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AN ANNOTATED CHECKLIST OF THE FRESHWATER FISHES OF TEXAS, WITH KEYS TO IDENTIFICATION OF SPECIES

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Preface to the Second Edition

Since our original key to the fishes of Texas was published(Hubbs,et.al, 1991), several changes to the fish fauna of Texas have occurred. The number of recognized species and subspecies found inhabiting the state's freshwaters has increased by 21 species since our original key was published to the presently recognized 268 taxa. Many of the additions have come from newly collected forms, often as a result of introductions and from the division of existing species into more than one group resulting from recent advances in molecular genetics studies. One of the newly discovered species, *Gambusia clarkhubbsi* from San Felipe Creek in Del Rio, was named in honor of Dr. Clark Hubbs. One of the most significant trends we have noted is the continued decline of the state's native fish fauna. We note herein that nearly 40% of the state's fishes are of conservation concern and in need of some form of protection. This is nearly twice as many as were considered in need of protection in our first edition.

We have reworked portions of the original key and corrected many of the errors; added a glossary at the end in response to many requests for such; combined and expanded several of our original tables into one summary table of the status of all recognized Texas species; and updated the species accounts as needed.

Finally, we mourn the passing of Clark Hubbs, who died in early February 2008 and who initiated this effort nearly 60 years ago. Without his input and guidance, this key might have never been published.

Robert J. Edwards and Gary P. Garrett
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AN ANNOTATED CHECKLIST OF THE FRESHWATER FISHES OF TEXAS WITH KEYS TO THE IDENTIFICATION OF SPECIES

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ABSTRACT—Forty-nine families and 268 species of fishes are known to inhabit the freshwaters of Texas. We report on the distribution and status of these fishes and provide a key to their identification. Of the native fishes originally found in Texas, five taxa, *Cyprinella lutrensis blairi* (Maravillas red shiner), *Notropis orca* (phantom shiner), *N. simus simus* (Rio Grande bluntnose shiner), *Gambusia amistadensis* (Amistad gambusia) and *G. georgei* (San Marcos gambusia) are apparently extinct, and four, *Hybognathus amarus* (Rio Grande silvery minnow), *Notropis simus pecosensis* (Pecos bluntnose shiner), *Oncorhynchus clarki virginalis* (Rio Grande cutthroat trout) and *Gambusia senilis* (blotched gambusia) appear to be extirpated from the state. Over 40 percent of the remaining primary freshwater species are of conservation concern and in some need of protection. Key Words: Texas fishes, dichotomous keys, fish distribution, checklist.

The freshwater fish fauna of Texas is conspicuous in its diversity and high degree of endemism. Contributing factors include the large geographic area covered by the state, the number of discontinuous drainages and the diversity of hydrographic features. Equally important however, is the fact that Texas occupies a broad transition zone between several major physiographic provinces of North America and encompasses a large number of distinctive biotic zones (Hubbs, 1957a; Edwards et al., 1989). More than 70 percent of the 268 species we recognize spend all or a significant portion of their lives in freshwater. Although the remaining species are primarily estuarine or marine, they may be found in low salinity habitats, some of these may also spend all or nearly all of their life in freshwater as well. A precise separation is quite subjective as many streams (e.g., Pecos, Brazos, and Wichita rivers) commonly have salinities higher than those in the tidally influenced Sabine Lake.

The number of fish species historically recognized as the Texas fauna ranged from 154 (Evermann and Kendall, 1894) through 190 (Knapp,

1953), 197 (Jurgens and Hubbs, 1953), 208 (Hubbs, 1957b), 209 (Hubbs, 1958), 211 (Hubbs, 1961), 215 (Hubbs, 1972), 217 (Hubbs, 1976), 226 (Hubbs, 1982), 247 (Hubbs et al. 1991) to the present 268. There have been a few cases of species being synonymized and removed from the list. Conversely, many species have been added because a once widespread taxon was shown to represent two or more distinct species such as the recent separation of *Dionda serena*, *D. argentosa* and *D. nigrotaeniata* from *D. episcopa* (Mayden et al., 1992). We propose as common names, Nueces roundnose minnow for *D. serena* and manantial roundnose minnow for *D. argentosa*. Other additions result from the 25 exotic fishes that have established breeding populations. Still others have been added because of geographic range extensions, such as the discovery of *Heterandria formosa* (least killifish) in the Sabine River. Also, a new species *Gambusia clarkhubbsi* (San Felipe gambusia) was recently discovered in Del Rio (Garrett and Edwards, 2003) and a new species of *Cycleptus* from the Rio Grande has been discovered and is being described (Bessert, 2006).

An unfortunately large number of freshwater fishes have been adversely impacted by human activities. In 1991, 25% of Texas freshwater fishes were of conservation concern (i.e., they were either already lost or potentially in danger of extinction or extirpation). By 2008, that number had grown to 44% of our state's freshwater fish fauna. In the Chihuahuan Desert region (west of the Pecos River), about half of the native fish species are threatened with extinction or already are extinct (Edwards et al., 1989; Hubbs, 1990). Five fishes that once inhabited Texas are now extinct (*Cyprinella lutrensis blairi*, Maravillas red shiner; *Notropis orca*, phantom shiner; *N. simus simus*, Rio Grande bluntnose shiner; *Gambusia amistadensis*, Amistad gambusia and *G. georgei*, San Marcos gambusia). Four more have been extirpated from the state. *Hybognathus amarus* (Rio Grande silvery minnow) once inhabited the entire Rio Grande basin, but now has a very limited range in the Rio Grande in New Mexico (Bestgen and Propst, 1996). *Notropis simus pecosensis* (Pecos bluntnose shiner) historically inhabited the lower Pecos River prior to the deterioration of habitat and water quality (Hoagstrom, 2003). Presumably *Oncorhynchus clarki virginalis* (Rio Grande cutthroat trout) occurred in McKittrick and Limpia creeks in west Texas, but none have been caught (or seen) in recent times (Garrett and Matlock, 1991). *Gambusia senilis* (blotched gambusia) once lived in the Devils River but the species now only occurs in the Río Conchos basin in Chihuahua, Mexico (Edwards et al., 2003).

All extinctions and extirpations are from the 177 native species that spend all or a significant portion of their life in freshwater. This equates to a loss of more than 5% of the freshwater species native to Texas. An additional 31 species and subspecies are listed as threatened or endangered

by the U.S. Department of the Interior and the Texas Parks and Wildlife Department. The Texas Wildlife Action Plan includes an additional 41 species that are of conservation concern and may soon be threatened or endangered. Table 1 lists the fish species of Texas and their status. We agree with the conclusion of Williams et al. (1989) that water quantity (either too much in the case of reservoirs or too little in the case of dewatering), habitat quality and the addition of introduced species are major components of the problem.

We herein present dichotomous keys to the families and species of Texas fishes and a brief description of range, status, etc. for each species. The list is modified from that of Hubbs (1982) and Hubbs et al. (1991) and the keys are modified from those originally developed by Hubbs for ichthyology students at the University of Texas. This list of species and the keys to their identification are preliminary in an endeavor to prepare a much fuller accounting of the species in a separate volume. Families are arranged phylogenetically, genera and species are listed alphabetically. Species and common names follow Nelson et al. (2004) unless otherwise noted.

Ecological associations are listed with each species account (i.e., freshwater, estuarine and marine) as well as their conservation status where appropriate (i.e., Introduced, Special Concern, Threatened and Endangered). These terms are defined as follows: Freshwater - fishes that are nearly always restricted to inland freshwaters, although some of these environments possess substantial salinities. Estuarine - fishes which commonly spend a substantial portion of their lives in brackish to marine coastal environments. Marine - fishes which are commonly dependent upon offshore, oceanic environments for a substantial period of their lives. Introduced - non-indigenous, transplanted by man. Special Concern - a taxon whose abundance or range has been reduced to the degree that it may be threatened with extinction or whose range is only peripherally in Texas and could be easily extirpated. Some species are included in this category in which up-to-date information concerning their status is unavailable or fragmentary. Threatened - Likely to become endangered in the near future. Endangered - Species so imperiled that they require assistance to avoid extinction.

KEY TO THE FAMILIES OF FRESHWATER FISHES OF TEXAS

1a. Pelvic fins absent ---------- 2
1b. Pelvic fins present ---------- 6
2a. Jaws absent; pectoral fins absent; 7 pairs of gill openings--------- PETROMYZONTIDAE (p. 8)
2b. Jaws present; pectoral fins small; 1 pair of gill openings---------- 3
3a. Dorsal fin attached to caudal fin; dorsal fin base goes less than 2 times in body length; upper jaw extends beyond eye ---------- 4
3b. Dorsal fin free from caudal fin base; dorsal fin base goes more than 4 time in body length; upper jaw does not reach vertical from eye ---------- 5
4a. Posterior nostril just above lower lip; scales absent; upper jaw projects further than lower jaw ---------- OPHICHTHIDAE (p. 11)
4b. Posterior nostril well above level of lower lip, even with a horizontal line through lower margin of eye; scales present (they are small and embedded); lower jaw projects further than upper jaw ---------- ANGUILLIDAE (p. 11)
5a. Body with plates; snout long and tubular ---------- SYNGNATHIDAE (p. 41)
5b. Body without plates; snout blunt ---------- TETRAODONTIDAE (p. 59)
6a. Five pairs of gill slits ---------- 7
6b. One pair of gill slits ---------- 9
7a. Gill slits dorsal to pectoral fins; body rounded ---------- CARCHARHINIDAE (p. 9)
7b. Gill slits ventral to pectoral fins; body depressed ---------- 8
8a. Snout elongate with sharp, saw-like teeth; no spines on dorsal surface ----- PRISTIDAE (p. 9)
8b. Snout short and blunt; sharp spine on dorsal surface of tail; body very much flattened ------ ---------- DASYATIDAE (p. 9)
9a. Caudal fin heterocercal ---------- 10
9b. Caudal fin homocercal ---------- 13
10a. Caudal fin strongly heterocercal; mouth inferior ---------- 11
10b. Caudal fin abbreviated heterocercal; mouth terminal ---------- 12
11a. Body not armored; snout paddle-like with 2 small barbels -------- POLYODONTIDAE (p. 10)
11b. Body with several bony scutes; snout not more than ⅔ of head length; 4 elongate barbels- ---------- ACIPENSERIDAE (p. 9)
12a. Scales ganoid; snout produced into an elongate beak; dorsal fin short, its origin posterior to the origin of the anal fin ---------- LEPISOSTEIDAE (p. 10)
12b. Scales cycloid; snout blunt; dorsal fin long, its origin anterior to the origin of the pelvic fin---------- AMIIDAE (p. 11)
13a. Both eyes on same side of head; dorsal and anal fins both with more than 25 soft fin rays ---------- 14
13b. Eyes on each side of head or absent; either dorsal or anal fin (or both) with fewer than 25 soft fin rays ---------- 15
14a. Edges of preopercle hidden by skin; no left pectoral fin ---------- ACHIRIDAE (p. 59)
14b. Edges of preopercle not hidden by skin; both pectoral fins present ---------- ----------PARALICHTHYIDAE (p. 58)
15a. Pelvic fins without a spine, and with more than 5 soft fin rays; anal fin with no spines; 1 dorsal fin with fin rays ---------- 16
15b. Pelvic and anal fins with 1 or more spines; 1 or more dorsal fins with fin rays ---------- 33
16a. Adipose fin present---------- 17
16b. No adipose fin ---------- 22
17a. Body scaled; head without barbels ---------- 18
17b. Body not scaled; head with 4 to 8 barbels if naked, otherwise body with bony plates --- 19
18a. Fewer than 50 lateral line scales ----------CHARACIDAE (p. 28)
18b. More than 60 lateral line scales ----------SALMONIDAE (p. 31)
19a. Body covered with bony plates---------- 20

19b. Body naked; head with 4 to 8 barbels ---- 21
20a. Three pairs of barbels; lateral row of armored scutes with spike-like extensions along the center of the plates; adipose fin ---- DORADIDAE (p. 30)
20b. No barbels; no spiked scutes; adipose fin with anterior spine ---- LORICARIIDAE (p. 30)
21a. Nostrils close together, posterior nostril without a barbel ---- ARIIDAE (p. 30)
21b. Nostrils far apart, posterior nostril with a barbel ---- ICTALURIDAE (p. 28)
22a. Head scaleless ---- 23
22b. Head partly scaled ---- 29
23a. Branchiostegal membranes free from isthmus; gill slits extend far forward below jaws - 24
23b. Branchiostegal membranes united to isthmus, gill slits do not extend far forward below jaws; no teeth on jaws ---- 28
24a. Mouth subinferior, below a tapering pig-like snout; upper jaw long, reaching beyond posterior margin of preopercle ---- ENGRAULIDAE (p. 12)
24b. Mouth variable, but if inferior, upper jaw not reaching behind eye ---- 25
25a. Lateral line absent; scales along midline of belly modified to form a saw-like keel ---- CLUPEIDAE (p. 12)
25b. Lateral line present; scales along midline of belly undifferentiated ---- 26
26a. Upper jaw not extending posterior to eye; dorsal fin above anal fin; gular plate absent ---- HIODONTIDAE (p. 11)
26b. Upper jaw extending posterior to eye; dorsal fin above pelvic fin; gular plate present --- 27
27a. Mouth terminal; last dorsal fin ray not elongated ---- ELOPIDAE (p. 11)
27b. Mouth superior; last dorsal fin ray elongated ---- MEGALOPIDAE (p. 11)
28a. Pharyngeal teeth numerous (>9) and comb-like; distance from anal fin origin to caudal fin base less than ½ the distance from the dorsal fin origin to caudal fin base; mouth adapted for sucking ---- CATOSTOMIDAE (p. 25)
28b. Fewer than 9 pharyngeal teeth on each side; distance from anal fin origin to caudal fin base more than ½ the distance from the dorsal fin origin to caudal fin base; mouth not adapted for sucking ---- CYPRINIDAE (p. 13)
29a. Snout needle-shaped; lateral line very low ---- BELONIDAE (p. 34)
29b. Snout not needle-shaped; lateral line, if present, median in position ---- 30
30a. Snout duck-billed or paddle shaped; caudal fin forked; lateral line median in position ---- ESOCIDAE (p. 31)
30b. Snout blunt; caudal fin rounded, incomplete lateral line ---- 31
31a. Origin of dorsal fin above or anterior to origin of anal fin; oviparous; adult males with a rounded anal fin; 3rd soft ray in anal fin branched in both sexes ---- 32
31b. Origin of dorsal fin posterior to origin of anal fin; viviparous; adult males with a modified anal fin forming a gonopodium; 3rd soft ray in anal fin un-branched in both sexes ---- POECILIIDAE (p. 36)
32a. Teeth conical and simple; 8 to 13 scale rows from pelvic origin to isthmus ---- FUNDULIDAE (p. 34)
32b. Teeth compressed and with 3 cusps; belly naked or with more than 15 scale rows from pelvic origin to isthmus ---- CYPRINODONTIDAE (p. 40)
33a. Anus anterior to pelvic fins; pelvic fins with more than 5 soft fin rays ---- APHREDODERIDAE (p. 32)
33b. Anus posterior to pelvic fins; pelvic fins with 5 soft fin rays ---- 34
34a. Pelvic fins abdominal or subthoracic; dorsal fins well separated ---- 35
34b. Pelvic fins thoracic (insertion underneath front third of pectoral fin rays); dorsal fins separate or united ---- 37
35a. Pectoral fin with 5 to 8 lower fin rays detached and filamentous ---- POLYNEMIDAE (p. 53)
35b. Pectoral fin entire ---- 36
36a. Three anal fin spines; 4 stout dorsal fin spines ---- MUGILIDAE (p. 32)
36b. One anal fin spine; 4 to 8 slender dorsal fin spines ---- ATHERINOPSIDAE (p. 33)

37a. Posterior part of lateral line with well developed spiny scutes; the 2 anal fin spines separated ---- CARANGIDAE (p. 51)
37b. Posterior part of lateral line (if present) unarmored; 1 to 8 anal fin spines, connected by membranes ---- 38
38a. Nostrils single on each side; lateral line interrupted ---- CICHLIDAE (p. 54)
38b. Nostrils double on each side; lateral line complete, incomplete or absent ---- 39
39a. Lateral line extending onto tip of middle fin rays of caudal fin ---- 40
39b. Lateral line, if present, not extending beyond base of caudal fin ---- 42
40a. One or 2 anal fin spines; mouth inferior; dorsal fin single; caudal rounded ---- SCIAENIDAE (p. 53)
40b. Three anal fin spines ---- 41
41a. Two separate dorsal fins ---- CENTROPOMIDAE (p. 42)
41b. Dorsal fins continuous ---- HAEMULIDAE (p. 52)
42a. Gill membranes broadly joined to isthmus; lateral line absent ---- 43
42b. Gill membranes free or nearly free from isthmus (may be joined to each other across isthmus); lateral line present or absent ---- 44
43a. Pelvic fins separate ---- ELEOTRIDAE (p. 55)
43b. Pelvic fins joined into a sucking disk ---- GOBIIDAE (p. 56)
44a. Premaxillaries excessively protractile, their basal processes very long; a groove at the top of the cranium ---- GERREIDAE (p. 51)
44b. Premaxillaries moderately protractile or not protractile; no groove at the top of the cranium ---- 45
45a. Jaw teeth prominent incisors; molar teeth on roof and floor of mouth --- SPARIDAE (p. 52)
45b. All teeth canines ---- 46
46a. One or 2 anal fin spines, the 1st usually distinctly longer than the 2nd (if present) ---- PERCIDAE (p. 47)
46b. Three or more anal fin spines, the 3rd distinctly longer than the 1st ---- 47
47a. Opercle with a spine; pseudobranchium well developed and uncovered ---- MORONIDAE (p. 42)
47b. Opercle without a spine; pseudobranchium absent or covered with skin ---- 48
48a. Four or 5 dorsal fin spines; lateral line absent; scales cycloid; 5 branchiostegals ---- ELASSOMATIDAE (p. 54)
48b. Six to 13 dorsal fin spines; lateral line present; scales ctenoid; 6 or 7 branchiostegals ---- CENTRARCHIDAE (p. 43)

FAMILY PETROMYZONTIDAE—lampreys

1a. Disc large; length of disc 143 times in total length; cusps in posterior field not degenerate; adults with well-developed intestine ---- *Ichthyomyzon castaneus*
1b. Disc small; length of disc 172 to 263 times in total length; cusps in posterior field degenerate; intestine not developed ---- *Ichthyomyzon gagei*

Ichthyomyzon castaneus Girard—chestnut lamprey

Chestnut lampreys range from Saskatchewan to Quebec in Canada; throughout the Mississippi River Basin south to Louisiana and in Gulf of Mexico drainages from Georgia to Texas. In Texas, this parasitic species occurs in East Texas streams in the Red, Sabine and Neches basins. Freshwater.

Ichthyomyzon gagei Hubbs & Trautman—southern brook lamprey
The southern brook lamprey ranges along the Gulf of Mexico drainages from western Florida to eastern Texas and north through eastern Oklahoma to Missouri and east to Tennessee. In Texas, this non-parasitic species occurs in the Red, Sabine and Neches basins. Freshwater.

FAMILY CARCHARHINIDAE—requiem sharks

1a. Teeth smooth; length of longest gill slit more than ⅓ of the height of the dorsal fin; head triangular in front of nostrils ------- *Carcharhinus isodon*
1b. Teeth serrate; length of longest gill slit less than ¼ of the height of the dorsal fin; head bluntly rounded in front of nostrils ----- *Carcharhinus leucas*

Carcharhinus isodon (Müller & Henle)—finetooth shark
This Atlantic species commonly occurs along the coast in the surf zone and may enter coastal streams in their downstream stretches. Marine.
Carcharhinus leucas (Müller & Henle)—bull shark
Bull sharks are found circumtropically in euryhaline and low salinity estuaries and river mouths. In Texas, this species occurs along the coast and may travel short distances upstream in coastal streams. Estuarine.

FAMILY PRISTIDAE—sawfishes

Pristis pectinata Latham—smalltooth sawfish
This tropical Atlantic species occurs from New York to Bermuda, and then through the Gulf of Mexico and south to Brazil. Sawfish are primarily coastal inhabitants in Texas. Marine. Special Concern.

FAMILY DASYATIDAE—whiptail stingrays

Dasyatis sabina (Lesueur)—Atlantic stingray
The Atlantic stingray occurs along shallow coastal waters from Chesapeake Bay to Mexico. The species occurs in all of the major bays of Texas and may also migrate considerable distances inland. Estuarine.

FAMILY ACIPENSERIDAE—sturgeons

Scaphirhynchus platorynchus (Rafinesque)—shovelnose sturgeon
Shovelnose sturgeons once occurred throughout most of the Mississippi and Missouri river drainages, and two specimens were obtained by Dr. Oscar Loew from the Rio Grande in Albuquerque, New Mexico during the 1872 to 1874 surveys of the western U.S. fishes reported by Cope and Yarrow (1875). Its presence in the lower Pecos River during prehistoric times was confirmed by Jurgens (2005). This would strongly suggest that it likely occurred in many Texas rivers. This species is presently found in Texas

only in the Red River below Dennison Dam (Lake Texoma Reservoir). Freshwater. State Threatened.

FAMILY POLYODONTIDAE—paddlefishes

Polyodon spathula (Walbaum)—paddlefish
Originally the paddlefish ranged throughout much of the Mississippi River drainage and eastward of the Appalachian Mountain range and the Great Lakes. In Texas, this species occurred in every major river from the Trinity basin eastward. By the 1950s their numbers and range had been substantially reduced. Freshwater. State Threatened.

FAMILY LEPISOSTEIDAE—gars

1a. Large teeth in upper jaw in 2 rows on each side ---------- *Atractosteus spatula*
1b. Large teeth in upper jaw in 1 row on each side ----------2
2a. Beak long and narrow, its least width goes about 12 to 20 times in length; snout more than ⅔ of head length---------- *Lepisosteus osseus*
2b. Beak short and blunt, its least width goes about 5 to 7 times in length; snout less than ⅔ of head length----------3
3a. Fifty nine to 63 lateral line scales; 50 to 54 predorsal scales; 38 to 44 scale rows around body---------- *Lepisosteus platostomus*
3b. Fifty four to 57 lateral line scales; 46 to 59 predorsal scales; 32 to 38 scale rows around body---------- *Lepisosteus oculatus*

Atractosteus spatula (Lacépède)—alligator gar
Alligator gar ranges along the Gulf Coast from Veracruz, Mexico to western Florida and northward to the lower reaches of the Mississippi, Missouri and Ohio river drainages. A disjunct population also occurs in Nicaragua. In Texas this species is found in coastal streams from the Red River to the Rio Grande. Freshwater.
Lepisosteus oculatus (Winchell)—spotted gar
Spotted gar occur from Lake Erie southeastward through the Ohio and Missouri drainages of the Mississippi and then westward through the coastal streams of Texas. Freshwater.
Lepisosteus osseus (Linnaeus)—longnose gar
Longnose gar are found from Quebec throughout the eastern U.S. southward to the Rio Grande drainage in Texas, Mexico and New Mexico. Longnose gar may be found in most Texas rivers. Freshwater.
Lepisosteus platostomus Rafinesque—shortnose gar
Shortnose gar ranges throughout the Mississippi River drainage, especially in low gradient, slowly flowing streams, oxbow lakes and backwater areas. This species inhabits the Red River basin below Lake Texoma. Freshwater.

FAMILY AMIIDAE—bowfins

Amia calva Linnaeus—bowfin

Bowfins occur from the Great Lakes and drainages southward to central Texas and eastward throughout Florida. Not native to Appalachian streams, but introduced populations now occur in this region. In Texas, found in the Red, San Jacinto, and Neches river systems and the downstream reaches of the Brazos and Colorado basins. Freshwater.

FAMILY HIODONTIDAE—mooneyes

Hiodon alosoides (Rafinesque)—goldeye

This species ranges from the Northwest Territories, Canada, southward along the Mississippi basin to Louisiana. In Texas it is restricted to the Red River basin and is especially abundant in Lake Texoma. Freshwater. Special Concern.

FAMILY ELOPIDAE—tenpounders

Elops saurus Linnaeus—ladyfish

A coastal inhabitant occurring throughout the Gulf of Mexico, the Caribbean to Brazil, ladyfish may be found inhabiting most of the bays and estuaries in Texas. Specimens are also often found in the lower reaches of coastal streams. Estuarine.

FAMILY MEGALOPIDAE—tarpons

Megalops atlanticus Valenciennes—tarpon

This species is found from Nova Scotia south through the Caribbean to Brazil and inhabits coastal waters statewide. Estuarine. Special Concern.

FAMILY ANGUILLIDAE—freshwater eels

Anguilla rostrata (Lesueur)—American eel

This species is known from most of the Atlantic and Gulf coasts of North America, including the Caribbean coasts of Central and South America to Brazil. Texas records include specimens from the Red River to the Rio Grande in most of the large river systems of the state. Dams impede the upstream migrations of the species and have effectively eradicated the species in the western part of the state. Freshwater-Estuarine. Special Concern.

FAMILY OPHICHTHIDAE—snake eels

Myrophis punctatus Lutken—speckled worm eel

Occurring from North Carolina throughout the Gulf of Mexico and the Caribbean to Brazil, this species is commonly found burrowed into mud bottomed habitats in the bays of the state. It has also been collected from

the downstream sections of several river systems in the state including the Neches River and the Rio Grande. Marine.

FAMILY ENGRAULIDAE—anchovies

1a. Twenty three to 31 anal fin rays; 11 to 12 pectoral fin rays ---------- *Anchoa mitchilli*
1b. Eighteen to 23 anal fin rays; 13 to 17 pectoral fin rays ---------- *Anchoa hepsetus*

Anchoa hepsetus (Linnaeus)—striped anchovy

Coastal in their distribution from Nova Scotia through the Gulf of Mexico and the Caribbean to Uruguay, this species may be found inhabiting most of the bays and estuaries in Texas. Striped anchovies appear to be more common in the southern part of the state where bays tend to have higher salinities. Marine.

Anchoa mitchilli (Valenciennes)—bay anchovy

A coastal inhabitant from Maine along the Atlantic and Gulf coasts to Yucatan, bay anchovies are very abundant in most of the bays and estuaries in Texas. Specimens are also often found in the lower reaches of coastal streams. Estuarine.

FAMILY CLUPEIDAE—herrings

1a. Last ray of dorsal fin not elongated; mouth terminal or superior ---------- 2
1b. Last ray of dorsal fin greatly elongated; lower jaw included ---------- 4
2a. Posterior margins of lateral scales fluted or pectinated; more than 60 longitudinal scale rows ---------- *Brevoortia gunteri*
2b. Posterior margins of lateral scales entire; fewer than 60 longitudinal scale rows ---------- 3
3a. Body depth goes fewer than 3 times in standard length; more than 30 gill rakers below angle of 1st arch ---------- *Harengula jaguana*
3b. Body depth goes more than 3 times in standard length; fewer than 30 gill rakers below angle of 1st arch ---------- *Alosa chrysochloris*
4a. Twenty nine to 33 anal fin rays; base of dorsal fin contained 1.0 to 1.6 times in last ray length; black shoulder spot (especially in young) equal to or larger than pupil; mouth below level of middle of eye ---------- *Dorosoma cepedianum*
4b. Twenty four to 28 anal fin rays; base of dorsal fin contained 1.5 to 1.8 times in last ray length; black shoulder spot (especially in young) smaller than pupil; mouth at level of eye ---------- *Dorosoma petenense*

Alosa chrysochloris (Rafinesque)—skipjack herring

This is an anadromous fish native to the Gulf of Mexico. It may be occasionally found in streams, lakes and borrow pits in Gulf drainages. Estuarine.

Brevoortia gunteri Hildebrand—finescale menhaden

This primarily coastal species, native to the western Gulf of Mexico, may be found inhabiting most of the bays and estuaries in Texas, especially in the southern half of the state. A related species, *B. patronus*, found

throughout the Gulf of Mexico, may also occur in low salinity estuaries, especially when young. Marine.

Dorosoma cepedianum (Lesueur)—gizzard shad

Native to the eastern U.S. from the Great Lakes south to northern Mexico with the exception of New England, the Appalachian Mountains and southern Florida, gizzard shad may be found statewide in all major streams and is especially abundant in reservoirs, often constituting more than half of the fish biomass. Freshwater.

Dorosoma petenense (Günther)—threadfin shad

Threadfin shad are native to the lower Mississippi and southern Ohio river basins, and Gulf of Mexico coastal streams from Florida to Central America. This species may be found in all streams within the eastern half of the state. Threadfin shad have been widely introduced as a forage fish in reservoirs. Freshwater.

Harengula jaguana Poey—scaled sardine

A primarily coastal species ranging from the east coast of Florida throughout the Gulf of Mexico and the Caribbean to Brazil, scaled sardines may be found inhabiting most of the bays and estuaries in Texas. It commonly moves short distances upstream in coastal streams. Estuarine.

FAMILY CYPRINIDAE—minnows

Note: species that have only one character for each alternative in a couplet should be keyed out in both subdivisions (the species should be found in both).

1a. More than 15 soft rays on dorsal fin; dorsal and anal fins each with a strong serrated spine ---- 2
1b. Fewer than 10 soft rays on dorsal fin; dorsal and anal fins without spines ---- 3
2a. Upper jaw with 2 long, fleshy barbels on each side; 35 to 38 lateral line scales (except mirror and leather carps); pharyngeal teeth 1,1,3-3,1,1 ---- *Cyprinus carpio*
2b. Upper jaw without barbels; 26 to 29 lateral line scales; pharyngeal teeth 4-4 ---- *Carassius auratus*
3a. Pharyngeal teeth with prominent parallel grooves; distance from anal fin origin to end of caudal peduncle goes 3 or more times in distance from tip of snout to anal fin origin ---- *Ctenopharyngodon idella*
3b. Pharyngeal teeth without prominent parallel grooves; distance from anal fin origin to end of caudal peduncle goes 2.5 or fewer times in distance from tip of snout to anal fin origin ---- 4
4a. Cartilaginous ridge of lower jaw prominent and separated by a definite groove from lower lip; intestine wound spirally around the air bladder ---- 5
4b. Cartilaginous ridge of lower jaw hardly evident and not separated by a definite groove from the lower lip; intestine not wound spirally around the air bladder ---- 6
5a. Lower jaw length greater than eye length; more than 65 lateral line scales ---- *Campostoma ornatum*
5b. Lower jaw length less than eye length; fewer than 60 lateral line scales ---- *Campostoma anomalum*
6a. Premaxillaries not protractile; upper lip connected with skin of snout by a frenum ---- *Rhinichthys cataractae*
6b. Premaxillaries protractile; upper lip separated from skin of snout by a deep groove continuous across the midline ---- 7

7a. Lateral line greatly decurved ---- 8
7b. Lateral line usually not decurved, either straight or with a broad arch ---- 9
8a. Abdomen behind pelvic fins with a fleshy keel over which the scales do not pass; pharyngeal teeth in 1 row (4-4 or 5-5); gill rakers long and slender, 17 to 19 on the 1st gill arch; eyes and median fins usually yellow-green ---- *Notemigonus crysoleucas*
8b. Abdomen behind pelvic fins scaled; pharyngeal teeth in 2 rows (3,5-5,3 or 2,5-5,2); gill rakers short and stout, 9 to 10 on the first gill arch; eyes and fins usually red ---- *Scardinius erythrophthalmus*
9a. Pharyngeal teeth in main row typically 5-5 or 4-4 ---- 10
9b. Pharyngeal teeth in main row typically 4-4 ---- 11
10a. Mouth very small, almost vertical; no pharyngeal teeth in lesser row ---- *Opsopoeodus emiliae*
10b. Mouth large and only moderately oblique; 2 pharyngeal teeth in lesser row ---- *Semotilus atromaculatus*
11a. Maxillary barbels present ---- 12
11b. No maxillary barbels ---- 18
12a. Body speckled (for most specimens >20 mm standard length); pharyngeal teeth 4-4 ---- 13
12b. Body always silvery; pharyngeal teeth in 2 rows ---- 17
13a. Two pairs of barbels; posterior barbels longer than orbit length; anterior barbels usually half of orbit length; lips fleshy and thickened posteriorly; breeding males with 3 or 4 rows of tubercles on pectoral fin membranes ---- 14
13b. One or 2 pairs of barbels; posterior barbels less than orbit length, anterior barbels, if present, less than half anterior barbel length; lips not fleshy; breeding males with 1 or 2 rows of tubercles on pectoral fin membranes ---- 15
14a. Anal fin rays usually 7; pectoral fins in adult males falcate, reaching beyond base of pelvic fin ---- *Macrhybopsis australis*
14b. Anal fin rays usually 8; pectoral fins of adult males rounded, barely reaching pelvic fin base ---- *Macrhybopsis tetranema*
15a. Lateral stripe absent or most distinct on posterior portion of body ---- 16
15b. Lateral stripe distinct along side of body ---- *Macrhybopsis marconis*
16a. Lateral stripe absent; 20 to 50 scales above lateral line with clusters of melanophores ---- *Macrhybopsis aestivalis*
16b. Lateral stripe present; few scales above lateral line with clusters of melanophores ---- *Macrhybopsis hyostoma*
17a. Pharyngeal teeth 2,4-4,2; lateral line scales 49 to 57; occiput depth less than width; small barbel present at corner of mouth ---- *Platygobio gracilis*
17b. Pharyngeal teeth 1,4-4,1; fewer than 50 lateral line scales; depth at occiput greater than width ---- *Macrhybopsis storeriana*
18a. Lower lip thick with a fleshy lobe on each side that is partially separated from the mandible by a groove (best observed from the front) ---- *Phenacobius mirabilis*
18b. Lower lip thin, without a fleshy lobe ---- 19
19a. More than 50 lateral line scales ---- *Gila pandora*
19b. Fewer than 45 lateral line scales ---- 20
20a. Predorsal scales crowded; much smaller than those on rest of body; 7 anal fin rays; first 2 obvious dorsal fin rays stout, well separated from the following well developed but unbranched ray by a membrane ---- 21
20b. Predorsal scales not crowded except for fish with 9 or more anal fin rays; first obvious dorsal fin ray a thin splint, closely attached to the following well developed but unbranched ray, especially at tip ---- 22
21a. Intestine long, more than twice standard length; caudal spot not separated from the longitudinal streak by a clear space ---- *Pimephales promelas*
21b. Intestine short, forming a simple S-shaped loop; caudal spot separated from the longitudinal streak by a clear area ---- *Pimephales vigilax*

22a. Intestinal canal long, more than twice standard length ---------- 23
22b. Intestinal canal short, forming a simple S-shaped loop ---------- 31
23a. A black band through eye to snout; eye as long as snout ---------- 24
23b. No black band through eye to snout; eye shorter than snout ---------- 28
24a. Seven anal fin rays ---------- *Dionda serena*
24b. Eight anal fin rays ---------- 25
25a. Caudal peduncle depth wide; long postorbital ---------- 26
25b. Caudal peduncle depth narrow; short postorbital ---------- 27
26a. Typically 38 or more lateral line scales ---------- *Dionda episcopa*
26b. Typically 37 or fewer lateral line scales ---------- *Dionda nigrotaeniata*
27a. Double dashes present along lateral line canal; caudal spot wedge-shaped; prominent markings on dorsal scale pockets ---------- *Dionda diaboli*
27b. Lateral line canal without double dashes; caudal spot rounded; no prominent markings on dorsal scale pockets ---------- *Dionda argentosa*
28a. Mid-dorsal with a thin stripe flanked on each side by another faint dark stripe ---------- *Hybognathus hayi*
28b. Mid-dorsal stripe broad and solid ---------- 29
29a. Head width about equal to distance from tip of snout to back of eye; 11 to 15 scale rows across belly (counted just in advance of pelvic insertion, excluding the lateral line scales); eye contained in snout about 1.5 times ---------- 30
29b. Head width considerably greater than distance from tip of snout to back of eye; 14 to 22 scale rows across belly; eye contained in snout about 2 times ---------- *Hybognathus placitus*
30a. Scales with 10 radii ---------- *Hybognathus nuchalis*
30b. Scales with 8 radii ---------- *Hybognathus amarus*
31a. Mouth terminal and oblique; pharyngeal teeth in 2 rows, 1 or 2,4-4,2 or 1 (except in *Cyprinella lutrensis*) ---------- 32
31b. Mouth subinferior and horizontal; pharyngeal teeth 4-4 (except in *Hybopsis amnis* and *Notropis braytoni*) ---------- 60
32a. Dorsal fin less triangular, the last fin ray about ½ the length of the longest; interradial membranes of dorsal fin with melanophores (weak or lacking in young and female *Cyprinella proserpina*) ---------- 33
32b. Dorsal fin more triangular, the last fin ray less than ½ the length of the longest; interradial membranes of dorsal fin without melanophores (except along rays and except in *Pteronotropis hubbsi* which has more than 8 anal fin rays and a prominent lateral stripe ending in a caudal spot) ---------- 36
33a. Caudal fin base with a large black spot (larger than eye); no dark bar above pectoral fin base ---------- *Cyprinella venusta*
33b. Caudal fin base without a large black spot; a dark bar above pectoral fin base ---------- 34
34a. Tubercles on head of high males larger on snout than on occiput; a distinct black median stripe from the chin to the isthmus; snout length greater than upper jaw length ---------- *Cyprinella proserpina*
34b. Tubercles on head of dominant males larger on occiput than on snout; the black median stripe on chin extends no farther posteriorly than below eye; upper jaw length greater than snout length ---------- 35
35a. Mouth slightly subinferior; head blunt and rounded; snout length plus upper jaw length 17% or less of standard length; body more slender, distance between dorsal and anal fin origins 24 to 29% of standard length (higher figures for adult males, lower figures for females and young) ---------- *Cyprinella lepida* or *Cyprinella* sp.
35b. Mouth more terminal; head sharp and compressed; snout length plus upper jaw length 17% or more of standard length; body usually deeper, distance between dorsal and anal fin origins 26 to 36% of standard length (higher figures for adult males, lower figures for females and young) ---------- *Cyprinella lutrensis*

36a. Usually 9 to 12 anal fin rays; pharyngeal teeth typically 2,4-4,2 ---------- 37
36b. Usually 6 to 8 anal fin rays; pharyngeal teeth typically 1,4-4,1 ---------- 47
37a. Origin of dorsal fin opposite insertion of pelvic fin; dorsal origin nearer tip of snout than base of caudal fin ---------- 38
37b. Origin of dorsal fin behind insertion of pelvic fin; dorsal origin nearer base of caudal fin than tip of snout ---------- 41
38a. Scales with dark markings forming longitudinal stripes; exposed portions of lateral line scales greatly elevated; more than 18 predorsal scales ---------- *Luxilus chrysocephalus*
38b. Sides of body silvery; exposed portions of lateral line scales not markedly elevated; fewer than 17 predorsal scales ---------- 39
39a. Usually 8 anal fin rays; depth at occiput more than width at occiput ---- *Notropis shumardi*
39b. Usually 7 anal fin rays; depth at occiput less than width at occiput ---------- 40
40a. Mid-dorsal stripe about 5 chromatophores wide; iris black; about 15 chromatophores on line between orbits; snout definitely overhanging mouth ---------- *Notropis potteri*
40b. Mid-dorsal stripe about 10 chromatophores wide; iris with some white anteriorly and posteriorly; more than 30 chromatophores on line between orbits; snout not definitely overhanging mouth ---------- *Notropis blennius*
41a. Scales small, 41 or more in lateral line; 25 or more predorsal scales ---------- 42
41b. Scales large, 40 or fewer in lateral line; 24 or fewer predorsal scales ---------- 43
42a. Dorsal fin with prominent black spot at base of anterior rays; origin of dorsal fin midway between base of caudal fin and front of eye or nostril ---------- *Lythrurus umbratilis*
42b. Dorsal fin without prominent black spot; origin of dorsal fin midway between base of caudal fin and pupil ---------- *Lythrurus fumeus*
43a. Prominent black lateral stripe extending through eye and ending in a caudal spot ½ of caudal peduncle depth ---------- *Pteronotropis hubbsi*
43b. No caudal spot; either fewer than 10 anal fin rays or no prominent black lateral stripe -- 44
44a. No chromatophores on lateral line scales other than on lateral stripe; mid-dorsal stripe behind dorsal fin usually 1 to 2 chromatophores wide ---------- 45
44b. A few chromatophores on lateral line scales other than those on lateral stripe; mid-dorsal stripe behind dorsal fin usually 3 to 5 chromatophores wide ---------- 46
45a. Eye larger, contained about 2.5 to 3 times in body depth (measured over curve); black lips ---------- *Notropis amabilis*
45b. Eye smaller, contained about 4 times in body depth (measured over curve); no black lips (may be dusky) ---------- *Notropis jemezanus*
46a. Eye shorter than snout; underside of opercle light ---------- *Notropis oxyrhynchus*
46b. Eye longer than snout; underside of opercle gray ---------- *Notropis atherinoides*
47a. Eye large, contained about 2.5 to 3 times in body depth (measured over curve) ---------- *Notropis amabilis*
47b. Eye small, contained about 3.5 to 4 times in body depth (measured over curve) ---------- 48
48a. No paired dots along lateral line ---------- 49
48b. Paired dots along lateral line ---------- 55
49a. Prominent black lateral stripe extending through eye and ending in a caudal spot; lateral line incomplete ---------- *Notropis maculatus*
49b. No prominent lateral stripe extending through eye; no caudal spot; lateral line complete -- 50
50a. Depth at occiput more than width at occiput; usually 8 anal fin rays ---------- 51
50b. Depth at occiput equal to or less than width at occiput; usually 7 anal fin rays ---------- 54
51a. Dorsal fin insertion well behind insertion of pelvic fin, nearer base of caudal fin than tip of snout ---------- 52
51b. Dorsal fin insertion opposite insertion of pelvic fin, nearer tip of snout than base of caudal fin ---------- 53

52a. Usually 8 anal fin rays; 9 or 10 gill rakers on 1st gill arch; 14 to 16 rakers on 2nd arch; 10 or 11 rakers on 3rd arch; pharyngeal arch slender; posterior edge of jaw does not reach pupil ---- *Notropis orca*

52b. Usually 9 or 10 anal fin rays; 6 to 8 gill rakers on 1st gill arch; 11 to 13 raker s on 2nd arch; 8 or 9 rakers on 3rd arch; pharyngeal arch broad; posterior edge of jaw under pupil ---- *Notropis simus*

53a. Pectoral fin length goes more than 5 times in standard length; no caudal spot ---- *Notropis shumardi*

53b. Pectoral fin length goes fewer than 4 times in standard length; caudal spot faint ---- *Notropis braytoni*

54a. Dorsal stripe conspicuously interrupted in base of dorsal fin, producing a dark dash at base of dorsal fin ---- 55

54b. Dorsal stripe not conspicuously interrupted in base of dorsal fin ---- 56

55a. Snout length greater than distance from anterior tip of mandible to posterior tip of maxillary; head depth 15.9 to 17.7% of standard length; opercle length 8.0 to 9.6% of standard length ---- *Notropis buccula*

55b. Snout length shorter than distance from anterior tip of mandible to posterior tip of maxillary; head depth 17.4 to 19.5% of standard length; opercle length 9.5 to 11.4% of standard length ---- *Notropis bairdi*

56a. Pharyngeal teeth in lesser row stout; body depth goes 4.25 times in standard length ---- *Notropis potteri*

56b. Pharyngeal teeth in lesser row thin; body depth goes about 4 times in standard length ---- *Notropis blennius*

57a. Lateral stripe diffuse ---- *Notropis shumardi*

57b. Lateral stripe distinct ---- 58

58a. Caudal spot separated from stripe by light space; pharyngeal teeth in 1 row (4-4) ---- *Notropis atrocaudalis*

58b. Caudal spot, if present, attached to stripe; pharyngeal teeth in 2 rows ---- 59

59a. Usually 8 anal fin rays ---- *Notropis chalybaeus*

59b. Usually 7 anal fin rays ---- *Notropis texanus*

60a. Last ray of dorsal fin about ½ the length of the longest; interradial membranes of dorsal fin with melanophores (weak or lacking in female and young of *C. proserpina*) ---- 61

60b. Last ray of dorsal fin much less than ½ the length of the longest; interradial membranes of dorsal fin without melanophores (except along the edge of rays or forming a dash on the anterior two membranes) ---- 63

61a. Tubercles on head of dominant males larger on snout than on occiput; a distinct black median stripe from the chin to the isthmus; snout length greater than upper jaw length ---- *Cyprinella proserpina*

61b. Tubercles on head of dominant males larger on occiput than on snout; the black median stripe on chin extends no farther posteriorly than below the eye; upper jaw length greater than snout length ---- 62

62a. Mouth slightly subinferior; head blunt and rounded; snout length plus upper jaw length 17% or less of standard length; body more slender, distance between dorsal and anal fin origins 24 to 29% of standard length (higher percentages for adult males, lower percentages for young females) ---- *Cyprinella lepida* or *Cyprinella* sp.

62b. Mouth more terminal; head sharp and compressed; snout length plus upper jaw length 17% or more of standard length; body usually deeper, distance between dorsal and anal fin origins 26 to 36% of standard length (higher percentages for adult males, lower percentages for young females) ---- *Cyprinella lutrensis*

63a. Lateral line incomplete; dark dash on proximal ⅓ of first 2 dorsal fin membranes ---- *Notropis maculatus*

63b. Lateral line complete; no pronounced dark markings on dorsal fin membranes ---- 64

64a. Lateral line scales markedly elevated anteriorly (higher than wide), their height 2 to 5 times their width ; usually 8 anal fin rays; pharyngeal teeth 4-4 ---- 65

64b. Lateral line scales not markedly elevated anteriorly, their height 1 to 2 times their width; usually 7 anal fin rays; pharyngeal teeth 4-4 or 1,4-4,1 ---- 66

65a. Body dark, with pronounced dark lateral stripe; dorsal fin height goes 2.1 or more times in predorsal length ---- *Notropis volucellus*

65b. Body light, with predorsal spot most prominent color mark; dorsal fin height goes 2.0 or fewer times in predorsal length ---- *Notropis buchanani*

66a. Upper sides of body with scattered, large melanophores ---- *Notropis chihuahua*

66b. Upper sides of body without scattered, large melanophores ---- 67

67a. Eye small, shorter than snout and contained about 4 times in head length ---- 68

67b. Eye larger, equal to or longer than snout and contained 3.5 or fewer times in head length ---- 69

68a. Fins not falcate, 1st anal fin ray less than twice as long as last; caudal peduncle depth about ½ greatest body depth (measured over curve) ---- *Notropis sabinae*

68b. Fins falcate, 1st anal fin ray more than twice as long as last; caudal peduncle depth about ⅓ greatest body depth (measured over curve) ---- *Notropis girardi*

69a. Depressed dorsal fin longer than head; distance from corner of mouth to posterior end of maxillary about equal to distance from corner of mouth to tip of mandible ---- *Hybopsis amnis*

69b. Depressed dorsal fin shorter than head; distance from corner of mouth to posterior end of maxillary much less than distance from corner of mouth to tip of mandible ---- 70

70a. Lateral stripe composed of a series of doubled dashes; dorsal base with two distinct black dashes separated by a clear space when viewed from above ---- *Notropis stramineus*

70b. Lateral stripe solid, not composed of a series of doubled dashes, dorsal base without distinct black dashes separated by a clear space when viewed from above ---- 71

71a. Pharyngeal teeth 1,4-4,1; lateral line below lateral stripe between pectoral and pelvic fins; lateral stripe composed of scattered melanophores ---- *Notropis braytoni*

71b. Pharyngeal teeth 4-4; lateral line never below lateral stripe; lateral stripe solid ---- *Notropis atrocaudalis*

Campostoma anomalum (Rafinesque)—central stoneroller

This widespread species is found throughout the eastern U.S. In Texas it is primarily found in streams of the Edwards Plateau and occurs as far west as the Devils River and Sycamore Creek. There is recent evidence that this species is a mixture of several distinct genetic forms (Blum et al. 2008). Freshwater.

Campostoma ornatum Girard—Mexican stoneroller

Primarily occurring in Mexico, this species ranges into Texas in the Rio Grande tributaries in Brewster and Presidio counties (Big Bend region). Freshwater. State Threatened.

Carassius auratus (Linnaeus)—goldfish

Goldfish are native to Asia and have been introduced statewide, often as a result of aquarium releases. They survive in only scattered locations, and usually for only short periods of time. Freshwater. Introduced.

Ctenopharyngodon idella (Valenciennes)—grass carp

Found widely scattered in the Canadian, Red, Sabine, Trinity and Rio Grande basins of Texas. This species, introduced from Asia, is rapidly

extending its range in Texas, primarily from initial stockings. Freshwater. Introduced.

Cyprinella lepida Girard—plateau shiner

A Texas endemic that inhabits headwater streams in the Frio and Sabinal rivers of the Nueces basin on the Edwards Plateau. According to Mayden (1989), this species is also endemic to the upper reaches of the Guadalupe basin. Freshwater. Special Concern

Cyprinella sp.—Nueces River shiner

A Texas endemic that inhabits headwater streams in the Nueces River on the Edwards Plateau and is genetically distinct from *C. lepida* (Richardson and Gold, 1995). Freshwater. Special Concern

Cyprinella lutrensis (Baird & Girard)—red shiner

Ranges throughout the southern Great Plains of the U.S. into Mexico. This plains species occurs widely throughout the state. The Maravillas red shiner (*C. lutrensis blairi*), was likely a unique species. It was found only in a very limited area of the Big Bend region in west Texas and is thought to be extinct (Miller et al., 1989), although attempts to document this form in the region are limited. Freshwater. *Cyprinella l. blairi* - Presumed Extinct.

Cyprinella proserpina (Girard)—proserpine shiner

Extremely limited range includes the Devils and lower Pecos rivers, Las Moras, Pinto, and San Felipe creeks in west Texas, and the Río San Carlos in Mexico. Freshwater. State Threatened.

Cyprinella venusta Girard—blacktail shiner

Ranges in most streams in Texas as far west as the Edwards Plateau. A population has been introduced into the Pecos River near Pandale. Freshwater.

Cyprinus carpio Linnaeus—common carp

Carp are native to Eurasia and have been introduced statewide. They are widespread and are most abundant in large bodies of water. They may be expected in nearly any body of water in the state. Freshwater. Introduced.

Dionda argentosa Girard—manantial roundnose minnow

Limited to the spring-influenced headwaters and spring runs of the Devils River, and San Felipe and Sycamore creeks. The common name we have chosen is the Spanish word which translates as "spring-run", a reference to the type of habitat which is necessary for this species' survival. Freshwater. Special Concern

Dionda diaboli Hubbs & Brown—Devils River minnow

Restricted to the Devils River, San Felipe, and Sycamore creeks (Val Verde County) and Pinto Creek (Kinney County). A population which once inhabited Las Moras Creek (Kinney County) has been extirpated. This

species has declined significantly in abundance in the last decade. Freshwater. State Threatened, Federally Threatened.

Dionda episcopa Girard—roundnose minnow

Inhabits the spring-influenced tributaries and segments of the Rio Grande (Big Bend region) and Pecos River in New Mexico and Texas. Freshwater. Special Concern.

Dionda nigrotaeniata (Cope)—Guadalupe roundnose minnow

This Texas endemic occupies the spring-fed Edwards Plateau streams in the Colorado and Guadalupe river basins. Freshwater. Special Concern.

Dionda serena Girard—Nueces roundnose minnow

This Texas endemic occupies the spring-fed Edwards Plateau streams in the Nueces and San Antonio river basins. Freshwater. Special Concern.

Gila pandora (Cope)—Rio Grande chub

One isolated population inhabits Little Aguja Creek (Nations Canyon) in the Davis Mountains of trans-Pecos Texas. The species inhabits limited areas of the Rio Grande and Pecos basins in New Mexico and southern Colorado. Freshwater. State Threatened.

Hybognathus amarus (Girard)—Rio Grande silvery minnow

Formerly abundant throughout the Rio Grande and Pecos basins, it is apparently extirpated in Texas and exists only in scattered Rio Grande locations in New Mexico. Freshwater. State Endangered, Federally Endangered. Presumed Extirpated.

Hybognathus hayi Jordan—cypress minnow

Cypress minnows occur in lowland streams of the southern Mississippi and adjacent basins from Illinois and Indiana southward. This species is restricted in the state to the Sabine and Cypress basins. Freshwater.

Hybognathus nuchalis Agassiz—Mississippi silvery minnow

Found in east Texas streams from the Brazos River eastward and northward to the Red River. Its range continues throughout the Mississippi basin to the Great Lakes. Freshwater.

Hybognathus placitus Girard—plains minnow

Native to the Great Plains from Texas northward to North Dakota and Montana. Plains minnows range in central Texas from the Colorado and Brazos basins northward to the Red River. Freshwater.

Hybopsis amnis (Hubbs & Greene)—pallid shiner

Ranges widely throughout the Mississippi River basin southward along the Gulf Coastal Plain in Texas to the Guadalupe basin. Freshwater.

Luxilus chrysocephalus Rafinesque—striped shiner

Early records of this species were commonly reported as *Luxilus* (= *Notropis*) *cornutus* (Mitchill). *Luxilus chrysocephalus* was elevated to specific rank by Gilbert (1961). Very limited in Texas, occurring only in the northeast corner of the state in tributaries of the Red, Sulphur and

Cypress drainages. The subspecies that is found in the state is *L. c. isolepis* which occurs throughout the south-central U.S. Freshwater.

Lythrurus fumeus (Evermann)—ribbon shiner
Found east of the Balcones Escarpment and in the Coastal Plain of east and northeast Texas, from the Lavaca drainage northward to the Red River. Elsewhere this species is widespread in the lower Mississippi drainages. Freshwater.

Lythrurus umbratilis (Girard)—redfin shiner
Ranging throughout the Mississippi and Ohio river valleys and into the Great Lakes region, this species is near the southwestern edge of its range in Texas. It has been found in the Red, Sabine, Neches and Trinity basins in Texas. Freshwater.

Macrhybopsis aestivalis (Girard)—speckled chub
Endemic to streams of the Rio Grande and Río San Fernando (Eisenhour, 2004). In Texas, it is found primarily in the Rio Grande between the confluence with the Río Conchos and the Pecos River. Freshwater. Special Concern.

Macrhybopsis australis (Hubbs & Ortenburger)—prairie chub
Recognized as a distinct species within the *M. aestivalis* complex by Eisenhour (1999). Endemic to the upper Red River basin (Eisenhour, 2004). Freshwater. Special Concern.

Macrhybopsis hyostoma (Gilbert)—shoal chub
Recognized as a distinct species within the *M. aestivalis* complex by Eisenhour (1999). Widespread in central and eastern U.S. In Texas, this species occurs from the Sabine River to the Lavaca River (Eisenhour, 2004). Freshwater.

Macrhybopsis marconis (Jordan & Gilbert)—burrhead chub
Recognized as a distinct species within the *M. aestivalis* complex by Eisenhour (1999). Occurs in the San Antonio and Guadalupe rivers and remnant populations may persist in the Edwards Plateau portion of the Colorado River (Eisenhour, 2004). Freshwater. Special Concern.

Macrhybopsis storeriana (Kirtland)—silver chub
This species is found in Texas in the Red River and the lower Brazos River. The Brazos River population is apparently disjunct from other populations of this species which range through the Mississippi River basin to Mobile Bay. Freshwater. Special Concern.

Macrhybopsis tetranema (Gilbert)—peppered chub
Recognized as a distinct species within the *M. aestivalis* complex by Eisenhour (1999). Endemic to the large, plains streams of the Arkansas River basin. This species is apparently declining throughout much of its natural range. In Texas, it is now only found in portions of the upper South Canadian River (Eisenhour, 1999). Freshwater. Special Concern.

Notemigonus crysoleucas (Mitchill)—golden shiner
Widely distributed throughout the state, primarily as a result of bait releases. This species is probably only native to the streams of east Texas. Freshwater.

Notropis amabilis (Girard)—Texas shiner
Ranges primarily within the Edwards Plateau streams (including portions of the San Gabriel River on the northeast) and to the Pecos River in the west. The species is also found in Rio Grande tributaries in Mexico, including the Río Salado and Río San Juan. Freshwater.

Notropis atherinoides Rafinesque—emerald shiner
A wide ranging species throughout the central U.S., especially the Mississippi basin, this species is at the edge of its range in Texas, occurring in the Red, Sabine, Neches and the lower Trinity drainages. Freshwater.

Notropis atrocaudalis Evermann—blackspot shiner
Primarily an east Texas species, it ranges within the state from the lower Brazos basin north and eastward to the Red River. Freshwater. Special Concern.

Notropis bairdi Hubbs & Ortenburger—Red River shiner
This species is restricted to the Red River basin in Texas and Arkansas. Freshwater. Special Concern.

Notropis blennius (Girard)—river shiner
This species extends from Hudson Bay south through the Mississippi basin to Texas, Louisiana and Mississippi. Primarily a mainstream inhabitant, this species occurs in the state only in the Red River drainage. Freshwater.

Notropis braytoni Jordan & Evermann—Tamaulipas shiner
This species is restricted to the Rio Grande and Río Conchos basins in Texas and Mexico. It also occurs in the lower Pecos River. This shiner appears to have declined substantially in abundance. Freshwater. Special Concern.

Notropis buccula Cross—smalleye shiner
Native to the middle and upper Brazos River drainage. Likely extirpated from the middle Brazos River, but stable in the upper basin. This species is presumed to have been introduced into the Colorado River near Austin. Freshwater. Special Concern.

Notropis buchanani Meek—ghost shiner
Ranges from the lower Rio Grande and its Mexican tributaries northward to the Great Lakes. It inhabits large silt-laden streams. Originally described by Meek in 1869 from a small creek near Poteau (LeFlore County), Oklahoma who named the species after Dr. John L. Buchanan, then president of Arkansas Industrial University (now University of Arkansas). Freshwater.

Notropis chalybaeus (Cope)—ironcolor shiner
Found in coastal streams from New York to Texas, and in the southern Great Lakes through parts of the Mississippi River to the Gulf of Mexico. In Texas, this species is found only in northeast Texas streams from the Sabine River to the Red River with the exception of an isolated population found in the San Marcos River headwaters. Freshwater. Special Concern.

Notropis chihuahua Woolman—Chihuahua shiner
Limited in Texas to small tributaries of the Rio Grande in the Big Bend region. Elsewhere, it occurs primarily in the Río Conchos basin in Chihuahua, Mexico. Freshwater. State Threatened.

Notropis girardi Hubbs & Ortenburger—Arkansas River shiner
In Texas, found in the Canadian River. This species is apparently declining throughout much of its natural range, the Arkansas River drainage. Freshwater. State Threatened, Federally Threatened.

Notropis jemezanus (Cope)—Rio Grande shiner
The species originally ranged throughout the Rio Grande basin, including the Pecos, Conchos, San Juan and Salado drainages. It has declined in abundance in recent years and appears spottily distributed within the basin. Freshwater. Special Concern.

Notropis maculatus (Hay)—taillight shiner
Restricted in Texas to the Sulphur and Cypress drainages in extreme northeast Texas. Freshwater. Special Concern.

Notropis orca Woolman—phantom shiner
Originally ranging from around El Paso to the mouth of the Rio Grande, this species is thought to be extinct (Miller et al., 1989). It is closely related to the bluntnose shiner, *Notropis simus*. Freshwater. Extinct.

Notropis oxyrhynchus Hubbs & Bonham—sharpnose shiner
This species is endemic to the Brazos River. A presumed introduced population exists in the Colorado River above Buchanan Reservoir. This species is apparently decreasing in abundance perhaps as a result of decreased turbidity downstream from reservoirs in the Brazos basin. Freshwater. Special Concern.

Notropis potteri Hubbs & Bonham—chub shiner
Ranges in Texas throughout the Brazos and Red basins. A population is also known from the San Jacinto drainage near Conroe. Freshwater. Special Concern.

Notropis sabinae Jordan & Gilbert—Sabine shiner
Inhabits small Austroriparian streams of east Texas from the San Jacinto drainage northward along the Gulf Coast to the Sabine River basin. Freshwater. Special Concern.

Notropis shumardi (Girard)—silverband shiner
A primarily large-stream species inhabiting the Mississippi-Missouri River

systems, in Texas this species is abundant in the Brazos basin and is found in limited numbers in the Red River and other Coastal Plain streams as far south as the Lavaca drainage. Freshwater. Special Concern.

Notropis simus (Cope)—bluntnose shiner
Once found throughout the Rio Grande and Pecos River, this species is composed of two subspecies (each likely a unique species), *N. simus simus* (inhabiting the Rio Grande proper) and *N. simus pecosensis* in the Pecos River (Chernoff et al., 1982). *Notropis s. simus* has not been captured since 1964 and is now considered extinct (Miller et al., 1989). *Notropis s. pecosensis* is now limited to the New Mexico portion of the Pecos River. Freshwater. State Threatened. Extirpated/Extinct.

Notropis stramineus (Cope)—sand shiner
This species ranges sporadically throughout the Edwards Plateau, in the Big Bend region of the Rio Grande, and along the Red River. Elsewhere, it is found throughout the Great Plains, and the upper Mississippi and Missouri river basins eastward through the Great Lakes region. Freshwater.

Notropis texanus (Girard)—weed shiner
Distributed in low gradient streams in the eastern part of the state from the Nueces basin northward to the Red River at about Lake Texoma. Freshwater.

Notropis volucellus (Cope)—mimic shiner
Found throughout the eastern half of the state from the Nueces basin northward, but apparently not found in the Red River in Texas. Freshwater.

Opsopoeodus emiliae Hay—pugnose minnow
The range of the pugnose minnow in Texas is primarily in streams of the Coastal Plain. There is a record of this species in the Trinity River near the Dallas area. Elsewhere, it is found throughout the Mississippi Valley, usually in slow moving rivers and streams. Freshwater.

Phenacobius mirabilis (Girard)—suckermouth minnow
A wide-ranging species throughout the central U.S., it occurs in limited numbers in Texas Gulf Coastal Plains streams including the Red, Sabine, Trinity, Canadian and Colorado drainages. Freshwater.

Pimephales promelas Rafinesque—fathead minnow
A widespread species east of the Rocky Mountains in North America. Fathead minnows may be found throughout much of the state presumably as a result of bait releases. Freshwater.

Pimephales vigilax (Baird & Girard)—bullhead minnow
This species occurs throughout the central U.S. and Gulf Coast drainages of Texas. Apparently introduced into the upper basins of the Rio Grande, Red and Canadian in Texas. Freshwater.

Platygobio gracilis (Richardson)—flathead chub
A very rare species in Texas, the flathead chub is known from the Canadian

River in the Panhandle in Texas and also occurs in the Rio Grande and Pecos Rivers in northern New Mexico. Its main distribution is within the Mississippi and Missouri river systems in the central U.S. and Canada. Freshwater.

Pteronotropis hubbsi Bailey & Robison—bluehead shiner

Inhabits Caddo Lake in Texas. Elsewhere this species is found sporadically in cypress swamps in portions of Arkansas and Louisiana. Freshwater. State Threatened.

Rhinichthys cataractae (Valenciennes)—longnose dace

This species inhabits a wide area of northern North America. Its range extends south along the Rio Grande and Pecos River in New Mexico and extends into Texas throughout the Rio Grande to about Laredo. Freshwater. Special Concern.

Scardinius erythrophthalmus (Linnaeus)—rudd

Native to Europe, this species was originally introduced into New York and has recently spread throughout the southeast as a bait minnow. This introduced species has been found in Texas in widely scattered localities throughout the state. Freshwater. Introduced.

Semotilus atromaculatus (Mitchill)—creek chub

This species is found throughout the eastern U.S. In Texas, it is limited to the smaller streams of east Texas to the coastal waters of the Brazos basin. Freshwater.

FAMILY CATOSTOMIDAE—suckers

1a. Dorsal fin base more than ⅓ of standard length; 22 to 30 dorsal fin rays ---------- 2
1b. Dorsal fin base less than ¼ of standard length; 4 to 18 dorsal fin rays ---------- 7
2a. More than 50 lateral line scales; eye closer to back of head than to tip of snout; head abruptly more slender than body (in adults)---------- 3
2b. Fewer than 45 lateral line scales; eye closer to tip of snout than back of head; head gradually more slender than body ---------- 4
3a. Lip papillae short, only around mouth ---------- *Cycleptus elongatus*
3b. Lip papillae long, extending forwards onto end of snout ----------*Cycleptus* sp.
4a. Subopercle broadest below middle, subtriangular; cheek deep and long (eye about equidistant between the upper corner of the gill slit and the posteroventral angle of the preopercle) ----------*Carpiodes carpio*
4b. Subopercle broadest at middle, subsemicircular; cheek shallow and foreshortened (distance from eye to posteroventral angle of preopercle ¾ of distance to upper corner of the gill slit---- 5
5a. Mouth large and very oblique; upper jaw as long as snout; upper lip about level with the lower margin of orbit; lips thin and faintly striate----------*Ictiobus cyprinellus*
5b. Mouth small and a little oblique; upper jaw distinctly shorter than snout; upper lip well below the lower margin of orbit; lips thick and coarsely striate ---------- 6
6a. Body more elongate, greatest depth goes 2.6 to 3.3 times in standard length; thickness of head goes fewer than 5 times in standard length; distance from the posterior tip of the maxillary to the front of mandible greater than eye length (about twice eye length in large adults)---------- *Ictiobus niger*
6b. Body deeper and narrower, greatest depth goes 2.2 to 2.8 times in standard length; thickness of head goes more than 5 times in standard length; distance from the posterior tip of

the maxillary to the front of the mandible less than eye length (about equal to eye in large adults)---------- *Ictiobus bubalus*
7a. Lateral line complete and well developed in adults; air bladder with 3 chambers ----------8
7b. Lateral line incomplete or absent in adults; air bladder with 2 chambers ---------- 11
8a. Caudal fin with a black streak on lower lobe ---------- *Moxostoma poecilurum*
8b. Caudal fin without a black streak ----------9
9a. Dorsal fin rays 13; tip of dorsal fin blackish; caudal fin yellowish; lower sides golden to red ---------- *Moxostoma erythrurum*
9b. Dorsal fin rays 11 or 12; distal half of dorsal fin membranes dusky; caudal fin dusky; lower sides olive to yellow ---------- 10
10a. Pectoral fin length equal to head length; width of eye goes 4 to 5.5 times into head length; 44 to 46 scales along the lateral line ---------- *Moxostoma congestum*
10b. Pectoral fin length less than head length; width of eye goes nearly 5.5 times into head length; 47 to 50 scales along the lateral line ----------*Moxostoma austrinum*
11a. Lateral line somewhat developed in adults; mouth inferior and horizontal; color pattern (except in the pale, obscurely mottled young) consists of rows of black spots (1 on each scale) ---------- *Minytrema melanops*
11b. Lateral line always absent; mouth subterminal and oblique; color pattern (except in young with 2 dark stripes) consists of narrow vertical bars---------- 12
12a. Longitudinal scale rows 34 to 38 (usually 36 to 38); eye larger (eye length approximately ½ of snout length), back with crescentric scale marks ---------- *Erimyzon sucetta*
12b. Longitudinal scale rows 39 to 43 (usually 39 to 41); eye smaller (eye length goes more than 2 times in snout length), back without crescentric scale marks ----------*Erimyzon oblongus*

Carpiodes carpio (Rafinesque)—river carpsucker

Ranges statewide, most commonly in the larger rivers and reservoirs. Young individuals are often found in small streams. Freshwater.

Cycleptus elongatus (Lesueur)—blue sucker

Inhabits large rivers throughout the Mississippi basin and continuing southward in limited numbers through the major streams of Texas excluding the Rio Grande. Freshwater. State Threatened.

Cycleptus sp.—Rio Grande blue sucker

Phylogenetic analysis of mitochondrial DNA sequences revealed the *Cycleptus* of the Rio Grande is monophyletic and clearly divergent (Burr and Mayden 1999; Buth and Mayden 2001; Bessert 2006). Freshwater. Special Concern.

Erimyzon oblongus (Mitchill)—creek chubsucker

Occurs in east Texas streams from the Red River southward to the San Jacinto drainage. Elsewhere it occurs throughout the southern Great Plains, the lower Mississippi Valley, and Atlantic Coast drainages. An early record exists from the Devils River. Freshwater. State Threatened.

Erimyzon sucetta (Lacépède)—lake chubsucker

Occurs widely in the Mississippi, Gulf Coast, and southeastern Atlantic seaboard drainages to Virginia. Ranges in Texas primarily in east Texas from the Red River to the Brazos River. A disjunct population has additionally been recorded in the upper Guadalupe River. Freshwater.

Ictiobus bubalus (Rafinesque)—smallmouth buffalo

A wide-ranging species, smallmouth buffalo are native to streams from Pennsylvania and West Virginia west to Montana and south to Mexico. In Texas, this species may be found throughout the state with the exception of the Texas panhandle. It is commonly found in reservoirs and larger streams. Freshwater.

Ictiobus cyprinellus (Valenciennes)—bigmouth buffalo

Ranges from the Great Lakes southward through the Ohio and Mississippi river basins. In Texas, limited to the Red River east of Lake Texoma and the Sulphur River in the extreme northeast part of the state. Freshwater.

Ictiobus niger (Rafinesque)—black buffalo

This species occurs throughout the Mississippi, Ohio, Missouri, and adjacent basins. Scattered records occur throughout the state, including from the Rio Grande, Colorado, Brazos, Sabine and Red basins. Early taxonomic difficulties in recognizing this species, its unusually disjunct distribution pattern and its apparent rarity in the state suggest a possible introduction of this species into many localities (Conner, 1977) or many intermediate records have been published which are misidentifications of the very common smallmouth buffalo, *I. bubalus*. Freshwater.

Minytrema melanops (Rafinesque)—spotted sucker

Ranges widely in the U.S. In Texas it is found primarily in east Texas streams from the Red to the Brazos basins. A disjunct population occurs in the Llano River (Colorado River basin) near Junction downstream to about Mason. Freshwater.

Moxostoma austrinum Bean—Mexican redhorse

Recorded from Texas in the Alamito Creek area of the Big Bend region. The range of this species extends to the Pacific slope drainages in Mexico. This species is closely related to the gray redhorse. Freshwater. Special Concern.

Moxostoma congestum (Baird & Girard)—gray redhorse

This species is restricted in Texas to the streams within the Edwards Plateau including the Brazos, Colorado, Guadalupe, San Antonio, Nueces and Rio Grande drainages. Elsewhere, its range includes Gulf of Mexico coastal streams as far south as the Río Soto la Marina in Mexico. Freshwater.

Moxostoma erythrurum (Rafinesque)—golden redhorse

Although widely distributed throughout the eastern U.S., this species occurs only in the Red River in Texas. Freshwater.

Moxostoma poecilurum Jordan—blacktail redhorse

Found in streams emptying into the Gulf of Mexico. In Texas limited to the Sabine basin west through the San Jacinto drainage. Freshwater.

FAMILY CHARACIDAE—characins

Astyanax mexicanus (De Filippi)—Mexican tetra

In Texas, the Mexican tetra is native to the Rio Grande and possibly the Nueces River drainages. It has been introduced statewide by "bait bucket" release. The most successful introductions have been in areas with substantial spring flows. Freshwater.

FAMILY ICTALURIDAE—bullhead catfishes

1a. Eyes absent; skin without pigment ---------- 2
1b. Eyes present; skin pigmented ---------- 3
2a. No teeth on jaws; lips at corner of mouth thin ---------- *Trogloglanis pattersoni*
2b. Well developed teeth on jaws; lips at corner of mouth thick ---------- *Satan eurystomus*
3a. Adipose fin joined to the caudal fin or separated from it by no more than a shallow notch ---------- 4
3b. Adipose fin free at tip, not joined to caudal fin ---------- 5
4a. Jaws nearly equal, mouth terminal; pectoral fin spine not serrated; dark axial streak conspicuous; dorsal, anal and caudal fins not dark edged; lower lip and chin not heavily speckled with dark pigment ---------- *Noturus gyrinus*
4b. Lower jaw included (underslung), mouth sub-terminal; pectoral spine serrated; axial streak inconspicuous; dorsal, anal and caudal fins with dark edges; lower lip and chin heavily speckled with dark pigment ---------- *Noturus nocturnus*
5a. Premaxillary band of teeth on upper jaw with a lateral backward extension on each side; head depressed ---------- *Pylodictis olivaris*
5b. Premaxillary band of teeth on upper jaw without a lateral backward extension on each side; head rounded ---------- 6
6a. Caudal fin rounded or shallowly emarginate; anal fin rays (including all rudiments) 17 to 27 ---------- 7
6b. Caudal fin deeply forked; anal fin rays (including all rudiments) 22 to 36 ---------- 8
7a. Anal fin rays 17 to 23; caudal fin square or slightly emarginate; chin barbels blackish; eye goes into snout length 2.4 or fewer times ---------- *Ameiurus melas*
7b. Anal fin rays 24 to 27; caudal fin rounded; chin barbels whitish; eye goes into snout length 2.6 or more times ---------- *Ameiurus natalis*
8a. Anal fin rays 30 to 36 ---------- *Ictalurus furcatus*
8b. Anal fin rays 22 to 29 ---------- 9
9a. Anal fin rays 27 to 29; pectoral fin spine goes less than 5 times into standard length ---------- *Ictalurus punctatus*
9b. Anal fin rays 22 to 26; pectoral fin spine goes more than 5 times into standard length ---- 10
10a. Anal fin rays 23 to 26; pectoral spine length much more than caudal peduncle depth ---------- *Ictalurus lupus*
10b. Anal fin rays 22 to 25; pectoral spine length about equal to caudal peduncle depth ---------- *Ictalurus* sp.

Ameiurus melas (Rafinesque)—black bullhead

A wide ranging species in eastern North America. Its Texas native distribution is statewide except for the trans-Pecos drainages. This species has been widely introduced throughout the state. Freshwater.

Ameiurus natalis (Lesueur)—yellow bullhead

A wide-ranging species in eastern North America. It occurs throughout all but the trans-Pecos and Panhandle drainages within Texas. Freshwater.

Ictalurus furcatus (Lesueur)—blue catfish
Ranges in all except the northwestern part of Texas, mainly in the larger rivers and streams. A morphologically distinct, spotted form exists in the Rio Grande. Freshwater.

Ictalurus lupus (Girard)—headwater catfish
Native to the Pecos and Rio Grande basins of Texas, New Mexico and Mexico. This species was once found in the upper Nueces, San Antonio, Guadalupe and Colorado basins, but appears to be extirpated from these systems (Kelsch and Hendricks, 1990). Colorado River populations were likely the result of introductions (R. R. Miller, pers. comm.). Special Concern. Freshwater.

Ictalurus punctatus (Rafinesque)—channel catfish
Widespread east of the Rocky Mountains in temperate North America. Ranges throughout the state, however the species is presumably not native, but introduced, to the upper Rio Grande and Pecos basins. Freshwater.

Ictalurus sp.—Chihuahua catfish
Restricted to the Rio Grande basin from New Mexico south through Texas and into Mexico as far as the Río San Fernando. In Texas, this undescribed species was native to the Rio Grande and Big Aguja Creek (Davis Mountains) in west Texas. Irrigation and indiscriminant stockings of *I. punctatus* were likely factors in its extirpation from the state. It may still occur in the ríos Conchos, Salado and San Fernando in Mexico. Freshwater. Special Concern.

Noturus gyrinus (Mitchill)—tadpole madtom
Occurs widely throughout eastern Texas from the Red River to the Nueces basin. There is also a report of this species from the Rio Grande in Webb County that may be a result of an introduction. Elsewhere, this species ranges widely east of the Rocky Mountains, except in upland streams draining the Appalachian Mountains. Freshwater.

Noturus nocturnus Jordan & Gilbert—freckled madtom
Found primarily in east Texas from the Red River southward to the Brazos basin. Freshwater.

Pylodictis olivaris (Rafinesque)—flathead catfish
Ranges throughout the Mississippi, Ohio and Missouri basins southward along the Gulf Coast drainages to Mexico. Occurs statewide. Freshwater.

Satan eurystomus Hubbs & Bailey—widemouth blindcat
Restricted to the San Antonio Pool of the Edwards Aquifer in the vicinity of San Antonio at depths of 300 to 600 meters. Freshwater. State Threatened.

Trogloglanis pattersoni Eigenmann—toothless blindcat
Restricted to the San Antonio Pool of the Edwards Aquifer in the vicinity of San Antonio at depths of 300 to 600 meters. Freshwater. State Threatened.

FAMILY ARIIDAE—sea catfishes

1a. Lower jaw with 4 barbels; pectoral and dorsal fins with long filaments ------ *Bagre marinus*
1b. Lower jaw with 6 barbels; pectoral and dorsal fins without long filaments ---------*Arius felis*

Arius felis (Linnaeus)—hardhead catfish
Hardhead catfish inhabit coastal waters from Massachusetts to Mexico; they often migrate upstream short distances in coastal rivers. Estuarine.

Bagre marinus (Mitchill)—gafftopsail catfish
This species ranges along coastal waters of the Atlantic and Gulf coasts from Massachusetts to southeastern Brazil and may also be found in western Cuba and Trinidad. It may be found throughout the Texas coast. Marine.

FAMILY DORADIDAE—thorny catfishes

1a. Lateral body surface with whitish stripes ---------- *Platydoras armatulus*
1b. Body covered with whitish spots ---------- *Agamyxis pectinifrons*

Agamyxis pectinifrons (Cope) – whitebarred catfish
One specimen, from an apparent aquarium release has been recorded in a wastewater canal near Mercedes. This species inhabits the Amazon River basin in Bolivia, Brazil, Colombia and Peru. Freshwater. Introduced.

Platydoras armatulus (Valenciennes) - southern striped Raphael
Specimens have been taken in San Felipe Creek, Del Rio. Freshwater. Introduced.

FAMILY LORICARIIDAE—suckermouth catfishes

1a. Dorsal fin short with 9 or fewer rays ---------- *Hypostomus* sp.
1b. Dorsal fin long with 10 or more rays ----------2
2a. Light spots on a dark background; ventral surface with white vermiculations wider than dark ---------- *Pterygoplichthys anisitsi*
2b. Dark spots on a light background ----------3
3a. Discrete spots on ventral surface; posterior sides of body without chevrons of coalesced spots---------- *Pterygoplichthys multiradiatus*
3b. Dark spots forming extensive vermiculations on sides and ventral surface ----------
---------- *Pterygoplichthys disjunctivus*

Hypostomus sp.—armadillo del río
Native to the Amazon basin in South America, this species has been introduced into numerous locations, including the headwaters of San Felipe Creek (Val Verde County), San Antonio River (Bexar County) and Comal Springs (Comal County). This species or a close relative to *H. plecostomus* has been introduced into many other sites in the U.S. We prefer the common name "armadillo del río" for the species introduced to Texas rather than the Nelson et al. (2004) name of "suckermouth" catfish because of long usage (Hubbs et al., 1978) and because it adheres to the American Fisheries

Society's guidelines for the establishment of official common names of fishes. Freshwater. Introduced.

Pterygoplichthys anisitsi (Eigenmann and Kennedy) – suckermouth armored catfish

Pterygoplichthys disjunctivus (Weber) - vermiculated sailfin catfish

Pterygoplichthys multiradiatus (Hancock) - Orinoco sailfin catfish

The above three species of *Pterygoplichthys* are native to various drainage systems in South America. Established populations of one or more of these species exist in the Buffalo Bayou drainage, Harris County; in the headwaters of the San Marcos, Comal, and San Antonio rivers; and in irrigation canals in Hidalgo County (Edwards, 2001; Nico and Martin, 2001; Hoover et al., 2004). Freshwater. Introduced.

FAMILY ESOCIDAE—pikes

1a. Opercles with scales on dorsal half only ---------- *Esox lucius*
1b. Opercles with scales covering most of ventral half ---------- 2
2a. Branchiostegal rays 11 to 13; fewer than 115 scale rows along body------- *Esox americanus*
2b. Branchiostegal rays 14 to 17; more than 120 scale rows along body ---------- *Esox niger*

Esox americanus vermiculatus Lesueur—grass pickerel

This species inhabits Mississippi River drainages from the Great Lakes to the Brazos River of Texas. In Texas, this subspecies is primarily restricted to east Texas and coastal streams from the Red River basin south to the Brazos River basin. Freshwater.

Esox lucius Linnaeus—northern pike

This species has a world-wide northern circumpolar distribution. Northern pike have been introduced into a few north Texas reservoirs. Freshwater. Introduced.

Esox niger Lesueur—chain pickerel

The chain pickerel is native to the Atlantic and Gulf Coast drainages as far west as the Red and Sabine basins. Freshwater.

FAMILY SALMONIDAE—salmons

1a. Lateral scale rows 120 to 140; basibranchial teeth absent; paired fins with a white border; no deep red to orangish slash on each side of throat along inner side of dentary bone; small spots heavily scattered along sides and caudal fin ---------- *Oncorhynchus mykiss*
1b. Lateral scale rows 150 to 180; basibranchial teeth usually present, but small or vestigial; paired fins uniformly brown or reddish but without a white border; deep red to orangish slash on each side of throat along inner side of dentary bone; large spots concentrated on caudal peduncle in adults ---------- *Oncorhynchus clarki*

Oncorhynchus clarki (Richardson)—cutthroat trout

Although evidence is largely circumstantial, cutthroat trout are likely native to the state. The trout that probably occurred in Texas was the Rio Grande

cutthroat trout, *O. clarki virginalis* (Girard). The current range of this subspecies includes the headwaters of the Rio Grande and Pecos drainages, possibly the headwaters of the Canadian drainage (Behnke, 1979). It is thought to have been originally present in at least Limpia and McKittrick creeks in Texas and possibly elsewhere in the Davis mountains (Garrett and Matlock, 1991). Freshwater. Special Concern-Extirpated.

Oncorhynchus mykiss (Walbaum)—rainbow trout

Native to streams of the Pacific Northwest from Baja California to Alaska, this introduced species in Texas has a self-sustaining population only in McKittrick Canyon in the Guadalupe Mountains. Introduced individuals may be found in many other localities that provide a "put and take" fishery. Freshwater. Introduced.

FAMILY APHREDODERIDAE—pirate perch

Aphredoderus sayanus (Gilliams)—pirate perch

Ranges widely throughout the Atlantic Slope, Gulf Coast and Mississippi Valley streams. Occurs primarily in east Texas from the Red River southward through the lower Brazos basins. Freshwater.

FAMILY MUGILIDAE—mullets

1a. Lower jaw rounded, without a symphyseal knob; lower limb of 1st gill arch with 17 to 20 gill rakers; no adipose eyelid; scales ctenoid ---------- *Agonostomus monticola*
1b. Lower jaw angular, with a prominent symphyseal knob; lower limb of 1st gill arch with 25 to 60 gill rakers; adipose eyelid well developed in adults; scales cycloid in young, ctenoid in adults----------2
2a. Soft dorsal and anal fins with few scales; sides with longitudinal dark stripes along the scale rows; usually 8 (rarely 7 or 9) anal fin soft rays; usually 41 lateral line scales ---------- ---------- *Mugil cephalus*
2b. Soft dorsal and anal fins with many scales; sides without longitudinal dark stripes along the scale rows; usually 9 anal fin soft rays; usually 38 lateral line scales ---------- *Mugil curema*

Agonostomus monticola (Bancroft)—mountain mullet

Generally found along the Atlantic and Gulf coasts through the Caribbean to Colombia and Venezuela in South America, this species has been found considerable distances upstream in various Texas streams from the Trinity River to the Rio Grande, where it is a common inhabitant of the lower Rio Grande. Freshwater-Estuarine.

Mugil cephalus Linnaeus—striped mullet

This species has a world-wide circumtropical distribution and occurs in all of the major bays and estuaries of Texas. Striped mullet may also migrate considerable distances inland. Estuarine.

Mugil curema Valenciennes—white mullet

A coastal species in temperate and tropical seas of the western hemisphere, white mullet may be found inhabiting most of the bays and estuaries in

Texas. Specimens are also often found in the lower reaches of coastal streams. Estuarine.

FAMILY ATHERINOPSIDAE—New World silversides

1a. Jaws produced into a short beak; snout length much longer than eye length; scales small, more than 60 scales in lateral series; more than 20 anal fin rays---------- *Labidesthes sicculus*
1b. Jaws not produced into a beak; snout length equal to or shorter than eye length; scales large, usually fewer than 50 in lateral series; fewer than 20 anal fin rays ---------- 2
2a. Scales ctenoid, rough to the touch; double pairs of dark spots on dorsum; bases of dorsal and anal fin covered with scales ---------- *Membras martinica*
2b. Scales cycloid, smooth to the touch; dorsum with crosshatching, but not double pairs of dark spots; bases of dorsal and anal fins not covered with scales---------- 3
3a. Usually 8 second dorsal fin rays; air bladder long and opaque when viewed in bright light, with usually 4 or more anal fin rays in front of the posterior tip of the air bladder; only exists as females---------- *Menidia clarkhubbsi*
3b. Usually 9 second dorsal fin rays; air bladder long and transparent or short and opaque; either male or female ---------- 4
4a. Air bladder long and transparent, its posterior tip smoothly rounded; usually 4 or more anal fin rays in front of the posterior tip of the air bladder; horizontal distance between spinous dorsal and anal fin origin less than 7% of standard length---------- *Menidia beryllina*
4b. Air bladder short and opaque, its posterior tip blunt and rectangular; usually 3 or fewer anal fin rays in front of the posterior tip of the air bladder; horizontal distance between spinous dorsal and anal fin origin greater than 7% of standard length ---------- *Menidia peninsulae*

Labidesthes sicculus (Cope)—brook silverside

Ranges from the Great Lakes southward through the Mississippi basin and Gulf Coastal Plain drainages. In Texas, this species is restricted to the Sabine and portions of the Red River of east Texas. Freshwater.

Membras martinica (Valenciennes)—rough silverside

Primarily found in coastal waters from New York to near Tabasco, Mexico. Introduced populations thrive in both Amistad and Falcon reservoirs. Marine.

Menidia beryllina (Cope)—inland silverside

Originally found in coastal waters and upstream in coastal streams along the Atlantic and Gulf coasts as far south as the Río Panuco and Laguna de Tampamachoco in northern Veracruz, Mexico. Widely introduced into freshwater impoundments. In Texas may be found in many reservoirs. Freshwater-Estuarine.

Menidia clarkhubbsi Echelle & Mosier—Amazon silverside

Known from only scattered localities in Texas including near Copano Bay and Galveston Bay. We use the common name "Amazon silverside" rather than "Texas silverside" as proposed by Nelson et al. (2004) as our name is more descriptive of the reproductive biology of the species. This all-female species of apparent hybrid origin reproduces by gynogenesis. Marine. Special Concern.

Menidia peninsulae (Goode & Bean)—tidewater silverside

Tidewater silversides are native to coastal waters from Florida to northeastern Mexico. This species inhabits more saline environments than *Menidia beryllina*. Marine.

FAMILY BELONIDAE—needlefishes

Strongylura marina (Walbaum)—Atlantic needlefish

This species inhabits coastal waters from Maine to Brazil. It may also be found considerable distances upstream in the lower portions of coastal streams. Estuarine.

FAMILY FUNDULIDAE—topminnows

1a. Distance from origin of dorsal fin to end of hypural plate less than distance from origin of dorsal fin to preopercle or occasionally about equal to that distance; more than 30 longitudinal scale rows ---------- 2
1b. Distance from origin of dorsal fin to end of hypural plate more than distance from origin of dorsal fin to preopercle; 30 or fewer longitudinal scale rows ---------- 11
2a. More than 40 longitudinal scale rows; gill slit not extending dorsal to uppermost pectoral fin ray ---------- 3
2b. Fewer than 40 longitudinal scale rows; gill slit extending dorsal to uppermost pectoral fin ray ---------- 4
3a. Lateral scales large; usually 42 to 50 scale rows in lateral series (modally 47); breeding males with red on fins ---------- *Fundulus zebrinus*
3b. Lateral scales small; usually 47 to 60 scale rows in lateral series (modally 53); breeding males with orangish-yellow fins ---------- *Fundulus kansae*
4a. Body with a distinct dark lateral band ---------- 5
4b. Body without a distinct dark lateral band ---------- 6
5a. Spots on body distinct, color resembles lateral band ---------- *Fundulus olivaceus*
5b. Spots on body diffuse, color resembles back coloration ---------- *Fundulus notatus*
6a. Eye goes more than 1.5 times in snout; body with about 10 dark bars, the last with dark spot dorsally ---------- *Fundulus similis*
6b. Eye goes fewer than 1.5 times in snout; body barred or not, but never with a dark spot on dorsal part of caudal peduncle ---------- 7
7a. A dark subocular bar; most prominent dark spots on body arranged in more than 2 lengthwise stripes ---------- *Fundulus blairae*
7b. No dark subocular bar; body mottled, barred or irregularly spotted ---------- 8
8a. Dorsal fin originating posterior to anal fin origin; fewer than 15 scale rows from pelvic origin to isthmus ---------- 9
8b. Dorsal fin originating anterior to anal fin origin; more than 15 scale rows from pelvic fin origin to isthmus ---------- 10
9a. Large black spots on body arranged in 2 irregular rows; 11 to 13 anal fin rays ---------- *Fundulus jenkinsi*
9b. Dark spots on body absent or small and not in rows; usually 10 anal fin rays ---------- *Fundulus chrysotus*
10a. Predorsal stripe absent or not reaching occiput ---------- *Fundulus grandis*
10b. Predorsal stripe reaching occiput; no noticeable cross-hatched pattern; dark markings on scales not concentrated at posterior edge ---------- *Fundulus pulvereus*

11a. Body barred; body depth goes 3 times in standard length; fewer than 10 dorsal fin rays --- *Adinia xenica*
11b. Body not barred; body depth goes 3.5 times or more in standard length; 10 or more dorsal fin rays --- 12
12a. Conspicuous lateral stripe extending through eye to snout; body depth goes 4.5 to 5 times in standard length --- *Lucania goodei*
12b. No distinct lateral stripe; body depth goes 3.5 to 4 times in standard length- *Lucania parva*

Adinia xenica (Jordan & Gilbert)—diamond killifish
A species most commonly found in coastal waters from Florida to Texas. Individuals may penetrate short distances upstream in coastal streams. Estuarine.

Fundulus blairae Wiley & Hall—western starhead topminnow
This species is found in drainages of the northern Gulf of Mexico. It ranges in the state from the Red River southward to the Brazos River near College Station. Freshwater.

Fundulus chrysotus (Günther)—golden topminnow
Native to coastal drainages from South Carolina, Florida and Georgia east to Texas and north to southeastern Missouri. Ranges in Texas from the Sabine River southward in coastal streams to Copano Bay. Freshwater.

Fundulus grandis Baird & Girard—Gulf killifish
Primarily found in coastal waters and their tributaries from Florida to Laguna de Tampamachoco, Veracruz, Mexico. Often introduced as a "bait minnow" and may be found ranging widely in the Brazos, Rio Grande and Pecos basins. Estuarine.

Fundulus jenkinsi (Evermann)—saltmarsh topminnow
Occurs sporadically along the Gulf Coast from western Florida to Texas. Originally described and known in Texas only from Dickinson Bayou (near Galveston Bay). Estuarine.

Fundulus kansae Garman—northern plains killifish
Native to the Mississippi River basin. Occurs in the Canadian River in Texas. Freshwater.

Fundulus notatus (Rafinesque)—blackstripe topminnow
Occurs in the central U.S. throughout the Mississippi basin and adjacent drainages. Native to eastern Texas from the Red to the San Antonio basins. Freshwater.

Fundulus olivaceus (Storer)—blackspotted topminnow
Occurs in the central U.S. throughout the Mississippi and adjacent drainages. Ranges in Texas from the San Jacinto drainage north and eastward to the Red River basin. Freshwater.

Fundulus pulvereus (Evermann)—bayou killifish
Occurs in coastal waters and short distances inland from about Corpus Christi to Sabine Lake in Texas and then eastward along the Gulf Coast to Mobile Bay, Alabama. Estuarine.

Fundulus similis (Baird & Girard)—longnose killifish
A species most commonly found in coastal waters from northeastern Florida to northeastern Mexico, however, individuals may penetrate short distances upstream in coastal rivers. Marine.

Fundulus zebrinus Jordan & Gilbert—plains killifish
Occurs from the Red River to the Pecos River. An introduced population exists in the Rio Grande and some of its tributaries in and near Big Bend National Park. A native population once found in Austin is now extirpated. Freshwater.

Lucania goodei Jordon—bluefin killifish
Native to southeastern U.S. Typically inhabits small streams and ponds. Introduced in California, North Carolina, South Carolina and Texas (Gallaway et al., 2008). Freshwater.

Lucania parva (Baird)—rainwater killifish
Native to coastal waters from Massachusetts to Laguna de Tampamachoco, Veracruz, Mexico and then sporadically further south in Laguna de Terminos, Tabasco, Cancun, Quintana Roo and Isla Cozumel. This species was collected by Evermann (1892) in San Antonio Springs and also occurs in the Pecos River, Leon Creek, and in Falcon Reservoir in the Rio Grande basin. It has been introduced (ca. 1980) into Clear Creek (Menard County, San Saba River drainage). Freshwater-Estuarine.

FAMILY POECILIIDAE—livebearers

1a. Origin of dorsal fin anterior to anal fin origin; intestinal canal long with many convolutions ---2
1b. Origin of dorsal fin posterior to anal fin origin; intestinal canal short with few convolutions ---5
2a. Dorsal fin rays 10 or more---3
2b. Dorsal fin rays fewer than 9 (usually 7 or 8) --- *Poecilia reticulata*
3a. Dorsal fin rays 12 to 14 ---4
3b. Dorsal fin rays 10 to 12; dorsal fin base less than ½ predorsal length; dark spots on scales do not obscure diamond-shaped color pattern; only exists as females --- *Poecilia formosa*
4a. Dorsal fin base more than ½ predorsal length; dark spots on scales obscure diamond-shaped color pattern --- *Poecilia latipinna*
4b. Dorsal fin base approximately ½ predorsal length; no dark spots on scales, often a dark lateral stripe; males with greatly elongated lower caudal rays --- *Xiphophorus hellerii*
5a. Dorsal fin origin slightly behind anal fin origin; dark band on sides with vertical bars; large black spots near bases of dorsal and caudal fins of both sexes and on anal fin of females --- *Heterandria formosa*
5b. Dorsal fin origin well behind anal fin origin; no dark band on sides; median fins without large black spots near their bases ---6

6a. Spines at tip of 3rd anal fin ray of male gonopodium (first enlarged ray) 1 to 3 times longer than wide ---------- 7
6b. Spines at tip of 3rd anal fin ray of male gonopodium 4 to 10 times longer than wide ------- 8
7a. Dorsal fin rays 6 (rarely 7); distal end of the 4th fin ray of gonopodium in male parallel or curved in only a weak arch ---------- *Gambusia affinis*
7b. Dorsal fin rays 7; distal end of the 4th fin ray of gonopodium in male curved in a wide arch ---------- *Gambusia speciosa*
8a. Distal segments of anterior branch of 4th fin ray of gonopodium coalesced to elbow --------- ---------- *Gambusia georgei*
8b. Distal segments of anterior branch of 4th fin ray of gonopodium not coalesced to elbow -- 9
9a. Dorsal fin rays 9 (rarely 10); predorsal stripe distinct and broad ----- *Gambusia clarkhubbsi*
9b. Dorsal fin rays 7-8; predorsal stripe thin or absent ---------- 10
10a. Dorsal and anal fins without yellow pigmentation; dusky lateral stripe indistinct; mouth without dark markings and anal spot of females not restricted to area immediately around anus; pectoral fin of males with indentation, much deeper than widest pectoral fin ray---------- ---------- *Gambusia heterochir*
10b. Dorsal and (in females) anal fins with yellow pigmentation (lost in preservation); dusky lateral stripe pronounced; mouth with dark markings or anal spot of females restricted to area immediately around anus; pectoral fin of males with slight indentation, shallower than widest pectoral fin ray---------- 11
11a. Lateral stripe broad; caudal fin without prominent dark markings; markings on sides crescentric; tip of anterior branch of 4th ray of male gonopodium does not extend to tip of posterior branch ---------- 12
11b. Lateral stripe thin and threadlike; caudal fin with prominent dark markings; markings on sides rounded specks; tip of anterior branch of 4th ray of male gonopodium extends as far as tip of posterior branch ---------- 14
12a. Elbow of gonopodium composed of usually 4 fused segments; no dark markings around anus of mature females ---------- *Gambusia senilis*
12b. Elbow of gonopodium composed of usually 2 (rarely 3) fused segments; dark markings on anus of mature females ---------- 13
13a. Body deep, maximum body depth goes into standard length about 4 times in females; longest serra goes 1.2 times (usually ranges from 1.0 to 1.4) into width of segment on ray 4p of gonopodium; suborbital bar weak; chin bar faint; few crescentric lateral marks; predorsal streak weak to absent ---------- *Gambusia gaigei*
13b. Body slender, maximum body depth goes into standard length about 5 times in females; longest serra goes 1.7 times (usually ranges from 1.5 to 1.9) into width of segment on ray 4p of gonopodium; suborbital bar prominent; lateral stripe broad and conspicuous ---------- ---------- *Gambusia amistadensis*
14a. Postanal streak prominent (darker than markings on scale pockets); dark markings on mouth; median row of spots on caudal fin; median row of spots on dorsal fin; terminal hook on 4th and 5th rays of gonopodium angular at tip ---------- *Gambusia geiseri*
14b. Postanal streak weaker than markings on scale pockets; dusky or no markings on mouth; no prominent spots in middle of caudal fin; a subbasal row of spots on dorsal fin; terminal hooks on 4th and 5th rays of gonopodium rounded at tip---------- *Gambusia nobilis*

Gambusia affinis (Baird & Girard)— western mosquitofish

This is a wide-ranging species in the southern half of the U.S. east of the Rocky Mountains. It may be found throughout the state of Texas. It has been widely introduced throughout the world for mosquito control. Freshwater.

Gambusia amistadensis Peden—Amistad gambusia

The original range of the species included the headsprings and the 1.3 km springrun of Goodenough Springs (Val Verde County) to its confluence with the Rio Grande (Peden, 1973). The species became extinct in the wild when Goodenough Springs, once the 3rd largest spring system in Texas was inundated by Amistad Reservoir in 1968 (Peden, 1973; Brune, 1981). Culture populations were maintained until the late 1970s at the University of Texas at Austin and at the U.S. Fish and Wildlife Service's endangered species culture facility in Dexter, New Mexico. These populations were contaminated by western mosquitofish (*G. affinis*) which eliminated the Amistad gambusia in these cultures prior to 1983 (Hubbs and Jensen, 1984, Miller et al., 1989). Freshwater. Extinct.

Gambusia clarkhubbsi Garrett & Edwards—San Felipe gambusia

This species was only recently discovered (Garrett and Edwards, 2003) and is restricted to the headwaters of San Felipe Creek, a 15-km tributary of the Rio Grande in the city of Del Rio (Val Verde County). San Felipe gambusia is a member of the *nobilis* species group. It appears to prefer thermally-consistent spring flows and is apparently most common in edge habitats adjacent to flowing waters. This new species occurs sympatrically with *G. speciosa*. Freshwater. Special Concern.

Gambusia gaigei Hubbs—Big Bend gambusia

The Big Bend gambusia is restricted to an extremely limited series of springs in the Boquillas Crossing and Rio Grande Village areas of Big Bend National Park. At least 2 populations are believed to have originally existed; one at Boquillas Spring and the other at "Spring 4", east of the Rio Grande Village campground in the national park. The population inhabiting Boquillas Spring is extinct and the population in Spring 4 was once extirpated. However, the species now consists of descendents of 3 individuals of the Spring 4 population and is maintained in refuges in Big Bend National Park and at the U.S. National Fish Hatchery in Dexter, New Mexico as well as Spring 4. Freshwater. State Endangered, Federally Endangered.

Gambusia geiseri Hubbs & Hubbs—largespring gambusia

The range of this species was originally restricted to the headwaters of the San Marcos and Comal rivers in central Texas. They have been introduced into many other drainages including, the headwaters of the Concho River (Tom Green County), San Solomon Springs and associated irrigation network (Reeves County), Leon Creek (Pecos County), Devils River (Val Verde County) and Independence Creek (Terrell County). Freshwater.

Gambusia georgei Hubbs & Peden—San Marcos gambusia

This species was restricted to a very limited portion of the San Marcos River springrun several kilometers below the headsprings. This species has

always been rare, and its existence difficult to document. San Marcos gambusia were captured alive and an artificial culture established in Austin and in Dexter, New Mexico in 1979 and 1980, respectively. Both of these cultures were contaminated by *G. affinis* in the early 1980s (see also *G. amistadensis*) and the last individual taken from the wild was captured in 1981. Despite considerable efforts to secure this species since then, none have been taken. It is likely extinct (Miller et al., 1989). Freshwater. State Endangered, Federally Endangered. Extinct.

Gambusia heterochir Hubbs—Clear Creek gambusia

This species is restricted to the impounded headwater springs of Clear Creek, a tributary to the San Saba River (Menard County). A series of very old dams located at the extreme headwaters contributed to a competitive advantage by *G. affinis* at this location and also resulted in a long established hybrid swarm (Hubbs, 1971) between these 2 species. A major dam reconstruction during the late 1970s has had the effect of reducing the incidence of hybridization above the dam (Edwards and Hubbs, 1985). Freshwater. State Endangered, Federally Endangered.

Gambusia nobilis (Baird & Girard)—Pecos gambusia

Known from scattered localities in western (trans-Pecos) Texas and eastern New Mexico. In Texas, this species inhabits the headwaters of Phantom Lake (Jeff Davis County), San Solomon, Giffin, and East Sandia springs (Reeves County), Diamond Y Draw and Diamond Y Springs (Pecos County). Originally, it also inhabited Leon Springs (its type locality, approximately 16 km upstream from Diamond Y Springs) and also Comanche Springs (within the city of Fort Stockton) prior to their desiccation. Freshwater. State Endangered, Federally Endangered.

Gambusia senilis Girard—blotched gambusia

Although the species is primarily found within the Río Conchos drainage of Chihuahua, Mexico, a population was once known from the Devils River in Texas. This population was probably extirpated shortly after Amistad Reservoir was constructed. Freshwater. State Threatened. Extirpated.

Gambusia speciosa Girard—Tex-Mex gambusia

We follow the evidence of Rauchenberger (1989) in recognizing this form as a distinct species. The species primarily occurs in Mexico, occupying streams and tributaries to the Rio Grande and more southern drainages. Tex-Mex mosquitofish have a limited distribution in Texas, occurring only in the Devils River and associated streams in Val Verde County. Freshwater.

Heterandria formosa Agassiz—least killifish

A coastal species ranging from North Carolina through Florida and west to the Texas border. This species has been found in Texas only on the west

bank of the Sabine River near the Interstate Highway 10 crossing in Orange County (Hanks and McCoid, 1988). Freshwater.

Poecilia formosa (Girard)—Amazon molly

The native range of this species in Texas is the lower Rio Grande; however, it has been introduced in several localities in the lower Nueces, San Antonio and San Marcos rivers. Elsewhere, this species is also native to Gulf Coast streams in northeastern Mexico. This all female species reproduces by gynogenesis. Freshwater.

Poecilia latipinna (Lesueur)—sailfin molly

Primarily found in coastal waters from North Carolina to Laguna de Tampamachoco, Veracruz, Mexico; however, numerous inland populations exist primarily in spring-influenced central Texas headwaters and in the lower Rio Grande. Contrary to some reports which argue that all Texas inland localities are native (Burgess, 1980), we agree with Brown (1953) that these represent introductions. Estuarine/Freshwater.

Poecilia reticulata Peters—guppy

Native to Trinidad and northern Venezuela, this popular aquarium species has been introduced widely within the state. An established population in the wild exists only in the San Antonio River near Brackenridge Park. Freshwater. Introduced.

Xiphophorus hellerii Heckel—green swordtail

Native to streams from Honduras to southern Mexico, this fish is established in the headwaters of the San Antonio River, downstream from the San Antonio Zoo (Edwards, 2001). Freshwater. Introduced.

FAMILY CYPRINODONTIDAE—killifishes

1a. Distance from origin of dorsal fin to end of hypural plate more than distance from origin of dorsal to anterior nostril---------- *Cyprinodon variegatus*

1b. Distance from origin of dorsal fin to end of hypural plate less than the distance from origin of dorsal to anterior nostril ----------2

2a. Abdomen fully scaled ----------3

2b. Abdomen naked anterior to pelvics ----------5

3a. Lateral scale rows 26 to 27; lateral blotches of female deeper than long; dark terminal caudal bar of adult males about ¼ of caudal depth ----------*Cyprinodon eximius*

3b. Lateral scale rows 24 or 25; lateral blotches of female longer than deep; dark terminal caudal bar of adult males about ⅓ of caudal length----------4

4a. Dorsal speckled at base; basal exposed part of lateral scales darker than edge----------
----------*Cyprinodon elegans*

4b. Dorsal unicolor; lateral scales evenly colored---------- *Cyprinodon bovinus*

5a. Caudal peduncle depth less than distance from snout to back of eye; in adults greatest body depth contained more than 2.5 times in standard length ---------- *Cyprinodon rubrofluviatilis*

5b. Caudal peduncle depth more than distance from snout to back of eye; in adults greatest body depth contained less than 2.5 times in standard length ---------- *Cyprinodon pecosensis*

Cyprinodon bovinus Baird & Girard—Leon Springs pupfish
Occurs in the Diamond Y Draw drainage, a flood tributary of the Pecos River (Pecos County) in western Texas. This population nearly went extinct when introduced sheepshead minnows extensively hybridized with them. Historically, the species also occurred in Leon Springs, approximately 15 km southwest from the presently inhabited location but was extirpated when the springs were pumped dry. Freshwater. State Endangered, Federally Endangered.

Cyprinodon elegans Baird & Girard—Comanche Springs pupfish
The distribution of this species is restricted to a small series of springs, their outflows and man-made irrigation canals in the vicinity of Balmorhea, Texas, including Phantom Springs (Jeff Davis County), San Solomon Springs, Giffin Springs and Toyah Creek (Reeves County). The population in Comanche Springs (Pecos County) was extirpated when the springs were pumped dry. Freshwater. State Endangered, Federally Endangered.

Cyprinodon eximius Girard—Conchos pupfish
The range of this species is from the Río Conchos, Chihuahua, Mexico to the Devils River, Texas. The two Texas populations, Devils River and Alamito Creek are morphologically and biochemically distinct from the Río Conchos populations. Freshwater. State Threatened.

Cyprinodon pecosensis Echelle & Echelle—Pecos pupfish
Restricted to the Pecos River in Texas and New Mexico. This species is nearly extirpated in Texas due to hybridization with introduced sheepshead minnows. Freshwater. State Threatened.

Cyprinodon rubrofluviatilis Fowler—Red River pupfish
Occurs naturally in the upper Red and Brazos basins. The Red and Brazos populations may be genetically distinct at the species level. Introduced populations also exist in the Canadian and Colorado basins. Freshwater. Special Concern.

Cyprinodon variegatus Lacépède —sheepshead minnow
This species inhabits primarily coastal waters on the Atlantic and Gulf coasts from Maine south through the Gulf of Mexico and the Caribbean to Venezuela. It sometimes extends considerable distances upstream in coastal streams, especially in the Rio Grande. Introduced populations exist at several localities in the trans-Pecos region and in the San Antonio basin. Freshwater-Estuarine.

FAMILY SYNGNATHIDAE—pipefishes

1a. Median trunk ridge deflected ventrally at anus and continuous with inferior trunk ridge; 40 to 47 dorsal rays; obvious spiny projections on rings; brood pouch on males under belly---------- *Microphis brachyurus*
1b. Median trunk ridge terminates at anus; 27 to 36 dorsal rays; lateral tail ridge with a slight discontinuity and then an upward swing posteriorly---------- 2

2a. Snout short, 40 to 50% of head length; 27 to 36 dorsal fin rays; 15 to 17 trunk rings; 30 to 34 tail rings ---------- *Syngnathus scovelli*
2b. Snout long, 49 to 66% of head length; 33 to 36 dorsal fin rays; 19 to 21 trunk rings; 34 to 37 tail rings ---------- *Syngnathus louisianae*

Microphis brachyurus (Bleeker)—opossum pipefish
Found in Texas only in the lowermost reaches of the Rio Grande in Cameron County, although this species is widespread throughout the brackish waters of Central America, the Antilles and scattered localities along the eastern Gulf and Atlantic coasts of the U.S. Estuarine. State Threatened.

Syngnathus louisianae Günther—chain pipefish
Found in coastal waters from Maryland south to the Caribbean and through most of the Gulf of Mexico, this species may migrate upstream considerable distances in coastal streams. Marine.

Syngnathus scovelli (Evermann & Kendall)—gulf pipefish
Found in coastal waters from Florida to Mexico. This species may migrate upstream considerable distances in coastal streams. Estuarine.

FAMILY CENTROPOMIDAE—snooks

1a. Second anal fin spine not reaching to caudal fin base; tips of pelvic fins reaching barely to anus; 9 to 10 gill rakers on lower arch ---------- *Centropomus undecimalis*
1b. Second anal fin spine reaching past caudal fin base; tips of pelvic fins reaching past anus; 13 to 16 gill rakers (excluding rudiments) on lower arch ---------- *Centropomus parallelus*

Centropomus parallelus Poey—smallscale fat snook
This species is known in Texas only from the lower Rio Grande near its confluence with the Gulf of Mexico. Its range extends from the Atlantic and Gulf coasts of Florida through the Gulf of Mexico south to Brazil. Throughout its range it is known to ascend great distances in coastal streams (Rivas, 1986). Estuarine. Special Concern.

Centropomus undecimalis (Bloch)—common snook
Found in coastal waters from North Carolina, through the Gulf of Mexico south to Brazil. This species commonly inhabits the lower portions of coastal streams, especially in southern Texas. Estuarine. Special Concern.

FAMILY MORONIDAE—temperate basses

1a. Dorsal fins united at base; 2nd and 3rd anal fin spines approximately equal in length; no teeth on tongue; 9 to 10 anal fin soft rays; stripes along sides usually sharply broken and offset above front of anal fin ---------- *Morone mississippiensis*
1b. Dorsal fins separated; 2nd anal fin spine much shorter than 3rd; base of tongue with teeth; 11 to 13 anal fin soft rays; stripes along sides usually continuous----------2

2a. Body depth goes less than 3 times in standard length; teeth in single patch on back of tongue---------- *Morone chrysops*
2b. Body depth goes more than 3 times in standard length; teeth in 2 parallel patches on back of tongue---------- *Morone saxatilis*

Morone chrysops (Rafinesque)—white bass
A widespread species throughout the Ohio and Mississippi drainages, the Great Lakes and southward to the Red River basin. This species has been widely introduced in the state, especially into reservoirs. Freshwater.

Morone mississippiensis Jordan & Eigenmann—yellow bass
This species is native to the central Mississippi Valley and adjacent drainages. It is restricted in Texas from the Red River southward to the San Jacinto drainage. Although abundances of this species are now reduced, this was a common, commercially harvested fish in the late 1800s. It was often erroneously referred to as "striped bass". Freshwater.

Morone saxatilis (Walbaum)—striped bass
This species ranges along the Atlantic and Gulf coasts east to around Lake Pontchartrain Louisiana. Although not native to Texas, this species has been widely stocked and maintains a significant fishery in many reservoirs, commonly replacing the previously introduced white bass. Estuarine. Introduced.

FAMILY CENTRARCHIDAE—sunfishes

1a. Anal spines 3 (rarely 2 or 4)---------- 2
1b. Anal spines 5 to 8---------- 15
2a. Body depth usually goes 3 to 5 times in standard length; more than 55 lateral line scales - 3
2b. Body depth usually goes 2 to 2.5 times in standard length; fewer than 55 lateral line scales ---------- 6
3a. Shortest dorsal fin spine goes 2.4 to 3.9 times in longest dorsal spine; bases of soft dorsal and anal fins without scales; pyloric caecae branched at base---------- *Micropterus salmoides*
3b. Shortest dorsal fin spine goes 1.1 to 2.5 times in longest dorsal spine; bases of soft dorsal and anal fins scaled; pyloric caecae not branched---------- 4
4a. Dorsal fin soft rays 12; 28 to 32 scales around caudal peduncle; 11 to 14 scales above lateral line; 19 to 25 scales below lateral line---------- *Micropterus dolomieu*
4b. Dorsal fin soft rays 13 to 15; 22 to 28 scales around caudal peduncle; 7 to 10 scales above lateral line; 14 to 19 scales below lateral line---------- 5
5a. Small spots on scales not present dorsal to lateral line; dark lateral stripe prominent; caudal spot prominent; maximum depth of bars making up lateral stripe goes 3 to 4 times into maximum body depth ---------- *Micropterus punctulatus*
5b. Small spots on scales extend to near dorsal; dark lateral stripe obscured by barring; caudal spot usually indistinct (more so in adults); maximum depth of bars on body goes 1.5 to 2 times into maximum body depth ---------- *Micropterus treculii*
6a. Teeth on tongue and pterygoids; supramaxilla longer than breadth of maxilla; maxillary width exceeds suborbital---------- *Lepomis gulosus*
6b. No teeth on tongue or pterygoids; supramaxilla absent or shorter than breadth of maxilla; maxillary width less than suborbital---------- 7
7a. Pectoral fins short and rounded going 3.75 or more times in standard length ---------- 8
7b. Pectoral fins long and pointed, upper pectoral fin rays much longer than lower; pectoral fin goes 3.5 or fewer times in standard length ---------- 13
8a. Opercle stiff to its margin (not including membrane); posterior edge of opercle within opercular membrane smooth ----------9
8b. Opercle produced into a thin flexible projection lying within the opercular membrane; posterior edge of opercle within opercular membrane fimbriate---------- 11
9a. Fewer than 40 scales on incomplete lateral line; black spot on dorsal fin with a light margin in young---------- *Lepomis symmetricus*
9b. More than 35 scales on complete lateral line; black spot, if present on dorsal fin, without a light margin ---------- 10
10a. Dark spot at posterior base of dorsal fin; gill rakers in adults long, when depressed reaching beyond base of 2nd raker below; supramaxilla ⅔ width of maxilla ---*Lepomis cyanellus*
10b. No dark spot at posterior base of dorsal fin; gill rakers in adults short, when depressed not reaching base of 2nd raker below; supramaxilla ⅓ width of maxilla----------*Lepomis miniatus*
11a. Palatine teeth present; opercular membrane dark to its margin---------- *Lepomis auritus*
11b. Palatine teeth absent; opercular membrane not dark to its margin---------- 12
12a. Cheek scales 3 to 5; 12 (rarely 13) pectoral fin rays; 33 to 40 lateral line scales; anal base convex ---------- *Lepomis marginatus*
12b. Cheek scales 5 to 7; 13 to 15 pectoral fin rays; 38 to 49 lateral line scales; anal base nearly straight ---------- *Lepomis megalotis*
13a. Opercle margined with scarlet (normally faded in preserved material), stiff to its margin; gill rakers short, not reaching beyond base of 2nd raker below when depressed---------- ---------- *Lepomis microlophus*
13b. Opercle not margined with scarlet, flexible; gill rakers reaching at least to base of 2nd below when depressed ---------- 14
14a. Anal fins with 7 to 9 soft rays; no dark spot on posterior part of dorsal fin; palatine teeth present ---------- *Lepomis humilis*
14b. Anal fins 10 to 12 soft rays; a dark spot on posterior part of dorsal fin; palatine teeth absent ---------- *Lepomis macrochirus*
15a. Dorsal fin spines 11 to 13 ---------- 16
15b. Dorsal fin spines 6 to 8---------- 17
16a. Anal fin with 6 spines and 10 to 11 soft rays; fewer than 20 gill rakers on 1st arch; preopercle entire or weakly crenate ---------- *Ambloplites rupestris*
16b. Anal fin with 7 to 8 spines and 13 to 15 soft rays; more than 24 gill rakers on 1st arch; preopercle finely serrate ---------- *Centrarchus macropterus*
17a. Dorsal fin spines (usually) 6; length of dorsal fin base less than distance from its origin to posterior margin of eye; body pigmentation in vertical bands ---------- *Pomoxis annularis*
17b. Dorsal fin spines 7 or 8; length of dorsal fin base equal to or greater than distance from its origin to posterior margin of eye; body pigmentation in scattered spots ---------- ---------- *Pomoxis nigromaculatus*

Ambloplites rupestris (Rafinesque)—rock bass
Introduced into the state from Neosho, Missouri in the late 1800s, this species now occurs in the San Marcos, Comal and upper Guadalupe rivers. Freshwater. Introduced.

Centrarchus macropterus (Lacépède)—flier
Found in Atlantic coastal drainages from Virginia across the Gulf Coastal Plain to Texas and extending north through the Mississippi basin to southern Illinois, this species is restricted in the state to lowland streams in east Texas including the Sabine, Neches and San Jacinto drainages. Freshwater.

Lepomis auritus (Linnaeus)—redbreast sunfish
Introduced into the state from its original range in the streams of the Atlantic slope. It now occurs throughout the eastern and southern parts of Texas as far west as Independence Creek (Pecos drainage). Freshwater. Introduced.

Lepomis cyanellus Rafinesque—green sunfish
The original range of this species was a broad area of the U.S. and northern Mexico east of the Rocky Mountains and west of the Appalachian chain. It occurs throughout the state of Texas and has been widely introduced throughout the remainder of the U.S. Freshwater.

Lepomis gulosus (Cuvier)—warmouth
This species is widely distributed throughout much of the central and eastern U.S. It may be found statewide with the exception of the plains streams in the Texas Panhandle area. Freshwater.

Lepomis humilis (Girard)—orangespotted sunfish
This species occurs in the central U.S. south of the Great Lakes and extends into Texas throughout the northern half of the state to the Colorado River drainage. A number of introductions have occurred into various systems as far south as the Rio Grande basin. Freshwater.

Lepomis macrochirus Rafinesque—bluegill
This wide-ranging species occurs naturally in the U.S. and northern Mexico east of the Rocky Mountains and may be found statewide. Two subspecies are native to the state, *L. m. macrochirus* in the northeastern half of the state and *L. m. speciosus* in the central, southern and western parts of the state. A third subspecies, *L. m. purpurescens*, native to Atlantic coastal plain drainages has been introduced widely as a sport and forage fish. Freshwater.

Lepomis marginatus (Holbrook)—dollar sunfish
This species occurs in southern Atlantic coastal drainages from North Carolina to Florida and west to Texas. It is restricted in the state to east Texas from the Sulphur and Sabine basins, southward to the Navasota River (Brazos drainage). Freshwater.

Lepomis megalotis (Rafinesque)—longear sunfish
This species is wide ranging throughout much of the central U.S. southward to northeastern Mexico. It may be found statewide in Texas except in the headwaters of the Canadian and Brazos rivers. A number of populations have been introduced throughout the state. Freshwater.

Lepomis microlophus (Günther)—redear sunfish
This species ranges throughout most of the southeastern U.S. It is native to the eastern two-thirds of Texas. It is likely that the San Marcos River is southern end of its distribution (R.R. Miller, pers. comm.). This species has been widely transplanted throughout the state. Freshwater.

Lepomis miniatus Jordan—redspotted sunfish
Previously regarded as a subspecies of *L. punctatus*, this species ranges throughout most Gulf Slope drainages. Redspotted sunfish may be found in most drainages in the state of Texas, with the exception of streams in the northwestern part of the state. Freshwater.

Lepomis symmetricus Forbes—bantam sunfish
This species is primarily found in western Mississippi River lowlands from southern Illinois to Texas. In the state, the bantam sunfish is limited to coastal drainages from the Red River southward to the Colorado River basin near the coast. Freshwater.

Micropterus dolomieu Lacépède —smallmouth bass
Native to northern streams east of the Rocky Mountains but has been widely introduced throughout the world. In Texas, smallmouth bass have been widely stocked, particularly in Edwards Plateau streams and reservoirs. Freshwater. Introduced.

Micropterus punctulatus (Rafinesque)—spotted bass
Native to streams of the lower Mississippi and Ohio basins, extending eastward to northwestern Florida. Native to eastern Texas from the Red River to the Guadalupe basin exclusive of the Edwards Plateau. Freshwater.

Micropterus salmoides (Lacépède)—largemouth bass
A wide ranging species originally found throughout much of the U.S. east of the Rocky Mountains, including all of Texas except portions of the Panhandle region. This game species has been widely introduced and transplanted throughout the world. In addition to the native subspecies, *M. s. salmoides*, a subspecies from peninsular Florida, *M. s. floridanus*, has been stocked widely in state waters, especially in reservoirs. Freshwater.

Micropterus treculii (Vaillant & Bocourt)—Guadalupe bass
Endemic to streams of the northern and eastern Edwards Plateau including portions of the Brazos, Colorado, Guadalupe and San Antonio basins. This species is also found outside of the Edwards Plateau streams in decreased abundance primarily in the lower Colorado River. Two introduced populations have been established in the Nueces River system. The Guadalupe bass is the official state fish of Texas. Freshwater. Special Concern.

Pomoxis annularis Rafinesque—white crappie
Although the natural range of this species was throughout most of the south-central U.S., it has been widely stocked as a game species. It occurred naturally in the eastern two-thirds of Texas, but introduced populations may now be found statewide except in the upper Texas portions of the Rio Grande and Pecos basins. Freshwater.

Pomoxis nigromaculatus (Lesueur)—black crappie

The native range of this species originally included the eastern Great Plains north through the Great Lakes region and the southern Atlantic coastal drainages to Virginia. In Texas, its range included central Texas eastward, exclusive of the Edwards Plateau. It has been widely introduced as a game species, although not quite to the extent of *Pomoxis annularis*. Freshwater.

FAMILY PERCIDAE—perches

1a. Preopercle strongly serrate; upper jaw extending to below the middle of the eye or farther - ---------- 2
1b. Preopercle smooth or weakly serrated; upper jaw not extending as far as to below middle of eye---------- 4
2a. Anal fin soft rays 6 to 8; no canine teeth ---------- *Perca flavescens*
2b. Anal fin soft rays 12 to 13; canine teeth strong ---------- 3
3a. Cheeks well scaled; 17 to 19 dorsal fin soft rays; 5 or 6 pyloric caecae -- *Sander canadensis*
3b. Cheeks sparsely scaled; 19 to 22 dorsal fin soft rays; 3 or 4 pyloric caecae -- *Sander vitreus*
4a. Belly naked; body depth contained in standard length more than 7 times---------- 5
4b. Belly scaled (a narrow naked band may be present on midline); body depth contained in standard length less than 7 times---------- 6
5a. Scales restricted to lateral line region; lateral blotches longer than deep ---------- ---------- *Ammocrypta clara*
5b. Scales not restricted to lateral line region; lateral blotches deeper than long ---------- ---------- *Ammocrypta vivax*
6a. More than 77 scales in lateral line; snout conical extending beyond upper lip ---------- 7
6b. Less than 77 scales in lateral line; snout less conical, not extending beyond upper lip ----- 9
7a. Lateral bars wide, 9 to 10 whole bars; mid-bars between whole bars short, about ½ the length of the whole bars---------- 8
7b. Lateral bars thin, 14 to 16 whole bars (usually 15); mid-bars between whole bars long, about equal to length of whole bars ---------- *Percina macrolepida*
8a. Vertical bars on sides of body with obvious constrictions medially; bars expanded dorso- and ventrolaterally; breeding males with black on breast and also the pelvic and anal fins ------- ---------- *Percina carbonaria*
8b. Vertical bars on sides of body equal thickness throughout length, without obvious constrictions medially; breeding males without black on breast, pelvic or anal fins---------- ---------- *Percina caprodes*
9a. Sides with large black rectangular blotches; midline of belly with a series of enlarged scales or naked---------- 10
9b. Sides without large black rectangular blotches; scales on belly normal ---------- 13
10a. Less than 60 scales in lateral line; upper lip connected to snout by a narrow frenum-------- ---------- *Percina shumardi*
10b. More than 60 lateral line scales; upper lip connected to snout by a broad frenum -------- 11
11a. Nape naked; upper jaw reaches to pupil of eye ---------- *Percina maculata*
11b. Nape scaled; upper jaw reaches to no more than anterior ⅓ of eye---------- 12
12a. Preopercular serrae 5 or more ---------- *Percina sciera*
12b. Preopercular serrae 0 to 3 ---------- 13
13a. Usually 10 anal rays; short snout and head; head length contained in standard length more than 4.5 times ---------- *Percina apristis*
13b. Usually 9 anal rays; long snout and head; head length contained in standard length less than 4 times ----------*Percina phoxocephala*
14a. Lateral line very short, fewer than 6 scales with pores ---------- 15
14b. More than 6 pored lateral line scales ---------- 16

15a. Dorsal fin spines 6 (occasionally 7); anal fin spine1 ---------- *Etheostoma fonticola*
15b. Dorsal fin spines 8; anal fin spines 2 ----------*Etheostoma proeliare*
16a. Pectoral fin longer than head, reaching beyond anus; head angular, profile in front of eye more than 45 degrees ---------- *Etheostoma histrio*
16b. Pectoral fin shorter than head, not reaching anus; head profile rounded, profile in front of eye less than 45 degrees---------- 17
17a. Lateral line with a slight upward curve anteriorly---------- 18
17b. Lateral line straight ---------- 19
18a. Infraorbital canal uninterrupted, 6 to 8 (usually 8) pores; breast unscaled; distance from snout to angle of gill cover equal to ½ of head length ---------- *Etheostoma gracile*
18b. Infraorbital canal interrupted with 2 to 4 pores in the anterior segment and usually 2 pores in the posterior segment; breast scaled; distance from snout to angle of gill cover greater than ½ of head length----------*Etheostoma fusiforme*
19a. Anal fin spine 1; body depth contained in standard length more than 5 times ---------- ----------*Etheostoma chlorosoma*
19b. Anal fin spines 2; body depth contained in standard length less than 5 times ---------- 20
20a. Light longitudinal streak along lateral line; body in cross section nearly round ---------- ----------*Etheostoma parvipinne*
20b. No light longitudinal streak along lateral line; body cross section oval---------- 21
21a. Gill membranes rather widely joined across isthmus; a black spot at upper margin of pectoral fins---------- 22
21b. Gill membranes hardly connected; no black spot on upper margin of pectoral fins ------ 23
22a. No discrete red or yellow spots on side of body; vertical blotches on sides of body most distinct posteriorly ----------*Etheostoma radiosum*
22b. Discrete red (in males) or yellow spots (in females) on side of body; vertical blotches on sides of body usually not prominent ---------- *Etheostoma artesiae*
23a. Infraorbital canal complete ---------- *Etheostoma asprigene*
23b. Infraorbital canal interrupted below eye ---------- 24
24a. Body bars 8 to 9; throat of males orange (lost in preservation) ------*Etheostoma spectabile*
24b. Body bars 10 to 12; throat of males blue or red (lost in preservation) ---------- 25
25a. Opercle naked or with only a few scales; more than 50 lateral line scales; throat blue or green in males (lost in preservation) ---------- *Etheostoma lepidum*
25b. Opercle heavily scaled; fewer than 50 lateral line scales; throat red in males (lost in preservation) ----------*Etheostoma grahami*

Ammocrypta clara Jordan & Meek—western sand darter

This species range extends from the Neches, Sabine and Red river basins in Texas northward through the Mississippi Valley to Wisconsin and Minnesota. Freshwater. Special Concern.

Ammocrypta vivax Hay—scaly sand darter

This species is native to the tributaries of the lower Mississippi River basin. In Texas it occurs from the San Jacinto River to the Sabine River in the eastern part of the state. Freshwater.

Etheostoma artesiae (Hay)—redspot darter

Found in streams in the southeastern U.S. In Texas, it occurs in small creeks from the San Jacinto through the Sabine basins. This darter, previously recognized as a subspecies of *E. whipplei* was elevated to specific status by Piller et al. (2001). The species was originally captured in an artesian well, hence its name. Freshwater.

Etheostoma asprigene (Forbes)—mud darter
This species ranges through many of the larger mainstream Mississippi Valley streams and occurs in east Texas from the Red River south to the Neches basin. Freshwater.

Etheostoma chlorosoma (Hay)—bluntnose darter
The range of this species includes streams along the Gulf Coast from the Guadalupe River eastward to Alabama and north to Illinois in the Mississippi basin. Freshwater.

Etheostoma fonticola (Jordan & Gilbert)—fountain darter
This species is endemic to only the upper San Marcos and Comal rivers in central Texas. The original population in the Comal River was extirpated in the mid-1950s when Comal Springs ceased to flow. A population from San Marcos was reintroduced into Comal Springs during the early 1970s. Freshwater. State Endangered, Federally Endangered.

Etheostoma fusiforme (Girard)—swamp darter
While primarily an Atlantic Slope and eastern Gulf Slope ranging species, this species has been found in Cypress Creek near Nacogdoches in northeast Texas at the western-most portion of its range. Freshwater.

Etheostoma gracile (Girard)—slough darter
Occurs in streams throughout the Gulf Coastal Plain and is found in Texas from the Rio Grande to the Red River. Most records for this species end at the Nueces River. The Rio Grande records are from an old Jordan and Evermann (1896) citation and from one recent collection (Chaney and Pons, 1989). Freshwater.

Etheostoma grahami (Girard)—Rio Grande darter
This species is essentially restricted to the mainstream and spring-fed tributaries of the Rio Grande and the lower Pecos River downstream to the Devils River and Dolan, San Felipe and Sycamore creeks in the U.S. and in the headwaters of the ríos San Juan and Salado, in Mexico. Freshwater. State Threatened.

Etheostoma histrio Jordan & Gilbert—harlequin darter
This species ranges from the southern Mississippi Valley into extreme east Texas. It occurs in the state in small detritus-laden tributaries in the Cypress, Sabine, Neches and Trinity basins. Freshwater.

Etheostoma lepidum (Baird & Girard)—greenthroat darter
This species inhabits Edwards Plateau streams, especially spring-influenced headwaters in the Colorado River southward to the Nueces River basin. A disjunct series of populations inhabit tributaries of the Pecos River in New Mexico. Freshwater.

Etheostoma parvipinne Gilbert & Swain—goldstripe darter
The range of this species is the Gulf Coastal Plain and lower Mississippi

drainages westward as far as the Navasota River (Brazos River basin) in east Texas. This species occupies small first-order creeks. Freshwater.

Etheostoma proeliare (Hay)—cypress darter
The range of this species is the southern Mississippi basin and Gulf Coastal Plain from northwestern Florida to Texas. In Texas, this species is limited to extreme east Texas streams including the San Jacinto drainage north to the Red River. Freshwater.

Etheostoma radiosum (Hubbs & Black)—orangebelly darter
This species is limited to the Red River in Texas. It is primarily found in Red River tributaries in Oklahoma and Arkansas. Freshwater. Special Concern.

Etheostoma spectabile (Agassiz)—orangethroat darter
Found through much of the central U.S., especially in the Ozarks and central lowlands, this species occurs in Texas primarily in the Edwards Plateau from the San Antonio River north and east to the Red River. It is absent from the portions of streams flowing through the Coastal Plain. Freshwater.

Perca flavescens (Mitchill)—yellow perch
Introduced as a game species throughout much of North America. Its native range includes much of the southern tier of Canada and the northern U.S. east of the Rocky Mountains. In Texas, this introduced species has established breeding populations only in the Rio Grande near El Paso, in Meredith Reservoir on the Canadian River, and Greenbelt Reservoir on the Salt Fork of the Red River, despite being introduced into many other waters in the state. Freshwater. Introduced.

Percina apristis (Hubbs & Hubbs)—Guadalupe darter
Endemic to the Guadalupe, San Marcos and Comal rivers. Originally recognized as a subspecies of *P. sciera* (Hubbs, 1954), species status was designated based upon distinct meristic characters (Robins and Page, 2007). Freshwater. Special Concern.

Percina caprodes (Rafinesque)—logperch
This is a wide-ranging species found throughout much of the central U.S. In Texas it occurs only in a limited section of the middle Red River. Freshwater.

Percina carbonaria (Baird & Girard)—Texas logperch
This species occurs throughout the Edwards Plateau region of central Texas north and east to the Red River (Morris and Page, 1981). Freshwater.

Percina macrolepida Stevenson—bigscale logperch
The range of this species is from the Red and Sabine basins in east Texas, south and west to the Devils River (Rio Grande drainage) along with some Mexican tributaries in the region. Freshwater.

Percina maculata (Girard)—blackside darter
This is a wide ranging species from the Great Lakes southwards through the Mississippi basin. In Texas it is restricted to the Red River basin in the northeast part of the state. Freshwater. State Threatened.

Percina phoxocephala (Nelson)—slenderhead darter
Occurs throughout the central Ohio and Mississippi river basins, as far south as the Red River in eastern Oklahoma and northeast Texas. Freshwater.

Percina sciera (Swain)—dusky darter
The range of this species extends from the Colorado River system north and eastward through the state of Texas to Indiana, Ohio and West Virginia. Freshwater.

Percina shumardi (Girard)—river darter
The range of this species includes drainages from parts of the Hudson Bay system in Canada southward in the Mississippi basin to Texas. In the state this species is limited to east Texas streams including the Red southward to the Neches and a disjunct population in the Guadalupe and San Antonio river systems east of the Balcones Escarpment. Freshwater.

Sander canadensis (Griffith & Smith)—sauger
This species is indigenous to waters from Quebec south through the Great Lakes and extending from Montana through the Mississippi River Valley to Arkansas and Tennessee. This games species has been introduced into a few impoundments in north Texas. Freshwater. Introduced.

Sander vitreus (Mitchill)—walleye
This species naturally occurs throughout much of northern North America east of the Rocky Mountains. It has been widely introduced throughout the U.S. Introduced populations have been stocked into numerous reservoirs in Texas. Freshwater. Introduced.

FAMILY CARANGIDAE—jacks

Caranx hippos (Linnaeus)—crevalle jack
A coastal inhabitant found world wide in temperate and tropical seas, crevalle jack may be found inhabiting most of the bays and estuaries in Texas. Specimens are also often found in the lower reaches of coastal streams. Marine.

FAMILY GERREIDAE—mojarras

1a. Preopercle strongly serrate; 12 or more gill rakers on lower limb of 1st gill arch ---------- ---------- *Diapterus auratus*
1b. Preopercle entire (or with only a few small serrations at angle); 9 or fewer gill rakers on lower limb of 1st gill arch ---------- 2

2a. Nine gill rakers on lower limb of 1st gill arch; spinous dorsal fin distinctly tri-colored (dusky at base, clear in middle, jet black at tip) ---------- *Eucinostomus melanopterus*
2b. Eight gill rakers on lower limb of 1st gill arch; spinous dorsal fin not tri-colored ---------- ---------- *Eucinostomus argenteus*

Diapterus auratus Ranzani—Irish pompano
Native to coastal environments from northeast Florida through the Gulf of Mexico and the Caribbean to Brazil. This species may be found inhabiting most of the bays and estuaries in Texas. Specimens are also often found in the lower reaches of coastal streams. Marine.

Eucinostomus argenteus Baird & Girard—spotfin mojarra
This species inhabits coastal waters from New Jersey south through Bermuda, the Gulf of Mexico and the Caribbean to Brazil. Spotfin mojarra may be found inhabiting most of the bays and estuaries in Texas. Specimens are also often found in the lower reaches of coastal streams. Estuarine.

Eucinostomus melanopterus (Bleeker)—flagfin mojarra
A coastal species found throughout the Gulf of Mexico southward to Brazil and in West Africa, flagfin mojarra may be found inhabiting most of the bays and estuaries in Texas. Specimens are also often found in the lower reaches of coastal streams. Marine.

FAMILY HAEMULIDAE—grunts

1a. Preopercle strongly serrate, with anteriorly directed serrations on the lower margin; 2 enlarged spines at angle; 12 dorsal fin spines ---------- *Conodon nobilis*
1b. Preopercle moderately, or not at all, serrate, with no anterior pointing serrations; 13 dorsal fin spines ---------- *Pomadasys crocro*

Conodon nobilis (Linnaeus)—barred grunt
Barred grunts inhabit coastal waters from Mississippi to the Yucatan in Mexico. Specimens are also often found in the lower reaches of coastal streams, especially in southern Texas. Marine.

Pomadasys crocro (Cuvier)—burro grunt
A coastal inhabitant ranging from southern Florida through the Gulf of Mexico and the Caribbean to Brazil. Specimens are also often found in the lower reaches of coastal streams, especially in southern Texas. Marine.

FAMILY SPARIDAE—porgies

1a. More than 60 lateral line scales; a dark shoulder spot ---------- *Lagodon rhomboides*
1b. Fewer than 50 lateral line scales; no shoulder spot ---------- *Archosargus probatocephalus*

Archosargus probatocephalus (Walbaum)—sheepshead
A coastal fish ranging from Massachusetts to the Yucatan peninsula. This species may be found inhabiting most of the bays and estuaries in Texas.

Specimens are also often found in the lower reaches of coastal streams. Estuarine.

Lagodon rhomboides (Linnaeus)—pinfish

This species inhabits coastal waters from Massachusetts south through the entire Gulf of Mexico. It may be found inhabiting most of the bays and estuaries in Texas. Specimens are also often found in the lower reaches of coastal streams. Estuarine.

FAMILY POLYNEMIDAE—threadfins

Polydactylus octonemus (Girard)—Atlantic threadfin

This species inhabits coastal waters from Massachusetts south through the Gulf of Mexico and the Caribbean. It may be found in most of the bays and estuaries in Texas, especially at night during spring and early summer. Specimens are also often found in the lower reaches of coastal streams. Marine.

FAMILY SCIAENIDAE—drums

1a. Lower jaw projecting; 1 pair of enlarged canine teeth on upper jaw ---------- 2
1b. Upper jaw projecting or mouth terminal; no enlarged teeth ---------- 3
2a. Upper sides with well defined spots; 3rd and 4th dorsal fin spines the longest; membrane between soft dorsal and anal rays not scaled ---------- *Cynoscion nebulosus*
2b. Upper sides without spots; 1st and 2nd dorsal fin spines the longest; membrane between soft dorsal and anal rays scaled ---------- *Cynoscion arenarius*
3a. Lower jaw with 1 or more barbels ---------- 4
3b. Lower jaw without barbels ---------- 5
4a. Pectoral fin length about equal to the distance from the front of the eye to the opercular membrane ---------- *Micropogonias undulatus*
4b. Pectoral fin length about equal to the head length ---------- *Pogonias cromis*
5a. Mouth terminal; distance from anal fin origin to hypural plate much less than the distance from the anal fin origin to the pelvic fin origin ---------- *Bairdiella chrysoura*
5b. Mouth inferior; distance from anal fin origin to hypural plate equal to the distance from the anal fin origin to the pelvic fin origin ---------- 6
6a. Dark shoulder spot; more than 60 lateral line scales ---------- *Leiostomus xanthurus*
6b. No dark shoulder spot; fewer than 60 lateral line scales ---------- 7
7a. Dark spot on caudal peduncle above lateral line; upper jaw extends posterior to eye ---------- *Sciaenops ocellatus*
7b. No dark spot on caudal peduncle; upper jaw extends to below middle of eye ---------- *Aplodinotus grunniens*

Aplodinotus grunniens Rafinesque—freshwater drum

Ranges from Hudson Bay region of Canada south to Guatemala east of the Rocky Mountains and excluding the Atlantic slope drainages. In Texas, this species occurs nearly statewide except in the Panhandle region. Freshwater.

Bairdiella chrysoura (Lacépède)—silver perch

A coastal species ranging from New York to Mexico. Silver perch may be

found inhabiting most of the bays and estuaries in Texas. Specimens are also often found in the lower reaches of coastal streams. Estuarine.

Cynoscion arenarius Ginsburg—sand seatrout

A coastal species from the Gulf of Mexico. It may be found inhabiting most of the bays and estuaries in Texas. Specimens are also often found in the lower reaches of coastal streams. Marine.

Cynoscion nebulosus (Cuvier)—spotted seatrout

This species ranges in coastal waters from New York to Tampico, Mexico. It may be found inhabiting most of the bays and estuaries in Texas. Specimens are also often found in the lower reaches of coastal streams. Estuarine.

Leiostomus xanthurus Lacépède —spot

Known from Massachusetts to Mexico, this coastal species may be found inhabiting most of the bays and estuaries in Texas. Specimens are also often found in the lower reaches of coastal streams. Estuarine.

Micropogonias undulatus (Linnaeus)—Atlantic croaker

Known from Massachusetts to Mexico, this coastal species may be found inhabiting most of the bays and estuaries in Texas. Specimens are also often found in the lower reaches of coastal streams. Estuarine.

Pogonias cromis (Linnaeus)—black drum

This species inhabits coastal waters from Massachusetts to Argentina and may be found in most of the bays and estuaries in Texas. Specimens are also often found in the lower reaches of coastal streams. Marine.

Sciaenops ocellatus (Linnaeus)—red drum

This very popular coastal sportfish occurs from Massachusetts to Mexico and may be found inhabiting most of the bays and estuaries in Texas. Specimens are also often found in the lower reaches of coastal streams. Estuarine.

FAMILY ELASSOMATIDAE—pygmy sunfishes

Elassoma zonatum Jordan—banded pygmy sunfish

This is a wide-ranging species occurring in lowland streams of the Atlantic Slope and Gulf Coastal Plains. It inhabits east Texas from the Red River southward to the Brazos River basin. Freshwater.

FAMILY CICHLIDAE—cichlids

1a. Anal fin spines 5 or 6 ---------- *Cichlasoma cyanoguttatum*
1b. Anal fin spines fewer than 5 (usually 3) ---------- 2
2a. Gill rakers 8 to 10 on lower part of 1st gill arch; transverse bands present on sides; dorsal fin with yellow spots ---------- *Tilapia zillii*
2b. Gill rakers 14 or more on lower part of 1st gill arch; color pattern other than that above ---- 3

3a. Gill rakers 14 to 20 (usually 17 to 18) on lower part of first gill arch; most teeth in outer row are unicuspid in adults; sides with 3 or 4 dark blotches or with no markings; no yellow on dorsal fin; caudal fin without distinct vertical stripes---------- *Oreochromis mossambicus*
3b. Gill rakers 18 to 26 on lower part of 1st gill arch; outer row of teeth bicuspid in adults; caudal fin unmarked, or with vague, irregular dark markings, caudal fin often with a broad, red distal margin; young often with vertical bands on caudal fin---------- *Oreochromis aureus*

Cichlasoma cyanoguttatum (Baird & Girard)—Rio Grande cichlid
Native to the U.S. and Texas only in the Rio Grande and Pecos drainages, this species is also native to northeastern Mexico. Widely introduced; established populations exist as far north in Texas as the San Gabriel River (Brazos River system). Freshwater.

Oreochromis aureus (Steindachner)—blue tilapia
Native to the Middle East along the Mediterranean and North Africa, this aquacultural species has been introduced into Texas and has become established in the Rio Grande, San Antonio, Guadalupe and parts of the Colorado river drainages. Numerous other introductions have also occurred. Most successful establishments are in areas without extremely cold winter water temperatures (e.g., the lower Rio Grande basin and reservoirs heated by power plant effluents). Freshwater. Introduced.

Oreochromis mossambicus (Peters)—Mozambique tilapia
Native to Africa, this aquacultural species has been introduced into Texas and has become established primarily in the San Marcos, Guadalupe and San Antonio rivers along the Balcones fault zone. Freshwater. Introduced.

Tilapia zillii (Gervais)—redbelly tilapia
Originally ranging from north-central Africa to Jordan, this introduced species has been established in the headwaters of the San Antonio River. Freshwater. Introduced.

FAMILY ELEOTRIDAE—sleepers

1a. Fewer than 40 scale rows; maxillary reaching anterior margin of orbit ---------- *Dormitator maculatus*
1b. More than 50 scale rows; maxillary reaching posterior margin of pupil ---------- 2
2a. Teeth on vomer---------- *Gobiomorus dormitor*
2b. No teeth on vomer; preopercle with a posterio-ventrally directed spine---------- 3
3a. Dorsal fin soft rays 12; 10 anal fin soft rays; scales cycloid; about 100 lateral scale rows --- *Erotelis smaragdus*
3b. Dorsal fin soft rays 9; 9 anal fin soft rays; ctenoid scales posteriorly; fewer than about 70 lateral scale rows---------- *Eleotris amblyopsis*

Dormitator maculatus (Bloch)—fat sleeper
Fat sleepers range in coastal waters from North Carolina south to Florida, throughout the Gulf of Mexico and the Caribbean to Brazil. They may be found inhabiting most of the bays and estuaries in Texas. Specimens are also often found in the lower reaches of coastal streams. Estuarine.

Eleotris amblyopsis (Cope)—largescaled spinycheek sleeper
Ranges in coastal habitats from South Carolina and the Bermudas, throughout the Gulf of Mexico, the Caribbean, the Bahamas and West Indies to Brazil, including most of the bays and estuaries in Texas. Specimens are also often found in the lower reaches of coastal streams. Estuarine.

Erotelis smaragdus (Valenciennes)—emerald sleeper
A coastal species ranging from the northern Gulf of Mexico to Brazil, emerald sleepers may be found inhabiting most of the bays and estuaries in Texas. Specimens are also often found in the lower reaches of coastal streams. Marine.

Gobiomorus dormitor Lacépède —bigmouth sleeper
Found in southern Florida and Texas and south through the Gulf of Mexico and the Caribbean to South America. This species inhabits the coastal regions of southern Texas. Specimens are very common in the lower reaches of the Rio Grande. Freshwater-Estuarine.

FAMILY GOBIIDAE—gobies

1a. Body long and slender; body depth goes about 7 times in standard length ---------- *Gobioides broussonetii*
1b. Body short and stout; body depth goes fewer than 7 times in standard length ----------2
2a. Upper pectoral fin rays free from membrane; tongue notched-------- *Bathygobius soporator*
2b. Upper pectoral fin rays joined to membrane; tongue indented but not notched ----------3
3a. Body naked ----------4
3b. Body mostly scaled----------5
4a. Usually 12 (11 to 13) 2nd dorsal fin rays; usually 10 (9 to 11) anal fin rays; pelvic length goes 1.2 to 1.5 times into distance from pelvic fin base to anal fin origin-- *Gobiosoma robustum*
4b. Usually 13 (12 to 14) 2nd dorsal fin rays; usually 11 (10 to 12) anal fin rays; pelvic length goes 1.6 to 2.0 times into distance from pelvic fin base to anal fin origin-------- *Gobiosoma bosc*
5a. Second dorsal fin rays 15 to 16 ; 16 to 17 anal fin rays; dark brown spots on body; 2 or 3 dark vertical bars below 2nd dorsal fin ----------*Microgobius gulosus*
5b. Second dorsal fin rays 11 to 14; 11 to 16 anal fin rays----------6
6a. Second dorsal fin rays 14; 15 anal fin rays; more than 60 scales rows in lateral series ------- *Gobionellus oceanicus*
6b. Second dorsal fin rays 11 to 12; 11 to 13 anal fin rays----------7
7a. Scales small, more than 70 rows in lateral series ----------*Awaous banana*
7b. Scales large, about 29 to 40 rows in lateral series ----------8
8a. Patch of scales on upper margin of opercle; 2 dark spots on caudal fin base ---------- *Evorthodus lyricus*
8b. No patch of scales on upper margin of opercle----------9
9a. Second dorsal fin rays 11; 12 anal fin rays---------- *Gobionellus boleosoma*
9b. Second dorsal fin rays 12; 13 anal fin rays ---------- 10
10a. Upper membranes of dorsal fins clear or dusky but without distinct blackened margins 11
10b. Upper membranes of dorsal fins with distinct blackened margins--- *Gobionellus atripinnis*
11a. Canine teeth present on lower jaw----------*Gobionellus stigmaticus*
11b. No canine teeth present on lower jaw ---------- *Gobionellus shufeldti*

Awaous banana (Valenciennes)—river goby
This species is known from the Atlantic and Gulf coasts of the U.S. south through the West Indies and Central America to Venezuela and from northwest Mexico to northern Peru.. In Texas, this species is known only from the Rio Grande in Hidalgo and Cameron Counties (Edwards et al., 1986). Freshwater-Estuarine. State Threatened.

Bathygobius soporator (Valenciennes)—frillfin goby
This coastal species ranges from North Carolina to Florida and through the Gulf of Mexico. It may be found inhabiting most of the bays and estuaries in south Texas. Specimens are also often found in the lower reaches of coastal streams, especially in the lower Rio Grande. Marine.

Ctenogobius claytonii (Meek)—Mexican goby
A coastal species, the Mexican goby is known only from a few records in southern Texas and eastern Mexico (Gilbert and Randall, 1979; R. R. Miller, pers. comm.). It was originally described from the lower Rio Grande and ranges southward to Laguna de Pajaritos near Coatzacoalcos, Veracruz. Estuarine. State Threatened.

Ctenogobius boleosoma (Jordan & Gilbert)—darter goby
Occurs from North Carolina south through the Gulf of Mexico and Caribbean to Brazil. This coastal species may be found inhabiting most of the bays and estuaries in Texas. Specimens are also often found in the lower reaches of coastal streams. Estuarine.

Ctenogobius shufeldti (Jordan & Eigenmann)—freshwater goby
Coastal, may be found inhabiting most of the bays and estuaries from Galveston Bay north and east to about North Carolina. Specimens may also be found in the lower reaches of coastal streams. Estuarine.

Ctenogobius stigmaticus (Poey)—marked goby
This euryhaline species ranges from North Carolina south along the Atlantic and Gulf coasts and the Caribbean to Brazil. Marine.

Evorthodus lyricus (Girard)—lyre goby
This species is indigenous to coastal waters from Maryland to Suriname and the West Indies. It may be found inhabiting most of the bays and estuaries in Texas. Specimens are also often found in the lower reaches of coastal streams. Marine.

Gobioides broussonetii Lacépède —violet goby
A coastal inhabitant ranging along the Atlantic and Gulf coasts from Georgia to Brazil. Violet gobies may be found inhabiting most of the bays and estuaries in Texas. Estuarine.

Gobionellus oceanicus (Pallas)—highfin goby
This species is found in coastal waters from North Carolina to Campeche, Mexico. Highfin gobies may be found inhabiting most of the bays and estuaries in Texas. Specimens are also often found in the lower reaches of

coastal streams. Marine.

Gobiosoma bosc (Lacépède) —naked goby
Coastal, ranges from Long Island Sound to Campeche, Mexico. Naked gobies may be found inhabiting most of the bays and estuaries in Texas. Specimens are also often found in the lower reaches of coastal streams, especially in the southern part of the state. Estuarine.

Gobiosoma robustum Ginsburg—code goby
The range of this species includes coastal waters from Chesapeake Bay south to Florida and through the Gulf of Mexico to the Yucatan peninsula. They may be found inhabiting most of the bays and estuaries in Texas. Specimens are also often found in the lower reaches of coastal streams. Estuarine.

Microgobius gulosus (Girard)—clown goby
A coastal inhabiting species, known in Texas from the Corpus Christi Bay system north through the northern Gulf of Mexico and along the Atlantic coast to Chesapeake Bay. Estuarine.

FAMILY PARALICHTHYIDAE—sand flounders

1a. Lateral line with no high arch over the pectoral fin on the ocular side ----------2
1b. Lateral line highly arched over the pectoral fin on the ocular side ---------- ---------- *Paralichthys lethostigma*
2a. Upper jaw reaching to below the middle of eye; jaws equal; greatest body depth ½ or less of standard length ---------- *Citharichthys spilopterus*
2b. Upper jaw reaches to below front of eye; jaw on blind side larger than jaw on eyed side; greatest body depth greater than ½ of standard length ---------- *Etropus crossotus*

Citharichthys spilopterus Günther—bay whiff
Bay whiffs are coastal inhabitants ranging from New Jersey to Brazil, and may be found inhabiting most of the bays and estuaries in Texas. Specimens are also often found in the lower reaches of coastal streams. Estuarine.

Etropus crossotus Jordan & Gilbert—fringed flounder
A coastal species found from Chesapeake Bay south through the Gulf of Mexico and the Caribbean to South America. They may be found inhabiting most of the bays and estuaries in Texas. Specimens are also often found in the lower reaches of coastal streams. Marine.

Paralichthys lethostigma Jordan & Gilbert—southern flounder
Ranges in coastal habitats from North Carolina south through Florida and west along the Gulf Coast to northern Mexico. Southern flounders may be found inhabiting most of the bays and estuaries in Texas. Specimens are also often found in the lower reaches of coastal streams. Estuarine.

FAMILY ACHIRIDAE—American soles

1a. Right pectoral fin absent; 66 to 75 lateral line scales ---------- *Trinectes maculatus*
1b. Right pectoral fin present; 75 to 85 lateral line scales ---------- *Achirus lineatus*

Achirus lineatus (Linnaeus)—lined sole

Coastal, ranging from South Carolina south through the Gulf of Mexico and the Caribbean to Uruguay. This species may be found inhabiting most of the bays and estuaries in Texas. Specimens are also often found in the lower reaches of coastal streams. Estuarine.

Trinectes maculatus (Bloch & Schneider)—hogchoker

A coastal species known from Massachusetts south along the Atlantic Coast, throughout the Gulf of Mexico to Venezuela. Hogchokers may be found inhabiting most of the bays and estuaries in Texas. Specimens are also often found in the lower reaches of coastal streams. Estuarine.

FAMILY TETRAODONTIDAE—puffers

Sphoeroides parvus Shipp & Yerger—least puffer

Known from the Gulf of Mexico from Apalachicola Bay, Florida, west along the Gulf Coast to the Yucatan peninsula. This species may be found inhabiting most of the bays and estuaries in Texas. Specimens are also often found in the lower reaches of coastal streams. Marine.

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GLOSSARY

acoustico-lateralis system—The sensory system in fishes, consisting of the lateral line organs and the inner ear.

adipose eyelid—A fixed fatty tissue extending around the margin of the eye or covering the eye, found in some bony fishes such as goldeye, mooneye, most species of trout, and some mullets.

adipose fin—A soft, fleshy, unpaired fin lying on the midline between the dorsal and caudal fins; present in trout, catfish and tetras.

air bladder—A sac-like structure, sometimes with more than one chamber, along the dorsal wall of the abdominal cavity.

anal fin—An unpaired, median ventral fin located posterior to the anus.

anterior—The front part or in front of another part.

axial streak—A dark slash-like marking at the junction of the pectoral fin and the body; found in some madtom catfishes.

barbel—A fleshy, slender, fingerlike or flaplike extension on the dorsal or ventral side of the head or near the corner of the mouth.

basal processes—Used in reference to the base of the premaxillary bone in the upper jaw, which in some species, such as the mojarras, is long, extremely extensible and protracted, making the mouth into almost the form of a funnel.

basibranchials—A series of median bones behind the tongue and between the gills; in some fish they bear teeth (termed hyoid teeth).

bicuspid—Teeth with two points or cusps.

blind side—Used in reference to the side of flounders and soles opposite of the eyes; generally the side which rests closest to the substrate.

body depth—The maximum dorsal-ventral dimension of a fish. The measurement is usually taken immediately in front of the dorsal fin.

bony plates—Modified scales forming body armor. These may be found in the armored catfish and seahorses, as well as other species.

branchiostegal rays—An elongated fanlike series of bones on the throat region immediately below and slightly behind the gill covers that are joined by a membrane.

canine teeth—Sharp, conical, pointed teeth that are usually found in the front part of the jaw and often are longer than other teeth.

cartilaginous ridge—A prominent rise on the lower jaw of stonerollers, which is accompanied by a definite groove separating the ridge itself from the lower lip.

caudal—Toward the tail.

caudal peduncle—The slender region of the tail located between the posterior margin of the anal fin base and the hypural plate.

caudal peduncle depth—The least vertical measurement of the caudal peduncle.

cheek scales—The rows of scales in the greatest length between the orbit and the posterior-most corner of the preoperculum.

chromatophores—A pigment bearing cell, often appearing as small, star-shaped spots.

coalesce—To come together.

compressed—Flattened from side-to-side.

convolutions—Bends, especially in reference to the intestinal canal.

cranium—Pertaining to the skull.

crenate—Wrinkled in appearance.

crescentric scale marks—Half-moon shaped markings made by chromatophores on the scales of species such as *Gambusia heterochir*.

ctenii—Small tooth-like or comb-like structures on the exposed part of a scale. A ctenoid scale is a scale which has ctenii, such as those found in sunfish and perch, as well as many other fishes.

cusps—Points, usually in reference to the number of prominences on specified teeth.

cycloid scale—A rounded to oval scale which lacks ctenii, such as those found in the Cyprinidae and Catostomidae.

decurved—A deep downward curve.

degenerate—Not well developed, appearing minimized.

dentary—The anterior, elongate paired bones of the lower jaw that are joined along the midline by the mandibular symphysis.

diffuse—Scattered, not concentrated.

disc—The oral opening of lampreys including the circular jawless lip with its fimbriae, the tooth bearing roof of the mouth, and the esophageal cavity. This is also known as the buccal disk. The whole of the esophageal cavity is known as the buccal funnel.

distal —Toward the outer edge.

dorsal—Refering to the back or upper side.

dorsal fin—The spinous or soft-rayed median unpaired fin on the back of a fish. The fin can sometimes be divided into two parts, and these may appear joined. If so, the anterior part is spinous, and the posterior part is composed of soft-rays.

dorsolaterally—The sides above the midline of the fish.

dorsum—Toward the dorsal side.

elbow of gonopodium—A protuberance on the anterior portion of ray 4 of the gonopodium of some livebearers. This is generally composed of one or more segments.

emarginate—Notched but not quite forked, such as found in the caudal fins of many of the sunfishes and basses.

falcate—Deeply concave and shaped like a sickle. In a falcate fin the middle rays are much shorter than the surrounding rays.

filament—A threadlike ray; for example, the last ray in the dorsal fin in shads is produced into a long filament.

fimbriate—Fringed at the margin.

fin origins—Point of attachment of the anterior portion of a fin.

fluted—Possessing grooves.

frenum—A membrane connecting two different parts such as the membrane joining the upper jaw to the snout.

ganoid—A type of scale with a hard enamel-like outer layer that grows from underneath and from the outer surfaces of the margin. Found in gars.

gill arch—Cartilaginous or bony support for the gill filaments and the gill rakers.

gill rakers—Blunt, peg-like extensions on the anterior portion of the first gill arch. Although these may occur on other gill arches as well, they are often rudimentary and not used taxonomically.

gill slit—The posterior margin of the opercle; the opening for the excurrent water flow from the gills.

gonopodium—The modified anal fin rays of males belonging to the family Poeciliidae. The gonopodium is used as an intromittent organ in the transfer of sperm to the female.

gular plate—A large bony plate between the anterior third of the lower jaws of the bowfin.

head length—The length from the tip of the snout to the posterior edge of the operculum.

heterocercal—A tail fin in which the upper lobe has a distinct fleshy base and is longer than the lower lobe, as is found in sharks, bowfins and sturgeons.

homocercal—A tail fin in which the upper and lower lobes are symmetric. The fin may be split into two distinct but equal lobes or may be rounded.

hooks—The angular bones on the end of the fourth and fifth rays of the gonopodium of male livebearers.

hypural plate—The base of the caudal fin; makes a definite crease when the caudal fin is bent.

incisors—Long sharp-edged front teeth used for cutting.

inferior—Below another structure.

infraorbital canal—The part of the lateral line canal system which goes around much of the eye.

interradial membranes—The membrane between the fin rays.

isthmus—The narrowed throat region where the breast joins the head.

keel—A ridge-like structure.

lateral blotches—Reasonably prominent large accumulations of chromatophores along the sides.

lateral line canal—A tubular part of the acoustico-lateralis system that generally extends along the side of the body from the operculum to the hypural plate or slightly beyond, sometimes even onto the tail.

lateral line scales—The number of scales with pores along the lateral line from the back of the shoulder girdle to the hypural plate.

tail ridge—A small raised crest found toward the tail of pipefishes.

longitudinal scale rows—The number of scales along the side of the body where the lateral line would usually occur. This count is taken in fishes in which the lateral line is incomplete, interrupted, or absent.

lower jaw included—Lying underneath and behind the upper jaw; underslung.

mandible—Lower jaw.

mandibular symphysis—Joint at the jaw tip connecting the left and right mandibles.

maxilla—An upper jaw bone lying above or behind the premaxilla bone.

maxillary—Pertaining to the upper jaw bone, the maxilla.

medially—Toward the middle or midline relative to another structure or point of reference.

median—Toward the middle or midline.

melanophores—A chromatophore with melanin (black pigment).

molar (molariform teeth)—Broad, rounded teeth as in the human molar teeth.

nape—The area on the back of a fish beginning at the occipital region of the head and extending back to the dorsal fin origin.

oblique—At an angle to the body part referenced.

occiput—The posterior portion of the top of the head; generally beginning above or over the eyes and extending posteriorly to about the nape region anterior to the dorsal fin.

ocular side—The side with eyes; usually in reference to flounders and soles.

opercle (operculum)—The flat, flap-like, thin series of bones which cover the gills.

opercular membrane—A thin membrane along the edge of the operculum which serves as a closing valve for the operculum when water is drawn into the mouth.

orbit—The eye socket.

oviparous—An egg-laying species.

palatine—A paired bone in the roof of the mouth lying on either side of the centrally placed vomer and behind the premaxilla bone.

pectinate—Narrow parallel projections resembling teeth of a comb.

pectoral fins—The anteriorly located paired fins, positioned behind the head and the opercles. The fins can either be located on the sides or ventrally on the body.

pelvic fins—The generally more posteriorly positioned of the two paired fins. These fins are also termed the ventral fins. Pelvic refers to the area surrounding the pelvic region.

pelvic origin—The anterior-most point where the pelvic fin joins the body.

pharyngeal teeth—The tooth-like projections on the most posterior, highly modified gill arch of minnows and suckers. Pharyngeal teeth counts are based on the two arches. The count is made from the outer row to the inner row of the left side, then from the inner row to the outer row of the right side. In some species, only the inner rows are present. For example, in the red shiner that has 4 teeth in only the inner row, the formula is expressed as 0,4-4,0. If a tooth is lost in extracting the arch, the empty socket is still counted.

postanal streak—A dark, thin line from the anus to the base of the caudal fin.

posterior—The back part or behind another part.

posterio-ventrally (posteroventral)—Toward the back lower part.

predorsal—In front of the dorsal fin.

predorsal scales—Number of rows of scales crossing the midline between the occiput (back of the head) and the origin of the dorsal fin.

predorsal streak—A dark, thin line from the origin of the dorsal fin reaching anteriorly usually to the head.

premaxillary—The anterior pair of bones forming the upper jaw.

preopercle—The bone just in front of the opercle bone.

protractile—Extensible, as appears in the upper lip of minnows, suckers and mojarras.

proximal—Located nearest the body or point of attachment.

pseudobranchium—An accessory gill on the inner surface of the opercle.

pterygoids—The region along the middle of the roof of the mouth where some sunfish have teeth.

pyloric caecae—Fingerlike extensions on the duodenum immediately behind the pylorus of the stomach. Sometimes termed the pyloric caecum or the intestinal diverticulum.

radii—Radiating lines on scales which extend out from the center of the scale.

rudiments—Generally referring to poorly or undeveloped parts, such as rudimentary fin rays.

scutes—A horny or bony plate on the head or body.

serra—The elongated, comb-like or saw-like structures on the subterminal portion of the posterior ray 4 of the gonopodium of livebearers.

serrate—Saw-toothed.

snout—The anterior-most extension of the head.

soft fin rays—A fin support element that is usually branched, segmented, and usually flexible.

spine—A rigid, sharp, bony fin support element.

spinous dorsal—The anterior portion of the dorsal fin which possesses spines.

standard length—The distance from the tip of the upper jaw to the hypural plate.

striate—A series of small parallel grooves often found in the lips of suckers.

subbasal—Low toward the base; for example a row of spots is seen in some livebearers in the lower portion of the dorsal fin.

subinferior—Definitely below another structure; as in anchovies whose mouths are clearly underslung beneath their snouts.

subocular—Below or beneath the eye.

subopercle—Below or beneath the opercle or gill cover.

subsemicircular—Approximating a semicircle with the greatest width near the center of the arc.

subthoracic—Below or beneath the thorax or throat.

subtriangular—Approximating a triangle.

supramaxilla—An upper jaw bone lying immediately above the main jaw bone, the maxilla.

sutures—The lines of union between adjacent bony elements such as those found on the terminal hooks on the fourth ray of the gonopodium of some livebearers.

symphyseal knob—A prominent bump in the middle of the lower jaw of some mullets.

tail ridge—A small raised crest found along the posterior sides toward the tail of pipefishes. These are often found in association with anteriorly located trunk ridges.

terminal—Toward the tip or end.

terminal hook—The angular bone on end of the fourth and fifth rays of the gonopodium of male livebearers.

trunk ridge—A thin elevated portion extending along the midline of pipefishes. The portion found along the midline anterior to the dorsal fin is called the median trunk ridge. In some species it dips ventrally at the anus and joins the posteriorly located inferior trunk ridge. In other species, the median trunk ridge terminates at the anus and a lateral tail ridge begins immediately posterior to its terminus and extends backwards.

tail ridge—A small raised crest found toward the tail of pipefishes.

trunk rings—Modified scales forming body armor found in pipefishes and seahorses.

tubercles—Cornified epidermal bumps or projections on the outer surface of fish. These are often present during the breeding season in the males (and some females) of many species of fish. These structures are also called nuptial tubercles.

unicuspid—With one point.

ventral—Toward the bottom.

ventrolaterally—Along the lower sides.

vestigial—Generally a structure which is poorly or undeveloped. Sometimes referred to as rudimentary.

viviparous—A fish which gives birth to live young.

vomer—The median, unpaired bone on the roof of the mouth lying immediately behind the maxillaries. This bone sometimes bears teeth which are called vomerine teeth.

TABLE 1. Status of freshwater fishes of Texas. Shown for each species is their conservation status (E = Endangered; T = Threatened; SC = Special Concern), if they are extinct or extirpated, species found most often in marine or estuarine environments (FW-E = estuarine species often found spending much of their lives in freshwater; E = estuarine; M = marine), and introduced species (= I).

Species	Status	Extinct/ Extirpated	Marine/ Estuarine	Intr.
Ichthyomyzon castaneus chestnut lamprey				
Ichthyomyzon gagei southern brook lamprey				
Carcharhinus isodon finetooth shark			M	
Carcharhinus leucas bull shark			E	
Pristis pectinata smalltooth sawfish	E		M	
Dasyatis sabina Atlantic stingray			E	
Scaphirhynchus platorynchus shovelnose sturgeon	T			
Polyodon spathula Paddlefish	T			
Atractosteus spatula alligator gar	SC			
Lepisosteus oculatus spotted gar				
Lepisosteus osseus longnose gar				
Lepisosteus platostomus shortnose gar				
Amia calva bowfin				
Hiodon alosoides goldeye	SC			
Elops saurus ladyfish			E	
Megalops atlanticus Tarpon	SC		E	
Anguilla rostrata American eel	SC		FW-E	

Table 1. Continued

Species	Status	Extinct/ Extirpated	Marine/ Estuarine	Intr.
Myrophis punctatus speckled worm eel			M	
Anchoa hepsetus striped anchovy			M	
Anchoa mitchilli bay anchovy			E	
Alosa chrysochloris skipjack herring			E	
Brevoortia gunteri finescale menhaden			M	
Dorosoma cepedianum gizzard shad				
Dorosoma petenense threadfin shad				
Harengula jaguana scaled sardine			E	
Campostoma anomalum central stoneroller				
Campostoma ornatum Mexican stoneroller	T			
Carassius auratus goldfish				I
Ctenopharyngodon idella grass carp				I
Cyprinella lepida plateau shiner	SC			
Cyprinella sp. Nueces River shiner	SC			
Cyprinella lutrensis red shiner				
Cyprinella lutrensis blairi Maravillas red shiner		Extinct		
Cyprinella proserpina proserpine shiner	T			
Cyprinella venusta blacktail shiner				
Cyprinus carpio common carp				I
Dionda argentosa manantial roundnose minnow	SC			

Table 1. Continued

Species	Status	Extinct/ Extirpated	Marine/ Estuarine	Intr.
Dionda diaboli Devils River minnow	T			
Dionda episcopa roundnose minnow	SC			
Dionda nigrotaeniata Guadalupe roundnose minnow	SC			
Dionda serena Nueces roundnose minnow	SC			
Gila pandora Rio Grande chub	T			
Hybognathus amarus Rio Grande silvery minnow	E	Extirpated		
Hybognathus hayi cypress minnow				
Hybognathus nuchalis Mississippi silvery minnow				
Hybognathus placitus plains minnow				
Hybopsis amnis pallid shiner				
Luxilus chrysocephalus striped shiner				
Lythrurus fumeus ribbon shiner				
Lythrurus umbratilis redfin shiner				
Macrhybopsis aestivalis speckled chub	SC			
Macrhybopsis australis prairie chub	SC			
Macrhybopsis hyostoma shoal chub				
Macrhybopsis marconis burrhead chub	SC			
Macrhybopsis storeriana silver chub	SC			
Macrhybopsis tetranema peppered chub	SC			
Notemigonus crysoleucas golden shiner				

Table 1. Continued

Species	Status	Extinct/ Extirpated	Marine/ Estuarine	Intr.
Notropis amabilis Texas shiner				
Notropis atherinoides emerald shiner				
Notropis atrocaudalis blackspot shiner	SC			
Notropis bairdi Red River shiner	SC			
Notropis blennius river shiner				
Notropis braytoni Tamaulipas shiner	SC			
Notropis buccula smalleye shiner	SC			
Notropis buchanani ghost shiner				
Notropis chalybaeus ironcolor shiner	SC			
Notropis chihuahua Chihuahua shiner	T			
Notropis girardi Arkansas River shiner	T			
Notropis jemezanus Rio Grande shiner	SC			
Notropis maculatus taillight shiner	SC			
Notropis orca phantom shiner		Extinct		
Notropis oxyrhynchus sharpnose shiner	SC			
Notropis potteri chub shiner	SC			
Notropis sabinae Sabine shiner	SC			
Notropis shumardi silverband shiner	SC			
Notropis simus pecosensis Pecos bluntnose shiner	T	Extirpated		
Notropis simus simus Rio Grande bluntnose shiner		Extinct		

Table 1. Continued

Species	Status	Extinct/ Extirpated	Marine/ Estuarine	Intr.
Notropis stramineus sand shiner				
Notropis texanus weed shiner				
Notropis volucellus mimic shiner				
Opsopoeodus emiliae pugnose minnow				
Phenacobius mirabilis suckermouth minnow				
Pimephales promelas fathead minnow				
Pimephales vigilax bullhead minnow				
Platygobio gracilis flathead chub				
Pteronotropis hubbsi bluehead shiner	T			
Rhinichthys cataractae longnose dace	SC			
Scardinius erythrophthalmus rudd				I
Semotilus atromaculatus creek chub				
Carpiodes carpio river carpsucker				
Cycleptus elongatus blue sucker	T			
Cycleptus sp.	SC			
Erimyzon oblongus creek chubsucker	T			
Erimyzon sucetta lake chubsucker				
Ictiobus bubalus smallmouth buffalo				
Ictiobus cyprinellus bigmouth buffalo				
Ictiobus niger black buffalo				

Table 1. Continued

Species	Status	Extinct/ Extirpated	Marine/ Estuarine	Intr.
Minytrema melanops spotted sucker				
Moxostoma austrinum Mexican redhorse	SC			
Moxostoma congestum gray redhorse				
Moxostoma erythrurum golden redhorse				
Moxostoma poecilurum blacktail redhorse				
Astyanax mexicanus Mexican tetra				
Ameiurus melas black bullhead				
Ameiurus natalis yellow bullhead				
Ictalurus furcatus blue catfish				
Ictalurus lupus headwater catfish	SC			
Ictalurus punctatus channel catfish				
Ictalurus sp. Chihuahua catfish	SC			
Noturus gyrinus tadpole madtom				
Noturus nocturnus freckled madtom				
Pylodictis olivaris flathead catfish				
Satan eurystomus widemouth blindcat	T			
Trogloglanis pattersoni toothless blindcat	T			
Arius felis hardhead catfish			E	
Bagre marinus gafftopsail catfish			M	
Agamyxis pectinifrons whitebarred catfish				I

Table 1. Continued

Species	Status	Extinct/ Extirpated	Marine/ Estuarine	Intr.
Platydoras armatulus southern striped Raphael				I
Hypostomus sp. armadillo del rio				I
Pterygoplichthys anisitsi sailfin catfish				I
Pterygoplichthys disjunctivus vermiculated sailfin catfish				I
Pterygoplichthys multiradiatus butterfly sailfin catfish				I
Esox americanus vermiculatus grass pickerel				
Esox lucius northern pike				I
Esox niger chain pickerel				
Oncorhynchus clarkii virginalis Rio Grande cutthroat trout	SC	Extirpated		
Oncorhynchus mykiss rainbow trout				I
Aphredoderus sayanus pirate perch				
Agonostomus monticola mountain mullet			FW-E	
Mugil cephalus striped mullet			E	
Mugil curema white mullet			E	
Labidesthes sicculus brook silverside				
Membras martinica rough silverside			M	
Menidia beryllina inland silverside			FW-E	
Menidia clarkhubbsi Texas silverside	SC		E	
Menidia peninsulae tidewater silverside			M	
Strongylura marina Atlantic needlefish			E	

Table 1. Continued

Species	Status	Extinct/ Extirpated	Marine/ Estuarine	Intr.
Adinia xenica diamond killifish			E	
Fundulus blairae western starhead topminnow				
Fundulus chrysotus golden topminnow				
Fundulus grandis Gulf killifish			E	
Fundulus jenkinsi saltmarsh topminnow			E	
Fundulus kansae northern plains killifish				
Fundulus notatus blackstripe topminnow				
Fundulus olivaceus blackspotted topminnow				
Fundulus pulvereus bayou killifish			E	
Fundulus similis longnose killifish			M	
Fundulus zebrinus plains killifish				
Lucania goodei bluefin killifish				I
Lucania parva rainwater killifish			FW-E	
Gambusia affinis western mosquitofish				
Gambusia amistadensis Amistad gambusia		Extinct		
Gambusia clarkhubbsi San Felipe gambusia	SC			
Gambusia gaigei Big Bend gambusia	E			
Gambusia geiseri largespring gambusia				
Gambusia georgei San Marcos gambusia	E	Extinct		
Gambusia heterochir Clear Creek gambusia	E			

Table 1. Continued

Species	Status	Extinct/ Extirpated	Marine/ Estuarine	Intr.
Gambusia nobilis Pecos gambusia	E			
Gambusia senilis blotched gambusia	T	Extirpated		
Gambusia speciosa Tex-Mex gambusia				
Heterandria formosa least killifish				
Poecilia formosa Amazon molly				
Poecilia latipinna sailfin molly				
Poecilia reticulata guppy				I
Xiphophorus hellerii green swordtail				I
Cyprinodon bovinus Leon Springs pupfish	E			
Cyprinodon elegans Comanche Springs pupfish	E			
Cyprinodon eximius Conchos pupfish	T			
Cyprinodon eximius ssp. Devils River pupfish	T			
Cyprinodon pecosensis Pecos pupfish	T			
Cyprinodon rubrofluviatilis Red River pupfish	SC			
Cyprinodon variegatus sheepshead minnow			FW-E	
Microphis brachyurus opossum pipefish	T		E	
Syngnathus louisianae chain pipefish			M	
Syngnathus scovelli gulf pipefish			E	
Centropomus parallelus smallscale fat snook	SC		E	
Centropomus undecimalis common snook	SC		E	

Table 1. Continued

Species	Status	Extinct/ Extirpated	Marine/ Estuarine	Intr.
Morone chrysops white bass				
Morone mississippiensis yellow bass				
Morone saxatilis striped bass			E	I
Ambloplites rupestris rock bass				I
Centrarchus macropterus Flier				
Lepomis auritus redbreast sunfish				I
Lepomis cyanellus green sunfish				
Lepomis gulosus warmouth				
Lepomis humilis orangespotted sunfish				
Lepomis macrochirus bluegill				
Lepomis marginatus dollar sunfish				
Lepomis megalotis longear sunfish				
Lepomis microlophus redear sunfish				
Lepomis miniatus redspotted sunfish				
Lepomis symmetricus bantam sunfish				
Micropterus dolomieu smallmouth bass				I
Micropterus punctulatus spotted bass				
Micropterus salmoides largemouth bass				
Micropterus treculii Guadalupe bass	SC			
Pomoxis annularis white crappie				

Table 1. Continued

Species	Status	Extinct/ Extirpated	Marine/ Estuarine	Intr.
Pomoxis nigromaculatus black crappie				
Ammocrypta clara western sand darter	SC			
Ammocrypta vivax scaly sand darter				
Etheostoma artesiae redspot darter				
Etheostoma asprigene mud darter				
Etheostoma chlorosoma bluntnose darter				
Etheostoma fonticola fountain darter	E			
Etheostoma fusiforme swamp darter				
Etheostoma gracile slough darter				
Etheostoma grahami Rio Grande darter	T			
Etheostoma histrio harlequin darter				
Etheostoma lepidum greenthroat darter				
Etheostoma parvipinne goldstripe darter				
Etheostoma proeliare cypress darter				
Etheostoma radiosum orangebelly darter	SC			
Etheostoma spectabile orangethroat darter				
Perca flavescens yellow perch				I
Percina apristis Guadalupe darter	SC			
Percina caprodes Logperch				
Percina carbonaria Texas logperch				

Table 1. Continued

Species	Status	Extinct/ Extirpated	Marine/ Estuarine	Intr.
Percina macrolepida bigscale logperch				
Percina maculata blackside darter	T			
Percina phoxocephala slenderhead darter				
Percina sciera dusky darter				
Percina shumardi river darter				
Sander canadensis Sauger				I
Sander vitreus walleye				I
Caranx hippos crevalle jack			M	
Diapterus auratus Irish pompano			M	
Eucinostomus argenteus spotfin mojarra			E	
Eucinostomus melanopterus flagfin mojarra			M	
Conodon nobilis barred grunt			M	
Pomadasys crocro burro grunt			M	
Archosargus probatocephalus sheepshead			E	
Lagodon rhomboides pinfish			E	
Polydactylus octonemus Atlantic threadfin			M	
Aplodinotus grunniens freshwater drum				
Bairdiella chrysoura silver perch			E	
Cynoscion arenarius sand seatrout			M	
Cynoscion nebulosus spotted seatrout			E	

Table 1. Continued

Species	Status	Extinct/ Extirpated	Marine/ Estuarine	Intr.
Leiostomus xanthurus spot			E	
Micropogonias undulatus Atlantic croaker			E	
Pogonias cromis black drum			M	
Sciaenops ocellatus red drum			E	
Elassoma zonatum banded pygmy sunfish				
Cichlasoma cyanoguttatum Rio Grande cichlid				
Oreochromis aureus blue tilapia				I
Oreochromis mossambicus Mozambique tilapia				I
Tilapia zillii redbelly tilapia				I
Dormitator maculatus fat sleeper			E	
Eleotris amblyopsis largescaled spinycheek sleeper			E	
Erotelis smaragdus emerald sleeper			M	
Gobiomorus dormitor bigmouth sleeper			FW-E	
Awaous banana river goby	T		FW-E	
Bathygobius soporator frillfin goby			M	
Ctenogobius claytonii Mexican goby	T		E	
Ctenogobius boleosoma darter goby			E	
Ctenogobius shufeldti freshwater goby			E	
Ctenogobius stigmaticus marked goby			M	
Evorthodus lyricus lyre goby			M	

Table 1. Continued

Species	Status	Extinct/ Extirpated	Marine/ Estuarine	Intr.
Gobioides broussonetii violet goby			E	
Gobionellus oceanicus highfin goby			M	
Gobiosoma bosc naked goby			E	
Gobiosoma robustum code goby			E	
Microgobius gulosus clown goby			E	
Citharichthys spilopterus bay whiff			E	
Etropus crossotus fringed flounder			M	
Paralichthys lethostigma southern flounder			E	
Achirus lineatus lined sole			E	
Trinectes maculatus hogchoker			E	
Sphoeroides parvus least puffer			M	

Summary:

Total number = 268
Endangered, Threatened and Special Concern = 74
Extinct and Extirpated = 9
Introduced = 25

Year	Native freshwater fishes	Species lost or threatened with loss	% of native freshwater fishes lost or threatened with loss
1991	169	43	25%
1997	169	49	29%
2008	177	77	44%