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THE PROPAGATION OF THE BLUEGILL, HELIOPERCA MACHROCHIRA (Rafinesque), AND THE BLACK CRAPPIE, POMOXIS SPARIODES (Lacepede), IN IOWA GRAVEL PITS

EVERETT B. SPEAKER

The purpose of this paper is to discuss the value of abandoned gravel pits in Iowa for the propagation of bluegill, Helioperca machrochira, and black crappie, Pomoxis spariodes. These observations were made at the Lake View fisheries station, located in Sac County. This area formerly constituted a series of thirty pits varying in size from a fraction of an acre to five acres. Several years ago the Iowa Fisheries Division stocked a number of fishes in one of the pools to ascertain their value for fish production. A marked degree of success attended their efforts, and an elaborate plan of development followed. The opportunity for carrying out this plan presented itself when the Veterans Conservation Corps camp was established at Lake View.

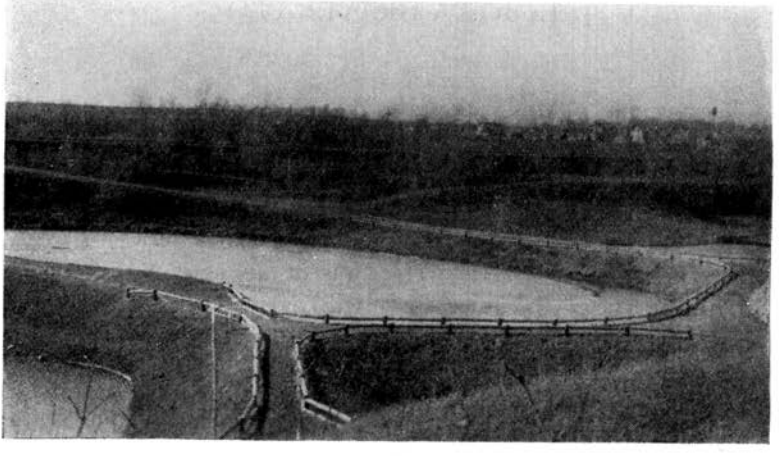
DEVELOPMENT

The unsightly spoil banks were rounded off and planted with trees and fruit-bearing shrubs, the bottoms of the pools were levelled to facilitate seining operations, breeding areas were created and dykes were constructed at vantage points to divide the irregular shaped ponds into usable units.

Since there was already an abundance of Ceratophyllum demersum, Myriophyllum spicatum, Naias flexilis and several species of Potamogetons in the ponds, it was not necessary to re-establish aquatic vegetation for food producing and oxygenating purposes. Wiebe (1935), Embody (1928), Dyche (1914), Langlois (1933), Andrews (1935), Doze (1928), and others have published interesting data in regard to aquatic plants in pond culture. It is not the purpose of this paper to discuss the merits and objections of the higher forms in relation to fish culture.

In addition to the larger plants present, there were several species of algae, including Spiragyra, Zygnema, Microsystic, Alphanizomenon and Anabaena. These plants constitute a very important part in the food chain of fishes. Some of the entomostraca feed upon these algae, especially the green forms commonly

called "blanket moss." Since factors pertinent to the productivity of entomostraca are directly responsible to the productivity of fishes, agal growth was mechanically stimulated by the introduction of fertilizers into the ponds. Cotton seed meal and potassium di-hydrogen phosphate, sheep manure and other commercial fertilizers were added to the various ponds. When sheep and cow



manure was used, it was mixed with straw and placed in wire crates to confine it to designated areas. Fresh cultures were added at regular intervals.

An attempt was made to remove all of the native fishes from the ponds with drag seines. This proved very difficult since the ponds could not be drained, and a large number of predacious fishes Lepomis humilis and L. Cynellus) escaped capture.

Propagation

Virtually all of the ponds were under the process of construction during the 1935 season, and obviously the spawning was greatly impaired. Brood fishes were stocked in the ponds which had been practically completed, and forage minnows added. The fathead minnow (Pimephales promelas) and blunt-nosed minnow (Hybroyhynchus notatus) were used exclusively for forage fishes. Most of the brood stock was placed in the ponds late in April. After the fishes had spawned, the parent stock was removed and placed in deep holding ponds and the fry left in the brood ponds. Although this method of pond culture has been abandoned by most progressive stations, it was necessary in order to utilize the ponds last season.

Although careful observations were made on the large-mouthed (Aplites salmoides) and small-mouthed bass (Micropterus dolomieu), the spawning and hatching records of the Helioperca and Pomoxis were meager. It was found, however, that most of the crappies spawned during the latter part of May and June, and that the bluegills did not complete spawning until early in July.

Six of the thirty pond units were used in the production of crappie and bluegill. Roughly two acres of water were used for each species. Since at least a portion of the bottoms of all the pools are sand and gravel, it was not difficult for the fishes to find suitable spawning areas. The bluegill nests were saucer-shaped depressions in the gravel from 16 to 20 inches in diameter, and their adhesive eggs deposited upon the clean bottom. Since some of the parent fishes were observed hovering over the nests until late in July, they were not removed until shortly before the fingerlings were taken out for distribution.

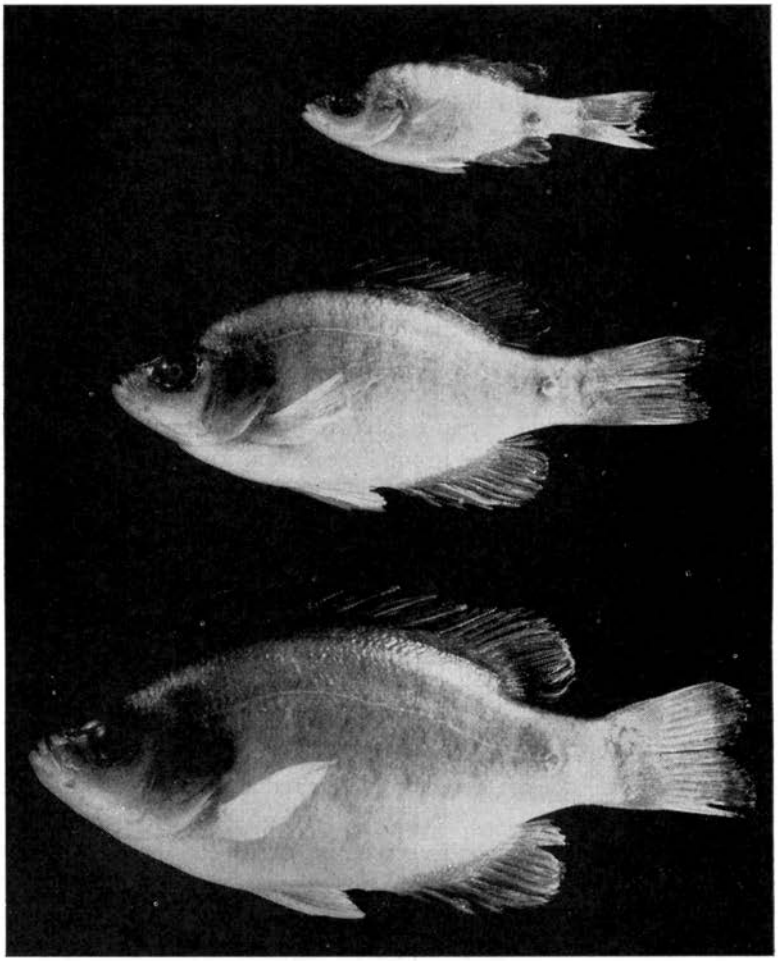
The feeding habits of the bluegill and crappie are markedly different. It was found that by keeping a good supply of natural foods (Daphnia magnum, Cladocera, etc.,) in the ponds, artificial feeding was not necessary in the bluegill ponds. The adults, however, were occasionally fed ground meats and ground fish (Cyprinus carpio) to keep cannibalism at a minimum. The crappie, on the other hand, were given forage minnows in addition to the natural foods produced in the ponds.

Severe losses in the fry stage was observed in all of the ponds, and an examination of the water revealed large numbers of predacious aquatic animals. Plankton net tows were made in all of the ponds, and huge numbers of water boatman (Arctacorixa alternata), backswimmers (notonecta undulata), water bug (Belostoma), and dragon fly nymphs were taken. Undoubtedly these carnivors were at least a factor in the reduction of fishes in the fry stage.

Snapping turtles (Chelydra serpentina) are fierce beasts of prey which eat large numbers of fish, according to Pratt (1935), and are an important factor in reducing the number of fishes in the ponds. Several wading birds, including the Great Blue Heron (Ardea herodior herodior), Black-crowned Night Heron (Nycticorax Nycticorax hoactli), and the Eastern Green Heron (Butorides virescens virescens) were present. In addition to these predacious birds there were quite a number of Piedbilled Grebe (Podilymbus podiceps podiceps), Forster's Tern (Sterna forsteri) and Kingfisher (Megaceryle alcyon alcyon) which undoubtedly took their

toll from the crop. Other losses were attributed to cannibalism of fishes.

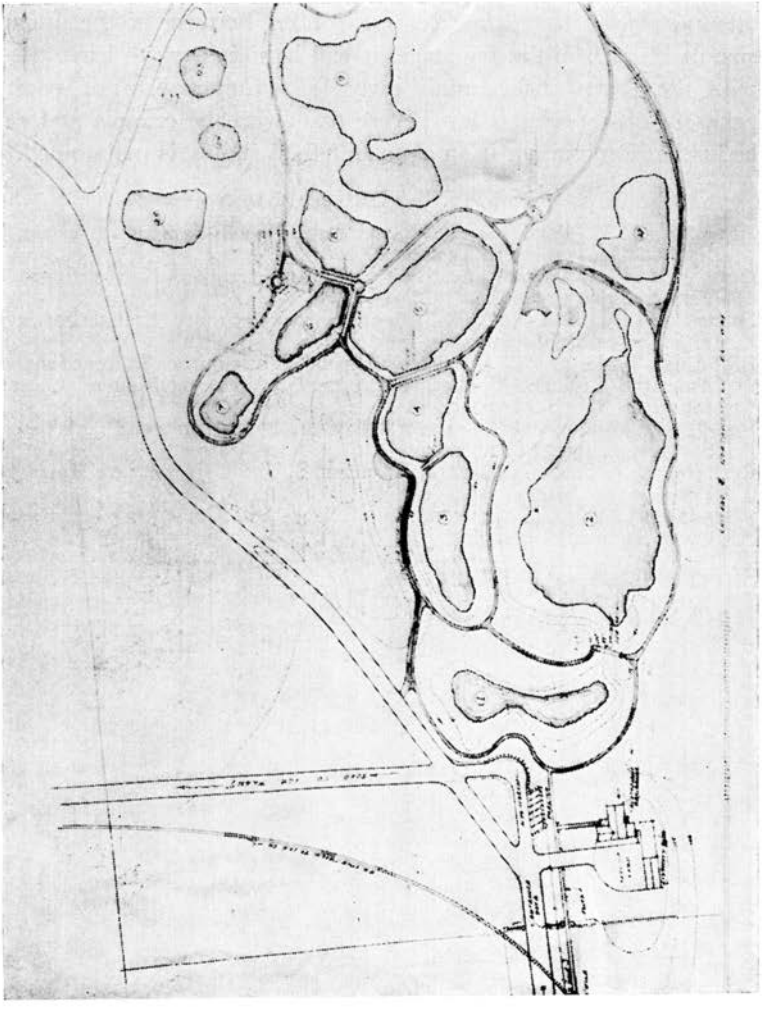
The ponds were pumped down in November with a four-inch pump and all of the fishes were removed. It was interesting to note that a variation in length of nearly 100 per cent. occurred in fishes of the same age.



Although some of the crappie had attained a total length of 9 cm., the average length was approximately 6 cm. 17,125 crappie were taken, giving an average of 8,562 fish per acre. The bluegills, which are a much slower growing fish, had attained an average length of 4 to 5 cm., and a maximum growth of 7 cm. The bluegill ponds produced 14,650 fish.

Conclusion

It was found that the bluegill, Helioperca machrochira, and the black crappie, Pomoxis spariodes, can be successfully propagated in abandoned gravel pits in Iowa. It was further proven that factors pertinent to pond fish culture such as the production of entomostraca, aquatic vegetation and proper environmental conditions for spawning could be successfully maintained in the ponds. The dissolved oxygen content of the water was sufficiently high to prevent asphyxiation at all times and the hydrogen-ion concentration remained relatively constant. That the growth rate of both species was very un-uniform proved conclusively that a proper



food balance was not maintained in the ponds. Predacious fishes and insects are responsible for large losses in the fry stage. Optimum results cannot be obtained by rearing young fishes in the same ponds with the brood stock because of excessive cannibalism.

The results of last season's experiment would indicate that the production could be greatly increased by maintaining a biological balance, improving cultural methods, and reducing the numbers of predators.

All of the 30 ponds have been completed and most of them pumped dry and the fishes removed. The black crappie will be spawned in ponds constructed for this purpose and the fry trapped off and placed in separate rearing ponds. Because of the minute size of bluegill in the fry stage, it will be necessary to leave them with the parent fishes until early fall. Cannibalism of parent fishes in this species is less severe than with the crappie and can be held at a minimum if an abundant food supply is maintained.

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