TR 75-10

MICHIGAN DEPARTMENT OF NATURAL RESOURCES

Fisheries Division

Technical Report: No. 75-10

November, 1975

EVALUATION OF SALMONID REPRODUCTION FOLLOWING INSTALLATION OF ARTIFICIAL SPAWNING RIFFLES

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SUMMARY

A habitat improvement program was undertaken on the Fishdam River, Delta County, Michigan in 1972 and 1973 with the intent of enhancing salmonid reproduction and habitat. Intense use was made of artificial gravel riffles in October and November of 1972, 1973 and 1974 by brook, brown and rainbow trout and by coho salmon in 1973 and 1974. Young of the year brook, brown and rainbow trout were encountered in substantial numbers during fishery surveys in 1973 and 1974, and juvenile coho salmon were taken for the first time in 1974. One live brook trout egg and several sac fry coho salmon were taken during an analysis of salmonid redds during February of 1975.

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INTRODUCTION

The Fishdam River lies in the eastern part of Delta County in the Upper Peninsula of Michigan. It originates in VanWinkle Lake and flows southward into Big Bay de Noc on Lake Michigan.

Fishery surveys in the upper reaches of the river in the 1950's and 1960's revealed a low trout population experiencing little natural reproduction. Brown trout (Salmo trutta) were periodically planted in the stream through 1973, and brook trout (Salvelinus fontinalis) are native.

Salmonid reproduction was believed to be limited by a lack of spawning gravel and excessive quantities of shifting sand and silt. Groundwater discharge to this section of stream is substantial, and favorable temperature regimes exist throughout the year. The stream is of modest size, averaging about 15 feet wide in the study area with a discharge of 10 c.f.s.

METHODS AND MATERIALS

A habitat improvement program was undertaken during the summer of 1972 and 1973 on a one-mile portion of stream. One phase consisted of installing 66 log wing deflectors and covers, and the tiling of cold spring water directly into the stream bed. The other phase was concerned with creating 11 rock and rubble riffles with spawning gravel and developing three specially designed spawning riffles.

Electro-fishing surveys were conducted during the fall of 1973 and 1974 to determine what changes, if any, were occurring in the salmonid populations. Success of salmonid redds was determined by raking and disturbing several inches of gravel and rubble and using a fine mesh hand net to capture eggs, fry, invertebrates, and any other material that might drift downstream. Analysis of length frequency distributions of brown trout taken in surveys allowed for the separation of wild young of the year browns and hatchery fingerlings.

RESULTS AND DISCUSSION

A quantitative comparison of salmonid populations before and after habitat improvement was not possible because of the weakness of preliminary fishery survey data on the specific portion of the stream where improvement occurred. It can be stated though, that suitable spawning areas were essentially nonexistent in this area and that the overall salmonid populations were low and being partly maintained by annual stocking.

Brook and brown trout spawning activity was observed during October and November of 1972, 1973, and 1974 on artificial gravel riffles. Adult coho salmon (Oncorhynchus kisutch) spawning activity was common on the gravel riffles during November of 1974.

Wild young of the year brook and brown trout were taken during surveys in May and September 1973. A survey in November, 1974 found wild young of the year brook trout at a rate of 1.6 per hundred yards of stream and wild young of the year brown trout at a rate of 1.0 per hundred yards of stream. These figures are comparable to what was found in surveys made prior to habitat improvement.

Fisheries surveys in the 1950's covering 1750 feet of stream and in the 1960's encompassing some 2380 feet of stream failed to reveal the presence of rainbow trout, yet in the September, 1973 survey, young of the year rainbow were taken at a rate of 0.17 per hundred yards of stream. The occurrence of these fish increased to 0.70 per hundred yards of stream in the November, 1974 survey. In addition, yearling rainbows were encountered at a rate of 1.1 per hundred yards of stream in 1974.

Juvenile coho salmon were also taken in the November, 1974, survey. They occurred at a rate of 2.5 per hundred yards of stream and were the first natural salmon reproduction recorded in the Fishdam River. Coho salmon, having been introduced in Michigan waters in 1966, could not have been encountered in earlier surveys.

Attempts to recover salmonid eggs or sac fry from redds in February, 1974 resulted in no eggs or fry even though redds were quite common on the spawning riffles. Another attempt in the middle of January, 1975 resulted in recovery of sac fry coho salmon and one live brook trout egg. The sac fry coho salmon were quite active and capable of considerable swimming ability.

Thus the artificial gravel riffles are not only heavily used by brook, brown and rainbow trout and coho salmon, but some eggs of these fish incubate successfully to the sac fry stage. Evidence strongly suggests that the recent successful reproduction of rainbow trout and coho salmon in this area of the Fishdam River can be attributed to the addition of artificial spawning sites.