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A PRELIMINARY CHECKLIST OF THE FISHES OF CADDO LAKE IN NORTHEAST TEXAS

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Abstract.—Based upon both historical records and recent collections, a total of 86 species of fish in 19 families are reported from Caddo Lake in northeast Texas. A large fraction of these are both native and essentially freshwater species; only four are introduced (*Cyprinus carpio, Morone chrysops, M. saxatilis* and *Stizostedion vitreum*) and only two migrate from estuaries (*Alosa crysochloris* and *Anguilla rostrata*). This diversity represents more than half of the native nonestuarine species known from Texas. Seventeen additional species which are expected to occur in Caddo Lake are also reported. The fish diversity of Caddo Lake is compared with other regions of North America.

The extraordinary diversity of Caddo Lake freshwater fishes is undoubtedly related to its unique habitat diversity and minimal human disturbance. Many Texas streams have had substantial anthropogenic changes (Anderson et al. 1995; Hubbs et al. 1997). Additionally, among Texas waters it is close to the center of North American freshwater fish diversity that is greatest in the southern Appalachian region, and which tends to decrease with distance from that focal center (Hocutt & Wiley 1986). Nevertheless, Caddo Lake is unique for Texas as a relatively undisturbed and biologically diverse ecosystem.

This study is based upon both historical records as well as recent collections. Voucher specimens are deposited with the holdings of the Texas Cooperative Wildlife Collection (TCWC) of Texas A&M University, the Texas Natural History Collection (TNHC) of the University of Texas at Austin, the University of Louisiana at Monroe (NLU), the Strecker Museum (SM) of Baylor University and the Oklahoma State University Collection (OSUS). However, many of the species reported in this study were collected only by the late Robert J. Kemp who was the resident biologist in Marshall with the Texas Game and Fish Commission for more than 20 years. Both the presence and identification of specimens of these species was earlier verified by the author. Unfortunately, these reference collections were discarded by later workers. Those species noted with an asterisk (*) are those which were collected by Robert J. Kemp.

DOCUMENTED SPECIES

Family Petromyzontidae

Ichthyomyzon castaneus.—The chestnut lamprey is a parasitic lamprey that is well known in the Austroriparian area.

Material examined.—TCWC 38701.

Family Polyodontidae

**Polyodon spathula.*—This species is considered a species of concern by Texas Parks and Wildlife. Paddlefish have declined recently as a result of dams that are barriers to their migration.

Family Lepisosteidae

**Lepisosteus osseus.*—The longnose gar is abundant throughout Texas and is a major predator on all fish and competitor to largemouth bass. Like all gars, it has limited gill capacity and often has to breathe atmosphere air. Like all gars, it has a ganoid scale armor that provides protection against most predators.

Lepisosteus oculatus.—The spotted gar is widely distributed in the Austroriporian. Like the longnose gar, it is a major fish predator and competitor with largemouth bass.

Material examined.—TCWC 31902.

**Lepisosteus platostomus.*—The shortnose gar is widely distributed in the Austroriparian. Like all gars, it is a major fish predator and a competitor with largemouth bass.

**Lepisosteus spatula.*—The alligator gar is the largest gar and widely distributed in east Texas. As a large predator fish it eats many fish.

Family Amiidae

Amia calva.—The bowfish is widely distributed in the Austroriparian. Like the gars, it is predacious on fish and competes with largemouth bass.

Material examined.—TCWC 50501.

Family

**Anguilla rostrata.*—The Americ
the Sargassa Sea. Dams have prec
Caddo Lake.

Family

**Alosa chrysochloris.*—Shipjack
in the lower Mississippi and Red

Dorosoma cepedianum.—Gizzar
It is often considered a troublesom
that they dominate the food chain i
game fish. Adults are too large t

Material examined.—TNHC 19

**Dorosoma petenense.*— Threac
often die during cold winters. The
Guatamala's Lake Peten. They co
too large to be eaten by game fish

Family

**Cyprinella lutrensis.*—The red
has been widely used as a bait fis
areas and causes major problems
Canyon.

**Cyprinella venusta.*—The black
of Texas. It formed a hybrid swa
a gravel pit in the Guadalupe Rive
from the river the hybrid number

Family C

**Cyprinus carpio.*—Common ca
States. It was introduced into Nor
sion in the 1800's as a food and ga
in Texas by the first Game and F
successful and so harmful to the
mission was dissolved by the legi

MENTED SPECIES

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31902.

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nily Amiidae

widely distributed in the Austroriparian. on fish and competes with largemouth

50501.

Family Anguilidae

**Anguilla rostrata*.—The American eel is catadromous and breeds in the Sargassa Sea. Dams have precluded young elvers from repopulating Caddo Lake.

Family Clupeidae

**Alosa chrysochloris*.—Shipjack herring is an estuarine fish and dams in the lower Mississippi and Red rivers have precluded repopulation.

Dorosoma cepedianum.—Gizzardshad are abundant in most of Texas. It is often considered a troublesome fish as they can become so abundant that they dominate the food chain in reservoirs and reduce abundance of game fish. Adults are too large to be prey to most game fish.

Material examined.—TNHC 1910.

**Dorosoma petenense*.— Threadfin shad are southern in origin and often die during cold winters. The original specimens were collected in Guatamala's Lake Peten. They compete with gizzard shed and never get too large to be eaten by game fish.

Family Cyprinidae

**Cyprinella lutrensis*.—The red shiner is native to most of Texas. It has been widely used as a bait fish and has been introduced into many areas and causes major problems in the Colorado River near Grand Canyon.

**Cyprinella venusta*.—The blacktail shiner is native to the eastern half of Texas. It formed a hybrid swarm with red shiners downstream from a gravel pit in the Guadalupe River. After that wash water was removed from the river the hybrid number diminished.

Family Catostomidae

**Cyprinus carpio*.—Common carp are now widespread in the United States. It was introduced into North America by the U.S. Fish Commission in the 1800's as a food and game species. It was widely distributed in Texas by the first Game and Fish Commission. That effort was so successful and so harmful to the native game fishes that the first Commission was dissolved by the legislature after five years.

**Hybognathus hayi*.—The cypress minnow is abundant in the Austroriparian. Like all minnows and shiners it is an essential part of the food chain.

Hybognathus nuchalis.—The Mississippi silvery minnow is abundant in the Austroriparian.

Material examined.—TNHC 1303.

**Luxilis chrysocephalus*.—The striped shiner is abundant in the Austroriparian.

**Lythurus fumeus*.—The ribbon shiner is abundant in the Austroriparian.

**Lythurus umbratilis*.—The redfin shiner is abundant in the Austroriparian.

**Notemigonus crysoleucas*.—The golden shiner is abundant in the eastern half of the United States. It is extensively used as a bait fish and scattered populations now occur in western states.

**Notropis amnis*.—The pallid shiner is widely distributed in the Austroriparian. It has a distensible ventral mouth and feeds on the lake bottom.

Notropis atherinoides.—The emerald shiner is widely distributed in the eastern United States. It is commonly abundant in lakes but not so in Texas reservoirs.

Material examined.—TNHC 1306.

**Notropis atrocaudalis*.—The blackspot shiner is widely distributed in the Austroriparian and is common in east Texas clear creeks.

Notropis blennius.—The river shiner is widely distributed in Austroriparian rivers.

Material examined.—TNHC 5635.

Notropis chalybeus.—The ironcolor shiner is scarce in Astroriparian creeks.

Material examined.—TNHC 1420.

Notropis maculatus.—The taill
creeks.

Material examined.—TCWC 31

Notropis texanus.—The weed
creeks.

Material examined.—NLU 658

Notropis volucellus.—The mimi
creeks.

Material examined.—TNHC 81

Notropis hubbsi.—The bluehead
natural lakes. It has been collecte

Material examined.—TNHC 39

Opsopoeodus emiliae.—The p
Astroriparian. It has a distensibl
on the button.

Material examined.—TNHC 13

**Pimephales vigilax*.—The bul
Austroriparian.

**Semotilus atromaculatus*.—The
United States. It is a large piscivo
game fish.

Family C

**Carpiodes carpio*.—The river
having a ventral mouth and feedi
over most of Texas and often is v

**Erimyzon oblongus*.—The creek
the eastern United States. It has a
the South Guadalupe River and on
Amistad Reservoir was constructe

press minnow is abundant in the Austrori-
shiners it is an essential part of the food

e Mississippi silvery minnow is abundant

1303.

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5635.

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1420.

Notropis maculatus.—The taillight shiner is scarce in Austroriparian creeks.

Material examined.—TCWC 319010.

Notropis texanus.—The weed shiner is abundant in Austroriparian creeks.

Material examined.—NLU 65871.

Notropis volucellus.—The mimic shiner is abundant in Austroriparian creeks.

Material examined.—TNHC 8132.

Notropis hubbsi.—The bluehead shiner is often found in cypress filled natural lakes. It has been collected in Texas only in Caddo Lake.

Material examined.—TNHC 3965.

Opsopoeodus emiliae.—The pugnose minnow is abundant in the Astroriparian. It has a distensible ventral mouth and commonly feeds on the button.

Material examined.—TNHC 1302.

**Pimephales vigilax*.—The bullhead minnow is abundant in the Austroriparian.

**Semotilus atromaculatus*.—The creek chub is abundant in eastern United States. It is a large piscivorous minnow that may compete with game fish.

Family Catostomidae

**Carpiodes carpio*.—The river carp sucker is like most suckers in having a ventral mouth and feeding on the lake bottom. It is abundant over most of Texas and often is very abundant in reservoirs.

**Erimyzon oblongus*.—The creek chubsucker is abundant in streams in the eastern United States. It has a small population in the headwaters of the South Guadalupe River and once occurred in the Devils River before Amistad Reservoir was constructed.

**Erimyzon succetta*.—The lake chubsucker is abundant in lakes in the eastern United States.

**Ictiobus bubalus*.—The smallmouth buffalo is abundant in the eastern United States. Like all buffalo they may become excessively abundant in Texas reservoirs.

**Ictiobus cyprinellus*.—The bigmouth buffalo is abundant in the eastern United States. Like all buffalo they may become excessively abundant in Texas reservoirs.

**Ictiobus niger*.—The black buffalo is abundant in the eastern United States. Like all buffalo they may become excessively abundant in Texas reservoirs.

Minytrema melanops.—The spotted sucker is abundant in the Austroriparian.

Material examined.—TNHC 1911.

Family Ictaluridae

**Ameiurus melas*.—The black bullhead is abundant in the eastern United States. Like most bullheads, this species seldom gets large enough to be eaten by humans. Small black bullheads have pectoral and dorsal spines with a very painful toxin when penetrating skin.

**Ameiurus natalis*.—The yellow bullhead is abundant in the eastern United States.

**Ictalurus furcatus*.—The blue catfish is abundant in eastern United States. This catfish grows to large size and is often used for human food consumption.

**Ictalurus punctatus*.—The channel catfish is abundant in eastern United States. This catfish is extensively used in aquaculture. It is more common in streams than the blue catfish.

Noturus gyrinus.—The tadpole madtom is abundant in the Austroriparian. The common name of this small fish is derived from its ability to inflict painful stings.

Material examined.—TNHC 1305.

**Noturus nocturnus*.—The freckl
riparian. Like *Noturus gyrinus*, it

**Pylodictis olivaris*.—This large
States. It is commonly used by p

Family

Esox americanus.—The grass p
States. This is a small pickerel a

Material examined.—TNHC 14

Esox niger.—The chain pickere
This moderate sized pickerel is us

Material examined.—TNHC 13

Family Ap

Aphredoderus sayanus.—The
Austroriparian. It's anus migrate
that it is located in its throat. It i

Material examined.—TNHC 14

Family Cy

Fundulus chrysotus.—The gol
Austroriparian. Like all topminn
and is a part of the food chain.

Material examined.—NLU 658

Fundulus dispar.—The starh
Austroriparian.

Material examined.—TNHC 9

Fundulus notatus.—The black
parian.

Material examined.—TNHC 1

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mouth buffalo is abundant in the eastern
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le madtom is abundant in the Austrori-
his small fish is derived from its ability

1305.

**Noturus nocturnus*.—The freckled madtom is abundant in the Austroriparian. Like *Noturus gyrinus*, it can inflict painful stings.

**Pylodictis olivaris*.—This large catfish is common in eastern United States. It is commonly used by poachers.

Family Esocidae

Esox americanus.—The grass pickerel is abundant in eastern United States. This is a small pickerel and seldom used as a game fish.

Material examined.—TNHC 1490.

Esox niger.—The chain pickerel is common in eastern United States. This moderate sized pickerel is used as a game fish.

Material examined.—TNHC 1306.

Family Aphredoderidae

Aphredoderus sayanus.—The pirate perch is abundant in the Austroriparian. It's anus migrates anteriorally during development so that it is located in its throat. It incubates its eggs in its gill pouch.

Material examined.—TNHC 1494.

Family Cyprinodontidae

Fundulus chrysotus.—The golden topminnow is abundant in the Austroriparian. Like all topminnows this species feeds on the surface and is a part of the food chain.

Material examined.—NLU 65864.

Fundulus dispar.—The starhead topminnow is abundant in the Austroriparian.

Material examined.—TNHC 936.

Fundulus notatus.—The blackstripe topminnow is in the Austroriparian.

Material examined.—TNHC 1308.

Fundulus olivaceous.—The blackspotted topminnow is similar to the black stripe topminnow but tends to be more common in headwaters.

Material examined.—TCWC 319009.

Family Poeciliidae

Gambusia affinis.—The western mosquito fish is abundant all over Texas. It is viviparous and produces living young. It has been extensively used by mosquito control agencies as they feed on mosquito larvae. Together with its near relative (*G. holbrooki*) they are found in all continents except Antarctica. Their use has been detrimental to many native fishes which are as good in controlling mosquito abundances.

Material examined.—TNHC 1307.

Family Atherinidae

Labidesthes sicculus. The brooksilverside is abundant in eastern United States streams. It can be very abundant in lakes and reservoirs in the absence of other silversides.

Material examined.—TNHC 1320.

Menidia beryllina.—The inland silverside is abundant in eastern United States estuaries and adjacent rivers. It is native to Caddo Lake. It has been introduced widely into Texas reservoirs where it flourishes. Its abundance is in part due to high reproduction rate. A female lays up to 1000 eggs daily comprising 6% of her biomass for four summer months. As the season progresses males become much less abundant as they are readily consumed by bass while in pursuit of females.

Material examined.—TNHC 1419.

Family Percichthyidae

**Morone chrysops*.—The white bass is native to eastern states. It is probably an exotic in Caddo Lake as they are known to be native in Texas only in the downstream reach of the Red River. It has been widely introduced into Texas reservoirs as a game fish.

Morone mississippiensis.—The yellow bass is abundant in the Austroriparian. It is not extensively used as a game fish as it is

relatively small.

Material examined.—TNHC 19

**Morone saxatilis*.—The striped
has been widely introduced int
Striped bass and white bass hybri

Family C

Elassoma zonatum.—The band
filled Austroriparian waters. It i
a game fish.

Material examined.—TNHC 1

**Centrarchus macropterus*.—Th
parian. It is of moderate size
fishermen.

Lepomis cyanellus.—The gree
United States. Its moderate size r

Material examined.—SM 1520

Lepomis gulosus.—The warmn
States. Its moderate size leads to
green sunfish it has a relatively l

Material examined.—TNHC 1

Lepomis macrochirus.—The
eastern United States. Its relati
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Texas natives and are often cons

Material examined.—TNHC 1

Lepomis marginatus.—The do
Austroriparian. It is too small t

Material examined.—TNHC 1

Lepomis megalotis.—The long

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reservoirs as a game fish.

The yellow bass is abundant in the
tensively used as a game fish as it is

relatively small.

Material examined.—TNHC 1912.

**Morone saxatilis.*—The striped bass is native to Atlantic estuaries. It has been widely introduced into Texas reservoirs as a game fish. Striped bass and white bass hybrids are also used as game fish.

Family Centrarchidae

Elassoma zonatum.—The banded pigmy sunfish is abundant in creek filled Austroriparian waters. It is vastly too small to be considered as a game fish.

Material examined.—TNHC 1312.

**Centrarchus macropterus.*—The flier is abundant in the Austroriparian. It is of moderate size and not extensively used by sport fishermen.

Lepomis cyanellus.—The green sunfish is abundant in the eastern United States. Its moderate size means moderate use as a game species.

Material examined.—SM 1520.

Lepomis gulosus.—The warmmouth is abundant in the eastern United States. Its moderate size leads to minimal use as a game fish. Like the green sunfish it has a relatively large mouth for a sunfish of its size.

Material examined.—TNHC 1319.

Lepomis macrochirus.—The bluegill is widely distributed in the eastern United States. Its relative large size makes it a sought after game fish. Atlantic coastal populations tend to be heavier than the Texas natives and are often considered a better game fish.

Material examined.—TNHC 1318.

Lepomis marginatus.—The dollar sunfish is widely distributed in the Austroriparian. It is too small to be used as a game fish.

Material examined.—TNHC 1314.

Lepomis megalotis.—The longear sunfish is abundant throughout the

eastern United States. It is too small to be used extensively as a game fish.

Material examined.—TNHC 1496.

Lepomis microlophus.—The redear sunfish is common in the Austroriparian. It is relatively large for a sunfish and is extensively used as a game fish.

Material examined.—TNHC 1313.

Lepomis punctatus.—The spotted sunfish is abundant in the Austroriparian. It is relatively small and little used as a game fish.

Material examined.—TNHC 1315.

Lepomis symmetricus.—The bantam sunfish is abundant in the Austroriparian. It is much too small to be used as a game fish.

Material examined.—TNHC 1316.

**Micropterus punctulatus.*—The spotted bass is abundant in the Austroriparian. It is extensively used as a game fish.

Micropterus salmoides.—The largemouth bass is widely abundant in the eastern United States. It is the prime freshwater game fish in the United States and subsequently introduced into temperate waters world wide. The Florida subspecies is even longer and more sought after as a game fish. F_1 hybrids have excellent growth and make trophy fish. Unfortunately backcross hybrids have lost that heterotic trait.

Material examined.—TNHC 1317.

**Pomoxis annularis.*—The white crappie is native to the eastern United States. It is widely used as a game fish.

Pomoxis nigromaculatus.—The black crappie is native to the eastern United States. It also is widely used as a game fish.

Material examined.—TNHC 1502.

Family Percidae

**Ammocrypta vivax.*—The scaly sand darter is native to the Austrori-

parian. Like all darters adult sand
and thus are bottom fish. All a
change and evidence of human di

**Etheostoma asprigene.*—The n
parian.

Etheostoma chlorosomum.—Th
Austroriparian.

Material examined.—TNHC 6

Etheostoma fusiforme.— Like
darter is Austroriparian.

Material examined.—OSUS 47

Etheostoma gracile.—The slou

Material examined.—TNHC 1

**Etheostoma histrio.*—The harl
piles in the Austroriparian.

Etheostoma proeliare.—The c

Material examined.—TNHC 9

**Percina macrolepida.*—The b
Texas. It is one of the largest d

**Percina maculata.*—The black

**Percina shumardi.*—The river
eastern United States. It was
Lake.

**Percina sciera.*—The dusky
United States.

**Stizostedion vitreum.*—The wa
in the United States. They have
sport fish.

is too small to be used extensively as a game

'NHC 1496.

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NHC 1317.

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ıs a game fish.

s.—The black crappie is native to the eastern
idely used as a game fish.

NHC 1502.

Family Percidae

e scaly sand darter is native to the Austrori-

parian. Like all darters adult sand darters have a reduced swim bladder and thus are bottom fish. All are also susceptible to environmental change and evidence of human disturbances.

**Etheostoma asprigene*.—The mud darter is native to the Austroriparian.

Etheostoma chlorosomum.—The bluntnose darter is common in the Austroriparian.

Material examined.—TNHC 65867.

Etheostoma fusiforme.— Like many Caddo Lake darters, the swamp darter is Austroriparian.

Material examined.—OSUS 4731, 4732.

Etheostoma gracile.—The slough darter is Austroriparian.

Material examined.—TNHC 1311.

**Etheostoma histrio*.—The harlequin darter lives in submerged brush piles in the Austroriparian.

Etheostoma proeliare.—The cypress darter is Austroriparian.

Material examined.—TNHC 927.

**Percina macrolepida*.—The bigscale logperch is native to eastern Texas. It is one of the largest darters.

**Percina maculata*.—The blackside darter is Austroriparian.

**Percina shumardi*.—The river darters occurs in large streams in the eastern United States. It was however collected well within Caddo Lake.

**Percina sciera*.—The dusky darter occurs throughout the eastern United States.

**Stizostedion vitreum*.—The walleye is native to more northern waters in the United States. They have been introduced widely in Texas as a sport fish.

Family Scienidae

**Aplodinotus grunniens*.—The freshwater drum is native to the eastern United States.

Species of Probable Occurrence

Seventeen additional species are likely to occur in Caddo Lake. Other than the state fishery biologists who focus on game species, fewer than 20 collections have been taken from Caddo Lake.

Ichthyomyzon gagei.—The southern brook lamprey is Austroriparian. This species is non parasitic. In effect it skips the parasitic phase and dies shortly after its first breeding.

Macrohybopsis aestivalis.—The speckled chub is Austroriparian.

Notropis bairdi.—The Red River shiner is native to the Red River system of Texas and Oklahoma.

Notropis buchanani.—The ghost shiner is native to the eastern United States.

Notropis potteri.—The chub shiner is native to eastern Texas and Oklahoma.

Notropis stramineus.—The sand shiner is native to the eastern United States.

Phenacobius mirabilis.—The suckermouth minnow is native to the eastern United States.

Cycleptus elongates.—The blue sucker is native to the Austroriparin. Populations often are reduced by dams that block spawning migrations.

Moxostoma poecilurum.—The blacktail red horse is native to the Austroriparian.

Heterandria formosa.—The least killifish is a small species in the Astroriparian.

Table 1. Numbers of known fish species in
Parentheses indicate number of probable

Region	Number of native freshwater fish	ir
Caddo Lake	80 (+15?)	
Edwards Plateau	55	
Trans-Pecos	48 (+1?)	
Austroriparian	96	
Utah	26	
New Mexico	71	
Arizona	26	
Nevada	33	
California	63	
Montana	52	
Alberta, Canada	51	

Lepomis auritus.—The redbrea
As a large sunfish it has been wi

Lepomis humilis.—The oranges
the eastern United States.

Ammocrypta clara.—The west

Etheostoma parvipinne.—The
occurance in Caddo Lake might

Tilapia aurea.—Blue tilapia
facilities and caused serious prob

Tilapia mossambica.—The Mos
aquaculture facilities.

Mugil cephalus.—The striped
found far upstream in the eastern

Dis

The biodiversity of Caddo Lak
extensively by comparison with t
Plateau and Trans-Pecos (Table
waters upstream from, and west,
The Edwards Plateau has 55 na
Trans-Pecos has 48 native (and o
(Hubbs et al. 1991).

ıily Scienidae

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ROBABLE OCCURRENCE

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Table 1. Numbers of known fish species in Texas localities and western states or territories. Parentheses indicate number of probable species.

Region	Number of native freshwater fish	Number of introduced freshwater fish	Source
Caddo Lake	80 (+15?)	4 (+3)	This study
Edwards Plateau	55	13	Hubbs et al. (1991)
Trans-Pecos	48 (+1?)	13	Hubbs et al. (1991)
Austroriparian	96	12	Hubbs et al. (1991)
Utah	26	30	Sigler & Miller (1963)
New Mexico	71	25	Sublette et al. (1990)
Arizona	26	61	Minckley (1973)
Nevada	33	28	La Rivers (1994)
California	63	49	Moyle (1976)
Montana	52	128	Brown (1971)
Alberta, Canada	51	8	Nelson & Paetz (1992)

Lepomis auritus.—The redbreast sunfish is native to east coast states. As a large sunfish it has been widely introduced in Texas.

Lepomis humilis.—The orangespot sunfish is a small sunfish native to the eastern United States.

Ammocrypta clara.—The western sand darter is Austroriparian.

Etheostoma parvipinne.—The goldstripe darter is Austroriparian. Its occurance in Caddo Lake might be only near creek inlets.

Tilapia aurea.—Blue tilapia has escaped widely from aquaculture facilities and caused serious problems to native fishes.

Tilapia mossambica.—The Mossambique tilapia also has escaped from aquaculture facilities.

Mugil cephalus.—The striped mullet is estuarine but commonly is found far upstream in the eastern United States.

DISCUSSION

The biodiversity of Caddo Lake fishes can be illustrated much more extensively by comparison with two studied Texas regions, the Edwards Plateau and Trans-Pecos (Table 1). The latter is defined to include all waters upstream from, and west, of the Rio Grande/Pecos confluence. The Edwards Plateau has 55 native and 13 introduced species. The Trans-Pecos has 48 native (and one probable) and 13 introduced species (Hubbs et al. 1991).

Additionally Caddo Lake itself has 82% of the fish species known for east Texas. This contrasts to other east Texas reservoirs that contain less than half of the east Texas fishes. State/province fish numbers also shows the regional diversity of Caddo Lake fish fauna (Table 1). The regional data cover vastly more area and isolated drainages, compared to that of Caddo Lake. Caddo Lake has more native fishes and many fewer exotics, showing it to be relatively unimpacted by fish introductions.

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MORTALITY OF BL
IN THREE FISHI
ON LAKE AM

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and Gene
Wildlife and Fisheries Mana
Texas Tech University,
**Amistad National Recre*
Del Rio,

Total mortality of black bass (*Micropteru*
on Lake Amistad, Texas, ranged from 0.
temperature. Total mortality in tournament
47.2%, respectively) was considerably great
based on a model that predicts mortality as
in these tournaments probably was relatec
(August) and depressurization illness (Septe
(0.3%), held in March 1999, was less than

Competitive fishing events (fish
contests and other events in whicl
inducements), particularly for blac
an important use of freshwater
(Shupp 1979; Duttweiler 1985; Sc
of black bass anglers participate
1998a). Despite the popularity
angling is at times a contentio
management agencies expressing
biological impacts (Schramm et a
anglers who do not participate in
fish captured and released in tour
1998a). Also, most (51%) of thes
is negatively impacted by tournan

Although tournament-associatec
since the 1970s (Holbrook 1975
change since the 1980s. Total
released fish averaged 26.2% in
although it may be substantially lo
those conducted in winter and sp
need to document mortality of fish
and, especially, the rules and co