1971 Drainage Tobacco Huston # 85474

Montana Fish and Game Report

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Fisheries Division

Job Progress Report

ANNUAL PROGRESS REPORT

HABITAT DEVELOPMENT OF YOUNG CREEK, TRIBUTARY TO LIBBY RESERVOIR, 1970 - 1971

by

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Reservoir Investigation Project

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MONTANA FISH AND GAME DEPARTMENT

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JOB PROGRESS REPORT

Project Title: Habitat Development of Young Creek, Tributary to Libby Reservoir

Job Title: Stream fish population determinations and migration patterns for Young Creek. July 1970 - June 1971

ABSTRACT

Young Creek enters the Kootenai River about three miles south of the United States-Canadian border. This stream was selected to determine if spawning runs of an adfluvial westslope cutthroat trout (Salmo clarki subsp.) could be caused to successfully replace indigenous fluvial and resident cutthroat. This stream contained a good population of cutthroat trout, both fluvial and non-migratory, and brook trout (Salvelinus fontinalis).

Development work accomplished in 1970-71 included: (1) removal of potential fish migration barriers from the stream below junction of the North and South Forks of Young Creek downstream to the mouth, approximately 11 miles; (2) suppression of the resident fish population with rotenone from junction of the North and South Fork downstream seven miles to reduce competition with planted fish; and (3) imprint planting of 50,000 adfluvial westslope cutthroat fingerlings into the area chemically treated.

Operation of an upstream trap indicated that between 100 and 300 migratory cutthroat from the Kootenai River entered Young Creek to spawn in April and May of 1971. Data from the downstream trap indicated that emigration of juvenile cutthroat is controlled by flow patterns. Peak migration occurred when flows dropped below 20 cfs.

BACKGROUND

Young Creek was chosen as a study by the Montana Fish and Game Department and the Corps of Engineers to determine the feasibility of establishing spawning runs of adfluvial westslope cutthroat in suitable tributaries of Libby Reservoir. Young Creek rises on the east slope of the Purcell Mountains and flows approximately 15 miles to its confluence with the Kootenai River about three miles south of the Canadian border. The gradient averages 120 feet per mile from the junction of the North and South Forks of Young Creek to the mouth. Measured discharges have varied from a recorded high of 110 cfs during 1971 spring runoff to a low of less than 10 cfs during late fall and winter and temperatures ranged from a minimum of 32° F. in the winter to a high of 67° F. in the summer. Soils in the watershed consist primarily of unconsolidated glacio-lacustrine silts and clays.

Initial work on Young Creek consisted of a general physical and biological survey (Huston 1970). A fish barrier-trap designed to monitor the movements of fish moving into or out of Young Creek was constructed and placed in operation in the fall of 1969. Fish population data collected in 1969-70 fiscal year indicated that Young Creek has a good population of resident cutthroat and brook trout. The 1970 spawning run of fluvial cutthroat was estimated to be between 50 to 100 fish. The number of outmigrant juveniles (529) from Young Creek indicated spawning runs may have been larger in years prior to 1970.

This report describes work done on the development aspect of the project and summarizes fish population data for migratory and resident trout. Resident cutthroat trout are fish which complete their entire life cycle in Young Creek. Fluvial cutthroat are those fish which move from a larger stream to a smaller stream to spawn; in this case cutthroat trout that migrate from the Kootenai River into Young Creek for spawning. Adfluvial fish are those that move from still water (lake or reservoir) into a stream to spawn.

PROCEDURES

Cutthroat trout collected in the upstream trap were scale sampled, measured, weighed, sexed and tagged, spawned and released downstream. Fertilized eggs were taken to a hatchery for incubation. Cutthroat trout collected in the downstream trap were scale sampled, measured, weighed, finclipped and released. Scales were imprinted on plastic and the images enlarged by a microprojector for analysis.

Fish were collected from Young Creek above the trap by electrofishing.

Rotenone was used to suppress the resident fish population. A concentration of 2.5 ppm was maintained in the stream for 10 hours. The rotenone was detoxified by potassium permangenate maintained at a concentration of 3.2 ppm for 13 hours.

A velocity head rod was utilized to make discharge measurements in cubic feet per second.

A 30-day Foxboro recording thermograph was used to monitor temperatures.

OBJECTIVES

The specific objectives of this project for fiscal year 1971 were: (1) remove potential barriers to fish migration; (2) eliminate or reduce resident fish populations in areas which native migratory cutthroat do not utilize; (3) make imprint plants of adfluvial cutthroat trout in areas relatively free from competition by resident fish; and (4) evaluate fish trapping structures.

FINDINGS

Habitat Development

Probable barriers to fish migration were removed downstream from the junction of the North and South Forks to the Kootenai River, a distance of

11 miles. Following barrier removal resident fish populations were eliminated with rotenone below the junction of the North and South Forks downstream to Section 15 T37N R28W, a distance of seven miles. Rotenone was detoxified in Section 15 because fish population data collected in 1969-70 indicated that Young Creek below this section served as a spawning and rearing area for fluvial cutthroat from the Kootenai River.

Adfluvial Fish Population

Approximately 50,000 adfluvial cutthroat sub-fingerlings were planted in the chemically treated area. These cutthroat are progeny of adults collected from a tributary of Hungry Horse Reservoir. They should live in Young Creek for two years then migrate to the reservoir in 1972. The enumeration of out-migrate juveniles will permit preliminary evaluation of the success of the imprint plant. Following two years of life in the reservoir the adfluvial cutthroat should return to Young Creek and spawn in the spring of 1974. At this time, more complete evaluation of the success of the repopulation by imprint stockings will be possible.

Fluvial Fish Population

Information collected from population sampling and from landowners along Young Creek indicated that the creek historically supported a spawning run of fluvial cutthroat from the Kootenai River. Landowners also reported, that in years past, a few Dolly Varden had utilized Young Creek for spawning. Neither source of information gave any indication that mountain whitefish from the Kootenai River spawned in Young Creek. This was substantiated by observations and fish population sampling in the fall of 1970.

The upstream fish trap was operated from April 25, 1971 through June 5, 1971 and a total of 54 fluvial cutthroat was caught in the trap. These fish were measured, tagged, sexed, spawned and released downstream from the trap. About 20,000 eggs were collected and will be reared in a hatchery. These fish will be utilized where needed to establish fluvial stocks of cutthroat trout in suitable streams such as the Fisher River. Eggs from four pair of fish were observed for chromosome study.

The study ratio of the 1971 run was 1 male to 2.6 females. Males had an average length and weight of 13.8 inches and 1.00 pounds, whereas females averaged 13.9 inches in length and 1.10 pounds. The males ranged in size from 10.0 to 16.2 inches and females from 11.4 to 16.9 inches.

The downstream trap was installed on April 6, 1971 and fished continuously throughout April. Trap operation in May and June was sporadic because of high flows. The flows during May ranged from a low of 24 cfs to a high of 106 cfs and averaged 60 cfs. Flows remained high throughout June, averaging 55 cfs. Movement of bed-load material and vast quantities of drifting organic debris precluded operation of the downstream trap during most nights. Screen cleaning was required at less than 1/2 hour intervals on many nights. The debris problem was intensified by the movement of material from old beaver dams which has been broken open during the barrier removal work.

Data on the downstream movement of juvenile cutthroat in 1970 and 1971 are summarized in Table 1. A total of 498 juveniles was passed through the downstream trap from April through July 1970. There were 19 nights when the trap was removed because of high discharge and large amounts of debris, an estimated 31 juvenile trout moved downstream during this period. The total estimate is minimal because the operation of the trap was not 100 percent efficient and small numbers of juveniles move downstream before installation and after removal of the trap.

Timing of the downstream movement of juveniles in 1971 appears to be different than in 1970. From April through June 1971 only 62 juveniles were passed through the downstream trap as compared to 400 in 1970. The estimated total of juveniles moving downstream during this period was 431 cutthroat in 1970 and 150 in 1971. Downstream migrants numbered 370 juveniles in June 1970 as compared to an estimated 39 in June of 1971. Movement in 1971 increased the first week of July averaging four fish per day. Data collected after July 7 are not presented.

Preliminary data indicate that the timing of juvenile migration may be controlled by discharge volumes. The discharge in June, 1970 was less than 20 cfs. In contrast, the discharge in June, 1971 ranged from 25 to 81 cfs and averaged 55 cfs. When the discharge dropped below 20 cfs on July 1, catch rates increased dramatically.

Juveniles caught in the downstream trap in 1970 ranged in total length from 1.9 to 8.7 inches and had an average length of 6.1 inches. The age composition of the 1970 juvenile migrants was calculated to be: Age I- 8 percent; Age II- 70 percent and Age III- 22 percent. The age composition may be subject to bias caused by growth of fish from April through July. The bias can be minimized by segregating the outmigrants by two week periods and analyzing the growth and age composition for each period separately.

A total of 33 more cutthroat spawners was captured in the trap in 1971 than in 1970. The recapture of four unmarked adult spawners in the downstream trap indicated that the 1971 run was greater than the 54 fish actually trapped. An estimated 50 to 100 fluvial cutthroat spawned in Young Creek in 1970 including the one mile of stream below the trap. The estimate for total numbers of fluvial cutthroat spawning in 1971 above and below the trap would be a minimum of 100 and maximum of 300 fish. It appeared that removal of potential barriers below the trap could have facilitated movement of cutthroat into the drainage. A culvert near the mouth of Young Creek which may have been a partial barrier in previous years was blocked by debris in 1971 and water was diverted over the railroad enabling fish to by-pass the culvert.

The age and growth data for fish collected in the Young Creek trap during 1970 are summarized on Table 2. The actual lengths of juvenile fish at time of most recent annulus formation are represented by the March 15, 1971 collection. The back calculated lengths should closely agree with actual lengths if the body-scale relationship used is valid. For purpose of this calculation it was assumed that relationship between fish length and scale length was linear with an intercept at zero. Accurate aging is prerequisite to accurate estimates of survival of year classes.

Table 1. Juvenile cutthroat collected in downstream trap in Young Creek for April, May, June and July, 1970 and April, May and June, 1971

	April		May		June		July
	1970	1971	1970	1971	1970	1971	1970
Average No. Per Day	0.4	0.6 1/	1.6 2/	3.0 3/	11.9	1.3 4/	3.2
Number Per Month	11	15	19	24	370	23	98
Estimated No. Per Month	11	18	50	93	370	39	98
Average Length (inches)	2.9	3.9	4.7	4.5	6.4	6.2	5.9
Size Range (inches)	1.9-5.6	2.0-7.1	2.3-8.1	2.5-8.1	1.9-8.7	4.8-8.3	3.1-8.4

1/ Based on 25 days of operation.
2/ Based on 12 days of operation.
3/ Based on 8 days of operation.
4/ Based on 16 days of operation.

Table 2. Summary of growth of cutthroat trout collected from Young Creek fish trap, spring 1970 and Young Creek above the fish trap, March 1971

Type of Fish	Date of Collection	Length in inches at each annulus					Number of Fish Aged
		I	II	III	VI	V	
Juvenile trout	March 1971 1/	2.5	4.3	6.1			68
Juvenile trout	June 1970 2/	1.6	4.5	6.4			162
Adult trout	June 1970 2/	2.4	5.7	9.4	12.1	14.7	15

1/ A virtual annulis was assigned to these fish at the scale edge. These lengths are not back calculated. They represent the actual average length for each age group at the time of most recent annulis formation.

2/ These averages are based on back calculation from nomograph data which assumes intercept is 0 and body-scale relationship is linear.

The empirical and back calculated lengths for the Age II and III juvenile fish agree quite well but there is considerable difference between the back calculated and empirical lengths at Age I. The difference results from three variables: (1) the electrofishing gear was probably more selective for the larger Age I fish in the March 1971 collection; (2) a test plotting of the scale data showed that the intercept was approximately 0.6 inches on the positive scale and (3) scales were not taken from the exact same location on the fish for different sampling dates.

Brown (1952) found scale formation was not completed in many young-of-year yellowstone cutthroat from Yellowstone Lake and therefore some fish did not lay down a normal annulus the first year. This problem exists to a certain extent in cutthroat trout from Young Creek; however, scales taken from the first row above the lateral line generally have an annulis because these are the first scales to be formed. A collection of young-of-year cutthroat should be accomplished at the end of growing season in October to determine the actual growth during the first year. This will provide additional criteria for calculating a valid body-scale relationship.

Back calculated growth at Age I, II and III of adult spawners captured in the upstream trap in 1970 is greater than the actual growth of fish collected in March 1971 for the same age groups. This results primarily from the fast growth rates associated with their life in the Kootenai River. The small sample size precludes a detailed analysis of growth but the growth rates appear to be comparable to adfluvial cutthroat from Hungry Horse Reservoir (Huston 1969).

RECOMMENDATIONS

1. Collect cutthroat in Young Creek at end of growing season to determine actual length at annulus formation, growth and survival of imprint plants.

2. Segregate age and growth data for outmigrant juveniles by two week periods to minimize bias caused by growth throughout the period of migration.

3. Survey Young Creek for migratory game fish spawners from Kootenai during the fall.

4. Operate downstream trap on occasion throughout the year to estimate number of juveniles moving out of the drainage other than in the April to August period.

5. Install a trash barrier in the bypass channel to make maintenance of downstream trap easier.

Prepared by Joe Huston & Bruce May — Approved by Art Whitney

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