8.3	0.12	160	18.8			
I+	14.3	0.63	92	57.2			
II+ and older	18.4	1.36	68	92.5	70	84	17
Totals			320 (±80)	168.8 (±50)			
			Walleye				
0+	4.6	0.03	[b]	[b]	5	9	0
I+	8.5	0.19	1	0.2			
II+	12.1	0.58	6	3.3			
III+ and older	14.5	0.98	13	12.4			
Totals			20 (±7)	16.9 (±6)	13	24	6

[a] 80% confidence interval.
[b] Numbers sampled insufficient for estimate.