Temporal and Spatial Distribution of Cyprinid Fishes Between 1921 and 1995 in the North Canadian River Drainage, Oklahoma

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A 20-year survey (1976-1995) of fishes in the North Canadian River, (known as the Beaver River in the Oklahoma Panhandle), Lake Eufaula, and the Canadian River below Lake Eufaula produced 23 species of cyprinids. A review of 261 past and recent fish collections (1921-1995) by others revealed an additional eight species of cyprinids found in the North Canadian River drainage. The distribution and the relative abundance of these 31 cyprinids species over time is connected to changes in using land within the drainage and to the various habitat requirements of each species. ©1997 Oklahoma Academy of Science

INTRODUCTION

This paper presents an annotated checklist, taken from archival records and our own samples, of the cyprinid fishes known to occur in the North Canadian River drainage (NCR) of Oklahoma. We discuss the occurrence and distribution of cyprinid fishes in relation to the possible influences of human activities in the watershed.

Little is known of the effects of urbanization and other cultural alterations of land use upon native cyprinids in large Oklahoma streams. Most cyprinids in these streams are tolerant of physiochemical stress, as are most native fishes in prairie streams. The present species have evolved in streams with stressful, physical (high water temperatures), and chemical (low dissolved oxygen and high salinity) conditions similar to those produced by urbanization (1). Therefore, the relative abundance of those species that are more tolerant of such conditions would be expected to remain similar over time or to increase while the relative abundances of less tolerant species would be expected to decline.

METHODS

Historical Collections (1921-1995): In Table 1, we have compiled a comprehensive list of the fish surveys recorded between 1921 and 1995. The earliest fish collections we found that were recorded from the drainage were taken by an unknown collector in 1921 from Buffalo Creek, a tributary of Gaines Creek, in Latimer and Pittsburg Counties.

In unpublished records of University of Oklahoma Museum of Natural History (OKMNH), we found two extensive fish surveys from the 1960s. In 1962, A. Houser and H. L. Lindsay of the Oklahoma Department of Wildlife Conservation (ODWC) conducted a pre-impoundment survey, which included more than 100 collections taken from the mainstem of the NCR and its tributaries in the area of the then proposed Lake Eufaula. Then, in 1963, H. L. Lindsay and M. Bates of the Oklahoma Biological Survey (OBS) made 36 collections from the Beaver River and its tributaries in the Panhandle and other areas in NW Oklahoma (Table 1). [Editor's note: This paper has an unusually large number of extensive tables; all tables are collected at the end of the text; see pp. 55-92.]

Collections before 1975 from the central urbanized (Oklahoma City) sections of the river are rare. Since 1975, however, there have been six fish surveys in this area. In Table 1 we list 261 past fish collections (year-year) taken from the NCR drainage.

Additional records of cyprinid fishes listed in collections from reservoirs were obtained from unpublished ODWC Job Performance Reports (ODWCLS) that are on file at

the Oklahoma Fisheries Research Laboratory (OFRL) for the years 1964-1994. Most of these reports lacked voucher specimens, limiting their usefulness. However, most of the earlier collections of lake minnows were taken by ODWC field personnel, most of whom were former students, who referred most of these specimens to G. A. Moore and C. R. Riggs for identification (personal communiations with ODWC field people).

Current Collections (1976-1995): We include information on minnows from the following reservoirs: Lake Canton, Lake Fort Supply, Lake Optima, Lake Overholser, Lake Hefner, Shawnee City Lake #1, Shawnee City Lake #2, Lake McAlester, American Horse Lake, and Lake Eufaula (Table 1).

In 1976-1995 Oklahoma State Departmental of Environmental Quality (ODEQ), formerly the Oklahoma State Department of Health (OSDH), conducted surveys that included 467 collections from 60 sites on the NCR and its tributaries and reservoirs. We collected fishes at ten mainstem, long-term monitoring sites and 30 additional short-term ones from river and stream, and 21 sites in ten lakes (Table 2). A review of 261 fish collections from the drainage (1921 to 1995) found in museums at Oklahoma State University (OSUS), University of Oklahoma (OKMNH), University of Kansas (UK), University of Michigan (UMMZ), United States National Museum of National History (USNM), and University of Tulsa (UT) now OSUS, provided additional data on the past occurrence and distribution of cyprinid fishes (Table 1).

The ten, long-term sampling sites (Figure 1) were established on the mainstem of the NCR between 1976 and 1980 and were visted two or three times a year through 1995 (Table 2). Collecting locations were selected primarily on the basis of their accessibility by roads and were areas that were influenced by water quality, impoundments, wastewater discharges, and storm water runoff as nonpoint-sources (2).

A heavily leaded seine, 3.3×1.3 m with 3.0-mm mesh, was used in all sampling. A 200-m reach of stream was sampled during each visit. The sampling technique for all stream sites consisted of slow seining as close to shore and cover as possible. We would first establish the upstream boundary, then seine downstream 200 m, and this point became the downstream boundary.

Lake surveys consisted of shoreline seining of 100 m (10 hauls of 10 m each using a 3.3-m minnow seine) to catch smaller fish. In lakes larger cyprinids (carp) were also collected by using 330-m experimental gill nets set overnight.

In this study, we define six categories of relative abundance values calculated as the number of specimens per collection (approximately 200 m) (2) as follows: very abundant (VA) = over 5,000; abundant (A) = 4,999-500; common (C) = 499-100; rare (R) = 99-20; very rare (VR) = 19-1; 0 = no specimen collected; and '— ' = no collection that year.

RESULTS

The 467 collections produced 532,183 fish of which 338,410 (64%) were cyprinids. In the 371 collections from the ten, long-term mainstem sites, cyprinids consist of 66% of all fish collected (Tables 3 and 4). In the collections from the tributaries 51% of the fish collected were cyprinids. In lake collections cyprinids comprised 14% of the fish (Table 3).

Campostoma anomalum (Rafinesque) Central stoneroller: Stonerollers have never been common in the mainstem of the NCR. We found past records of this species from the mainstem (Table 5). We found the stoneroller to be VR (1-4) in the lower segments (E, F, and G) of the mainstem (Table 6).

In the past, stonerollers were found in some of the tributaries of the NCR east of Seminole County. The 1962 ODWC survey found stonerollers to be A (3,416) in 51 collections from 18 tributaries of the proposed Lake Eufaula (Table 5). In 1988 we found this species to be VR (1-8) from tributaries in the lower reaches of NCR (Table 6).

Past collections taken by OBS from tributaries in Beaver and Texas Counties did not contain the stoneroller. In 1988, in single collections from each of two sites on Corrumpa

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Creek, we found this species to be C (224 specimens) (Table 3).

Today, stonerollers are primarily collected in the NCR or in some of the tributaries below Lake Eufaula GM10 (Table 3). This species probably has always been in the headwater tributaries of the NCR in Cimarron County, and in the tributaries of lower reaches of the river below Lake Eufaula (Table 5). This species may have disappeared from the mainstem above Lake Eufaula because of habitat limitations (Table 7). Lake Optima, and a dry section of the Beaver River west of the lake, apparently prevent downstream movement from the western tributaries, where the species is common today. The lack of gravel and rock substrata in the Beaver River and its lower tributaries may also limit stoneroller downstream movements. Lake Eufaula may be a barrier to the upstream migration of stonerollers from downstream tributaries where this species was C (134-842) (Table 5).

Cyprinus carpio (Linnaeus) Common carp: Common carp likely has occurred in western Oklahoma and southwestern Kansas since its introduction to Kansas in the early 1880s (3). A 1962 preimpoundment survey (Lake Eufaula) produced 131 common carp from seven tributaries and six specimens from mainstem sites (Table 5).

Comman carp were C in most ODWC lake surveys between 1965 and 1994. Unpublished job reports at OFRL indicated it is C in lakes of the NCR (Table 3).

These carp were more common in the mainstem of NCR and reservoirs than in the tributaries, being present in 37% of our mainstem collections (Table 8), in all our reservoir collections, and in 63% of our lake collections (Table 3).

These carp were most numerous in the central segments of the NCR (Table 8) segments C, D, and E. Before 1992, they were R in collections from the headwaters (MI, M2, and M3), and VR in collections from lower segments (M10) of the NCR (Table 7).

Ctenopharyngodon idella (Valenciennes) Grass carp: We failed to collect any grass carp; however, it was stocked by ODWC for weed control in several small lakes including Beaver City Lake in Beaver County and Guymon City Lake in Texas County in 1983 (Table 9). Both the grass carp and the hybrid *C. idella* \times *Hypophthalmichythys noblilis* were introduced into the American Horse Lake (ODWC unpublished stocking records) in Blaine County (Table 9). Throughout the drainage, the grass carp has also been stocked by landowners in many small ponds with aquatic weed problems (4). No grass carp have been collected from the mainstem.

Hybognathus placitus (Girard) Plains minnows: The plains minnow was collected by Ortenburger in 1926, from Coldwater Creek in Texas County (Table 5). Past collections from the westernmost tributaries indicated this species was C (Table 5). Two of our collections made in 1988 from Palo Duro Creek contained 220 specimens (Table 3).

During the 1962 ODWC survey, collections from the mainstem in the area of the proposed Lake Eufaula produced 12,469 plains minnows (Table 5). In the past, this species was VA in the mainstem now inundated by Lake Eufaula (Table 10).

This species was once A in the mainstem, downstream of Lake Eufaula; preimpoundment collections found 1,580 specimens (Table 11). In 1982 we found that this species was R; we collected 21 specimens from the mainstem north of Whitefield (Site M10) (Table 10).

In 1981 we collected a single specimen from the river north of El Reno (M7). This was the last record of this species from segments D and E of this species. Downstream from Oklahoma City our last collection of this species was at Harrah (M10) in 1986 (Table 10).

The plains minnow was collected from all ten mainstem sites (Table 10), and in 117 of the collections from the mainstem. In our collections, this species was VR (ten specimens) in reservoirs and C (339 specimens in four collections) in some western tributaries (Table 3).

Today, the plains minnow is R in the

drainage. Since 1982, this species has not been found downstream of Lake Eufaula (Table 11). A notable decline in the numbers of the plains minnows occurred after 1983; three sites (M4, M8, and M9) exhibited declines (Table 10). This decline of the plains minnow may be related to construction of reservoirs and in-stream flow depletions because of deep-well irrigation. A review of collection records indicated this species has never been reported to be A in the central sections of the river upstream of Lake Overholser. This lake, which was constructed in 1919, and Canton Lake, constructed in 1948, might have restricted upstream dispersals. However, it is R within Canton Lake. In the 1962 surveys conducted by ODWC, this species was VA in the river below Oklahoma City and downstream to the mouth of the river (Table 5). Since the construction of Lake Eufaula in 1964, this minnow has almost disappeared from the river downstream of Lake Eufaula. Since 1983 it has also declined above the lake. Cross (*3*) indicated a similar change in abundance in the Cimarron and Salt Fork Rivers of the Arkansas drainages in Kansas.

It was once an A minnow but today is a VR minnow between sites MI and M4 below Lake Optima and west of Woodward. Stream flow patterns in the Beaver River between Lake Optima and Wolf Creek are still mainly controlled by storm events and spring flows. Because Lake Optima has never released water, the river downstream still retains the natural flow patterns for a small prairie stream.

In the sections of the river with a continuous flushing action by daily discharges from the reservoir, or increases in daily discharges from sewage treatment plants, the changes in flow may contribute to the decline of the plains minnow over a long period. This herbivorous minnow feeds on diatoms, other microorganisms, and finely divided detritus that accumulates in pools and calm, shallow water or along sandbars. Increased discharges from lakes or the South Side Oklahoma City Waste Water Treatment Plant (95 million gallons/day wash away this food source). In sections of the river below these discharges, there are very few pools or calm areas for feeding. With the increases in downstream flows and unstable substrata of sand, the sand may have covered much of the organic debris and other food materials for this species. Burial of the organic debris by sand would make the food unavailable to plains minnows and would contribute to a decline in abundance.

Macrhybopsis aestivalis (Girard) Speckled chub: Hubbs and Ortenburger (5) collected nine (OKMNH 6219) and 18 (UMMZ 80431) specimens in 1926 from Coldwater Creek, a tributary of the NCR 13 km southeast of Guymon in Texas County. Examinations of past fish collections indicate this species was R in the river west of Woodward and it is now extirpated from the river west of Woodward (Table 5).

Apparently, there has been a decline in the number and distribution of the speckled chub in the study area. The virtual absence of speckled chub, in our collections and in collections made by other workers (6,7,10) during the 1980s and 1990s, indicates a serious depletion. This species was collected only twice during our survey. We found record of one recent collection (1993) from the mainstem north of Whitefield (6). This was the site (M10) where we collected it in 1982.

The lack of suitable habitat of pea-sized gravel substrata and main channel habitat may account for the absence of this species in our tributaries and reservoirs collections.

Platygobio gracilis (**Richardson**) **Flathead chub:** The flathead chub was always VR in the river. In 1988 we took three from Corrumpa Creek south of Wheeless, east of the New Mexico state line in Cimarron County. In 1977 a single specimen was collected from Fort Supply Lake by ODWCLS (Table 9). The status of this species in the river seems critical and appears limited to the westernmost sections of the mainstem above Lake Optima.

Macrhybopsis storeriana (Kirtland) Silver chub: Only one record of silver chub from the NCR drainage was found. One 1962 collection took six specimens from the NCR near the mouth of the Deep Fork River. It is likely that the silver

chub has always been VR in the river. We collected twice (two to seven specimens) from Site M10 near Whitefield (Table 9). A recent survey (1993) also found this species at site M10 (6). The silver chub was not found in any of our tributaries or reservoirs. The silver chub now seems limited to the mainstem downstream from Lake Eufaula near Whitefield (M10).

Notemigonus crysoleucas (Mitchell) Golden shiner: The first collections of golden shiners from the drainage were made by Ortenburger in 1926 from Coldwater Creek in Texas County, and in 1927 from the NCR in Hughes County (Table 5). Some time after the 1930s, this species was widely transported for bait.

Most collections of golden shiners were from the tributaries. We found records of only two collections from the mainstem (Table 5). This species was R in the river before 1975 and remains R today (Table 4). Golden shiners were present in our collections from mainstem sites M4-M10. Collections from the westernmost mainstem sites (M1, M2, and M3) failed to produce this species. and it was present in only one of our tributary collections (Table 4).

The annual lake surveys by the ODWC of Optima, Canton, Fort Supply, Hefner, Overholser, Shawnee City #1, and Eufaula Reservoirs in the 1970s and 1980s usually indicated this species was R. In our survey, golden shiners were found in five reservoirs, usually R (maximum = 34 specimens) in four collections from Lake Canton, and the species was R in tributaries (Table 5).

Bait bucket discards may account for up to 1,223 specimens found in the reservoirs. A similar probability may account for the increase in numbers at site M10 where there is more fishing than at other mainstem sites.

Scardinius erythrophthalmus (Linnaeus) Rudd: On 26 June 1990, we collected two large specimens of this exotic species from the Elm Point area of Lake Eufaula, in the Gaines Creek arm of the lake (12). These specimens of rudd may be bait bucket discards (Table 9).

Notropis atherinoides (Rafinesque) Emerald shiner: Our collections show a decline in the abundance of the emerald shiner in the three Panhandle counties. During the time we collected from the these counties, this species was not found any of our 90 collections, 79 from the mainstem and 11 from the tributaries (Table 12). The absence of emerald shiners from all 79 collections from the Beaver River in the Oklahoma Panhandle reflects a substantial change in the recent distribution of this species west of Woodward, where at one time it was VB (Table 5).

The emerald shiner exhibited a tendency toward greater abundance in downstream areas than in other areas of the NCR (Table 12). Most of the specimens (93%) were collected between sites M7 and M9. Between sites M4 and M8 this species has declined in abundance since 1980, and 7 specimens have been collected since 1986 (Table 11). This species was C during the 1962 ODWC survey of the proposed Lake Eufaula (Table 5). But recent surveys indicate that this species is very rare above Lake Eufaula. It still occurs at site M10 below the lake (6) (Table 12).

Past ODWC lake surveys indicate this species occurred in both Canton Lake and Lake Eufaula. A recent (1990-1992) ODWC lake survey of Lake Eufaula indicated emerald shiners were still common (Table 5). During our lake surveys (1976-1996) this species was VR in all lakes (Table 12), and appears to be on the decline. The lack of voucher specimens limits the usefulness of this ODWC data, but we have included it to make others aware of emerald shiner presence.

Notropis bairdi (Hubbs and Ortenburger) Red River shiner: The Red River shiner is a recent invader of the Arkansas River basin from the Red River System (11,12). Our survey produced the only known record of this species in the NCR drainage (Table 9). Our specimens were deposited at OSUS, but were not cataloged into the collections; we assume they have now been lost. Recent surveys, since 1983, have failed to find the Red River shiner (1,6,7). This species apparently has not established

itself in the NCR.

Notropis blennius (Girardi) River shiner: The river shiner has been rare in past collections from the NCR and limited to the lower segments (M9-M10). We observed a similar distribution (M7-M10), and relative abundance is VR (four collections from three sites yielded 11 specimens) (Table 9). These specimens were deposited at OSUS, but they were not cataloged and may be lost. A recent collection at site M10 in 1993 found 25 specimens that were placed in the museum at OSUS (#26354) (7).

A review of past and recent collection records would suggest that there has been little change in distribution and abundance of the river shiner (Table 9).

Notropis boops (Gilbert) Bigeye shiner: Past collection records found that the bigeye shiner was limited to the tributaries of the lower reaches of the NCR (segment F) and produced 1-64 specimens (Table 5). We found this species to be C (up to 157 specimens) and to comprise over half the fish collected from the tributaries of Gaines Creek (Table 4). We could not find any records of this shiner from the mainstem.

Notropis buchanani (Meek) Ghost shiner: We found 18 records of this species from the drainage. In 1962, 2,344 specimens were collected from the tributaries of Gaines Creek and the mainstem of NCR (Table 5). We found ghost shiners to be VR (nine specimens) in the mainstem. We found ghost shiners were VR also in Lake Overholser and Lake Eufaula (Table 4).

This shiner has a spotty distribution. In the past, the largest number collected was from the large, turbid tributaries of Lake Eufaula (Gaines and Longtown Creeks). Recent collections found the ghost shiner was rare in lakes and in the NCR upstream of Lake Eufaula (Table 5).

Luxilus cardinalis (Fowler) Cardinal shiner: The cardinal shiner was reported in the area of Belle Starr Landing in McIntosh County and was listed as abundant. This is the only record of this species in the drainage. Because there is no voucher specimen, this record may be a questionable one.

Notropis emilate (Hay) Pugnose minnow: In 1921, the first pugnose minnow collected was from Gaines Creek, a large tributary that now empties into Lake Eufaula (OKMNH 15450). Examination of past collections showed this species was restricted to the tributaries of the NCR in Pittsburg and Latimer Counties (Table 5). In other past collections this minnow was VR to R (nine collections, 38 specimens). Today, it is still rare and limited in distribution to the same area. We collected a single specimen from Gaines Creek near the mouth of Pit Creek. This is the only recent record (since 1962) of this species from the drainage.

Notropis girardi (Hubbs and Ortenburger) Arkansas River shiner: The first collection of this shiner from the NCR drainage occurred in 1926 when 215 specimens were collected from Coldwater Creek southwest of Guymon, in Texas County, by Hubbs and Ortenburger (5). In the past, Arkansas River shiner was common in the tributaries and mainstem west of Woodward (M1-M4) (Table 5). Past collections from the tributaries and mainstem of the lower NCR drainage (M9- M10) found this species to be A before 1965. Records of past collections of this shiner from the central segments (M4-M8) are lacking. Most sites described in the 1962 ODWC survey of the proposed Lake Eufaula are now inundated by Lake Eufaula (Table 5).

Past collections show that since 1965, this species has been on the decline. In our collections we observed that this species has disappeared from the NCR drainage (*12*) except for 1 specimen found in 1994 from the westernmost site (M1). In the 372 collections we have made since 1976, we found this shiner to be VR, occurring in 16 collections (Table 13). Recent surveys of the NCR by others failed to find this shiner (Table 5).

In the past, the Arkansas River shiner was VA in the western segments (M1-M4) and eastern segments (M9-M10) of the mainstem of the NCR river. This species has also declined from the western tributaries (Coldwater Creek) where in the past it was C. At one time it may have been found throughout

the drainage. Long-term pollution problems in central Oklahoma during the later 1920s and early 1930s (Oklahoma City oil field) may account for the decline of this species in segments M7-M9. The first recorded fish collection (OKMNH 42064 and OKMNH 22983) from the urbanized Oklahoma City segment (M7-M8) was in 1936 and reported only two species of fish. Today the Arkansas River shiner is virtually absent from the drainage (Table 5).

After it disappeared from the river, this shiner was present in several reservoirs; ODWC surveys of Lake Canton and Lake Eufaula found this species (Table 5). One collection by ODWC found this species was C (135 specimens). These specimens might have washed in from the South Canadian River (JPDEQ unpubl. data) where this species is still VA. However, collections from Lake Eufaula after 1988 did not find this species and we found none in our collections from the lake. The lack of voucher specimens would limit the usefulness of these lake records; however, it is important to let others know of the possible presence of the Arkansas River shiner.

Cyprinella lutrensis (Baird and Girard) Red shiner: The first collection of the red shiner from the drainage was made by Ortenburger in 1926 from Coldwater Creek, southwest of Guymon in Texas County (OKMNH 6235). Since 1926, this shiner has occurred in varying numbers (2-5,482 specimens) at most sites and in all counties through which the river flows. It is apparent that this minnow was VA and widely distributed in the past (Table 5). Today, it is still VA, widely distributed, and fairly stable in abundance (Tables 14 and 15).

The red shiner was the most abundant species collected and composed more than 41% of the total fishes collected at seven of the mainstem sites (Table 15). This shiner had the widest distribution of all the minnows, representing 48% of the fish and occurring in 88% of the collections. It was absent in our collections from the headwaters tributaries of Gaines Creek, but it appears to be limited in distribution in the headwaters of the tributaries in eastern sections of the NCR drainage. In the present survey, this species was abundant at most mainstem sites except M10, and was present in most collections from the reservoirs and tributaries (Table 3). The red shiner seems to be sustaining itself better than most cyprinids, perhaps because of its tolerance to intermittent flow and its opportunistic feeding and reproductive behavior (1).

Notropis nubilus (Forbes) Ozark minnow: Ozark minnow is VR. There is one record of this minnow from the drainage. In 1966 the ODWCLS of Belle Starr Landing in Lake Eufaula collected the Ozark shiner (Table 9) and it was listed as R by the collector. The lack of a voucher specimen would limit the usefulness of this record.

Notropis ortenburgeri (Hubbs) Kiamichi shiner: The first known collection of the Kiamichi shiner from the drainage was in 1931 by Ortenburger. Since 1931, this species was collected only during the 1962 ODWC survey of the proposed Lake Eufaula (Table 5). We could not find any recent records of this species from the NCR drainage, and we failed to collect any Kiamanchi shiner during our survey (1976-1995).

In the past, this species was limited to the tributaries of Gaines Creek in Pittsburg and Latimer Counties and occurred in varying numbers (1-33 specimens) (Table 5). Today this species is rare in the NCR drainage and appears to be limited in distribution to the eastern tributaries in Pittsburg and Latimer Counties. The 1962 collections were the last records of this species from the NCR drainage.

Notropis potteri (Hubbs and Bonham) Chub shiner: A single specimen of chub shiner was collected from Canton Lake in 1979 during the ODWCLC survey. This is the only known collection of this species in the NCR drainage and probably represents bait transport from Red River drainage. The lack of a voucher specimen would limit the usefulness of this record.

Notropis rubellus (Agassiz) Rosyface shiner: The rosyface shiner is R

and has been collected only one time from the NCR drainage. In 1952, 20 specimens (USNM 00165834) were collected from a tributary of the NCR, 19.4 km north of Seminole near the Pottawatomie and Seminole County line on Oklahoma Highway 9, or RTE 99, which was known as the Arkansas Drive at that time (Table 9).

Notropis stramineus (Cope) Sand shiner: In past collections sand shiner was A in the upstream sections of the mainstem of the river, but showed spotty distribution in the tributaries. Records shows that the sand shiner was absent in the headwaters tributaries of the lower NCR and the proposed Lake Eufaula (Table 5). We observed a similar trend in distribution and abundance during our study (1976-1995) (Tables 16 and 17). This species was not found downstream during the 1962 ODWC survey (OKMNH). It probably was never abundant in the lower reaches of the river (Table 5).

We found the sand shiner was abundant and widely distributed in the mainstem west of Oklahoma City (upstream of M8) (Table 16). It represented 6% of all fish and was found in 66% of the collections. This species was taken from nine of the mainstem sites (M1-M9), and was C or R, except from M10 below Lake Eufaula where it was VR (Table 16). In the past (before 1976) and during recent surveys (1976-1995), this species was not found downstream from M10 (Table 5).

We found this shiner in four tributaries (Kiowa, Palo Duro, Wolf and Longtown Creeks) (Table 3). Its abundance in these tributaries was highly variable. The largest numbers (1,022 specimens from three collections) were found in Palo Duro Creek. This species was absent from the headwaters tributaries of the NCR river and many of the smaller tributaries of the river in Latimer and Pittsburg Counties (Table 5).

In the past, this shiner was C in collections from upstream reservoirs (L1-L3). However, in downstream reservoirs (L4-L9) it was R. Two recent ODWCLC collections (1991 and 1994) from Lake Eufaula found this shiner to be C (Table 5).

While this shiner is fairly stable in abundance in the western segments of the river, during the period of our study the abundance of the sand shiner appears to be on the decline in those lower mainstem sites (M9-M10) (Table 17).

Lythrurus umbratilis (Girard) Redfin shiner: The 1962 ODWC survey of the proposed Lake Eufaula found redfin shiner in 35 collections; all were collected from the tributaries in McIntosh, Okmulgee, Pittsburg, Haskell, and Latimer Counties (Table 5).

As in the past, we found the redfin shiner is VR in the mainstem. We made one collection from the mainstem (M10) and also observed it was VR (only two specimens) in our collections from the tributaries (Table 4).

Notropis volucellus (Cope) Mimic shiner: In past and recent collections, mimic shiner was VR. We observed that it was limited in distribution to Lake Eufaula and its tributaries. All past and recent collections were from this area (Table 9).

We collected a single mimic shiner from the Oak Ridge area of Lake Eufaula on 14 September 1984. On 20 July 1992, we obtained another specimen from Elm Creek two miles south of Featherson in Pittsburg County. These specimens were transported to OSUS, but apparently were discarded without being cataloged. In 1988, four specimens of this shiner were collected from Lake Eufaula by ODWCLS (Table 4). Lack of voucher specimens would limit the usefulness of this collection.

One past collection of this species from the river or the tributaries was indicated on a distribution map of freshwater fishes in the United States: the exact location was difficult to determine from the atlas (8). However, it appears that this location may be Featherson Creek, where we collected minic shiners in 1964 (OKMNH 34089-6 specimens). Featherson Creek is a tributary of Sans Bois Creek on the Arkansas River.

Phenacobius mirabilis (Girardi) Suckermouth minnow: Suckermouth minnow was first taken from the drainage in 1926 by Ortenburger from Coldwater Creek southeast of Guymon (OKMNH 9243, specimens).

Since 1926 it has been rare in collections from the tributaries and the mainstem west of Woodward (Table 5). In our collections we found this species was VR to C (up to 174 specimens) in the western segments (M1-M4) of mainstem of the Beaver River (Table 4).

Past collections from the lower tributaries of the proposed Lake Eufaula found this minnow was R (316 specimens from 24 collections). In past collections from the mainstem from three collections (18 specimens), we found it to be VR in Okfuskee, Okmulgee, and McIntosh Counties (Table 5). Downstream from Lake Eufaula, this species was more abundant in the past than it is today (Table 17). After the impoundment of Lake Eufaula, this species seems to have declined in the river immediately downstream and upstream from the lake. A decline in the numbers collected at M10 was observed after 1962. For the period 1926-1995, it appears to be fairly stable in abundance above Lake Eufaula (Table 18).

Since 1980, we have been unable to collect this minnow below the lake (M10) but collected it at sites M1-M9. During this survey it was most abundant (up to 174 specimens) in the upstream reaches of the mainstem (M2-M4) (Table 18). Other recent collections (1989 and 1992) found up to ten specimens of this species in the mainstem above the Lake Eufaula (6,7) (Table 5).

We found the suckermouth minnow in variable numbers (0-21 specimens) in 4 collections from the tributaries and 14 specimens in 6 collections, from Lake Canton. Between 1967 and 1983, this species was collected by the ODWCLS from Lake Canton and Lake Optima (Table 5). There are no voucher specimens for these collections, which should be viewed with limited confidence.

Pimephales notatus (Rafinesque) Bluntnose minnow: The first record of the bluntnose minnow from the drainage was made in 1925 by E.B. Force (9), who collected 14 specimens from Okmulgee County. We found 86 past collections of this species; most came from the tributaries in the eastern sections of the drainage. Past collections from the mainstem indicate VR (two collections) (Table 5).

We collected bluntnose minnows three times from two NCR mainstem locations (M8 and M10). Six of our collections from five eastern tributary sites included this species (Table 4).

In this survey, this species clearly exhibits greater abundance in downstream areas then elsewhere in the drainage, with 99% coming from the river downstream of Lake Eufaula (M10) or from the tributaries of Lake Eufaula. Our westernmost collection was from west of Harrah (M8) in Oklahoma County. A recent collection (1989) included a single specimen from the river north of Dustin, in Okfuskee County (7). This minnow remains VR in the NCR mainstem, but is C in the eastern tributaries in Haskell, Pittsburg, and Latimer Counties.

We failed to find this species in our lake surveys. Past collections by the ODWCLS found two to eight specimens in the western lakes, but it was C (3-218 specimens) in Lakes Hefner and Overholser (Table 5).

Pimephales promelas (Rafinesque) Fathead minnow: Fathead minnow was first collected from the mainstem near Weleetka in Hughes County in 1924 by Ortenburger (OKMNH). Since 1924, it has been found to be A up to 1,064 specimens from the mainstem and tributaries of the western segments (A, B, and C) of the NCR. Extensive collecting in the lower reaches of the NCR and tributaries found this species to be R (201 specimens from 14 collections) (Table 5). Recent collections from the central, urbanized segment of the NCR mainstem included 14-16 specimens (Table 5).

Most of the specimens (63%) we obtained came from nine mainstem sites (M1-M9). None was collected from site M10, which is downstream from Lake Eufaula. This species was in 220 (60%) of the mainstem collections and represented 3% (13,978) of the fish taken from the mainstem (Table 19).

In the tributaries, this species formed 5% (701 specimens) of the fish taken and was present in 29% of our collections. It

was found in four of the reservoirs and represented 2.1% of the fish taken. In six collections from the lakes, we found 360 specimens (Table 4).

In this survey, this most adaptable minnow exhibited greater abundance in upstream areas than in the lower reaches of the NCR (Table 19). This species represented from 2% to 11% of the fish collected at sites upstream from site M6. Downstream from site M6 the percentage varied from 0.0% to 2.0%. The largest numbers were collected at site 3 north of May in Beaver County and site 4 north of Woodward in Woodward County (Table 19).

The flushing flows from Oklahoma City South Side Waste Water Treatment Plant (WWTP) and Lake Eufaula have contributed to declines in this species at sites M8-M10 (Table 19). The largest numbers were collected in 1985 and 1986 and in 1993 and 1994 (Table 20).

Pimephales tenellus (Girard) Slim minnow: A single specimen of the slim minnow was collected from Emachaya Creek west of Whitefield on Highway 9 in Haskell County by M. Curd, R. Sisk, and B. Branson in 1959 (OSUS-UPR). On 20 July 1992, we collected two specimens from Elm Creek 3 km south of Featherson in Pittsburg County. These specimens were deposited at OSUS, but were apparently discarded without being cataloged. In a 1950 ODWCLS collection from Lake Canton, we found one record of this species that was deposited at OKMNH (Table 9).

Pimephales vigilax (Baird and Girard) Bullhead minnow: The first collection of bullhead minnow from the NCR drainage was by Ortenburger in 1928 from the river north of Woodward (Table 5) (OKMNH). Past collections from the Beaver River north of May (M3) downstream to Watonga (M6) produced 1-7 specimens. Other past collections (1962-1975) indicated that the bullhead minnow was more abundant (up to 142 specimens) in the lower reaches (M9-M10) of the mainstem and the lower tributaries of the NCR than in other areas of NCR (Table 20). In the past this species was VR below site M10.

The bullhead minnow was abundant and widely distributed in our survey, comprising 1% of the fish collected, and was found in 53% of the collections. This species was collected from nine of the mainstem sites with the exception of the westernmost site M1 (Table 22). The bullhead minnow was in 216 (58%) of the mainstem collections, which produced 98% of the specimens (Table 4).

We found this minnow was C in collections from reservoirs, where it occurred in 31 collections and comprised 2% of the fish. The reservoirs produced 17% of the specimens, with the largest numbers taken from Lake Canton (Table 4).

The bullhead minnow appeared to increase in abundance downstream. Numbers increased from zero specimens at the westernmost site M1 to 2,519 specimens at site M9. This omnivorous minnow was R downstream of Lake Eufaula (Site M10) (Table 21).

The number of specimens collected in 1991 and 1994 was much greater than the number collected earlier (Table 20). We have observed a substantial increase of this species since 1991 at sites M8-M9.

Erimystax x-punctatus (Hubbs and Crowe) Gravel chub: We found one past record of the gravel chub from the NCR drainage. In 1962 a single specimen was collected from Gaines Creek during the ODWC survey led by Houser and Lindsay. This specimen was deposited into the University of Tulsa fish collections (TU #437) and later transferred to OSUS (Table 9).

CONCLUSIONS

In Tables 7, 11, 14, 17, and 21, we attempt to show changes in fish numbers using relative abundance based on the number of specimens per collection. Eighteen species occurred in such small numbers (fewer than 20 specimens) that we made no attempt to establish a trend for these species. These were *C. idella, E. x-punctatus, L. cardinalis, L. umbratilis, M. aestivalis, M. storeriana, N. bairdi, N. boops, N. emilate, N. nubilus, N. ortenburgeri, N. potteri, N. rubellus, N. volucellus, P. notatus, P. gracilis, P. tenellus, and S.*

erythrophtalmus. The remaining 13 species were evaluated for spatial or temporal trends. These species were *C. anomalum, C. carpio, C. lutrensis, H. placitus, N. crysoleucas, N. atherinoides, N. blennius, N. buchamani, N. girardi, N. stramineus, P. mirabilis, P. promelas, and P. vigilax.* Four species (carp, red shiner, suckermouth minnow, and golden shiner) exhibited a wide distribution in the drainage and appeared to be fairly stable in abundance.

Plains minnows exhibited an upstream distribution trend and a decline in abundance downstream below Oklahoma City. This decline may be connected to changes in flows because of the increase in discharges from Oklahoma City Southside Waste Water Treatment Plant. This increase in flows may flush out bottom microflora and organic detritus used by this species for food.

The emerald shiner showed a downstream distribution and was R. The lack of fast, deep channels, their preferred habitat, may limit this species to the lower reaches of the mainstem of the NCR.

The Arkansas River shiner and the speckled chub are two species that had almost disappeared from the NCR where in the past they were C. The lack of elevated flows during periods of reproduction may account for this decline.

Sand shiners and fathead minnows exhibited an upstream trend in distribution and abundance. Fathead minnows find large deposits of organic matter, plankton, and insect larvae in the upstream sites.

Three additional species showed trends in distribution and abundance. The bullhead minnows showed a downstream trend both in distribution and in abundance. The bigeye shiner was limited in distribution to the smaller tributaries in the lower reaches of the drainage. The central stonerollers were limited in distribution to headwater tributaries and the tributaries of Lake Eufaula. The lack of gravel and bedrock substrata may account for the absence of this grazing species in the mainstem.

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Figure 1. Map of river segments and ODEQ fish-monitoring sites on the North Canadian River, 1976-1996.

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teGasaway, GenningsODWCLSCLGGCB??teGasaway, LewisODWCLSCLGICB?teGasaway, LewisODWCLSCLGICB?teGasaway, LewisODWCLSCLGICB?teGomez, MoserODWCLSCLGMCB?teBrossODWCLSCLGMCB??teWhite, LewisODWCLSCLGMCB??dwardMiller, Pigs, OASODWCLSCLWLCB??dwardLindsayUTCTWLCB???dwardLindsayUTCRMPW1-1-?dwardSyahlODWCLSCLSCB????dwardCohranODWCLSCLSCB?????dwardOK. Water Res. Bd.(3)CRNPW1-1-???dwardOK. Water Res. Bd.(5)CROWRBW2?? </td <td>Moore, Jarmen, Lander</td> <td>OSUS, GMFN</td> <td>CTMJW</td> <td>1</td> <td></td> <td></td> <td></td>	Moore, Jarmen, Lander	OSUS, GMFN	CTMJW	1			
ieGasaway, Lewis Gasaway, LewisODWCLS ODWCLSCLGLCB?~ieGasaway, Lewis Gomez, MoserODWCLS GUBCBCLGLCB?~~?ieGomez, Moser Gomez, MoserODWCLS GUBCBCLGLCB?~~??ieBross BrossODWCLS GUBCBCLGMCB??~~??ieWhite, Lewis Maard LindsayODWCLS MowCLSCLBCB?~~~???odward Maard Syahl Maard BrosODWCLS SUT UT CRLIWCLWLCB??~~?? </td <td>Gasaway, Gennings</td> <td>ODWCLS</td> <td>CLGGCB</td> <td>ć.</td> <td></td> <td></td> <td>¢.</td>	Gasaway, Gennings	ODWCLS	CLGGCB	ć.			¢.
aceGasaway, LewisODWCLSCLGLCB?~neGomez, MoserODWCLSCLGMCB?~~neBrossODWCLSCLGMCB?~~neWhite, LewisODWCLSCLBCB?~~neWhite, LewisODWCLSCLBCB?~~neWhite, LewisODWCLSCLBCB?~~neWhite, LewisODWCLSCLMCB?~~dwardMiller, Pigg, OASOSUSCLMLCB?~~dwardLindsayUTCLMLCB?~~~dwardLindsayUTCRMPW11~~dwardSyahlODWCLSCLMLCB?~~~odwardSyahlODWCLSCLMEB?~~~odwardNater Res. Bd.ODWCLSCLSCB?~~~odwardOK. Water Res. Bd.(3)CROWRBW1~1~~odwardOk. Water Res. Bd.(5)CRUMRBW22~~~	Gasaway, Lewis	ODWCLS	CLGLCB	د:	-	1	¢.,
neGomez, MoserODWCLSCLGMCB??neWhite, LewisODWCLSCLBCB?~?neWhite, LewisODWCLSCLBCB?~?neWhite, LewisODWCLSCLBCB?~?dwardMiller, Pigg, OASODWCLSCLWLCB???dwardLindsayUTCLWLCB?~~?dwardLindsayUTCLWLCB?~~?dwardLindsayUTCRMPW1~1~dwardSyahlODWCLSCLSCB?~~?dwardFelley, CothranODWCLSCLSCB?~~?dwardOK. Water Res. Bd.(3)CRSB6~1~dwardOk. Water Res. Bd.(3)CROWRBW22~~dwardLarson, Echelle(5)CRLAEW11~1~	Gasaway, Lewis	ODWCLS	CLGLCB	د.			۰.
ne Bross ne White, Lewis ODWCLS CLBCB ? ? ne White, Lewis ODWCLS CLWLCB ? ? ddward Miller, Pigg, OAS ODWCLS CLWLCB ? ? ddward Lindsay UT CRLIW 1 - 1 ddward Syahl cohran ODWCLS CRMPW 1 1 ddward Syahl cohran ODWCLS CLSCB ? ? odward Relley, Cothran ODWCLS CLSCB ? ? odward OK. Water Res. Bd. (3) odward OK. Water Res. Bd. (3) odward Larson, Echelle (5) CRLAEW 1	Gomez, Moser	ODWCLS	CLGMCB	۰.	1	-	¢- 1
ne White, Lewis ODWCLS CLWLCB ? ? ne White, Lewis ODWCLS CLWLCB ? ? dward Miller, Pigg, OAS OSUS CRMPW 1 - 1 dward Lindsay UT CRLIW 1 - 1 dward Syahl ODWCLS CLSCB ? ? ne Syahl Cothran ODWCLS CLSCB ? 1 dward Pelley, Cothran ODWCLS CLSCB ? 1 odward Nater Res. Bd. (3) odward OK. Water Res. Bd. (3) odward Larson, Echelle (5) CRLAEW 1 1 CRLAEW 1 1 CRLWCB ? ? CRLWCB ? ? CRLWCB ? ? CRLWCB ? ? CRLWCB ? ? CRLWCB ? ? CRLWCB ? ? ? br>	Bross	ODWCLS	CLBCB	۰.			۰.
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dwardMiller, Pigc, OASOSUSCRMPW1-1-odwardLindsayUTCRLIW1-1-1-odwardSyahlUTCRLSCB??-1-?odwardFelley, CothranODWCLSCLSCB?-1-1-odwardFelley, CothranOKMNHCRFCW1-1-1odwardOK. Water Res. Bd.(3)CRCWRBW1-1-10odwardOk. Water Res. Bd.(3)CROWRBW2-20odwardLarson, Echelle(5)CRLAEW1-1-1-1-		ODWCLS	CLWLCB	ċ	1	-	د.
odwardLindsayUTCRLIW1 $-$ 1neSyahlODWCLSCLSCB? $ -$?odwardFelley, CothranOKMNHCRFCW1 $ -$ neStahlODWCLSCLSB6 $ 6$ odwardOK. Water Res. Bd.(3)CRSB6 $ 6$ odwardOK. Water Res. Bd.(3)CROWRBW1 $ 1$ $-$ odwardDk. Water Res. Bd.(5)CRLAEW1 $ 1$ $-$		SUSO	CRMPW	1		1	-
ne Syahl ODWCLS CLSCB ? ? dward Felley, Cothran OKMNH CRFCW 1 - 1 - 7 ne Stahl OK. Water Res. Bd. ODWCLS CLSB 6 6 odward OK. Water Res. Bd. (3) CROWRBW 1 - 1 OK. Water Res. Bd. (3) CROWRBW 1 - 1 Odward Larson, Echelle (5) CRLAEW 1 - 1		UT	CRLIW	1		1	-
odwardFelley, CothranOKMNHCRFCW1-neStahlODWCLSCLSB66odwardOK. Water Res. Bd.(3)CROWRBW1-1-odwardOK. Water Res. Bd.(3)CROWRBW1-1-odwardDk. Water Res. Bd.(3)CROWRBW2-2-odwardDk. Water Res. Bd.(3)CRLAEW1-1-		ODWCLS	CLSCB	د.		-	۰.
ne Stahi ODWCLS CLSB 6 – – 6 odward OK. Water Res. Bd. (3) CROWRBW 1 – 1 – 1 odward Ok. Water Res. Bd. (3) CROWRBW 2 – 2 – 2 odward Larson, Echelle (5) CRLAEW 1 – 1 – 1		OKMNH	CRFCW	-	1	1	-
odwardOK. Water Res. Bd.(3)CROWRBW11odwardOk. Water Res. Bd.(3)CROWRBW22odwardLarson, Echelle(5)CRLAEW11		ODWCLS	CLSB	9			9
odward Ok. Water Res. Bd. (3) CROWRBW 2 - 2 - 2 odward Larson, Echelle (5) CRLAEW 1 - 1	OK.	(3)	CROWRBW	1	1	1	ł
odward Larson, Echelle (5) CRLAEW 1 - 1 - 1	Ok. Water Res.	(3)	CROWRBW	2	-	2	1
	d Larson, Echelle	(5)	CRLAEW	1		1	

of the North Canadian River drainage from various sources. id feb . j J = TT 1

Cantor	Collector Iser Hall	Coursed	-				
	lser Hall	aninoc	Code	Coln.	T	R	Г
	Hall						
		ODWCLS	DLHH0	1		*****	
		ODWCLS	DLHO0	1			
	Smithpeter	OKMNH	DTRSB	2		11	
	Moore	GMFN	DRRLSB	-4		1	1
	Riggs, Goodman	OKMNH	DRRB	2		2	
	Taylor	OKMNH	DTTC		1	1	I
	Adamas	TU	DRAB	1		1	1
1974 Oklahoma	Summers	ODWCLS	DLS00	1	-	verver	-
1975			DLSH0	1			
1977 Blaine	Marshall, McGovern	OCCHD	DRTMAB	4	2	Ŧ	
1977-79	\mathbf{Stahl}	ODWCLS	DLSCB	ę	1		ę
1978 Blaine	Pigg, Martinez	TU	DRPMB	,		1	
	Wright	ODWCLS	DLW00	1			-
82	1		DLWH0	4			4
1983-95 Oklahoma	Summers, Martin	ODWCLS	DLSM00	1			
		ODWCLS	DLSMH0	5]	and the second	າວ
1987 Canadian	Matthews, Gelwuck	(9)	DRMAGC	1	-		
1989 Canadian	Larson, Echelle	OSUS, (5)	DRLAEC	1	-	1	I
1990 Blaine	Larsen, Echelle	OSUS, (5)	DRLAEB	1		1	1
1992 Canadian	Lutrell, Echelle	(4)	DRLUEC			1	
Blaine		(4)	DRLUEB	1	1	1	
Oklahoma		(4)	DRLUEO	2		2	****
1993 Blaine	Lutrell, Echelle	OSUS, (5)	DRLUEB	1		1	
E. L. Overholser to Harrah							
1936 Oklahoma	Unknown	OKMNH	ERU0	1		1	
1948 Oklahoma	OU Fish and Game Survey	OKMNH	ELFGH0	1		-	1
			ELFG00		-	ļ	Г
1949 Oklahoma	1949 Oklahoma Moore, Riggs OKMNH ELMRH0 1 – – –	OKMNH	ELMRH0			-	Г

b Collector code: identifies who collected the specimens, etc.; see Table 5. c Number of collections reported. d L: lake; R: river; T: tributary.

TABLE 1 (contd.). Historical collections of Cvorinid fish of the North Canadian River drainage from various sources

J. PIGG, M. COLEMAN, and R. GIBBS

Habitat ^d T R L		11	4		10 13		1	1	1	1	1	1	1	1	1	4]	1	1	1	1	NAMES AND ADDRESS ADDRE		1 area area	1 ****		<i>6</i> 0
No." Coln.		11	4	9	23		1	1	1		1	1	1	1	1	4	1	4	1	1	1		1	1	1	1	-
Collector Code ^b		ERMAO	ERUSFO	ELMSHO	ETMAGO		FTMP	FTUL	FRHOH	FTFO	FROH	FTOO	FTOP	FTMHO	FTMHP	FTMHL	FTLHP	FTMIP	FLMHS	FTLHP	FTLLSS		FTRGS	FTRGH	FTRGM	FRRSH	FTRSM
Source ^a		OCCHD, (7)	(8)	ODWCLS	(9)		NNN	OKMNH	OKMNH	OKMNH, (9)	OKMNH	OKMNH	OKMNH	OKMNH	OKMNH	OKMNH	OKMNH	OSUS, GMFN	ODWCLS	OKMNH	NNN		OKMNH	OKMNH	OKMNH	OKMNH	OKMNH
Collector	h (cont.)	Marshall, McGovern	U.S. Fish & Wild. Ser.	Martin, Summers	Matthews, Gelwick		Meeks	Unknown	Hubbs, Ortenburger	Force	Ortenburger UOBS	Ortenburger UOBS	Ortenburger UOBS)			Laura Hubbs	Moore, Irwin	Moore, Hall	Laura Hubbs	Lachner, Leapley,	Schwartz	Riggs, Goodmen	}		Riggs, Smith	Riges. Shehaden
County	F. I. Overholser to Harrah (cont.	Oklahoma	Oklahoma	Oklahoma	Oklahoma	F. Harrah to L. Eufaula	Ind. Terr.	Latimer	Hughes	Okmulgee	Hughes	Okmulgee	Pittsburg	Okmulgee	Pittsburg	Latimer	Pittsburg	Pittsburg	P'watomie	Pittsburg	Seminole		Seminole	Hughes	McIntosh	Hughes	McIntosh
Year	F. L. Over	1977-78	1982	1983-88	1987	F. Harrah	1893	1921	1924	1926	1927	1929		1929		1931	1944	1947	1948	1944	1952		1959			1961	

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DISTRIBUTION of CYPRINID FISHES

TABLE 1 (C	ontd.). Historical co	TABLE 1 (contd.). Historical collections of Cyprinid fish of the North Canadian River drainage from various sources.	he North Canadian	River drainage from va	rious sources.			
				Collector	No.c		Habitat ^d	
Year	County	Collector	Source	$Code^{b}$	Coln.	L	R	<u>[]</u>
F. Harra.	F. Harrah to L. Eufaula (contd.)	ontd.)						
1962	Okfuskee	Houser, Lindsay	OKMNH	FRHLO	2	ł	2	1
	Okmulgee		OKMNH	FRTHLO	ę	ŝ		
	McIntosh		OKMNH	FRTHLM	39	27	10	2
	Pittsburg		OKMNH	FTHLP	43	43		•
	Haskell		OKMNH	FTHLH		-4		Witness
1962	Latimer	Houser, Lindsay	OKMNH	FTHLL	ŝ	ň		1
	Latimer	Seacat, Landrith	OKMNH	FTSLL	2	7		
	Pittsburg	Seacat, Landrith	OKMNH	FTSLP	90	ø		I
1963	McIntosh	Riggs, Wade, Smith	OKMNH	FRRWM	1		1	
	Okmulgee		OKMNH	FRRWSO	1	1		
1964	Seminole	Lindsay	TU	FTLS	1	1	-	
1978	Hughes	Felley, Cothran	OKMNH	FRFCH	2	1	I	
	Seminole	Felley, Cothran	OKMNH	FRFCS	1			ł
	Okfuskee	Felley, Cothran	OKMNH	FRCSO	1		1	vename
1978-96	McIntosh	Wright	ODWCLS	FLWM	6		- 1	6
1979-86	P'watomie			FLWS#1P	9			9
1979-86	P'watomie			FLWS2#2P	9			9
1987	Seminole	Matthews, Gelwick	(9)	FRMAGS	2	1	2	
1989	Okfuskee	Larson, Echelle	(5)	FRLAEO	ę	ł	ę	-
1989	P'watomie	Larson, Echelle	(5)	FRLAEP	1		1	
1993	P'watomie	Luttrell, Echelle	(4)	FRLUEP	1	*****	T	ł
1993	Okmulgee	Luttrell, Echelle	(4)	FRLUEO	1		Ţ	-
1993	McIntosh	Luttrell, Echelle	(4)	FRLUE2M	1		1	
a Where the I OK Dent V	Where the record was found. GMFN: Geor OK Dent Wild Cons lake surveys: OKM	a Where the record was found. GMFN: George Moore Field Notebooks; OBS: Oklahoma Biological Survey; OCCHD: OK City-County Health Department; ODWCLS: OK Dent. Wild Cons. Jake surveys: OKMNH: Haith OK Museum Natural History: OSHS: OK State Hait, Zoological Museum: TMUC, Towor Haith Department; Natural History: OSHS: OK State Haith Zoological Museum: TMUC, Towor Haith Department; ODWCLS:	s; OBS: Oklahoma Biol atural History: OSUS.	ge Moore Field Notebooks; OBS: Oklahoma Biological Survey; OCCHD: OK City-County Health Department; ODWCLS: NH: IIniv. OK Museum Natural History: OSIIS: OK 8446 IIniv. Zoological Museum, TNEC, Texas IIniv. Matural III:	City-County Hea	alth Departmen	t; ODWCLS:	
Collections:	TU: University of Tulsa	Collections: TU: University of Tulsa: UK: University of Kansas: USNM: United States Natural History Museum: For numbered references see the last society of this table	M: United States Natur	ral History Museum: For i	numbered reference	s see the last se	attion of this to	old
h Collector co	der identifies who coller	b Collector code: identifies who collected the enerimens atc : see Table 5	5 a Number of colle	totions another to the totion				
n nananna n	חבי וחבווויוובס אווח החווכר	then the specimens, ever, see tours		c Mumber of collections reported. a L: lake; K: river; I: tributary.	e; K: river; 1: tribi	utary.		

L			-		The second	- Anna and A	d'ha an de a	and the		-	- Annual - L	e.	(580
Habitat ^d P	К		1	and faith	Ι	2	According	-	1	1	1	atural History ection of this tak	banization. 8, 109 (1978).
E	Ţ		an intervent	1		2	2	2	and share	salawar so''	- Andrew State	: Texas Univ. N. ces see the last s butary. outard, OK.	na City, OK. na. Effects of ur Acad. Sci. 5i Fish Wild S
No. ^c	Coln.		1	l	I	4	2	2	-	1	I	l Museum; TNHC numbered referen ke, R: river; T: tri 1929). 1 River Near N	Basin. Oklahor iner in Oklahor 1 (1991). ttral Oklahoma K. Proc. Okla.
Collector	Code"		GRMM	GTCSBH	GRHLM	GTRHLH	GTLIBH	GTLIBH	GRLMH	GRUH	GRLUEH	 al History; OSUS: OK State Univ. Zoological Museum; TNHC: Texas Inited States Natural History Museum; For numbered references see c. Number of collections reported. d. L: lake; R: river; T: tributary. full. Univ. Okla. Biol. Sur. I, 17-43 (1929). a Panhandle. Copeia 7. 137 (1950) ability Analysis of the North Canadian River Near Woodwa 	1 the Arkansas River ob No. 3 (1993). <i>he Arkansas River shi</i> bject No. E-8 Job No. Canadian River in cer Canadian River in cer r in Logan County, OK
	Source ^a		OKMNH	OKMNH	OKMNH	OKMNH	OKMNH	OKMNH	TU	SUSO	(4)	aural History, OSUS: C datural History, OSUS: C S. c Number of collec s. Bull. Univ. Okla. homa Panhandle. Coj ttainability Analysis of	the Speckled Chub in rt. Project No. E-8 J and distribution of t ect Final Report. Pro Creek and the North ang the Cimarron River Nanodian River Near
andere and a first of the second s	Collector	ias R.	Moore	Curd, Sisk, Branson	Houser. Lindsay	Houser, Lindsay	Lindsay, Bates (OBS)	Lindsay, Bates (OBS)	Lindsay, Maxwell	Unknown collector	Luttrell, Echelle	 oK Dept. Wild. Cons. lake surveys, OKNNH: Univ. OK Museum Natural History, OSUS: OK State Univ. Zoological Museum; TNHC: Texas Univ. Natural History oK Delections: TU: University of Tulas, UK: University of Kansas, USNM: United States Natural History Museum; For numbered references see the last section of this table. b Collector code: identifies who collected the specimens, etc.; see Table 5. c Number of collections reported. d L: lake; R: river; T: tributary. REFERENCES cited by number in this table: 1. Hubbs, C.L. and Ortenburger, A.L., Notes on OK fishes. Bull. Univ. Okla. Biol. Sur. I, 17–43 (1929). 2. Blair, A.P., Some cold-blooded vertebrates of the Oklohoma Panhandle. Copeia 7. 137 (1950) 3. Simpson, S., Bastian, M.V., and Scheitman. R Use Attainability Analysis of the North Canadian River Near Woodward, OK. 	 Oklahoma City, OK. Okla. Water Res. Bd. (1985). Luttrell, G.R., Echelle. A.A., and Zale, A.V Status of the Speckled Chub in the Arkansas River Basin. Oklahoma City, OK. Luttrell, G.R., Echelle. A.A., and Zale, A.V Status of the Speckled Chub in the Arkansas River Basin. Oklahoma City, OK. Oklahoma Dept. Wildlife Conserv. Final Project Report. Project No. E-8 Job No. 3 (1993). Larson, R.D., Echelle A.A., and Zale, A.V. <i>Life history and distribution of the Arkansas River shiner in Oklahoma</i>. Larson, R.D., Echelle A.A., and Zale, A.V. <i>Life history and distribution of the Arkansas River shiner in Oklahoma</i>. Larson, R.D., Echelle A.A., and Zale, A.V. <i>Life history and distribution of the Arkansas River shiner in Oklahoma</i>. Larson, R.D., Echelle A.A., and Zale, A.V. <i>Life history and distribution of the Arkansas River shiner in Oklahoma</i>. Larson, R.D., Echelle A.A., and Zale, A.V. <i>Life history and distribution of the Arkansas River shiner in Oklahoma</i>. Mathews. W.J. and Gelwick, F.P., Fishes of Crutcho Creek and the North Canadian River in central Oklahoma. Effects of urbanization. <i>Southwest. Nat.</i> 35, 403–410 (1990). Marshall, C.L. The Distribution of <i>the North Canadian River Neur Oklahoma City</i>. OK. <i>Proc. Okla. Acad. Sci.</i> 58, 109 (1978). Marshall, C.L. The Distribution of <i>the North Canadian River Neur Oklahoma City</i>. OK. Theo. Okla. Wild. Ser. (March 1983).
Collector No.	County	G. L. Eufaula to Arkansas R.	McIntosh	Haskell	McIntosh	Haskell	Haskell	Haskell	Haskell	Haskell	Haskell	 a. Market are record was rough to the surveys; OKM OK Dept. Wild. Cons. lake surveys; OKM Collectons: TU: University of Tulsa; UK: 1 b. Collector code: identifies who collected the REFERENCES cited by number i REFERENCES cited by number i 1. Hubbs, C.L. and Ortenburget, A. 2. Blair, A.P., Some cold-blooded wild 3. Simpson, S., Bastian, M.V., and 	Oklahoma City, OK. Okla. Water J Luttrell, G.R., Echelle, A.A., and Z Oklahoma Dept. Wildlife Conserv. Larson, R.D., Echelle A.A., and Zal Oklahoma City, OK: Okla. Dept. V Matthews, W.J. and Gelwick, F.P., <i>Southwest. Nat.</i> 35 , 403–410 (1990) Marshall, C.L., The Distribution of Score, C.M. Associe Hobston Feolu
	Year	G. L. E	1959		1962		1963	1963	1972	1974	1993	 a William and Aller and All	0kl 4. Lut 4. Lut 5. Lar 5. Lar 6. Mat 8. Sou

and the Oklahoma De Description of Lo	partment of E	nvironmental	Quality (EQ) 1975-19	995.	
Seg- Name of Stream/Lake,			C :/	<u> </u>		
	Legal		Site	Col-		No.
Ument Highway Map Info. ^a	TRS	County	Code	lector	Period ^b	Col. ^c
A. NM State Line to L. Op		C :	m •			
Corrumpa Ck State Line	02N 01E 07		T1	DH	88	1
Corrumpa Ck S Wheeless	02N 01E 23		T2	DH	88	1
Beaver R N Goodwell	03N 13E 22		M11	DH	90–91	2
L. Optima (one site)	03N 18E 32	Texas	L1	DH, EQ	84-95	8
B. L. Optima to Woodward		æ				
Hackberry Ck SE Hardesty	01N 18E 01		T22	DH	88	1
Beaver R S Turpin	03N 21E 06		M1	DH, EQ	81-95	28
Beaver R ODWC Area	04N 22E 08		M12	DH, EQ	90-95	4
Beaver R N Beaver	04N 24E 07		M2	DH, EQ	81-95	26
Beaver R E Beaver	04N 25E 27		M13	DH	90	1
Palo Duro Ck SE Hardesty	01N 18E 14		T3	DH	88	1
Palo Duro Ck E Hardesty	02N 19E 21		T4	DH	89–9 0	2
Kiowa Ck SW Slapout	01N 27E 12		T5	DH	88	1
Kiowa Ck W Slapout HW 3	02N 27E 29		T6	DH	88	1
Kiowa Ck N Slapout	02N 27E 11		T7	DH	88	1
Beaver R S Knowles	04N 27E 32		M16	DH	90	1
Beaver R Laverne	26N 25W 09	-	M14	DH	87	1
Beaver R N May	25N 24W 23	-	M3	DH, EQ	81 - 95	28
Ft. Supply L.(5 sites)	24N 22W 17		L2	DH, EQ	85-90	8
Wolf Ck E Ft Supply	24N 22W 09	Woodward	T8	DH, EQ	90-93	3
C. Woodward to L. Canton						
NCR N Woodward	23N 16W 25		M4	DH, EQ	78 - 95	47
NCR NE Seiling	20N 16W 28	Dewey	M5	DH, EQ	85-95	22
Canton L (four sites)	19N 18W 32	Blaine	L3	DH, EQ	80 - 92	13
D. L. Canton to L. Overhol	ser					
NCR S Watonga	16N 12W 27	Blaine	M6	DH, EQ	7895	36
NCR N El Reno	13N 07W 32	Canadian	M7	DH, EQ	76-95	57
L. Overholser (one site)	12N 04W 30	Oklahoma	L4	DH, EQ	80-92	3
L. Hefner (one site)	13N 04W 34	Oklahoma	L5	DH, DH	80-92	4
L. Hefner Duck Pond	13N 04W 34	Oklahoma	L6	DH	80	2
E. L. Overholser to Harrah						
NCR NW Harrah	12N 01E 22	Oklahoma	M8	DH, EQ	76-95	58
F. Harrah to L. Eufaula						
NCR N Little on HW 56	11N 06E 27	$P'watomie^d$	M15	DH	85	1
Shawnee L. No. 2	10N 02E 14	P'watomie	L7	DH, EQ	80-94	3
Wetlands L. Clearview	11N 11E 31	Okfuskee	L8	EQ	9293	2
Unnamed T	10N 10E 13	Okfuskee	T23	EQ	93	1
Alabama Ck SW Clearview	11N 10E 36	Okfuskee	Т9	EQ	93	1
Alabama Ck SW Clearview	11N 11E 31	Okfuskee	T10	EQ	93	1
NCR NE Wetumka	09N 10E 12		M9	DH, EQ	78-95	40
G. L. Eufaula to Arkansas 1		•		· •		

 TABLE 2. Fish-collecting sites of the Oklahoma State Department of Health (DH)

 and the Oklahoma Department of Environmental Quality (EQ) 1975-1995.

G. L. Eufaula to Arkansas R(continued next page) a L = Lake; Ck = Creek; M = Mainstem of North Canadian River; T = Tributary.

b Century is omitted: 89 = 1989; 78-95 = 1978-1995.

c Number of collections during period.

d Pottawatomie

and the Oklahoma De	partment of r	invironmenta	i Quanty	(EQ) 1970-1	995.	
Description of Loca	ation of Site					
Seg- Name of Stream/Lake,	Legal		Site	Col-		No.
↓ment Highway Map Info.ª	TRS	County	Code	lector	Period ^b	Col. ^c
G. L. Eufaula to Arkansas	R					
Gaines Ck at Pit Ck	04N 17E 03	Latimer	T11	DH	85	1
T Pit Ck W Gowen	04N 17E 03	Latimer	T12	DH	85	1
T Pit Ck at Pit Ck	05N 17E 34	Latimer	T13	DH	85	1
Gaines Ck below Pit Ck	05N 17E 36	Latimer	T14	DH	85	1
Elm Ck S Featherson	07N 17E 35	Pittsburg	T15	DH, EQ	88-92	2
Ash Ck 4 S ODWC ^{e}	06N 17E 13	Latimer	T16	DH	88	1
Ash Ck 5 S $ODWC^{e}$	06N 18E 18	Latimer	T17	DH	88	1
Ash Ck 4.5S $ODWC^e$	06N 17E 14	Latimer	T18	DH	88	2
Ash Ck 5SE ODWC ^e	06N 17E 14	Latimer	T19	DH	88	1
T Ash Ck 5 S $ODWC^e$	06N 17E 14	Latimer	T20	DH	88	1
Longtown Ck 5 N Quinton	08N 18E 10	Haskell	T21	DH, EQ	90-93	2
L. Eufaula (five sites)	10N 18E 25	McIntosh	L9	DH, EQ	84-90	11
L. McAlester (one site)	07N 14E 33	Pittsburg	L10	DH, EQ	8089	3
C. N Whitefield	09N 19E 12	Haskell	M10	DH, EQ	79-95	35

TABLE 2. (contd.) Fish-collecting sites of the Oklahoma State Department of Health (DH) and the Oklahoma Department of Environmental Quality (EQ) 1975-1995.

 \overline{a} L = Lake; Ck = Creek; M = Mainstem of North Canadian River; T = Tributary.

b Century is omitted: 89 = 1989; 78-95 = 1978-1995.

c Number of collections during period.

d Pottawatomie

e ODWC Collins Ranch Headquarters.

TABLE 3. Number of collections of fish, number of specimens, and number and percentage of cyprinids, collected by OSDH^a and ODEQ^b at indicated sites on the North Canadian River and its lakes and tributaries

Total Cypinids Number of collections/specimens* Site #fish $\frac{\pi}{2}$ CA CC CL HP NA NG NS A. NM State Line to L. Optima T1 468 368 79 1/218 - 1/10 - <t< th=""><th></th><th>lak</th><th>es and t</th><th>ributa</th><th>aries.</th><th></th><th></th><th></th><th></th><th></th><th></th></t<>		lak	es and t	ributa	aries.						
A. NM State Line to L. Optima - <											
T1 468 368 79 1/218 T2 177 131 74 1/6 - 2/3054 T2 177 131 74 1/6 - 2/3054 T11 2530 2448 97 7/970 2/227 11 3674 1469 40 - 6/148 1/10 - 5/20 B. Lake Optima to Woodward T22 533 18 07 - 1/10 1/10							CL	HP	NA	NG	NS
T2 177 131 74 1/6 - 2/3054		IM Sta				na					
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	T1	468	368	79							
L1 3674 1469 40 $ 6/148$ $ 1/10$ $ 5/20$ B. Lake Optima to Woodward T22 533 18 07 $ 1/10$ $1/10$ $ -$ M1 42385 11745 28 $ 2/3$ $27/3636$ $13/254$ $ 7/187$ $26/5590$ M12 14606 10290 70 $ 3/73$ $6/4277$ $5/278$ $ 1/7$ $6/2865$ M2 34356 16884 49 $ 10/444$ $25/6231$ $18/384$ $ 25/6813$ M13 906 609 67 $ 1/1$ $1/120$ $ 1/643$ T4 7052 2997 38 $ 1/1$ $1/120$ $ 1/643$ T4 7052 2997 38 $ 1/1$ $1/1432$ $ 2/1294$ T5 534 440 82 $ 1/1$ $1/1432$ $ 1/6$ T6 263 152 58 $ 1/1$ $1/1432$ $ 1/6$ T7 250 13 05 $ 1/12$ $1/155$ $ 1/2$ M16 397 319 80 $ 1/12$ $ 1/2$ M14 598 298 50 $ 1/1$ $1/134$ $ 1/210$ M14 598 298 50 $ 1/1$ $1/134$ $ 1/210$ M14 598 298 50 $ 1/1$ $1/328$ $ 2/2$ T8 1025 386 38 $ 1/1$ $7/433$ $ 2/2$ T8 1025 386 38 $ 1/1$ $3/328$ $ 2/5$ C. Woodward to L. Canton M4 68402 51402 76 $ 15/127$ $47/33703$ $25/1420$ $7/32$ $5/11$ $47/33703$ M3 3194 $ 2/9$ D. L. Canton to L. Overholser M6 34316 24564 72 $ 21/165$ $36/21746$ $7/35$ $4/4$ $ 2/9$ D. L. Canton to L. Overholser M6 34316 24564 72 $ 21/165$ $36/21746$ $7/35$ $4/4$ $ 36/1569$ M7 55737 48252 87 $ 21/165$ $36/21746$ $7/35$ $4/4$ $ 36/1569$ M7 55737 48252 87 $ 21/165$ $36/21746$ $7/35$ $4/4$ $ 36/1569$ J7 58 1254 270 22 $ 1/27$ $ -$ L6 77 58 85 5 $ 4/63$ $1/116$ $ -$ L7 505 319 63 $ 3/311$ $3/287$ $ -$ L7 505 319 63 $ 3/311$ $3/287$ $ -$ L8 167 0 00 $ -$	T2	177	131	74	1/6						
B. Lake Optima to Woodward T22 533 18 07 - 1/10 1/10 - - - - M1 42385 11745 28 - 2/3 27/3636 13/254 - 7/187 26/5590 M12 14060 1020 07 - 3/73 6/4277 5/278 - 1/7 6/2865 M2 34356 16884 49 - 10/444 25/6231 18/384 - - 25/6813 M13 906 609 67 - 1/1 1/120 - - - 1/472 T3 2957 2377 80 - 1/1 1/432 - - 1/643 T7 250 13 05 - 1/1 1/137 - - 1/1 M14 598 298 50 - 1/1 1/134 - - 1/210 M14 598 298 50 - 1/1 3/328 - - 2/2 <td>M11</td> <td>2530</td> <td>2448</td> <td>97</td> <td></td> <td></td> <td>7/970</td> <td></td> <td></td> <td></td> <td>2/227</td>	M11	2530	2448	97			7/970				2/227
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	L1	3674	1469	40		6/148			1/10		5/20
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	B. L	ake Oj	ptima t	o We	oodward						
M12 14606 10290 70 $3/73$ $6/4277$ $5/278$ $1/7$ $6/2865$ M2 34356 16884 49 $10/444$ $25/6231$ $18/384$ $25/6813$ M13 906 609 67 $1/1$ $1/120$ $1/472$ T3 2957 2377 80 $1/1610$ $1/472$ T4 7052 2697 38 $1/1$ $1/132$ $1/16337$ T7 250 13 05 $1/105$ $1/16337$ M16 397 319 80 $1/111134$ $1/1274240$ L2 1915 708 37 $4/120$ $7/443$ $2/2$ T8 1025 386 38 $1/1$ $3/328$ $2/2$	T22	533	18	07			,				
M2 34356 16884 49 — 10/444 25/6231 18/384 — — 25/6813 M13 906 609 67 — 1/1 1/120 — — — 1/472 T3 2957 2377 80 — — 1/11 1/120 — — … 1/472 T3 2957 38 … 1/1 2/960 2/220 … … … 1/643 T4 7052 2697 38 … 1/1 1/137 …				28		•		13/254			26/5590
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	M12	14606	10290	70						1/7	'
T3 2957 2377 80 1/1610 1/643 T4 7052 2697 38 - 1/1 2/960 2/220 - 2/1294 T5 534 440 82 - 1/1 1/137 2/1294 T5 534 440 82 - 1/1 1/137 7 T6 263 152 58 - 1/1 1/137 7 T7 250 13 05 1/12 1/1 M16 397 319 80 1/105 1/11 M14 598 298 50 - 1/1 1/134 1/33 M3 38940 26002 67 - 13/92 27/15572 10/1053 - 1/1 27/4240 L2 1915 708 37 - 4/120 7/443 2/2 T8 1025 386 38 - 1/1 3/328 2/25 C. Woodward to L. Canton M4 68402 51402 76 - 15/127 47/33703 25/1420 7/32 5/11 47/33703 M5 12435 7782 63 - 8/452 22/5657 3/3 3/9 - 17/358 L3 16157 818 05 - 6/45 11/227 2/6 4/4 - 2/9 D. L. Canton to L. Overholser M6 34316 24564 72 - 21/165 36/21746 7/35 4/4 - 36/1569 M7 55737 48252 87 - 27/111 53/46216 4/25 7/45 - 47/1348 L4 1784 106 06 - 3/51 2/37 1/3 - 1/2 L5 1254 270 22 - 1/27 1/2 L5 1254 270 22 1/27	M2	34356	16884	49				18/384			25/6813
T4 7052 2697 38 1/1 2/960 2/220 2/1294 T5 534 440 82 1/1 1/432	M13	906	609	67	-	1/1				-	1/472
T5 534 440 82 - 1/1 1/432 - - - - T6 263 152 58 - 1/1 1/137 - - - 1/6 T7 250 13 05 - - 1/12 - - 1/1 M16 397 319 80 - - 1/105 - - - 1/210 M14 598 298 50 - 1/1 1/134 - - - 1/33 M3 38940 26002 67 - 13/92 27/15572 10/1053 - 1/1 27/4240 L2 1915 708 37 - 4/120 7/443 - - 2/2 2/5 C. Woodward to L. Canton M 68402 51402 7/32 5/11 47/33703 25/1420 7/32 5/11 47/33703 M5 12435 7782 63 - 8/452 22/5657 3/3 3/9 - 17/358	T3	2957	2377	80							1/643
T6 263 152 58 - 1/1 1/137 - - - 1/6 T7 250 13 05 - - 1/12 - - 1/1 M16 397 319 80 - - 1/105 - - 1/1 M14 598 298 50 - 1/1 1/134 - - - 1/1 1/33 M3 38940 2002 67 - 13/92 27/15572 10/1053 - 1/1 27/4240 L2 1915 708 37 - 4/120 7/443 - - - 2/2 T8 1025 386 38 - 1/1 3/328 - - 2/2 T8 1025 386 38 - 1/1 3/328 - - - 2/2 C. Woodward to L. Canton L. Canton C. Canton G/45 1/27 2/2 5/14 7/32 5/11 47/33703 M5	T4	7052	2697	38		1/1	2/960	2/220			2/1294
Tr 250 13 05 — — 1/12 — — — 1/12 — 1/1 M16 397 319 80 — 1/1 1/12 — 1/1 M16 397 319 80 — 1/1 1/15 — 1/2 M14 598 298 50 — 1/1 1/15 — 1/2 M14 598 298 50 — 1/1 1/134 — 1/3 M3 38940 26002 67 — 13/92 27/15572 10/1053 — 1/1 27/4240 L2 1915 708 37 — 4/120 7/443 — — 2/2 T8 1025 386 38 — 1/1 3/328 — — 2/2 C. Woodward to L. Canton M4 68402 51402 76 — 15/127 47/33703 25/1420 7/32 5/11 47/33703 M5 12435 7782 63 — 8/452 22/5657 3/3 3/9 — 17/358 L3 16157 818 05 — 6/45 11/227 2/6 4/4 — 2/9 D. L. Canton to L. Overholser M6 34316 24564 72 — 21/165 36/21746 7/35 4/4 — 36/1569 M7 55737 48252 87 — 27/111 53/46216 4/25 7/45 — 47/1348 L4 1784 106 06 — 3/51 2/37 1/3 — 1/2 L5 1254 270 22 — 1/27 — — 1/27 L6 77 58 85 — 4/63 1/116 — — 1/1 E. L. Overholser to Harrah M8 88406 47853 54 1/1 17/69 56/44395 19/117 18/56 — 39/706 F. Harrah to L. Eufaula M15 54 2 04 — — — — — — — 1/1 L5 135 135 100 1/1 — 1/130 — — — — — — — — — — — — — — — — — — —	T5	534	440	82		1/1	1/432				
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	T6	263	152	58		1/1	1/137				1/6
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	T7	250	13	05		-	1/12		-		1/1
$\begin{array}{cccccccccccccccccccccccccccccccccccc$		397	319	80			1/105		Additional		1/210
L2 1915 708 37 - 4/120 7/443 2 2/2 T8 1025 386 38 - 1/1 3/328 2/5 C. Woodward to L. Canton M4 68402 51402 76 - 15/127 47/33703 25/1420 7/32 5/11 47/33703 M5 12435 7782 63 - 8/452 22/5657 3/3 3/9 - 17/358 L3 16157 818 05 - 6/45 11/227 2/6 4/4 - 2/9 D. L. Canton to L. Overholser M6 34316 24564 72 - 21/165 36/21746 7/35 4/4 - 36/1569 M7 55737 48252 87 - 27/111 53/46216 4/25 7/45 - 47/1348 L4 1784 106 06 - 3/51 2/37 1/3 - 1/2 L5 1254 270 22 1/27 1/2 L6 77 58 85 - 4/63 1/116 1/2 L6 77 58 85 - 4/63 1/116 - 1/12 E. L. Overholser to Harrah M8 88406 47853 54 1/1 17/69 56/44395 19/117 18/56 - 39/706 F. Harrah to L. Eufaula M15 54 2 04 1/2 L7 505 319 63 - 3/31 3/287 1/2 L8 167 0 00 - 1 - 1/130 1/2 L7 505 319 63 - 3/31 3/287 1/2 L8 167 0 00 - 1 - 1/130 1/2 L9 123 135 135 100 1/1 - 1/130 1/2 M9 82919 71552 86 2/2 10/10 140/64255 18/3940 31/1314 1/1 21/172 continued on next page	M14		298	50		1/1	1/134		An officer		1/33
L2 1915 708 37 - 4/120 7/443 2 2/2 T8 1025 386 38 - 1/1 3/328 2/5 C. Woodward to L. Canton M4 68402 51402 76 - 15/127 47/33703 25/1420 7/32 5/11 47/33703 M5 12435 7782 63 - 8/452 22/5657 3/3 3/9 - 17/358 L3 16157 818 05 - 6/45 11/227 2/6 4/4 - 2/9 D. L. Canton to L. Overholser M6 34316 24564 72 - 21/165 36/21746 7/35 4/4 - 36/1569 M7 55737 48252 87 - 27/111 53/46216 4/25 7/45 - 47/1348 L4 1784 106 06 - 3/51 2/37 1/3 - 1/2 L5 1254 270 22 1/27 1/2 L6 77 58 85 - 4/63 1/116 1/2 L6 77 58 85 - 4/63 1/116 - 1/12 E. L. Overholser to Harrah M8 88406 47853 54 1/1 17/69 56/44395 19/117 18/56 - 39/706 F. Harrah to L. Eufaula M15 54 2 04 1/2 L7 505 319 63 - 3/31 3/287 1/2 L8 167 0 00 - 1 - 1/130 1/2 L7 505 319 63 - 3/31 3/287 1/2 L8 167 0 00 - 1 - 1/130 1/2 L9 123 135 135 100 1/1 - 1/130 1/2 M9 82919 71552 86 2/2 10/10 140/64255 18/3940 31/1314 1/1 21/172 continued on next page	M3	38940	26002	67		13/92	27/15572	10/1053		1/1	27/4240
T8 1025 386 38 $ 1/1$ $3/328$ $ 2/5$ C. Woodward to L. Canton M4 68402 51402 76 $ 15/127$ $47/33703$ $25/1420$ $7/32$ $5/11$ $47/33703$ M5 12435 7782 63 $ 8/452$ $22/5657$ $3/3$ $3/9$ $ 17/358$ L3 16157 818 05 $ 6/45$ $11/227$ $2/6$ $4/4$ $ 2/9$ D. L. Canton to L. Overholser $ 21/165$ $36/21746$ $7/35$ $4/4$ $ 2/9$ D. L. Canton to L. Overholser $ 21/115$ $36/21746$ $7/35$ $4/4$ $ 2/9$ D. L. Canton to L. Overholser $ 1/21$ $ 1/21$ $ 1/21$ $ 1/21$ L4 1784 106 06 $ 3/51$ $2/37$ $1/3$ $ 1/21$ L5 1254 2				37							
M4 68402 51402 76 $-$ 15/127 47/33703 25/1420 7/32 5/11 47/33703 M5 12435 7782 63 $-$ 8/452 22/5657 3/3 $3/9$ $-$ 17/358 L3 16157 818 05 $ 6/45$ 11/227 $2/6$ $4/4$ $ 2/9$ D. L. Canton to L. Overholser </td <td></td> <td></td> <td></td> <td>38</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>2/5</td>				38							2/5
M4 68402 51402 76 $-$ 15/127 47/33703 25/1420 7/32 5/11 47/33703 M5 12435 7782 63 $-$ 8/452 22/5657 3/3 $3/9$ $-$ 17/358 L3 16157 818 05 $ 6/45$ 11/227 $2/6$ $4/4$ $ 2/9$ D. L. Canton to L. Overholser </td <td>C. V</td> <td>Voodw</td> <td>ard to</td> <td>L. C</td> <td>anton</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>	C . V	Voodw	ard to	L. C	anton						
L3 16157 818 05 — 6/45 11/227 2/6 4/4 — 2/9 D. L. Canton to L. Overholser M6 34316 24564 72 — 21/165 36/21746 7/35 4/4 — 36/1569 M7 55737 48252 87 — 27/111 53/46216 4/25 7/45 — 47/1348 L4 1784 106 06 — 3/51 2/37 1/3 — 1/2 L5 1254 270 22 — 1/27 — - 1/27 — - 1/2 L6 77 58 85 — 4/63 1/116 — - 1/1 E. L. Overholser to Harrah M8 88406 47853 54 1/1 17/69 56/44395 19/117 18/56 — 39/706 F. Harrah to L. Eufaula M15 54 2 04 —						15/127	47/33703	25/1420	7/32	5/11	47/33703
L3 16157 818 05 — 6/45 11/227 2/6 4/4 — 2/9 D. L. Canton to L. Overholser M6 34316 24564 72 — 21/165 36/21746 7/35 4/4 — 36/1569 M7 55737 48252 87 — 27/111 53/46216 4/25 7/45 — 47/1348 L4 1784 106 06 — 3/51 2/37 1/3 — 1/2 L5 1254 270 22 — 1/27 — - 1/27 L6 77 58 85 — 4/63 1/116 — - 1/1 E. L. Overholser to Harrah M8 88406 47853 54 1/1 17/69 56/44395 19/117 18/56 — 39/706 F. Harrah to L. Eufaula M15 54 2 04 —				63		•			3/9		17/358
M6 34316 24564 72 — 21/165 $36/21746$ $7/35$ $4/4$ — $36/1569$ M7 55737 48252 87 — $27/111$ $53/46216$ $4/25$ $7/45$ — $47/1348$ L4 1784 106 06 — $3/51$ $2/37$ $1/3$ — — $1/2$ L5 1254 270 22 — — $1/27$ — — — $1/2$ L6 77 58 85 — $4/63$ $1/116$ — — — $1/1$ E. L. Overholser to Harrah M8 88406 47853 54 $1/1$ $17/69$ $56/44395$ $19/117$ $18/56$ — $39/706$ F. Harrah to L. Eufaula — … …	L3		818	05				2/6	4/4		2/9
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	D. I	. Cant	ton to i	L. 01	verholse	r					
M7 55737 48252 87 $-$ 27/111 53/46216 4/25 $7/45$ $-$ 47/1348 L4 1784 106 06 $ 3/51$ $2/37$ $1/3$ $ 1/2$ L5 1254 270 22 $ 1/27$ $ -$	M6	34316	24564	72		21/165	36/21746	7/35	4/4		36/1569
L4 1784 106 06 - $3/51$ $2/37$ $1/3$ - - $1/2$ L5 1254 270 22 - - $1/27$ - 1/1 1/	M7			87			53/46216	4/25	7/45	A11-71-7	47/1348
L5 1254 270 22 - - $1/27$ - - - - - - - - - - 1/1 L6 77 58 85 - $4/63$ $1/116$ - - - 1/1 E. L. Overholser to Harrah M8 88406 47853 54 $1/1$ $17/69$ $56/44395$ $19/117$ $18/56$ - $39/706$ F. Harrah to L. Eufaula -				06				1/3	-		1/2
L6 77 58 85 - $4/63$ $1/116$ - - $1/1$ E. L. Overholser to Harrah M8 88406 47853 54 $1/1$ $17/69$ $56/44395$ $19/117$ $18/56$ - $39/706$ F. Harrah to L. Eufaula M15 54 2 04 - -<			270	22		•	1/27				
M8 88406 47853 54 $1/1$ $17/69$ $56/44395$ $19/117$ $18/56$ $=$ $39/706$ F. Harrah to L. Eufaula M15 54 2 04 $=$ <td></td> <td></td> <td></td> <td>85</td> <td></td> <td>4/63</td> <td>1/116</td> <td></td> <td>10.000 M</td> <td></td> <td>1/1</td>				85		4/63	1/116		10.000 M		1/1
F. Harrah to L. Eufaula M15 54 2 04 $ -$	E . L	. Over	holser	to H	arrah						
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	M8	88406	4785 3	54	1/1	17/69	56/44395	19/117	18/56	-	39/706
L7 505 319 63 - $3/31$ $3/287$ L8 167 0 00	F . E	Iarrah	to L. l	Eufai	ıla						
L8 167 0 00 - <td>M15</td> <td>54</td> <td>2</td> <td>04</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>	M15	54	2	04							
T23 135 100 $1/1$ $ 1/130$ $ -$		505	319	63		3/31	3/287				
T9 48 37 74 $1/23$ $ 1/9$ $ -$ T10 40 22 55 $1/3$ $1/17$ $ -$ <	L8	167	0	00							
T10 40 22 55 1/3 1/17 - M9 82919 71552 86 2/2 10/10 140/64255 18/3940 31/1314 1/1 21/172 continued on next page	T23	135	135	100							
110 40 22 53 1/3 1/1 M9 82919 71552 86 2/2 10/10 140/64255 18/3940 31/1314 1/1 21/172 continued on next page	T9	48	37	74			1/9			-	
continued on next page	T10	40	22	55	1/3						
	M9	82919	71552	86	2/2	10/10	140/64255	18/3940	31/1314	1/1	21/172
	cont	inued o									

- No data or collection that year.

a Oklahoma State Department of Health.

b Oklahoma Department of Environmental Quality.

c CA: Campostoma anomalum; CC: Cyprinus carpio; CL: Cyprinella lutrensis; HP: Hybognathus placitus; NA: Notropis atherinodes; NG: Notropis girardi; NS: Notropis stramineus.

d L: Lake; M: Mainstem of river; T: Tributary.

	Total	Cyprir			Nu	mber of co	llections/	specimens	:	
Site	#fish	#	%	CA	CC	CL	HP	NA	NG	NS
G. L	. Eufau	la to Arka	ansas R							
T11	25	14	56	Terrane and		1/5				
T12	34	32	94		-		-	1/32		-
T13	20	0	00				-			
T14	75	50	67		Common games		MALE OF A	1/24	-	1.146-0011
T15	73	20	27	1/8			and we get	in an internation	n	
T16	224	140	63	1/3				A Mark your a		
T17	172	43	25	1/4						
T18	485	378	78	1/1	-					
T19	44	23	52							
T20	46	20	43	1/7		******	-			
T21	88	24	27	2/13						1/7
L9	9176	1147	13	1/4	2/21	8/611	1/1	4/20		
L10	338	155	46		3/310	3/114		Antonia	courses called	-
M10	5582	828	15	3/11	5/23	20/412	1/21	11/54	-	nya pennyaki
Sum	mary			N.C. ^e	No.	fish	No. c	yprinids	% cy	prinids
Tribu	taries (2	23 sites)		29	14	855	7.	520		51
Lt.	mainste	m(10 sites)	f	377	463	3478	30	7329	(56
Main	stem(6 s	sites)		12	19	091	13	966	-	73
Lakes	s(10 lake	es,21 sites)		57	34	847	5	050]	14
Tota	ls			475	53:	2271	33	8865	(54

TABLE 3. (contd.) Number of collections of fish, number of specimens, and number and percentage of cyprinids, collected by OSDH^a and ODEQ^b at indicated sites on the North Canadian River and its lakes and tributaries.

— No data or collection that year.

a Oklahoma State Department of Health.

b Oklahoma Department of Environmental Quality.

c CA: Campostoma anomalum; CC: Cyprinus carpio; CL: Cyprinella lutrensis; HP: Hybognathus placitus; NA: Notropis atherinodes; NG: Notropis girardi; NS: Notropis stramineus.

d L: Lake; M: Mainstem of river; T: Tributary.

e Number of collections.

f Long-term mainstem of river.

			Number	of collections/spe	ecimens ^c		
Site^d	NBU	NC	NV	PM	PN	PP	PV
A. NI	M State	Line to L. O	ptima				
T1		souther the	strate to a			1/147	
T2						1/125	
M11				2/11		1/156	
L1	individual g					7/330	
B. L.	Optima	to Woodwar	·d				
T22	1000 B ¹ (r),		Sector By			-	-
M1				10/24		26/2009	
M12		such a fielder		4/21		4/2673	1/96
M2	1/17	- 18 Allered		19/271		25/2722	2/2
M13	All to a loss	AL 1. (MUT 1	contract,		-	1/16	
Т3	A - 1887-16			1/16		1/108	
T4	1	100 Mar 10		1/1		2/221	
T5	American	ana - 1981	1.000 Later			1/17	
T6		- 707 Nov.				1/8	
T7	A 11 Mar	10.000		www.pr.date	-		
M16		1	And Adding -	1/2	-	1/2	
M14			a through the	1/34		1/36	
M3	·* · ·			23/230	-	27/4765	8/39
L2		1/1	107 W 101		-Canada	2/25	5/167
Т8			100 F 10 La	3/24		1/8	3/20
C. We	oodward	to L. Canto	n	,		-, -	0/20
M4		4/4	where a	37/749	warmen.	44/4780	38/576
M5		1/14		16/140	-	20/1340	13/245
L3		The Price	Vice in Vice	6/14		2/40	12/424
D. L.	Canton 1	to L. Overho	lser	,		/ -	
M6		2/5	Marries.	15/46	******	24/759	29/223
M7		2/2	P THE REAL	19/34	-14-16-00	24/151	$\frac{32}{318}$
L4	1/13	and the second second			Harvest		
L5			19 W1	1000		1/31	
L6		1/2	4 to reading	des l'alles	Managara -		2/99
E. L. (Overhols	er to Harral	1				2700
M8		7/9	5.000 at #1.	10/34	1/1	29/370	42/2095
M15		and a second sec	200.000-				
L7		1/1	10 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	astronik Ma		-	
L8		All and the second s	Andrew was	-	the second second		**************************************
T23		100 x 10 x 100		1/4	Theorem a		
Т9		400000, 1 1	and index	-/-	1/5	1 million and an	
T10		*	10 mil 10 mil		1/2	- Anno ann an Anno	
M9		2/2	I to the log	18/94	-/- -	1/3	38/2519
	ued on ner	•				1/0	30/2019

continued on next page

No data or collection that year.

a Oklahoma State Department of Health.

b Oklahoma Department of Environmental Quality.

c LU: Lythrurus umbratilis; NB: Notropis boops; NBU: Notropis buchnani; NC: Notemigonus crysoleucas; NV: Notropis volucellus; PM: Phenacobius mirabilis;

PN: Pimephales notatus; PP: Pimephales promelas; PV: Pimephales vigilax;

d L: Lake; M: Mainstem of river; T: Tributary.

			Number of a	collections/spe	cimens ^c		
Site^d	NBU	NC	NV	PM	PN	PP	PV
G. L.	Eufaula to	o Arkansas R.				********	
T11	_	-		-	1/2		and the second
T12		1/32					Million Control of Con
T13							
T14			1. March 1.		The second		
T15		MINISTRA AND	1/1		CARDING Read-	1/7	Ref. of Anto
T16					1/15	-	
T17	_	Administration		-	1/1		
T18		No.		B	1/24		
T19					ALCONOMIC 1	10.00	an a manager
T20		Name and Address of Ad	-	-	1/1	The Constants	1000-00-0
T21						14100101	week # 1997
L9	2/6		1/1				10/152
L10		Mountain 1	the second s		2/11	1.00 Million (1.00	2/20
M10	2/9	8/69	1/1		5/15	· · · · · · ·	13/167

TABLE 4. (contd.) Number of collections of fish and number of specimens collected by $OSDH^a$ and $ODEQ^b$ at indicated sites on the North Canadian River and its lakes and tributaries.

- No data or collection that year.

a Oklahoma State Department of Health.

b Oklahoma Department of Environmental Quality.

c LU: Lythrurus umbratilis; NB: Notropis boops; NBU: Notropis buchnani; NC: Notemigonus crysoleucas; NV: Notropis volucellus; PM: Phenacobius mirabilis;

PN: Pimephales notatus; PP: Pimephales promelas; PV: Pimephales vigilax;

d L: Lake; M: Mainstem of river; T: Tributary.

TABLE 4a. Number of collections of fish and number of specimens collected by $OSDH^a$ and $ODEQ^b$ at indicated sites on the North Canadian River and its lakes and tributaries. For these species there was no specimen from sites upstream from these.

	Number	of collections/specimens ^c
Site^d	LU	NB
G. L. 1	Eufaula to	Arkansas R.
T11	and the second second	1/6
T12		
T13		Alers Aler-
T14		
T15	1/2	
T16		1/121
T17	1/10	1/28
T18	1000 miles	1/156
T19		1/21
T20		1/12
T21	AND COMPANY	1/4
L9		
L10		
M10		

- No data or collection that year.

a Oklahoma State Department of Health.

b Oklahoma Department of Environmental Quality.

c LU: Lythrurus umbratilis; NB: Notropis boops;

d L: Lake; M: Mainstem of river; T: Tributary.

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		22 —	1	159	
a CA: Campostoma anomalum; CC: Cyprinus carpio, CL: Cyprincila lutrensis; HP: Hybognatinus placitus; LU: Lynrurus unoratins; MA: Macrinyoopsis assiruuts	s umbratilis; N	AA: Macrhy	bopsis aestiv	alis;	
MS. Macrhybopsis storeriana; NC: Notemigonus crysoleucas; NA: Notropis athernoides; NB: Notropis buchanani; NE: Opeopedus emiliae;	otropis buchan	ani, NE: Ul	sopoeodus e	ninae;	
NG: Notropis girardi; NO: Notropis ortenburgeri; NS: Notropis stramineus; NV: Notropis volucellus; PM: Phenacobius mirabitis; PN: Primephates notatus;	mirabilis; PN	i: Pimephale	s notatus;		
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1974 CRMPW	-		437	50				62		· ·	-		25 -	- 25	12	- 4		99	ĺ
a CA: Campostoma anomalum; CC: Cyprinus carpio; CL: Cyprinella lutrensis; HP: Hybognathus placitus; LU: Lythrurus umbratilis; MA: Macrhybopsis aestivalis;	ma anc	malum; (CC: Cypri	inus carpi	io; CL: (yprinell	a lutrens	is; HP:	Hybogna	thus plac	itus; LU.	Lythru	rus umb	ratilis; N	A: Macr	hybopsis	aestivali	5;	
MS: Macrhybopsts storertana; NC: Noternigonus crysoleucas; NA: Notropis atherinoides; NB: Notropis boops; NBU Notropis buchanani; NE: Opsopoedus emiliae;	psis ste	preriana;	NC: Note	migonus	crysoleu	cas; NA:	Notropi	s atherin	ioides; N	B: Notro	pis boop	; NBU	Notropi	buchanc	mi; NE:	Opsopoe	odus emil	iae;	
NG: Notropis girardi, NO: Notropis ortenburgeri, NS: Notropis stramineus; NV: Notropis volucellus; PM: Phenacobius mirabilis; PN: Pimephales notatus;	girardi;	NO: Not	ropis orte	nourgeri;	NS: No	tropis str	amineus	; NV: N	otropis 1	volucellus	; PM: <i>P</i>	ienacobi	us mira	bilis; PN:	Pimeph	ales nota	tus;		
	es prom	telas; PV:	Pimepha	les vigila:	L														
b Collector Code is given at the end of the last section of the table	is give	n at the (and of the	last secti	ion of th	e table.													

TABLE 5. (contd.) Number of specimens in	numb	er of spe	cimens		INSTOLICAL USIL CONSCIOUS HOIL OF							a								
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a CA: Campostoma anomalum; CC: Cyprinus carpio; CL: Cyprinella lutrensis; HP: Hybognathus placitus; LU: Lythrurus umbratilis; MA: Macrhybopsis aestivalis; AC: Macrhybopsis storeriana; NC: Notemigonus crysoleucas; NA: Notropis atherinoides; NB: Notropis boops; NBU Notropis buchanani; NE: Opsopoeodus emilio NG: Notropis girardi; NO: Notropis ortenburgeri; NS: Notropis stramineus; NV: Notropis volucellus; PM: Phenacobius mirabilis; PN: Pimephales notatus; NG: Notropis girardi; NO: Notropis ortenburgeri; NS: Notropis stramineus; NV: Notropis volucellus; PM: Phenacobius mirabilis; PN: Pimephales notatus;	ta anon sis ston rardi; l	alum; C eriana; N VO: Notr	C: Cypri IC: Note: opis orte	nus cary migonus nburgeri	oio; CL: crysoler ; NS: Nc	Cyprine scas; NA otropis s	lla lutrer : Notrop traminev	is: NV: J	: Hybogn inoides; Notropis	athus pl NB: Not volucell	us carpio; CL: Cyprinella lutrensis; HP: Hybognathus placitus; LU: Lythrurus umbratilis; MA: Macrhybopsts aestwatts; igonus crysoleucas; NA: Notropis atherinoides; NB: Notropis boops; NBU Notropis buchanani; NE: Opsopoeodus emiliae; burgeri; NS: Notropis stramineus; NV: Notropis volucellus; PM: Phenacobius mirabilis; PN: Pimephales notatus;	U: Lythr ps; NBL Phenaco	urus um Notrop bius mir	bratilis; is bucha abilis; P	MA: Ma nani; N N: Pime	acrhybop E: Opso; phales r	sis aesti poeodus iotatus;	ivalis; emiliae;		
PP: Pimephales prometas; PV: Pimephales uguar. b Collector Code is given at the end of the last section of the table.	: <i>prome</i> s given	las; PV: at the er	<i>Pimepha</i> id of the	les vigili last seci	az. tion of tł	he table.														

TABLE 5. (contd.) Number of specimens in historical fish collections from the North Canadian River and its lakes and tributaries.

Proc. Okla. Acad. Sci. 77:43-92(1997)

Coll										Num	ber of sl	Number of specimens"									
Year Code	de°	CA	SC	CL	НР	ΓΩ	MA	MS	NA	NC	NB	NBU	NE	ŊĠ	NO	NS	NV	ΡM	PN	ΡP	ΡV
D. L. (D. L. Canton to L.	to L.		Overholser (contd.)	ntd.)																
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1984 DL	DLSMHO	I	92	687	١		1	I	I		-		1	ļ		1		I	I	I	10
1985 DL	DLSMHO	۱	5	300				I	5		1	-		I				1	1	1	109
DL	DLSMOO		-	676	I		1		1	342			1	1	1	1	1	I	18	I	I
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1992 ER	ERLUEC			+ +			1	١	-	1		1		1		++		+ +	I	+ +	+ +
a CA: Campostoma anomalum; CC: Cyprinus carpio; CL: Cyprinella lutrensis; HP: Hybognathus placitus; LU: Lythrurus umbratilis; MA: Macrhybopsis aestivalis; MS: Macrhybopsis storeriana; NC: Notemigonus crysoleucas; NA: Notropis atherinoides; NB: Notropis boops; NBU Notropis buchanani; NE: Opsopoeodus emilia	CA: Campostoma anomalum; CC: Cyprinu MS: Macrhybopsis storeriana; NC: Notemi	a anor is stor	nalum; C eriana; N	C: Cyprii VC: Noten	nus carpi nigonus c	o; CL: C rysoleuc	'yprinello as; NA: .	i lutrens Notropis	is; HP: atherin	Hybognt oides;	Athus pla VB: Noti	s carpio; CL: Cyprinella lutrensis; HP: Hybognathus placitus; LU: Lythrurus umbratilis; MA: Macrhybopsis aestivalis; gonus crysoleucas; NA: Notropis atherinoides; NB: Notropis boops; NBU Notropis buchanani; NE: Opsopoeodus emiliae;	U: Lythr ps; NBU	urus un J Notrop	ibratilis; is bucha	MA: M nani; N.	acrhybo E: Opso	psis aesi poeodus	tivalis; emiliae		
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b Collecto	Collector Code is given at the end of the last section of the table.	given.	at the er	aur io bu	last secur	on ui tut	table.														

TABLE 5. (contd.) Number of specimens in historical fish collections from the North Canadian River and its lakes and tributaries.

J. PIGG, M. COLEMAN, and R. GIBBS

	. (Num	Number of specimens ^a	scimens ^a									
Cour. Year Code ^b	CA	CC	CL	ЧP	ΓΩ	MA	MS	NA	NC	NB	NBU	NE	NG	ON	NS	NV	ΡM	ΡN	РР	ΡV
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1961 FRRSH		-	ł		1			1	2			-	I	No.	1		1	I	-	-
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1962 FTHLH			-		-	ļ	-	ł	2	-	I		1	-	1	-		168	1	
	609	ļ	I	I	19	-		20	6	124	l	10	525	20		-		97	-	-
FTHLP	1589	ŝ	879	1590	117	11	-	1283	66	3251	926	ი	669	66	-		114	930	2	265
FTSLP	170		58	-	18	1	-	913	4	-	-	2	114	10			28	141	-	25
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a CA: Campostoma anomalum; CC: Cyprinus carpio; CL: Cyprinella lutrensis; HP: Hybognathus placitus; LU: Lythrurus umbratitis; MA: Macrhybopsis aestivalis; MS: Macrhybopsis storeriana; NC: Notemigonus crysoleucas; NA: Notropis atherinoides; NB: Notropis boops; NBU Notropis buchanani; NE: Opsopoeodus emilio NG: Notropis girardi; NO: Notropis ortenburgeri; NS: Notropis stramineus; NV: Notropis volucellus; PM: Phenacobius mirabilis; PN: Pimephales notatus;	toma ar bopsis s s girard	10malum toreriane t; NO: N	i, CC: <i>Cy</i> , 1; NC: <i>Ne</i> <i>lotropis</i> of	prinus ca stemigoni rtenburge	urpio; Cl us cryso :ri; NS:	L: Cyprii leucas; N Notropis	iella luti IA: Notr stramin	ensis; H opis athe eus; NV:	P: Hybog rinoides Notropi	is carpio; CL: Cyprinella lutrensis; HP: Hybognathus placitus; LU: Lythrurus umbratilis; MA: Macrhybopsis aestivalis; igonus crysoleucas; NA: Notropis atherinoides; NB: Notropis boops; NBU Notropis buchanani; NE: Opsopoeodus emiliae; urgeri; NS: Notropis stramineus; NV: Notropis volucellus; PM: Phenacobius mirabilis; PN: Pimephales notatus;	acitus; L tropis boo us; PM: J	U: Lythi ps; NB(Phenaco	urus um) Notrop bius min	bratilis; is bucha abilis; Pl	MA: Mı nani; Nl N: Pime	acrhybof E: Opsol phales n	osis aesti poeodus votatus;	ivalis; emiliae;		
PP: Pimephales promelas; PV: Pimephales vigilar. b Collector Code is given at the end of the last section of the table.	ales pro: de is giv	<i>melas</i> ; P 'en at th'	V: Pimep e end of t	hales vig he last se	<i>ilax.</i> ection of	the tabl	ف													

TABLE 5. (contd.) Number of specimens in historical fish collections from the North Canadian River and its lakes and tributaries.

TABLE 5. (contd.) Number of specimens in historical fish collections from the North Canadian River and its lakes and tributaries.	d.) Nu	mber of	specimen	id ni st	storical	fish coll	ections	from th	e North	Canadi	an River	and its	lakes a	nd trib	utaries.					
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Year Code ^b	CA	CC	CL	HP	ΓΩ	MA	MS	NA	NC	NB	NBU	NE	NG	NO	SN	NV	PM	PN	PP	ΡV
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1985 FLWEM	I	29	1649	1		ļ		2011	20		I	1	135	ł		-	1			647
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1989 FRLAEP	1	I	80	١		I					-		1	1	115	-				117
1991 FLWEM	17	17	978		I	I	I	149	20	1	1			I			ł	ł	1	
1993 FMLUEP	arcuman.	1						++		-	-		1			[+ +			
FMLUEO			+ +	I			I	++	1		ł	l	١			1		***		1
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a CA: Campostoma anomalum; CC: Cyprinus carpio; CL: Cyprinella lutrensis; HP: Hybognathus placitus; LU: Lythrurus umbratilis; MA: Macrhybopsis aestivalis;	ma ano	malum;	CC: Cypi	inus ca	rpio; CL	: Cyprin	ella lutre	:nsis; HF	: Hybog	nathus p	lacitus; I	.U: Lyth	rurus ur	nbratilis	MA: M	facrhybo	psis aes	stivalis;		
NIS: Macrigoopsis storertand; N.C. Notemigonus crysoleucas; INA: Notropis auterinotaes; INB: Notropis 00095; NDU Notropis ouchanant; NE: Opsopoedus emitae; NG: Natronis airardi: NO: Natronis artenhuraet: NS: Natronis stramineus: NV: Natronis volucellus: PM: Phenarchius	psis sio	NO: No	tronis art	enhurne	s crysol	eucas; IN. Votronis	A: Notro stramine	pus athen us: NV·	Notroni	ND: ND: NO	ilare: PM.	ops; ND Phenace	U NOUTO	pis ouch	ananı; r on- pim	HE: UPS enhales	opoeodus	s emuna.		
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historical fish collections from the North Canadian River and its lakes and tributaries.	Number of specimens ^a	NBU			1	i			-		-	acitus; L ropis boc us; PM: lownstree as; B, B ash; P, P ash; P, P n Horse; n Horse;
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TABLE 5. (contd.) Number of specimens in		ేల	G. L. Eufaula to Arkansas R.	1959 GRMM	GTCSH	1962 GRHLM	GTRHLH 214	1963 GTLIBH	HWIWD 220	1074 GRITH	1993 GRLUEH	 a CA: Campostoma anomalum; CC: Cyprinus carpio; CL: Cyprinella lutrensis; HP: Hybognathus placitus; LU: Lythrurus umbratilis; MA: Macrhybopsis aestivalis; a CA: Campostoma anomalum; CC: Cyprinus carpio; CL: Cyprinella lutrensis, HP: Hybognathus placitus; LU: Lythrurus umbratilis; PN: Pimephales of the matter of the mathematic storeriana; NO: Notropis storeriana; NO: Notropis storeriana; NO: Notropis storeriana; NO: Notropis storeriana; NN: Notropis atherinoides; NB: Notropis boops; NBU Notropis buchanani; NE: Opsopeodus emitiae; NG: Notropis giardi; NO: Notropis ortenburgeri; NS: Notropis stramineus; NV: Notropis volucellus; PM: Phenacobius mirabilis; PN: Pimephales notatus; NP: Pimephales promelas; PV: Pimephales vigilar. b Collector Code: 4-6 letters, e.g., GMLUEH. First letter: Segment of river A to G (headwaters to downstream). Second letter: Type of waters: T = tributary, M = mainstem, L = lake. Third letter To last letter = Collector symbol. Last letter: county: C, Cimarron; T, Texas; B, Beaver; H, Harper; W, Woodward; B, Blaine; C, Canadian; C, Oklahoma; PO, Pottawatomie; S, Seminole; Of, Okfuskee; O, Okmulgee; H, Hughes, M, Mcintoshi, P, Pittsburg; H, Haskell. If site is a lake: Next to last letter(s) is symbol for that lake: O, Optima; CH, Lake Chambers; FS, Fort Supply; C, Canton; AH, American Horse; O, Overholser; H, Hefner; S, Shawnee Lakes; E, Lake Eufaula. + Species collected but count was not given. Species was not collected that year.

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TABLE 1. ITERIA IN LOCATE CONCLUSION Small letters indicates collect See footnotes for key to other Campostoma anomalum	ull lette footno ia and	Small letters indicates collections by others. Large letters indicates collections by DEQ. See footnotes for key to other abbreviations. For identification of Segment and Site, see stoma anomalum Relative Abundance at Site	tes col		s by o obrevii	thers. ations.	Large l For id	entifica	indicat tion of Relati	ons by others. Large letters indicates collections by DEQ. abbreviations. For identification of Segment and Site, see Table 2. Relative Abundance at Site	ections ant and indance	by DE Site, s s at Sit	Q. ee Tab e		c			C		
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1966 - 1975		!		г		ļ				ъ	V		{						(
1976 - 1980	ר 				ი	ı	VR		VR	r			٧K				-	¢	0	4 N N
1981 - 1985	R r	0	VR	VR	Я	ы	VR	0	VR	ı		VR	R	ъ	 -		ਸ ਸ	4 c	ц 1	ч л л
1986 - 1990	Rr	VR	VR	VR	Ж	r	VR	VR	VR	r				н				4	-	
1991 - 1995	R r	VR	R	R		٧r	VR	D	VR	r	VR	VR	VR	г		VK VK	H VH		VI	LIN N
	r collec vas col ndance	ction tha lected; n is indica	t year. umber ited by	unknov : RI+- 3	wn.	OWD. 20_000 snacimans:														
VA Vas. over 3,000 specimens, A a: 500-4,999 specimens; C c: 100-499 specimens;	-4,999 -4,999 -499 sp	over a,000 specimens; 500–4,999 specimens; 100–499 specimens;		VR vr: 1-19 specimens; 0: none collected.	1-19 si none c	vr: 1-19 specimen 0: none collected	us; 1.													

TABLE 7. Trends in relative abundance (number per collection) for Campostoma anomalum and Cyprinus carpio for years 1921-1995.

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			Num	ber of (C. carpi	o collec	ted at S	Site M#			Total	No.
Year	<u>M1</u>	M2	M3	M4	M5	M6	M7	M8	M9	M10	$C.ca.^{a}$	Cln. ^b
1976							1	0			1	2^{-}
1977						-	2	4			6	6
1978				1		0	5	0	0	—	6	8
1979				9		0	2	1	1	0	13	15
19 80				2		101	24	4	0	3	134	18
1981	0	0	0	33		14	4	14	3	7	75	19
1982	0	0	0	7		13	16	16	10	0	62	19
1983	0	1	5	19		3	3	3	10	0	44	21
1984	0	0	0	0		2	19	7	1	0	29	21
1985	0	4	3	6	0	5	0	0	0	0	18	23
1986	0	0	0	0	0	4	1	0	1	0	6	20
1987	0	2	0	0	1	0	2	2	0	0	7	20
1988	1	1	0	0	0	0	0	3	0	0	5	22
1989	0	0	5	3	2	0	3	2	0	0	15	28
1990	0	0	1	0	0	2	3	2	0	12	20	23
1991	0	0	18	0	1	7	1	8	0	0	35	24
1992	0	0	16	0	12	7	21	0	14	1	71	24
1993	2	1	23	10	435	4	3	1	0	0	479	21
1994	0	413	14	1	0	1	0	0	0	0	429	23
1995	0	22	7	36	1	2	1	2	0	0	71	20
Totals ^c		444	92	127	452	165	111	69	40	23	1526	377
NOC^d	28	26	28	47	22	36	57	58	40	35		377
$N(Cc)^e$	2	10	13	15	8	21	27	17	10	5		128

 TABLE 8. Cyprinus carpio: distribution at the ten long-term fish-collecting sites on the NCR from 1976 to 1995.

- No data or collection that year.

a Total number of C. carpio collected for the year.

b Total number of collections for the year.

c Total (sum) for each column.

d Number of collections at the site, 1976–95.

e Number of collections which contained C. carpio.
TABLE 9. Rare historical cyprinids collections from museum records (MR), unpublished field notes (UPFN), unpublished stocking records(USR), unpublished Oklahoma Department of Wildlife Conservation (ODWC-LS), and other studies (OS) for mainstem (M), tributary (T), and lake (L) sites on the North Canadian River (NCR), Oklahoma.

	(1),	Collector			No.	No.
Year	County	or survey	Location	Sources	Coll.	Fish
Ct	enopharyngod	lon idella				
A. N	M State Li	ne to L. Optima				
1983	Texas	ODWC	Guymon City Lake	USR		
B. L.	Optima to	Woodward				
1981	Beaver	ODWC	Beaver City Lake	USR		
1984	Beaver	ODWC	Beaver City Lake	USR		
1985	Beaver	ODWC	Beaver City Lake	USR		
D. L.	Canton to	L. Overholser				
1980	Blaine	ODWC	American Horse L.	\mathbf{USR}		
1981	Blaine	ODWC	American Horse L.	USR		
Ple	atygobio grac	ilis				
B. L.	Optima to	Woodward				
1978	Woodward	ODWCLS	Lake Fort Supply	ODWC	1	1
1988	Cimarron	$DEQ(P \& G)^a$	Corrumpa Creek	ODEQ	1	3
	otropis bairdi					
B. L.	Optima to	Woodward				
1983	Beaver	DEQ(P & G)	NCR, Turpin	ODEQ	1	28
D. L.	Canton to	L. Overhosler				
1976	Canadian	DEQ(P & G)	NCR, El Reno	ODEQ	1	1
	acrhybopsis s					
F. Ha	arrah to La					
1962	McIntosh	$ODWC(H \& L)^a$	Proposed L. Eufaula	OKMNH	1	9
1985	Haskell	DEQ(P & G)	CR Whitefield	ODEQ	1	2
1988	Haskell	DEQ(P & G)	CR Whitefield	ODEQ	1	7
1993	Haskell	$L \& E^a$	CR Whitefield	ь	1	1
		hrophthalmus				
F. Ha	arrah to La					
1990	Pittsburg	DEQ(P & G)	L. Eufaula	OSUS	1	2
				23186		
	otropis blenni					
	Canton to	Lake Overholser				
1977	Canadian	ODEQ(P & G)	NCR El Reno (M7)	ODEQ	1	1
	arrah to L.			~~~~~		-
1962	McIntosh	ODWCLS(H & L)	Deep Fork R mouth	OKMNH	2	5
1979	Hughes	ODEQ(P & G)	NCR Wetumka (M9)	ODEQ	1	3
		Arkansas R.				_
1990	Haskell	ODEQ(P & G)	CR Whitefield (M10)	ODEQ	2	7
1993	Haskell	L&E	CR Whitefield	OSUS	1	25
1994	Haskell	ODEQ(P & G)	CR Whitefield (M10)	ODEQ	1	1
	otropis nubilu					
	arrah to L.		T D A I	ODWCI C	-	
1967	McIntosh	ODWCLS Wright	L. Eufaula	ODWCLS	1	r
	otropis rubella					
	arrah to L.		~		_	~~
1952	Seminole	Lachner, et al.	Tri. NCR	USNM	1	20
	nued on next					

a P & G: Pigg, Gibbs; L & E: Luttrell, Echelle; H & L: Houser, Lindsay; C & B: Cross, Buck.

b Luttrell, G.R., Echelle, A.A., and Zale, A.V., Status of the Speckled Chub in the Arkansas River Basin. Oklahoma City, OK. Oklahoma Dept. Wildlife Conserv. Final Project Report. Project No. E-8 Job No. 3 (1993).

TABLE 9. (contd.) Rare historical cyprinids collections from museum records (MR), unpublished field notes (UPFN), unpublished stocking records(USR), unpublished Oklahoma Department of Wildlife Conservation (ODWC-LS), and other studies (OS) for mainstem (M), tributary (T), and lake (L) sites on the North Canadian River (NCR), Oklahoma.

	· · · ·	()		· //		
		Collector			No.	No.
Year	County	or survey	Location	Sources	Coll.	\mathbf{Fish}
No	tropis voluce	llus				
F. Ha	arrah to L.	Eufaula				
1984	Pittsburg	ODEQ(P & G)	L. Eufaula	ODEQ	1	1
1988	McIntosh	ODWCLS Wright	L. Eufaula	ODWCLS	1	4
1992	Pittsburg	ODEQ(P & G)	Elm CR	ODEQ	1	1
Pin	mephales tend	ellus	·····			
C. W	oodward to	Lake Canton				
1950	Blaine	ODWCLS(C & B) ^a	L. Canton	ODWCLS	?	?
Er	imystax x-pu	nctatus				
G. Ha	arrah to L.I	Eufaula				
1962	Pittsburg	ODWC(H & L)	Gaines CR	TU	1	1
D P.	C. Digg Cib	has I la E. Lutter II Eak		T' 1 O 0 T		

a P & G: Pigg, Gibbs; L & E: Luttrell, Echelle; H & L: Houser, Lindsay; C & B: Cross, Buck.

	191	0-1990.										
			Numb	er of H.		s collec	cted at	Site M	#		Total	No.
Year	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	$H.pl.^a$	Cln^b
1976		_					20	2			22	2
1977	—						0	11			11	6
1978				118		1	2	13	3	-	137	8
1979				27		8	2	15	2139	0	2191	15
1980	—			1085		1	0	20	637	0	1743	18
1981	0	0	0	17	_	0	1	9	9	0	36	19
1982	23	5	7	71		0	0	0	137	21	264	19
1983	138	130	787	75		0	0	17	970	0	2117	21
1984	0	3	6	0	—	0	0	3	1	0	13	21
1985	0	22	2	9	1	3	0	9	2	0	48	23
1986	1	1	5	0	0	0	0	18	39	0	64	20
1987	12	15	124	8	1	0	0	0	0	0	160	20
1988	32	25	2	0	0	0	0	0	0	0	59	22
1989	15	3	115	1	0	0	0	0	0	0	134	28
1990	19	13	0	0	0	0	0	0	0	0	32	23
1991	13	8	15	0	0	0	0	0	0	0	36	24
1992	0	16	0	6	1	22	0	0	0	0	45	24
1993	1	89	0	0	0	0	0	0	2	0	92	21
1994	0	54	0	2	0	0	0	0	0	0	56	23
1995	0	0	0	1	0	0	0	0	0	0	1	20
Total ^c	254	384	1063	1420	3	35	25	117	3939	21	7261	377
NOC^d	28	26	28	47	22	36	57	58	40	35		377
$N(Hp)^{\alpha}$	° 13	18	10	25	3	7	4	19	17	1		
· No.	alleatin		a maada A	hat woor	an dat							

TABLE 10. Hybognathus placitus:distribution at the ten long-term fish-collecting sites on the NCR1976-1995.

-: No collections were made that year or data not available.

a Total number of H. placitus collected for the year.

b Total number of collections for the year.

c Total (sum) for each column.

d Number of collections at the site, 1976–95.

e Number of collections which contained H. placitus.

<i>iotdes</i> for 1926–1995.		
i contections) for hypognations placetus and Notropis atherin	rge letters indicates collections by DEQ.	
	Small letters indicates collections by others. L	Confronting for line to attain the interior

	See tootnotes for key	tes tor I	key to o	ther abb	to other abbreviations. For identification of Segment and Site, see Table 2.	ls. For j	dentific	ation of	Segme	nt and S	bite, see	Table 2					
					ſ		Rel	ative A	bundan	Relative Abundance at Site	te						
Segment⇒	A				я					с О			D	E	F	0	ß
Years	ATHB	T4	M12	M1	M13	M2	M3	L2	M4	M5	L3	M6	M7	M8	M9	1.9	M10
Hybognathus placitus	s placitus																
1925 - 1935	ပ				I				1	1	1	I			ł		+
1936 - 1945	++				I	ł	1		r			۱	I				⊢ ⊢
1946 - 1955	I	I	ပ	r	1	r	ч	ł	r	ΥΓ	Ч		[I			
1956-1965	ບ	ల	1	r		ч	ч	1							a	c	
1966-1975			I	1		I	1	J		1	5	1			9 1	9	P.A.
1976-1980	-			-				1	U	-	ບ ^ເ	VR.	VR	æ	: C		
1981–1985			I	R	I	R	U	0	Я	VR	В	VB	VB	V.B	» ت	VB	V.P.
1986 - 1990	0	U	U	VR	0	VR	R	0	VR	VR	VR	0	0	VB			11.
1991-1995	I	1	Я	VR	1	VR	VR	0	VR	VR	VR	VR	0 0		VR		
Notropis atherinoides	herinoides												,	>	24		
1925 - 1935	+ +	I	ļ	I		+ +	-	-					1		VF		
1936 - 1945	VI	I							l	1		۱			:		
1946 - 1955	1					h			Vľ	+	1	+ +		-	νr		
1956 - 1965	++			r	1	r	ч	1	ц		υ υ	• +		ļ	: L	5A	F
1966 - 1975					-		I			. U	, U	:			>	2 -	-
1976-1980			I		-	1	1		R		б	0	VR	VR	C		VB
1981-1985	1			0		0	0		VR	VR	VRa	VR	VR	VB	2	VA	VR
1986 - 1990	-			0	1	0	0	1	VR	VR	VR	VR	VR	VB	1	VR	VB
1991-1995				0		0	0	1	0	0	I	0	0	VR	0	20	VB
- No data or collection that year	· collectio.	n that J	/ear.														
++ Species was collected; number unknown.	as collect	ed; nun	ber unl	cnown.													
retarive apulituatice is indicated by:	nance is l	nuicate	a oy:														
	over 5,000 specimens; 500-4,999 specimens;	cimens; cimens;	>	:: 20–99 T: 1–19 (R r: 20–99 specimens; VR vr: 1–19 specimens;	:ns; is;											
C c: 100-	100-499 specimens;	nens;	0): none (0: none collected												

0	2
o	5

			Numb	er of N.	atherine	oides col	lected a	t Site M	#		Total
Year	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	$N.at.^a$
1976		-					29	22		*******	51
1977	—				-		8	1			9
1978				16		0	0	2	24		42
1979				7		0	1	0	17	2	27
1980				6		0	4	1	392	0	403
1981	0	0	0	0		1	1	1	6	0	9
1982	0	0	0	1		0	0	3	12	30	46
1983	0	0	0	1		1	0	4	115	1	122
1984	0	0	0	0		1	1	7	76	0	85
1985	0	0	0	0	7	0	0	0	159	0	166
1986	0	0	0	0	1	1	0	1	7	2	12
1987	0	0	0	0	1	0	0	1	10	0	12
1988	0	0	0	0	0	0	1	1	28	3	33
1989	0	0	0	1	0	0	0	0	61	0	62
1990	0	0	0	0	0	0	0	5	7	1	13
1991	0	0	0	0	0	0	0	5	127	2	134
1992	0	0	0	0	0	0	0	2	138	0	140
1993	0	0	0	0	0	0	0	0	56	0	56
1994	0	0	0	0	0	0	0	0	22	5	27
1995	0	0	0	0	0	0	0	0	2	8	10
$Totals^b$	0	0	0	32	9	4	45	56	1259	54	1459
NOC ^c	28	26	28	47	22	36	57	58	40	35	377
$N(Na)^d$	0	0	0	7	3	4	7	18	30	11	80

TABLE 12. Notropis atherinoides: distribution the ten long-term fish-collecting sites on the NCR1976-1995.

-: No collections were made that year or data not available.

a Total number of N. atherinoides collected for the year.

b Total (sum) for each column.

c Number of collections at the site, 1976–95.

d Number of collections which contained N. atherinoides.

		1975-197	79	1	980-198	4]	1985–199)5	Last
Site	$\overline{\mathrm{NS}^a}$	NC ⁶	TC^{c}	NS	NC	TC	NS	NC	TC	collection
Turpin	0	0	0	178	3	6	12	5	21	1994
Beaver	0	0	0	0	0	6	0	0	19	1963
May	0	0	0	1	1	6	0	0	21	1982
Woodward	0	0	3	11	5	$\overline{14}$	0	0	30	1982
Seiling	0	0	0	0	0	0	0	0	22	
Watonga	0	0	3	0	0	10	0	0	23	
El Reno	0	0	8	0	0	16	0	0	33	
Harrah	0	0	10	0	0	16	0	0	32	
Wetumka	1	1	3	0	0	13	0	0	23	1979
Whitefield	0	0	3	0	0	11	0	0	20	
Totals	1	1	30	190	9	98	12	5	244	

 TABLE 13. The Arkansas River shiner (Notropis girardi): distribution for the ten long-term

 fish-collecting sites on the NCR 1976-1995.

a NS: Number of specimens of Notropis girardi collected.

b NC: Number of collections containing this species.
c TC = Total number of collections during period.
6 Site was dry at time of visit.

		1	T M10 T		AND A STATE	•	ා ත (ත	 0 	 0 	, D (>		н	M9 L9 T M10	++ ++		-	J	י היכ י	- כי נ							
		F	L9		1		<	0 0	0,	Ua	ບດ				L7 N	+	1		1	•	່ບເ							
			6	1	1	1	_	J.	_	_				田	M8					•	t -	¥ •	¥ ·	A				
			6W	1	1		ನ	VL	0	0	00				L5			Vľ	I	and a set of the set o	VL	ч	ს (:				
le 2.		ы	M8				ບ (0	0	0	0 0			D	L4	1	I	+ +	1	I	^ر ر	vart	H.	×				
Small letters indicate collections by others. Large letters indicate collections by ODEQ. See footnotes for key to other abbreviations. For identification of Segment and Site, see Table 2.		D	M7	_				0	0	0	0 0	5			M7	1			ပ	-	4 ·	A -	A ·	A				
Small letters indicate collections by others. Large letters indicate collections by ODEQ. See footnotes for key to other abbreviations. For identification of Segment and Site, see	Relative Abundance at Site		E	1	1	ł	VI	1	1	1	1		t Site		3 M6			ч	ပ	-			A ·					
ons by it and	dance			I	1	1	-	1	1	I	ı		ance a		M5 L3		-	с с	C I	с 1		0 0	2					
collecti	Abun	U	M6					0	0	0	00		Relative Abundance at Site	C	M4 M		1	ະ ວ	r –	ا ن د				A (
licate o on of S	elative	_	L3	I			VI		Vľ	VI	VI	5	lative .		T8 N		1		c				0					
ers ind tificati	В		M5	1		VI	r	0	0	0	0	-	Re		L2 '			1	-	I	υ	U	C	ဎ				
ge lett or iden										يم					M3	++++	-	ပ	ပ	I		A	C	A				
rs. Lar ons. Fe			M4			r	ч	0	0	VR	0	2		В	M2			٧٢	ပ	-		C	C	A			20-99 specimens;	ted.
y othe: reviatio			M3	va	-	ပ	ပ	0	0	VR	0	-			IW			Vľ	c	1	ļ	U	C	C			9 spec	e collec
tions b er abbi		B	M2		1	r	ပ	r	0	0	0	0			M12			1	۱				Α	υ	umou	ILOW IL): none collected
collect to oth												~			T3-7	1		ы	g	-			Α	c	ar.	by:	R r: VD))) 1) 1)
dicate or key	×		IW	Va		г	r	0	0	R	Ж	VR			LI					1	а	Ca	U	VR	hat ye	licated	nens;	inells;
ters in notes fo		A	M		-	ပ	ပ	1		0	0	0	ŝ	A	T1-2	0		ъ	в				0	1	ction t	neueu e is ind) specin	100-499 specimens;
nall let e footi	ardi		Ē	0		ပ	r		1	-	0		lutrens		IIM		-	а	ся	I		1	A	A	or colle	was cu ndance	r 5,000	-4,999 s
N N	Notropis girardi	Segment ->	Year	1925-1935	1936-1945	1946-1955	1956-1965	1966-1975	1976-1980	1981-1985	1986-1990	1991-1995	Cyprinella lutrensis	Segment⇒_	Years	1925-1935	1936-1945	1946-1955	1956-1965	1966-1975	1976-1980	1981-1985	1986-1990	1991-1995	No data or collection that year	++ Species was conected, number unknown. Relative abundance is indicated by:	VA va: over 5,000 specimens;	Ala: 200 Clc: 100

TABLE 14. Trends in relative abundance (numbers per collections) for *Notropis girardi* and *Cyprinella lutrensis* for years 1926–1995. Small letters indicate collections by others Targe letters indicate collections by ODEO.

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		n conce		mber of I			ted at Sit	e M#		· · · · · ·	Total
Year	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	$C.lu.^a$
1976		1		~			767	202			969
1977							2071	1064			3135
1978						997	5660	580	1805		9506
1979				1539	******	1681	1795	222	4293	0	9530
1980	1.100-1.10		A service.	486		505	1341	1332	4482	27	8173
1981	0^{b}	0^{b}	06	3412		2374	5488	2430	8413	1	22118
1982	59	22	229	1256	Reconstruction of	1825	1879	3878	1410	0	10558
1983	438	992	1471	2874		808	1752	4182	5230	23	17770
1984	23	176	2077	3827		2491	3065	1669	4448	1	17777
1985	180	361	807	2877	624	1021	3944	2333	2083	88	14318
1986	484	70	812	1582	232	436	726	4463	3707	149	12661
1987	280	483	965	1612	301	1055	444	2331	2538	0	10009
1988	329	768	433	292	106	461	2731	525	2489	77	8211
1989	379	211	432	267	113	916	2867	800	1949	3	7937
1990	593	418	1347	643	257	615	1444	2048	2194	3	9562
1991	248	313	3158	5903	1221	3102	2992	7271	5032	1	29241
1992	119	140	696	2759	1099	1288	1753	2854	4733	6	15447
1993	209	581	1166	1475	401	400	1330	355	2675	0	8592
1994	105	685	1225	1849	264	365	2496	2153	7542	33	16717
1995	170	850	754	586	1039	655	1674	3672	1226	0	10626
Sum^{c}	3616	6070	15572	33703	5657	20995	46219	44364	66249	412	215412
NOC^d	28	26	28	47	22	36	57	58	40	35	377
Ne	27	25	27	47	22	36	53	56	36	20	349
% ^f	9	18	40	49	42	63	83	50	75	9	

 TABLE 15. Red shiner (Cyprinellus lutrensis): distribution at the ten long-term fish-collecting sites on the NCR 1976-1995.

- No collections were made at that site in that year.

a Total number of C. lutrensis collected for the year.

b Site was dry that year.

c Total (sum) for each column.

d Number of collections at the site, 1976–95.

e Number of collections which contained C. lutrensis.

f Percent, by number, of C. lutrensis in collected fishes.

	1970	<u>5-1995.</u>	Number	of N. str	amine		ed at S	to M4			Total	No.
Veen	M1	M2	M3	M4	M5	M6				110	$N.st.^{a}$	
Year	1111		1110	11/14	1015	1010	M7	<u>M8</u>	M9	M10		$\frac{\operatorname{Cln}^{b}}{2}$
1976							5	9		-	14	2
1977					-	*******	27	18			45	6
1978				57		72	210	144	16		499	8
1979				32		45	30	1	15	0	123	15
1980				41		12	59	14	1	0	127	18
1981	0	0	0	649		103	84	0	68	0	904	19
1982	108	44	38	166		51	140	59	3	0	609	19
1983	712	1173	343	455		31	79	25	9	0	2827	21
1984	144	54	699	3074		248	96	129	9	0	4453	21
1985	631	941	535	631	143	432	328	158	0	0	3799	23
1986	422	202	190	332	17	128	21	22	1	0	1335	20
1987	117	166	216	123	8	49	6	1	2	0	688	20
1988	333	119	105	8	4	8	4	20	0	0	601	22
1989	122	77	272	36	0	16	15	61	6	0	605	28
1990	1353	495	143	106	6	16	8	3	5	0	2135	23
1991	578	799	642	827	0	56	12	11	25	0	2950	24
1992	176	852	189	1062	68	100	151	16	1	0	2615	24
1993	290	570	562	686	39	76	8	0	0	0	2231	21
1994	379	1117	954	1751	45	71	58	6	10	0	4391	23
1995	140	278	754	295	28	11	7	3	0	0	1516	20
Totals	^c 5505	6887	5642	10331	358	1525	1348	700	171	0	32467	377
NOC^d		26	28	47	22	36	57	58	40	35		377
N(Ns)		21	27	47	17	36	47	34	20	0		275

TABLE 16. Notropis stramineus: distribution at the ten long-term fish-collecting sites on the NCR 1976-1995.

No collections were made that year.
 a Total number of N. stramineus collected for the year.
 b Total number of collections for the year.

c Total (sum) for each column.

d Number of collections at the site.

e Number of collections which contained N. stramineus.

2	ee too	tnote	s for	key ti	o othe	r abbi	reviatio	See footnotes for key to other abbreviations. For identification of Segment and Site, see Table 2.	r ident	ificatio	n of S	egmei	nt and	Site,	see T	able 2								
										Re	Relative Abundance at Site	Abun	dance	at Sil	e									
Segment⇒								В						U			Π			ы		G.		5
Years	M11	H	3	IW	M12	M2	T2-3	T4-7	M16	M14	M3	L2	M4	M5	L3	M6	M7	L4	L5	M8 N	M9 I		T	M10
Notropis stramineus	amine	sna																						
1925 - 1935			ပ			I						I										1		
1936-1945	Vľ	г			I	1	1	-			۱	1		I	ł		1		1					
1946 - 1955	l	I	1	ł	I		ļ					Vľ	ч	I	1	1		-	1					
1956-1965	ပ	c	r	Vľ		Vľ	ပ	ပ			Vľ		ŗ		ч	1	1		1	,				
1966-1975	I		r		I	I			ł		ļ	VI	ပ	ပ	ម		+			1		, , ,	_	-
1976 - 1980			ပ	Vľ	I		-	1		ł	I	VI	Я		ч	\mathbf{Rc}	్ల		F	BC V	VR T	۔ + +	1	- 0
1981-1985		I	сR	υ		A	-		-		U	VI	A	Ч	ы	υ	0		•				1	
1986 - 1990	U	0	ж	U	ပ	C	Α	VR	1	I	C	VR	Ö	VR	VR	Я		VB	VB				_	
1991-1995	С		R	υ	ပ	A	Υ		-		U	VR	A	ч	VR	Я							, c	
Phenacobius mirabilis	mira	bilis																			1			,
1925 - 1935	VI			1		+ +				1				I			1		1	1	1	+	י + +	-
1936 - 1945			I				I					۱	I	I				1	1		1	- 1	- 1	
1946 - 1955		I	I		I	I					١	VI	+ +		1	1	1			1	1		-	
1956-1965	ల	I			VI	r		1012.000				I	Vľ	I	VI	++					vr -	1	, F	
1966 - 1975				l						I	١	I			Vľ			1	1	1	:	1	.	
1976 - 1980	I		VI	1				-	Vľ			νr	VR	1	VI	0	VR			vr0 V	V.B.	vr -	I	C
1981-1985			٧ſ	VR		Я			ļ	1	Я	0	Я	Я	VR	VR	VR					' ! 0	1	
1986 - 1990	VR		0	VR	VR	VR			VR	Я	VR	0	VR	VR	VR	VR	VR	1	-		: et		C	~ C
1991-1995	VR		0	VR	VR	VR	1		1		VR	0	R	VR	VR	VR	VR	ł			VR		0	0
No data or collection that year.	collec	ction	that	year.																				
++ Species was collected; number unknown.	as col	lected	l; nun	nber	unkno	wn.																		
Relative abundance is indicated by:	dance	IS IN(dicate	ed by:																				
VA va: over 5,000 specimens; Alar 500-4 000 specimens:	over 5,000 specimens; 500-4 999 specimens:	speci	mens		R r: 2	20-99	R r: 20-99 specimens; VRIvr: 1_10 specimens;	iens;																
	100–499 specimens;	vecime	ens;		. :0 1	10ne c	none collected	d. b																
	•																							

					mirabil	is colle	cted at	Site M	#		Total	No.
Year	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	$P.mi.^{a}$	$Cln.^{b}$
1976			—				0	0			0	2
1977							1	0			1	6
1978				8		0	1	0	1		10	8
1979				7		0	0	0	3	0	10	15
1980		<u></u>		4		0	0	0	0	0	4	18
1981	0	0	0	81		2	1	0	2	0	86	19
1982	0	0	16	32		1	1	1	3	0	54	19
1983	2	2	17	30	<u></u>	0	1	0	33	0	85	21
1984	0	0	17	174		3	0	1	0	0	195	21
1985	1	119	52	74	48	3	2	0	0	0	299	23
1986	2	9	14	22	2	2	2	11	5	0	69	20
1987	4	4	4	6	1	1	1	0	1	0	22	20
1988	0	5	5	1	9	0	0	11	2	0	33	22
1989	0	2	2	6	0	1	0	7	0	0	18	28
1990	4	9	22	8	7	3	0	0	5	0	58	23
1991	3	7	5	31	1	6	2	1	4	0	60	24
1992	0	9	3	144	7	16	12	0	16	0	207	24
1993	0	45	27	47	11	5	4	1	14	0	154	21
1994	5	26	18	61	48	3	3	1	1	0	166	23
1995	3	34	28	13	6	0	3	0	0	0	87	20
Totals ^c	24	271	230	749	140	46	34	34	90	0	1618	377
NOC^d	28	26	28	47	22	36	57	58	40	35		377
$N(Pm)^e$	10	19	23	37	16	14	19	10	17	0		165

TABLE 18. Phenacobius mirabilis: distribution at the ten long-term fish-collecting sites on the NCR 1976-1995.

- No data or collection that year.

a Total number of P. mirabilis collected for the year.

b Total number of collections for the year.

c Total (sum) for each column.

d Number of collections at the site, 1976-95.

e Number of collections which contained P. mirabilis.

			Number	of P. pr	romelas	collecte		ite M#			Total	No.
Year	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	$P.pr.^a$	$Cln.^{b}$
1976			*******			~	0	0			0	2
1977	—						5	11			16	6
1978				59		16	5	4	0		84	8
1979				32		381	6	0	0	0	419	15
1980				17		1	4	2	0	0	24	18
1981	0	0	0	521		56	1	3	0	0	581	19
1982	19	44	109	137		0	2	5	3	0	319	19
1983	116	128	454	679	_	19	2	13	0	0	1411	21
1984	11	1	477	404		8	7	70	0	0	978	21
1985	334	335	1475	268	349	92	32	34	0	0	2919	23
1986	628	38	110	132	16	6	3	189	0	0	1122	20
1987	195	426	65	118	4	0	0	1	0	0	809	20
1988	34	83	101	18	33	0	0	1	0	0	270	22
1989	42	46	126	26	3	0	0	6	0	0	249	28
1990	141	106	73	8	20	4	23	1	0	0	376	23
1991	127	262	523	293	87	45	8	10	0	0	1355	24
1992	15	399	199	407	310	92	25	1	0	0	1448	24
1993	126	213	710	290	194	13	26	6	0	0	1578	21
1994	147	444	263	1201	271	10	23	13	0	0	2372	23
1995	74	197	80	161	53	10	2	0	0	0	577	20
Totals	2009	2722	4765	4771	1340	753	174	370	3	0	13978	377
NOC^d	28	26	28	47	22	36	57	58	40	35		377
$N(Pp)^{\epsilon}$	26	25	27	44	20	24	24	29	1	0		220

 TABLE 19. Fathead minnow (*Pimephales promelas*) at the ten long-term fish-collecting sites on the NCR 1976-1995.

— No data or collection that year.

a Total number of P. promelas collected for the year.

b Total number of collections for the year.

c Total (sum) for each column.

d Number of collections at the site, 1976-95.

e Number of collections which contained P. promelas.

			Nur		P. vigi		ected at	Site M#	¢		Total	No.
Year	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	$P.vi.^a$	Cln^b
1976							0	0			0	2
1977			_				41	1			42	6
1978				6		21	5	7	3		42	8
1979		******		5		4	0	8	10	0	27	15
1980		—		6	-	5	0	16	20	1	48	18
1981	0	0	0	10		14	7	6	29	16	82	19
1982	0	0	0	12		0	10	9	21	1	53	19
1983	0	0	23	73		5	1	21	67	15	205	21
1984	0	0	3	53		24	1	4	267	0	352	21
1985	0	0	5	3	0	12	19	44	20	39	142	23
1986	0	1	0	16	1	1	7	173	57	11	267	20
1987	0	1	0	4	0	5	3	44	143	0	200	20
1988	0	0	0	22	0	10	7	3	132	1	175	22
1989	0	0	0	4	3	14	12	23	95	0	151	28
1990	0	0	4	36	9	17	39	50	91	0	246	23
1991	0	0	0	167	169	24	27	430	412	0	1229	24
1992	0	0	1	32	7	16	39	74	139	2	310	24
1993	0	0	1	26	40	3	14	114	190	1	389	21
1994	0	0	2	95	15	6	78	365	766	80	1407	23
1995	0	0	0	0	3	34	8	683	57	0	785	20
Totals ^c	0	2	39	570	247	215	318	2075	2519	167	6152	377
NOC^d	28	26	28	47	22	36	57	58	40	35		377
$N(Pv)^e$	0	2	8	38	14	29	32	42	38	13		216

TABLE 20. Pimephales vigilax: distribution at the ten long-term fish collection sites on the NCR 1976-1995.

- No data or collection that year.

a Total number of P. mirabilis collected for the year.

b Total number of collections for the year.

c Total (sum) for each column.

d Number of collections at the site, 1976–95.

e Number of collections which contained P. mirabilis.

TABLE 21. Trends in relative abundance (numbers per collections) for <i>Pimephales vigilax</i> and <i>Pimephales promelas</i> for years 1926–1995. Small letters indicate collections by others. Large letters indicate collections by ODEQ. See footnote for key to other abbreviations. For identification of Segment and Site, see Table 2.	nds in all lett	Trends in relative abundance (numbers per collections) for <i>Pimephales vigilax</i> and <i>Pim</i> Small letters indicate collections by others. Large letters indicate collections by ODEQ. See footnote for key to other abbreviations. For identification of Segment and Site, see	abundi ate col ey to o	ance (1 lection ther al	numbei s by o brevia	(numbers per one by others. abbreviations.	collections) for <i>Pimephales vigilax</i> and <i>Pimephales</i> Large letters indicate collections by ODEQ. For identification of Segment and Site, see Table 2.	ons) fo etters entifice	r Pim indicat	ephale. te coll f Segn	s vigila ections tent an	x and by OI d Site,	Pimep)EQ. see T	hales p ble 2.	romela	s for ye	ars 19	26–199	5.		
Pimephales vigilax	igilax								Relat	ive Ab	Relative Abundance at Site	ce at S	ite								
Segment⇒			в					ပ								Ш		G.		9	
.	Ml	M2	M3	L2		T8	M4	M5	L3	1	M6	M7	L4		L5 1	M8	L7	M9	$\Gamma 0$	M10	0
1925-1935	I	1	+ +			1		٧٢			1							1			.
1936 - 1945			1		,	I		1	I	1	1	1		1	,	I		l			
1946 - 1955			Vľ	I	r	VI	VI	VI	I	1		1		VL		VI	VI	ပ			
1956–1965				I		Vľ		1	ъ			+++++++++++++++++++++++++++++++++++++++		I	'	1		ပ	ပ	VI	
1966-1975	1				•	1		I	L			Vľ		VL		VI		-	с	1	
1976–1980				ပ	1	1	VR		C		VR	VR	VI	VL		Я		VR	ფ	VR	_ `
1981-1985	0	0	VR	с С	1	I	Я	0	U		VR	VR	ΝΓ	0c		VR	0	Я	ಸ	VR	
1986-1990	0	VR	VR	U I	- × ·	VR	VR	VR	0		VR	VR	Ч	0		8	0	υ	Я	VR	
1991-1995	0	0	VR	C		R	VR	R	0		VR	ж	щ	0		A	0	U	U	VR	
Pimephales promelas	romela	3																			
								_	Relativ	e Abu	Relative Abundance at Site	at Sit	e								
Segment⇒		A					в					0			D		Э		н	C	1
Years T1	T2	M11	L1	M1 N	M12	M2	M13	T5	T3 N	M3 I	L2 M4	4 M5	5 L3	M6	M7	L4	M8	L5	M9 L9	01M (0
1925–1935 c	I	I	1	r		r		1											 ++		.
1936 - 1945								1		1	++	+	++		ł					1	
1946–1955 —		r	-	VI	VI			٧ſ		-	T I			1	r		I	r		1	
1956–1965 —		r	l	Vľ	ပ	ပ	с	٧ľ	, VI	- TV	– VI	1	va		ပ			I	r I	L L	
1966 - 1975		ł	r	Vľ				I	1	-	г 		ы		ц					-	
1976–1980 —			J	1		1	с U				vr VJ					r	rO	ł	с 		
1981 - 1985			c	с С		U		1		A	C L	C		r R	VR		Я		VR vr	0	
1986–1990 C	U	Я	U	U U	R	U	VR	VR	с С		RR		« VR				ч		- 0	0	
1991-1993		Я	C	с	A	C			-								\mathbf{VR}		0	0	
0 0	collecti s collec ance is ,000 sp	on that ted; nur indicaté ecimens	year. nber ur ed by: ; R	unknowi : R r: 20	1. -99 sp	own. 20-99 specimens;	ŝ														
Ala. 300-4 C c: 100-4	100-499 specimens;	100–499 specimens;		v n/vr: 1-13 specimens; 0: none collected.	1-19 specimen none collected	ected.															

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