FURTHER COLLECTIONS OF OKLAHOMA LAKE AND POND FISHES

GORDON E. HALL, Oklahoma Game and Fish Department, Wilburton

This paper is a report on the fishes collected in 14 Oklahoma lakes and ponds during the summer of 1950 by Oklahoma Game and Fish Department personnel. Representative specimens were collected and preserved incidental to the reclamation of some farm ponds and to the fishery management investigations of those city lakes and reservoirs included in the summer survey program. Although the primary purpose of these investigations was not a taxonomic or distributional study, they did afford the opportunity to enlarge upon the distribution of Oklahoma lake fishes as previously reported by Hall (3), from collections made during the summer of 1948.

Unlike the 1948 survey, when fish were collected by gill nets and seines only, this year's collections were made almost entirely with the aid of powdered cube root containing five per cent rotenone. The use of this drug in fishery research and management has been explained by various workers, including Leonard (8) and Krumholz (7). Essentially, it cuts off the supply of oxygen which passes through the gill capillaries and forces the fish to the surface of the water, where they can be picked up with dip nets.

On the large lakes gill nets were used to help block off areas to be poisoned, to check on the movements of fish in and out of these areas, and to test the effectiveness of the drug in deep waters. Information concerning the use of gill nets in connection with rotenone studies will be reported elsewhere. Twenty-foot minnow seines were used occasionally to supplement the other catches, but the rotenone was usually sufficient to obtain the various kinds and sizes of fish in the sampled area.

The 14 bodies of water ranged in size from two to 7,000 surface acres and varied physically from shallow, turbid ponds with little vegetation to very clear lakes with numerous submerged and emergent aquatic plants. In four of the 14, the largest of which was 35 acres, an attempt was made to remove the entire fish population; on the larger lakes from one to three small coves were sampled.

In order to present a summary of these collections in a manner acceptable to the general fishing public, as well as to this scientific society, it seemed advisable to omit a discussion of the distributon of each species by an annotated list, as was done with the previous collection (3). Instead, a brief description of each lake, the order of dominant fishes in the catch, and comments on the species composition, unusual catches, and the general fishing picture are given. Information concerning the production in terms of pounds per acre, the age and growth of fishes, and management recommendations for each lake are being reported in various other papers and will be available later in the form of lake management reports from the Oklahoma Game and Fish Department. For the distribution records, the total list of species and their distribution by lakes is recorded in Table I.

Guthrie Country Club Lake

Location: One mile east of Guthrie in Logan County.
Physical Characters: 65 acres; water usually clear; dead trees, submerged brush, and numerous aquatic plants provide excellent cover for bass, crappies, and sunfishes, but make motorboating somewhat hazardous.
Area Studied: Two acre cove of eight foot maximum and four foot average depth.
Order of Dominant Fishes in Catch: Largemouth bass, bluegill, green sunfish, and redear sunfish.

NUMBER OF SPECIES COLLECTED: 11

COMMENTS: The majority of largemouth bass killed were young-of-the-year, indicating a very successful hatch in 1950; few crappies were collected but better crappie habitat is available in other parts of the lake than the area sampled; bluegill, redear, and green sunfishes were in excellent condition; with the exception of six small bullheads, no rough fish were found. All conditions point to this being one of the better fishing lakes for its size in Oklahoma.

CLINTON CITY LAKE

LOCATION: Washita County, 17 miles west of Clinton.

PHYSICAL CHARACTERS: 335 surface acres; water slightly turbid due to open shore lines and much wind; practically no weed beds.

AREA STUDIED: 2.5 acre cove; six foot maximum and three foot average depth.

ORDER OF DOMINANT FISHES IN CATCH: White crappie, black crappie, orange-spotted sunfish, channel catfish, and white bass.

NUMBER OF SPECIES COLLECTED: 15

COMMENTS: Black bass fishing is no longer good in this lake, and the crappies and sunfishes are of smaller average size than is considered best for good fishing; furthermore, the populations of the latter fishes are large, to the extent that they may be overpopulated; some of the largest carpsuckers (10 lbs.) collected in Oklahoma have been taken from this lake consistently. White bass have been stocked since the 1948 investigation, and the planting has apparently been successful, since over 50 were collected from this one small cove.

LAKE OKMULGEE

LOCATION: Five miles west of Okmulgee, in Okmulgee County.

PHYSICAL CHARACTERS: 643 surface acres; willow and buttonbush present along most of the heavily wooded shorelines; water slightly turbid; large amounts of organic matter and debris on bottom.

AREA STUDIED: Two coves; (1) 2.5 acres; 10 foot maximum depth; 3.5 foot average depth; (2) two acres; 16 foot maximum depth; 8 foot average depth.

ORDER OF DOMINANT FISHES IN CATCH: Both coves—gizzard shad, drum, white crappie, channel catfish, and miscellaneous sunfishes.

NUMBER OF SPECIES: 21.

COMMENTS: One of the few lakes in Oklahoma containing very many spotted black bass; the absence of coarse fishes in our collections substantiates previous futile attempts by commercial fishermen to take these fishes here; twelve more species were collected at this time with the use of rotenone than were taken in 1948 with gill nets and seines, indicating to some extent the selectivity of the latter methods; eleven of the 13 species collected by Force (2) in the ponds and streams of Okmulgee County in 1926 were included in the 1948 and 1950 collections from Okmulgee Lake; white bass planted in 1948 have been taken only rarely by fishermen, and none was taken during this investigation.

ALTUS-LUCIEN RESERVOIR

LOCATION: Kiowa County, almost equidistant from Hobart, Altus, and Mangum.

PHYSICAL CHARACTERS: 6,806 surface acres; water clear; smartweed and willows abundant along shorelines; plum bushes numerous in shallow water.

AREA STUDIED: Two coves—(1) two surface acres, 18 foot maximum and 8 foot average depth; (2) five acres, 8 foot maximum and 2.5 foot average depth.

ORDER OF DOMINANT FISHES IN CATCH: Both collections—gizzard shad, carp, channel catfish, carpsuckers, and largemouth bass.

NUMBER OF SPECIES: 22.

COMMENTS: Small gizzard shad were killed in great numbers. Because of their habit of schooling near the surface of the water, where they are present, young gizzard shad are affected most quickly and in the greatest numbers by rotenone; other fishes are not as easily affected and may even escape. In the first cove, gill nets revealed the presence of large numbers of carpsuckers, of which only a few were picked up after poisoning the area. These fish were caught near the bottom of the net in deep water and had apparently attempted to leave the area when the rotenone was applied. The second cove was more completely blocked with gillnets than the first, and a greater poundage of carp, carpsuckers, and channel catfish were collected with the nets than with the rotenone, which killed largely shad and small carp. The foregoing would indicate that under certain conditions, as in open coves, rotenone alone is not sufficient to adequately sample the fish population, and that a variety of methods is needed.

GUTHRIE NEW CITY LAKE

LOCATION: Four miles south and three miles west of Guthrie in Logan County.

PHYSICAL CHARACTERS: Approximately 300 surface acres; quite turbid; buttonbush, willow, and smartweed common.

AREA STUDIED: Several size mesh gill nets were set in various parts of the lake, and hook and line methods were used.

ORDER OF DOMINANT FISHES IN CATCH: Black Bullhead, longear sunfish, green sunfish, bluegill, largemouth bass.

NUMBER OF SPECIES: 8

COMMENTS: This lake has been impounded for two years but never opened for public fishing; it was originally stocked with largemouth bass, crappie, and bluegill, none of which appears to be very abundant yet. The presence of large numbers of black bullhead in this new lake is typical of the succession that apparently occurs in newly impounded waters in Oklahoma. In new lakes the black bulhead generally becomes dominant in the first year of impoundment, is very abundant for a few years, and then gradually is replaced by other species. Recent investigations by the author at two new impoundments in eastern Oklahoma (Fort Gibson and Wister Reservoirs) have revealed that this same type of succession—initial black bullhead dominance—has occurred there, also. The new city lake of Guthrie will be opened for fishing in the spring of 1951.

GREENLEAF LAKE

LOCATION: Four miles southeast of Braggs in Muskogee County.

PHYSICAL CHARACTERS: 900 surface acres; water usually clear; water willow *(Dianthera)* very abundant along heavily wooded shorelines.

AREA STUDIED: Two coves—(1) 2.5 acres; 8 foot maximum depth; 2.5 foot average depth (2) 1.5 acres; 6 foot maximum depth; 1.75 foot average depth.

ORDER OF DOMINANT FISHES IN CATCH: Both coves—gizzard shad, bluegill, warmouth, redear sunfish, green sunfish, largemouth bass.

NUMBER OF SPECIES: 39.

COMMENTS: The largest total number of species from any of the 14 lakes taken here was due largely to the proximity of the lake to the rich fish fauna of the Ozark region. Channel catfish and crappie were scarce in the poison collections, but many were caught in gill nets. This lake contains an abundance of many kinds of fishes to please many types of fishermen.

Fort Supply Reservoir

Location: Woodward County, three miles south of Fort Supply and 10 miles Northeast of Woodward.

Physical Characters: 1,750 surface acres; water slightly turbid.

Area Studied: Two coves—(1) one acre; 5 foot maximum depth; 1½ foot average depth; (2) 2.5 acres; 9 foot maximum depth; 3.5 foot average depth.

Order of Dominant Fishes in Catch: First cove—largemouth bass, black bullhead, carp, bluegill, white crappie; Second cove—carp, largemouth bass, white crappie, black bullhead, bluegill.

Number of Species: 23.

Comments: Abnormal rains preceding and during period of investigation raised the water level to unprecedented height, obscured boundaries of former coves, and interfered with the collection of an adequate sample of the fish population. Further investigation is needed on this particular lake.

Lake Murray

Location: Carter and Love Counties, midway between Ardmore and Marietta.

Physical Characters: 5,728 surface acre; water usually clear; buttonbush and willows common; stumps beneath water surface hazardous for boating.

Area Studied: Three coves—(1) 4.5 acres; 18 foot maximum depth; 3 foot average depth (2) 1.5 acres; 16 foot maximum depth; 8 foot average depth. (3) 2.5 acres; 9 foot maximum depth; 3.5 foot average depth.

Order of Dominant Fishes in Catch: First cove—gizzard shad, carp, largemouth bass, white crappie and channel cat. Second and third coves—gizzard shad, bluegill, redear, white crappie.

Number of Species: 27.

Comments: A much greater kill of all fishes, especially carp, occurred in the first of the three coves sampled. Factors contributing to this included the location of the first cove in the shallow upper reaches of the lake; the concentration of food and forage fishes in this area due to rains the preceding few days; ideal climatic conditions the day of the poisoning, such as high temperatures and very quiet waters. The finding of the tadpole madtom *(Schilbeodes mollis)* in Lake Murray represented an extension of its known range; previously it had been collected only as far west as the Clear Boggy River. This is still one of the best bass lakes in Oklahoma.

Goddard Lake

Location: Carter County, 18 miles northeast of Ardmore on Goddard Ranch.

Physical Characters: 35 surface acres; water exceptionally clear with numerous aquatic plants *(Potamogeton* spp., *Chara,* and coontail*)* growing at all depths; oxygen 7 ppm. down to six meters.

Area Studied: Approximately 30 of the 35 acres rotenoned; 29 foot maximum depth; 13 foot average depth.

Order of Dominant Fishes in Catch: Largemouth bass, bluegill, redear sunfish, black crappie, and channel catfish.

Number of Species: 12.

Comments: This was the first attempt by the survey crew to obtain a complete kill. The lake contained a heavy, if not overpopulation of bass and sunfishes; only a few large channel catfish were collected, indicating this species had not been spawning; numerous submerged plants kept fish from rising to surface and interfered with recovery.

Pond on Fisher Circle-F Ranch

Location: Oklahoma County, three miles south and ½ mile west of Edmond.

Physical Characters: Two surface acres; 9 foot maximum depth and 4 foot average depth; water very turbid; smartweed abundant.

Area Studied: Entire pond.

Order of Dominant Fishes in Catch: White crappie, bluegill, green sunfish.

Number of Species: 4.

Comments: This was a typical example of an overpopulated farm pond; crappie were very abundant and of small average size, except for a very few extra large individuals. One river carpsucker, weighing 12 pounds and 13 ounces, was picked up soon after the rotenone was applied. At this time, it is the largest of this species known from Oklahoma waters[1]. It was probably introduced either from a bait bucket or with other fish seined from a river and put in this pond many years previously.

Pond on Lexington Game Refuge

Location: Cleveland County, five miles northeast of Lexington.

Physical Characters: 2.2 surface acres; 13.5 foot maximum depth; 6 foot average depth; water clear; lake located in wooded area and well protected from wind; thermocline present from 6 to 8 feet; no oxygen present below thermocline.

Area Studied: Entire pond.

Order of Dominant Fishes in Catch: Orange spotted sunfish, black crappie, black bullhead, green sunfish, and bluegill.

Number of Species: 9.

Comments: Pond heavily overpopulated with first three of above named species; only large fish collected were 11 river carpsuckers, ranging in weight from 3 to 10 pounds, and one 29 pound black buffalo; pond originally stocked with fish from South Canadian River 17 years previous. Continual checking for several days following application of rotenone revealed no live fish in pond.

Strington Sub-Prison Lake

Location: Atoka County, four miles north of Stringtown on game refuge.

Physical Characters: 60 surface acres; water slightly turbid; buttonbush, willow, and smartweed abundant.

Area Studied: Two acre cove; 12 foot maximum depth; 4 foot average depth.

Order of Dominant Fishes in Catch: Bluegill, white crappie, green sunfish, largemouth bass, and channel catfish.

Number of Species: 14.

Comments: Golden shiners, up to eight inches in length were very abundant and easily taken in both gill nets and seines; bass fishing has dropped off in recent years, but channel catfishing is still good; lake to be lowered or drained completely in near future for work on the dam; at that time fish population will be removed and lake restocked after refilling.

Lake Carleton

Location: Latimer County, 6 miles north of Wilburton, in Robbers Cave State Park.

Physical Characters: 52 surface acres; waters very clear; lake located between two mountains at source of Fourche Maline River; surround-

[1] Size record omitted from report of 1948 collections—Black bullhead (*Amieurus melas*), weighing three pounds and three ounces, was collected in Veteran's Lake, one mile southwest of Sulphur, in Murray County, July 13, 1948.

TABLE I

Fishes Taken from Fourteen Oklahoma Lakes and Ponds, 1950.

SPECIES*	GUTHRIE COUNTRY CLUB LAKE	CLINTON CITY LAKE	LAKE OKMULGEE	ALTUS-LUGERT RESERVOIR	GUTHRIE NEW CITY LAKE	GREENLEAF LAKE	FORT SUPPLY RESERVOIR	LAKE MURRAY	GODDARD LAKE	POND ON FISHER CIRCLE-F RANCH	LEXINGTON OAKES NURSERY POND	STRINGTOWN SUB-PRISON LAKE	LAKE CARLETON	COTTRELL LAKE
Lepisosteus productus (spotted gar)			X			X	X							
Lepisosteus osseus (longnose gar)			X	X		X	X	X						
Dorosoma cepedianum (gizzard shad)				X		X	X	X						
Ictiobus niger (black buffalo)				X							X			
Carpiodes carpio (river carpsucker)		X		X			X	X		X	X			
Hypentelium nigricans (hogsucker)						X	X							
Minytrema melanops (spotted sucker)						X	X							
Moxostoma duquesnii (black redhorse)						X	X							
Moxostoma erythrurum (golden redhorse)						X	X	X						
Cyprinus carpio (carp)		X		X			X	X						
Hybopsis storerianus (silver chub)														
Opsopoedus emiliae (pugnose minnow)														
Notemigonus crysoleucas (golden shiner)							X	X				X	X	X
Notropis percobromus (plains shiner)												X		
Notropis umbratilis (redfin shiner)			X											
Notropis zonatus (striped shiner)						X								
Notropis whipplii (steelcolor shiner)						X								
Notropis camurus (bluntface minnow)						X								
Notropis lutrensis (red shiner)	X	X	X	X		X			X		X			X
Notropis boops (bigeye shiner)														
Notropis deliciosus (sand shiner)														
Phenacobius mirabilis (suckermouth minnow)							X	X					X	
Hybognathus placita (plains minnow)				X			X	X						

TABLE I (Cont'd)

SPECIES*	GUTHRIE COUNTRY CLUB LAKE	CLINTON CITY LAKE	LAKE OKMULGEE	ALTUS-LUGERT RESERVOIR	GUTHRIE NEW CITY LAKE	GREENLEAF LAKE	FORT SUPPLY RESERVOIR	LAKE MURRAY	GODDARD LAKE	POND ON FISHER CIRCLE-F RANCH	LEXINGTON GAME REFUGE POND	STRINGTOWN SUB-PRISON LAKE	LAKE CARLETON	COTTRELL LAKE
Pimephales promelas (fathead minnow)														
Ceratichthys perspicuus (bullhead minnow)														
Ceratichthys vigilax (parrot minnow)														
Hybarhynchys notatus (bluntnose minnow)														
Campostoma anomalum (stoneroller)														
Ictalurus lacustris (channel catfish)														
Amieurus melas (black bullhead)														
Amieurus natalis (yellow bullhead)														
Pilodictis olivaris (flathead catfish)														
Schilbeodes mollis (tadpole madtom)														
Schilbeodes insignis (slender madtom)														
Fundulus notatus (blackband topminnow)														
Fundulus olivaceus (blackspotted topminnow)														
Plancterus kansae (plains killifish)														
Gambusia affinis (mosquitofish)														
Lepidema chrysops (white bass)														
Percina caprodes (logperch)														
Cottogaster copelandi (river darter)														
Boleosoma chlorosomum (bluntnose darter)														
Poecilichthys spectabilis (orangethroat darter)														
Poecilichthys whipplii (redfern darter)														
Hololepis gracilis (western swamp darter)														
Micropterus punctulatus (spotted black bass)														
Micropterus salmoides (largemouth black bass)														

TABLE I (Cont'd)

SPECIES*	GUTHRIE COUNTRY CLUB LAKE	CLINTON CITY LAKE	LAKE OKMULGEE	ALTUS-LUGERT RESERVOIR	GUTHRIE NEW CITY LAKE	GREENLEAF LAKE	FORT SUPPLY RESERVOIR	LAKE MURRAY	GODDARD LAKE	POND ON FISHER CIRCLE-F RANCH	LEXINGTON SUB-PRISON LAKE	STRINGTOWN SUB-PRISON LAKE	LAKE CARLETON	COTTAGE LAKE
Chaenobrytius coronarius (warmouth)	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Lepomis cyanellus (green sunfish)	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Lepomis humilis (orangespotted sunfish)	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Lepomis megalotis (longear sunfish)	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Lepomis macrochirus (bluegill)	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Lepomis microlophus (redear sunfish)	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Pomoxis annularis (white crappie)	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Pomoxis nigro-maculatus (black crappie)	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Labidesthes sicculus (brook silversides)	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Aplodinotus grunniens (freshwater drum)	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Totals	11	15	21	22	8	38	22	27	12	4	6	14	26	16

* Common and scientific names are those accepted by the American Fisheries Society (1).

ed by pine woods and high bluff overhanging west side of lake; bottom rocky and water willow *(Dianthera americana)* abundant.

AREA STUDIED: 0.5 surface acre cove; 6 foot maximum depth; two foot average depth; gill nets and hook and line methods used in other parts of lake.

ORDER OF DOMINANT FISHES IN CATCH: Green sunfish, warmouth, largemouth bass, spotted bass, and bluegill.

NUMBER OF SPECIES: 20.

COMMENTS: Plugging, fly-fishing, or bait fishing excellent for basses and sunfishes; motor boats not allowed on lake, and more people fish in stream above and below lake; no overpopulation of any species evident, and fish appear to be in excellent condition.

COTTRELL LAKE

LOCATION: Logan County, five miles northeast of Guthrie.

PHYSICAL CHARACTERS: Six surface acres; maximum depth 18 feet; average depth—six feet; turbid; willow and buttonbush present.

AREA STUDIED: Entire Lake.

ORDER OF DOMINANT FISHES IN CATCH: White crappie, largemouth bass, carp, bluegill, and orangespotted sunfish.

NUMBER OF SPECIES: 16.

COMMENTS: Too many small crappie present, but, with the exception of Lake Murray, this lake contained more large bass per acre than any of the other lakes investigated; many large carp, up to 28 pounds, were collected, as well as one 23 pound flathead catfish; lake had originally been stocked with river fish, which accounts for the presence of coarse fishes and several typical stream minnows.

SUMMARY OF COLLECTIONS

Fifty-seven species were collected from the 14 lakes and ponds. As in 1948, one particular lake in the northeast section of Oklahoma contributed the largest number of species. This year Greenleaf Lake contributed 39 of the 57 species, whereas, in 1948, 32 of the 47 species collected were taken from Grand Lake. Throughout the present survey one particular distributional fact was very noticeable—the difficulty of collecting a large number of species from any one spot in western Oklahoma, and the ease with which it could be done farther east. However, the fact is not new to fish collectors. Hubbs and Ortenburger (5) noted that the fish fauna of eastern Oklahoma was obviously richer than that of the western part of the state. The nearness of eastern Oklahoma to the varied fish faunas of Arkansas, Missouri, Louisana, and the Mississippi valley is in part responsible for this. Furthermore, environmental factors, such as the absence of clear, cool waters, and gravelly shoals, no doubt limit the western distribution of many of the minnows and darters.

On several occasions this summer, fishes that normally occur in rivers or streams such as the striped shiner, the silver chub, and the river darter, were collected in lakes and ponds. These collections are recorded in the distribution table, but it should not be misconstrued that these fishes are permanent residents of that lake, or that the species has extended the range of its environment. In all such cases only one or two specimens were found in a collection of several thousand fish, and they should be regarded as bait bucket introductions. Every bait fisherman should be cautioned against dumping the remainder of his bait into the lake when he is through fishing, and pond owners against promiscuously stocking a pond with river fish. Unwanted species, such as carp, goldfish, and certain sunfishes, are often introduced by these methods, and their introduction may eventually alter the game fish population.

Certain typically stream species are apparently able to tolerate lentic conditions, since large populations of the suckermouth minnow, and the tadpole madtom, were found in Altus-Lugert Reservoir and Lake Murray respectively.

Reading across Table I from left to right, one can see the statewide distribution of certain species. Those particular ones, such as the game and pan species, which have been stocked from Oklahoma fish hatcheries were found in most of the lakes. The green sunfish and bluegill occurred in all 14 of the waters; the white crappie and largemouth bass occurred in 12 lakes, the orangespotted sunfish and black bullhead in eleven, and the channel catfish in 10. Carp and carpsucker were the most widespread coarse fishes, occurring in 6 and 7 lakes respectively, and the red shiner occurred in more lakes (9) than any other minnow. Eight species were taken only in Greenleaf Lake. Representative specimens from all collections are deposited in the University of Oklahoma Museum of Zoology, and with certain species, duplicates are deposited in the Oklahoma A. & M. College Museum of Zoology.

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