CURRENT AND FUTURE CONSIDERATIONS CONCERNING STRIPED BASS CULTURE AND MANAGEMENT

by

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ABSTRACT

One million acres of water in inland reservoirs currently contain fishable populations of striped bass. Fingerling production in 1974 was in excess of 10.5 million fish and this equals the total fingerling introductions between 1965 and 1973. Major efforts are in progress in estuaries to reestablish striped bass populations and to mitigate losses of fish due to power plant operation. Improved fertilization techniques in ponds should serve to increase fingerling production in the future. The use of hybrids is slowly gaining favor, both in reservoirs and in small impoundments. Reservoir management of striped bass suffers from the lack of quantification of fingerling survival and of the effects of the fish upon the forage base and upon the creel.

INTRODUCTION

Nineteen-seventy-four should be regarded as the year that the art of striped bass culture and management attained its puberty in the botanical sense of flowering and bearing fruit. The recent advances in spawning, hatching and rearing have resulted in the creation of several new striped bass fisheries in reservoirs. Major efforts are being made in several estuaries to establish or to reestablish striped bass populations and as a means of mitigating fish losses resulting from power plant operation.

The advances in the striped bass program have been the direct result of the interest and determination of individual fish biologists who find the species so facinating and its potential so great and in the commendable attitude of fisheries administrators in South Carolina and in other state and federal agencies to share the resource and information concerning its culture. And in the Striped Bass Committee, Southern Division, American Fisheries Society which serves both as a clearing house for information and for formulating projects designed to advance the art.

RESULTS AND DISCUSSION

Spawning and hatching. Of the several phases in the culture and management of striped bass, spawning and hatching techniques are both the most practiced and best defined. In 1973, nine states operated hatcheries which produced a total of 155 million larval striped bass (Montgomery, 1974). The recent innovation in tank spawning and hatching as described by Bishop (1974) holds the promise of greatly simplifying the larval production procedures both from the standpoint of the labor and equipment required as well as the skill needed to produce large numbers of larvae. In-as-much as the practice of stocking larval striped bass into the wild has little to recommend it, the current production more than satisfies the demand. State and federal agencies for the past two years have used approximately 500 acres of ponds for fingerling production and with an average stocking rate of 100,000 fry per acre, the demand amounts to about 50 million per year.

Rearing. The striped bass hatches into a pro-larvae which has no mouthparts or gastro-intestinal tract. Such organs develop within about five days and the larvae are then able to accept and thrive upon brine shrimp for several weeks after hatching. Attempts to date to feed the larval stage prepared diets have resulted in poor survival and slow growth. Despite these problems several agencies have continuing programs which test the feasibility of rearing striped bass in intensive culture systems. At this writing, however, the only feasible method of rearing large numbers of fingerlings is in earthen ponds.

[1]Presented at the annual meeting of the Southern Division, American Fisheries Society, White Sulfur Springs, West Virginia, November 18, 1974. To be published in the Proceedings of the 28th Annual Conference, Southeastern Association of Game and Fish Commissioners.

Fingerling production in ponds in 1974 by all reporting agencies amounted to almost 10.5 million fish and this represents an increase of about 3 million fish over the production from all sources in 1973.[2] Since federal production was approximately the same between years, there was an almost 100% increase in the total fingerling production by state agencies. (The increase is a reflection of an increase in the knowledge and skill among striped bass culturists and, in addition, several hatchery system has arrived at certain standard procedures which has enable an average production of approximately 30,000 fingerlings per surface acre and by devoting approximately 150 acres of water to striped bass culture have produced about 4.5 million fingerlings per year for the past two years (Braschler, 1974).) Last year the federal system produced an average of 35 pounds of fish per acre in an average of 39 days growing period. Wide variation in production was the rule between hatcheries and between individual ponds.[2] For an example, in six acres at the Edenton National Fish Hatchery an average production of 65,000 fish weighing 90 pounds was achieved per acre.

On the assumption that about 500 acres of water will be devoted to the culture of striped bass by all agencies in 1975 and assuming that all agencies will be able to produce at the same efficiency as the federal effort in 1974, then it can be predicted that the maximum possible fingerling production in 1975 will be 15 million.

An examination of the rearing efforts and results which are available from various agencies shows a bewildering array of variables over a wide range of rearing techniques. Despite the multivariant aspect of the data, a clear empirical pattern emerges, as follows: If healthy, vigorous larvae are stocked and the water quality remains good, the percent of survival and the pounds of fish produced per acre are directly proportional to the kinds and amounts of zooplankton available during the growing period. (Since the quantity of zooplankton is related to the fertilization. Both residual and that applied during the rearing effort, it follows that optimum fertilization procedures would tend to maximize production.)

At this point in time, there is not much uniformity in the kinds and amounts of fertilizer used among the several agencies or in the application thereof. Pond fertilization is in the trial-and-error period of development and some interesting correlations are apparent at this time. For example, the federal hatchery system favors hay as a source of organic material and with its use in 1974 produced a mean growth of 0.90 lbs. of fish/acre/day. In the best ponds at Edenton National Fish Hatchery, a mean growth of 2.1 pounds of fish/acre/day was achieved. As pointed out by Braschler (1974), vegetative growth which volunteers in the dry pond bottom during the summer months and occassional application of inorganic fertilizer also contribute to the production of zooplankton. In 1974, with the use of cotton seed meal as a source of organic fertilizer and with at least one application of inorginic fertilizer, Addison in Alabama produced an average of 1.42 lbs. of fish/acre/day and Parker in Mississippi produced 1.90 lbs. of fish/acre/day.[3] Of course, there are numerous examples of poor production despite the quality and quantity of fertilizer and this reflects other factors such as the weather, the quality of the fry and the skill of the fish culturist. On the other hand, in individual ponds where all conditions were apparently very favorable, excellent production was achieved, In Texas in 1974 with the use of alfalfa pellets, approximately 3.7 lbs. of fish/acre/day was produced in the best striped bass rearing pond and about 6.6 lbs. of fish/acre/day was harvested from the best hybrid pond.[4] In 1972, Marine Protein Corporation produced 5.0 lbs. of fish/acre/day in a striped bass pond having large amounts of residual organic material and which received hay before watering the pond.

[2]Ware, Forrest. 1974. Report to the Striped Bass Committee, August 13-15, 1974. Panama City, Florida.

[3]Personal correspondance, Joe Addison, Alabama Department of Conservation, Montgomery, Alabama and Walter Parker, Mississippi Game and Fish Commission, Jackson, Mississippi.

[4]Personal correspondence, Ed Bonn, Texas Parks and Wildlife Department, Denison, Texas.

The quantity of the various sources of organic fertilizer used and the schedule of application has been variable between hatcheries. Hay is usually applied at the rate of 800-1000 pounds per acre in several applications during the growing season. The best hatchery in Texas in 1974 used 500 pounds per acre of alfalfa pellets applied before the pond was watered. Relatively good results have been achieved with the use of 150-200 pounds of cotton seed or soybean meal per acre. There are numerous examples of oxygen depletions resulting from organic materials and algae blooms. One wonders, however, about the relative efficiency of certain animal manures as fertilizers and about the maximum production per acre which could be achieved by utilizing intensive fertilization along with aeration or oxygen injection to prevent an oxygen sag. It seems clear that pond fertilization techniques need better definition in order that pond culture of striped bass may become more productive and efficient.

HYBRIDIZATION

Ware (1974) again emphasized the remarkable heteroisis which is displayed by progeny resulting from artificial hybridization between white bass and striped bass and provides additional valuable information concerning the culture of hybrids. The use of hybrids in lieu of or in addition to striped bass for the creation of sport fishing is a management decision to be determined by each agency. In 1974, Texas entered the ranks of those states with an active and significant hybrid program by stocking almost 0.25 million fingerlings into six reservoirs. The average survival of hybrid fingerlings in pond production in 1974 in Texas was an amazing 74%.[4] Since the first production of hybrids in 1965 (Stevens, 1965), it has almost invariably demonstrated a superior survivorship compared to striped bass. In addition, the growth is superior to that of the striped bass. None of these advantages have seemed to impress the majority of workers in the southeast at this point in time. It is fervently hoped, however, the deformity hypothesis has been laid to its well deserved rest by Mr. Ware's evidence and that future decisions to accept or reject the hybrid will be based upon other, more logical, considerations.

STRIPED BASS INTRODUCTIONS

The identification by Bailey (1974) of striped bass fisheries in some 30 reservoirs in 12 states is very good news. Certainly such results are necessary for the continued justification of the program. The very significant recent increase in the production of fingerlings should assure that these fisheries will be maintained through annual additions of fingerlings and that additional new fisheries will be established. The outlook in this respect looks very bright.

The failure of the program, in most cases, to reduce shad populations is good or bad depending upon one's point of view. Jenkins (1973) questioned whether the forage base in certain reservoirs is adequate to support existing predator populations and noted that the Reservoir Committee, Southern Division, American Fisheries Society is presently engaged in a study to gain further insight into predator-prey relationships in 26 reservoris in 11 states where striped bass and other predators have been stocked. The idea that there may not be a surplus of shad in reservoirs is a new one and, as such, has the burden of proof. Should it prove to be valid, however, then presumably it will be up to the fishermen to determine which predator gets the shad.

According to the information compiled and presented by Bailey (1974), a total of 10.4 million fingerlings have been stocked in 0.85 million acres of water between 1965 and 1973 for a stocking rate of about 12 fish/acre. Of this total, fisheries have been established in 0.54 million acres but when all fisheries including those established by natural reproducing populations are considered it can be calculated that about 1.0 million acres of water in inland reservoirs provide striped bass fishing at present.

It is not surprizing that, for the most part, quantification is lacking on that 1.0 million acres of water which would enable strong inferences to be drawn concerning

stocking rates and the effects of the fish on the creel and the forage base. In fact, the fishery itself is defined by the Striped Bass Committee as the situation in which fishermen fish specifically for the striped bass and expect to catch it. This definition serves in lieu of a creel census which is very expensive to perform. The criterian, however, could hardly be more subjective. By this definiation fisheries have been established by stocking as little as 0.5 fingerlings/acre (Clark Hill, S.C. - hybrids) and as much as 178 fingerlings/acre (Greenwood, S.C. - striped bass). Fisheries have failed to materialize at stocking rates up to 55 fingerlings/acre (Talquin, Florida). To make matters worse, fingerling stocking has frequently been accompanied by the stocking of fry, advanced fry, advanced fingerlings, yearlings and adults.

In only a few instances have introduced striped bass populations been thought by the biologist in charge to have affected shad populations although there seems to be little quantification of these assumptions (Bailey, 1974). For an example, in the period between 1968 and 1973, over 4 million fingerlings were stocked into Greenwood and Murray in South Carolina which together total 61,300 acres and yet, no data are available to describe the effects of this major effort on the forage base or the creel. In Florida two small lakes, Hunter and Julianna, had drastic reductions in shad populations after haveing received 60 to 72 fingerlings per acre respectively. The J. Percy Priest Reservoir, a new impoundment in Tennessee, had a significant reduction of shad after receiving about 6 fingerlings/acre although advanced fry were also introduced and survival of walleye and black bass was also exceptionally good.[5]

If the 10 million fingerlings which were produced by state and federal agencies in 1974 had been evenly divided and stocked into 1.0 million acres, the stocking rate would be 10 fish/acre. If one assumes an annual natural mortality of 50%, then 2.5 catachable fish per acre would remain two years after stocking. Using the growth rate attained in the Santee-Cooper Reservoir by striped bass in the mid-fifties (Stevens, 1957), it can be calculated the 2.5 fish/acre would weigh about 4.0 pounds. Such quantities, in my judgement, would probably produce the often-mentioned trophy fishing but would have little effect on the forage base in most southern reservoirs. Annual stocking of 10 fish/acre, however, may have the desired cummulative effect. Other alternatives include stocking more fish per acre and improving the quality and size of the striped bass stocked or the stocking of hybrids.

SUMMARY

The culture and management of striped bass has made great strides in the past 10 years. Striped bass fishing has been created in about 30 reservoirs and this number should increase in the future. Fingerling production will probably also increase in the ensuing years as better pond fertilization techniques are discovered and employed. Management in reservoirs and estuaries suffers at the present time from a serious lack of quantification of the extent of the survival of the introduced striped bass and the effects of the fish upon the forage base and the creel. It will be difficult to determine the proper stocking rate without having better information on survival and its effects.

If trophy- fishing is the desired end point then the program can rest on its laurels. If the end point is better fishing and a concomittant better utilization of shad, then the total acreage utilized should be reduced in order that current fingerling production can be stocked more intensively. A more intensive program program should also serve to generate more of the needed information concerning the effects of such introductions.

[5]Personal communication, David Bishop, Tennessee Game and Fish Commission, Knoxville, Tennessee.

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TOURNAMENT CATCH OF LARGEMOUTH BASS FROM ST. JOHNS RIVER, FLORIDA

by

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ABSTRACT

A three-day fishing tournament on the St. Johns River, Florida, in which 200 fishermen competed, yielded 1165 largemouth bass over 12 inches, and 1254 bass smaller than 12 inches. The over-all catch rate was 0.50 bass per hour. The catch per acre of water fished was 0.03 bass. Over-all mortality estimates ranged from 22.3 to 43.8 percent; they were due primarily to epidermal bacterial and fungal infections, contracted by handling. The 31-day tag retention rate for largemouth bass tagged with the Floy® FD-68-B anchor tag was found to be 51.1 percent for fish held in a hatchery pond.

INTRODUCTION

A three-day Florida invitational tournament of the Bass Anglers Sportsman's Society (B.A.S.S.: National Headquarters, Montgomery, Alabama) was held in the St. Johns River at Welaka during February 6, 7, and 8, 1974. This competitive sportfishing event was utilized to obtain information concerning catch and mortality rates, areas of fishing concentration, population structure, numbers of fish caught and released, and to mark and release largemouth bass back into the river system. The tournament was monitored jointly by personnel of the U.S. Fish and Wildlife Service (Welaka National Fish Hatchery), Putnam County, and the Florida Game and Fresh Water Fish Commission.

[1]Publication Number 17 of the Eustis Fisheries Research Laboratory, Florida Game and Fresh Water Fish Commission, P. O. Box 1903, Eustis, Florida 32726.