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GENERAL MANAGEMENT SUGGESTIONS FOR LAKES SURVEYED IN 1937

IN THE SEVERAL NATIONAL FORESTS OF MICHIGAN

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A few years ago it would have been a relatively simple matter to prepare these suggestions; at present they are presented with considerable hesitation and with some doubt regarding their value. Fresh-water fisheries investigation has reached the point where it suggests that current practices in fish management are frequently of questionable value but has not yet gone far enough to indicate what changes and substitutions are desirable. The fish manager, consequently, is in a rather uncomfortable position.

Certain studies vital to fish management have been initiated in recent years, but most of these have not been on a broad enough scale or carried far enough to permit the drawing of general conclusions. A few are mentioned briefly to indicate the current trend of thought and to emphasize the complexity of the fish management problem.

The whole fish management problem may be presented in a <sup>very</sup> few words: An acre of water will produce only about so many pounds of fish. In the old days this poundage was adequate to supply the demand and fish conservation generally was not needed. Today, however, with increased

population, more leisure time and highly developed means of transportation, the demand for fishing has very decidedly increased; in fact, it has increased to a point where the "supply" is inadequate. Ordinarily the problem could be settled very easily--if the demand for reasonably good fishing greatly exceeds the supply, increase the cost (license fees) to a point where the supply is adequate. However, in America the fish (and game) are the property of all of us, and the practices common to business cannot be applied here. Fishing costs must be kept low enough so all persons can enjoy the sport, even though the demand does greatly exceed the supply.

The fish conservationist must make the most of this situation and there is considerable question as to how far he can go in solving his major problem--that of supplying good fishing regardless of the demand. He has a few tools at his disposal but these are currently inadequate. He can:

1. Use the accepted fish management methods consisting of stocking, legislation, and environmental improvement.

2. He can increase the amount of water by building more lakes. In Michigan, with some five thousand lakes, this method cannot be expected to be as important as in other states which have little water and which are engaged in extensive lake building programs.

3. Continue to remove more species of fish and perhaps more waters from commercial fishing. Conservation has been defined as the greatest use of a resource by the greatest number of people. There is little doubt but what greater use by a greater number is obtained in sport fishing as compared with commercial fishing, and there seems to be ample justification for further limiting commercial fishing where it is known to adversely effect the sport fishery.

4. Develop sportsmanship; sportsmanship in this case being interpreted as the catching of any number of fish the angler may be able to get, but the removal from the lake of only a few. This idea, advanced by Hazzard<sup>1</sup>, is a very important one and is perhaps the most promising of the group if the angler can be convinced that sportsmanship is perhaps the only alternative to ever increasing restrictions or ever poorer fishing.

A few problems which are of basic importance are listed below. As previously indicated, too little work has been done to demonstrate that they are proven facts. They should be regarded merely as possibilities.

1. The poundage of fish in a lake probably remains relatively constant from year to year. Dr. David Thompson and associates in Illinois have found this to be true in a relatively large Illinois lake. If this condition is true generally, the chief problem of the fish manager will be to have as much of this poundage as possible represented by fish of the most desirable species and of suitable size. It is possible of course that the poundage can be increased by fertilizing or by introducing fish which do not compete for food with those already present, but the possibility of decidedly increasing the total poundage of fish on a large number of lakes seems rather remote at present.

Six Michigan lakes, studied in detail by the Institute, indicated a range in poundage from 2 $\frac{1}{4}$  pounds in one lake to 19 $\frac{1}{4}$  in another lake. Many of the lakes in the poorer portions of the state (State and National forests) will probably never support many pounds of fish.

2. It is probable that most lakes are at almost all times supporting their regular (maximum) poundage of fish. Thompson has expressed the

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<sup>1</sup> Hazzard, A. S. 1935. Better fishing. Am. Wildlife, Nov.-Dec., p. 89.

opinion (orally) that when fish are removed, the "building up" of the poundage to the normal level requires only a short time.

The removal of some fish from the lake presumably leaves more food for the others and results in increase in rate of growth or in survival. Whether or not this building up is decidedly speeded up by stocking with fry or fingerlings in the numbers usually planted needs yet to be proven.

3. A study of fishing for four years on Fife Lake indicates that the total annual catch from a lake is relatively constant (above a certain minimum of fishing, of course). An increase of 92% in fishing (1936 over 1934) resulted in an increase of only 18% in the catch. It is possible that the finding in Fife Lake applies generally; that greater fishing intensity reduces the average catch per hour, not the total population of fish.

4. It is the writer's opinion that "fishing out" a lake to a point where inadequate brood stock remains is almost an impossibility. (Howe Lake near Grayling was found to contain  $9\frac{1}{2}$  legal-sized bass per acre after it was presumably fished out.) Winter kill during 1935-36 on two lakes in southern Michigan which are "heavily fished" yielded an estimate (based on actual counts along representative lengths of shore line) of some 1,100 game fish per acre averaging from 6 to 7 inches in length.

It appears too that there is ordinarily a certain balance between fish and food and that the usual decline in the catch after the first few weeks may be partially due to the removal of enough fish to temporarily change this balance, i.e. reduce competition for food and cause the fish to bite less freely. A lake may, perhaps, be temporarily "fished out" when only a relatively small percentage of the available fish has been removed; i.e. the catch per hour may decidedly decline. There is a possibility that a majority of our lake fish are never caught. This

situation is perhaps more readily understood by using a comparison with farming: If a pasture is grazed to capacity by the cattle, you could probably soon "catch" a cow with a handful of fresh grass. A continuation of this "fishing" would probably soon reduce the number of cattle to a point where there is less demand for food and the grass in the pasture would presumably increase. Long before the last cow could be removed by this method (if done in a large pasture over a period of time) the pasture would probably be so good that your handful of grass would go unnoticed and would fail to interest the cattle.

5. Over-population is undoubtedly a major problem in Michigan. Enough studies have been made to indicate the seriousness of this problem. Bluegills and perch are apparently the chief "offenders." (Some lakes in which bluegills required from 7 to 8 years to reach six inches have been stocked annually with small bluegills.) In the areas in which the forests are located, intelligent management will probably eventually be largely a matter of controlling the number of fish by balancing predator against pan fish, by limiting the number of fry produced through destruction of the nests or removal of some of the fry, or reduction of the population by some other means. It will probably be a matter of holding down the number of fish to a point where they will have enough food to reach a desirable size in reasonable time.

6. Stocking of fish in some Michigan lakes must be regarded as of questionable value in view of the several items mentioned above.

Game managers seem to recognize the futility of planting rabbits and most other game animals as a means of maintaining a supply. They recognize the need for reducing the population of deer where they are starving to death. When they do fish work in connection with game work, however, they apparently fail to fully appreciate that the problems are parallel with regard to stocking for maintenance. (These comments refer to stocking

warm water lakes, not trout waters, although some of the same principles may apply there also.)

7. It need hardly be mentioned that the problems of fish managers will be primarily public relations problems for a considerable period of years. Most of the present findings of fisheries biologists seem to discount accepted fish management methods--which have been over-sold to the fishing public just as the "buck law" has been over-sold to the hunter sportsman.

8. It has been found that fish may show good growth in very poor lakes. In Howe Lake this seemed due to the fact that young fish (bass and perch) were the primary food of the larger bass and perch and that the number was thereby kept reduced to a point where food was adequate for the remaining fish. Introduction of forage fish in such lakes might result in over-population of game fish because of the greater chances of survival of young game fish.

9. Until more is known about fish predators, they should probably be regarded as beneficial rather than injurious (in lakes). According to reports, several hundred gar were removed from a small lake in southern Michigan a few years ago. Now it is reported that in this lake catching a mess of bluegills of desirable size is becoming increasingly difficult. With over-population of pan fish a major problem, the desirability of having predators seems obvious. Pike and bass are, of course, preferable to gar and dogfish as predators of pan fish. Again there is a parallel with predator control in deer management.

10. Fish populations change much more rapidly than is generally supposed. In four years in Fife Lake some species of fish had decidedly declined in the catch while others had decidedly increased. A single examination of a lake gives no indication of the trend. Adequate management

would require repeated examination. Suggestions made after one examination might be decidedly "out of date" and unsuitable within a very few years.

11. Certain age groups seem to predominate and the younger age groups are not necessarily the best represented. Some idea of the abundance of fish in the younger age groups would be needed to determine the desirability of stocking or encouraging the species. Methods for rapid and dependable sampling of fish in public waters are yet to be discovered.

More items might be listed, but the above-mentioned points suggest why the specific suggestions (based on a hasty survey) for individual lakes are presented with considerable reluctance. A careful consideration of the general problems mentioned would probably prove more beneficial than a close scrutiny of the specific recommendations which might be made.

In the suggestions for individual lakes, stocking for maintenance of warm water species is generally not recommended. Since some planting is probably necessary at present because of public opinion, such planting might be based on the following suggestion:

If the average size of pan fish caught is small, plant piscivorous fish (bass or walleyes). If the average size of pan fish caught is relatively large (suggesting though not proving fairly rapid growth), plant more pan fish (bluegills or perch).

A suggestion (not applicable to public lakes) made to the owner of a private lake might be briefly mentioned. An examination of the fish in the 35-acre lake indicated that bluegills, the dominant fish, were growing slowly; perch showed very good growth. The growth of bass could not be determined. Fishing was excellent in 1937. About 400 fish were taken at an average rate of over five per hour (the owner cooperating, with the Institute for Fisheries Research, kept a complete creel census).

It was recommended that fish removal in 1938 be concentrated on bluegills and that at least a thousand be removed. If, after 1938, the bluegills showed considerable increase in growth (suggesting a marked decrease in number), the fishing for bass (removal of bass) should be increased the following year. Few forage fish were present and young bluegills were probably a chief food item of the bass. The suggestions were made in the belief that the continuance of good fishing in this moderately infertile lake was dependent on keeping a balance between predator and prey and that this could be influenced by moderately intensive fishing for (removal of) either predator or prey.

An important item to the fish manager is the knowledge of the rate of growth of the fish. The scales collected in the forests have not yet been checked for growth. This report could probably be somewhat more valuable if such checking had been done. The fish managers in the several forests would do well to acquaint themselves with the method of growth determination ordinarily used and to check on the rate of growth of the fish in at least the more important lakes. (A binocular microscope would be satisfactory). Only a very small number of specimens (fifteen or twenty of each important species) need be examined to get some idea of the rate of growth.

Introduction of trout is recommended rather frequently especially for the acid lakes in the Upper Peninsula. Trout seem to do reasonably well in acid water and it appears that these lakes which will support very few warm water fish because of infertility may support a reasonable crop of trout.

Natural reproduction of trout cannot be expected in land-locked lakes. Brown trout are invariably not recommended because of the apparent difficulty of catching them in lakes.



Some summary cards state that according to reports fishing was very much better in the past. For a while the writer felt that these comments were due merely to the fact that exceptional experiences were remembered while ordinary experiences were forgotten--that the old timers remembered the big hauls they made and forgot the many times that they took few fish.

It now appears that the old timers may be correct; that they took many more fish years ago (per angler) from some or most of these waters. If doubling the fishing intensity tends to halve the catch per hour, as suggested in the Fife Lake work, the poorer fishing now is probably due to an increased fishing intensity. In the poorer lakes especially, enough fish are possibly removed early in the season to temporarily disturb the balance between fish and food (in favor of the food), with poorer fishing resulting.

With many lakes in the Forests capable of supporting only a small poundage of fish, a rapid "turn-over" of the fish would be desirable; keep taking some out so others have food. There is one drawback to this, however. The building up of the population of fish to a point where the "pasture" is again "grazed" to capacity may be too slow a process in northern lakes to permit a very rapid turn-over.

A brief, superficial survey, such as the one made on the several lakes in the Forests, is of some value, but it should not be assumed that fishing in the lakes will be decidedly improved by following the suggestions made for the individual lakes. Until survey data can be more intelligently interpreted and until more basic facts have been uncovered, fish management must be regarded as strictly in its infancy and decidedly limited in its effectiveness.

It is believed, however, that periodic and preferably annual, examinations at least for the more important lakes of the area of growth rate, relative abundance of the species and size groups, and the take per angler, will indicate the trend of the fish population, and that a knowledge of this trend coupled with intelligent use of the management practices now available will tend to some degree to improve fishing conditions.

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