

PONDS for IMPROVING STREAM FISHING

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SPORTSMEN, individually and as organizations, generally recognize the fact that stream fishing has become progressively poorer as the density of the country's population and concurrent fishing pressure have increased. Alarmed by this decline, they have sought methods for improving stream fishing. Most of the remedies tried have given disappointing results. The purpose of this publication is to present a method of stream-fishing improvement, and to point out those methods that have proved unsatisfactory.

Artificial restocking has been the method most widely used in an effort to improve stream fishing. Under this program a large part of the fish produced in hatcheries operated by various state and federal agencies has been liberated in streams each year. The results generally have been dis-

appointing. For example, Roach (4) reports that millions of small hatchery fish (small-mouth black bass, spotted black bass, rock bass, catfish, crappie, and bluegill bream) are planted in Ohio streams and lakes each fall; in 13 southeastern Ohio counties, however, less than 0.5 per cent of the 30,000 licensed fishermen catch stocked fish, and the stocked fish caught represent less than 0.03 per cent of those planted. Similarly, Surber (5), Westerman (6), and Hayford (2) report disappointing results from stocking fingerling trout in streams. There are two closely related explanations as to why annual restocking of streams does not improve the fishing. First, there are generally as many fish in a stream as the food supply can support. Consequently, adding more small fish will not improve fishing appreciably, unless the food supply is increased also. Secondly, the fish already in the stream are more than

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capable of producing all the little fish needed. Carbine (1), for example, studied the reproduction of bluegill bream and largemouth bass in a small lake, and found that each pair of spawning bluegills produced an average of 17,000 young and each pair of bass 7,000 to 8,000. Thus, each pair of bluegills produced enough young to stock more than 40 acres of streams or unfertilized lakes, and each pair of bass produced enough to stock approximately 300 acres. Therefore, the practice of annually pouring a few cans of bream or bass fingerlings into a stream must be considered generally as wasted effort.

After it became apparent that stocking streams with small fish did not improve fishing, certain Northern States began to use legal-sized trout. This resulted in temporary improvement in fishing, but, as Hazzard and Shetter (3) pointed out, it was a very expensive method. The practice of stocking legal-sized fish is too costly and impractical for use in southern streams where bream and bass are the principal species.

Closed seasons have also been tried as a means of improving fishing, but there is no evidence to indicate that they have

been of any value. In this connection Wiebe (7) states that good fishing has developed, and apparently is being maintained in the TVA lakes in northern Alabama without either closed seasons or intensive artificial stocking.

Stream improvement was widely practiced in trout streams during the early 1930's, when there was an abundance of CCC and PWA labor available. This consisted of building log or rock dams to form pools in streams. However, the log dams soon rotted or were destroyed by floods, and the pools filled with sand or silt. Fish culturists interested in trout streams now generally agree that the best method of improving such streams is to control erosion on the watershed. The same is true for other types of streams. As better soil conservation practices are adopted, stream fishing should improve, but this is a long-time program.

The construction and proper management of ponds on small streams appear to offer the best method of immediately improving stream fishing. The ways in which the well-managed ponds improve stream fishing are discussed in the following sections.

PONDS RESTOCK STREAMS

Unlike the fish truck that empties a few cans of little fish into the stream once a year, ponds continuously add small fish to the stream as long as water runs over the spillway. To determine the migration of fish over the spillway, a catch basin was constructed below the spillway of each of two ponds at the Alabama Agricultural Experiment Station. Between February 1 and October 1, 1939, a total of 6,882 small fish left a 1.5-acre pond built on a small stream. This total represents 24 separate losses during the season. A 1.3-acre pond built on a wet-weather branch lost a total of 13,888 small fish during 12 migrations in the same season. Similar results have been obtained during succeeding years, although the numbers of fish lost have varied depending on the

amount and distribution of rainfall. While both ponds supplied considerable numbers of small fish to the streams below, the losses were not sufficient to upset the balance, with plenty of small fish remaining in both ponds. It should be obvious to those who want state and federal hatcheries to continue restocking streams each year that the best and most economical procedure would be for the hatcheries to supply small fish to owners of new ponds. The natural migration of small fish to streams below would more than repay the hatcheries. For example, the two ponds previously mentioned supplied in one year approximately two and six times as many small fish to streams below as were used in the original stocking. Furthermore, without additional stocking the two ponds

continued to add small fish to the streams each year.

Again, unlike the fish truck that places only small bream and bass in streams, ponds add large fish to the streams below during periods of high water. Some adult fish are taken in the catch basins below the spillway of ponds at the Alabama Agricultural Experiment Station each year. For example, 10 adult bass (approximately 10 per cent of the total adult bass in the pond) and 24 adult bluegill bream went over the spillway of the 1.3-acre pond during a heavy rain late in March, 1943. These results substantiate the experience of fishermen who find that holes below dams frequently provide better fishing than ponds above. While some of the fish con-

gregated in such holes migrate from downstream and are stopped by the dam, most of them come over the spillway, as evidenced by the fact that fishing in the holes often is best following high water. Almost as many 5-pound bass are caught from a relatively small hole below a 30-acre pond near Auburn, Alabama, as are caught from the pond. The nature of the stream below is such as to exclude the possibility of the fish having grown in the stream.

Finally, some dams break during winter or spring floods each year, thereby adding large numbers of both small and large fish to the stream. Thus, the fishing downstream is improved at least temporarily.

PONDS INCREASE FOOD SUPPLY OF STREAMS

A large portion of the fish hatched each year are eaten by bass and other carnivorous fish. If this were not true, most bodies of water would be overstocked and

few of the fish would ever reach a desirable size. Thus, the principal function of the fish truck that empties a few cans of small fish into streams each year is to



Water leaving a well-managed pond carries fish and greatly increased quantities of fish food into the stream below, and thereby improves stream fishing.

provide a few high-priced meals for the bass already present. The pond, on the other hand, that continuously and recurrently loses small fish to the stream below provides a more steady food supply for the bass and other carnivorous species.

Properly managed ponds increase the food supply of streams in another important way. Such ponds are fertilized and, consequently, they contain countless millions of microscopic plants that form the fundamental food of most aquatic animals.

These small plants are eaten by microscopic animals and aquatic insects, which, in turn, are eaten by both young and adult bream and various forage minnows, and by the young of bass, crappie, and other carnivorous fish. The water pouring over the spillway of fertilized ponds, therefore, contains more food for all the fish in the stream than otherwise would be present. Actually, the water of a fertilized pond is four or five times more productive than that of the stream entering the pond.

PONDS REDUCE FISHING PRESSURE ON STREAMS

Well-managed ponds in the Southeastern States support four or five times as great a weight of fish per acre as do the streams on which they are built, thereby providing proportionately better fishing. Fishermen who have access to such ponds seldom fish in streams; thus they do not compete with those who must depend on streams as places to fish. Even if ponds

did not actually improve streams in any way, the reduction in competition would be of material benefit to the stream fishermen. More than 7,000 ponds have been constructed in Alabama alone, and they provide fishing for many thousand fishermen. As an example, one 12-acre pond near Auburn, Alabama, is fished by 60 families.



Fertilizer applied to a pond increases the productivity of the pond water four or five times. As this water leaves the pond over the spillway, it increases the amount of fish produced in the stream below.



Well-managed ponds in Alabama support four to five times the weight of fish per acre as do streams, thus providing proportionately better fishing. Fishermen who have access to such ponds do not compete with those who must depend on streams.

PONDS PREVENT SILTING OF STREAM CHANNEL

Ponds check the flow of streams, act as settling basins, and cause sand and coarser particles of silt to settle out, thus preventing the sanding of the stream channel below. A 6-acre mill pond near Auburn, Alabama, has become completely filled with sand, except for the run of the stream. Actually, the sand deposits are higher than the concrete dam. Ten years ago, the best fishing area of a 30-acre pond near Auburn was found at the head; today 5 or 6 acres of this area has become so filled with sand and silt as to be worthless for fishing. A sand bar at the head of a 2-acre pond at the Alabama Agricultural Experiment Station

is increasing rapidly in size, thereby decreasing the area of the pond. The sand and silt trapped in these ponds would have been deposited in the stream channels if the ponds had not been built.

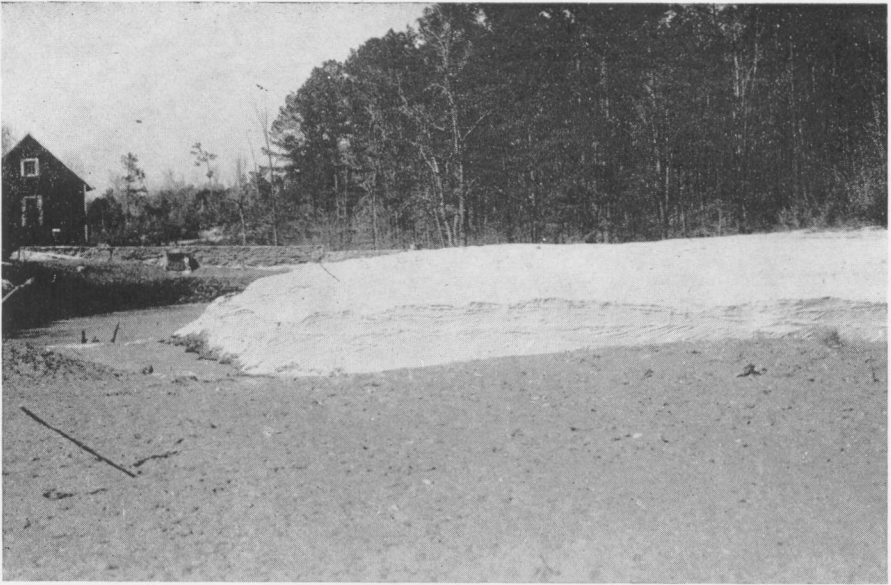
The sand-free water pouring over the spillway gradually scours the sand from the stream channel, deepens it, and improves it as a place for fish. In addition, the deepened stream channel carries more water and reduces flood danger.

Ponds finally become filled with sand and silt, however. The ultimate solution to stream improvement, therefore, lies in the control of erosion on the watershed.

CONCLUSION AND SUMMARY

The construction and proper management of ponds on small streams appear to offer the best method of immediately

improving stream fishing. It is concluded, therefore, that conservation-minded sportsmen, both individually and as or-



This pond has temporarily improved the stream below by acting as a settling basin for sand and silt entering the stream as the result of soil erosion. For permanent stream improvement, erosion must be adequately controlled on the watershed.

ganized groups, could do the general fishing public a service by sponsoring an expanded pond program.

Ponds improve stream fishing in the following ways:

(1) They continuously add small fish to the stream as long as water flows over the spillway, thus increasing the food supply for carnivorous fish.

(2) They add same large fish to the stream during periods of high water.

(3) Fertilized ponds increase the fertility of the stream, thereby increasing the food supply for all fish in the stream.

(4) They decrease fishing pressure on streams.

(5) They decrease the sand and silt deposits in the stream channel.

LITERATURE

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- (7) WIEBE, A. H. Fish-stocking policies and programs. Trans. Am. Fish. Soc. 71:351. 1941.

OTHER AVAILABLE PUBLICATIONS

BULLETIN No. 254. *Management of Farm Ponds.* H. S. Swingle and E. V. Smith; 32 pages illustrated.

One of the chief reasons for failure of ponds to yield good fishing is the lack of understanding of the principles underlying management of water areas. Based on their research, the authors explain the principles of good management, proper stocking, managing old ponds, fertilizing, fishing, and controlling weeds and mosquitoes.

CIRCULAR No. 87. *Factors Affecting the Reproduction of Bluegill Bream and Largemouth Black Bass in Ponds.* H. S. Swingle and E. V. Smith; 8 pages.

One of the principal problems involved in raising fish in ponds is management of population, so that a maximum number reaches desirable size each year. Some of the factors that were found in experiments conducted by this Station to affect the reproduction of bluegills and black bass are summarized in this circular.

CIRCULAR No. 95. *Construction of Farm Ponds.* John Lawrence; 56 pages illustrated.

This publication gives the step-by-step methods for building a farm pond, including: water supply, depth requirements, determination of pond area, construction details of dam, how to protect dam from breaks, filling the pond, and measures for mosquito control.

LEAFLET No. 22. *Raising Crickets for Bait.* H. S. Swingle; 4 pages illustrated.

The necessary equipment and methods for raising crickets in the garage, basement, or vacant room are given in detail in this publication.

PROGRESS REPORT SERIES No. 5. *Raising Fishworms for Bait.* H. S. Swingle and D. G. Sturkie; 4 pages.

The authors tell how a supply of fishworms can be maintained in the garage, basement, or outdoor worm bed.

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