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Changes in Fish Populations and Food Habits of Yellow Bass in North Twin Lake, 1956-1958¹

By JOE E. COLLIER

Abstract. Fish population studies initiated in 1953 indicated that most species were on the increase until the winter kill of 1955. In 1956, populations were below normal; in 1957 there was an increase in most species, followed by a decrease in 1958. Studies during 1953 and 1954 showed that the food of adult yellow bass consisted to a great extent of young-of-the-year yellow bass and gizzard shad, along with insects. During the summers of 1956, 1957, and 1958, forage fish were of very minor importance in the diet of yellow bass; they fed mainly on immature insects and minute crustacea.

North Twin Lake is located approximately five miles north of Rockwell City, in Calhoun County, Iowa. The lake is about two and one-half miles long and one-fourth mile wide. When full, it has a surface area of 569 acres. In 1939-1940 about 135 acres of the southern end of the lake was dredged by the State Conservation Commission to improve boating and fishing conditions (Owen, 1958). During the summers of 1956, 1957, and 1958 low water conditions reduced the lake to about two-thirds of its normal size. The greatest depth at that time was found to be about eight feet in the dredged area.

The Iowa Cooperative Fishery Research Unit started studies of the lake in 1951, and these studies have continued through 1958. The studies have included bottom fauna, fish populations and food habits of the various fishes of the lake. During the winter of 1955 the lake suffered a severe winter kill. The population of gizzard shad, *Dorosoma cepedianum* was almost eliminated. In the summers of 1956, 1957, and 1958 blue-green algae were a great problem. Algae were not a major problem during 1954 and 1955, the years that gizzard shad were abundant (Kutkuhn, 1958).

FISH POPULATIONS

The winter kill of 1955 made a great change in the fish population of the lake. The Iowa State Conservation Commission estimated 15,000 pounds of fish were killed. (Information given by Charles O'Farrell, State Conservation Commission.) This included 220 white

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suckers, 875 crappie, 490 yellow perch, 3,200 walleye, 375 largemouth bass, 24,000 yellow bass, and 4,000 pounds of gizzard shad, plus carp, buffalo and bullheads.

The Rough Fish Removal Crew of the Iowa State Conservation Commission, using two-inch mesh seines of about 3,200 foot lengths, took a fish census each year. Averages of 2.53 and 2.32 fish per net foot were taken in 1954 and 1955 before the winter kill (Table 1). Gizzard shad, carp, yellow bass, black bullheads, walleye and buffalo were the most abundant species. In 1956, 1957, and 1958, averages of .34, .82, and .40 fish per net foot were taken. During 1957 the fish population seemed to be on the increase, but in 1958 the population showed a decrease. In the winter of 1957 and spring of 1958 no evidence of low oxygen or winter kill was found. The carp population seems to be the only one that recovered to any extent after the 1955 winter kill.

Table 1

Fish Taken From North Twin Lake, Iowa, 1954-1958 Inclusive, by Rough Fish Removal Crew of Iowa State Conservation Commission

Type of fish	1954	1955	1956	1957	1958
Carp, <i>Cyprinus carpio</i>	16,854	30,448	5,197	9,201	26,292
Buffalo, <i>Ictiobus</i> spp.	9,729	8,919	2,352	1,007	910
Golden shiner, <i>Notemigonus crysoleucas</i>	88	0	0	0	0
White suckers, <i>Catostomus commersoni</i>	0	0	6	5	0
Gizzard shad, <i>Dorosoma cepedianum</i>	48,540	77,650	2	58	212
Crappie, <i>Pomoxis</i> spp.	834	1,239	134	118	77
Bullheads, mostly <i>Ictalurus melas</i>	14,611	12,570	518	3,078	406
Yellow perch, <i>Perca flavescens</i>	1,443	22	7	7	9
Walleye, <i>Stizostedion vitreum</i>	8,945	11,026	130	191	70
Bluegill, <i>Lepomis macrochirus</i>	25	241	1	4	11
Northern pike, <i>Esox lucius</i>	293	165	18	9	9
Catfish, <i>Ictalurus punctatus</i>	1	0	0	3	2
Largemouth bass, <i>Micropterus salmoides</i>	1,186	214	9	2	11
Yellow bass, <i>Roccus mississippiensis</i>	36,935	12,042	149	307	379
Total	139,396	154,536	8,517	13,990	28,458
Feet of net used	55,100	66,600	25,400	17,000	70,400
Fish/net foot	2.53	2.32	.34	.82	.40

The Cooperative Fishery Research Unit has used experimental gill-nets, each with 25 foot sections of 1½, 2, 2½, 3, and 4-inch mesh, stretch measure, for population analysis. The average catches per gill net hour for the years 1953-1958 (Table 2) show a decline

following the winter kill, similar to that evident from the seining records.

Shoreline seining with a minnow seine in 1956-1959 showed good reproduction of the yellow bass. Other young fish were not much in evidence except after 6,200 young largemouth bass were released in September 1956 and 20,000 yearling walleyes were put into the lake in June 1957. No small gizzard shad were taken during either summer by the shore line seining operations. None of this type of seining was carried out during the summer of 1958.

FOOD HABITS OF THE YELLOW BASS

Kutkuhn (1955) reported that in 1953-1954 young-of-the-year yellow bass fed largely on microcrustacea and on insects. As yearlings the yellow bass started to eat forage fish, and as adults they depended upon forage fish as their main food but continued to feed on insects at times. Young-of-the-year yellow bass were the main forage fish during the summer of 1953 and young-of-the-year gizzard shad the main forage fish for the summer of 1954. This was associated with an abundance of yellow bass in 1953 and an abundance of young-of-the-year shad in 1954.

In the summers of 1956 and 1957 the stomachs of 120 yellow bass were collected for study. As soon as the stomachs were removed from freshly caught fish they were placed in a 10 percent solution of formalin to stop digestion of the contents. No stomachs of the young-of-the-year bass were saved for study purposes. Some were

Table 2
Catches Per Gill Net Hour—North Twin Lake, Iowa, 1953 to 1958¹

Type of fish	1953	1954	1955	1956	1957	1958
Carp	.1	.2	.1	*	1.4	1.1
Buffalo	*	*	*	.1	*	*
Common white sucker	*	*	*	*	*	0
Gizzard shad	.4	4.6	3.5	.2	*	0
Black crappie	*	*	*	.1	*	0
Bullheads	2.0	1.8	1.2	1.5	1.6	.4
Yellow perch	3.0	.6	*	.1	.1	0
Walleye	.5	1.3	1.2	.4	.7	*
Northern pike	*	*	*	*	*	*
Yellow bass	3.1	4.1	2.7	.6	2.2	1.7
Total	9.2	13.0	9.3	3.2	6.1	3.4
Total gill net hours	196	128	114	264	265	36

¹Gill net data from 1953 to 1955 were collected by J. H. Kutkuhn and J. B. Owen and summarized in Quarterly Report of Iowa Cooperative Wildlife and Fisheries Research Units, Vol. 21, No. 1, Page 47.

*Less than one fish per 10 gill net hours.

opened, however, and found to contain some dipterous larvae and many *Cyclops* and *Daphnia*.

Unlike the fish of the summers of 1953 and 1954, these fish of 1956 and 1957 showed a dependence upon immature insects and

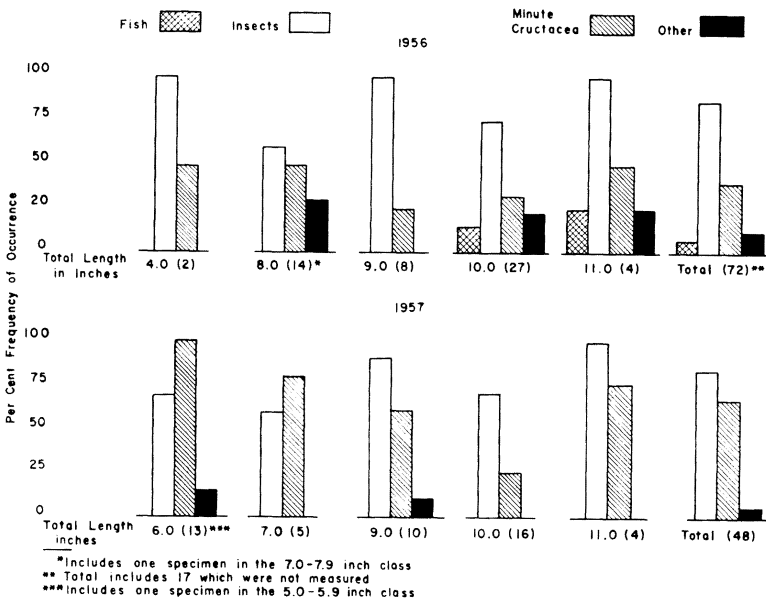


Figure 1. Food of yellow bass in North Twin Lake, Iowa, 1956 and 1957.

minute crustacea for their food supply (Figure 1 and Table 3). The type of food taken by the yellow bass was quite similar during the two summers of 1956 and 1957. Dipterous larvae and pupae of Chironomidae and *Chaoborus* were the main source of food for all sizes of bass examined. Minute crustaceans, especially *Cladocera*, were next in order of abundance in the stomachs. Only five of the stomachs taken during 1956-1957 contained fish remains. The type of fish eaten could not be determined. Young yellow bass were moderately abundant in 1956-1957, but other forage-sized fish were scarce. During the summer of 1957 approximately 40 percent of the stomachs contained backswimmers, Notonectidae. *Cyclops* were found in approximately 35 percent of the stomachs. No stomachs were preserved from the fish taken in the summer of 1958, but 20 stomachs were examined in the field. They contained *Daphnia*, *Cyclops*, *Chaoborus*, and chironomids, but no fish.

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Table 3

Food of the Yellow Bass of North Twin Lake, Iowa: Summers of 1956 and 1957

	1956	1957
Number of fish examined	72	48
Number empty	8	4
Food Item	Occurrence	Occurrence
Insects	54	36
Diptera	50	24
Chironomidae	44	17
<i>Chaoborus</i>	18	15
Other Diptera	—	2
Ephemera	9	6
Trichoptera	7	2
Hemiptera	4	19
Notonectidae	3	19
Other Hemiptera	1	1
Other Insects	1	7
Crustaceans	24	31
<i>Cladocera</i>	24	28
Eucopepoda	—	17
Other Crustacea	—	1
Fish	5	—
Other (mostly filamentous algae)	8	4

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