STATE OF IDAHO

DEPARTMENT OF FISH AND GAME

Ross Leonard, Director

FEDERAL AID TO FISH RESTORATION

COMPLETION REPORT

EXPERIMENTAL ROUGH FISH CONTROL

F 22-R

1955 - 1960

By

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Objectives

To determine if the quality of fishing for game fish could be improved by the removal of significantly large numbers of rough fish from waters where complete eradication is impractical.

To evaluate the economics and practicability of several methods of control of undesirable species of fish.

To conduct age-growth and population enumeration studies to evaluate the effects of removal of large numbers of undesirable species of fish from a stream or lake.

Summary of activities

Two attempts were made in 1955 to estimate the populations of fish in Lake Lowell, Idaho by mark-and-recovery methods. Both the spring and fall attempts were unsuccessful because of the low rate of recovery of marked fish. Hoop nets and seines were used as the sampling gear. (Cuplin, 1956)

Trammel nets, seines, try nets, and four different types of traps were tested in 1955 at Lake Lowell to determine their relative efficiency and the economics involved in the use of these devices to take rough fish species. Catches of rough fish by all types of gear tested were low and inconsistent.

A third attempt to estimate the fish populations in Lake Lowell was made in the fall of 1956 (Richards, 1957). Bullhead and perch were captured in hoop nets. Carp were taken in seine hauls.

The calculated population estimate for bullheads ranging in size from 6 to 18 inches total length was 959,161 within confidence limits of

$\underline{N}$ 811,205 and $\overline{N}$ 1,134,153 at the 95 percent confidence interval. The calculated carp population between 14 and 29 inches was estimated to be 1,279,999.

Various traps, fyke nets, trammel nets, and gill nets were tested in 1956 to determine if economical, limited-scale methods of rough fish harvest could be developed which would encourage more participation in commercial fishing in Idaho (Richards, 1957).

Concurrent with this, a study was made of rough fish market conditions and methods of processing rough fish. It was determined that under the existing market conditions the catches from the most efficient traps and nets tested could not be marketed profitably.

During the last three years of the project, 1957 through 1959, the objective of the project was shifted from the development of commercial methods of harvest to investigations of the life history of rough fishes and experimentation with partial control measures directed at susceptible periods of the individual species' life cycle (Richards, 1958; Keating, 1959; Fill and Keating, 1960).

Life history studies of carp at Lake Lowell and of squawfish in lakes near McCall, Idaho on the North Fork of the Payette River were conducted to determine when and where these fish populations concentrated and were susceptible to methods of partial rough fish control designed for specific situations.

Specific and intraspecific variations in the behavior of the fishes studied are discussed in detail in the annual reports. It was found that mature individuals of both species congregated during their spawning activities and that partial control measures against the spawners or the resultant fry could result in the destruction of large numbers of rough fish.

At Lake Lowell mature carp congregated in shallow, protected bays in April and May when surface water temperatures reached approximately 60 degrees Fahrenheit. The spawning activity usually occurred in water four feet or less in depth among aquatic and flooded terrestial vegetation during periods of calm, warm weather. Carp moved offshore during periods of inclement weather, but returned to the spawning areas when the weather again became calm and warm.

Squawfish habits were studied primarily at Cascade Reservoir and its tributaries; but observations were also made at Payette Lake, Upper Payette Lake, Little Payette Lake, and the tributaries of these waters.

Squawfish in Cascade Reservoir and Payette Lake were found to be primarily stream spawners unlike the lake spawning populations found in some north Idaho lakes (Jeppson, 1957). Observations at Upper Payette Lake and Little Payette Lake indicated that the squawfish populations in these lakes were primarily lake spawners.

Both Cascade reservoir and Payette lake had surface water temperatures of 50 to 60 degrees Fahrenheit when squawfish "ripened" and entered the spawning tributaries. Observed spawning took place in water at temperatures of approximately 60 degrees F. and above. Those tributaries of all lakes which were not used for spawning had water temperatures some 10 degrees F. lower than those waters in which spawning took place.

Squawfish spawned on large rubble in riffle areas and at the lower end of pools. Individual fish apparently left the streams soon after spawning. Squawfish fry gradually drifted downstream during the summer after hatching.

Experiments involving the application of Pro-Nox-Fish, an emulsifiable rotenone compound, to concentrations of spawning carp by a spray plane were conducted in 1957, 1958, and 1959. Various concentrations of

chemical and methods of application were tested to develop economical and effective methods of application.

Carp were effected by, but escaped from, the chemical when applied at a rate of one part per million. A concentration of two parts per million mortally affected most of the carp in the area treated with very few leaving the area. In one experiment two parts per million of Pro-Nox-Fish were applied in alternate, parallel strips across the area. A high percentage of the fish in the area was killed with a considerable reduction in chemical and flying costs.

These tests were conducted to improve and refine the methods of application. However, approximately 100,000 and 200,000 adult carp were killed in 1958 and 1959 respectively at Lake Lowell. Because of the limited size of the areas sprayed compared with the total spawning areas being used, it is estimated that the numbers of carp killed were substantially less than one-half of the carp spawners in the lake.

Chemical control measures directed at squawfish spawners were tested in 1958 and 1959 in the North Fork of the Payette river above Cascade reservoir. This same section of river was treated in 1959 after the fry emerged from the gravel.

Progressive refinement of the stream treatments resulted in effective kills of squawfish spawners and fry with Pro-Nox-Fish used at rates of one part per million and one-half part per million respectively. The toxicant was introduced into the stream by drip stations at rates based on the stream flow downstream.

Approximately 250,000 adult squawfish were killed during each treatment of the North Fork of the Payette river in 1958 and 1959. These fish were estimated to be at least 80 percent of the total number of spawning

squawfish from Cascade reservoir. No attempt was made to estimate the large number of fry killed in 1959. Relatively minor numbers of suckers, whitefish, and trout were killed during each treatment.

Preliminary plans based on life history study findings call for treatments of squawfish spawners and fry for four or five consecutive years until the immature fish which remain in the reservoir mature and enter the river to spawn.

Age-growth samples, species composition of net catches, and creel census data were collected in 1958 and 1959 so that changes in the fish populations of Cascade reservoir can be evaluated in the future.

In 1959 a weir was constructed across Lake Fork creek, a tributary of Cascade reservoir, to determine the effectiveness of this type of trap as a control method and to gather fish movement data. A limited amount of movement data was gathered but the trap was not effective during high stream flows and was finally discarded.

Discussion

Under the economic conditions existing during the course of this project it was determined that there was little hope for developing local markets for rough fish. Control of rough fish by encouraging increased commercial harvest of these fish appears to be unlikely; however, increases in the demand and value of rough fish may change conditions in the future.

Commercial fishermen must be able to maintain a high level of catch to stay in business. If their fishing effort is efficient and results in lower populations of rough fish, the catch-per-unit-of-effort will drop. It is very questionable if commercial fishermen could operate on a sustained basis without "farming" the fish population involved. The development of commercial fisheries and markets based on the fisheries could

seriously interfere with future plans for other types of rough fish controls which would be more efficient.

The use of water drawdowns, toxicants, explosive, nets and traps, migratory blocks, and other types of partial control methods are feasible if the proper conditions exist. Basic life history studies are needed; however, the control of rough fish in a given body of water will depend on the physical characteristics of that water and its tributaries. Spawning areas may be limited or extend along the complete shore of a reservoir. Water temperatures of different tributaries may vary and influence the movement of rough fish - as was suspected at Cascade reservoir. Isolated populations of the same species may have entirely different spawning habits - as was found with squawfish.

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