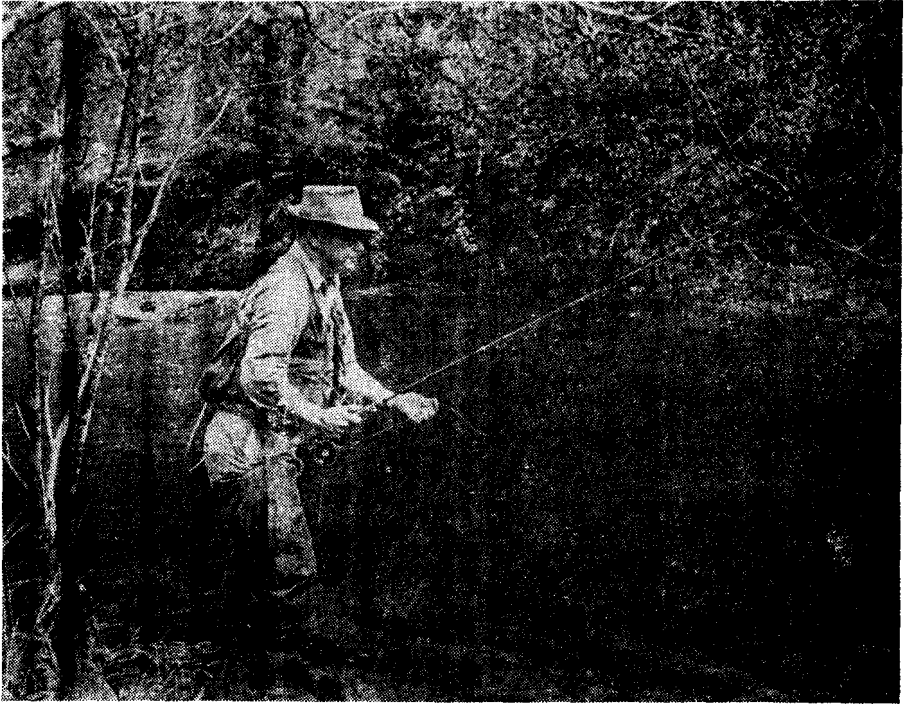


THE IMPACT OF INCREASING FISHING PRESSURE UPON WILD AND HATCHERY-REARED TROUT POPULATIONS



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ABSTRACT

Twelve years of trout stream management on the Standing Indian Wildlife Management Area in North Carolina has involved a fixed annual stocking of marked hatchery-reared trout. A complete creel census has been mandatory on the Area streams so that the catch of both stocked and wild trout could be followed.

It was concluded from this study that: (1) Wild trout populations deteriorated after two consecutive years of 40 trips per acre per year; (2) Hatchery-reared trout provided only a buffer to the destructive harvest of wild trout up to a point, then when the wild trout have been depleted the hatchery fish became dominant in the harvest; (3) Up to that point, harvest of wild trout, not the harvest of the stocked trout, upheld the trout fishery; and (4) Increased fishing pressure resulted in decreased average catch and catch per hour, whereas, decreased pressure resulted in higher average catches.

INTRODUCTION

The potential harvest of trout from a stream is influenced by: natural productivity, number of hatchery fishes stocked, mortality, and

fishing pressure. With a steadily increasing fishing pressure a point ultimately would be reached where the trout populations can no longer sustain a high catch rate.

In order to determine that point, a research study was initiated on the Standing Indian Wildlife Management Area in 1954.

The Standing Indian Wildlife Management Area encompasses 28,432 acres of land in Macon County, North Carolina. The principal stream on the Area is the Nantahala River which heads near the Georgia-North Carolina State line at an elevation of about 5,000 feet and flows north-northwest through the Area into Nantahala Reservoir. The major feeder streams within the Area are Kimsey, Park, Big Indian, Long, and Hem-patch Creeks. A barrier to prevent upstream migration of undesirable predator and competitor species has been present at the lower limit of the study area. Of the 43 miles of trout waters on the Management Area, 24 miles are large enough to provide good fishing. The major species of fishes in these streams are brook trout (*Salvelinus fontinalis*) (Mitchill), rainbow trout (*Salmo gairdneri*) Linnaeus, and brown trout (*Salmo trutta*) Linnaeus.

Regulations on the streams specify a creel limit of 10 and no lure restrictions except for the lower two miles of the Nantahala River where only artificial flies are permitted. Inasmuch as a mandatory creel census has been maintained since 1954, the catch of both wild and stocked trout has been followed.

METHODS AND PROCEDURES

The Area streams have been stocked with 6,000 trout annually divided into 550 brook, 1,100 brown, and 4,350 rainbow trout. The trout stocked ranged in size from seven to ten inches and were marked by amputation of the adipose and one pelvic or pectoral fin for later identification. Stocking was divided into one pre-season March stocking followed by smaller stockings at two-week intervals through the fishing season which extends from the first Saturday in April through Labor Day. The streams were open to fishing from 0600 hours to 2000 hours on Saturday, Sunday, Wednesday and major holidays.

As each fisherman checked out, the numbers of marked and unmarked trout, by species, in his creel, as well as the total hours fished, were recorded.

RESULTS AND DISCUSSION

The number of annual fisherman-trips recorded for the Standing Indian Wildlife Management Area increased from a low of 1,376 in 1954 to a high of 2,306 in 1961, after which the pressure dropped gradually to 1,598 fisherman-trips in 1965 (Figure 1). A breaking point occurred, but not as significantly as anticipated because of the inter-relationship between species of trout, the number of the stocked and wild trout, and the changing fishing pressure. This breaking point is depicted in the total catch, catch of wild trout, and catch per trip (Figure 1).

With a set annual stocking of 6,000 trout, the native trout population was jeopardized on the Area as the annual fishing pressure approached 2,200 trips or 40 trips per acre per season for two consecutive seasons. The anticipated catch rate of one trout per hour occurred until the pressure approached 2,300 fishermen in 1958. With the slight decline in pressure in 1959, the wild-trout harvest declined but the hatchery-reared fish harvest remained approximately the same. Again in 1961 and 1962 the fishing pressure reached approximately 2,300 men. This increased pressure was accompanied by a high wild-trout catch in 1961 and 1962 and hatchery-trout catch in 1962. After that, fishing pressure declined steadily through 1965. This indicates that a definite breaking point did occur in 1959 and 1963 or in other words after two consecutive years of pressure exceeding 2,200 fishermen. A pressure of 2,200 fishermen produced little effect on hatchery-reared trout until the wild-trout harvest declined sharply, then a decline of hatchery trout could be observed.

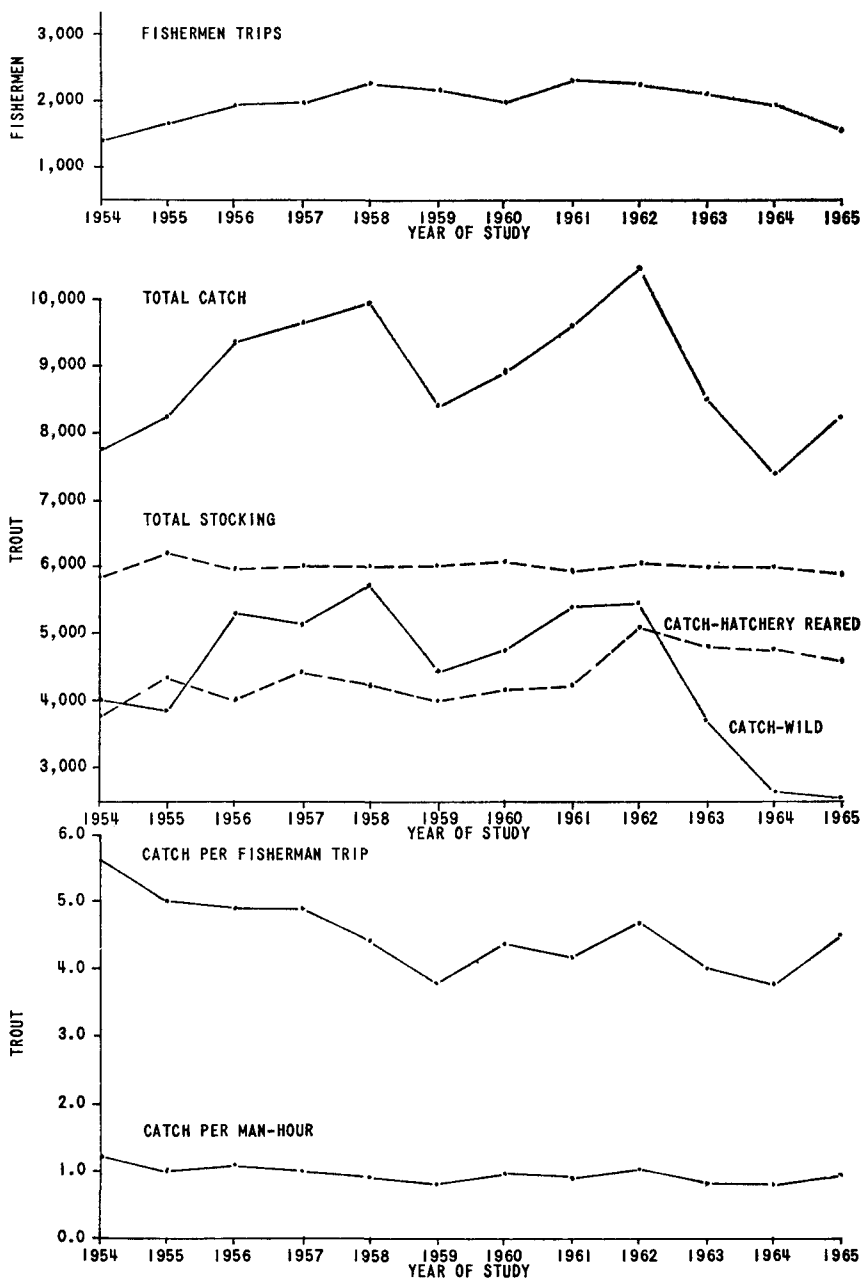


FIGURE 1. Annual fisherman trips, total catch, total stocking, average catch per trip and catch per hour of effort, Standing Indian Wildlife Management Area, 1954-1965.

An inverse relationship occurred between the fishing pressure and the average catch per hour and per trip. Increased fishing pressure resulted in decreased average catch and catch per hour, whereas, decreased pressure resulted in higher average catches.

To further evaluate the breaking point shown in 1959 and 1963, the status of the species composition of wild and hatchery-created trout was considered. The data shown in Figure 2 are mirror images as each is a function of the total harvest. The combined species total shows wild trout providing over 50 percent of the total catch from 1956 through 1962. Conversely, hatchery-reared trout provided well over 50 percent of the catch after 1962.

Wild rainbow trout provided in excess of 50 percent of the total rainbow catch from 1956 through 1961. Alternate peak year harvests of decreasing magnitude were evident in these years, but not in 1962 when the fishing pressure was the greatest. After 1961, hatchery rainbow trout dominated the total rainbow trout catch, making up a high of 67 percent of the 1965 catch. These data indicate an inconclusive breaking point was materializing as far back as 1959.

Wild brook trout in the total brook trout catch increased from a low of 46 percent in 1954 to a high of 76 percent in 1962, the second year of the peak fishing pressure. The wild brook trout status decreased in the years following but at no time did hatchery brook trout dominate the over-all brook trout harvest. Wild brook trout contributed to the stabilization of the combined species data. The quality of the brook trout fishery in 1965 was comparable to that of 1954.

The contribution afforded by brown trout to the combined species data was similar to that of the rainbow trout data, but in an inverse order. Wild brown trout, provided over 50 percent of the total catch of brown trout in only two years of the study, 1957 and 1961.

The average catch per trip declined from 5.6 in 1954 to 5.0 in 1955 at which time it held about constant until 1958, when it dropped to 4.4 and further to 3.8 in 1959. From 1959 to 1962 it gradually edged up to 4.7 in 1962, after which it again dropped as a result of two consecutive years of 2,200 fisherman-trips (Figure 1). This deviation is also reflected in the catch per man-hour.

CONCLUSIONS

It was concluded from the study that:

1. Wild trout populations deteriorate under the conditions of this study after two consecutive years of fishing pressure of 40 trips per acre per year.
2. Hatchery-reared trout provided only a buffer to the destructive harvest of wild trout up to a point, then when the wild trout had been depleted the hatchery fish became dominant in the harvest.
3. Up to that point, harvest of wild trout, not the harvest of the stocked trout, upheld the trout fishery.
4. Increased fishing pressure resulted in decreased average catch and catch per hour, whereas, decreased pressure resulted in higher average catches.

ACKNOWLEDGMENTS

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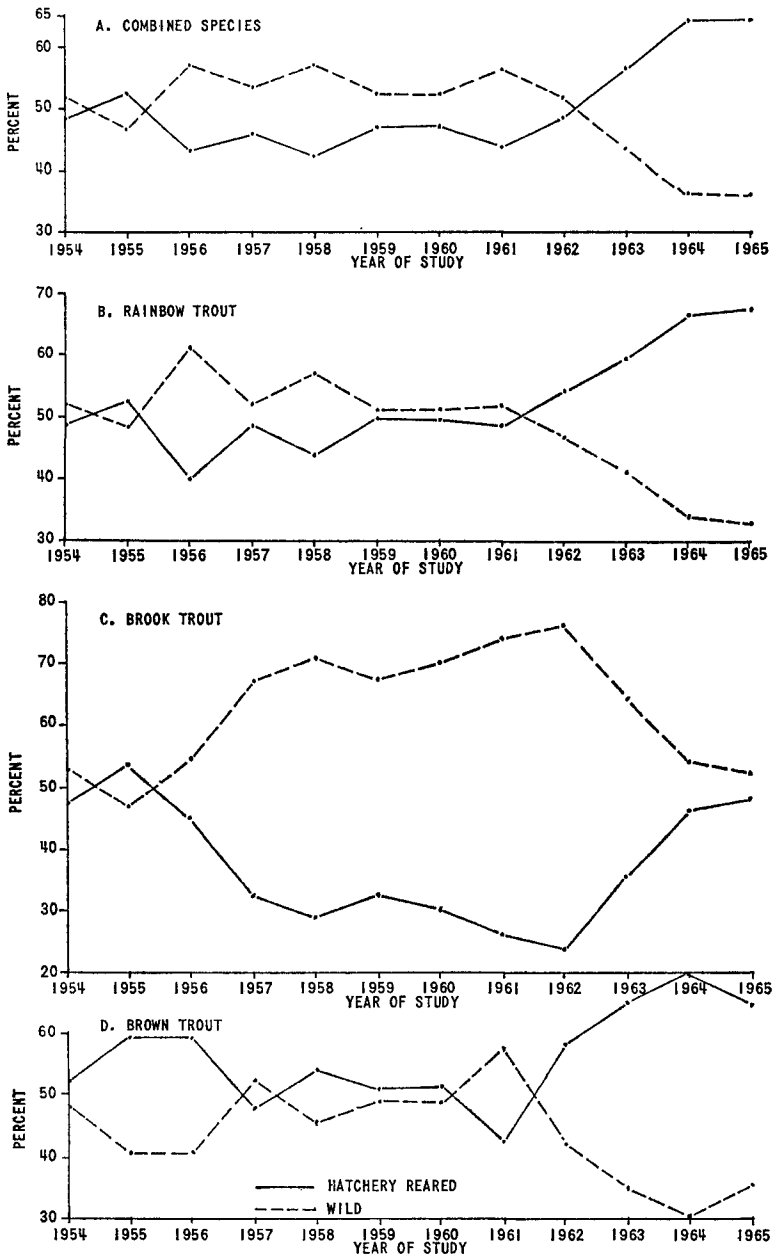


FIGURE 2. Percentage composition of hatchery-reared and wild trout in the total catch, Standing Indian Wildlife Management Area, 1954-1965.