DISCOVERY OF FISHES IN OKLAHOMA (1852-1972)

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By virtue of location, Oklahoma has a rich fish fauna, with Ozarkian species in the east and northeast and Ouachitan and Gulf Coast forms in the southeast, in addition to those of the Great Plains. The Great Plains Region is interrupted in the south and the southwest by the Arbuckle and Wichita Mountains where relict populations of some species, such as *Phoxinus erythrogaster, Dionda nubila, Notropis rubellus, Nocomis asper,* and *Etheostoma microperca,* represent the Ozarkian fauna. In number of species Oklahoma, with 168 species, rivals the Great Lakes Region, which has 172 (1). In contrast, Kansas has about 130 species (2). When more thorough studies are completed and new species are described, the number of native Oklahoma fishes may equal that of the Great Lakes Region.

This paper concerns investigations pertaining to the fish fauna of Oklahoma, exclusive of fish management, age and growth, population dynamics, anatomy, and life history. The purpose of the study was to develop a chronological history of discovery of the species known to occur in Oklahoma. Space does not permit listing all species taken by the many collectors and reported in the literature; instead individuals are credited with collecting or reporting species that, at the time, were new to our state list. The nomenclature used is usually that in current use, without considering synonymy. However, in Table 1, under "Author or collector . . . ," the original species names used by the various authors or collectors are given. Some species were described as new to science and under the rubric "Where First Taken," the symbol TL indicates the type locality of the species, although some type localities cannot be accurately designated.

1853 - 1886

Investigations pertaining to the fish fauna of Oklahoma began in 1852 when army personnel under the leadership of Captain Randolph Barnes Marcy conducted an exploration of the Red River of Louisiana territory for the purpose of finding a feasible route for construction of a railroad to the Pacific Coast.

The Marcy expedition actually began at Fort Smith, Arkansas, where the Captain applied for equipment and supplies. However, he obtained only "ten fine horses" and was told to go to Preston, Texas for equipment and supplies. Marcy's map shows Preston a short distance below the mouth of the Washita River. Probably the site is now inundated by Lake Texoma, but at the tip of a narrow peninsula there is a place called Preston Bend. Morris and McReynolds (3) showed Preston south of the Red River and south southwest of Fort Washita. Marcy obtained supplies and equipment at Preston and dispatched his wagon train over the route to the mouth of Cache Creek via Fort Washita and Fort Arbuckle. The latter fort is a short distance north of west from the present town of Davis. Fort Washita is located near Cumberland Gap on the Washita arm of Lake Texoma. It is now operated and maintained by the Oklahoma Historical Society and is a National Park Service Registered National Historic Landmark.

In order to contact his command, Marcy had to go to Fort Belknap, shown on present maps as just south of Newcastle, Young County, Texas. There he took command of the personnel for the expedition, namely Captain G. B. McClellan of the Engineers Corps, Lieutenant S. Updegraff, Doctor G. C. Shumard, surgeon, 55 men of Company D, 5th Infantry, and several Delaware Indian hunters, including John Bushman, the interpreter. They left Fort Belknap on 2 May 1852, proceeded to the mouth of Cache Creek (Cashe on Marcy's map) across the valley of the Little Wichita, and reached the high bluffs of the Big Wichita on 9 May. The Red River was in flood stage and not until 12 May did they effect the crossing in a violent rainstorm. Their entry into Oklahoma must have been southeastern Cotton

[1] Contribution No. 501 from the Department of Zoology, Oklahoma State University.

TABLE 1. *List of Oklahoma fishes, with first literature records and general localities. Type localities, if in Oklahoma, are indicated by* (TL).

Current nomenclature	Where first taken	Author or collector, date, reference, and species name used
PETROMYZONTIDAE		
Ichthyomyzon castaneus	Arkansas River, Fort Smith	Girard, 1858 (15), *Ichthyomyzon hirudo*
Ichthyomyzon gagei	Barren Fork, Adair Co.	Moore, 1933 (33), *Reighardina unicolor*
ACIPENSERIDAE		
Scaphirhynchus platorynchus	Poteau River, LeFlore Co.	Girard, 1858 (15), *Scaphirynchus platirhynchus*
POLYODONTIDAE		
Polyodon spathula	Kiamichi River, 4 miles E. Tuskahoma, Pushmataha Co.	Ortenburger and Hubbs, 1927 (28), *Polyodon spathula*
LEPISOSTEIDAE		
Lepisosteus oculatus	Mohawk Park, Tulsa	W. F. Blair et al., 1936 (Unpub.), *Lepisosteus productus*
Lepisosteus osseus	Poteau River, LeFlore Co.	Jordan and Gilbert, 1886 (17), *Lepidosteus osseus*
Lepisosteus platostomus	Poteau River, LeFlore Co.	Hubbs and Ortenburger, 1929 (18), *Lepisosteus platostomus*
Lepisosteus spatula	Poteau River, LeFlore Co.	Jordan and Gilbert, 1886 (17), *Lepidosteus tristoechus*
AMIIDAE		
Amia calva	Poteau River, LeFlore Co.	Hubbs and Ortenburger, 1929 (18), *Amia calva*
ANGUILLIDAE		
Anguilla rostrata	Locality not given in mimeographed list; specimens known from Cimarron and Elk rivers prior to 1938	C. L. Hubbs, 1938 (Unpub.), *Anguilla bostoniensis*
CLUPEIDAE		
Alosa alabamae	Illinois River	Moore and Paden, 1950 (47), *Alosa chrysochloris*
Alosa chrysochloris	Grand River, Mayes Co.	Hubbs and Trautman, 1935 (Unpub.), *Pomolobus chrysochloris*
Dorosoma cepedianum	Poteau River, LeFlore Co.	Jordan and Gilbert, 1886 (17), *Dorosoma cepedianum*
Dorosoma petenense	Red River, Bryan Co.	Miller, 1955 (77), *Signalosa petenensis*
HIODONTIDAE		
Hiodon alosoides	Sallisaw Creek, Sequoyah Co.	Meek, 1894 (22), *Hiodon alosoides*
Hiodon tergisus	Mountain Fork River, McCurtain Co.	Hall, 1956 (80), *Hiodon tergisus*
SALMONIDAE		
Salmo gairdneri	Planted in several localities	Moore, 1952 (45), *Salmo gairdneri*
Salmo trutta	Planted in Boecher Lake, Blaine Co., and elsewhere	Hall, 1956 (80), *Salmo trutta*
ESOCIDAE		
Esox americanus	Poteau and Red River systems	Meek, 1896 (23), *Lucius vermiculatus*
Esox lucius	Planted (1972) in several lakes	Oklahoma Conservation Department, 1966 (Unpub.)
Esox niger	Red River, Choctaw Co.	Meek, 1896 (23), *Lucius reticulatus*
CHARACIDAE		
Astyanax mexicanus	Lake Texoma, Marshall Co.	Riggs, 1954 (70), *Astyanax fasciatus mexicanus*
CYPRINIDAE		
Campostoma anomalum	Arkansas River, Fort Smith	Girard, 1856 (7), *Dionda spadicea*
Carassius auratus	Salina and Locust Grove, Mayes Co. (55)	A. P. Blair, 1948 (Unpub.), *Carassius auratus*
Cyprinus carpio	Red River, McCurtain Co.	Ortenburger and Hubbs, 1927 (28), *Cyprinus carpio*
Dionda nubila	Sallisaw Creek, Sequoyah Co.	Meek, 1894 (22), *Hybognathus nubila*

Current nomenclature	Where first taken	Author or collector, date, reference, and species name used
Hybognathus nuchalis	Arkansas River, Fort Smith	Girard, 1856 (7), *Hybognathus argyritus*
Hybognathus placitus	(TL) Arkansas River near "Fort Makee," Sequoyah Co.	Girard, 1856 (7), *Hybognathus placitus* Jordan and Gilbert, 1886 (17), *Hybopsis aestivalis*
Hybopsis aestivalis	Poteau River, LeFlore Co.	
Hybopsis gracilis	Canadian River, near Norman, Cleveland Co.	Ortenburger and Hubbs, 1927 (28), *Platygobio gracilis* Jordan and Gilbert, 1886 (17), *Hybopsis storerianus* Hubbs and Trautman, 1935 (Unpub.), *Erimystax x-punctatus* Meek, 1894 (22), *Hybopsis kentuckiensis* Meek, 1894 (22), *Notemigonus chrysoleucus* Jordan and Gilbert, 1886 (17), *Notropis shumardi* Girard, 1856 (7), *Alburnus dilectus* Moore and Cross, 1950 (55), *Notropis atrocaudalis*
Hybopsis storeriana	Poteau River, LeFlore Co.	
Hybopsis x-punctata	Grand River, Mayes Co.	
Nocomis asper	Sallisaw Creek, Sequoyah Co.	
Notemigonus crysoleucas	Sallisaw Creek, Sequoyah Co.	
Notropis amnis[a]	Poteau River, LeFlore Co.	
Notropis atherinoides	Arkansas River, Fort Smith	
Notropis atrocaudalis	Lukfata Creek, McCurtain Co.	
Notropis bairdi	(TL) Red River, 6-9 miles south of Hollis, Harmon Co.	Hubbs and Ortenburger, 1929 (18), *Notropis bairdi*
Notropis blennius	(TL) Arkansas River, Fort Smith	Girard, 1856 (7), *Alburnops blennius* Jordan and Gilbert, 1886 (17), *Notropis scabriceps* and *N. illecebrosus* (in part)
Notropis boops[b]	Poteau River, LeFlore Co.	
Notropis buchanani[c]	Poteau River, LeFlore Co.; (TL) tributary of Poteau River	Jordan and Gilbert, 1886 (17), *Notropis illecebrosus* (in part) Hubbs and Trautman, 1935 (Unpub.), *Notropis camurus*
Notropis camurus	Grand River, Mayes Co.	
Notropis chalybaeus	Mountain Fork River, McCurtain Co.	Ortenburger and Hubbs, 1927 (28), *Notropis nux*
Notropis cornutus[d]	Mountain Fork River, McCurtain Co.	Ortenburger and Hubbs, 1927 (28), *Notropis cornutus isolepis* Meek, 1896 (23), *Opsopoeodus emiliae*
Notropis emiliae	Poteau River	
Notropis fumeus	Mountain Fork and Little rivers, McCurtain Co.	Ortenburger and Hubbs, 1927 (28), *Notropis u. umbratilis* (in part)
Notropis girardi	(TL) Arkansas River system; Cimarron River near Kenton, Cimarron Co.	Hubbs and Ortenburger, 1929 (18), *Notropis girardi*
Notropis greenei	(TL) Arkansas River system; Elk River, Delaware Co.	Hubbs and Ortenburger, 1929 (18), *Notropis greenei*
Notropis lutrensis	(TL) Near the mouth of Otter Creek, tributary of North Fork, Red River, Tillman Co.	Baird and Girard, 1853 (6), *Lauciscus lutrensis*
Notropis maculatus	Oxbow lakes, Little River basin, McCurtain Co.	Reeves, 1953 (67), *Notropis maculatus*
Notropis ortenburgeri	(TL) Mountain Fork River, 10 miles S.E. Broken Bow, McCurtain Co.	Ortenburger and Hubbs, 1927 (28), *Notropis ortenburgeri* Moore, 1948 (49), *Notropis perpallidus*
Notropis perpallidus	Beaver's Bend State Park	
Notropis pilsbryi	Sallisaw Creek, Illinois and Grand river basin, northeastern counties	Hubbs and Ortenburger, 1929 (18), *Notropis zonatus* Moore, 1952 (45), *Notropis potteri*
Notropis potteri	Red River	

TABLE 1. (Continued)

Current nomenclature	Where first taken	Author or collector, date, reference, and species name used
Notropis rubellus	Arkansas River basin, N.E. Oklahoma	Hubbs and Ortenburger, 1929 (18), *Notropis percobromus*
Notropis shumardi	(TL) Arkansas River, Fort Smith	Girard, 1856 (7), *Alburnops shumardi*
Notropis spilopterus	Illinois River, Cherokee Co.	W. F. Blair et al., 1936 (Unpub.), *Notropis spilopterus*
Notropis stramineus	Red and Arkansas basins	Ortenburger and Hubbs, 1927 (28), *Notropis deliciosus*
Notropis umbratilis	(TL) Sugarloaf Creek, tributary of Poteau River, LeFlore Co.	Girard, 1856 (7), *Alburnus umbratilis*
Notropis venustus	Red River basin	Meek, 1896 (23), *Notropis venustus*
Notropis volucellus	Elk River, Delaware Co.	Hubbs and Ortenburger, 1929 (18), *Notropis v. volucellus*
Notropis whipplei	(TL) Sugarloaf Creek, tributary of Poteau River, LeFlore Co.	Girard, 1856 (7), *Cyprinella whipplii*
Phenacobius mirabilis	(TL) Arkansas River, Fort Smith	Girard, 1856 (7), *Exoglossum mirabile*
Phoxinus erythrogaster	Sallisaw Creek, Illinois and Elk river basins	Hubbs and Ortenburger, 1929 (18), *Chrosomus erythrogaster*
Pimephales notatus	Poteau River, LeFlore Co.	Jordan and Gilbert, 1886 (17), *Pimephales notatus*
Pimephales promelas	Arkansas River near "Fort Makee," Sequoyah Co.	Girard, 1856 (7), *Pimephales maculosus*
Pimephales tenellus	(TL) 20 miles W. Choctaw Agency, Pittsburg Co.	Girard, 1856 (7), *Hyborhynchus tenellus*
Pimephales vigilax	(TL) Near the mouth of Otter Creek, tributary of N. Fork, Red River, Tillman Co.	Baird and Girard, 1853 (6), *Leucisus vigilax*
Semotilus atromaculatus	20 miles W. Choctaw Agency, Pittsburg Co.	Girard, 1856 (7), *Leucosomus incrassatus*
CATOSTOMIDAE		
Carpiodes carpio[e]	Red River, McCurtain Co.; Canadian River, Cleveland Co.	Ortenburger and Hubbs, 1927 (28), *Carpiodes carpio*
Carpiodes velifer	Poteau River, LeFlore Co.	Jordan and Gilbert, 1886 (17), *Ictiobus velifer*
Catostomus commersoni	Barren Fork, Adair Co.; Elk River, Delaware Co.	Hubbs and Ortenburger, 1929 (18), *Catostomus c. commersoni*
Cycleptus elongatus	Lake Texoma, Love Co.; Grand Lake, Delaware Co.	Moore, and Cross, 1950 (55), *Cycleptus elongatus*
Erimyzon oblongus	Coal Creek, tributary of South Fork, Canadian River., Pittsburg Co.	Girard, 1856 (7), *Moxostoma claviformis*
Hypentelium nigricans	Poteau River, LeFlore Co.	Jordan and Gilbert, 1886 (17), *Catostomus nigricans*
Ictiobus bubalus	Poteau River, LeFlore Co.	Hubbs and Ortenburger, 1929 (18), *Ictiobus bubalus*
Ictiobus cyprinellus	Red River near Arthur City, Choctaw Co.	Meek, 1896 (23), *Ictiobus cyprinella*
Ictiobus niger	Poteau River, LeFlore Co.; Verdigris River, Rogers Co.	Hubbs and Ortenburger, 1929 (18), *Ictiobus niger*
Minytrema melanops	Poteau River, LeFlore Co.; Goodland, Choctaw Co.	Meek, 1896 (23), *Minytrema melanops*
Moxostoma carinatum	Poteau River, LeFlore Co.	Jordan and Gilbert, 1886 (17), *Placopharynx carinatus*

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Moxostoma duquesnei	West Cache and Headquarters Creek, Wichita National Forest, Comanche Co.	Hubbs and Ortenburger, 1929 (18), *Moxostoma duquesnei*
Moxostoma erythrurum	Poteau River, LeFlore Co.	Jordan and Gilbert, 1886 (17), *Moxostoma macrolepidotum*
Moxostoma macrolepidotum	Chikaskia River, Kay Co.	Moore and Cross, 1950 (55), *Moxostoma aureolum*
ICTALURIDAE		
Ictalurus furcatus	Red River, McCurtain Co.	Ortenburger and Hubbs, 1927 (28), *Ictalurus furcatus*
Ictalurus melas	Arkansas River, Fort Smith	Girard, 1858 (15), *Pimelodus catulus*
Ictalurus natalis	Poteau River, LeFlore Co.	Jordan and Gilbert, 1886 (17), *Ameiurus natalis*
Ictalurus nebulosus[1]	Poteau River (doubtful record), LeFlore Co.; Kiamichi River, Pushmataha Co.	Meek, 1896 (23), *Ameiurus nebulosus*
Ictalurus punctatus	Poteau River, LeFlore Co.	Jordan and Gilbert, 1886 (17), *Ictalurus punctatus*
Noturus eleutherus	Mountain Fork River, McCurtain Co.	Reeves, 1950 (53), *Schilbeodes eleutherus*
Noturus exilis	Spring Creek, Cherokee Co.	Moore (*Fide* Hubbs), 1932 (Unpub.), *Schilbeodes exilis*
Noturus flavus	Poteau River, LeFlore Co.	Jordan and Gilbert, 1886 (17), *Noturus flavus*
Noturus miurus	Poteau River, LeFlore Co.	Jordan and Gilbert, 1886 (17), *Noturus miurus*
Noturus nocturnus	Poteau River (also in "Washita" and Saline Rivers; Arkansas type locality not designated).	Jordan and Gilbert, 1886 (17), *Noturus nocturnus* (orig. descr.)
Noturus placidus	Illinois River, Sequoyah Co.	Moore and Paden, 1950 (47), *Schilbeodes miurus*
Pylodictis olivaris	Arkansas River near Fort Smith	Jordan and Gilbert, 1886 (17), *Leptops olivaris*
AMBLYOPSIDAE		
Amblyopsis rosae	Twin Cave and Jail Cave, Delaware Co.; Cave Springs Ranch Cave, near Miami, Ottawa Co.	Black, 1971 (122), *Amblyopsis rosae*
Typhlichthys subterraneus	Cave spring near Peoria, Ottawa Co.	Hall, 1956 (80), *Typhlichthys subterraneus*
APHREDODERIDAE		
Aphredoderus sayanus	Tributary of Little River, 9 miles E. Broken Bow, McCurtain Co.	Ortenburger and Hubbs, 1927 (28), *Aphredoderus sayanus*
CYPRINODONTIDAE		
Cyprinodon rubrofluviatilis	West Cache Creek and other Red River tributaries in Harmon, Greer, and Beckham counties	Hubbs and Ortenburger, 1929 (18), *Cyprinodon rubrofluviatilis*
Fundulus catenatus	Spavinaw Creek, Buffalo Creek, and Elk River, Delaware Co.	Hall, 1956 (80), *Fundulus catenatus*
Fundulus kansae	Streams in Cleveland, Comanche, Murray, and Woods counties	Ortenburger and Hubbs, 1927 (28), *Plancterus kansae*
Fundulus notatus	Poteau River (misidentification), LeFlore Co.; Little River system, McCurtain Co.; Kiamichi River, Pushmataha Co.	Ortenburger and Hubbs, 1927 (28), *Fundulus notatus*
Fundulus notti	Poteau River, LeFlore Co.	Meek, 1896 (23), *Zygonectes escambiae*

TABLE 1. (Continued)

Current nomenclature	Where first taken	Author or collector, date, reference, and species name used
Fundulus olivaceus	Poteau River, LeFlore Co.	Jordan and Gilbert, 1886 (17), *Zygonectes notatus*
Fundulus sciadicus	Spavinaw Cree, 0.7 miles S. Jay Delaware Co.	Hubbs and Ortenburger, 1929 (18), *Fundulus sciadicus*
POECILIIDAE		
Gambusia affinis	Lee Creek, possibly in Arkansas	Jordan and Gilbert, 1886 (17), *Gambusia patruelis*
ATHERINIDAE		
Labidesthes sicculus	Poteau River, LeFlore Co.	Jordan and Gilbert, 1886 (17), *Labidesthes sicculus*
Menidia audens	Bar pits off Red River, Bryan Co.	Moore and Cross, 1950 (55), *Menidia audens*
PERCICHTHYIDAE		
Morone chrysops	Locality not given in mimeographed list	Hubbs, 1938 (Unpub.), *Lepibema chrysops*
Morone mississippiensis	Van's Lake 8 miles N. Muskogee, Wagoner Co.	A. D. Aldrich, *circa* (1937 (Unpub.), *Morone interrupta*
Morone saxatilis	Planted, Great Salt Plains Reservoir, Alfalfa Co.	Hall, 1956 (80), *Roccus saxatilis*
ELASSOMATIDAE		
Elassoma zonatum	Swamp 10 miles E. Broken Bow, McCurtain Co.	Moore and Poole, 1948 (50), *Elassoma zonatum*
CENTRARCHIDAE		
Ambloplites rupestris	Sallisaw Creek, Sequoyah Co.	Meek, 1894 (22), *Ambloplites rupestris*
Centrarchus macropterus	Pine Lake 7 miles S. Broken Bow, McCurtain Co.	Ortenburger and Hubbs, 1927 (28), *Centrarchus macropterus*
Chaenobryttus gulosus	Poteau River, LeFlore Co.	Meek, 1896 (23), *Chaenobryttus gulosus*
Lepomis auritus	Lake Duncan, Stephens Co.	Moore and Cross, 1950 (55), *Lepomis auritus*
Lepomis cyanellus	Near the mouth of Otter Creek, tributary of N. Fork, Red River, Tillman Co.	Baird and Girard, 1853 (6), *Pomotis longulus*
Lepomis humilis	(TL) Sugarloaf creek, tributary of Poteau River, LeFlore Co.	Girard, 1856 (7), *Bryttus humilis*
Lepomis macrochirus	Poteau River, LeFlore Co.	Jordan and Gilbert, 1886 (17), *Lepomis pallidus*
Lepomis marginatus	Mountain Fork and Little River tributaries, McCurtain Co.	Reeves and Moore, 1951 (56), *Lepomis marginatus*
Lepomis megalotis	Near the mouth of Otter Creek, tributary of N. Fork, Red River, Tillman Co.	Baird and Girard, 1853 (6), *Pomotis breviceps*
Lepomis microlophus	Illinois River, near mouth of Swimmers Branch, Cherokee Co. (47)	Moore, 1941 (Unpub.), *Lepomis microlophus*
Lepomis punctatus	Slough 10 miles S.E. Broken Bow, Mountain Fork River, McCurtain Co.	Ortenburger and Hubbs, 1927 (28), *Sclerotis miniatus*
Lepomis symmetricus	Swamp near Eagletown, McCurtain Co.	Moore and Cross, 1950 (55), *Lepomis symmetricus*
Micropterus dolomieui	Sallisaw Creek, Sequoyah Co.	Meek, 1894 (22), *Micropterus dolomieu*
Micropterus punctulatus	Pond 2 miles N. Wister, LeFlore Co.; tributaries of Little River, McCurtain Co.	Ortenburger and Hubbs, 1927 (28), *Micropterus pseudaplites*

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Micropterus salmoides	Poteau River, LeFlore Co.	Jordan and Gilbert, 1886 (17), *Micropterus salmoides*
Pomoxis annularis	Poteau River, LeFlore Co.	Jordan and Gilbert, 1886 (17), *Pomoxis annularis*
Pomoxis nigromaculatus	Pond near Sayre, Beckham Co.; streams near Okmulgee, Okmulgee Co.	Hubbs and Ortenburger, 1929 (18), *Pomoxis sparoides*
PERCIDAE		
Ammocrypta clara	Red River, S. Bennington, Bryan Co.	Linder, 1959 (87), *Ammocrypta clara*
Ammocrypta vivax	Poteau River, LeFlore Co.	Jordan and Gilbert, 1886 (17), *Ammocrypta vivax*
Crystallaria asprella	Little River, McCurtain Co.	Moore, 1952 (45), *Crystallaria asprella*
Etheostoma asprigene	Little River basin, McCurtain Co.	Moore and Cross, 1950 (55), *Poecilichthys jessiae*
Etheostoma blennioides	Poteau River, LeFlore Co.	Jordan and Gilbert, 1886, (17), *Diplesion blennioides*
Etheostoma chlorosomum	Poteau River, LeFlore Co.	Meek, 1896 (23), *Etheostoma chlorosoma*
Etheostoma cragini	Tributaries of Grand River, Delaware Co. and Mayes Co.	Moore and Cross, 1950 (55), *Poecilichthys cragini*
Etheostoma flabellare	Saline Creek, Mayes Co.	W. F. Blair, et al., 1936 (Unpub.), *Catonotus flabellaris lineolatus*
Etheostoma fusiforme	Swamp 3 miles S. Eagletown, McCurtain Co.	Reeves, 1950 (53), *Hololepis barratti*
Etheostoma gracile	Poteau River, LeFlore Co.	Jordan and Gilbert, 1886 (17), *Etheostoma fusiforme*
Etheostoma histrio	Poteau River, LeFlore Co.	Jordan and Gilbert, 1886 (17), *Ulocentra histrio*
Etheostoma microperca	Sallisaw Creek, Sequoyah Co.	Meek, 1894 (22), *Etheostoma microperca*
Etheostoma nigrum	Poteau River, LeFlore Co.	Jordan and Gilbert, 1886 (17), *Bolesoma camurum* (misidentification)
Etheostoma parvipinne	Gates Creek, Fort Towson, Choctaw Co.	Moore and Cross, 1950 (55), *Poecilichthys parvipinnis*
Etheostoma proeliare	Tributary of Black Fork, Poteau River, 6 miles S. Heavener, LeFlore Co.	Hubbs and Ortenburger, 1929 (18), *Microperca proeliaris*
Etheostoma punctulatum	Elk River, 7 miles N. Grove, Delaware Co.	Hubbs and Ortenburger, 1929 (18), *Poecilichthys punctulatus*
Etheostoma radiosum	Yanubbe Creek, 2 miles N. Broken Bow, McCurtain Co.	Ortenburger and Hubbs, 1927 (28), *Poecilichthys whipplii*
Etheostoma spectabile	Sallisaw Creek, Sequoyah Co.	Meek, 1894 (22), *Etheostoma coeruleum spectabile*
Etheostoma stigmaeum	Sallisaw Creek, Sequoyah Co.	Meek, 1894 (22), *Etheostoma saxatile*
Etheostoma whipplei	(TL) Coal Creek, Tributary of Canadian River, Pittsburg Co.	Girard, 1859 (16), *Boleichthys whipplii*
Etheostoma zonale	Flint Creek, Delaware Co.	Moore, 1932 (Unpub.), *Poecilichthys zonalis*
Perca flavescens	Canadian River, near Norman, Cleveland Co.	Ortenburger and Hubbs, 1927 (28), *Perca flavescens*
Percina caprodes	Poteau River, LeFlore Co.	Jordan and Gilbert, 1886 (17), *Percina caprodes*
Percina copelandi	Poteau River, LeFlore Co.	Jordan and Gilbert, 1886 (17), *Cottogaster copelandi*
Percina maculata	Poteau River, LeFlore Co.	Jordan and Gilbert, 1886 (17), *Hadropterus aspro*
Percina nasuta	Poteau River, LeFlore Co.	Jordan and Gilbert, 1886 (17), *Hadropterus phoxocephalus*
Percina pantherina	(TL) Little River west of Pickens, Pushmataha Co., S 1, T 2 S, R 20 E. Recorded earlier by Reeves (53)	Moore and Reeves, 1955 (54), *Hadropterus pantherinus*

TABLE 1. (Continued)

Current nomenclature	Where first taken	Author or collector, date, reference, and species name used
Percina phoxocephala	Grand River, Mayes Co.	Hubbs and Trautman, 1935 (Unpub.), *Hadropterus phoxocephalus*
Percina sciera	Poteau River, LeFlore Co.	Cross and Moore, 1952 (19), *Hadropterus s. sciera*
Percina shumardi	(TL) Arkansas River near Fort Smith	Girard, 1859 (16), *Hadropterus shumardi*
Percina uranidea	Red River drainage at Arthur, Texas; Goodland, Okla.; Kiamichi River, Pushmataha Co.	Meek, 1896 (23), *Etheostoma ouachitae*[a]
Stizostedion canadense	Poteau River, LeFlore Co.	Jordan and Gilbert, 1886 (17), *Stizostedion canadense*
Stizostedion vitreum	Lee Creek, possibly in Arkansas	Jordan and Gilbert, 1886 (17), *Stizostedion vitreum*
SPARIDAE		
Archosargus probatocephalus	Oxbow Lake near Poteau; Cache Creek near Lawton. Records of doubtful validity.	Moore and Cross, 1950 (55), *Archosargus probatocephalus*
SCIANIDAE		
Aplodinotus grunniens	Poteau River, LeFlore Co.	Girard, 1858 (15), *Amblodon grunniens*
MUGILLIDAE		
Mugil cephalus	Service generator tubes, Denison Dam	Riggs, 1957 (83), *Mugil cephalus*
COTTIDAE		
Cottus carolinae	Grand and Illinois river drainages, N.E. Oklahoma	Hubbs and Ortenburger, 1929 (18), *Cottus bairdii zopherus*

[a] Confused by Jordan and Gilbert (17) with *N. shumardi*. Reported by Hubbs and Ortenburger (18) from Sallisaw Creek and Elk River.
[b] Misidentified as *N. scabriceps* and *N. illecebrosus* (in part) by Jordan and Gilbert (17); taken in McCurtain, Pushmataha, and Comanche counties by Ortenburger and Hubbs (28).
[c] Taken, but not recognized, by Jordan and Gilbert (17). Original description by Meek (23).
[d] TL of *N. c. isolepis* Hubbs and Brown, 10 miles S.E. Broken Bow, McCurtain county.
[e] Doubtful record from Poteau River by Girard (17).
[f] Meek's (23) Kiamichi record may be valid since Hall (80) took many specimens from McCurtain county.
[g] Hubbs and Black (24) ". . . regard *Etheostoma* (*Hadropterus*) *ouachitae* Jordan and Gilbert . . . as a synonym of *Imostoma uranidea*." Meek's (23) records are questionable; there are no other records.

County. Map 16 of Morris and McReynolds (3) leaves the false impression that the Marcy expedition started from Fort Arbuckle. His wagon train did go from Preston to Fort Arbuckle via Fort Washita, but Marcy was on a different route.

Marcy's (4) narrative style report is like a fascinating adventure story. While he wrote in detail about the fauna and flora, he made almost no reference to fishes. On one occasion he mentioned a clear brook, probably in present Harmon County, where he imagined he would see "spotted trout," but saw only "sunfish and minnows" in great abundance. Although he stated that all specimens taken were preserved in alcohol, he failed to describe the method of capture or to give credit to the collectors.

Up to 1900 the general practice of collectors was to fix and preserve specimens in alcohol. David Starr Jordan (5) related that when he and his helper, J. O. Snyder, went to Japan in 1900, he bought ten barrels of alcohol in Tokyo, with instructions for delivery in Nagasaki. When he called for the alcohol, it was not available. The Japanese Government, needing all available transports to carry troops and material to China, where the Boxer Uprising was in progress, could not deliver the alcohol. However, a supply of formaldehyde was available. At first Jordan was unhappy about the matter, but soon learned that formaldehyde was superior to alcohol for his purpose.

On 22 May Marcy reached a creek where otter were common; they named it Otter Creek and gave its location as longitude 100° 0′ 45″ (actually nearer 99°) and latitude 34° 34′ 6″. At this location Captain McClellan, who was in charge of meteorological observations, upset the "mountain barometer," and thereafter had to depend on an aneroid barometer.

Near the mouth of Otter Creek someone somehow captured a few fishes that later reached the Smithsonian Institution where they were studied by Spencer F. Baird and Charles Girard who published their descriptions (6). *Leuciscus lutrensis* (=*Notropis lutrensis*), *Leuciscus vigilax* (=*Pimephales vigilax*), and *Pomotis breviceps* (=*Lepomis megalotis breviceps*) were new to science. *Pomotis longulus* (=*Lepomis cyanellus*) was a first record for Oklahoma. One to several specimens of each species were taken. It would seem that even an improvised seine would have yielded more specimens, but the capture of fishes was only incidental to the purpose of the expedition. The figure (Pl. XIV, Fig.) of *Leuciscus vigilax* fails to show the caudal spot and concentration of melanophores on the anterior dorsal rays so characteristic of *Pimephales vigilax*. Possibly the authors (6) or their artist overlooked these features.

Sexual differences apparently were not appreciated at the time; *Notropis lutrensis* was described under two different names. Later Girard (7) continued to be misled and assigned other names, even in different genera, to the same species taken from different localities. Jordan, Evermann, and Clark (8) recognized two genera, *Cyprinella* and *Mowiana*, while synonymizing four nominal species with the former and 14 species in four genera with the latter; all of these are now known to represent *N. lutrensis*.

Girard (7) stated that a survey of routes for a railroad to the Pacific began in 1853 and continued until 1855. Evidently he was in error since the Marcy expedition was in 1852. Girard gave no collection dates for specimens sent to him and merely stated "The fishes were collected at different times and periods by several naturalists and surgeons attached to the various surveys undertaken within the five years past." Thus it might appear that some collections reported by Girard were collected a year earlier than were the Otter Creek specimens taken on the Marcy expedition. Exact locations were not given by Girard, but those taken from the Arkansas River at Fort Smith and from present Oklahoma are of importance in this connection.

The personnel credited with collecting specimens included Dr. George G. Shumard, surgeon, H. B. Möllhausen, artist, and Lieutenant E. G. Beckwith, all under the command of Lieutenant Whipple. Dr. C. B. Kennerly was also attached to Whipple's command, but apparently did not collect in present Oklahoma. All specimens were preserved in alcohol; they were carefully studied and compared with eastern fishes and even with specimens from the Eastern Hemisphere.

Of the 22 species listed by Girard (7), 13 constitute additions to the state list (see Table 1).

The following species, with approximate type localities in parentheses, were described as new to science: *Pimephales tenellus* (Coal Creek, 20 miles west of Choctaw agency), *Hybognathus placitus* (sluice of Arkansas

River near "Fort Makee"), *Phenacobius mirabilis* (Arkansas River at Fort Smith), *Notropis umbratilis* (Sugarloaf Creek, tributary of Poteau River), *Notropis blennius* (Arkansas River at Fort Smith), *Notropis shumardi* (Arkansas River at Fort Smith), and *Notropis whipplei* (Sugarloaf Creek, tributary of Poteau River). *Notropis shumardi* also was described under another name (*Alburnops illecebrosus*), but, as pointed out by Gilbert and Bailey (9), the first revisers, Jordan and Gilbert (10), chose the name *shumardi* and placed *illecebrosus* in synonymy.

It is difficult or impossible to locate some of the collection sites mentioned by Girard (7). Coal Creek, a tributary of the South Canadian River, was indicated as 20 miles west of the Choctaw Agency, now nonexistent except for an historic marker, located on a bend of the Poteau River southwest of Spiro. On present maps it would appear that, if one travelled due west from the Choctaw Agency, no tributary of the South Canadian would be found at a distance of 20 miles. At approximately that distance is Sans Bois Creek, a tributary of the Arkansas River. Coal Creek is shown on an old map, dated 1852 and without cartographic credit (O.S.U. Library Call No. 3992; S62, 26.5), south southwest of Fort Gibson. This Coal Creek is a tributary of Gaines Creek, tributary to the South Canadian, and is much farther than 20 miles from the Choctaw Agency. Shirk (11) used an interesting entry, Toboxky 10 miles north of McAlester, Pittsburg County. The name is adapted from the Choctaw word for coal and comes from nearby Coal Creek now known as Gaines Creek. Evidently Gaines Creek is now inundated by Lake Eufaula.

Probably Gaines Creek is where Möllhausen collected the types of *Moxostoma claviformis* (=*Erimyzon oblongus claviformis*) (see Hubbs, 12) and *Hyborhynchus tenellus* (=*Pimephales tenellus*). Hubbs and Black (13) gave the approximate locality (map 2) on an Arkansas River tributary below the mouth of the Canadian River. The question is: how did they measure distances then? The Canadian River was well known as was its tributary Coal Creek; see Shirk's (11) note above.

I have failed to locate "Fort Makee"; however, Asher and Adams' map *Arkansas and Portion of Indian Territory* dated 1879 (O.S.U. Library Call Number 4000; 26.5, 1879) shows "Mackey's Salt Works" on Vine Creek (probably the present Vian Creek), tributary of the Arkansas River between Sallisaw Creek and the Illinois River. Hubbs and Trautman (14) referred to a collection made by Seth Meek in 1895 at "Mackey's Ferry" on Sallisaw Creek, although Meek referred to "Mackey's Store." There is no place on the creek where a ferry would be required.

On 7 May 1955, Carl D. Riggs, Gordon Hall, John King, and I collected fishes near an old store building, with a high board front, located on Sallisaw Creek. On the store front the name McKee was dimly visible. Near the store the creek flowed over a rocky bottom easily negotiable for wagons. Shirk (11) listed McKey as 6 miles west of Sallisaw. It was a post office, from 13 March 1891 to 14 July 1928, named for Lugie Mackey, a local resident.

It seems possible that this location could have been a stopping place for military personnel enroute westward from Fort Smith. Girard (7) credited Lieutenant Beckwith with collection of the types of *Hybognathus placitus* from "sluice of the Arkansas River near Fort Makee." The old McKee store was not far from the mouth of Sallisaw Creek.

On 12 April 1972, my wife and I visited this locality. McKee's store was razed several years ago, according to residents of the present McKey community. The euphonic similarity of the several spellings may explain the confusion. We may imagine the collectors reporting to Lieutenant Whipple who wrote the place name as it sounded to him.

Another locality mentioned by Girard (7) as Antelope Creek, Arkansas, could not be found on any available map. The collection of *Leucosomus pallidus* (=*Semotilus atromaculatus*) by C. B. Kennerly in Antelope Creek may be a doubtful first record for Oklahoma since, at the time, Arkansas included much of present Oklahoma.

The exact locality on Sugarloaf Creek will never be known, but that stream is shown on present-day maps as a tributary of the Poteau River south of Fort Smith, where Möllhausen collected the types of *Alburnus umbratilis* (=*Notropis umbratilis*) and *Cyprinella whipplii* (=*Notropis whipplei*).

Girard (15) added four species to the state list when he described *Ichthyomyzon hirudo* (=*I. castaneus*), *Scaphirynchus platirhynchus* (*sic*), *Pimelodus catulus*

(=*Ictalurus melas*), and *Amblodon grunniens* (=*Aplodinotus grunniens*), all from the Arkansas River near Fort Smith. The next year, 1859, he further contributed two additions to the state ichthyofaunal list: *Boleichthys whipplii* (=*Etheostoma whipplei*) from Coal Creek in present Pittsburg County, and *Hadropterus shumardi* (=*Percina shumardi*) from the Arkansas River near Fort Smith (16).

The next important fish collections from Oklahoma were made in September, 1884, when David Starr Jordan, assisted by his students, Charles Henry Gilbert, Professor Joseph Swain, and Seth E. Meek, working under the direction of the U.S. National Museum and the U.S. Fish Commission, collected in the Poteau River, its tributary James Fork, and Lee's Creek above the town of Van Buren, Arkansas. According to Jordan and Gilbert (17) Slate Ford was "some distance west of the village of Hackett City" in Arkansas.

> In 1939 I led a field class in a search for Slate Ford. We found a place near the town of Shady Point that appeared to have served as a crossing in early days. A steep bank on the west side of the river was plainly cut by wagon wheels. Since that time, farming operations have obliterated the old trail. The river bottom at this place is slate.

Jordan and Gilbert (17) listed 43 species from the Poteau River although some forms may be of doubtful status or the locality was not clearly given. *Lepisosteus tristoechus* (=*L. spatula*) was not taken, but the authors stated "a large skin seen," without saying where. Their statement that "unless otherwise stated, all species were taken in the Poteau and Lee's Creek" leaves one in doubt. They listed *Ictiobus velifer*, but later writers, Hubbs and Ortenburger (18), Hubbs (12), and Jordan, Evermann and Clark (8) did not clarify this record. I assume that they took *Carpiodes velifer*, a species known to occur in the Poteau. Their *Notropis scabriceps* probably was *N. boops* and *Zygonectes notatus* was *Fundulus olivaceus* since *F. notatus* is unknown in the Poteau. *Hadropterus phoxocephalus*, reported as not very common, is now known as *Percina nasuta* and *P. phoxocephala* is not known to occur in the Poteau. Their *Etheostoma fusiforme* probably was *E. gracile*. A perplexing situation was encountered by Cross and Moore (19), who borrowed Jordan and Gilbert's specimens labelled *Notropis illecebrosus* from U.S.N.M. This collection of 35 specimens proved to be a complex of two genera and seven species, but not *N. illecebrosus* (=*N. shumardi*). It is difficult to think that Dr. Jordan or his student Gilbert could have been responsible for such confusion, but subsequent handling of the collection may be considered.

Except for changes in generic assignment, all other species reported by Jordan and Gilbert (17) are quite plausible. One species, *Noturus nocturnus*, was described as new to science, without indication of the type locality. The authors stated "Abundant in flowing water in the Poteau River." "It was also taken in the Washita (Ouachita) and Saline Rivers." Later, Jordan, Evermann and Clark (8) and Taylor (20) indicated the type locality of *Schilbeodes nocturnus* as the Saline River, Benton, Arkansas. These dedicated ichthyologists, using improved equipment, added 38 species to the faunal list for Oklahoma, then Indian Territory, and, thus, brought the total to 55 (see Table 1).

1887 - 1896

Although a collection in July, probably in 1888, by Charles H. Gilbert (21) was not made in Oklahoma, it is pertinent at this point since he was working in a small tributary of the Poteau River about 7 miles west of Waldron, Arkansas. Of the 10 species reported, he claimed to have added three species to the list of Jordan and Gilbert (17) for the Poteau River. Whereas Jordan and Gilbert identified *Notropis scabriceps*, Gilbert reported *Notropis heterodon*. Both records were misidentifications of *Notropis boops*. Gilbert's *Etheostoma caeruleum lepidum* was probably *E. spectabile*. The other species, *Etheostoma microperca*, may be considered valid, because a small stream in the Ozark uplands could be an appropriate habitat for the least darter.

During 1891 through 1893, Seth Meek, then Professor of Biology and Geology, at "The Arkansas Industrial University," was conducting investigations of the fishes of Arkansas under auspices of the U.S. Fish Commission and the University. Although his title (22) indicates he was working in Arkansas, he did include a list of fishes taken from the "Sallisaw River" near "Makey's Store." Under a center heading

"List of the Fishes of the White River Basin," he reported a specimen of *Noturus eleutherus* from the Sallisaw River near Makey's Store. Under another center heading "The Arkansas River Basin," he listed 31 species from the same locality. Some of these represent obvious misidentifications. His *N. eleutherus,* if actually taken from the Sallisaw, must have been *N. miurus.* There can be no doubt that Meek collected in the Sallisaw since, according to his description, the river at the locality "50 miles west of Fort Smith . . . and where visited (near Makey's store) has a sandy and gravelly bottom. It is similar to the Illinois River, which is only a few miles west of it, . . ." is fairly accurate.

Meek's *Petromyzon concolor* represents *Ichthyomyzon castaneus* (see Hubbs and Trautman, 14, p. 73) and his *Notropis shumardi* was possibly *N. boops,* a common species although indicated as scarce by Meek. Although he should have been familiar with *Etheostoma proeliare,* Meek listed *Etheostoma microperca,* a species now found only in a few widely separated localities close to cold springs in Oklahoma. However, there might have been, at that time, such a spring near "Makey's Store." Otherwise Meek's list, taking into account present synonymy, is quite in order. Meek had added 12 species to the state list (see Table 1).

During the last week in May, 1894, Meek set out from Fort Smith, Arkansas, along the line of the St. Louis and San Francisco railroad with his destination-to-be Arthur City, Texas. Although he (23) did not clearly state his exact itinerary, he collected fishes in the Arkansas River at Fort Smith, in the Poteau River and a few of its rocky tributaries and lakes near Poteau, Indian Territory. His next stop was at Kiamichi, where he collected in the Kiamichi River and its tributary, Walnut Creek. He then went to Goodland, Indian Territory, where he collected in a creek he called Flat Creek, before proceeding on to the Red River near Arthur City, Texas.

In May, 1950, a party consisting of the Milton B. Trautman and George A. Moore families, accompanied by Milton R. Curd, attempted to follow, in part, the route taken by Meek in 1894. The village of Kiamichi was easily located, but Goodland, then shown on our road map, was obviously not the locality visited by Meek. We found an Indian school housed in rather newly constructed buildings and it was not near any creek. We then went to Hugo and inquired about the locality of old Goodland and Flat Creek. We were directed to Goodland, which consisted of an old brick building by the railroad. Our informer knew of no Flat Creek, but nearby there was a creek named Caney Creek. It seemed quite possible that Meek stopped off at the flagstop, Goodland, collected there and went on to the Red River. Shirk (11) gave the following entries: "Goodland, Choctaw County, 4 miles north of Hugo. Post Office 1871-1902, no longer in existence. Goodland, Choctaw County, 3 miles south of Hugo, Goodland Indian Orphanage founded 1848, in continuous service, Post Office 1915-1944."

As a result of his expedition, Meek (23) reported 58 species, six of which were additions to the state faunal list. *Notropis buchanani* was described as new to science and was taken "from a small creek near Poteau." It is not possible to state the exact type locality of this shiner, but, since Meek mentioned collecting in lakes near Poteau and since the creek nearest to those lakes is Sugarloaf Creek, he may have taken the types there. Cross and Moore (19) thought Meek worked in either Nail or Gap Creek, since he knew the name of Sugarloaf Creek.

Meek listed *Etheostoma ouachitae* from Kiamichi, Goodland, and Arthur City. Hubbs and Black (24, p. 2) ". . . regard *Etheostoma* (*Hadropterus*) *ouachitae* Jordan and Gilbert . . . as a synonym of *Imostoma uranidea.*" Although no specimens of *Percina uranidea* have been reported from Oklahoma since 1894, it is possible that the species occurs in the Red River and its tributaries.

1897 - 1930

During April, 1903, Dr. Henry A. Pilsbry, a conchologist, collected fishes at Wister, Indian Territory, and at Limestone Gap in the Red River basin. Present-day maps show a Limestone Gap in Atoka County on Highway 69. Of the six species he sent to Henry W. Fowler, at the Philadelphia Academy, five were from Indian Territory, but none constituted new records for the area. Fowler (25) described *Notropis pilsbryi,* but the types were from the White River Basin at Rogers, Arkansas. However, this species is a common inhabitant of the Arkansas Basin in eastern Oklahoma.

During World War I (1914-1918) field activities were greatly reduced although

Fowler (26) reported one species, *Fundulus notatus*, from Indian Territory without citing the locality. Of interest in this connection is the original description of *Cyprinodon bovinus rubrofluviatilis*, later elevated to a full species, from the Brazos River between Seymour and Authon, Texas. The collector, W. S. Black, took specimens also "from Staked Plains between the Brazos River and Tulip, Red River, and from the Red River basin south of Clarendon, Texas." Fowler stated that the subspecies was "named for the Red River, of the most northern inland eastern region at which a member of the genus *Cyprinodon* has been found."

In June, 1927, the Board of Regents of the University of Oklahoma authorized the establishment of the Oklahoma Biological Survey as a scientific bureau of the University, with A. Richards as Director, A. O. Weese, ecologist, Paul B. Sears, botanist, R. E. Jeffs, curator of the herbarium, and A. I. Ortenburger, curator of vertebrates. Prior to the establishment of the biological survey, the Department of Zoology of the University of Oklahoma had been conducting summer expeditions in various parts of the state since 1923 (27). One of these expeditions was conducted under the leadership of A. I. Ortenburger between 15 and 25 July 1925. The field work was confined to the southern half of the state, largely in LeFlore, McCurtain, and Pushmataha counties, although some collections were reported from Comanche, Murray, and Cleveland counties. The report by Ortenburger and Hubbs (28) included 57 forms of fishes including two new genera, one new species, and mention of *Micropterus pseudaplites* (=*M. punctulatus*) later described by Hubbs (29). Also included was the description of *Notropis cornutus isolepis* (Hubbs and Brown). The new genera of sunfishes, *Sclerotis* Hubbs and *Allotis* Hubbs were later synonymized in *Lepomis* and are currently named *Lepomis punctatus* and *L. humilis* respectively; the former species was new to the state fauna. *Notropis ortenburgeri* Hubbs, a distinct species, was described as new to science. Fourteen other species were added to the state list (see Table 1). *Notropis sabinae* was listed, but later Hubbs and Ortenburger (18) showed it to be a complex of two new species, *N. girardi* and *N. bairdi*.

During June and July, 1926, the Museum of Zoology, University of Oklahoma, continued the biological survey again led by Dr. Ortenburger. The collections were studied by Dr. Hubbs (18) who contributed much nomenclatural information concerning cyprinid species, sunfishes and some advance notices of discoveries in the genera *Hybognathus*, *Moxostoma*, and *Poecilichthys* (=*Etheostoma*). Since the collections were largely from southwestern Oklahoma, where the fauna is sparse, only 32 species were obtained. Three species were described as new to science, although one, *Extrarius australis*, is currently recognized as *Hybopsis aestivalis australis*. The other two, *Notropis bairdi* (from Red River) and *Notropis girardi* (from the Arkansas basin), currently stand as valid species. Three other species were added to the known Oklahoma fauna (Table 1).

Some species collected by Edith R. Force from ponds and streams in Okmulgee County were included, although Force (30) also reported 13 species.

During the summer of 1927, A. I. Ortenburger led a field party from the Museum of Zoology, University of Oklahoma to eastern Oklahoma and western Arkansas. Collections of fishes were taken from the Red, Ouachita, and Arkansas River basins (18). Of the 81 species reported, 14 had not been known previously from Oklahoma and one, *Notropis greenei*, was described as new to science (Table 1).

In their introduction (18, p. 47) they stated that 21 species were added to the list of Oklahoma fishes, but in their systematic account, I found only 15 species definitely claimed as new records. Apparently for nomenclatural reasons, they reported *Ulocentra stigmaea* (=*Etheostoma stigmaeum*) as new to the state list. Meek (22) took the species in Sallisaw Creek in 1893 and reported it as *Etheostoma saxatile*. *Notropis percobromus*, later (31, pp. 16, 17) indicated as a representative of *Notropis rubellus*, was reported. Hubbs apparently, at this time, considered it as a distinct species and included his manuscript name *Notropis rubricorpus* in a state list. This list was published under Hubbs' name by Aldrich (32), thus creating a *nomen nudum*.

The report authored by Ortenburger and Hubbs (28) in 1927 and the two by Hubbs and Ortenburger (18) in 1929 contributed

extensively to the taxonomy of Oklahoma fishes and clarified many nomenclatural problems of that period.

After the appearance of the above reports, collections of fishes were made by classes under my direction, beginning in 1930. The specimens were, in large part, sent to Dr. Hubbs at the University of Michigan for identification. This marks the approximate time that the zoological collections at Oklahoma A&M College had a modest beginning. The collections were used initially merely for class study, with no serious intent of establishing a zoological repository. In the absence of funds for travel, the instructor and students shared expenses. Most of the field work was necessarily limited to localities that could be reached during a 4-hour laboratory period, or on vacation occasions when we camped on the creek or river banks. Since the eastern part of the state has the richest fauna, most field trips were planned in that direction to the neglect of the western counties. Presumedly field studies were also conducted by instructors at the University of Oklahoma, although under somewhat better conditions by virtue of the Oklahoma Biological Survey established in 1927.

1931 - 1941

On 5 July 1931, Delavan and Creaser (presumedly Edwin P.) collected eight species of fishes in ponds 2 miles west of Wilburton, without adding to the known fish fauna (unpublished notes).

In 1932, Dr. Hubbs reported to me on numerous collections that had been sent to him for identification. Two species, *Noturus exilis*, Spring Creek in Cherokee County, and *Etheostoma zonale*, Flint Creek in Delaware County, were added to the Oklahoma list.

The first record of *Ichthyomyzon gagei* from Oklahoma was a specimen taken from Barren Fork 10 miles east of Tahlequah by my student Jack Baker in April, 1931. This specimen was reported by Moore (33) as *Reighardina unicolor*, but was overlooked by Hubbs and Trautman (14). The specimen was later (14 June 1937) presented to the Museum of Zoology, University of Michigan, where it was studied by Bailey (34).

In September, 1935, Carl L. Hubbs and Milton B. Trautman collected fishes in Grand River, Mayes County, in Spring Creek and Elk River, Delaware County, and in Lost Creek, Ottawa County. Their collection from Grand River was particularly impressive with a total of 48 species including four new Oklahoma records (Table 1).

In connection with his studies, W. F. Blair (35), assisted by his wife Fern, his brothers P. F. and A. P. Blair, and A. D. Aldrich, made numerous collections of fishes in Cherokee, Delaware, Major, Mayes, Osage, Rogers, Tulsa, Wagoner, and Woods counties in 1936. The specimens were sent to the University of Michigan for identification by Dr. Hubbs. Three species were added to the Oklahoma list (Table 1). One species, *Notropis ariommus*, is on my list obtained from the Museum of Zoology, University of Michigan, but this is an apparent error, since this species is unknown in Oklahoma. Two records of *Notropis ortenburgeri* are of special interest, though not unexpected in view of more recent collections. The center of distribution of the Kiamichi shiner is in the Red River basin, but the Blairs took it from Lost Creek, Osage County, and from Spavinaw Creek, below Spavinaw Lake, Delaware County.

Carl L. Hubbs compiled several manuscript lists of Oklahoma fishes, that, according to Dr. R. M. Bailey (personal communication) though undated, were prepared as early as 1934 or 1935. One of these undated lists was credited to C. L. Hubbs and I. A. Rodeheffer and was probably written later than 1938. One of the Hubbs lists is of special interest because he stated that the list was based on information available to him "in January, 1938." Several species were added to the known fauna. Hubbs indicated that some species were listed on the basis of "evidence considered reliable." I have searched in vain for records of *Anguilla rostrata*, *Morone chrysops*, and *Percina sciera* earlier than 1938. Since I spent the winter of 1937-38 as a graduate student under Dr. Hubbs, and since I vividly remember taking eels from the Cimarron River near Perkins and from the Elk River in Delaware County, it is possible that I told Dr. Hubbs of my experiences. The specimens were not preserved. In the 1930's I helped Dr. R. Chester Hughes, parasitologist, take fishes in a trammel net from Stillwater Creek near Ripley. We took several white bass, then named *Lepibema chrysops*. I can-

not account for the *P. sciera* record, although the species was taken by my class from the Poteau River 4 miles south of Wister and at Slate Ford near Shady Point, on 7 and 8 August 1939, as reported by Cross and Moore (19). Other species added to the earlier lists are based on the Ortenburger and Hubbs (28) and Hubbs and Ortenburger (18) reports.

Surveys of stream systems began in 1938 when John D. Mizelle and I conducted an appraisal of the fishes of Stillwater Creek in Payne County (36). We took 28 species, but none was new to the State List.

Although this treatise concerns recent fishes, mention may be made of a fossil relegated to the family Cyprinodontidae and identified as *"Plancterus kansae?"* by Stovall and McAnulty (37). Hubbs (38) showed that the specimen was misidentified and tentatively called it *Menidia* sp., closely similar to *Menidia audens*, in the family Atherinidae.

Two publications appearing in 1940 deserve mention. Hubbs and Bailey (39) described *Micropterus punctulatus wichitae* from the Wichita Mountains. Hubbs and Moore discussed subspecies of *Notropis zonatus*, but later these two forms were elevated to full species, *N. zonatus* and *N. pilsbryi* (41).

The redfin darters were studied by Hubbs and Black (42) and a new subspecies, *Poecilichthys whipplii radiosus*, was shown to occur in Oklahoma. Later, Moore and Rigney (43) demonstrated this form as a full species, now named *Etheostoma radiosum*, and described two new subspecies now known as *E. r. cyanorum* (Blue River) and *E. r. paludosum* (Clear and Muddy Boggy rivers and the Kiamichi). *E. r. radiosum* was found in the Little River basin and eastward. At the time, we believed that *E. whipplei* was restricted to the Arkansas River system and *E. radiosum* occurred only in the Red River basin. Recent collections reveal the presence of the former in tributaries of the Red River in southern Arkansas.

Hubbs' latest manuscript list, dated 25 July 1941, included 133 species names, some of which were based on specimens or information submitted by W. F. Blair, A. D. Aldrich, or G. A. Moore. *Hiodon alosoides* was listed for the first time, although Meek (22) had reported it from the Sallisaw. *Carpiodes velifer* was included, probably on the basis of a misidentified specimen from Stillwater Creek, Payne County. The inclusion of the yellow bass, *Morone interrupta* (=*M. mississippiensis*) was based on specimens taken from Van's Lake, 8 miles north of Muskogee, by Aldrich. Probably *Pimephales tenellus* was included as a result of studies then in progress on the nominal genus *Ceratichthys* by Hubbs and Black, although the species had been described by Girard (7). Other additions to Huggs' lists, *Notropis spilopterus* and *Fundulus olivaceus*, are attributable to Hubbs' detailed studies of these species and their nearest relatives. *Lepomis microlophus* had been introduced earlier from Texas by the Oklahoma Game and Fish Department and was first taken by Moore from the Illinois River in 1941.

1942 - 1952

Notropis percobromus does not appear in Table 1, although Hubbs (31) decided that it was distinct from *N. atherinoides*. In collections from the Poteau River around 1939 and later (1947) we found the two forms appeared to be distinctly different. Bailey and Allum (44) became convinced that the two forms are conspecific. Their arguments, based on examination of specimens from the wide range of *N. atherinoides*, are quite convincing.

The first published list of the fishes of Oklahoma was credited to Carl L. Hubbs, probably without his permission and surely without benefit of proofreading. It appeared in a bulletin by Aldrich (32). The only copy of this publication available to me is the 5th edition. Probably the earlier editions did not include lists of species. This list contains 126 species and 43 subspecies. Unfortunately, the list included one *nomen nudum* (mentioned above) based on a manuscript name that was included in Hubbs' 1941 list.

The Oklahoma Game and Fish Department followed the original published list of fishes by Hubbs (32) with several pamphlets which were entitled *Know your Oklahoma Fishes* and were illustrated by Wallace Hughes. The fish lists were compiled by Moore (45) and by Moore and Riggs (46). A later issue failed to give credit to the authors. The list by Moore (45) included 157 species. By 1954 the list had grown to 162 and the 1963 list included

167 names. The species added to the list were taken by field parties working under the auspices of the State Game and Fish Department and, in large part, by my classes from Oklahoma A&M College.

From 1946 through 1948, I taught ichthyology in authorized August intersession terms. Since plans were being laid for construction of dams on the Illinois, Poteau, and Mountain Fork rivers by the U.S. Corps of Army Engineers, Tulsa District, the Corps and the Game and Fish Department requested preimpoundment surveys of the fish faunas of those river systems. Expenses of the survey parties were personally borne, although the Corps furnished a car and driver (Mr. Cecil Haight) and the Game and Fish Department sent Mr. Ed Jarrell with a pick-up truck to transport our gear from station to station.

In 1946 the Illinois River, then a free-flowing stream of clear, cool, and sparkling water, yielded 91 species of fishes, most of which had been reported earlier for Oklahoma. Moore and Paden (47) listed two species as new to the state list. The listing of *Hiodon alosoides* as new to the state list was in error because Meek (22) had previously reported it as scarce in Sallisaw Creek. Among many young *Alosa,* listed (47) as *Pomolobus chrysochloris* (=*Alosa chrysochloris*), were several specimens (48) later identified by Dr. R. M. Bailey as *Alosa obiensis* (=*A. alabamae*); this constitutes the first collection of that species in Oklahoma. *Noturus placidus,* listed (47) as *Schilbeodes eleutherus,* was later described by Taylor (20). *Lepomis microlophus,* taken earlier by Moore in 1941, was listed as new to the state. Although Moore and Paden were not aware of it, the Illinois survey party had collected three species for the first time in Oklahoma.

During the last two weeks of August, 1947, prior to construction of the Wister Dam, a preimpoundment survey was conducted on the Poteau watershed, again by my ichthyology class aided by the Corps and the Game and Fish Department. Cross and Moore (19) listed 93 species of fishes for the river system. The survey party took 69 species, 15 of which had not been recorded previously for the river; none was new to the state.

On 22 September 1948, a statement of agreement was signed by participating agencies creating the Oklahoma Fish and Game Council. Those agencies were: the Oklahoma Game and Fish Department, Oklahoma A&M College, University of Oklahoma, Corps of Engineers, and the Fish and Wildlife Service, U.S.D.I. The Council consisted of five members, one from each agency. Each year the Council elected a chairman from its own membership. The objectives of the Council, briefly stated, were to pool certain resources for the purpose of developing sound biology and wildlife management practices for impounded waters and their watersheds.

The Council sponsored graduate students at the University and the A&M College. The students were employed part time by the Corps of Engineers and were expected to conduct research on reservoir areas under the jurisdiction of the Corps. The final reports of the students were expected to fulfill partially the requirements toward the Master's or Doctor's degree. From 1949 to 1972, 18 reports have been filed with the Council. These reports formed the bases of 12 Master's theses and six doctoral dissertations.

Originally all the students were employed by the Corps of Engineers, but during the 1950's funds were not available and there were no active research projects. About 1961, the research program was resumed with financial support coming from the Corps and the Oklahoma Department of Wildlife Conservation. The Council remains active at the present time, but without representation from the Fish and Wildlife Service. Recently the Corps was forced to discontinue employment of students.

Most of the reports are concerned with reservoir management involving limnological studies, population dynamics, age and growth of fishes, etc., and are beyond the scope of the present paper. However, some will be mentioned below because they include information on the fish fauna of several reservoir areas before and/or after impoundment. In chronological order, investigations were conducted on the Illinois River (Tenkiller Ferry Dam), Poteau River (Wister Dam), Mountain Fork River (Broken Bow Dam), Verdigris River (Oologah Dam), Arkansas River (Keystone Dam), and Canadian River (Eufaula Dam).

From 1947 through 1952 considerable information about Oklahoma fishes was ac-

cumulated. W. F. Blair and party took 31 species (unpublished list) from the Illinois River near Scraper. Bailey (34) published a note on lampreys of Oklahoma and Texas. Hubbs and Black (13) published their monograph on the genus *Ceratichthys* (=*Pimephales*, in part). Moore (49) reported the first record of *Notropis perpallidus* for Oklahoma on the basis of a single specimen from Beaver's Bend State Park, 6 June 1947. Moore and Poole (50) reported the first record of *Elassoma zonatum;* on 19 April 1947 21 specimens had been taken, by a college class directed by the late W. H. Irwin, from a roadside pool near a swamp 10 miles east of Broken Bow, McCurtain County. Paden (51) erroneously reported *Amphiodon* (=*Hiodon*) *alosoides* as a first state record, as did previous workers who overlooked Meek's (22) record from Sallisaw Creek.

Probably the paper by Moore and McDougal (52) contributed to the merger of *Amphiodon* with *Hiodon* by showing the striking similarity between the retinae of the two nominal genera.

During the last two weeks of August, 1948, my ichthyology class surveyed the Mountain Fork River. The results of this survey were used as a Master's thesis by J. D. Reeves (53). Two species were described as new to science. *Hadropterus pantherinus* (=*Percina pantherina*) was later included in a publication by Moore and Reeves (54). The other species reported as new to science proved to be a misidentification, but constituted a new state record, *Hololepis barratti* (=*Etheostoma fusiforme*). *Noturus eleutherus,* reported as *Schilbeodes eleutherus,* was also a first state record, later to be recorded by Taylor (20). *Etheostoma asprigene,* reported as *Poecilichthys jessiae,* was taken for the first time and reported by Moore and Cross (55) together with 13 previously unrecorded species (see Table 1); one species, *Perca flavescens,* had been reported by Ortenburger and Hubbs (28). Six of the species had been included in a manuscript list by Hubbs as forms to be expected in Oklahoma. Of primary importance was the validation of *Poecilichthys parvipinnis* (=*Etheostoma parvipinne*) that had been synonymized previously with *Etheostoma squamiceps.*

During the decade (1942-1952) an important event took place when (1948) the Cooperative Fisheries Experiment Station was established at the University of Oklahoma under the direction of William H. Thompson. On 1 July 1950, a memorandum of understanding (revised July 1962) between the Department of Wildlife Conservation and the University became effective and the name was changed to the Oklahoma Fishery Research Laboratory.

Investigations by personnel of the laboratory began with lake surveys, preimpoundment, age and growth studies, and population estimates. The results of these investigations have appeared, largely, in mimeographed reports which were distributed to interested parties. However, contributions were made to various journals, including Proceedings of the Oklahoma Academy of Science, Transactions of the American Fisheries Society, Copeia, Journal of Wildlife Management, and several other publications. Since most of the work of the Fishery Research Laboratory has been concerned with management problems outside the objectives of the present paper, I will mention below only a few contributions that are concerned with discovery of Oklahoma fishes.

At this time (1948), the study of Oklahoma fishes was given important impetus when Carl D. Riggs was appointed to a post on the staff of the University of Oklahoma. Dr. Riggs became my close friend and we enjoyed a cooperative relationship in the field and laboratory until he moved to the University of South Florida in 1971 to become Vice President of Academic Affairs. Soon after his arrival in Oklahoma Dr. Riggs became interested in fishery studies on Lake Texoma, where in 1949 he conducted a summer field class from a barge. In July, 1950, the University of Oklahoma Biological Station was opened for student enrollment and it has become a permanent establishment at Willis, Oklahoma, presently under the leadership of Dr. Loren G. Hill.

Concurrently with the above events, another field station was established under the leadership of the late Dr. William H. Irwin of Oklahoma A&M College. This field station, the Oklahoma Wildlife Station, held sessions during the summers of 1949 and 1950 at the then abandoned Camp Gruber near Braggs and Greenleaf Lake. Through lack of appropriations the station was discontinued. It is regrettable that the

two major institutions did not combine their efforts to establish a cooperative field laboratory.

Much literature published in 1951 is of importance to the taxonomy of Oklahoma fishes. *Lepomis marginatus* was found to be fairly common in the Little River basin of McCurtain County (56). Riggs and Moore (57) gathered information pertinent to the distribution of paddlefish and sturgeon, species seldom taken by survey parties. During the summer of 1948, a survey party sponsored by the Oklahoma Game and Fish Department conducted an exhaustive survey of 11 Oklahoma lakes (58). Forty-seven species, representing 12 families of fishes, were taken from widely separated waters. After pressure by several ichthyologists, Carl L. Hubbs (59) described *Notropis amnis* Hubbs and Greene, an uncommon Oklahoma species. The name *Notropis amnis* had been a *nomen nudum* since 1935. In the same year Hubbs and Bonham (60) described three new species of minnows, two of which were subsequently discovered in Oklahoma, but only in the Red River. One of these, *Notropis brazosensis*, was synonymized with *N. shumardi*, but the other, *N. potteri*, is still considered a good species. A list of the fishes of Canton Reservoir by Buck and Cross (61) included 32 species, with annotations of some taxonomic importance, particularly with regard to *Lepisosteus productus* (=*L. oculatus*). Trautman and Martin (62) described *Moxostoma aureolum pisolabrum* from the Ozark uplands and included specimens from Oklahoma. Part of these specimens had been reported as *M. aureolum* (=*M. macrolepidotum*) by Moore and Cross (55). Hutchens and Hall (63) reported two adult specimens of *Alosa obiensis* (=*A. alabamae*) from the stilling basin below Wister Dam on the Poteau River. They were not aware, at the time, that the species had been taken by the Illinois Survey party in 1946, but their discovery led to re-examination of specimens from the Illinois.

Some reports alluded to above, including those of Moore and Rigney (43), Cross and Moore (19) and Moore (45), need only be mentioned here.

In 1952, the Oklahoma Fisheries Research Laboratory conducted a preimpoundment survey of the Fort Gibson Reservoir area. The results of this survey were written by Robert M. Jenkins (64). Jenkins included a list of 77 species of fishes taken by the survey party and supplemented by the list of fishes taken near Choteau by Hubbs and Trautman on 12 September 1935 (unpublished). Although no species were added to the state list, Jenkins' report is important from the standpoint of fish distribution. Twenty-three species were found only in upland tributaries on the east side of Grand River, four species were found only in lowland tributaries west of Grand River, and 50 species were collected in Grand River proper and/or tributaries on both sides of the river. Information in this report was included in a publication by Hall (48) along with additions and corrections to the list of Illinois River fishes. Hall's addition of nine species to the list for the Illinois River brought the total to 96 and he predicted that further work would probably increase the number to 100 species.

Investigations on the fishes of Wister Reservoir were begun in 1949 and continued through 1951. The results of this work were written by Latta (65) and also reported by Hall and Latta (66) and Hall (58). Forty-nine species were found in the lake, its tributaries and the stilling basin below the dam. Some uncommon species taken include: *Ichthyomyzon castaneus, Polyodon spathula, Hiodon alosoides, Carpiodes velifer, Anguilla rostrata,* and *Stizostedion canadense*. No additions to the state fauna were made.

1953 - 1963

Jones D. Reeves (67), after having completed his thesis on the fishes of Mountain Fork River, undertook a survey of the entire Little River system, in Oklahoma, at his own expense. With help from friends and his students from Southeastern A&M College, Wilburton, he compiled a list of 96 species. *Notropis maculatus* was taken for the first time in Oklahoma from Pine, Martin, and Grassy lakes, oxbows of Mountain Fork and Little rivers; *Crystallaria asprella*, from Little River near the Arkansas boundary, was also a new record. These two species were included by Moore (45) in a published list.

In 1953, Samuel Jackson (68) used rotenone on Black Hollow of Lower Spavinaw Lake, Mayes and Delaware counties, as a means of studying fish populations. His

Table 1 listed 19 species by common names, but lumped unidentified sunfishes (81 specimens) and minnows (estimated 6,500 specimens). All fishes taken were buried.

Oklahoma lampreys were treated by Hall and Moore (69) who discussed their characteristics and distribution.

Riggs (70) published the first record of the Mexican banded tetra (*Astyanax mexicanus*) on the basis of a single specimen taken from a pond on an island in Lake Texoma. He believed it represented a bait-bucket introduction, and that the species probably could not survive in the lake. However, subsequent reports (71, 72) indicated a strong possibility that the species had spawned in the lake.

Results of additional river surveys, discovery of additional species in Oklahoma, and the description of a new species were published in 1955. Moore and Buck (73), using data taken by workers in Kansas and information gathered by themselves, reported a study of the fishes of the Chickaskia River in Oklahoma and Kansas. Forty-two species representing 12 families of fishes were listed, but none was new to the state. However, a male specimen of *Pimephales tenellus tenellus* was destined to contribute to the monograph by Hubbs and Black (13, Fig. 1, Pl. 2). Linder (74) worked on the fishes of Blue River in southern Oklahoma. He listed 49 species representing 9 families, including some species that were unexpected at the time since they are Ozarkian forms. These species were: *Notropis rubellus, Dionda nubila, Hybopis biguttata* (=*Nocomis asper*), and *Etheostoma microperca.* A new hybrid combination was described, *Etheostoma* (*radiosum cyanorum* X *spectabile* subsp.). Hall (75) became interested in the effects of impoundment on river fishes. Twenty-two stream species were found in Lake Tenkiller one year after impoundment. Four species, *Pimephales tenellus, Schilbeodes* (=*Noturus*) *exilis, Etheostoma whipplei,* and *E. flabellare,* found in early postimpoundment collections, almost disappeared from later collections. The study was made to supplement an earlier report by Hall and Jenkins (76). At the time of his publication Miller (77) added two species to the list of Oklahoma fishes (*Notropis brazosensis,* which was later synonymized with *N. sumardi,* and *Signalosa petenensis*). *Signalosa* became a synonym of *Dorosoma,* but *D. petenense,* taken near the mouth of Blue River, stands as a new record. Moore and Reeves (54) described *Hadropterus pantherinus* (=*Percina pantherina*), a new species from the Little River system in southeastern Oklahoma and Arkansas. Riggs (78) demonstrated the effective use of the electric shocker combined with seines in collecting fishes.

In 1956, two publications contributed to a better understanding of Oklahoma fishes and added significantly to the Oklahoma list. The nominal genus *Erimystax* was relegated to subgeneric rank as Hubbs and Crowe (79) described seven new forms. One of these, *Hybopsis x-punctata,* had been considered rare in Oklahoma, until Riggs (78), using seines and electric shocker, found it in abundance on Illinois River riffles. Hall (80) reported six species as additions to the state list. Two of these, *Salmo trutta* and *Roccus* (=*Morone*) *saxatilis,* are transplants. In reporting *Ictalurus nebulosus,* Hall overlooked the records of Meek (23) for the Poteau and Kiamichi rivers. The Poteau record may be regarded as a misidentification, but the Kiamichi record is possibly valid since locations in Hall's records for the Little River system in McCurtain County are not far distant from the site worked by Meek. The other three species (*Hiodon tergisus,* from lower reaches of the Mountain Fork River, *Typhlichthys subterraneus,* from a cave near Peoria, Ottawa County, and *Fundulus catenatus,* from tributaries of Grand Lake and the Illinois River) were interesting additions to the state fauna.

During the summer of 1956, prior to construction of the Oologah Dam on the Verdigris River, a biological survey of the river was made by the Oklahoma Game and Fish Department under the direction of R. M. Jenkins of the Fisheries Research Laboratory at Norman (81). The fishes taken on this survey were used as the basis of a Master's thesis by George H. Wallen, of Oklahoma State University (82), who listed 68 species representing 12 families of fishes. Wallen's remarks about *Morone interrupta* (=*M. mississippiensis*) are of interest. He credited Gordon Hall with taking the yellow bass from Van's Lake, an oxbow near the Verdigris River, on 2 June 1950. Aldrich had taken the species there, probably in 1937, but during the summers of 1954 and 1955 the lake was dry and

Wallen expressed belief that it was no longer a tributary of the Verdigris.

Riggs (83) reported taking *Mugil cephalus* from the service generators of the Denison Dam. The first specimens of *Dorosoma petenense* from Lake Texoma were reported as *Signalosa petenensis* by Riggs and Moore (84). In a few years this important forage fish rivaled the gizzard shad in abundance in Lake Texoma. Rotenone samples yielded a greater number of threadfin than gizzard shad.

Heard (85) reported an interesting note on *Fundulus kansae*. A population of the plains killifish was found in Salt Branch of Saline Creek, tributary to Grand River. The creek heads in a salt flat near Highway 82 one mile south of Salina. *Gambusia affinis* was the only other species taken from this salty stream.

Orr (86), in his dissertation, gave a list of fishes of Heyburn Reservoir, an impoundment on Polecat Creek, Creek County, Oklahoma. This species-poor reservoir yielded only 25 species of fishes.

Linder (87) reported *Ammocrypta clara* for the first time from the Red River. His specimens were taken 28 October 1953, from Red River south of Bennington, Bryan County, Oklahoma. In his paper, Linder included characters that distinguish the species from its nearest relatives.

A significant contribution to the known distribution of darters (Percidae) in northeastern Oklahoma was made by Blair (88).

Heard (89) called attention to live-bait imports as potential additions to Oklahoma's fish fauna. He found *Chrosomus* (=*Phoxinus*) *eos* and *Eucalia* (=*Culaea*) *inconstans* in bait dealers' holding ponds, but there is no evidence that these northern species are established in the state.

Riggs and Bonn (90) listed 71 species from Lake Texoma. They gave an interesting account of the replacement of *Labidesthes sicculus* by *Menidia audens*.

A preimpoundment survey of Rock Creek, Murray County, Oklahoma, was carried out by the Oklahoma Wildlife Conservation Department and the University of Oklahoma Biological Survey prior to construction of the dam to create Arbuckle Reservoir southsouthwest of Sulphur. The report of Sandoz (91) included evidence of 38 species of fishes, including one unidentified *Notropis*. Sandoz also listed 59 species that were expected to occur in Arbuckle Reservoir.

In 1960, a study of the fishes of the Arkansas and Cimarron rivers in the Keystone area was made with support from the Army Engineers and the Oklahoma Wildlife Conservation Department (92). This report was concerned primarily with the food and game species to the omission of the smaller fishes. The ten species studied are included in Linton's Table 2 (92). Of primary interest in this connection is that the study included 19 specimens of the paddlefish, *Polyodon spathula*.

Blair and Windle (93) published a note on the darter associates of *Etheostoma cragini* and thus contributed to knowledge of the natural history and distribution of several species.

During the summer of 1961, a preimpoundment survey of the Eufaula area was conducted under the joint leadership of Dr. Hague Lindsay and Mr. Alfred Houser with the support of the Oklahoma Biological Survey, the Oklahoma Fishery Research Laboratory, and the Corps of Army Engineers. Field workers assigned to the leaders were graduate and undergraduate students. The specimens taken by the survey parties were deposited in the Museum of Zoology, University of Oklahoma. The results of the survey have not yet been published. I was particularly interested in a fine series of young *Ictalurus furcatus* from Gaines Creek. Except for the single specimen reported by Cross and Moore (19), these specimens are the only ones I have seen from the Arkansas River basin. Other specimens of interest include a specimen of *Polyodon* and several records of *Percina maculata* from Gaines Creek (personal communication from Dr. Lindsay).

Dr. Lindsay and Mr. Bates were employed by the Oklahoma Biological Survey to collect fishes from many areas of the state in the summer of 1962. The results of this work have not been published, but the specimens are on deposit at the University of Oklahoma. According to Dr. Lindsay (personal communication) gaps in the distribution of many species were filled.

Hadley and Carter (94) listed 46 species of fishes from Salt Creek, a tributary of the

Arkansas River in western Osage County. Later Hadley (95) added nine species to the Salt Creek list bringing the total of known species to 55, an impressive list for such a small stream. Of particular interest is his account of a specimen of *Ambloplites rupestris* and one *Stizostedion vitreum*. The rock bass possibly is explained by the fact that the Oklahoma Department of Wildlife Conservation had planted the species in some streams of Osage County in the 1940s.

Moore and Riggs (46) listed 167 species of fishes then known to have been taken in Oklahoma. Five of these were indicated as transplants that had not become established and an exotic species (*Salmo trutta*) was inadvertently omitted. Also there is no proof that *Archosargus probatocephalus* and *Mugil cephalus* have established populations in Oklahoma. In another paper Riggs and Moore (96) reported range extensions for *Moxostoma macrolepidotum pisolabrum* and *Percina shumardi*. The specimens were taken from the tailwaters of Lake Texoma.

1964 - 1972

During the present decade a number of publications important to the taxonomy of Oklahoma fishes appeared. Gilbert (41), working with the subgenus *Luxilus*, accepted the characters demonstrated by Hubbs and Moore (40) and recognized *Notropis pilsbryi* as a full species, but did not place *Notropis cornutus* in Oklahoma. According to Gilbert, *Notropis chrysocephalus chrysocephalus* occurs in the Illinois River and *N.c. isolepis* in tributaries of the Red River. Perhaps further study will establish *isolepis* as a full species. Miller (97) did not agree with Gilbert in recognizing *chrysocephalus* as a full species. Miller's argument seems to be convincing. Blair (98) gave an interesting discussion of zoogeographic import regarding *Etheostoma cragini* and its nearest relatives. *Percina shumardi* was taken for the first time by Riggs and Wade (99) in the Illinois River close to its confluence with the Arkansas River and about 50 miles west of the type locality, the Arkansas River at Fort Smith. *Menidia audens*, formerly believed to be restricted to the Red River basin, was found to be doing well in Boomer Lake, Payne County in 1964 by Sisk and Stephens (100). Specimens had been planted there by W. H. Irwin in 1961. Apparently the species is spreading in the Arkansas River system since Gomez and Lindsay (101) reported its presence in Keystone Reservoir and the apparent replacement of *Labidesthes* by *Menidia* as found in Lake Texoma by Dowell and Riggs (72). Wade (102) conducted a survey of Little River prior to construction of the dam, in Cleveland County, to impound Lake Thunderbird.

Moore and Kernodle (103) reported the largest chestnut lamprey, *Ichthyomyzon castaneus*, on record. The specimen was taken from its host, a carp, in an oxbow of the Illinois River near Tahlequah.

Municipal sewage and land-use practices often effect changes in fish faunas. In an effort to assess such changes, Wade and Craven (104) compared their studies with earlier surveys (36, 105) of the fishes of Stillwater Creek in Payne and Noble counties. The work of Moore and Mizelle (36) took place before impoundment of Lake Carl Blackwell, whereas that by Cross (105) came after impoundment and was concerned with an increase in domestic pollution. Between 1950 and 1966 the sewage discharge into Stillwater Creek nearly doubled. Moore and Mizelle listed 28 species, Cross found 40, and Wade and Craven found 27. Probably the greater number of species found by Cross can be attributed to the stabilized flow between the dam and the sewage outlet, made possible by a leaky valve in the control tower at the dam. Species taken by Cross but not by others were: *Notropis blennius, Pimephales notatus, Campostoma anomalum, Chaenobrytus gulosus, and Notropis pilsbryi* (accidental). Six species, *Notropis stramineus, Phenacobius mirabilis, Morone chrysops, Lepomis microlophus, L. megalotis,* and *Aplodinotus grunniens*, were found by Cross (105) and Wade and Craven (104), but not recorded by Moore and Mizelle (36). Four species, *Notropis girardi, Fundulus notatus, F. kansae,* and *Pomoxis nigromaculatus*, taken by the earlier collectors, were not found by Wade and Craven. Probably the differences in species composition among the three surveys can, in part, be explained by chance, but doubtless also by changes in the stream quality caused by impoundment, increased sewage discharge and lack of complete sewage treatment, and changes in land use.

Branson (106) assembled all available information on the fishes of the Neosho

River system in Oklahoma, including extensive personal collections. The Neosho or Grand River is without doubt the richest river in Oklahoma. Branson listed 103 species known from the river system and added a supplementary list of 13 species that he thought could be expected. Two species included in the latter list, *Noturus placidus* (as *N.* sp., then undescribed) and *Amblyopsis rosae*, have since been recorded from the area.

May and Gasaway (107) attempted to identify larval and juvenile fishes, primarily from Canton Reservoir. Their report includes a preliminary key to identification of larval Oklahoma fishes, descriptions of some common species, a bibliography, four line drawings, and 54 photographs.

Larval fishes from Lake Texoma were studied by Taber (108), who illustrated early life history stages of 17 species and discussed their distribution and relative abundance. Observations of spawning habits were also included.

The monograph on the genus *Noturus* by Taylor (20) was the most important publication, pertinent to ichthyology in Oklahoma, of the decade. This long-awaited work includes detailed treatment of 23 species including ten new to science and seven members of Oklahoma's fauna. One of the new species is *Noturus placidus* from the Neosho River and lower Illinois River. Problems concerning identification of our madtoms were solved.

On 12 June 1967, several large schools of striped mullet, *Mugil cephalus*, were observed below Denison Dam by Hill and Curd (109). They succeeded in taking ten specimens with electro-fishing gear. The mullet migrate into fresh water only during the summer.

The confusing nomenclatural history of the minnow genus *Hybopsis* was reviewed by Reno (110). This paper could be an important starting point for students undertaking studies of a taxonomic nature involving the Cyprinidae.

Although I have avoided mention of many studies of fish populations, attention may be called to such a study of the stilling basin below Canton Reservoir by Moser and Hicks (111). There is a dearth of information on distribution of fishes in western Oklahoma and Moser and Hicks listed, by common names, 20 species in their Tables 1-4. Unfortunately, they did not identify the few minnows recovered, but merely stated that they saw not more than a dozen.

Notropis girardi has been known only from the Arkansas River system and *N. bairdi* only from upper reaches of the Red River basin above Lake Texoma. Cross (112) reported a specimen of *N. girardi* from Wildhorse Creek, a tributary of the Washita River in Garvin County. Cross considered the possibility of transfer by man, but did not rule out the possibility of natural transfer from the South Canadian, of the Arkansas system, to the adjacent Washita drainage.

Plantings of the threadfin shad, *Dorosoma petenense*, in the Arkansas River system in 1961 and 1970 have had poor success, but Mensinger (113) reported four specimens below Robert S. Kerr Dam. He suggested that the species may have come from planted stock in Dardanelle Reservoir via Ozark Reservoir.

Echelle, Shelton and Taber (114) listed seven species as additions to the fish fauna of the main body of Lake Texoma.

Up to the time of this writing (November, 1972), I have seen only a few papers on the taxonomy and distribution of Oklahoma fishes which were published in 1972. Gomez and Lindsay (101) on *Menidia* in Keystone Reservoir and the Arkansas River was mentioned above. The long expected appearance of the Ozark cavefish, *Amblyopsis rosae*, in Oklahoma was finally reported, independently, by Black (115) and Tafanelli and Russell (116). Black's specimens came from Twin Cave and Jail Cave, Delaware County, and Cave Springs Ranch Cave near Miami, Ottawa County. Tafanelli and Russell took a specimen from a cave near Miami and also reported on an unusual collection made by Eugene Hart while he was working on a floodwater retarding structure on the Whitewater Creek watershed in Delaware County. About 20 fish were seen, but only five specimens were preserved and are now in the Oklahoma State University collections. One of Oklahoma's most distinctive minnows, the pugnose minnow, long known as *Opsopoeodus emiliae*, has been exhaustively studied by Gilbert and Bailey (117) who recognized it as a subgenus of

Notropis because most generic characters, considered valid in the past, are not consistently present or are shared by other species of *Notropis*. One character, maxillary barbels, was found as a complete surprise although they discovered that some other species of *Notropis* also may have barbels. [The reader's attention is called to the paper by Campos and Hubbs (118). They demonstrated that the karyotypes of *Opsopoeodus* and *Notropis* are distinctly different and stated that "synonymizing the genera may have been premature."] Natural intergeneric fish hybrids are rather rare. Robison and Miller (119) reported a cyprinid hybrid (*Notropis pilsbryi* X *Phoxinus erythrogaster*) from Cloud Creek at State Highway 116, Delaware County. Fish larvae are often perplexing, but important. In May, 1950, Dr. Milton B. Trautman, Milton R. Curd, and I took several specimens of postlarval gars (*Lepisosteus spatula*) from a slough off Red River near Bluff in Choctaw County. We believe that our description (120) is of the youngest known example of the species.

Although I have attempted to cite all publications directly pertinent to the taxonomy and distribution of Oklahoma fishes, doubtless some works have been overlooked. However, I believe that credit has been given to all authors and field party leaders who have contributed to completion of the list of presently known Oklahoma fishes. In all probability the list is still incomplete. I think new species may yet be described from Oklahoma and some known forms may be discovered in the state. Investigations now in progress, such as that under the leadership of Dr. Hague Lindsay of the University of Tulsa, may be expected to contribute much to Oklahoma ichthyology. Other presently active workers include Dr. W. Frank Wade of Southeastern State College, Dr. Michael M. Stevenson of the University of Oklahoma, Dr. Rudolph J. Miller of Oklahoma State University, and Mr. Warren Adams, an undergraduate student at the University of Tulsa, who (personal communication) plans to assemble all distributional records of Oklahoma fishes, an ambitious undertaking.

Ichthyology in Oklahoma will be enhanced soon when a book now in press by Miller and Robison (121) is made available. Future students will find this work an invaluable aid to the study of ichthyology.

Since drastic changes in Oklahoma's water resources already have been effected and other projects are being planned, it is inevitable that changes in the fish fauna should occur. Construction of dams on our rivers has had a profound influence on the fish fauna. Much habitat, formerly utilized by many species, has been inundated so that the ranges, particularly of riverine forms, have been greatly reduced. Many species adapted to live in riffle habitats have been forced to move upstream or have been extirpated from portions of their former ranges. The dams and locks on the Arkansas River may permit some species, previously unknown in that drainage system, to enter Oklahoma. As indicated above, some evidence of such an invasion already exisits. Dams, in the absence of locks, will hamper upstream migrations to spawning sites formerly utilized, for example, by species of *Alosa*. On the other hand, lake-inhabiting fishes can be expected to thrive and increase in abundance.

Time will tell to what extent we have erred. Has it been unfortunate to transplant species in our waters? Some introduced forms may never succeed or may remain innocuous though present. The first transplanted species, the rainbow trout (*Salmo gairdneri*), was doomed to failure as a self-propagating species. However, in some areas, a put-and-take fishery was established. Other species such as the walleye *Stizostedion vitreum*, the striped bass, *Morone saxatile*, and the northern pike, *Esox lucius*, are of a doubtful nature and possibly will never become abundant.

According to Lachner (122) exotic fishes should never be released in the United States, yet many have been. We now regret that the carp, *Cyprinus carpio*, was brought to the United States in 1831 by private interests, yet we now permit other exotics to be introduced. Fortunately the introduction of the tench, *Tinca tinca*, into Oklahoma in 1889-90 was a failure (123), but maybe we shall regret the importation of the grass carp, *Ctenopharyngodon idella*, and the walking catfish, *Clarias batrachus*.

Continued studies by various agencies and independent individuals can contribute significantly, if comprehensive postimpoundment investigations are compared with the preimpoundment surveys already on record.

ACKNOWLEDGMENTS

I am indebted to Dr. Donald Kizer, editor of these Proceedings, for inviting me to undertake this work. Had I been fully aware of its magnitude, I probably would have declined, but it has been stimulating and has revived many memories of my too often inept attempts to contribute to Oklahoma ichthyology. Drs. Carl D. Riggs and Loren G. Hill kindly furnished dates of important events. Dr. A. P. Blair sent literature and names of people who aided in some early collecting. Bob Grinstead supplied the history and contributions of the Oklahoma Fishery Research Laboratory. William T. Nailon Jr. provided the historical background and a list of contributions of the Oklahoma Fish and Game Council. Dr. Rudolph J. Miller gave helpful advice. Dr. L. Herbert Bruneau kindly loaned literature on Oklahoma place names. I am grateful to all these people for their help.

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