MONTANA FISH AND GAME REPORT

In Cooperation with U.S. Army Corps of Engineers

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Fisheries Division

Job Progress Report

Annual Progress Report

HABITAT DEVELOPMENT OF YOUNG CREEK, TRIBUTARY TO LIBBY RESERVOIR, July 1, 1972 - June 30, 1973

By

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Reservoir Investigation Project

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ANNUAL REPORT, 1972-1973

Habitat Development of Young Creek

ABSTRACT

The number of cutthroat trout (Salmo clarki) entering Young Creek from Lake Koocanusa for spawning increased markedly in 1973 compared to previous years. Some of these fish were adfluvial westslope cutthroat trout (S. clarki subsp.) from imprint plants made in Young Creek. About 1,300 outmigrant juvenile cutthroat trout were captured by the downstream trap in the first six months of 1973. The downstream trap is not 100 percent efficient so the actual numbers of outmigrants is higher. Survival of the hatchery-reared cutthroat planted in Young Creek continues to be excellent.

BACKGROUND

Young Creek was selected to determine the feasibility of establishing spawning runs of non-indigenous strain of adfluvial westslope cutthroat trout into suitable reservoir tributary streams. Young Creek enters Lake Koocanusa from the west about two miles south of the Canadian border. Annual flows range from peaks of about 100 cfs to lows of 5 cfs. Water temperatures range from 33° F. to 65 - 70° F. Indigenous fish species found in the creek included fluvial[1/] and resident westslope cutthroat, rainbow trout (Salmo gairdneri) and brook trout (Salvelinus fontinalis). Physical and biological information is presented by Huston and May[2/].

The Corps of Engineers designed and built an upstream-downstream fish trap immediately above full-pool elevation of Lake Koocanusa in fall 1969. Department of Fish and Game personnel removed barriers inhibiting free movement of fish from the junction of North and South Fork Young Creek to Kootenai River (about 15 miles) in summer of 1970. The existing fish population from the junction of the North and South Forks downstream a distance of about 11 miles was removed using rotenone in August 1970 and the initial plant of adfluvial westslope cutthroat trout was made in September 1970. Annual plantings of about 50,000 fingerlings cutthroat have been made annually since 1970.

1/ Fluvial refers to fish that migrate from a river to spawn in a tributary stream, whereas adfluvial refers to fish that migrate from a lake or reservoir to spawn in a river or stream.

2/ Huston, Joe E. and Bruce May. 1970. Habitat Development of Young Creek, Tributary to Libby Reservoir. Annual Progress Report, Contract No. DACW 67-70-C-0002, Montana Department of Fish and Game. 5pp.

Work done during the period of July 1, 1969 through June 30, 1972 is detailed by May3/. Briefly, Young Creek was found to support a small spawning run of cutthroat trout, rainbow trout and rainbow-cutthroat hybrids from Kootenai River. The spawning run in 1970, 1971 and 1972 was 21, 54 and 78 mature fish respectively. The increasing numbers of adult fish caught each year is thought to be primarily related to stream channel and reservoir pool clearance activities including removal of a culvert below the trap site.

The catch of outmigrant juvenile fish was 498 fish in 1970, 147 in 1971 and 352 in 1972. The downstream moving fish caught in 1970 and 1971 were thought to be primarily progeny of fluvial spawning fish while the catch in 1972 was thought to be primarily fish from the imprint plants. Spawners from Kootenai River (fluvial fish) were not passed upstream through the trap in 1971 through 1973. These fish were artificially spawned and the eggs moved into Department hatcheries.

Adfluvial cutthroat trout spend from one to three years in the natal stream before emigrating downstream into the lake or reservoir. They spend from one to three additional years in the lake before returning to the natal stream to spawn. The majority of fish spend two years in the natal stream and two years in the lake before maturing and returning to spawn. The first adfluvial cutthroat were planted in Young Creek in fall of 1970 as age-class 0+ fish. These fish should have emigrated from Young Creek in 1972 and should return to spawn the first time in spring 1974. A few fish were expected to return to spawn in 1973 as precocius individuals. These "early" spawners are generally males.

PROCEDURES

Adult cutthroat trout collected in the upstream trap were scale sampled, measured, weighed, sexed, tagged, released upstream or spawned and released downstream. Fish more than 13 inches total length were judged to be fluvial cutthroat and they were spawned and released below the trap. The eggs of these fish were taken to the Flathead Lake trout hatchery. Fish less than 13 inches total length were judged to be adfluvial cutthroat and they were released above the trap to complete spawning naturally.

Juvenile cutthroat trout collected in the downstream trap were scale sampled weighed, measured, marked by fin removal and released downstream. Methods outlined by Vincent were used during electrofishing operations and to calculate population estimates in Young Creek4/. A 30-day Foxboro thermograph was used to monitor water temperatures.

3/ May, Bruce. 1972. Habitat Development of Young Creek, Tributary to Libby Reservoir, 1969-1972. Annual Progress Report, Contract No. DACW 67-70-C-0002, Montana Department of Fish and Game report. 8pp.

4/ Vincent, E. R. 1969. River Electrofishing and Fish Population Estimates, Montana Department of Fish and Game methods, Mimeo. pp. 1-7.

OBJECTIVES

The primary objective of this project is the conversion of Young Creek into a spawning and rearing stream for westslope cutthroat trout from Lake Koocanusa (Libby Reservoir). The objectives of this fiscal-year segment were to monitor upstream and downstream fish movement through the Young Creek trap, determine survival of adfluvial cutthroat trout planted in Young Creek, determine growth patterns of cutthroat in Lake Koocanusa during its first year of impoundment, and evaluate the fish trapping facility and design improvements.

FINDINGS

Adult Spawning Fish: It was anticipated that a few precocious spawners from the first imprint plant made in Young Creek in 1970 would return to spawn in 1973. The number of fish captured in 1973 totalled 103 fish; an increase of 25 fish over 1972 and 82 over 1970. It was noted that generally the fish fell into two size catagories, those less than 13 inches long and another group more than 15 inches long. The smaller size group included two fish that had been marked leaving Young Creek as juveniles in 1971 probably from the 1970 imprint plant. Basic coloration differences were noted between the smaller and larger size groups indicating that the smaller fish were likely adfluvial cutthroat and the larger fluvial cutthroat.

Many of the smaller size trout were males. Male fish frequently mature at an earlier age than females. Several females were also found. Fast growth rates by fish in new impoundments may result in maturation at an earlier age than in less fertile waters.

Analysis of scale samples for age determination and growth rates and patterns will aid in determination of whether an individual fish was adfluvial or fluvial. These data will be reported in future progress reports.

Juvenile Outmigrant Fish: About 50,000 fingerling adfluvial westslope cutthroat trout were planted in Young Creek in 1970, 1971 and 1972. An additional 32,000 were planted in 1973 because of the extreme drawdown of Lake Koocanusa and the subsequent loss of Young Creek fish out of the reservoir into Kootenai River in winter 1972 - 1973.

The downstream trap was operated a total of 103 days out of the possible 122 days from April through July, 1973. Total catch of outmigrant juvenile cutthroat trout was 1,260 fish. The next highest catch was recorded in 1970 when 498 fish were caught during 109 days of trapping.

The 1970 catch was all fluvial cutthroat since no adfluvial fish had yet been planted in Young Creek. Fluvial spawning cutthroat were not allowed upstream past the trap to spawn in Young Creek in 1971, 1972 or 1973. The catch of juvenile cutthroat trout in 1973 should have all been adfluvial fish from the imprint plants made in 1970 - 1972.

Preliminary size distribution of the downstream catch indicates that a majority of the fish were two years old. The next most abundant age was three years old and the least abundant, 1-year old fish. Two-year old fish would have been from the imprint plant of 1971, 3-year old fish from 1970, and 1-year old fish from 1972.

Data from Hungry Horse Creek, tributary to Hungry Horse Reservoir, showed that the order of abundance in the outmigrants was age-class II, age-class I and age-class III being the least abundant[2/]. Outmigration pattern of the westslope cutthroat trout is probably controlled by a combination of genetics and population densities in the rearing stream. Population densities may not have been great enough in Young Creek until after the plantings of 1972 were completed to create conditions compatible for large outmovement of juvenile fish. Low population densitites may have accounted for the lack of outmovement of the 1970 imprint plant until 1973 when they should have moved downstream in 1971 and 1972.

Future planting of Young Creek with hatchery fish will be dependent upon numbers of spawners from the reservoir entering the drainage. It is estimated that a spawning run with a minimum capacity of 250,000 eggs is needed to retain present fish population densities.

Instream Fish Populations: In August 1970, the upper 11 miles of Young Creek were chemically treated to remove the existing cutthroat - brook trout population. The lower 4 miles were not treated. Fish population samplings has been limited to two 1,000 foot-long creek sections; one about in the middle of the treated area (section 3) and the other in the lower mile of the untreated area (section 1).

Section 3 is sampled to determine survival of the planted fish, standing crop estimates and reinvasion of the area by brook trout. Section 1 is sampled to determine standing crop estimates and influence of a migratory cutthroat population on a resident brook trout population.

Prior to start of planting in 1970, the fish population of section 1 was fluvial cutthroat trout and brook trout. Electrofish sampling conducted in 1972 showed that the population mix has changed to about 90 percent cutthroat and 10 percent brook trout (Table 1). Standing crop estimate for this section was 446 fish one year old or older.

Table 1. Population estimates of cutthroat and brook trout in section 1 of Young Creek, July, 1972.

	Number of	
Age-Class	Brook Trout	Cutthroat Trout
I	20	272
II	11	87
III		54
IV		2
Total	31 ± 29%*	415 ± 29%*

* 95 percent confidence limits

2/ Huston, Joe E. 1972. Reservoir Investigations, Job Progress Report, Federal Aid to Fish Restoration Project F-34-R-5, Job III-a, Montana Department of Fish and Game, 7pp. mimeo.

Prior to chemical treatment, the fish population of section 3 was about 50 percent brook trout and 50 percent resident cutthroat trout. Adfluvial cutthroat trout have been planted in and around section 3 annually since 1970. Fish population sampling done in July 1972 indicated that the population composition in section 3 was almost all cutthroat trout indicating very little reinvasion by brook trout (Table 2).

Table 2. Population estimates of cutthroat and brook trout in Section 3 of Young Creek, July, 1972.

Age-Class	Brook Trout	Cutthroat Trout
I and II	8	
I		457
II		186
III		5
Total	8 ± 67%*	648 ± 26%*

* 95 percent confidence limits

Survival rates from year to year for each of the imprint plants of adfluvial cutthroat trout have been excellent (Table 3). Survival rates are likely directly related to chemical treatment of the stream in 1970 reducing or eliminating competition and predation by a resident fish population. The actual survival of each years' plant is higher since the instream sampling does not take into account outmigration of juvenile fish. Growth rates of the adfluvial fish have been slightly slower than anticipated and this may be related to the chemical treatment temporarily reducing insect populations.

Table 3. Annual survival rates of adfluvial cutthroat trout planted in Young Creek.

Year of Plant	Number planted per 1,000 feet of stream	Percent survival to 1971	Percent survival to 1972
1970	1,350	29.2	47.2
1971	1,350	--	33.4

Evaluation of Fish Trapping Facilities: Downstream trap efficiency has been rated good at flows of less than 50 cfs but poor at higher volumes. Flows greater than 50 cfs occur during the spring run-off and carry large amounts of small-size debris. The debris plugs the incline screens necessitating continual washing or removal of screens. One quarter inch mesh screen is normally used and mesh size of 3/8 inch has been tried. This larger mesh will work with continual washing to flows of about 75 cfs, but fingerling-size fish may be lost through the mesh. Efficiency is also poor during the period of the year when considerable water has to be passed through the bypass channel to attract upstream-moving fish into the upstream trap.

Downstream trap efficiency may be improved by installation of trash screens in front of the incline screens to capture the larger floating debris yet allow fish movement. A downstream trap could be installed in the bypass channel without disturbing attractiveness to upstream-moving fish. Efficiency

of the present trap should be determined by moving marked outmigrant fish immediately above the trap, releasing and retrapping them. Upstream trapping efficiency should be 100 percent with proper maintenance of the upstream trap leads.

Miscellaneous Information: It was anticipated that good numbers of adults from the 1970 imprint plant should return to spawn in Young Creek in spring 1974. The drawdown of Lake Koocanusa to elevation 2230 msl in winter 1972 resulted in many cutthroat trout leaving the reservoir and moving into Kootenai River below Libby Dam. Three cutthroat trout marked as outmigrant juveniles at the Young Creek downstream trap were recaptured from the Kootenai River below Libby Dam in winter-spring 1973. Quantative exodus of Young Creek cutthroat from the reservoir into the river below the dam is not known but the possibility exists that enough moved downstream to severely limit the return of adult spawners.

Large numbers of the 1970 and 1971 imprint plants emigrated from Young Creek into the reservoir in 1973. It is anticipated that Lake Koocanusa will be drafted to or near elevation 2230 again in winter 1973 resulting in another exodus of fish from the reservoir into the river below Libby Dam. If this occurs spawning runs of adult fish into Young Creek for 1974 - 1976 may be greatly reduced. Planting of Young Creek with hatchery-reared fish may have to be continued several years beyond the anticipated cut-off date (1972) to keep instream fish populations at an acceptable level.

The U. S. Geologic Survey is operating a continuous-recording flow gauge in Young Creek about 100 yards above the fish trap. This recorder will be operated for the period of April 1, 1973 through September 30, 1974. Operation thereafter will likely be limited to about 8 months each water year. Flow data collected in 1973 and 1974 will be analyzed to determine how much water should be filed on as a reservation for recreational and fisheries uses under Montana's new water-use laws.

A rancher owning land along Young Creek above the fish trap is constructing an irrigation system to withdraw water from the creek. He has assured Department personnel that he will not dewater the creek and that he will take precautions to reduce fish loss from the creek into the irrigation system.

RECOMMENDATIONS

Recommendations listed below are those items needing work that are not specifically listed in the DACW 67-70-C-0002 contract.

1. Efforts should be made to improve downstream trap efficiencies during periods of flow greater than 50 cfs. Methods to be investigated should include installation of trash screens in front of the trap and installation of a downstream trap in the bypass channel.

2. Efficiency rate of the downstream trap should be determined for different creek volumes.

3. The irrigation diversion located above the trap should be inspected periodically to determine fish loss from the creek. Efforts to reduce fish losses, if they occur, should be made with cooperation from the rancher.

4. Mechanical removal of brook trout and their replacement with adfluvial cutthroat trout may be advisable to increase production potential of the drainage.

5. Hatchery-reared cutthroat trout may have to be planted in Young Creek in 1974. Numbers of fish entering the drainage to spawn may not be sufficient to maximize instream population densities.

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