

# FISHERY VALUES OF A RESTORED ILLINOIS RIVER BOTTOMLAND LAKE

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During the past century certain of man's activities have had a direct effect upon the fisheries of Illinois. Intensive agriculture on the watersheds of the lakes and streams has accelerated the rate of erosion on the lands and the rate of siltation of the waters. Industrial and sewage wastes have polluted in varying degrees many of the natural waters of the State. Navigation dams on the larger rivers have reduced stream flow and, through the operation of the gates in these dams, fish often are exposed to severe fluctuations of water level. Thousands of acres of lakes and sloughs adjoining rivers have been drained for agricultural purposes. Many people consider these activities as evidence of progress, and, because they are unaware of values associated with natural areas, assume that agriculture has a higher economic use. The purpose of this paper is to present the economic importance of the sport and commercial fisheries of Lake Chautauqua, a restored Illinois River bottomland lake.

## DESCRIPTION OF LAKE CHAUTAUQUA

Lake Chautauqua is located in Mason County, near Havana, Illinois. The area now covered by the lake was originally a series of lakes and sloughs adjacent to, and connected with, the Illinois River. Following World War I these lakes and

sloughs were drained and leveed from the river for agricultural purposes by the Chautauqua Drainage and Levee District. In the fall of 1926 a flood on the Illinois River broke the levees and flooded the District. The land was not reclaimed for agriculture, so that the venture was a financial failure. In 1936 the U. S. Biological Survey (predecessor of the Fish and Wildlife Service) purchased the flooded drainage district for use as a migratory waterfowl refuge. By 1940, the levees had been repaired and water control gates and spillways installed. During moderate to high river stages the Illinois River may overflow into the lake. According to Stall and Melsted (1951:10) Lake Chautauqua covers 3,562 acres at "normal pool elevation", 435.0 feet mean sea level.

## PROCEDURE

On April 15, 1950, a cooperative fishery research program was started at Lake Chautauqua by the Illinois Natural History Survey, Illinois Department of Conservation, and the U. S. Fish and Wildlife Service. As part of this program, a creel census was conducted from 1950 through 1954 in the manner described by Starrett and McNeil (1952: 5-6). Fishing during the fall and winter months at the lake was restricted to certain parts of the lake and, prior to 1954, no fishing

was permitted on the lake during the duck hunting season. The Federal Service allowed trot-line fishing on the lake in 1954 and catch records were kept on this fishery.

Prior to 1951, commercial fishing on the lake was limited to wing-net fishing which was permitted from about the middle of March to the first of October. Since 1951, commercial seining has been allowed each year during September. In 1952, several commercial fishermen using wing-nets started "round-up" fishing on the lake, an effective method for taking bigmouth buffalo, *Ictiobus cyprinellus*. The inauguration of seining and "round-up" fishing increased the commercial fishing pressure and catch. Commercial fishery statistics for the lake were compiled from the monthly reports of wing-net catches prepared by the commercial fishermen and from the records of daily seine hauls kept by the writer.

#### SPORT FISHERY

A description of the sport fishery at Lake Chautauqua is given by Starrett and McNeil (1952). The following fishes dominated the pole-and-line catch at Lake Chautauqua: crappies, *Pomoxis annularis* and *P. nigromaculatus*; bluegills, *Lepomis macrochirus*; freshwater drum, *Aplodinotus grunniens*; and yellow bass, *Roccus mississippiensis*. The remainder of the pole-and-line catch consisted of: channel catfish, *Ictalurus punctatus*; largemouth bass, *Micropeterus salmoides*; white bass, *Roccus chrysops*; and 15 other species. The pole-and-line catch from 1950 through 1954 is summarized in Table

1. Fishing success at the lake varied from an average of 0.6 fishes caught per hour in 1952 and 1953 to 0.8 fishes in 1954. The catch figures indicate, however, that fishing varied considerably more from year to year than is suggested by the catch-per-hour data. Fishing pressure by pole-and-line fishermen at Lake Chautauqua ranged from 5,675 fisherman-days in 1953 to 13,717 days in 1951. The wide range in the annual number of fisherman-days reflected the fishing success, since the fishing pressure at Lake Chautauqua tended to vary directly with fishing success. The total annual fishing pressure at Lake Chautauqua might be expected to double, if good fishing were available at the lake throughout the summer.

Few people fish the lake specifically for largemouth bass; the bass caught are usually taken by anglers fishing for crappies or bluegills.

Complete data on trot-line catches are available only for 1954 (Table 2). Channel catfish and bullheads, *Ictalurus* spp., comprised 52.5% of the trot-line catch. These species formed only a small part of the pole-and-line catch (Table 1). Trot-line fishermen took few pan and game fishes (Table 2), but they were able to catch more catfish and bullheads than was possible with pole-and-line.

#### COSTS OF TRAVEL

The average fishing party at Lake Chautauqua consisted of two persons. Home addresses of the fishermen recorded on creel census cards were used to determine the distance each party traveled. The exact mileage traveled by the fishermen was

TABLE 1.—Summary of Creel Census Data (Pole-and-Line Fishermen) at Lake Chautauqua, Illinois, 1950 Through 1954.

Kinds of fishes	Number of fishes caught				
	1950	1951	1952	1953	1954
Crappie .....	10,096	35,496	18,422	12,510	32,151
Bluegill .....	7,626	9,335	8,316	1,680	15,787
Freshwater drum .....	9,459	4,274	4,930	898	4,535
Yellow bass .....	5,222	2,590	2,792	448	3,160
Channel catfish .....	1,205	1,206	1,120	321	884
Largemouth bass .....	1,347	1,105	1,240	726	564
White bass .....	14	805	909	69	319
Other species .....	1,853	1,515	1,726	983	2,948
Total number caught .....	36,822	56,326	39,455	17,635	60,348
Estimated weight (pounds) <sup>1</sup> .....	17,717	22,180	21,535	9,414	36,442
Anglers .....	10,499	13,717	12,230	5,675	13,357
Hours fished .....	53,735	76,768	71,126	29,235	78,320
Fishes caught per hour .....	0.7	0.7	0.6	0.6	0.8
Fishes caught per fisherman-day .....	3.5	4.1	3.2	3.1	4.5

<sup>1</sup> Based on mean weights of fish weighed during creel census survey.

not determined, but the approximate mileage was calculated by marking zones on an Illinois road map, using Lake Chautauqua as the center point, and drawing in concentric circles with radii of 25, 50, 75, etc. miles from the lake. A summary of all the recorded trips to the lake (Table 3) shows that 71.5% of the parties drove between 26 and 50 miles. The majority came from the nearest metropolitan counties, Peoria and Tazewell. Fishing at the lake attracted few anglers living more than 75 miles from the lake. Anglers traveling more than 100 miles were mostly from the Chicago metropolitan area (151- to 175-mile zone). Nearly all the out-of-state anglers accompanied resident anglers and had not come to Illinois for the

purpose of fishing at Lake Chautauqua.

The average distance traveled to the lake by fishing parties, excluding out-of-state fishermen was about 40 miles, or 80 miles round-trip.

The cost, in 1955, of driving an automobile one mile (excluding depreciation, insurance, and licenses) was \$0.035 as determined by the American Automobile Association (Anon., 1956:38). The cost of transportation for each fishing party to Lake Chautauqua for the average distance of 80 miles at \$0.035 per mile was \$2.80.

#### OTHER SPORT FISHING COSTS

Most of the anglers at Lake Chautauqua brought their lunches

TABLE 2.—Composition of Trot-Line Catch of 1,830 Sport Fishermen at Lake Chautauqua, Illinois, 1954.

Kinds of fishes	Number caught	Per cent of total number
Freshwater drum...	3,055	31.1
Bullhead .....	2,054	21.0
Channel catfish.....	3,086	31.5
Carp.....	369	3.7
Bluegill.....	588	6.0
Crappie.....	301	3.1
Yellow bass.....	206	2.1
Other species <sup>1</sup> .....	144	1.5
Totals.....	9,803	100.0

<sup>1</sup> 11 kinds of fishes including 21 largemouth bass.

and returned home the same day, so that expenditures for meals and lodging were negligible.

Inexpensive cane poles and live baits were used by most fishermen at Lake Chautauqua, although some still fishing was done with rods and reels of various costs. The number of hooks and sinkers lost per trip on sunken logs was quite high. The estimated, prorated cost for fishing tackle per fishing party at Lake Chautauqua was \$0.50, and the cost for live bait per fishing party was \$0.75.

Nearly all the fishing at Lake Chautauqua was done from boats. From 1950 through 1954, most of the boats used on the lake were rented from liverymen at the lake. The average cost for boat rental was \$1.40 per fishing party trip.

The use of outboard motors was not permitted on the lake until 1952. The prorated and operating costs of an outboard motor per fishing party trip was determined to be \$1.25. To standardize the fishing costs for

all five years it was considered advisable to include the outboard motor costs in the 1950 and 1951 fishing costs.

#### SPORT FISHERY VALUES

Bellrose and Rollings (1949:12) assigned recreational values of \$2.50 per pound for largemouth bass and \$0.75 per pound for other fishes taken by anglers. In the present paper, sport fishing values were separated into recreational and yield values. The recreational values were based on the amount of money anglers spent to take fish at the lake; yield values were determined from the market price of the fish caught by angling.

Recreational value, as used here, is the amount of money anglers spend per annum to fish at the lake. This covers expenditures for transportation, boats, live bait, tackle, outboard motors, and miscellaneous items. The derivations of these various fishing expenses, other than miscellaneous

TABLE 3.—Travel by Fishing Parties (Two Men) from Homes to Lake Chautauqua, Illinois, 1950 Through 1954.

Miles, origin to Lake Chautauqua	Number trips	Per cent, total number trips
0 to 25.....	4,359	19.6
26 to 50.....	15,909	71.5
51 to 75.....	1,152	5.2
76 to 100.....	231	1.0
101 to 125.....	56	0.3
126 to 150.....	67	0.3
151 to 175.....	397	1.8
176 to 200.....	4	.....
201 to 225.....	1	.....
Out of State.....	69	0.3
Totals.....	22,245	100.0

items, are given in the two preceding sections. The cost for an average fishing trip to Lake Chautauqua was computed as follows:

Transportation .....	\$ 2.80
Boat rental .....	1.40
Live bait .....	0.75
Tackle .....	0.50
Outboard motor .....	1.25
Miscellaneous items (licenses, candy, and beverages).....	1.00
Total .....	\$ 7.70

The cost per angler trip was \$3.85 since the average number of persons comprising a trip or party to the lake was two. The above costs are also applicable to trot-line fishing.

The recreational values of the sport fishery at Lake Chautauqua (1950 through 1954) are given in Table 4. The calculated average annual recreational value for this period was \$44,127.16.

The yield values of the sport fishery at Lake Chautauqua are based on the local wholesale prices (legal or illegal) of the fish caught. These prices, for undressed fish, averaged \$0.25 per pound for the species taken at Lake Chautauqua. The estimated numbers of pounds of fish taken annually by anglers (Tables 1 and 2) have been used in calculating the yield values of the Lake Chautauqua sport fishery (Table 4).

#### COMMERCIAL FISHERY VALUES

The principal species of fishes taken commercially at Lake Chautauqua are: bigmouth buffalo; carp, *Cyprinus carpio*; freshwater drum; and channel catfish. A summary of the annual commercial yields and values of the catches at Lake Chau-

TABLE 4.—Calculated Annual Sport Fishery Values of Lake Chautauqua, Illinois, 1950 Through 1954.

Year	Recreational value	Yield value
1950.....	\$40,421.15	\$4,429.25
1951.....	52,810.45	5,545.00
1952.....	47,085.50	5,383.75
1953.....	21,848.75	2,353.50
1954 <sup>1</sup> .....	58,469.95	12,687.75

<sup>1</sup> Includes trot-line fishing. Calculated recreational value of trot-line fishery was \$7,045.50 and calculated yield value was \$3,577.25.

tauqua (1950 through 1956) is given in Table 5. The yearly differences in the commercial yields at Lake Chautauqua were caused by: 1) variations in annual fishing pressure; 2) changes in fishing conditions, methods and devices; and 3) fluctuations in fish populations. The yield in 1950 was exceptionally low because fishermen confined all of their efforts to conventional wing-net fishing.

The calculated average annual value of the commercial catch of fishes from 1951 through 1956 was \$24,883.70. The highest calculated annual commercial yield value during the past 7 years at Lake Chautauqua was \$32,136.58 in 1954; during that year the reported value of the entire Illinois River catch amounted to only \$257,450.00 (unpubl.).

Most of the commercial fishermen that fish at Lake Chautauqua also fish in other waters, so that only a part of the value of their tackle and equipment can be assigned to the Lake Chautauqua fishery. The prorated value of the tackle and equipment used in 1954 on Lake Chautauqua was \$4,500.00.

TABLE 5.—Annual Yield and Calculated Value of Fish Taken Commercially at Lake Chautauqua, Illinois, 1950 Through 1956.<sup>1</sup>

Kinds of fish	Weight in pounds for designated years						
	1950	1951	1952	1953	1954	1955	1956
Carp.....	51,996	79,795	52,156	25,211	58,619	34,473	29,952
Buffalo.....	68,114	136,816	186,810	165,361	186,795	161,355	142,267
Freshwater drum.....	15,908	11,144	31,009	34,043	64,090	59,160	28,740
Channel catfish.....	7,057	5,208	7,940	4,380	13,938	13,084	16,704
Other species.....	1,179	833	1,754	50	119	41	56
Total catch.....	144,254	233,796	279,669	229,045	323,561	268,113	217,719
Value.....	\$13,273.08	\$21,108.60	\$28,075.99	\$23,150.65	\$32,136.58	\$23,491.17	\$21,339.18

<sup>1</sup> Based on yearly average local wholesale prices for undressed fish.

## DISCUSSION

The fishery of the Illinois River valley is primarily a lake fishery; although some sport and commercial fishing is done in the Illinois River channel, most of the fishing is confined to the shallow, mud-bottomed lakes adjacent to the river channel. Most of these bottomland lakes are either connected with the river, or are subject to the overflow from it.

Between 1904 and 1922, a number of the lakes in the Illinois River bottomland were drained and leveed from the river for agricultural purposes. To date only four of these drainage districts have been reflooded; three of them are operated and managed as privately owned, duck-shooting clubs and the fourth, Lake Chautauqua, is a governmentally controlled wildlife refuge.

Public fishing waters in Illinois have not been increased in proportion to the increase in population and interest in fishing. In 1950, Jenkins and Walraven reported on potential conservation areas along the Illinois River from Hennepin to Grafton. These writers stated (1950:78) that, "While ideally all of the river bottom areas should be returned to the river which made them and which can and will reclaim them at will, some of these areas are more feasible for immediate conservation development". In that report they listed eight drainage and levee districts covering 51,861 acres which they believed might be available for acquisition and early development. Such restored lakes would be used for recreation and for the storage of river flood-waters.

These former bottomland lakes,

now in drainage and levee districts, at one time were considered excellent commercial and sport fishing waters. The present investigation indicates that these areas would again furnish good fishing if they were reflooded. In 1954, the total calculated value of the fishery of Lake Chautauqua was \$103,294.28, or \$29.00 per acre. In addition to the fishery value a restored bottomland lake also has wildlife, boating and flood-storage values.

## SUMMARY

1. In Illinois, thousands of acres of lakes and sloughs adjoining rivers have been drained for agricultural purposes. Many conservationists believe that certain of these drainage and levee districts should be reflooded. Lake Chautauqua (near Havana) is a reflooded drainage district along the Illinois River, on which a cooperative fishery research program has been in progress since 1950.
2. A five-year creel census (1950 through 1954) was made at Lake Chautauqua. The principal species of fish taken by anglers were crappies, bluegills, freshwater drum, and yellow bass.
3. Fishing success during the five-year creel census period ranged from a low of 0.6 fishes per hour in 1952 and 1953 to a high of 0.8 fishes in 1954.
4. Fishing pressure by pole-and-line fishermen ranged from 5,675 man-days in 1953 to 13,717 man-days in 1951.
5. The highest annual catch was made in 1954 when anglers took 60,348 fishes on pole-and-line.

6. The estimated weight of the fishes caught by pole-and-line fishermen ranged from 9,414 pounds in 1953 to 36,442 pounds in 1954. The highest annual per acre yield by pole-and-line fishing (1954) was 10.2 pounds.

7. Trot-line creel data were available only for 1954. In that year a total of 9,803 fishes were caught on trot-lines by 1,830 fishermen. The estimated weight of the 1954 trot-line catch was 14,309 pounds.

8. Calculated annual yield values (values of fish as food) of the sport fishery ranged from \$2,353.50 in 1953 to \$12,687.75 in 1954 (the 1954 value included the trot-line as well as the pole-and-line catch).

9. The calculated average annual recreational value (cost of fishing, which included tackle, boats, transportation, etc.) was \$44,127.16. The calculated recreational value in 1954 was \$58,469.95.

10. The calculated average annual value of the commercial fish catch from the lake from 1951 through 1956 was \$24,883.70. The

calculated value of the 1954 catch was \$32,136.58.

11. The estimated prorated value of commercial tackle and equipment used at the lake was \$4,500.00.

12. The calculated total fishery value in 1954 at Lake Chautauqua was \$103,294.28 or \$29.00 per acre.

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