JOB COMPLETION REPORT

INVESTIGATIONS PROJECTS

State of Montana

Project No. F-7-R-2 Work Plan No. III Job No. III-A

Title of Job: Natural Reproduction of Kokanee in Flathead Lake and Tributaries.

Objectives:

Reproduction is an essential and key phase in the survival of any living organism. In fisheries it is a common practice to attempt aid of nature by artificial propagation. Flathead Lake is lowered considerably in the winter months by a hydroelectric plant, thus exposing many of the spawning beds. The purpose of this study is to establish the extent of kokanee spawning in Flathead Lake and its tributaries together with the degree of successful spawning.

Techniques Used:

During the spawning season, areas of concentration of kokanee were noted and marked on a map. An airplane was used in December and was extremely useful in locating spawning areas in isolated parts of the lake shore. Tributary streams were observed to determine how far upstream kokanee had migrated to spawn. Spawning beds were examined at the time of hatching of the eggs.

Findings:

Flathead Lake is the largest natural lake in Montana having an area of 120,320 acres and a shore line of 127 miles. The chief tributaries are the Flathead and Swan Rivers. The deepest part of the lake is 339 feet in the vicinity of Yellow Bay.

Due to a mild winter, very little ice was on the lake and this was of short duration. The result was that little ice fishing occurred on the lake.

The fluctuation of the water level of Flathead Lake is presented in Figure 1. This may be changed in the future due to the construction of Hungry Horse Dam on the South Fork River. At the time of writing of this report, the level is still at its lowest point of 2883 feet above mean sea level, where it has been for over a month.

Kokanee were seen in large numbers on spawning beds along the shores of the lake on November 1, 1952 (Figure 2). They were observed in McDonald Creek on November 3. On November 13, many kokanee were observed at the foot of Hungry Horse Dam on the South Fork of the Flathead River. Whitefish River was used for spawning purposes except for about two miles below Whitefish Lake. Swan River to the dam was also used by spawning kokanee. Observations made on other streams during the spawning season for the farthest upstream movement were noted (Figure 3). On December 5, observations were made from an airplane to determine the spawning areas along the shores of Flathead Lake. Concentrations of Kokanee were observed in 30 areas scattered along the shores of the lake (Figure 2).

A search was not made for eggs until it was condisered that hatching would occurr. A heavy schedule prevented close observation on the development of the eggs. In

the Whitefish River, on March 23, 1953, many eyed eggs and fry were collected. Some of the fry were estimated to be about one week old. On March 27, at Lookout Bay, on the west shore of Flathead Lake, where no seepage water was evident, many kokanee fry were collected. Some of the fry had absorbed their yolk sac. No eggs were found and approximately one-half of the fry observed were dead. On March 30, many eyed eggs and some fry were collected at Dr. Richards Bay on the east shore of Flathead Lake. These eggs and fry were in a good seepage area where accumulated water was running in depths up to two inches.

Lengths were taken of 400 males and 400 females collected from various areas on the lake and from Whitefish River during November 1952. The average lengths and the range in size are given in Table 1.

From November 17 to 20, 1952, 6,302 males and 6,487 females were captured in seining operations in Flathead Lake, giving a male to female ratio of 1: 1.03. Due to lack of ice cover a dredge was not used to determine depths of spawning kokanee. However, eggs and fry were found along the shore that was covered by at least five and one-half feet of water at time of deposition.

Table 1. The average length and range in size of kokanee taken from Flathead Lake and Whitefish River during November of 1952.

Location	Sex	Number	Average length in inches	Range	Standard Deviation
Flathead Lake					
Dr. Richard Bay	Males	100	13.4	12.6 to 14.1	0.3
	Females	100	13.0	11.6 to 13.9	0.3
Rollins Bay	Males	100	13.7	12.3 to 14.9	0.4
	Females	100	13.1	11.5 to 14.9	0.5
Somers Hatchery Bay	Males	100	13.7	12.6 to 14.4	0.4
	Females	100	13.1	12.4 to 13.7	0.3
Whitefish River	Males	100	13.3	12.2 to 13.9	0.4
	Females	100	12.7	11.7 to 13.8	0.4

Analysis and Recommendations:

The kokanee were found to spawn along the shores of Flathead Lake in many places. In two areas studied, eyed eggs and fry of kokanee were found. In Lookout Bay on the west shore of Flathead Lake, it is doubtful if any of the fry hatched above the water level would enter the lake. No seepage water was evident, thereby making it impossible for many of the fry observed to go to the lake. However, in Dr. Richards Bay on the east shore of the lake much seepage water was present where eggs and fry were observed and no difficulty would be encountered by the fry in entering the lake.

All of the tributary streams were used in varying amounts by spawning kokanee and the successful hatching was observed in one stream.

In considering the average lengths of each sex of kokanee collected from the different areas of the lake, there is some variation between the east shore and the west shore of the lake. Likewise a small difference is evident between

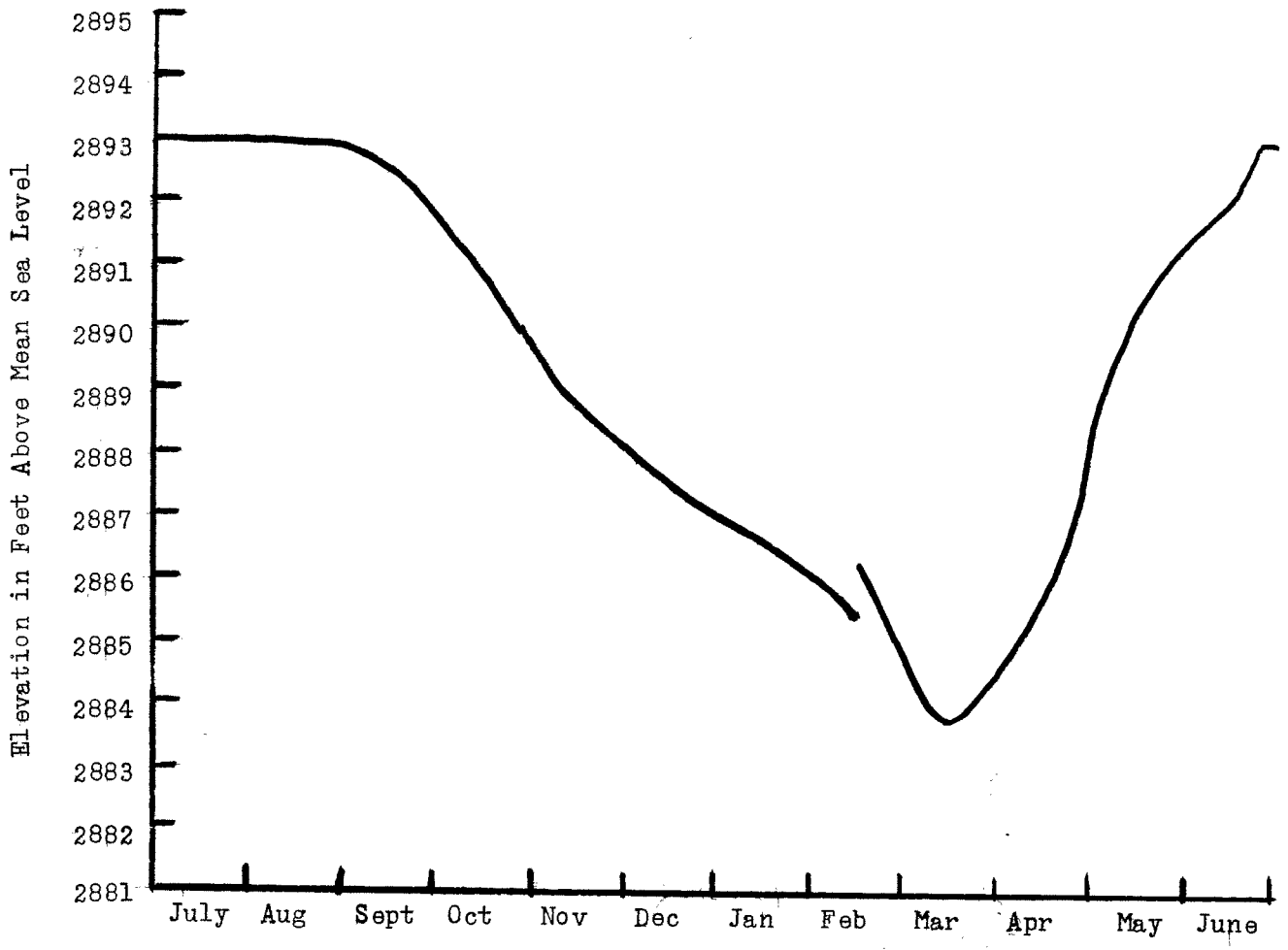

Figure 1. Fluctuation of the water of Flathead Lake from February 1952 through February 1953.

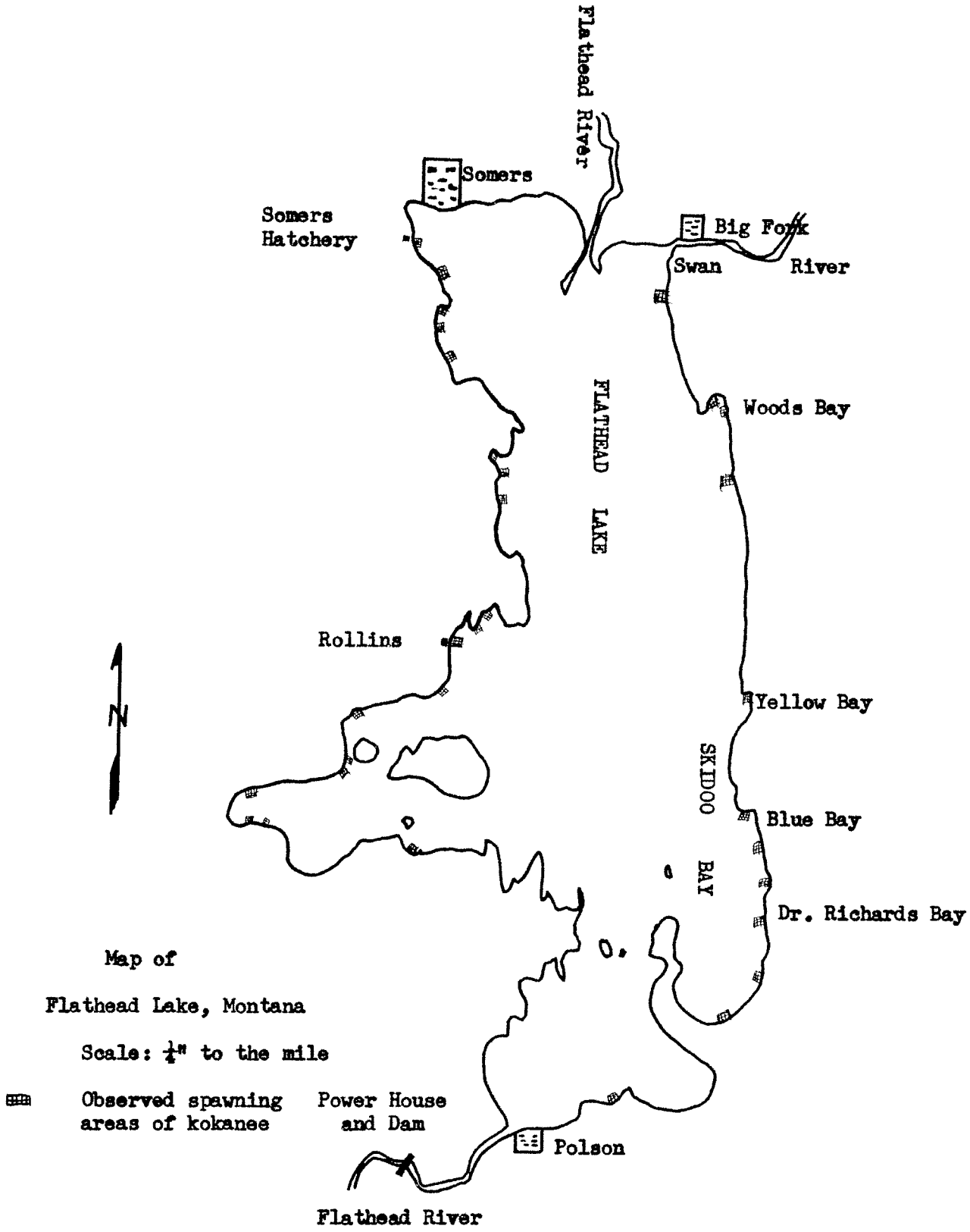

Figure 2. Shore areas used by spawning kokanee in the fall of 1952.

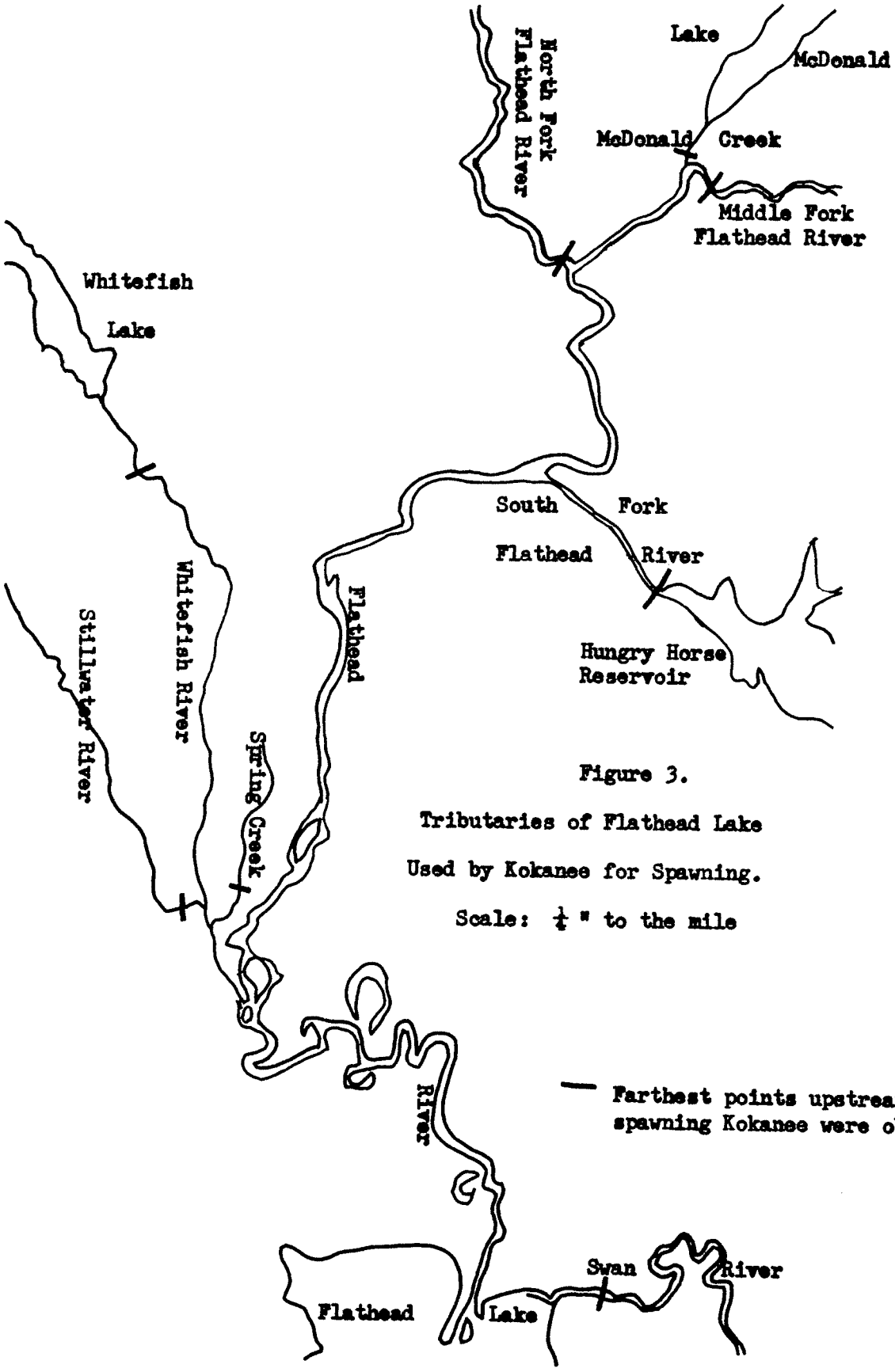

Figure 3.

Tributaries of Flathead Lake

Used by Kokanee for Spawning.

Scale: ¼ " to the mile

those kokanee collected in the lake and the Whitefish River (Table 1).

The often expressed theory that the kokanee in Flathead Lake have degenerated into a small race of fish can easily be discounted. Several spawning kokanee captured in Lake Francis, Pondera County, on November 1, 1952, which are of Flathead Lake stock, were weightd and measured. Lake Francis is planted each year as spawning facilities are non-existant. The following are the lengths and weights of these fish:

Male	19.1	inches	in	length,	weighing	1.75	pounds,
Male	17.7	"	"	"	"	1.74	"	"
Female	17.0	"	"	"	"	1.72	"	"
Female	13.8	"	"	"	"	1.70	"	.

Another example to further discount the "degeneration" theory was obtained from Foy Lake, Flathead County, which received its first plant of kokanee in April 1951. Ten kokanee were captured in a gill net on September 29, 1952. These fish were 17 months old when captured and averaged 14.6 inches in length and 1.33 pounds in weight.

It is recommended that this study be continued another year and an airplane be used for observing kokanee spawning beds along the shore and in the tributary streams. These observations should be taken over a period of several weeks. It is further recommended that emphasis be put on determining the depths at which the majority of the kokanee spawn in the lake.

Plants of kokanee fry are made in Flathead Lake each year. One year, the east shore of the lake will be planted and the following year the west shore. This is a change from the planting program in 1951 in which both shores were planted each year. As a result of this new program, the lake received about one-half the kokanee fry in 1952 than it did in 1951. However, a reminder of the work done in Cultus Lake, British Columbia is opportune at this time. In the report Forester (1938) states ".....in comparing the efficiencies of natural and artificial propagation it is found that, when the variations between the several years' results are considered, there is no statistically significant difference apparent."

Summary:

Kokanee were found to spawn successfully along the shores of Flathead Lake and in a tributary stream. Concentrations of spawners were found in 30 different areas around the shores of the lake. Spawning took place in at least five and one-half feet of water along the lake shore.

Data and Reports:

The original data and reports are with the project leader at Kalispell, Montana.

Literature Cited:

Foerster, R. E. 1938. An investigation of the relative efficiencies of natural and artificial propagation of sockeye salmon (Oncorhynchus nerka) at Cultus Lake, British Columbia. J. Fish. Res. Bd. Can., 4 (3), pp. 151-161

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