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Louisiana's Inland Fishes: A Quarter Century of Change

LOUISIANA'S INLAND FISHES: A QUARTER CENTURY OF CHANGE

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ABSTRACT

Louisiana inland waters include 25 families, 66 genera and 170 species. This is an increase from 22 families, 54 genera, and 148 species listed more than 25 years ago (Douglas, 1974). Two of the new families, Osmeridae and Salmonidae, are represented by transients and the third, Cichlidae, is an introduction. Most of the new genera are the result of systematic revisions. The species new to Louisiana include six newly described species, seven transient species, five introductions, and one range extension.

INTRODUCTION

Freshwater Fishes of Louisiana was published nearly two and one half decades ago (Douglas, 1974). Since that time fish guides have been published for nearby states that provide additional documentation of the ichthyofauna of the lower Mississippi Basin (Pflieger, 1975; Robinson and Buchanan, 1988; Etnier and Starnes, 1993). Also since that time, taxonomy of our state's fishes has undergone major revisions (Coburn and Cavender, 1992; Mayden, 1989; Parenti, 1981). Louisiana inland waters now include 25 families, 66 genera and 170 species (Table 1). An attempt is made herein to incorporate recent zoogeographic and taxonomic information with collection records from the University of Louisiana at Monroe (ULM), Museum of Natural History (Zoology) and provide a comprehensive overview of changes to the Louisiana inland ichthyofauna (Table 2).

The collection of fishes at ULM was initiated in the spring of 1962 as a teaching collection. The start consisted of a mere "trailer full" of specimens collected in and brought from Oklahoma. Since then the original teaching collection has grown into a research collection of impressive proportions. The collection of fishes now possesses voluminous data, documentation and specimens (some of which are valued as rare, unique, and irreplaceable) due largely to active and progressive field investigations during the past 35 years.

Recently, the ULM collection of fishes was listed as a regional center and cited as one of the four fastest growing collections in North America (Poss and Collette, 1995). Collections at the Los Angeles County Museum, Tulane University, National Museum of Natural History and ULM had grown the most since an initial survey in 1976 (Collette and Lachner, 1976). The ULM collection was listed as the fifth largest in terms of total number of specimens with over 1.5 million. Among educational institutions, only Tulane University and the University of Michigan have larger collections.

In ranking North American ichthyological resource centers, weighted categories were used to establish an index number for 117 collections. Categories included the following: total number

of specimens, total number of lots, holdings of type specimens, visitors, loan activity, exchanges, number of species, computerization, educational function, geographic coverage, staff size, and others. Thus, with an index number of 81, the ULM collection was designated a regional center and was ranked 15th of all national, state (province), private and university collections and was ranked first in the number of students receiving MS degrees (55) in collection-based research (Poss and Collette, 1995).

The collection now houses over 77,000 lots, at least 1750 species and secondary types for 31 species. In 1979, the collection of fishes received as a gift many specimens originally cataloged in the early collections of the American Museum of Natural History and the United States National Museum. Many specimens were collected in the Pacific Ocean by the Research Vessel Albatross and others from the freshwaters of Africa, South America and Asia in the early 1900's. These valuable specimens were discovered among the ruins and debris of an abandoned storage facility of a biological supply company. Collectors of this salvaged material included ichthyological legends David Starr Jordan, Charles Henry Gilbert, and Seth Eugene Meek. Permission was granted to catalog these historic specimens into the collection of fishes at ULM.

The Museum of Natural History at ULM has recently had placed in its care the larval fish collection of the Tennessee Valley Authority (TVA). This collection represents one of the largest such collections in North America and is represented by more than 6 million specimens housed in 19,000 vials. The fishes were obtained during a twelve year study involving waters within the TVA jurisdiction which included all or parts of the states of Tennessee, Mississippi, Alabama, Georgia, North Carolina, Virginia, and Kentucky.

RECENTLY DESCRIBED SPECIES

Pteronotropis hubbsi, bluehead shiner

Abundance of this species fluctuates substantially in the riverine backwaters of northeast Louisiana. This highly distinctive and beautiful minnow was described by Bailey and Robison (1978). A single specimen was collected from the mainstream of the Ouachita River in 1976, eleven years prior to its description. Extensive collecting from this locality and backwaters nearby produced only two additional specimens from 1968 to 1983. However, from these same waters (isolated backwater pools of the Ouachita River near Lazard Point in West Monroe) nearly 1000 specimens were collected from 1984 to 1991, but none from 1992 to 1995. The prolonged increase in bluehead shiner abundance during 1984-1991 and the later decrease following regional flooding suggests that populations may have been responding to hydrological factors. The ULM Museum of Natural History provided specimens for its

description with six lots (126 specimens) listed as paratypes.

Cycleptus meridionalis, southeastern blue sucker

This catostomid represents the most recent addition to the fish fauna of Louisiana. It was separated and described as a new species from populations of the monotypic *C. elongatus*, blue sucker, that were found in the mainstream reaches of major rivers of gulf slope drainages (Burr and Mayden, 1999). It differs from *C. elongatus* by having more scales, more dorsal-fin rays, a longer snout and a more elongate dorsal-fin base (Burr and Mayden, 1999). Specimens from the ULM collection were used in its description and a single specimen was designated a paratype.

Fundulus blairae, western starhead topminnow

This topminnow, long incorporated in the synonym of *F. notti*, bayou topminnow, was described by Wiley and Hall (1975). It differs from *F. notti* in lacking vertical bars on the sides of the body and in having a G-type head squamation pattern. Specimens used in its description were provided by the ULM collection of fishes. It is more commonly found in the backwaters and shoreline vegetation of rivers and lakes. In Louisiana, *F. blairae* is found statewide with the exception of the Ouachita River drainage.

Fundulus euryzonus, broadstripe topminnow

This topminnow was recognized as a distinct species by Suttkus and Cashner (1981) from Lake Pontchartrain tributaries in Louisiana and Mississippi. This species differs from its close sympatric relatives *F. notatus*, blackstripe topminnow, and *F. olivaceus*, blackspotted topminnow, by having a wider lateral stripe, fewer dorsal rays and fewer gill rakers (Suttkus and Cashner, 1981). It is endemic to the Tangipahoa and Amite rivers in Louisiana and Mississippi.

Percina aurora, pearl darter

This percid was confused with *P. copelandi*, channel darter, until its description by Suttkus et al. (1994). It possesses the following characters: large average body size, lack of tubercles, heavy pigmentation of breeding males, high number of marginal spines on the modified belly scales of breeding males and fully scaled cheeks (Suttkus et al., 1994). The ULM collection of fishes provided specimens used in its description with eight lots (23 specimens) designated as paratopotypes (Suttkus et al., 1994). *Percina aurora* is known from the Pearl River drainage in Louisiana and from the Pascagoula River drainage in Mississippi. Exhaustive collecting efforts in recent years in Louisiana have yielded no specimens of this species and it is now considered extirpated in Louisiana (H. Bart and B. Thompson, pers. comm.).

Percina suttkusi, gulf logperch

This species was reported as *P. caprodes*, logperch, (Douglas, 1974) following the work of Hay (1881). However, studies conducted by Thompson (1997) distinguished *P. suttkusi* from *P. caprodes* in that the former species has an entirely scaled nape, no scales between the eyes, no tubercles on scales or fins and a lateral pattern of thin vertical bars. It further differs

from *P. caprodes* by possessing a narrow red band in the spinous dorsal fin (Thompson, 1997). Specimens from the ULM museum were used in its description and a single lot of five specimens was designated paratypes. In Louisiana this species occupies waters of the Pearl River and Lake Pontchartrain drainages.

NOMENCLATURAL CHANGES

It is perhaps not surprising that many of the scientific name changes of fishes occurring in the inland waters of Louisiana during the last quarter century have occurred in the most speciose and taxonomically challenging freshwater family: Cyprinidae, the minnows and carps. Most revisions were in the minnow groups popularly known as shiners and chubs. Minnows are problematic when compared with other speciose taxa that are physically larger (sunfishes, bullhead catfishes) or more distinctly pigmented (darters, topminnows).

Since 1974, five subspecies have been elevated to species status. *Notropis wickliffi*, channel shiner, was considered a subspecies of *N. volucellus*, the mimic shiner (Trautman, 1931), but after considerable study was elevated to full species status (Etnier and Starnes, 1993). Adults possess a larger eye, deeper caudal peduncle, bigger mouth and a less deepened body (Trautman, 1931), a less arched back and a poorly defined dorsal blotch (Etnier and Starnes, 1993). It is one of the most abundant minnows in the lower Mississippi River including Louisiana (B. Thompson, pers. comm.).

Macrhybopsis aestivalis, speckled chub, was a complex group with six subspecies. Recently *Macrhybopsis hyostoma*, shoal chub, was elevated to species status after considerable morphological work (Eisenhour, 1999). *Macrhybopsis hyostoma* occurs west of the Mississippi River in Louisiana. The division of the *M. aestivalis* complex is unclear east of the Mississippi River (D. Eisenhour, pers. comm.).

Fundulus dispar, northern starhead topminnow, previously synonymized with *F. notti*, was resurrected by Wiley (1977). All specimens have a subocular teardrop and are without a cleithral stripe or distinct pigment aggregations on the pectoral fin base. Males and females differ in ventral and lateral pigmentation from *F. notti* and the pectoral and pelvic fins of both sexes are without pigment blotches (Wiley, 1977). Again, specimens from the ULM collection were used in its redescription. Like other starhead topminnows, it is more abundant in the heavily vegetated shorelines of lakes and rivers. In Louisiana it is found only in the Ouachita River drainage.

Warren (1992) showed conclusively that two species comprised the *Lepomis punctatus* complex: *L. punctatus*, blackspotted sunfish, and *L. miniatus*, redspotted sunfish. *Lepomis miniatus* differs from *L. punctatus* in having red-orange coloration on the sides of breeding males, larger scales and shorter, thicker gill rakers (Warren, 1992). The ULM museum provided specimens for its redescription. The centrarchid originally referred to as *L. punctatus* in Louisiana is now reassigned as *L. miniatus*. It is present in all river drainages in Louisiana.

Etheostoma lynceum, brighteye darter, was formerly one of two recognized subspecies of *E. zonale*, banded darter (Tsai and

Raney, 1974). More than a decade later, Etnier and Starnes (1986) removed this species from the synonymy of *E. zonale*. It differs from *E. zonale* in possessing larger scales and in the intensity of its lateral pigmentation (Etnier and Starnes, 1986). In Louisiana this darter is found in riffles of flowing waters in the Lake Pontchartrain and Pearl River drainages.

Most of the shiner species were originally split among several genera by the great ichthyologists of the 19th century (e.g., Rafinesque, Girard, Jordan) and this taxonomic structure held for almost 100 years (Gilbert, 1978). Then most genera were lumped into the large and taxonomically awkward genus *Notropis* based on some broad and inconsistent morphological characters. However, the "big-genus" *Notropis* lasted for only three or four decades before many of the original genera were reinstated. The cladistic and genetic works of Mayden (1989) were critical in reestablishing these taxa.

The shiners are typically minnows that are morphologically fusiform to somewhat terete in body shape. They are with soft-rayed fins and without barbels. They are most often found swimming in large schools in the mid-water column.

Cyprinella, previously treated as a subgenus of *Notropis*, was elevated to genus (Mayden, 1989). Four Louisiana shiners were transferred to *Cyprinella*: *C. camura*, bluntface shiner; *C. lutrensis*, red shiner; *C. venusta*, blacktail shiner and *C. whipplei*, steelcolor shiner. Since *Cyprinella* is feminine, *C. camurus* and *C. venustus* were amended accordingly to *C. camura* and *C. venusta*. *Luxilus*, also formerly a subgenus of *Notropis*, was elevated to genus by Mayden (1989). Only *L. chrysocephalus*, striped shiner, is found in Louisiana. Similarly the shiners *Lythrurus fumeus*, ribbon shiner, *L. roseipinnis*, cherryfin shiner, and *L. umbratilis*, redbfin shiner, were reassigned from *Notropis* to *Lythrurus* (Mayden, 1989). Following the work of Mayden (1989) the genus *Pteronotropis* now comprises the species *P. hubbsi*, bluehead shiner; *P. signipinnis*, flagfin shiner and *P. welaka*, bluenose shiner. All *Pteronotropis* in Louisiana share the characters of bright orange, red or blue colors and a very broad lateral stripe.

The chubs and minnows are typically morphologically terete (nearly cylindrical in cross section and usually tapered). They have soft-rayed fins (except carps) and many have barbels. They are frequently found on or near the bottom of the water column. *Macrhybopsis*, another cyprinid taxon, has been resurrected by Coburn and Cavender (1989) for selected barbeled minnows and replaces the former genus *Hybopsis* for the species *M. aestivalis*, speckled chub, and *M. storeriana*, silver chub, in Louisiana. Another cyprinid, currently *Notropis winchilli*, clear chub, was formerly placed in *Hybopsis* (Robins et al., 1991). *Notropis bucatius*, silverjaw minnow, has historically been placed in the monotypic genus *Ericymba*, but has been reassigned to *Notropis* and its gender changed from *E. bucatia* to *N. bucatius* (Coburn and Cavender, 1992; Raley and Wood, 2001). Still another cyprinid, the flathead chub, long known as *Hybopsis gracilis* is now reassigned to the monotypic genus *Platygobio* (Mayden, 1989).

The darters are usually terete in body shape. They possess two completely separate dorsal fins; the anterior spinous and the posterior soft-rayed. The lateral and ventral fins may be enlarged for station holding in strong current and the species are typically

benthic and solitary.

The crystal darter has historically been placed in the genus *Ammocrypta*, but Simons (1991) offered conclusive evidence to resurrect the genus *Crystallaria* for this percid. Thus *C. asprella* is known in Louisiana from the Ouachita and Pearl River drainages. Another darter, *Percina vigil*, saddleback darter, was previously referred to as *P. ouachitae* (Suttkus, 1985).

The catfishes have also undergone taxonomic change. *Ameiurus*, previously thought to be an invalid genus, was resurrected for the bullhead catfishes and thus separated from *Ictalurus* (Lundberg, 1989). Three species, *A. melas*, black bullhead, *A. natalis*, yellow bullhead, and *A. nebulosus*, brown bullhead, were transferred from *Ictalurus* to *Ameiurus*.

The alligator gar has for decades been listed as *Lepisosteus spatula*. Recent studies have disclosed several unique characters and therefore this species is now assigned to *Atractosteus* (Wiley, 1976).

The rainbow trout, historically long referred to as *Salmo gairdneri*, is now known as *Oncorhynchus mykiss*. Smith and Stearly (1989) hypothesized that this and other western trouts are more closely allied to *Oncorhynchus* than to *Salmo* and disclosed that it was first assigned the trivial name *mykiss*.

Menidia beryllina, inland silverside, replaces *M. audens*, Mississippi silversides, as the freshwater form in Louisiana (Chernoff et al., 1981). Other researchers insist, however, that *M. audens* is present in the lower Mississippi drainage of Louisiana from the Sabine River drainage east to the Pearl River drainage (B. Thompson, pers. comm.)

The shadow bass, *Ambloplites ariommus*, has been identified as a full species apart from the previously listed *A. rupestris*, rock bass, (Cashner and Suttkus, 1977). The latter is now considered a species of the northeast United States, whereas *A. ariommus* ranges into Louisiana where it is confined to the Florida parishes.

At least two changes have occurred in the taxonomy of higher taxa of North American freshwater fishes in recent years. The topminnows, genus *Fundulus* are now placed in the family Fundulidae (Parenti, 1981) and are fully separated from Cyprinodontidae in which they have long been placed. The temperate basses, genus *Morone*, are now assigned as members of the family Moronidae (Johnson, 1984) thus replacing Percichthyidae for the freshwater forms.

Several changes have also occurred in the common names of Louisiana's freshwater fishes. *Hybognathus nuchalis*, formerly know as the silvery minnow is now correctly called the Mississippi silvery minnow. *Fundulus notti*, is now correctly referred to as the bayou topminnow, thus replacing starhead topminnow as its common name. *Campostoma anomalum*, is now the central stoneroller instead of stoneroller, while *Esox americanus* is now known as the grass pickerel rather than the redbfin pickerel. Lastly, *Gambusia affinis* is correctly called the western mosquitofish, replacing mosquitofish.

Controversy surrounds *Elassoma*, pygmy sunfish. Some include it as part of the Centrarchidae (Robins et al., 1991). We follow Branson and Moore (1962) and will continue to use the family Elassomatidae as stated in more recent works (Jenkins and Burkhead, 1994; Etnier and Starnes, 1993; Page and Burr, 1991).

INTRODUCTIONS, RANGE EXTENSIONS, AND OTHER CHANGES

Three large, pelagic, Asian minnows reside and are evidently established in the waters of Louisiana (Douglas et al., 1996). *Ctenopharyngodon idella*, grass carp, was first discovered decades ago in Louisiana waters, and juveniles and adults are now found in every major river in the state. *Hypophthalmichthys nobilis*, bighead carp, and *H. molitrix*, silver carp, native to southern and central China, are documented in collections made from 1980 to present. In Louisiana records of bighead and silver carp are all from the Ouachita and Red River drainages. All three species spawn in rising, fast-flowing, turbid rivers and the larvae migrate to adjacent slack water. Collections of larval *Hypophthalmichthys* from a backwater outlet of the Black River near Jonesville, Louisiana totaled 12 specimens in 1992 (a low water year) to over 1600 specimens in 1994 (a high water year) indicating potentially high reproduction during floods. Impacts of these planktivorous minnows on native fishes are unknown, but monitoring populations is advisable. Because of their large size and powerful swimming abilities, these species are not susceptible to traditional fishing and sampling techniques. Occurrence may be documented, however, as bycatch of commercial fishermen and the spawning success from samples of larval fish assemblages.

The introduction and establishment of *Cichlasoma cyanoguttatum*, Rio Grande cichlid, has become apparent in and around the New Orleans area. It was first collected in 1996, but has since taken up residence and established a reproducing population (Fuentes and Cashner, 2002). *Lepomis auritus*, redbreast sunfish, a native of Atlantic coast drainages, are well-established in Toledo Bend Reservoir of the Sabine River. ULM museum records indicate two individuals were taken from the Ouachita River in 1972, but unlike the Toledo Bend population, there is no evidence of a reproducing population in the Ouachita Basin (M. Wood, pers. comm.).

Northern fishes with access to the Mississippi River may occasionally be displaced far south of their normal geographic ranges. Such fishes are considered transients or waifs and may find their way into the state of Louisiana. They are unlikely to reproduce successfully or to establish permanent populations.

Six such species are documented in collections made from the Mississippi River in Louisiana or Mississippi. They are *Osmerus mordax*, rainbow smelt, which normally occurs in the colder waters of the northeastern United States, but has recently been found near St. Francisville, West Feliciana Parish (Suttkus and Conner, 1980) and near Burnside, Ascension Parish (Douglas, pers. obs.); *Macrhybopsis gelida*, sturgeon chub, (Robison and Buchanan 1988; Page and Burr, 1991) which normally ranges from the Missouri River basin to the mid-Mississippi River, has been found near Lake Providence, East Carroll Parish; *M. meeki*, sicklefin chub (Ross and Brenneman, 1991; Page and Burr, 1991) with a normal range similar to *M. gelida* has been found near Vicksburg; *Oncorhynchus mykiss*, rainbow trout, (Ross and Brenneman, 1991) native to the Pacific slope of North America, but widely introduced elsewhere, has been taken in the Mississippi River very near Louisiana and *Noturus flavus*, stonecat, (Guillory, 1978) which ranges widely

throughout northern and central United States has been found impacted on a power plant intake screen near New Orleans. *Acipenser fulvescens*, lake sturgeon, was captured in an auxiliary canal near the old river control structure off the Mississippi River in 1994 (D. Walther, USFWS, pers. comm.).

Moxostoma duquesnei, black redhorse, and *Percina uranidea*, stargazing darter, (Douglas, pers. obs.) have been found in recent years in the extreme northern reaches of the Ouachita River basin in Louisiana. The single specimen of *M. duquesnei* obviously represents a waif that has drifted far southward from established populations from the Ouachita River in southwest Arkansas. However, the several specimens of *P. uranidea* taken in Bayou Bartholomew represent individuals from the southernmost limits of its normal range.

Ammocrypta clara, western sand darter, exhibited a significant eastward extension of its range in Louisiana from the Red River drainage to the Ouachita River drainage. Prior to 1974 no records of this species were noted east of the Red River drainage. Later, Hutchins (1988) reported taking four specimens from Bayou Bartholomew (Morehouse Parish) in the late 1980's. More recent collecting indicates that it is now common in the sand and gravel substrate in the lower reaches of Bayou Bartholomew. There it occurs sympatrically with *A. vivax*, scaly sand darter, and *Crystallaria asprella*, crystal darter.

Replacement of certain species of fishes has become increasingly evident in waters of northeast Louisiana during the last several decades as environmental alterations accelerate. Our collection records and research conducted by the United States Army Corps of Engineers, Waterway Experiment Station, Vicksburg, Mississippi, indicate an almost complete reversal of relative abundance of two closely-related cyprinids. This faunal change has occurred during the last twenty five years in four of five northeast Louisiana rivers.

Historical records for the period of 1965 to 1974 indicate *Cyprinella venusta*, blacktail shiner, comprised 31% of all minnows from Bayou Bartholomew, Bayou Macon, Big Creek, Boeuf River and Tensas River. No specimens of *C. lutrensis*, red shiner, were collected from these waters during that time. Since 1975, however, a stable population of *C. venusta* has persisted only in Bayou Bartholomew, whereas *C. lutrensis* now comprises 86% of all minnows in the other four rivers in northeast Louisiana. These reversals in relative abundance may be related to habitat changes associated with flood control projects. Stable substrates and minimal physical alterations contribute to population stability in Bayou Bartholomew. However, the remaining rivers in northeast Louisiana have been previously channelized and the area is intensively cultivated, creating conditions suitable to more tolerant taxa such as *C. lutrensis* (Douglas, 1990).

Effects of channelization are further supported by recent studies (Douglas, 1991) on the partially altered Tensas River, the easternmost tributary of the Ouachita River. In the channelized reaches, *C. lutrensis* is now numerically dominant, but in the few unchannelized reaches *C. venusta* is still the most abundant minnow.

DISCUSSION

Since 1974, there have been ten species described as new or elevated to species status. At least thirty-three taxa have been revised. Five exotic species have been established and at least seven species have displaced far downstream from their normal range. There have been significant range extensions and a displacement of one species by another.

What will the next quarter century hold? Undoubtedly, new species will continue to be "discovered," but at a slower rate, and most of these will be very similar to existing species that have been missed by earlier researchers. Also, taxa considered to be subspecies will be elevated to full species based on new findings.

Nomenclatural changes have occurred, are occurring, and will continue to occur in future years. Additional taxa may be split or lumped depending on current trends. In recent years the trend has been quite strong to split. Traditional meristic and morphometric methods of identification were supplemented by statistical analysis of morphometric variables, allozyme electrophoresis, presumptive gene loci and outgroup comparison and parsimony. However, Page and Burr (1991) insist the sand darters (Percidae) be lumped into the genus *Etheostoma*, thus negating *Ammocrypta* as a genus. This action has been viewed as premature by others (Etnier and Starnes, 1993). Continued disagreement will persist among investigators and taxonomic stability will be sought, but not achieved.

We can speculate that there will be additional introductions. However, species will become established only if environmental conditions are suitable. From time to time we find an occasional representative of exotic species such as pacu or tilapia in our inland waters, but to date no evidence of an established population.

The discovery of additional Mississippi River waifs will undoubtedly occur especially from studies conducted during periods of high water. In addition, range extensions and displacement of species are expected as environmental parameters change and species tolerant to wide-ranging conditions become dominant.

Streams that are relatively unaltered and have high species diversity (e.g. Bayou Bartholomew) should be recognized and conservation measures implemented to ensure long-term habitat quality. Restoration of altered streams may also lead to the re-establishment of sensitive species, such as wetland fishes, that have been extirpated or whose numbers have been depleted.

In this day of increasing environmental degradation, emphasized each passing year by accelerated practices of clear cutting timber, draining wetlands, clearing land, damming and channelizing rivers and polluting air and water with increasingly complex materials, man is determining the fate of many of our living creatures. As environments continue to be altered at an alarming rate, the ecology likewise changes. It seems inevitable that increasingly more species of animals will be hurried into an early extinction and denied their rightful place within the fauna of the world. Unfortunately, it will never be known just how many forms of life are forced into extinction through the thoughtlessness of man even before they are discovered, described, and made known to science.

Sadly, in most instances, funding for establishing and maintaining natural history collections is near the bottom of most prioritized lists. It is essential that these collections be maintained and financially supported. It is possible that in the future, collections of preserved and documented animals (and plants) in biological museums will offer the only evidence of living forms that once occurred, perhaps even prospered, but are now gone.

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Table 1. Checklist for the inland fishes of Louisiana. The AFS checklist was followed for most taxonomic decisions (Robins et al., 1991). Deviations are explained in the text.

FAMILY PETROMYZONTIDAE—LAMPREYS

- Ichthyomyzon castaneus*—chestnut lamprey
Ichthyomyzon gagei—southern brook lamprey

FAMILY ACIPENSERIDAE—STURGEONS

- Acipenser fulvescens*—lake sturgeon
Acipenser oxyrinchus—Atlantic sturgeon
Scaphirhynchus albus—pallid sturgeon
Scaphirhynchus platyrhynchus—shovelnose sturgeon

FAMILY POLYODONTIDAE—PADDLEFISHES

- Polyodon spathula*—paddlefish

FAMILY LEPISTOSTEIDAE—GARS

- Atractosteus spatula*—alligator gar
Lepisosteus oculatus—spotted gar
Lepisosteus osseus—longnose gar
Lepisosteus platostomus—shortnose gar

FAMILY AMIDAE—BOWFINS

- Amia calva*—bowfin

FAMILY HIODONTIDAE—MOONEYES

- Hiodon alosoides*—goldeye
Hiodon tergisus—mooneye

FAMILY ANGUILLIDAE—FRESHWATER EELS

- Anguilla rostrata*—American eel

FAMILY CLUPEIDAE—HERRINGS

- Alosa alabamae*—Alabama shad
Alosa chrysochloris—skipjack herring
Dorosoma cepedianum—gizzard shad
Dorosoma petenense—threadfin shad

FAMILY CYPRINIDAE—CARPS AND MINNOWS

- Camptostoma anomalum*—central stoneroller
Carassius auratus—goldfish
Ctenopharyngodon idella—grass carp
Cyprinella camura—bluntnose shiner
Cyprinella lutrensis—red shiner
Cyprinella venusta—blacktail shiner
Cyprinella whipplei—steelcolor shiner
Cyprinus carpio—common carp
Hybognathus hayi—cypress minnow
Hybognathus nuchalis—Mississippi silvery minnow
Hypophthalmichthys molitrix—silver carp
Hypophthalmichthys nobilis—bighead carp
Luxilus chrysocephalus—striped shiner
Lythrurus fumeus—ribbon shiner
Lythrurus roseipinnis—cherryfin shiner
Lythrurus umbratilis—redfin shiner
Macrhybopsis aestivalis—speckled chub
Macrhybopsis gelida—sturgeon chub
Macrhybopsis hyostoma—shoal chub

FAMILY CYPRINIDAE (continued)

- Macrhybopsis meeki*—sicklefin chub
Macrhybopsis storeriana—silver chub
Nocomis leptcephalus—bluehead chub
Notemigonus crysoleucas—golden shiner
Notropis amnis—pallid shiner
Notropis atherinoides—emerald shiner
Notropis atrocaudalis—blackspot shiner
Notropis blennioides—river shiner
Notropis boops—bigeye shiner
Notropis buchanani—ghost shiner
Notropis chalybaeus—ironcolor shiner
Notropis longirostris—longnose shiner
Notropis maculatus—taillight shiner
Notropis potteri—chub shiner
Notropis sabinae—Sabine shiner
Notropis shumardi—silverband shiner
Notropis texanus—weed shiner
Notropis volucellus—mimic shiner
Notropis wickliffi—channel shiner
Notropis winchelli—clear chub
Opsopoeodus emiliae—pugnose minnow
Phenacobius mirabilis—suckermouth minnow
Pimephales notatus—bluntnose minnow
Pimephales promelas—fathead minnow
Pimephales vigilax—bullhead minnow
Platygobio gracilis—flathead chub
Pteronotropis hubbsi—bluehead shiner
Pteronotropis signipinnis—flagfin shiner
Pteronotropis welaka—bluenose shiner
Semotilus atromaculatus—creek chub

FAMILY CATOSTOMIDAE—SUCKERS

- Carpionotus carpio*—river carpsucker
Carpionotus cyprinus—quillback
Carpionotus velifer—highfin carpsucker
Cycleptus elongatus—blue sucker
Cycleptus meridionalis—southeastern blue sucker
Erimyzon oblongus—creek chubsucker
Erimyzon sucetta—lake chubsucker
Erimyzon tenuis—sharpfin chubsucker
Hypentelium nigricans—northern hog sucker
Ictiobus bubalus—smallmouth buffalo
Ictiobus cyprinellus—bigmouth buffalo
Ictiobus niger—black buffalo
Minytremma melanops—spotted sucker
Moxostoma carinatum—river redhorse
Moxostoma duquesnei—black redhorse
Moxostoma poecilurum—blacktail redhorse

FAMILY ICTALURIDAE—BULLHEAD CATFISHES

- Ameiurus melas*—black bullhead
Ameiurus natalis—yellow bullhead
Ameiurus nebulosus—brown bullhead

Table 1. Continued.

FAMILY ICTALURIDAE (continued)

Ictalurus furcatus—blue catfish
Ictalurus punctatus—channel catfish
Noturus flavus—stonecat
Noturus funebris—black madtom
Noturus gyrinus—tadpole madtom
Noturus leptacanthus—speckled madtom
Noturus miurus—brindled madtom
Noturus munitus—frecklebelly madtom
Noturus nocturnus—freckled madtom
Noturus phaeus—brown madtom
Pylodictis olivaris—flathead catfish

FAMILY ESOCIDAE—PIKES

Esox americanus—grass pickerel
Esox niger—chain pickerel

FAMILY OSMERIDAE—SMELTS

Osmerus mordax—rainbow smelt

FAMILY SALMONIDAE—TROUTS

Oncorhynchus mykiss—rainbow trout

FAMILY APHREDODERIDAE—PIRATE PERCHES

Aphredoderus sayanus—pirate perch

FAMILY FUNDULIDAE—TOPMINNOWS

Fundulus blairae—western starhead topminnow
Fundulus chrysotus—golden topminnow
Fundulus dispar—starhead topminnow
Fundulus euryzonus—broadstripe topminnow
Fundulus notatus—blackstripe topminnow
Fundulus notti—bayou topminnow
Fundulus olivaceus—blackspotted topminnow

FAMILY POECILIIDAE—LIVEBEARERS

Gambusia affinis—western mosquitofish
Heterandria formosa—least killifish
Poecilia latipinna—sailfin molly

FAMILY ATHERINIDAE—SILVERSIDES

Labidesthes sicculus—brook silverside
Menidia beryllina—inland silverside

FAMILY SYNGNATHIDAE—PIPEFISHES

Syngnathus scovelli—gulf pipefish

FAMILY MORONIDAE—TEMPERATE BASSES

Morone chrysops—white bass
Morone mississippiensis—yellow bass
Morone saxatilis—striped bass

FAMILY CENTRARCHIDAE—SUNFISHES

Ambloplites ariommus—shadow bass
Centrarchus macropterus—flier
Lepomis auritus—redbreast sunfish

FAMILY CENTRARCHIDAE (continued)

Lepomis cyanellus—green sunfish
Lepomis gulosus—warmouth
Lepomis humilis—orangespotted sunfish
Lepomis macrochirus—bluegill
Lepomis marginatus—dollar sunfish
Lepomis megalotis—longear sunfish
Lepomis microlophus—reardear sunfish
Lepomis miniatus—redspotted sunfish
Lepomis symmetricus—bantam sunfish
Micropterus punctulatus—spotted bass
Micropterus salmoides—largemouth bass
Pomoxis annularis—white crappie
Pomoxis nigromaculatus—black crappie

FAMILY ELASSOMATIDAE—PYGMY SUNFISHES

Elassoma zonatum—banded pygmy sunfish

FAMILY PERCIDAE—PERCHES

Ammocrypta beani—naked sand darter
Ammocrypta clara—western sand darter
Ammocrypta vivax—scaly sand darter
Crystallaria asprella—crystal darter
Etheostoma asprigene—mud darter
Etheostoma caeruleum—rainbow darter
Etheostoma chlorosomum—bluntnose darter
Etheostoma collettei—creole darter
Etheostoma fusiforme—swamp darter
Etheostoma gracile—slough darter
Etheostoma histrio—harlequin darter
Etheostoma lynceum—brighteye darter
Etheostoma parvipinne—goldstripe darter
Etheostoma proeliare—cypress darter
Etheostoma stigmaeum—speckled darter
Etheostoma swaini—gulf darter
Etheostoma whipplei—redfin darter
Percina aurora—pearl darter
Percina caprodes—logperch
Percina copelandi—channel darter
Percina lenticula—freckled darter
Percina macrolepida—bigscale logperch
Percina maculata—blackside darter
Percina nigrofasciata—blackbanded darter
Percina sciera—dusky darter
Percina shumardi—river darter
Percina suttkusi—gulf logperch
Percina uranidea—stargazing darter
Percina vigil—saddleback darter
Stizostedion canadense—sauger
Stizostedion vitreum—walleye

FAMILY SCIAENIDAE—DRUMS

Aplodinotus grunniens—freshwater drum

FAMILY CICHLIDAE—CICHLIDS

Cichlasoma cyanoguttatum—Rio Grande perch

Table 2. Changes to the inland fishes of Louisiana.

1974	NAME CHANGES 2001
FAMILY ACIPENSERIDAE-STURGEONS	
<i>Scaphirhynchus albus-pallid</i> sturgeon	<i>S. albus</i> -pallid sturgeon
FAMILY LEPISTOSTEIDAE-GARS	
<i>Lepisosteus spatula</i> -alligator gar	<i>Atractosteus spatula</i> -alligator gar
FAMILY CYPRINIDAE-CARPS AND MINNOWS	
<i>Campostoma anomalum</i> -stoneroller	<i>C. anomalum</i> -central stoneroller
<i>Notropis camurus</i> -bluntnose shiner	<i>Cyprinella camura</i> -bluntnose shiner
<i>Notropis lutrensis</i> -red shiner	<i>Cyprinella lutrensis</i> -red shiner
<i>Notropis venustus</i> -blacktail shiner	<i>Cyprinella venusta</i> -blacktail shiner
<i>Notropis whitleyi</i> -steelcolor shiner	<i>Cyprinella whitleyi</i> -steelcolor shiner
<i>Hybognathus nuchalis</i> -silvery minnow	<i>H. nuchalis</i> -Mississippi silvery minnow
<i>Notropis chryscephalus</i> -striped shiner	<i>Luxilus chryscephalus</i> -striped shiner
<i>Notropis fumus</i> -ribbon shiner	<i>Lythrurus fumus</i> -ribbon shiner
<i>Notropis roseipinnis</i> -cherryfin shiner	<i>Lythrurus roseipinnis</i> -cherryfin shiner
<i>Notropis umbratilus</i> -redfin shiner	<i>Lythrurus umbratilus</i> -redfin shiner
<i>Hybopsis aestivalis</i> -speckled chub	<i>Macrhybopsis aestivalis</i> -speckled chub
<i>Macrhybopsis aestivalis</i> -speckled chub	<i>Macrhybopsis hyostoma</i> , shoal chub,
<i>Hybopsis storeriana</i> -silver chub	<i>Macrhybopsis storeriana</i> -silver chub
<i>Ericymba buccata</i> -silverjaw minnow	<i>Notropis buccatus</i> -silverjaw minnow
<i>Notropis volucellus</i> -wickliffi-mimic shiner	<i>Notropis wickliffi</i> -channel shiner
<i>Hybopsis winchelli</i> -clear chub	<i>Notropis winchelli</i> -clear chub
<i>Hybopsis gracilis</i> -flathead chub	<i>Platygobio gracilis</i> -flathead Chub
<i>Notropis signipinnis</i> -flagfin shiner	<i>Pteronotropis signipinnis</i> -flagfin shiner
<i>Notropis welaka</i> -bluenose shiner	<i>Pteronotropis welaka</i> -bluenose shiner
FAMILY ICTALURIDAE-BULLHEAD CATFISHES	
<i>Ictalurus melas</i> -black bullhead	<i>Ameiurus melas</i> -black bullhead
<i>Ictalurus natalis</i> -yellow bullhead	<i>Ameiurus natalis</i> -yellow bullhead
<i>Ictalurus nebulosus</i> -brown bullhead	<i>Ameiurus nebulosus</i> -brown bullhead
FAMILY CYPRINODONTIDAE FAMILY FUNDULIDAE-TOPMINNOWS	
<i>Fundulus notti</i> -starhead minnow	<i>F. notti</i> -bayou topminnow
<i>Fundulus notti</i> -starhead topminnow	<i>F. dispar</i> -northern starhead topminnow
FAMILY POECILIIDAE-LIVEBEARERS	
<i>Gambusia affinis</i> -mosquitofish	<i>G. affinis</i> -western mosquitofish
FAMILY ATHERINIDAE-SILVERSIDES	
<i>Menidia audens</i> -Mississippi silverside	<i>M. beryllina</i> -inland silverside
FAMILY CENTRARCHIDAE-SUNFISHES	
<i>Ambloplites rupestris</i> -rock bass	<i>A. ariommus</i> -shadow bass
<i>Lepomis punctatus</i> -blackspotted sunfish	<i>L. miniatus</i> -redspotted sunfish
FAMILY PERCIDAE-PERCHES	
<i>Ammocrypta asprella</i> -crystal darter	<i>Crystallaria asprella</i> -crystal darter
<i>Etheostoma zonale</i> -banded darter	<i>E. lynceum</i> -brighteye darter
<i>Percina ouachita</i> -darter	<i>Percina vigil</i> -saddleback darter

Table 2. Continued.

INTRODUCTIONS

FAMILY CYPRINIDAE-CARPS AND MINNOWS

Ctenopharyngodon idella-grass carp*Hypophthalmichthys molitrix*-silver carp*Hypophthalmichthys nobilis*-bighead carp

FAMILY CENTRARCHIDAE-SUNFISHES

Lepomis auritus-redbreast sunfish

FAMILY CICHLIDAE-CICHLIDS-New family for Louisiana

Cichlasoma cyanoguttatum-Rio Grande cichlid

RANGE EXTENSIONS AND TRANSIENTS

FAMILY ACIPENSERIDAE-STURGEONS

Acipenser fulvescens-lake sturgeon-transient

FAMILY CYPRINIDAE-CARPS AND MINNOWS

Macrhybopsis gelida-sturgeon chub-transient*Macrhybopsis meeki*-sicklefin chub-transient

FAMILY CATOSTOMIDAE-SUCKERS

Moxostoma duquesnei-black redhorse-transient

FAMILY ICTALURIDAE-BULLHEAD CATFISHES

Noturus flavus-stonecat-transient

FAMILY OSMERIDAE-SMELTS-New family for Louisiana

Osmerus mordax-rainbow smelt-transient

FAMILY SALMONIDAE-TROUTS-New family for Louisiana

Oncorhynchus mykiss-rainbow trout-transient

FAMILY PERCIDAE-PERCHES

Percina uranidea-stargazing darter-range extension

NEW SPECIES AND FAMILY

FAMILY CYPRINIDAE-CARPS AND MINNOWS

New species

Pteronotropis hubbsi-bluehead shiner

FAMILY CATOSTOMIDAE-SUCKERS

Split *Cycleptus elongatus*-blue sucker*C. meridionalis*-southeastern blue sucker

FAMILY CYPRINODONTIDAE

Split *Fundulus notti*-starhead topminnow

New species

FAMILY FUNDULIDAE-TOPMINNOWS

F. blairae-western starhead topminnow*Fundulus euryzonus*-broadstripe topminnow

FAMILY PERCICHTHYIDAE

FAMILY MORONIDAE-TEMPERATE BASSES

FAMILY PERCIDAE-PERCHES

Split-*Percina copelandi*-channel darterSplit-*Percina caprodes*-logperch*P. aurora*-pearl darter*P. suttkusi*-gulf darter