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OBSERVATIONS ON BLUEGILLS AT WHITMORE LAKE, MICHIGAN

The following observations were made from June 15 to July 1, 1935, at Whitmore Lake, Livingston and Washtenaw counties, Michigan, and mostly from 7 to 8:30 P.M. on week evenings and during the week-ends of June 15-16, 23 and 29-30. After June 25 there was said to be more people fishing during the evenings and week-ends than at any other time.

(1) An examination of the bluegill spawning beds from ^{June 15 to 20,} particularly in the northwest section of the lake, disclosed 7 large spawning colonies of from 20 to 100 nests each, and many smaller colonies and solitary nests. In less than 8% (estimated) of the cases the nests were deserted, some, from the appearance of the nests, for several days. At this time it was thought that the majority of the bluegills had finished spawning. Later this was proven not to be the case. This distinct break or interruption in spawning may have been due to the cold weather of the week of June 16.

(2) During the week of June 23 the weather became warmer. With the warming of the weather, new bluegill nests were formed out and by June 29-30 there were at least 5 large, new colonies of from 20 to 80 nests and several smaller ones. Also, many of the old nests in the old colonies were fanned out again and used. Examinations of some of these new nests showed bluegill eggs clinging to the stones and rootlets of the nest bottom.

(3) Of the 5 large, new colonies, 3 were located in water averaging 2 1/2 feet deep, 1 in water averaging 6 feet deep and 1 in water 10 feet, 3 inches deep. One of the nests in the latter colony was in 12 feet, 5 inches of water, the deepest bluegill nest, as regards depth of water, which I have ever noted.

(4) None of the several nests of large-mouth and small-mouth bass, pumpkinseeds, and what appeared to be hybrid sunfishes, were noted in the bluegill colonies.

(5) By June 25, the opening day of the inland lake fish season, many male bluegills were guarding their nests. The sport fishing was very heavy from the opening day on, especially so on week-ends, for as many as 31 boats containing fishermen were noted at one time. Occasionally one of these boats would anchor near or over one of the bluegill colonies with the result that one to many of the guarding males were caught. Most of the fishermen fishing over the beds appeared to be unconscious of the fact that bluegill nests were there. However, two fishermen were noted who gave every indication of knowing that they were fishing over a spawning colony and were deliberately fishing for and catching these guarding males. By the week-end of ^{the} July 29-30 more than half of the guarding bluegills had disappeared from the nests, ~~either~~ having been caught, ~~had~~ deserted their nests or ~~had~~ completed spawning. The colony of nests in 10 feet of water appeared to be the most depleted. This appears to have been largely due to this colony being located on the edge of a favorite fishing hole (off Todds Point) and to the ease with which the males could be caught; for unlike those individuals in the shallow water colonies, the individuals of this deep water colony were not readily disturbed by the boats and actions of the fishermen above them.

(6) In order to prove that the guarding male bluegills would take a hook, I anchored a boat within easy fly casting distance of a colony of 32 nests, containing over 26 males (counted 26 in sight at one time), and located in some 2 1/2 feet of water. At the end of 30 minutes of casting a small O spinner and No. 12 wet "black gnat" fly, I had taken 21 large bluegills, all of which were in full male breeding coloration. As all except 3 of these fish were released without being removed from the water, it may well be that some were recaptured. At least, one individual was recaptured, for upon its being released this fish swam away from the boat some dozen feet, stopped, apparently to rest and/or orient itself and then returned directly to the nest over which I had taken it. Upon the second cast this fish again took my

lure and was again brought up to the boat, where the injury of the previous hooking could be plainly seen.

(7) Believing that possibly the guarding male bluegills attacked the lure cast over the nest in order to repulse nest invaders rather than to obtain food, I anchored the boat in the center of the nesting colony, thereby driving the fishes into the edge of a nearby weed bed. Upon casting my lure over this weed bed I succeeded in catching 5 bluegills in male breeding coloration, which undoubtedly must have been males from the nesting colony. This tends to support the view that guarding males catch objects to eat during their period of guarding the eggs; for it does not appear likely that the defensive nest guarding instinct is so highly developed in these fishes as to force them to attack objects outside of their immediate nesting territory.

Further observations made it quite clear that these bluegills did feed during their period of nest guarding. From 8 to 8:30 P.M. of July^{ne} 29 there was a heavy hatch of moderate-sized May-flies and the guarding male bluegills could be seen rising time and again to the surface of the water to catch the floating insects. Also, the stomachs of two of the three males examined, contained traces of mayflies.

(8) All the guarding bluegills appeared to be extremely "slab-sided" and thin, and measurements of the three guarding males showed that they were much less thick in cross section than non-breeding males of equal size. This partial emaciation may well be the result of their recent breeding activities and a greatly reduced daily amount of foods.

(9) At Todds Point, at least 4 bluegills and 1 small-mouth bass nests were destroyed by persons walking over the nests while they were in bathing.

(10) Upon at least 6 occasions, one to three Musk-turtles (Sternotherus odoratus) were seen walking about over the bluegill beds and turning over stones with their snouts. On one occasion 5 bluegills were seen swimming around a turtle, apparently much excited and attempting to drive the turtle away. That these adult-sized, though rather small, turtles would be feeding on so small an object as bluegill eggs appears rather improbable.

(11) There apparently was a rather high mortality of adult bluegills throughout the spawning season; for in spite of the rapidity with which these dead fish were eaten by turtles, there ^{were} ~~was~~ usually the remains of from one to four bluegills lying along 100 yards of beach.

(12) Bluegills caught by the fishermen seem to roughly fit into three size classes : (1) those from 7 to 8 1/2 inches in length and consisting in part of males taken from their nests and non guarding males and females (2) those from 4 3/4 to 6 inches in length and (3) those from 3 1/4 to 4" in length.

(13) In many cases the number of fish caught by fishermen are under 6 inches in length and these greatly outnumber those fish caught that are over that length. Many of these undersized (non-legal) fish are caught on worms, or other natural bait and are so deeply hooked that they die when thrown back into the water. I counted 9 dead or dying undersized fish floating downwind from a party in a boat containing 5 fishermen. The Great Blue Herons have discovered this readily available food supply and are taking advantage of it. Their method is to fly at a moderate height over the lake (they are surprisingly tame for this species) and when a dead or dying bluegill is sighted, to circle down and pick the fish from the water, then return to land and devour it. Sometimes they will alight over deep water and eat the fish while swimming about. Some of them, apparently the more timid, will wait until the fish float\$ inshore away from the fishermen, whereupon these birds will wade out and catch the fish.

Observations indicate that since the opening of the fishing season the total number of Great Blue Herons has increased and is continuing to do so. On June 29 at 8 P.M. 10 of these birds were noted flying over or feeding about the lake. This number was at least 5 more than was noted at any one time previous to the opening of the fishing season.

Conclusions and Comments

Apparently Whitmore Lake has an abundance of spawning habitat for bluegills, at least the gravel beds appear to be neither over crowded nor have they all been occupied. From the number of yearling and subadult blue gills in the lake, it appears

obvious that the bluegill supply is not being too adversely affected by the partial removal, after June 25, of guarding male bluegills from their nests. However, in lakes where spawning areas are limited and fishing heavy, this taking of guarding males may well be an adverse factor and may be one of the reasons for some of these lakes containing so small a bluegill population.

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