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Fishes of the Charlotte Harbor Estuarine System, Florida

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To date, 255 fish species in 95 families have been reliably reported from the Charlotte Harbor estuarine system in southwest Florida. The species list was compiled from recent fishery-independent collections, a review of reports and peer-reviewed literature, and examination of cataloged specimens at the Florida Museum of Natural History. Thirty-nine species are new records for this estuarine system. Many of the newly documented species are common on the west Florida continental shelf and associated inshore habitats. Twenty-two previously reported species were not included in the species list presented herein on the basis of more recent research, doubtful original identifications, or questionable locality data.

Charlotte Harbor is a large, subtropical estuary located in southwest Florida (Fig. 1). The estuarine system is approximately 56 km long with a surface area of approximately 700 km² (Harris et al., 1983). Extensive seagrass flats (ca. 262 km²; Sargent et al., 1995) and mangrove fringe (143 km²; L. Kish, unpubl. data) characterize much of the estuary. The modal depth of the estuary is 3–4 m (Brooks, 1973), with a maximum depth of 15.5 m in Boca Grande Pass (Huang, 1966). The climate of the study area is subtropical, with distinct wet (June–Nov.) and dry (Dec.–May) seasons. Seasonal mean water temperatures range from 12 C to 36 C, and annual rainfall averages about 127 cm (Stoker, 1986). Because Charlotte Harbor proper is relatively small compared with the size of the watershed (Hammett, 1990), the salinity profile and flushing rate of the estuary is seasonally affected by river discharge (Miller and McPherson, 1991; Stoker, 1992), and its classification varies from salt wedge to well mixed depending on location and time of year (Stoker et al., 1989; Goodwin, 1996; Weisberg and Zheng, 2003). Variations in freshwater input to the estuary affect primary productivity as well as estuarine-resident and estuarine-dependent organisms (Montgomery et al., 1991; Flannery et al., 2002).

Although Charlotte Harbor remains one of the least-impacted water bodies in Florida, rapid human population growth and development surrounding the harbor and within the watershed have resulted in increased stress on the estuarine system (Hammett, 1990; Stoker, 1992; McPherson et al., 1996; Charlotte Harbor National Estuary Program, 1999). These anthropogenic effects are projected to continue. Thus, a thorough understanding of the

ecology of local organisms is necessary if the consequences of future coastal development or environmental changes are to be determined. An accurate list of the ichthyofauna of the Charlotte Harbor estuarine system is needed as a baseline for determining gross changes in fish community composition, such as introductions of nonindigenous species, or disappearance of species from the estuary related to habitat loss or alterations of hydrological regimes.

Charlotte Harbor has a rich history of ichthyological sampling. The first detailed studies of the fishes of the estuary and vicinity included information on tarpon, *Megalops atlanticus*, and shark biology by resident and visiting scientists at the Bass Biological Laboratory in Englewood, the Palmetto Key Laboratory (now known as Cabbage Key) in Pine Island Sound, and the Cape Haze Marine Laboratory in Placida (Clark, 1969; Burgess, 1992; Balon, 1994; Cantillo et al., 2002). In addition, other researchers have conducted fisheries research in or near Charlotte Harbor on other recreationally and commercially important species such as spotted seatrout, *Cynoscion nebulosus*, and striped mullet, *Mugil cephalus* (Table 1). To date, the most comprehensive sampling has been conducted by scientists working for the Florida Fish and Wildlife Conservation Commission (FWC) Fish and Wildlife Research Institute's (FWRI) [formerly Florida Marine Research Institute (FMRI)] ongoing Fisheries-Independent Monitoring (FIM) program. This program has collected fishes within the Charlotte Harbor estuarine system continuously since 1989. Initial sampling was restricted to the northern portion of the system (north of Pine Island) and included Charlotte Harbor proper; Gasparilla Sound, Bull Bay, Turtle Bay, the Myakka River (to ca. 27°03'N; US 41

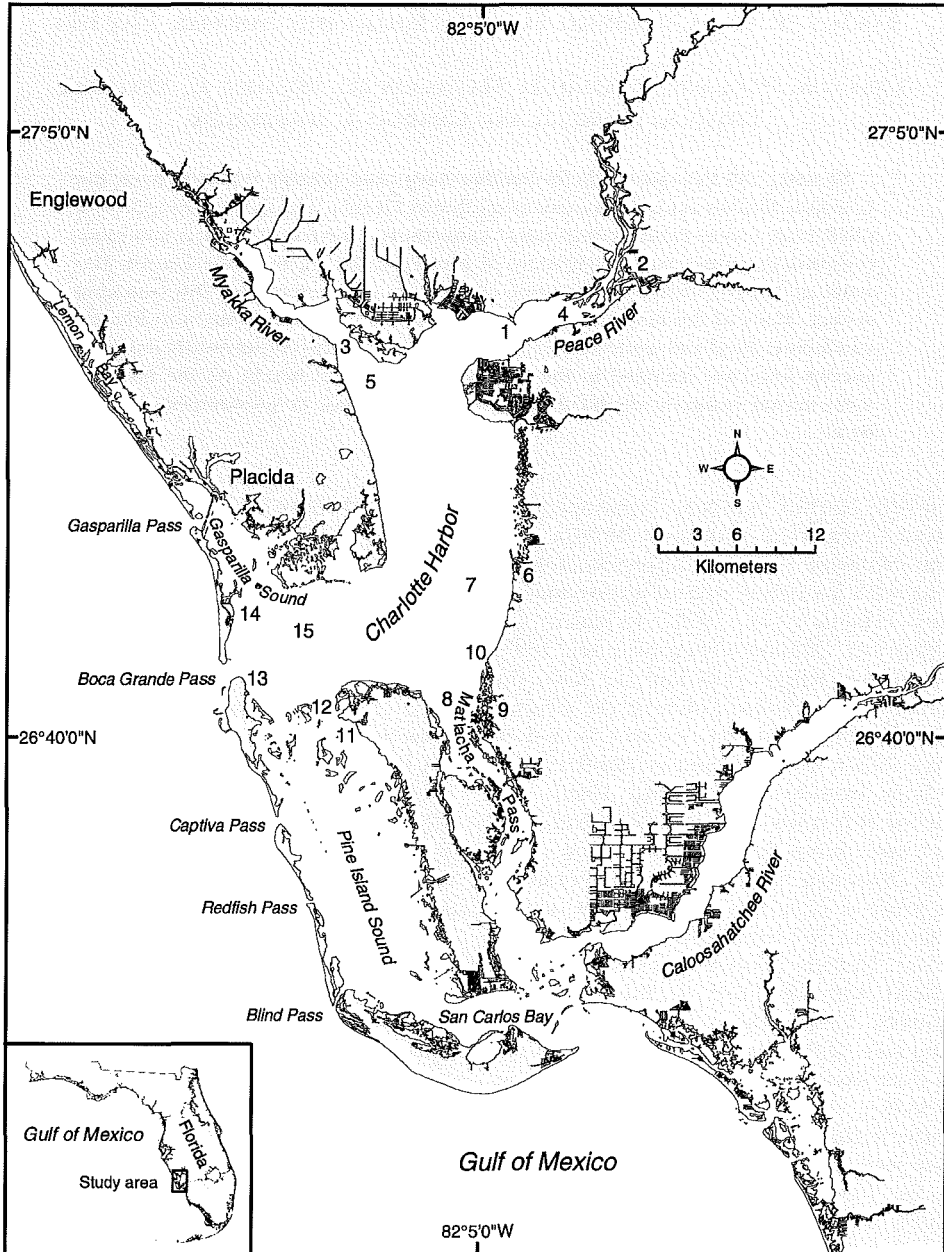


Fig. 1. Map of the Charlotte Harbor estuarine system, Florida. We used two methods to sample fishes during the study period (1989–2002): 1) stratified random sampling throughout the estuarine system using a variety of gear, and 2) fixed station sampling at sites indicated on the map. Stations 1–3, 6, and 9–13 were sampled with 3-mm-mesh seines. Stations 4–5, 7–8, and 14–15 were sampled with 6.1-m otter trawls (3-mm-mesh liner). All waters within the estuarine system out to the passes that were accessible by a shallow-draft boat were included in the sampling area. For the purposes of this article, the “Charlotte Harbor estuarine system” is defined as Charlotte Harbor proper, Gasparilla Sound, Pine Island Sound, Matlacha Pass, San Carlos Bay, and the watersheds of the Myakka, Peace, and Caloosahatchee rivers. It is important to note that Blind Pass naturally opens and closes and was closed for the latter half of the study period.

TABLE 1. Summary of published and unpublished references that contain information on fishes from the Charlotte Harbor estuarine system and vicinity. References are listed in the category in which the majority of the information that they contain falls; however, many references contain information from additional categories.

Subject	References
Ichthyofaunal surveys	Goode and Bean (1880), Goode (1882), Adams and Kendall (1891), Henshall (1891), Lönnberg (1894), Evermann and Kendall (1900), Fowler (1915, 1926, 1936, 1940, 1941, 1945), Briggs (1958), Phillips and Springer (1960), Woodburn (1960a, 1960b, 1960c, 1961a, 1961b, 1968), Finucane (1965), Anonymous (1968), Darovec (1995)
Elasmobranchs	Springer (1938, 1939a, 1939b, 1939c, 1940, 1941, 1950, 1960, 1967), Breder and Springer (1940), Breder and Krumholz (1941), Cox and Breder (1943), Springer and French (1944), Bigelow and Schroeder (1948, 1953), Heller et al. (1957), Heller (1959, 1960), Clark (1959a, 1959b, 1960, 1962a, 1962b, 1963a, 1963b, 1969), Clark and von Schmidt (1965), Randall (1963, 1992), Schultz and Malin (1963), Hueter and Manire (1994), Seitz and Poulakis (2002), Keeney et al. (2003), Poulakis and Seitz (2004)
Freshwater fishes	Woolman (1892), Ware (1969), Ware and Fish (1969), Kushlan and Lodge (1974), Layne et al. (1977), Lee et al. (1980), Gilbert (1987), Champeau (1990), Main et al. (1997), D. W. Ceilley and D. E. Ceilley (1999), Peebles (2002)
Estuarine and marine fishes	Storey and Perry (1933), Breder (1939a, 1939b, 1939c, 1940a, 1940b, 1941a, 1941b, 1941c, 1942a, 1942b, 1942c, 1942d, 1943, 1944a, 1944b, 1946, 1955, 1959), Merriman (1940), Shlaifer and Breder (1940), Storey (1940), Shlaifer (1941), Breder and Krumholz (1943), Breder and Clark (1947), Fowler (1954), Tavolga (1954), Clark (1959c, 1959d), Moffett (1961), Hildebrand (1963), Moe (1963), Topp (1963), Gunter and Hall (1965), Wang and Raney (1971), Topp and Hoff (1972), McNulty et al. (1974), Texas Instruments, Inc. (1978a, 1978b), Barnett et al. (1980), Leiby and Yerger (1980), Estevez et al. (1981), Fraser (1981, 1984, 1997), Darovec (1983), Harris et al. (1983), Matheson (1983), Ross (1983), Comp and Seaman (1985), Estevez (1985, 1986), Florida Marine Research Institute (1989–2003), Bullock and Smith (1991), Estevez et al. (1991), Wilson and Alberdi (1991), Continental Shelf Associates, Inc. (1992), Banford and Collette (1993), Taylor (1993), Environmental Quality Laboratory, Inc. (1994), Murphy and Taylor (1994), Crabtree (1995), Crabtree et al. (1995), Edic (1996), Crabtree et al. (1997), Smith-Vaniz (1997), Edwards (1998), Nelson (1998), Peters et al. (1998), Pierce et al. (1998), Charlotte Harbor National Estuary Program (1999), Poulakis and Mitchell (1999a, 1999b), Rubec et al. (1999), Nelson and Leffler (2001), Pierce and Mahmoudi (2001), Bell et al. (2002), Brown-Peterson et al. (2002), Adams (2003), Kupschus (2003, 2004), Poulakis et al. (2003), Rudershausen et al. (2003), Adams et al. (2004), Hanson et al. (2004), Patterson et al. (2004), Adams and Blewett (2004)
Fish kills	Willcox (1887), Storey and Gudger (1936), Storey (1937), Galloway (1941), Chapman (1973), Gilmore et al. (1978)
Exotics	Buntz and Manooch (1968), Fuller et al. (1999)
Mercury in fishes	Adams and McMichael (2001), Adams et al. (2003)

bridge), and the Peace River (to 27°00'N; ca. Whidden Bay). Matlacha Pass (north of ca. 26°38'N; Bascule Bridge) was added to the sampling area in 1992, and Pine Island Sound (north of 26°31'N; ca. Galt Island) was added to the sampling area in 1994. The Caloosahatchee River, southern Matlacha Pass, and San Carlos Bay have been sampled aperiodically; however, regular sampling of these areas was initiated in Nov. 2003. For the purposes of this article, the "Charlotte Harbor estuarine system" is defined as Charlotte Harbor proper, Gasparilla Sound, Pine Island Sound, Matlacha Pass, San Carlos Bay, and the watersheds of the Myakka, Peace, and Caloosahatchee rivers (Fig. 1). Smaller water bodies included within these boundaries that connect directly to the estuary are also considered part of the system. Passes that connect Charlotte Harbor with the Gulf of Mexico are considered part of the system but Gulf of Mexico beaches and nearshore coastal waters are not.

The purpose of this article is 1) to provide a comprehensive list of fish species known from the Charlotte Harbor estuarine system, 2) to document additions to the ichthyofauna of the estuarine system on the basis of FIM program collections and previously unpublished records at the Florida Museum of Natural History (FMNH), and 3) to comment on erroneous and questionable records of species reported from the estuarine system that exist in the published literature.

MATERIALS AND METHODS

Fish sampling by scientists with the FIM program was conducted throughout the study area to maximize the amount of data regarding the fish community. Initially, sampling was conducted during day, night, and crepuscular periods in fall and spring (1989–95), but more recent efforts (1996–2002) have consisted of monthly, daytime stratified-random sampling. Sample sites were stratified by depth and habitat type (e.g., seagrass flats, nonseagrass flats, shorelines). Charlotte Harbor was divided into 1 × 1 cartographic grids (1 nm²), and grids to be sampled were randomly selected without replacement. Each selected grid was then subdivided into microgrids by using a 10 × 10 cell overlay, and sample sites were randomly selected from among these microgrids. Fifteen fixed stations were also sampled monthly between 1990 and 1996 (see Fig. 1 for station locations). About 15,000 samples were collected during the study period (80% stratified random; 20% fixed station). The principal collecting gear

were seines (21.3-m seine, 3-mm mesh; 183-m haul seine, 38-mm mesh; 183-m purse seine, 51-mm mesh), trawls (6.1-m otter trawl, 3-mm mesh liner), and gill nets [184-m, 4-panel (75–150-mm mesh) or 198-m, 5-panel (50–150-mm mesh)]. Fishes were identified to the lowest practical taxon, measured, and enumerated in the field. Representative subsamples of fishes were retained for taxonomic verification and as voucher specimens, and the remainder of the catch was released. Hydrological data, including water temperature (C) and salinity (‰) were recorded at each sample site with a Hydrolab® water quality instrument. Additional specimens were obtained from anglers or through aperiodic sampling efforts conducted by FIM-program scientists. Voucher specimens have been deposited in the ichthyology collection of the FWC-FWRI (FSBC). This article includes FIM data collected between 1989 and 2002.

The species list compiled from FIM program sampling was combined with literature and FMNH records to construct a comprehensive list of fish species known from this estuarine system. Emphasis was placed on published literature, although a large amount of "gray literature" has been produced regarding fishes in the system (see Table 1). Gray literature used included Phillips and Springer (1960), Wang and Raney (1971), and Hueter and Manire (1994) (elasmobranchs only). Collectively, these unpublished data were included despite the inherent problems with gray literature (see Collette, 1990) because they are particularly useful in filling gaps in our knowledge of the Charlotte Harbor ichthyofauna.

The species list from FIM program sampling served as the basis for the comprehensive list, and data from other references were added to the list according to several criteria. Any potentially relevant documents were searched for records of fishes from the Charlotte Harbor estuarine system and vicinity (all studies searched that contain data on fishes from our area are included in Table 1). When a potential Charlotte Harbor record was identified, the location of the record was determined relative to our definition of the estuarine system (see Introduction). If the record came from within the predefined boundaries and the document contained 1) at least one species *not* found in the FIM or FMNH collections (i.e., a unique species) or 2) the only record of a species other than those from FIM or FMNH collections (i.e., it corroborated FIM and FMNH collections), the document was given a chronological identifying number relative to the

other studies included in the list, and all estuarine records from the document were incorporated.

Any species represented solely by FIM records or previously unpublished FMNH records (i.e., “ichthyofaunal additions”) are discussed on an individual basis, and collection data are included for these new Charlotte Harbor records [e.g., water depths (m), water temperatures, capture locations]. All other species are simply noted in the comprehensive species list (Table 2). If a given species is represented by FIM and FMNH specimens, FIM collection data are listed and the FMNH catalog number (UF) is simply noted. If FMNH holdings are the only known record(s) of a species from Charlotte Harbor, then available collection data are included for those museum records. Two new estuarine records from FIM sampling without voucher specimens were verified but were either too large for preservation (i.e., lemon shark, *Negaprion brevirostris*) or were damaged (i.e., mangrove rivulus, *Rivulus marmoratus*). Lemon shark lengths were converted from precaudal lengths to total (stretch) lengths (TL) according to the method of Hueter and Manire (1994); all other sizes are reported as standard lengths (SL).

Fisheries-Independent Monitoring Program scientists and other investigators verified records from previous studies included in the species list when possible. If more recent research or reidentification of voucher specimens prevented a previously reported species from being included in the list, the specifics regarding each case are discussed on an individual basis. If voucher specimens were unavailable for examination, known range and habitat use information was considered in validating the records of these species. In some cases, we spoke directly with the author(s) of a given study. If the validity of a species could not be confirmed after this treatment, the species was termed “questionable” and it was omitted from the list. Species considered questionable solely on the basis of doubtful locality data are simply footnoted in Table 2. Species considered questionable on the basis of doubtful identifications are discussed on an individual basis. It is important to note that because voucher specimens were unavailable for some species we considered questionable, verification of these species from our study area is impossible. Nomenclature follows Nelson et al. (2004), and synonymies follow Eschmeyer (1998) unless otherwise noted.

RESULTS AND DISCUSSION

Ichthyofaunal additions.—The format for presenting each new Charlotte Harbor species is as follows: common name, scientific name [FWC-FWRI catalog number(s); FMNH catalog number if museum specimen(s) are the only known record(s); number collected (n); size range collected; collecting gear (“seines” = specimens collected in more than one type of seine); water depth range (m; minimum–maximum, if applicable); water temperature range (C; minimum–maximum, including surface and bottom readings, if applicable); salinity range (‰; minimum–maximum, including surface and bottom readings, if applicable); time period of collection(s) (i.e., dawn, day, dusk, night); month(s) of collection; FMNH catalog number if museum specimen(s) exist in addition to FIM record(s)]; comments.

Lemon shark, *Negaprion brevirostris* (Poey, 1868) (n = 4; 98.5–134.8 cm TL; gill net; 0.3–1.0 m; 24.5–26.5 C; 29.9–34.8‰; dusk and night; March, May, and Nov.): Lemon sharks occur in inshore and continental shelf waters in both the Atlantic and eastern Pacific oceans and are known from both coasts of Florida (Bigelow and Schroeder, 1948; Castro, 1983). The only records of this species from the Charlotte Harbor area are those of Springer (1938) from a creek in Lemon Bay and from inlets “south of Englewood,” those of Clark and von Schmidt (1965) from “bays” and the nearshore Gulf of Mexico, and those of Wang and Raney (1971) from somewhere between “Venice and Estero Island, including Charlotte Harbor.” Our specimens were small and were captured near mangroves and seagrass beds (Cabbage Key, Demere Key, Cape Haze, Key Point), supporting the idea that these habitats serve as nursery areas for this species (Gruber, 1988). In addition to our small juvenile specimens, larger lemon sharks (168–267 cm TL) are commonly landed in shark tournaments conducted in Charlotte Harbor during June and Aug. (G. R. Poulakis, unpubl. data).

Honeycomb moray, *Gymnothorax saxicola* Jordan & Davis, 1891 (FSBC 19417; n = 1; 260 mm SL; trawl; 2.5 m; 25.6 C; 35.1‰; night; May): Honeycomb morays are found in the western Atlantic from New Jersey and Bermuda to south Florida and in the eastern Gulf of Mexico to Mobile Bay, Alabama (Robins and Ray, 1986; Boschung, 1992). In the Gulf of Mexico, they have been reported in >20 m of water (Ginsburg, 1951; Darovec, 1995), but

TABLE 2. List of fish species collected within the Charlotte Harbor estuarine system during Fisheries-Independent Monitoring (FIM) program sampling and other historical collections from 1880 to 2002. Nomenclature follows Nelson et al. (2004) and synonymies follow Eschmeyer (1998) unless otherwise noted. Studies in parentheses are for occurrences that are probable, but synonymies could not be confirmed. 1 = this study; 2 = Florida Museum of Natural History records; 3 = Goode and Bean, 1880; 4 = Henshall, 1891; 5 = Fowler, 1926^a; 6 = Storey and Gudger, 1936; 7 = Breder and Springer, 1940; 8 = Galloway, 1941; 9 = Fowler, 1945; 10 = Breder, 1946; 11 = Fowler, 1954; 12 = Phillips and Springer, 1960; 13 = Gunter and Hall, 1965; 14 = Wang and Raney, 1971; 15 = Gilmore et al., 1978; 16 = Lee et al., 1980; 17 = Champeau, 1990; 18 = Wilson and Alberdi, 1991; 19 = Randall, 1992; 20 = Banford and Collette, 1993; 21 = Hueter and Manire, 1994 (elasmobranchs only); 22 = Fraser, 1997; 23 = T. H. Fraser, unpublished data; 24 = Smith-Vaniz, 1997; 25 = Fuller et al., 1999; 26 = C. Koepfer, unpublished artificial reef data; 27 = M. M. Leiby, unpublished data.

Species	Common name	Study collected
Ginglymostomatidae		
<i>Ginglymostoma cirratum</i> (Bonnaterre, 1788)	nurse shark	1, 21
Triakidae		
<i>Mustelus norrisi</i> Springer, 1939	Florida smoothhound	1, 21
Carcharhinidae		
<i>Carcharhinus acronotus</i> (Poey, 1860)	blacknose shark	1, 21
<i>Carcharhinus brevipinna</i> (Müller & Henle, 1839)	spinner shark	1, 21
<i>Carcharhinus isodon</i> (Müller & Henle, 1839)	finetooth shark	21
<i>Carcharhinus leucas</i> (Müller & Henle, 1839)	bull shark	1, 21, 22
<i>Carcharhinus limbatus</i> (Müller & Henle, 1839)	blacktip shark	1, 21, 22
<i>Galeocerdo cuvier</i> (Péron & Lesueur, 1822)	tiger shark	19
<i>Negaprion brevirostris</i> (Poey, 1868)	lemon shark	1
<i>Rhizoprionodon terraenovae</i> (Richardson, 1836)	Atlantic sharpnose shark	1, 4, 6, 21
Sphyrnidae		
<i>Sphyrna lewini</i> (Griffith & Smith, 1834)	scalloped hammerhead	21
<i>Sphyrna mokarran</i> (Rüppell, 1837)	great hammerhead	21
<i>Sphyrna tiburo</i> (Linnaeus, 1758)	bonnethead	1, 4, 6, 14, 21
Narcinidae		
<i>Narcine bancroftii</i> (Griffith & Smith, 1834)	lesser electric ray	7
Pristidae		
<i>Pristis pectinata</i> Latham, 1794	smalltooth sawfish	1, 4
Rhinobatidae		
<i>Rhinobatos lentiginosus</i> Garman, 1880	Atlantic guitarfish	1, 14, 21
Rajidae		
<i>Raja eglanteria</i> Bosc, 1800	clearnose skate	1, 14, 21

TABLE 2. Continued.

Species	Common name	Study collected
Dasyatidae		
<i>Dasyatis americana</i> Hildebrand & Schroeder, 1928	southern stingray	1, 14, 21, 22
<i>Dasyatis sabina</i> (Lesueur, 1824)	Atlantic stingray	1, 12, 13, 14, 16, 21, 22
<i>Dasyatis say</i> (Lesueur, 1817)	bluntnose stingray	1, 4, 14
Gymnuridae		
<i>Gymnura micrura</i> (Bloch & Schneider, 1801)	smooth butterfly ray	1, 12, 14, 21, 22
Myliobatidae		
<i>Aetobatus narinari</i> (Euphrasen, 1790)	spotted eagle ray	1, 21
Rhinopteridae		
<i>Rhinoptera bonasus</i> (Mitchill, 1815)	cownose ray	1, 14, 21, 22
Mobulidae		
<i>Manta birostris</i> (Walbaum, 1792)	giant manta	4
Acipenseridae		
<i>Acipenser oxyrinchus</i> Mitchill, 1815	Atlantic sturgeon	1, 22
Lepisosteidae		
<i>Lepisosteus osseus</i> (Linnaeus, 1758)	longnose gar	1, 17, 22
<i>Lepisosteus platyrhincus</i> DeKay, 1842	Florida gar	1, 9, 13, 14, 16, 17
Amiidae		
<i>Amia calva</i> Linnaeus, 1766	bowfin	1, 17
Elopidae		
<i>Elops saurus</i> Linnaeus, 1766	ladyfish	1, 6, 9, 12, 13, 14, 16, 22
Megalopidae		
<i>Megalops atlanticus</i> Valenciennes, 1847	tarpon	1, 4, 6, 8, 16, 22
Albulidae		
<i>Albula vulpes</i> (Linnaeus, 1758)	bonefish	1, 4
Anguillidae		
<i>Anguilla rostrata</i> (Lesueur, 1817)	American eel	1, 16, 17
Muraenidae		
<i>Gymnothorax saxicola</i> Jordan & Davis, 1891	honeycomb moray	1

TABLE 2. Continued.

Species	Common name	Study collected
Ophichthidae		
<i>Bascanichthys scuticaris</i> (Goode & Bean, 1880)	whip eel	2, 27
<i>Echiophis intertinctus</i> (Richardson, 1848)	spotted spoon-nose eel	6
<i>Myrophis punctatus</i> Lütken, 1852	speckled worm eel	1, 12, 14
<i>Ophichthus gomesii</i> (Castelnau, 1855)	shrimp eel	1, 9, 14, 22
<i>Ophichthus ophis</i> (Linnaeus, 1758)	spotted snake eel	1, 14
Engraulidae		
<i>Anchoa cubana</i> (Poey, 1868)	Cuban anchovy	1, 12, 14
<i>Anchoa hepsetus</i> (Linnaeus, 1758)	striped anchovy	1, 4, 13, 14, 22
<i>Anchoa mitchilli</i> (Valenciennes, 1848)	bay anchovy	1, 4, 12, 13, 14, 16, 22
Clupeidae		
<i>Brevoortia patronus</i> Goode, 1878	Gulf menhaden	13, 22
<i>Brevoortia smithi</i> Hildebrand, 1941	yellowfin menhaden	13, 14, 22
<i>Dorosoma cepedianum</i> (Lesueur, 1818)	gizzard shad	1, 17
<i>Dorosoma petenense</i> (Günther, 1867)	threadfin shad	1, 13, 14, 16, 17
<i>Etrumeus teres</i> (DeKay, 1842)	round herring	1
<i>Harengula jaguana</i> Poey, 1865	scaled sardine	1, 4, 12, 13, 14, 22
<i>Opisthonema oglinum</i> (Lesueur, 1818)	Atlantic thread herring	1, 4, 12, 14, 22
<i>Sardinella aurita</i> Valenciennes, 1847	Spanish sardine	1, 2, 18
Cyprinidae		
<i>Ctenopharyngodon idella</i> (Valenciennes, 1844) ^b	grass carp	1, 16, 17
<i>Notemigonus crysoleucas</i> (Mitchill, 1814)	golden shiner	1, 4, 9, 16, 17
<i>Notropis chalybaeus</i> (Cope, 1867)	ironcolor shiner	16
<i>Notropis maculatus</i> (Hay, 1881)	taillight shiner	1, 9, 13, 16, 17
<i>Notropis petersoni</i> Fowler, 1942	coastal shiner	1, 9, 13, 16, 17
<i>Opsopoeodus emiliae</i> Hay, 1881	pugnose minnow	16
<i>Pteronotropsis hypselopterus</i> (Günther, 1868)	sailfin shiner	9, 16
Catostomidae		
<i>Erimyzon sucetta</i> (Lacepède, 1803)	lake chubsucker	16, 17
Ictaluridae		
<i>Ameiurus catus</i> (Linnaeus, 1758)	white catfish	1, 13, 14, 16, 17
<i>Ameiurus natalis</i> (Lesueur, 1819)	yellow bullhead	1, 9, 14, 17
<i>Ameiurus nebulosus</i> (Lesueur, 1819)	brown bullhead	17
<i>Ictalurus punctatus</i> (Rafinesque, 1818)	channel catfish	1, 13, 14, 17
<i>Noturus gyrinus</i> (Mitchill, 1817)	tadpole madtom	1, 16, 17

TABLE 2. Continued.

Species	Common name	Study collected
Clariidae		
<i>Clarias batrachus</i> (Linnaeus, 1758) ^b	walking catfish	1, 16, 17
Ariidae		
<i>Ariopsis felis</i> (Linnaeus, 1766)	hardhead catfish	1, 4, 6, 8, 12, 13, 14, 16, 22
<i>Bagre marinus</i> (Mitchill, 1815)	gafftopsail catfish	1, 4, 5, 6, 9, 13, 14, 15, 22
Callichthyidae		
<i>Hoplosternum littorale</i> (Hancock, 1828) ^b	brown hoplo	1
Loricariidae		
<i>Pterygoplichthys disjunctivus</i> (Weber, 1991) ^b	vermiculated sailfin catfish	1, 25
Synodontidae		
<i>Synodus foetens</i> (Linnaeus, 1766)	inshore lizardfish	1, 4, 6, 12, 13, 14, 22
Aphredoderidae		
<i>Aphredoderus sayanus</i> (Gilliams, 1824)	pirate perch	17
Ophidiidae		
<i>Ophidion grayi</i> (Fowler, 1948)	blotched cusk-eel	1
<i>Ophidion holbrookii</i> Putnam, 1874	bank cusk-eel	1, 22
<i>Ophidion josephi</i> Girard, 1858	crested cusk-eel	1
Phycidae		
<i>Urophycis floridana</i> (Bean & Dresel, 1884)	southern hake	1, 14, 22
Batrachoididae		
<i>Opsanus beta</i> (Goode & Bean, 1880)	Gulf toadfish	1, 9, 12, 13, 14, 22
<i>Porichthys plectrodon</i> Jordan & Gilbert, 1882	Atlantic midshipman	13
Ogcocephalidae		
<i>Ogcocephalus cubifrons</i> (Richardson, 1836)	polka-dot batfish	1, 5, 6, 14
Mugilidae		
<i>Mugil cephalus</i> Linnaeus, 1758	striped mullet	1, 4, 5, 6, 12, 13, 14, 16, 17, 22
<i>Mugil curema</i> Valenciennes, 1836	white mullet	1, 6, 9, 13, 14
<i>Mugil gyrans</i> (Jordan & Gilbert, 1884)	whirligig mullet	1, 15
<i>Mugil</i> species	redeye mullet	15

TABLE 2. Continued.

Species	Common name	Study collected
Atherinopsidae		
<i>Labidesthes sicculus</i> (Cope, 1865)	brook silverside	1, 4, 9, 13, 16, 17
<i>Membras martinica</i> (Valenciennes, 1835)	rough silverside	1, 13
<i>Menidia beryllina</i> (Cope, 1867)	inland silverside	1, 9, 12, 13, 14, 16, 22
<i>Menidia peninsulae</i> (Goode & Bean, 1879)	tidewater silverside	1, 4
Atherinidae		
<i>Atherinomorbus stipes</i> (Müller & Troschel, 1848)	hardhead silverside	2
Belonidae		
<i>Strongylura marina</i> (Walbaum, 1792)	Atlantic needlefish	1, 4, 5, 13, 16
<i>Strongylura notata</i> (Poey, 1860)	redfin needlefish	1, 4, 6, 10, 12, 13, 14
<i>Strongylura timucu</i> (Walbaum, 1792)	timucu	1, 12, 14
<i>Tylosurus crocodilus</i> (Péron & Lesueur, 1821)	houndfish	1, 10
Hemiramphidae		
<i>Hyporhamphus meeki</i> Banford & Collette, 1993	false silverstripe halfbeak	1, 20
<i>Hyporhamphus unifasciatus</i> (Ranzani, 1842)	Atlantic silverstripe halfbeak	1, 20
Aplocheilidae		
<i>Rivulus marmoratus</i> Poey, 1880	mangrove rivulus	1
Fundulidae		
<i>Adinia xenica</i> (Jordan & Gilbert, 1882)	diamond killifish	1, 13
<i>Fundulus chrysotus</i> (Günther, 1866)	golden topminnow	1, 4, 9, 13, 16
<i>Fundulus confluentus</i> Goode & Bean, 1879	marsh killifish	1, 9, 13, 16
<i>Fundulus grandis</i> Baird & Girard, 1853	Gulf killifish	1, 4, 9, 13, 14, 16
<i>Fundulus majalis</i> (Walbaum, 1792) ^c	striped killifish	1, 4, 9, 12, 13, 14
<i>Fundulus seminolis</i> Girard, 1859	Seminole killifish	1, 9, 12, 13, 14, 16, 17
<i>Lucania goodei</i> Jordan, 1880	bluefin killifish	1, 9, 12, 13, 14, 16
<i>Lucania parva</i> (Baird & Girard, 1855)	rainwater killifish	1, 4, 9, 12, 13, 14, 16
Poeciliidae		
<i>Gambusia holbrooki</i> Girard, 1859	eastern mosquitofish	1, 4, 5, 9, 12, 13, 14, 16, 17
<i>Heterandria formosa</i> Agassiz, 1855	least killifish	1, 4, 5, 9, 13, 16
<i>Poecilia latipinna</i> (Lesueur, 1821)	sailfin molly	1, 9, 12, 13, 14, 16, 17
Cyprinodontidae		
<i>Cyprinodon variegatus</i> Lacepède, 1803	sheepshead minnow	1, 4, 9, 12, 13, 14, 16
<i>Floridichthys carpio</i> (Günther, 1866)	goldspotted killifish	1, 4, 9, 12, 14
<i>Jordanella floridae</i> Goode & Bean, 1879	flagfish	1, 4, 9, 13, 16

TABLE 2. Continued.

Species	Common name	Study collected
Syngnathidae		
<i>Anarchopterus criniger</i> (Bean & Dresel, 1884)	fringed pipefish	1, 14
<i>Hippocampus erectus</i> Perry, 1810	lined seahorse	1, 13, 14, 22
<i>Hippocampus zosterae</i> Jordan & Gilbert, 1882	dwarf seahorse	1, 12, 14
<i>Microphis brachyurus</i> (Bleeker, 1853)	opossum pipefish	2
<i>Syngnathus floridae</i> (Jordan & Gilbert, 1882)	dusky pipefish	1, 4, 13, 14, 22
<i>Syngnathus louisianae</i> Günther, 1870	chain pipefish	1, 12, 13, 14, 22
<i>Syngnathus scovelli</i> (Evermann & Kendall, 1896)	Gulf pipefish	1, (4), 9, 12, 13, 14, 16, 22
<i>Syngnathus springeri</i> Herald, 1942	bull pipefish	1, 14
Fistulariidae		
<i>Fistularia tabacaria</i> Linnaeus, 1758	bluespotted cornetfish	1
Scorpaenidae		
<i>Scorpaena brasiliensis</i> Cuvier, 1829	barbfish	1, 12
<i>Scorpaena plumieri</i> Bloch, 1789	spotted scorpionfish	13, 14
Triglidae		
<i>Prionotus martis</i> Ginsburg, 1950	barred searobin	2
<i>Prionotus rubio</i> Jordan, 1886	blackwing searobin	1
<i>Prionotus scitulus</i> Jordan & Gilbert, 1882	leopard searobin	1, 4, 12, 13, 14, 22
<i>Prionotus tribulus</i> Cuvier, 1829	bighead searobin	1, 4, 13, 14, 22
Centropomidae		
<i>Centropomus parallelus</i> Poey, 1860	smallscale fat snook	16
<i>Centropomus pectinatus</i> Poey, 1860	tarpon snook	16
<i>Centropomus undecimalis</i> (Bloch, 1792)	common snook	1, 4, 6, 8, 9, 13, 14, 16, 17
Serranidae		
<i>Centropristis striata</i> (Linnaeus, 1758)	black sea bass	1, 14, 21, 26
<i>Diplectrum bivittatum</i> (Valenciennes, 1828)	dwarf sand perch	13
<i>Diplectrum formosum</i> (Linnaeus, 1766)	sand perch	1, 5, 13, 14
<i>Epinephelus itajara</i> (Lichtenstein, 1822)	goliath grouper	1, 4, 6, 8, 9, 14, 26
<i>Epinephelus morio</i> (Valenciennes, 1828)	red grouper	1, 6, 14, 26
<i>Mycteroperca microlepis</i> (Goode & Bean, 1879)	gag	1, 14, 26
<i>Rypticus maculatus</i> Holbrook, 1855	whitespotted soapfish	1
<i>Serraniculus pumilio</i> Ginsburg, 1952	pygmy sea bass	1, 2
<i>Serranus subligarius</i> (Cope, 1870)	belted sandfish	1, 4, 14, 22

TABLE 2. Continued.

Species	Common name	Study collected
Opistognathidae		
<i>Opistognathus robinsi</i> Smith-Vaniz, 1997	spotfin jawfish	1, 24
Centrarchidae		
<i>Enneacanthus gloriosus</i> (Holbrook, 1855)	bluespotted sunfish	1, 9, 13, 16
<i>Lepomis gulosus</i> (Cuvier, 1829)	warmouth	1, 4, 9, 16, 17
<i>Lepomis macrochirus</i> Rafinesque, 1819	bluegill	1, (4), 9, 12, 13, 14, 16, 17
<i>Lepomis marginatus</i> (Holbrook, 1855)	dollar sunfish	1, 9, 12, 16, 17
<i>Lepomis microlophus</i> (Günther, 1859)	redeer sunfish	1, (4), 13, 14, 16, 17
<i>Lepomis punctatus</i> (Valenciennes, 1831)	spotted sunfish	1, 4, 9, 16, 17
<i>Micropterus salmoides</i> (Lacepède, 1802)	largemouth bass	1, 4, 9, 17
<i>Pomoxis nigromaculatus</i> (Lesueur, 1829)	black crappie	1, 17
Percidae		
<i>Etheostoma fusiforme</i> (Girard, 1854)	swamp darter	1, 9, 16, 17
Apogonidae		
<i>Astrapogon alutus</i> (Jordan & Gilbert, 1882)	bronze cardinalfish	1, 2
Pomatomidae		
<i>Pomatomus saltatrix</i> (Linnaeus, 1766)	bluefish	1, 5, 6, 14, 22
Echeneidae		
<i>Echeneis naucrates</i> Linnaeus, 1758	sharksucker	6, 14
<i>Echeneis neucratoides</i> Zuiew, 1786	whitefin sharksucker	1
Rachycentridae		
<i>Rachycentron canadum</i> (Linnaeus, 1766)	cobia	1, 5, 22
Coryphaenidae		
<i>Coryphaena hippurus</i> Linnaeus, 1758	dolphinfish	23
Carangidae		
<i>Caranx crysos</i> (Mitchill, 1815)	blue runner	1, 6
<i>Caranx hippos</i> (Linnaeus, 1766)	crevalle jack	1, 5, 6, 8, 9, 13, 14
<i>Caranx latus</i> Agassiz, 1831	horse-eye jack	1
<i>Chloroscombrus chrysurus</i> (Linnaeus, 1766)	Atlantic bumper	1, 13, 14, 22
<i>Decapterus punctatus</i> (Cuvier, 1829)	round scad	1, 4
<i>Hemicaranx amblyrhynchus</i> (Cuvier, 1833)	bluntnose jack	1, 14, 22

TABLE 2. Continued.

Species	Common name	Study collected
<i>Oligoplites saurus</i> (Bloch & Schneider, 1801)	leatherjack	1, 6, 10, 13, 14, 22
<i>Selene setapinnis</i> (Mitchill, 1815)	Atlantic moonfish	14
<i>Selene vomer</i> (Linnaeus, 1758)	lookdown	1, 13, 14
<i>Trachinotus carolinus</i> (Linnaeus, 1766)	Florida pompano	1, 4, 5, 6, 13
<i>Trachinotus falcatus</i> (Linnaeus, 1758)	permit	1, 6, 13, 14, 15
Lutjanidae		
<i>Lutjanus analis</i> (Cuvier, 1828)	mutton snapper	1, 5
<i>Lutjanus apodus</i> (Walbaum, 1792)	schoolmaster	1, 4
<i>Lutjanus griseus</i> (Linnaeus, 1758)	gray snapper	1, 4, 6, 9, 13, 14, 22, 26
<i>Lutjanus synagris</i> (Linnaeus, 1758)	lane snapper	1, 4, 6, 9, 13, 14, 22
<i>Ocyurus chrysurus</i> (Bloch, 1791)	yellowtail snapper	1, 5
Lobotidae		
<i>Lobotes surinamensis</i> (Bloch, 1790)	Atlantic tripletail	1, 13, 14, 22
Gerreidae		
<i>Diapterus auratus</i> Ranzani, 1842	Irish pompano	1, 9, 17
<i>Eucinostomus argenteus</i> Baird & Girard, 1855 ^d	spotfin mojarra	1
<i>Eucinostomus gula</i> (Quoy & Gaimard, 1824)	silver jenny	1, 4, 9, 12, 13, 14, 22
<i>Eucinostomus harengulus</i> Goode & Bean, 1879 ^d	tidewater mojarra	1, 9, 12, 13, 14, 16, 22
<i>Eucinostomus jonesii</i> (Günther, 1879)	slender mojarra	1
<i>Eugerres plumieri</i> (Cuvier, 1830)	striped mojarra	1, 13, 14, 16
<i>Gerres cinereus</i> (Walbaum, 1792)	yellowfin mojarra	1, 4
Haemulidae		
<i>Anisotremus virginicus</i> (Linnaeus, 1758)	porkfish	26
<i>Haemulon aurolineatum</i> Cuvier, 1830	tomtate	1, 14
<i>Haemulon plumieri</i> (Lacepède, 1801)	white grunt	1, 6, 14
<i>Orthopristis chrysoptera</i> (Linnaeus, 1766)	pigfish	1, 3, 6, 9, 12, 13, 14, 16, 22
Sparidae		
<i>Archosargus probatocephalus</i> (Walbaum, 1792)	sheepshead	1, 4, 5, 6, 9, 13, 14, 16, 22, 26
<i>Archosargus rhomboidalis</i> (Linnaeus, 1758)	sea bream	1
<i>Calamus arctifrons</i> Goode & Bean, 1882	grass porgy	1, 14
<i>Calamus penna</i> (Valenciennes, 1830)	sheepshead porgy	3
<i>Calamus providens</i> Jordan & Gilbert, 1884	littlehead porgy	1
<i>Diplodus holbrookii</i> (Bean, 1878)	spottail pinfish	1, 14
<i>Lagodon rhomboides</i> (Linnaeus, 1766)	pinfish	1, 3, 4, 6, 9, 12, 13, 14, 16, 22, 26

TABLE 2. Continued.

Species	Common name	Study collected
Polynemidae		
<i>Polydactylus octonemus</i> (Girard, 1858)	Atlantic threadfin	1
Sciaenidae		
<i>Bairdiella batabana</i> (Poey, 1860)	blue croaker	1
<i>Bairdiella chrysoura</i> (Lacepède, 1802)	silver perch	1, 4, 12, 13, 14, 22
<i>Cynoscion arenarius</i> Ginsburg, 1930	sand seatrout	1, 12, 13, 14, 22
<i>Cynoscion nebulosus</i> (Cuvier, 1830)	spotted seatrout	1, 4, 6, 13, 14, 22
<i>Leiostomus xanthurus</i> Lacepède, 1802	spot	1, 4, 9, 12, 13, 14, 22
<i>Menticirrhus americanus</i> (Linnaeus, 1758)	southern kingfish	1, 4, 5, 9, 12, 13, 14, 22
<i>Menticirrhus littoralis</i> (Holbrook, 1847)	Gulf kingfish	1, 13
<i>Menticirrhus saxatilis</i> (Bloch & Schneider, 1801)	northern kingfish	1, 9, 12, 13
<i>Micropogonias undulatus</i> (Linnaeus, 1766)	Atlantic croaker	1, 9, 12, 13, 14, 22
<i>Pogonias cromis</i> (Linnaeus, 1766)	black drum	1, 13, 14, 22
<i>Sciaenops ocellatus</i> (Linnaeus, 1766)	red drum	1, 4, 5, 6, 9, 12, 13, 14
Mullidae		
<i>Mullus auratus</i> Jordan & Gilbert, 1882	red goatfish	1, 14
Kyphosidae		
<i>Kyphosus sectatrix</i> (Linnaeus, 1758)	Bermuda chub	1, 2
Elassomatidae		
<i>Elassoma evergladei</i> Jordan, 1884	Everglades pygmy sunfish	1, 9, 16
Cichlidae		
<i>Oreochromis aureus</i> (Steindachner, 1864) ^b	blue tilapia	1, 16, 17
Pomacentridae		
<i>Abudefduf saxatilis</i> (Linnaeus, 1758)	sergeant major	2
Labridae		
<i>Halichoeres bivittatus</i> (Bloch, 1791)	slippery dick	1, 4, 14
<i>Lachnolaimus maximus</i> (Walbaum, 1792)	hogfish	1, 8
Scaridae		
<i>Nicholsina usta</i> (Valenciennes, 1840)	emerald parrotfish	1, 12
Uranoscopidae		
<i>Astroscopus y-graecum</i> (Cuvier, 1829)	southern stargazer	1, 13, 14, 22

TABLE 2. Continued.

Species	Common name	Study collected
Labrisomidae		
<i>Paraclinus marmoratus</i> (Steindachner, 1876)	marbled blenny	1, 14
Blenniidae		
<i>Chasmodes saburrae</i> Jordan & Gilbert, 1882	Florida blenny	1, 13, 14
<i>Hypleurochilus caudovittatus</i> Bath, 1994	zebratail blenny	1
<i>Hypsoblennius hentz</i> (Lesueur, 1825)	feather blenny	1, 22
<i>Lupinoblennius nicholsi</i> (Tavolga, 1954)	highfin blenny	1, 2, 11
Gobiesocidae		
<i>Gobiesox strumosus</i> Cope 1870	skilletfish	1, 9, 13
Eleotridae		
<i>Dormitator maculatus</i> (Bloch, 1792)	fat sleeper	1, 9, 16
Gobiidae		
<i>Bathygobius soporator</i> (Valenciennes, 1837)	frillfin goby	1, 4, 9, 14
<i>Ctenogobius boleosoma</i> (Jordan & Gilbert, 1882)	darter goby	1, 13
<i>Ctenogobius smaragdus</i> (Valenciennes, 1837)	emerald goby	1
<i>Gobionellus oceanicus</i> (Pallas, 1770)	highfin goby	1, 14
<i>Gobiosoma bosc</i> (Lacepède, 1800)	naked goby	1, 9, 12, 13, 16, 22
<i>Gobiosoma longipala</i> Ginsburg, 1933	twoscale goby	1, 13
<i>Gobiosoma robustum</i> Ginsburg, 1933	code goby	1, 9, 12, 14, 16
<i>Lophogobius cyprinoides</i> (Pallas, 1770)	crested goby	1, 9
<i>Microgobius gulosus</i> (Girard, 1858)	clown goby	1, 4, 12, 13, 14, 16, 17, 22
<i>Microgobius thalassinus</i> (Jordan & Gilbert, 1883)	green goby	1, 22
Microdesmidae		
<i>Microdesmus longipinnis</i> (Weymouth, 1910)	pink wormfish	14
Ephippidae		
<i>Chaetodipterus faber</i> (Broussonet, 1782)	Atlantic spadefish	1, 6, 10, 13, 14, 16, 22, 26
Sphyraenidae		
<i>Sphyraena barracuda</i> (Edwards, 1771)	great barracuda	1
<i>Sphyraena borealis</i> DeKay, 1842	northern sennet	1, 14
<i>Sphyraena picudilla</i> Poey, 1860	southern sennet	1

TABLE 2. Continued.

Species	Common name	Study collected
Scombridae		
<i>Euthynnus alletteratus</i> (Rafinesque, 1810)	little tunny	23
<i>Scomberomorus cavalla</i> (Cuvier, 1829)	king mackerel	23
<i>Scomberomorus maculatus</i> (Mitchill, 1815)	Spanish mackerel	1, 6, 14, 22
Stromateidae		
<i>Peprilus burti</i> Fowler, 1944	Gulf butterfish	1
<i>Peprilus paru</i> (Linnaeus, 1758)	harvestfish	1
Bothidae		
<i>Bothus robinsi</i> Topp & Hoff, 1972	twospot flounder	1
Paralichthyidae		
<i>Ancylosetta quadrocellata</i> Gill, 1864	ocellated flounder	1, 22
<i>Citharichthys macrops</i> Dresel, 1885	spotted whiff	1, 4, 14
<i>Citharichthys spilopterus</i> Günther, 1862	bay whiff	2
<i>Etropus crossotus</i> Jordan & Gilbert, 1882	fringed flounder	1, 4, 13, 14, 22
<i>Paralichthys albigutta</i> Jordan & Gilbert, 1882	Gulf flounder	1, 4, 12, 13, 14, 22
<i>Paralichthys lethostigma</i> Jordan & Gilbert, 1884	southern flounder	13
<i>Syacium papillosum</i> (Linnaeus, 1758)	dusky flounder	1
Achiridae		
<i>Achirus lineatus</i> (Linnaeus, 1758)	lined sole	1, 4, 9, 12, 13, 14, 22
<i>Gymnachirus melas</i> Nichols, 1916	naked sole	1
<i>Trinectes maculatus</i> (Bloch & Schneider, 1801)	hogchoker	1, 4, 9, 12, 13, 14, 16, 17, 22
Cynoglossidae		
<i>Symphurus plagiusa</i> (Linnaeus, 1766)	blackcheek tonguefish	1, 4, 9, 12, 13, 14, 22
Balistidae		
<i>Balistes capriscus</i> Gmelin, 1789	gray triggerfish	1, 6, 9
Monacanthidae		
<i>Ahlueterus schoepfii</i> (Walbaum, 1792)	orange filefish	1, 14
<i>Monacanthus ciliatus</i> (Mitchill, 1818)	fringed filefish	1, 3, 4
<i>Stephanolepis hispidus</i> (Linnaeus, 1766)	planehead filefish	1, 4, 13, 14, 22
Ostraciidae		
<i>Acanthostracion quadricornis</i> (Linnaeus, 1758)	scrawled cowfish	1, 4, 6, 13, 14, 22
<i>Lactophrys trigonus</i> (Linnaeus, 1758)	trunkfish	1

TABLE 2. Continued.

Species	Common name	Study collected
Tetraodontidae		
<i>Lagocephalus laevigatus</i> (Linnaeus, 1766)	smooth puffer	1
<i>Sphaeroides nephelus</i> (Goode & Bean, 1882)	southern puffer	1, 12, 13, 14, 22, 26
<i>Sphaeroides spengleri</i> (Bloch, 1785)	bandtail puffer	1, 4, 6, 9
Diodontidae		
<i>Chilomycterus schoepfii</i> (Walbaum, 1792)	striped burrfish	1, 5, 6, 12, 13, 14, 22
<i>Diodon holocanthus</i> Linnaeus, 1758	balloonfish	1

^aThe following reef or offshore species were reported from Punta Gorda, Captiva Pass, or Boca Grande Pass; however, all of these locations are doubtful: *Urolophus jamaicensis*, *Exocoetus volitans* (probably *E. obtusirostris*), *Holocentrus adscensionis*, *Epiniphelus guttatus*, *Epiniphelus striatus*, *Seriola zonata*, *Lutjanus campechanus*, *Lutjanus joca*, *Stenotomus chrysops*, and *Sardinia sarda* (Fowler, 1915 1926, 1945).

^bNonindigenous species.

^cNelson et al. (2004) "continue to recognize" *Fundulus similis* (Baird & Girard, 1853) based on unpublished work, but they do not present information that would clarify the status of this species in our area. The *Fundulus similis* recognized in the 1991 AFS list (Robins et al., 1991) was a form confined to southeast Florida and the Florida Keys, but the traditional use of this name referred to a form similar to *F. majalis* that ranged from northeast Florida to Mexico (Hoese and Moore, 1977; Relyea, 1983). Pending clarification of this issue, we continue to use the name *Fundulus majalis* for the form found in Charlotte Harbor.

^dFowler (1945), Phillips and Springer (1960), Gunter and Hall (1965), Wang and Raney (1971), Lee et al. (1980), and Fraser (1997) list *Enicostomus argenteus*; however, all probably refer to *E. laevis*.

specimens have also been collected nearshore and in bays and inlets (Reid, 1954; Springer and Woodburn, 1960; Hastings, 1979). Our specimen was collected in Gasparilla Sound about 5 km north of Boca Grande Pass.

Whip eel, *Bascanichthys scuticaris* (Goode & Bean, 1880) (UF 21486; n = 1; marine; Aug.): Whip eels occur in the western Atlantic from North Carolina to Mobile Bay, Alabama, and near Tuxpan, Mexico (McCosker et al., 1989; Boschung, 1992). This species is most common in Florida from Cape San Blas to the Keys (Leiby and Yerger, 1980). Many specimens have been collected in the eastern Gulf of Mexico, often along beaches from Venice to Naples after red tide events (Leiby and Yerger, 1980; Leiby, 1981; M. M. Leiby, unpubl. data). The FMNH specimen was collected on the estuarine side of Sanibel Island near a ferry dock.

Round herring, *Etrumeus teres* (DeKay, 1842) (FSBC 19419; n = 2; 42 and 47 mm SL; seine; ≤0.8 m; 21.7 C; 34.3‰; day; March): Round herring occur in the eastern Pacific, the Indo-Pacific, and the western Atlantic from Nova Scotia to the Gulf of Mexico (Boschung, 1992). They are abundant in the continental shelf waters of the eastern Gulf of Mexico (Houde, 1977). Eggs and larvae have been collected ca. 54–197 km offshore in the Gulf of Mexico off Texas, Louisiana, and Tampa Bay, with some spawning probably occurring beyond the edge of the continental shelf (Fore, 1971; Houde, 1977). This species apparently enters bays and shallows less often than other herrings do (Robins and Ray, 1986), but in Florida it has been collected in St. Andrew Bay and Pensacola Bay (Ogren and Brusher, 1977; Cooley, 1978). Our specimens were captured in a single sample along Cayo Costa near Boca Grande Pass.

Brown hoplo, *Hoplosternum littorale* (Hancock, 1828) (FSBC 19483; n = 1; 124 mm SL; seine; 2.0 m; 27.1–27.4 C; 0.1‰; day; Sept.): The brown hoplo, a callichthyid armored catfish, is native to South America, where it is widespread east of the Andes and north of Buenos Aires (Reis, 1997). In Florida, it has been introduced in the St. Johns, Kissimmee, and Hillsborough river drainages, as well as in the Indian River Lagoon system (Nico et al., 1996; R. Ruiz-Carus, unpubl. data). This species is considered established in Florida, but its impact on native species is largely unknown. Blue crab (*Callinectes sapidus*) fishermen in Charlotte Harbor often report finding this species in their traps

after storms (R. Ruiz-Carus, pers. comm.). Our specimen was captured in the Peace River south of the Tamiami Trail (US 41).

Blotched cusk-eel, *Ophidion grayi* (Fowler, 1948) (FSBC 19368; n = 4; 62–85 mm SL; trawl; 3.9–4.6 m; 27.6–28.6 C; 32.2–34.9‰; dusk and night; May): As currently understood, blotched cusk-eels occur on the west Florida continental shelf and are widespread in the Gulf of Mexico and along the southeast Atlantic coast of the United States (Gilmore, 1977; Retzer, 1991; Darovec, 1995; McEachran and Fechhelm, 1998). This species is not abundant in inshore waters, but it has been collected in barrier island passes along the Gulf of Mexico coast of Alabama and in St. Andrew Bay in the Florida Panhandle (Ogren and Brusher, 1977; Boschung, 1992). Our specimens were collected just inside Boca Grande Pass and in central Charlotte Harbor near Cape Haze. Identifications of these specimens were on the basis of descriptions found in several publications (e.g., Robins and Ray, 1986; Hoese and Moore, 1998; McEachran and Fechhelm, 1998), but they must be considered tentative because the taxonomy of this group is currently being investigated.

Crested cusk-eel, *Ophidion josephi* Girard, 1858 (FSBC 19369; n = 30; 85–173 mm SL; trawl; 1.8–5.9 m; 22.9–27.6 C; 20.4–35.3‰; dawn, day, dusk, night; March, April, May, Oct.): As currently understood, crested cusk-eels occur on the west Florida continental shelf and are widespread in the Gulf of Mexico and along the southeastern Atlantic coast of the United States (Retzer, 1991; Darovec, 1995; McEachran and Fechhelm, 1998). This species is not abundant in inshore waters, but it has been collected inshore at various localities along the Atlantic and Gulf of Mexico coasts of the United States (Reid, 1954; Moe and Martin, 1965; Parker, 1965; Richmond, 1968; Tagatz, 1968; Ogren and Brusher, 1977; Cooley, 1978; Boschung, 1992; Baltz et al., 1993). The only previously known record of this species from the Charlotte Harbor area is that of Wang and Raney (1971) from somewhere between “Venice and Estero Island, including Charlotte Harbor.” Our specimens were collected in central and eastern Charlotte Harbor, Pine Island Sound, Gasparilla Sound, near the mouth of the Peace River, and near Boca Grande Pass. Identifications of these specimens were on the basis of descriptions found in several publications (e.g., Robins and Ray, 1986; Hoese and Moore, 1998; McEachran and Fechhelm,

1998), but they must be considered tentative because the taxonomy of this group is currently being investigated.

Hardhead silverside, *Atherinomorus stipes* (Müller & Troschel, 1848) (UF 54113; n = 3; marine; Sept.): Hardhead silversides occur in the western Atlantic from south Florida, the Bahamas, and the Yucatan to Brazil, including coastal waters of the eastern and southern Gulf of Mexico (Robins and Ray, 1986; McEachran and Fechhelm, 1998). This is a pelagic coastal species and is typically the most abundant coastal silverside within its range, especially in the West Indies (Randall, 1983; Robins and Ray, 1986). Lönnberg (1894) observed “a good many” hardhead silversides at Key West, the species was listed as “common” at Alligator Reef in the Florida Keys by Starck (1968), and Matheson et al. (1999) collected it in Florida Bay. The FMNH specimens were collected in eastern San Carlos Bay near Punta Rassa.

Mangrove rivulus, *Rivulus marmoratus* Poey, 1880 (n = 1; 22 mm SL; seine; 0.7 m; 27.3 C; 21.7‰; dusk; Oct.): The mangrove rivulus typically resides in mangrove swamps of the new world tropics and is a species of special concern in Florida (Taylor, 1988). *Rivulus marmoratus* is an opportunistic omnivore that normally inhabits temporal pools as well as the burrows of the great land crab, *Cardisoma guanhumi* (Taylor, 1992). It is rarely reported in Florida (e.g., Tabb and Manning, 1961; Lee et al., 1980; Taylor and Snelson, 1992), whereas along the Gulf of Mexico coast, most records are from south of Charlotte Harbor in Collier County (Taylor et al., 1995). Taylor (1993) reported a single specimen from Lemon Bay. The apparent scarcity of the mangrove rivulus throughout its range may be a collecting artifact rather than an accurate reflection of its abundance because standard sampling gear are ineffective in the microhabitats normally occupied by this species (Davis et al., 1990). Our specimen was collected along the mangroves near the mouth of the Myakka River.

Opossum pipefish, *Microphis brachyurus* (Bleeker, 1853) (UF 96985; n = 1; brackish; Aug.): Opossum pipefish (including four subspecies) are anadromous and occur in the Indian, western Pacific, and western Atlantic oceans (Gilmore and Gilbert, 1992; McEachran and Fechhelm, 1998). As currently understood, the western Atlantic populations are considered a separate subspecies, *Microphis brachyurus lineatus*, and occur in shallow water from New Jer-

sey to Brazil, including the Bahamas, the Caribbean Sea, and the Gulf of Mexico (McEachran and Fechhelm, 1998). They can be collected in freshwater or shallow coastal areas, where they are sometimes found in patches of floating sargassum (Robins and Ray, 1986). This species has been collected in the eastern Gulf of Mexico off Tampa Bay (Darovec, 1995). The FMNH specimen was collected in the Caloosahatchee River above the Alva Lock.

Bluespotted cornetfish, *Fistularia tabacaria* Linnaeus, 1758 (FSBC 19408; n = 1; 180 mm SL; seine; ≤ 1 m; 23.9 C; 35.5‰; day; April): Bluespotted cornetfish are found primarily in the southern Caribbean Sea, but they also occur elsewhere in the Caribbean, the Gulf of Mexico, and the tropical Atlantic (e.g., Christensen, 1965; Starck, 1968; Fritzsche, 1976). They are not considered common in any of these areas (Randall, 1983). Our specimen was collected in a seagrass bed near Captiva Pass.

Barred searobin, *Prionotus martis* Ginsburg, 1950 (UF 92851; n = 2; trawl; marine; Feb.): Barred searobins occur in the western Atlantic from northeast Florida south and along the west coast of Florida to offshore of Mobile Bay, Alabama (possibly west to Texas and Campeche, Mexico) (Robins and Ray, 1986; Boschung, 1992; Russell et al., 1992). In Florida, this species has been collected in various localities, including Pensacola Bay, Santa Rosa Sound, Cedar Key, in the eastern Gulf of Mexico off Tampa Bay and Charlotte Harbor, and in the western Atlantic off the Indian River Lagoon (Ginsburg, 1950; Reid, 1954; Lewis and Yerger, 1976; Gilmore, 1977; Cooley, 1978; Darovec, 1995). It is generally considered a shallow-water (20–45 m), continental shelf species, with larger individuals occurring in the deepest water. The FMNH specimens were collected in Captiva Pass.

Blackwing searobin, *Prionotus rubio* Jordan, 1886 (FSBC 19420, FSBC 19430, FSBC 19432; n = 33; 23–117 mm SL; trawl; 1.9–5.9 m; 17.3–30.5 C; 20.9–34.9‰; day, dusk, night; Jan.–March, May, Aug.–Dec.): Blackwing searobins occur in the western Atlantic from North Carolina to Cuba and in the Gulf of Mexico from Florida to Mexico (Russell et al., 1992; Cruz-Escalona et al., 2001). This species has been collected in bays as well as offshore to 212 m, but it is most common between 9 and 55 m (Ginsburg, 1950; Gilmore, 1977; Ogren and Brusher, 1977; Ross, 1983). Our specimens

were collected in central and eastern Charlotte Harbor as well as Pine Island Sound.

Whitespotted soapfish, *Rypticus maculatus* Holbrook, 1855 (FSBC 19422; n = 1; 108 mm SL; trawl; 5.5–7.0 m; 26.7–26.8 C; 30.3–30.8‰; day; Oct.): Whitespotted soapfish are found along the Atlantic coast of North America from Cape Hatteras, North Carolina to Jupiter Inlet, Florida, and in the Gulf of Mexico from Cape Sable, Florida northward (Christensen, 1965). They are mainly associated with hard bottoms in inlets and nearshore marine waters in the Gulf of Mexico (Smith, 1976, 1979; Hastings, 1979; Bortone et al., 1997). Courtenay (1967) reported that *R. maculatus* was most common between 27 and 91 m; however, it may prefer shallower (8–9 m) rocky ledges in the eastern Gulf of Mexico, where it has been collected in water as shallow as 1.5–3 m (Bullock and Smith, 1991). Given the habitat that this species is associated with, it is not generally susceptible to traditional gear-types and may be more common in our area than implied by previous literature and by our data. Our specimen was collected in Boca Grande Pass.

Pygmy sea bass, *Serraniculus pumilio* Ginsburg, 1952 (FSBC 19429; n = 76; 16–55 mm SL; seine, trawl; ≤ 5.3 m; 17.3–30.9 C; 12.9–37.6‰; dawn, day, dusk, night; Jan., March, May, Aug.–Dec.; UF 92840): Pygmy sea bass occur in the western Atlantic from North Carolina and the northern Gulf of Mexico to Venezuela, including near Puerto Rico (Hastings, 1973; Bullock and Smith, 1991). This species has been collected in the eastern Gulf of Mexico off Charlotte Harbor and is widely distributed on the western Florida continental shelf (Bullock and Smith, 1991). Our specimens were collected (often with sponges as bycatch) in the mouth of the Peace River, central Charlotte Harbor, northern Matlacha Pass, Pine Island Sound, Gasparilla Sound, and near Boca Grande Pass. The FMNH specimens were collected in Captiva Pass.

Bronze cardinalfish, *Astrapogon alutus* (Jordan & Gilbert, 1882) (FSBC 19473; n = 1; 18 mm SL; trawl; 2.5 m; 26.3–26.4 C; 34.9‰; dusk; May; UF 19525): Bronze cardinalfish occur in the western Atlantic from North Carolina and the northeast Gulf of Mexico to Venezuela, but they are absent from the Bahamas (Robins and Ray, 1986). This species has been collected from east-central Florida to Pensacola (type locality), including the eastern Gulf of Mexico off Charlotte Harbor (Starck, 1968; Smith,

1976; Gilmore et al., 1983; Boschung, 1992; Darovec, 1995). Our specimen was collected near Boca Grande Pass, and the FMNH specimens were collected in Placida.

Whitefin sharksucker, *Echeneis neucratoides* Zuiew, 1786 (FSBC 19452, FSBC 19459; n = 5; 145–242 mm SL; seines, trawl, gillnet; ≤ 2.5 m; 19.2–28.9 C; 25.2–35.9‰; day, night; March–June, Dec.): Whitefin sharksuckers inhabit coastal and offshore waters of the western Atlantic from Massachusetts to northern South America (Gilmore, 1977; Robins and Ray, 1986; Cervigón et al., 1993). Fowler (1945) listed this species from the general locality of “Boca Grande.” Although this study contains the first confirmed report of *E. neucratoides* from within Charlotte Harbor, the species may be more common in the area than implied by the literature because historically many authors did not distinguish it from *Echeneis naucrates* (Böhlke and Chaplin, 1993). Our specimens were collected in the Peace River, eastern and central Charlotte Harbor, and southern Pine Island Sound. The 155-mm-SL individual was collected with a lemon shark.

Horse-eye jack, *Caranx latus* Agassiz, 1831 (FSBC 18273, FSBC 19409; n = 9; 35–200 mm SL; seines; 0.1–2.5 m; 23.3–30.5 C; 20.2–34.8‰; day, dusk, night; May, June, Oct., Nov.): Horse-eye jacks occur in the western Atlantic from New Jersey to Brazil, including Bermuda and the Gulf of Mexico (Robins and Ray, 1986). This species is common along Florida’s east coast near the Indian River Lagoon, the Bahamas, the Florida Keys, and the Caribbean Sea (Starck, 1968; Gilmore, 1977; Randall, 1983), and is present, but less common, in the nearshore areas of the Gulf of Mexico (Boschung, 1992; Hoese and Moore, 1998). The only previously known record of this species from the Charlotte Harbor area is that of Wang and Raney (1971) from somewhere between “Venice and Estero Island, including Charlotte Harbor.” Our specimens were collected in eastern Charlotte Harbor, northern Pine Island Sound, and near Boca Grande Pass.

Spotfin mojarra, *Eucinostomus argenteus* Baird and Girard, 1855 (FSBC 19468; n = 1; 33 mm SL; seine; 1.0 m; 29.9 C; 31.6–31.8‰; day; Oct.): Spotfin mojarras have been reported from many localities in the western north Atlantic, but many of the records cannot be verified and may have been based on a congener, *Eucinostomus harengulus*, which is more abundant in inshore and estuarine waters—espe-

cially in Florida (Matheson, 1983; Matheson and McEachran, 1984). For this reason, we consider previous records of this species from Charlotte Harbor (e.g., Gunter and Hall, 1965; Wang and Raney, 1971; Fraser, 1997) to be questionable. As currently understood, this species ranges from New Jersey to southern Brazil, including both the Atlantic and gulf coasts of Florida (Matheson, 1983). Adult *E. argenteus* have been generally found on the continental shelf (Matheson and McEachran, 1984), and juveniles have been collected in estuaries during late summer or fall (R. E. Matheson Jr., unpubl. data). Our specimen was collected in Pine Island Sound north of Captiva Pass.

Slender mojarra, *Eucinostomus jonesii* (Günther, 1879) (FSBC 19470, FSBC 19515; n = 5; 29–52 mm SL; seine; ≤ 0.9 m; 20.7–31.4 C; 28.7–35.0‰; day; Jan., May, July, Nov.): Slender mojarras occur in the western north Atlantic from North Carolina to Brazil but are uncommon in the Gulf of Mexico, with rare individuals being recorded as far north in the eastern Gulf of Mexico as Lee County, Florida, and as far north in the western Gulf of Mexico as Cameron County, Texas (Matheson, 1983). This species is relatively common on the east coast of Florida. It is relatively uncommon in estuaries except near inlets. Because of the apparent rarity of this species on our coast and the taxonomic uncertainties that have historically surrounded members of this genus (Matheson and McEachran, 1984; Matheson and Gilmore, 1995), the absence of specimens from previous estuarine ichthyofaunal surveys in our area is not surprising. Our specimens were collected along beaches near Boca Grande and Gasparilla passes.

Sea bream, *Archosargus rhomboidalis* (Linnaeus, 1758) (FSBC 19407; n = 1; 158 mm SL; seine; 0.2–1.1 m; 21.5 C; 33.3‰; day; Dec.): Sea bream occur in the western Atlantic from New Jersey to Rio de Janeiro and are most abundant in the tropical parts of their range (Briggs, 1958; Vaughan, 1978). In Florida, most records are from south of Cape Canaveral to the Keys and Florida Bay (e.g., Starck, 1968; Gilmore, 1977; Sogard et al., 1989). Our specimen was collected in a seagrass bed in Pine Island Sound.

Littlehead porgy, *Calamus proridens* Jordan and Gilbert 1884 (FSBC 19425; n = 1; 41 mm SL; trawl; 2.1–2.2 m; 28.9 C; 32.1–32.2‰; day; June): Littlehead porgies occur along the At-

lantic and Gulf of Mexico coasts of Florida to about Louisiana, the Bay of Campeche, Mexico, and the Greater Antilles (Darcy, 1986; Robins and Ray, 1986). This is a shallow-reef species (found out to the middle shelf, including the Florida Middle Ground) that has been collected in the eastern Gulf of Mexico off Tampa Bay and Charlotte Harbor (Smith, 1976; Darovec, 1995; Hoese and Moore, 1998). This species has also been taken near offshore platforms and is often associated with sponges (Darcy, 1986). Our specimen was collected in Gasparilla Sound.

Atlantic threadfin, *Polydactylus octonemus* (Girard, 1858) (FSBC 19424; n = 1; 93 mm SL; seine; 1.0 m; 26.4 C; 21.1‰; day; May): Atlantic threadfins occur in the western Atlantic along the continental shelf from Massachusetts to Brazil, including the Gulf of Mexico (Dentzau and Chittenden, 1990; Hook, 1991). This species is sporadically abundant in the surf zone during the spring and summer and rarely occurs deeper than the inner shelf (Ogren and Brusher, 1977; Boschung, 1992; Hoese and Moore, 1998). In Florida, it has been reported in Santa Rosa Sound, Little Sabine Bay, Alligator Harbor, and the eastern Gulf of Mexico off Charlotte Harbor and Tampa Bay (Joseph and Yerger, 1956; Springer and Woodburn, 1960; Wang and Raney, 1971; Cooley, 1978; Darovec, 1995). Our specimen was collected in the Peace River.

Blue croaker, *Bairdiella batabana* (Poey, 1860) (FSBC 19054; n = 1; 102 mm SL; seine; 0.9 m; 28.2 C; 16.2‰; day; Oct.): Blue croakers are known in the western Atlantic from scattered localities in southern Florida, Mexico, Cuba, Puerto Rico, and the Virgin Islands (Robins and Tabb, 1965). The known distribution of this species may be patchy because of its habitat preferences, and it may have the broadest distribution in the Greater Antilles and along the Central American coast (Robins and Tabb, 1965). In Florida, this species has been listed as "occasional" at Alligator Reef by Starck (1968), and additional specimens have been collected in northwestern Florida Bay (n = 7; Tabb and Manning, 1961), in Buttonwood Canal near Flamingo (n = 4; Roessler, 1970), north of Cape Sable in Whitewater Bay (n = 1; Clark, 1971), and between Cape Sable and the Chatham River (n = 15; Lindall et al., 1973). Our specimen was collected in northern Pine Island Sound ca. 100 m from shore. To our knowledge, this is the first report of the blue croaker north of the Chatham River, ex-

tending its occurrence in the eastern Gulf of Mexico northward by ca. 56 km (30 nm).

Bermuda chub, *Kyphosus sectatrix* (Linnaeus, 1758) (FSBC 19426; n = 1; 122 mm SL; seine; ≤2.0 m; 23.2–24.0 C; 32.3–33.0‰; day; May; UF 206126): Bermuda chubs occur in the western Atlantic from Cape Cod and Bermuda to Brazil (Randall, 1983; Robins and Ray, 1986). They have been collected off eastern Florida and the northern coast of South America in shallow water over seagrass beds, sandy or rocky bottoms, and coral reefs (Gilmore, 1977; Cervigón et al., 1993). In the Bahamas, the young have also been collected from sargassum and patch reefs in water <5 m deep, whereas schools of larger individuals have been observed at greater depths (Böhlke and Chaplin, 1993). In the Gulf of Mexico, they have been collected in various localities, including Florida (Santa Rosa Sound, Tampa Bay, artificial reefs off Panhandle), Mississippi, and Texas (Dawson, 1963; Cooley, 1978; Bortone et al., 1997). Our specimen was collected in Captiva Pass, and the FMNH specimen was collected in eastern San Carlos Bay near Punta Rassa.

Sergeant major, *Abudefduf saxatilis* (Linnaeus, 1758) (UF 54114; n = 1; marine; Sept.): Sergeant majors occur in the western Atlantic from Rhode Island and the northern Gulf of Mexico to Uruguay (Robins and Ray, 1986). This species is found in a wide variety of habitats (e.g., reefs, grass beds, sandy bottom) and is considered one of the most common tropical fishes (Böhlke and Chaplin, 1993). The only previous record of this species from the Charlotte Harbor area is that of Wang and Raney (1971) from somewhere between "Venice and Estero Island, including Charlotte Harbor." The FMNH specimen was collected in eastern San Carlos Bay near Punta Rassa.

Zebratail blenny, *Hypleurochilus caudovittatus* Bath, 1994 (FSBC 19411, FSBC 19412; n = 3; 25–41 mm SL; trawl; 2.7–4.0 m; 20.9–31.3 C; 21.7–34.8‰; day; July, Aug., Dec.): Zebratail blennies are common in inlets of the near-shore Gulf of Mexico and are associated with hard bottoms along the west Florida coast (Smith, 1979; Bath, 1994). Bath (1994) examined the *Hypleurochilus geminatus* complex and recognized three species occurring in Florida: *H. geminatus* from the western Atlantic not including the Gulf of Mexico, *Hypleurochilus multifilis* from the northern Gulf of Mexico, and *H. caudovittatus* in the eastern Gulf of Mexico (Egmont Key, Tampa Bay). Our specimens

were collected in Gasparilla Sound, central Charlotte Harbor, and northern Matlacha Pass.

Emerald goby, *Ctenogobius smaragdus* (Valenciennes, 1837) (FSBC 19413, FSBC 19414, FSBC 19418, FSBC 19423; n = 13; 20–70 mm SL; seine; 0.3–1.2 m; 16.1–30.2 C; 10.5–35.5‰; dawn, day, night; March–May, Nov., Dec.): Emerald gobies occur in the western Atlantic from South Carolina to Brazil (absent from the West Indies except Cuba) including the Gulf of Mexico coast of Florida (Robins and Ray, 1986). This was the third most abundant brackish-water goby collected by Tabb and Manning (1961) in northern Florida Bay, and “numerous specimens” were reported by Henshall (1891) from the Marco area and Gordon Pass (both near Naples). Charlotte Harbor approximates the northern limit of the distribution of this species in the Gulf of Mexico (Gilbert and Randall, 1979), although it has been reliably reported at least as far north as Tampa Bay (Florida Marine Research Institute, 1997). This species is typically collected in stagnant, weedy backwaters, mangrove swamps, canals, and river mouths (Gilmore, 1977; Robins and Ray, 1986). Our specimens were associated with mangrove shorelines and seagrasses in central and eastern Charlotte Harbor.

Great barracuda, *Sphyaena barracuda* (Edwards, 1771) (FSBC 19428, FSBC 19446; n = 116; 54–474 mm SL; seines, gillnet; ≤ 2.5 m; 14.5–30.3 C; 9.9–37.8‰; day, dusk; Jan., March, April, June–Dec.): Great barracudas occur in the western Pacific, eastern Atlantic, and western Atlantic (deSilva, 1958). In the latter region, they occur from Massachusetts and Bermuda to southeastern Brazil and are widespread in the Gulf of Mexico. Juveniles are common in shallow bays and protected areas in the Bahamas and the Caribbean Sea (Böhlke and Chaplin, 1993; Cervigón et al., 1993). In Florida, this species has been collected from the Indian River Lagoon to the Panhandle and has been described as “very common” in the Tampa Bay area (e.g., Springer and Woodburn, 1960; Gilmore, 1977; Bortone et al., 1997). Most of our specimens were found in Gasparilla and Pine Island sounds but some were also collected in Turtle Bay, northern Matlacha Pass, and eastern Charlotte Harbor.

Southern sennet, *Sphyaena picudilla* Poey, 1860 (FSBC 19450; n = 47; 34–86 mm SL; seines; 0.2–1.2 m; 17.3–31.9 C; 8.3–37.2‰; dawn, day, night; Jan., March–July, Oct.–Nov.): Southern

sennets occur in the western Atlantic from Bermuda to Uruguay, including Florida and the Bahamas (Robins and Ray, 1986). This species can be very difficult to separate from *Sphyaena borealis*, and the two species may be synonymous (Robins and Ray, 1986; Hoese and Moore, 1998; Smith-Vaniz et al., 1999). It has been rarely reported in faunal surveys in Florida (e.g., Reid, 1954). Our specimens were collected in northern and central Matlacha Pass, Bull Bay, Pine Island Sound, Gasparilla Sound, and near Boca Grande Pass.

Gulf butterfish, *Peprilus burti* Fowler, 1944 (FSBC 19433, FSBC 19436; n = 3; 51–76 mm SL; trawl; 3.3–5.0 m; 18.4–25.8 C; 28.0–32.8‰; day; Feb., March, Nov.): Gulf butterfish occur throughout the Gulf of Mexico (Collette, 1963; Robins and Ray, 1986), but they are most abundant in the northern Gulf of Mexico south to Tampa Bay (Horn, 1970) or Sarasota (Caldwell, 1961). The range of this species may extend southward in response to cool temperatures in the northeastern Gulf of Mexico, and it has been hypothesized that some *P. burti* occasionally enter the Florida Current and are transported into the Atlantic, where hybridization with *Peprilus triacanthus* may occur (Perschbacher et al., 1979). Collette (1963) was the first to clearly demonstrate the distinctness of *P. triacanthus* and *P. burti*, and records of *P. triacanthus* from Charlotte Harbor (e.g., Wang and Raney, 1971; Fraser, 1997) and the Gulf of Mexico (e.g., Cooley, 1978) are referable to *P. burti* (Horn, 1970). Our specimens were collected in central Charlotte Harbor.

Harvestfish, *Peprilus paru* (Linnaeus, 1758) (FSBC 19405, FSBC 19416; n = 375; 43–193 mm SL; seine, trawl; 1.1–4.0 m; 13.5–30.4 C; 19.3–37.2‰; day; Jan.–Aug., Nov.–Dec.): Harvestfish occur in the western Atlantic from Chesapeake Bay to Argentina, including the Gulf of Mexico (Robins and Ray, 1986). In Florida, this species has been reported from various localities along both the Atlantic and gulf coasts, including the Gulf of Mexico off Charlotte Harbor (Springer, 1961; Moe and Martin, 1965; Tagatz, 1968; Gilmore, 1977; Cooley, 1978; Darovec, 1995). Our specimens were collected in upper Charlotte Harbor near the mouths of the Peace and Myakka rivers, near Alligator Creek, central Charlotte Harbor, northern Matlacha Pass, Pine Island Sound, Gasparilla Sound, and near Boca Grande Pass.

Twospot flounder, *Bothus robinsi* Topp and Hoff, 1972 (FSBC 19410; n = 1; 65 mm SL;

trawl; 3.3 m; 27.8–28.0 C; 34.7‰; day; May): Twospot flounder occur in the western Atlantic from New York and the northeastern Gulf of Mexico to Brazil (Robins and Ray, 1986). Off east Florida, this species has been collected over the open shelf and in inlets (Gilmore, 1977). Off west Florida, this species is common along the continental shelf off Tampa Bay and Charlotte Harbor at depths of 18–55 m and is rare in shallower water (Topp and Hoff, 1972; Darovec, 1995). Our specimen was collected in western Charlotte Harbor.

Bay whiff, *Citharichthys spilopterus* Günther, 1862 (UF 92831; n = 1): Bay whiffs occur in the western Atlantic from New Jersey, the northern Gulf of Mexico, and Antilles to Brazil (Robins and Ray, 1986). This species is found in in-shore waters to depths of 73 m, but it is rarely taken at depths exceeding 55 m in the Gulf of Mexico (Hoese and Moore, 1998). The bay whiff typically moves into bays and the shallow Gulf of Mexico during the warmer months of the year (Tagatz, 1968; Cooley, 1978; Hoese and Moore, 1998), but it has been taken in some bays during all seasons (Christensen, 1965; Parker, 1965; Baltz et al., 1993). Specimens have been collected on seagrass flats and sand bottom as well as in canals, river mouths, and freshwater tributaries associated with the Indian River Lagoon (Gilmore, 1977). The FMNH specimen was collected in Captiva Pass.

Dusky flounder, *Syacium papillosum* (Linnaeus, 1758) (FSBC 19406, FSBC 19415; n = 2; 192 and 197 mm SL; trawl; 4.0–5.7 m; 26.0–27.6 C; 22.5–34.9‰; night; May, Oct.): Dusky flounder occur in the western Atlantic from North Carolina to Brazil, including the entire Gulf of Mexico (Robins and Ray, 1986). Off east Florida, this species has been collected “frequently” over the open shelf near the Indian River Lagoon (Gilmore, 1977). Off west Florida, this flatfish is very common along the continental shelf near Tampa Bay and Charlotte Harbor in 18–91 m of water and is rare in shallower water (Moe and Martin, 1965; Topp and Hoff, 1972; Darovec, 1995). This species associates with calcareous substrates (including reefs), and the largest individuals are more common in deeper water (Starck, 1968; Topp and Hoff, 1972). Our specimens were collected in western Charlotte Harbor.

Naked sole, *Gymnachirus melas* Nichols, 1916 (FSBC 19434, FSBC 19463; n = 4; 35–97 mm SL; trawl; 1.7–4.8 m; 23.7–31.5 C; 28.9–35.3‰; day, dusk, night; April, May, July, Sept.): Naked

sole occur in the western Atlantic from Massachusetts to south Florida and the Bahamas, including the northern and eastern Gulf of Mexico (Robins and Ray, 1986). In Florida, this species has been collected over the open shelf near the Indian River Lagoon, in the eastern Gulf of Mexico off Charlotte Harbor in 18–91 m of water, in Santa Rosa Sound, and in St. Andrew Bay (Topp and Hoff, 1972; Gilmore, 1977; Ogren and Brusher, 1977; Cooley, 1978; Darovec, 1995). Our specimens were collected in Gasparilla Sound and western Charlotte Harbor.

Trunkfish, *Lactophrys trigonus* (Linnaeus, 1758) (FSBC 19431; n = 4; 80–122 mm SL; trawl, seine; 1.1–3.0 m; 18.0–28.2 C; 26.6–37.5‰; day; May, Sept., Nov.): Trunkfish occur in the western Atlantic from Massachusetts to Brazil, including the Gulf of Mexico (Robins and Ray, 1986). This species is typically found in clear waters of reefs and seagrass beds to a depth of 50 m (Joseph and Yerger, 1956; Starck, 1968; Boschung, 1992). Our specimens were collected over sand substrates and seagrasses in Pine Island and Gasparilla sounds.

Smooth puffer, *Lagocephalus laevis* (Linnaeus, 1766) (FSBC 19464; n = 2; 59 and 305 mm SL; trawl, seine; 0.5–2.4 m; 23.8–28.4 C; 26.8–27.6‰; dawn, day; May, Nov.): Smooth puffers are typically pelagic and are found in the Atlantic Ocean, Caribbean Sea, and the Gulf of Mexico (Robins and Ray, 1986). Off east Florida, they have been collected in neritic, off-shore-reef, and inlet habitats (Gilmore, 1977). In the Gulf of Mexico, they have been reported along the inner and middle continental shelf (e.g., off Tampa Bay) and occasionally from high-salinity portions of bays (Springer and Woodburn, 1960; Ogren and Brusher, 1977; Cooley, 1978; Hook, 1991; Boschung, 1992; Darovec, 1995; Hoese and Moore, 1998). Our specimens were collected in northern Matlacha Pass.

Balloonfish, *Diodon holocanthus* Linnaeus, 1758 (FSBC 19437; n = 1; 90 mm SL; trawl; 1.8–2.1 m; 28.3 C; 35.0–35.1‰; day; June): Balloonfish are circumtropical and use a wide variety of habitats (Briggs, 1958; Leis, 1978; Böhlke and Chaplin, 1993). In the Bahamas and the Caribbean Sea, this species is commonly found in <7 m of water near small patch reefs or in mangrove-lined tidal creeks (Randall, 1983; Böhlke and Chaplin, 1993). In Florida, specimens have been collected near Jupiter Inlet, Alligator Reef, and Tampa Bay (Springer and

Woodburn, 1960; Christensen, 1965; Moe and Martin, 1965; Starck, 1968). Our specimen was collected associated with seagrasses and sponges in Gasparilla Sound.

Erroneous and questionable records from the literature.—Smooth hammerhead, *Sphyrna zygaena* (Linnaeus, 1758): Fowler (1915) and Storey and Gudger (1936) listed this species from Charlotte Harbor, and Fowler (1926, 1945) listed it from the eastern Gulf of Mexico, but as currently understood, this species is not known from the Gulf of Mexico (Gilbert, 1967; Castro, 1983; McEachran and Fehhelm, 1998). This species has been described as having an amphitemperate and tropical range (Compagno, 1984), but it may be primarily temperate in distribution (Castro, 1983; Smale, 1991). In Florida, the smooth hammerhead has been found on the east coast and in extreme southern parts of the state (Compagno, 1984). Springer (1941) was the first author to clearly demonstrate the distinctness of *S. zygaena* and *Sphyrna lewini*, the latter of which is common in the Gulf of Mexico. Historical records of *S. zygaena* from the Gulf of Mexico refer to *S. lewini*.

Orangespot sardine, *Sardinella brasiliensis* (Steindachner, 1879): Hildebrand (1963) and Fraser (1997) listed this species from Charlotte Harbor. Orangespot sardines were thought to occur in the entire Gulf of Mexico and southeast Florida to Uruguay (e.g., Robins and Ray, 1986; Boschung, 1992), but recent genetic studies present evidence that *S. brasiliensis* and *Sardinella aurita* are conspecific in our area (Wilson and Alberdi, 1991; Tringali and Wilson, 1993; Nelson et al., 2004).

Redeye chub, *Notropis harperi* Fowler, 1941: Fowler (1945) listed this species from Charlotte Harbor. It occurs below the Fall Line in Atlantic- and Gulf-Slope drainages from the Altamaha River, Georgia, to the Escambia River drainage, Alabama, and south in Florida to the St. Johns and Withlacoochee River drainages (Tagatz, 1968; Lee et al., 1980; Page and Burr, 1991), which are well north of our study area. The Fowler (1945) specimens from Punta Gorda have been reidentified as *Notropis petersoni* (M. Sabaj, pers. comm.).

Speckled madtom, *Noturus leptacanthus* Jordan, 1877: Fowler (1945) and Gunter and Hall (1965) listed this species from Charlotte Harbor. Each record was based on a single specimen. This species is widespread in Atlantic- and Gulf-Slope drainages of the southeastern

United States but probably occurs no farther south in Florida than the upper St. Johns River drainage on the east coast and the Suwannee River drainage on the west coast (Taylor, 1969; Lee et al., 1980; Page and Burr, 1991). Taylor (1969) examined the Fowler (1945) specimen and reidentified it as *Noturus gyrinus*. He also tentatively includes the Gunter and Hall (1965) record in the synonymy of *Noturus gyrinus*.

Oyster toadfish, *Opsanus tau* (Linnaeus, 1766): Henshall (1891) and Storey and Gudger (1936) listed this species from Charlotte Harbor. After publication of these works, however, Schultz and Reid (1937) elevated the Gulf of Mexico subspecies, *Opsanus tau beta*, to specific status. As currently understood, *O. tau* occurs only along the Atlantic coast of Florida (south as far as Miami in cold years), and *O. beta* occurs along the Gulf of Mexico coast (Schultz and Reid, 1937; Robins and Ray, 1986).

Mummichog, *Fundulus heteroclitis* (Linnaeus, 1766): Henshall (1891) listed this species from Charlotte Harbor and several other south Florida localities. This species occurs from the Gulf of St. Lawrence to northeast Florida (Tagatz, 1968; Hardy, 1978). Kushlan and Lodge (1974) questioned the occurrence of this species in south Florida. Henshall's records were probably based on misidentifications of *Fundulus grandis* or *Fundulus confluentus*.

Black grouper, *Mycteroperca bonaci* (Poey, 1860): This species was listed by Storey and Gudger (1936) from Charlotte Harbor, by Storey (1937) from Sanibel, and by Fowler (1945) from Boca Grande. It occurs in the western Atlantic, including the Gulf of Mexico, but is not common off west Florida (Gilmore, 1977; Bullock and Smith, 1991). Juvenile *M. bonaci* have been captured in estuaries and on nearshore reefs, but many records from west Florida are probably of the gag, *Mycteroperca microlepis*, which is also called the "black grouper" in this region.

Banded sunfish, *Enneacanthus obesus* (Girard, 1854): Henshall (1891) listed this species from Charlotte Harbor. Recent authors indicate that it occurs in the western Atlantic from southern New Hampshire only as far south as central Florida (Tagatz, 1968; Lee et al., 1980; Page and Burr, 1991). *Enneacanthus gloriosus*, which can be difficult to separate from *E. obesus* (Jenkins and Burkhead, 1994), does occur in the Charlotte Harbor area (Lee et al., 1980), and

we believe that Henshall's record of *E. obesus* is probably based on a misidentification of *E. gloriosus*.

Redbreast sunfish, *Lepomis auritus* (Linnaeus, 1758): Fowler (1945) listed this species from Charlotte Harbor. It is native to the Atlantic and gulf slopes from New Brunswick, Canada, south to central Florida, but it has been widely introduced elsewhere (Lee et al., 1980; Boschung, 1992; Jenkins and Burkhead, 1994). In Florida, the present range of this species extends only as far south as the Tampa Bay drainage (Barnett, 1972; Lee et al., 1980). The Fowler (1945) record is a single faded juvenile (45 mm SL) and is either *Lepomis marginatus* or *Lepomis punctatus*—both of which have been collected in Charlotte Harbor. The specimen is certainly not *L. auritus* (M. Sabaj, pers. comm.).

Brown darter, *Etheostoma edwini* (Hubbs and Cannon, 1935): Fowler (1945) listed this species from Charlotte Harbor. It occurs in southern Georgia, Alabama, and into peninsular Florida as far south as the drainages of the St. Johns and Suwannee rivers, but a similar species, *Etheostoma fusiforme*, is found over most of the Florida peninsula, including the Charlotte Harbor area (Collette, 1962; Lee et al., 1980; Page and Burr, 1991). The Fowler (1945) record is a single specimen that has been reidentified as *Etheostoma fusiforme barratti* (M. Sabaj, pers. comm.).

Seaboard goby, *Gobiosoma ginsburgi* Hildebrand and Schroeder, 1928: Fraser (1997) listed this species from Charlotte Harbor, but other authors indicate that it is known only from the Atlantic coast of the United States, rarely as far south as southern Florida (Christensen, 1965; Dawson, 1966). A similar species, *Gobiosoma longipala*, is known from the gulf coast of Florida, including Charlotte Harbor (Gunter and Hall, 1965; this study). Fraser's (1997) specimen could not be located and may have been destroyed (T. H. Fraser, pers. comm.). We believe that this record is probably based on a misidentification of *G. longipala*.

Fourspot flounder, *Paralichthys oblongus* (Mitchill, 1815): Wang and Raney (1971) listed this species from Charlotte Harbor. It occurs in the western Atlantic from Georges Bank to south Florida; however, it is known to reside in progressively deeper water farther south in its range (to over 275 m; Robins and Ray, 1986). This record may have actually been that of an

other bothid with four ocelli, the ocellated flounder, *Ancylosetta quadrocellata*, which is known from Charlotte Harbor (Fraser, 1997; this study).

CONCLUSIONS

An additional 39 fish species have been recorded during FIM sampling or were found among collections at the FMNH, bringing the total number of species documented from within the Charlotte Harbor estuarine system to 255 (Table 2). The diversity of the ichthyofauna from the estuary can be attributed, at least in part, to the location of Florida in a climatic transition zone that can accommodate both temperate and tropical species (Comp and Seaman, 1985). Some of these new records could be attributable to strays from more suitable environments (e.g., continental shelf), some of the species are not easily collected by standard collecting techniques, one is a newly documented nonindigenous species, and some were probably encountered for the first time in this study because of the large number of collections (ca. 15,000) and the diversity of habitats sampled.

To date, the FIM program represents the most comprehensive collecting effort directed at the Charlotte Harbor ichthyofauna. Nevertheless, some species (e.g., large active species and small cryptic species) and some habitats (highly structured habitats such as rocky inlets) are not adequately sampled. Sampling efforts specifically directed at these types of species and habitats will be necessary to fully document the role that the Charlotte Harbor estuarine system plays in the life histories and population dynamics of Florida's coastal fishes.

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