
Distribution and Abundance of Fishes and Invertebrates in Central Gulf of Mexico Estuaries

Project Team

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Introduction

This report presents information on the spatial and temporal distribution, relative abundance, and life history characteristics of 43 fish and invertebrate species in nine estuaries along the Gulf coast of Louisiana and Mississippi. Its purpose is to disseminate data developed in the National Oceanic and Atmospheric Administration's (NOAA) *Estuarine Living Marine Resources* (ELMR) program (inside front cover), a joint study by the National Ocean Service (NOS) and National Marine Fisheries Service (NMFS). The presence, distribution, and relative abundance of each species' life history stage, and the time period it utilizes each estuary, are shown. The data and framework presented are illustrative of the nationwide ELMR program. Similar reports have been published for nine estuaries in Texas (Monaco et al. 1989), and thirteen estuaries along the Gulf coast of Florida and Alabama (Williams et al. 1990).

The objective of the ELMR program is to develop a consistent data base on the distribution, abundance, and life history characteristics of important fishes and invertebrates in the Nation's estuaries. The Nationwide data base is divided into four study regions (Figure 1). The data base contains the relative abundance and monthly occurrence of each species' life stage by estuary for three salinity zones (seawater, mixing, and tidal fresh) identified in NOAA's *National Estuarine Inventory (NEI) Data Atlas-Volume I* (NOAA 1985). When completed, the entire data base will contain information for ca. 150 fish and invertebrate species found in ca. 120 U. S. estuaries.

Study Rationale

Estuaries are among the most productive natural systems (Mann 1982, Odum and Heald 1975) and are critical to many living resources (Gunter 1967, Weinstein 1979). Estuaries are important nursery areas that provide food, refuge from predation, and valuable habitat for many species (Joseph 1973). Estuarine organisms that support important commercial and recreational fisheries include sciaenids, crabs, and shrimp. In spite of the well-documented importance of estuaries to fish and invertebrate populations, few consistent and comprehensive data bases exist which allow examinations of the relationships of many estuarine species found in or among groups of estuaries. Much of the distribution and abundance information for estuarine-dependent species (i.e. require estuaries during their life cycle) is primarily for the offshore life stages and does not adequately describe estuarine distributions (Darnell et al. 1983, NOAA 1988).

Only a few comprehensive sampling programs (e.g., States of Louisiana and Texas) collect fishes and invertebrates with identical methods across groups of estuaries within a region (Barret et al. 1978; Hammerschmidt and McEachron 1986). Most of the existing estuarine fisheries data cannot be compared among estuaries because of the variability in sampling strategies. In addition, existing research programs do not focus on how groups of estuaries may be important for regional management of fishery resources. Most existing comprehensive estuarine data are for a relatively few important commercial and recreational species.

Figure 1. ELMR study regions and regional research labs.



Since life stages of many species use both estuarine and marine habitats, information on distribution, abundance, temporal utilization, and life history characteristics are needed to understand the coupling of estuaries and nearshore/offshore areas. To date, a national, comprehensive, and consistent data base of this type does not exist. Consequently, there is a need to develop a program which integrates the disparate information on marine and estuarine species and their associated habitats into a useful, comprehensive, and consistent data base. The ELMR program was designed to help fulfill this need by developing a uniform nationwide data base on selected estuarine species. Results will complement NOAA efforts to have a national estuarine assessment capability (NOAA 1985) and also oceanic fishery sampling programs (Sherman and Alexander 1985). Compiling this information also identifies information gaps and assesses the content and quality of existing estuarine fisheries data.

Data Collection and Organization

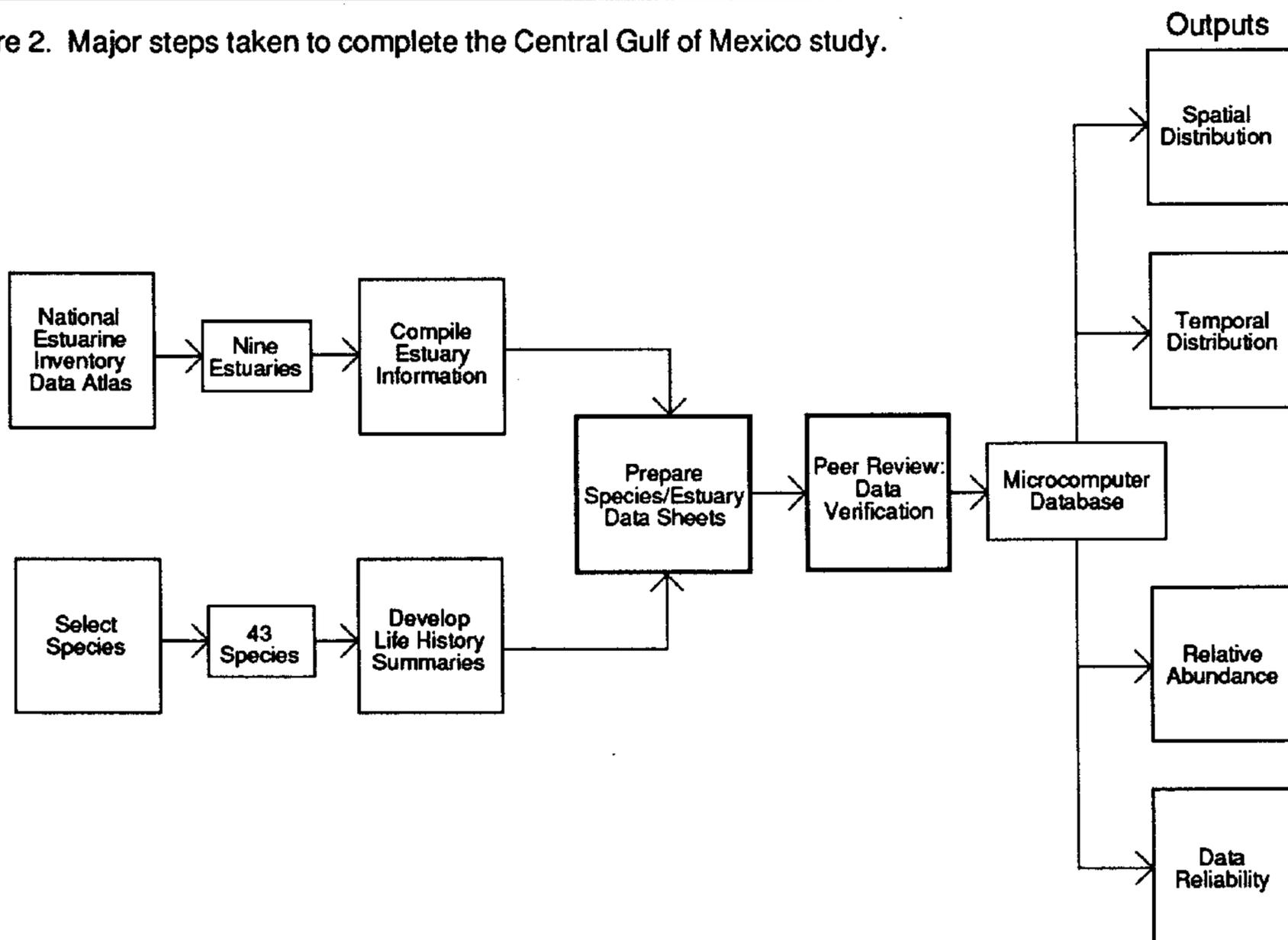
Figure 2 summarizes the major steps taken to collect and organize information on the distribution and abundance of fishes and invertebrates in Central Gulf of Mexico estuaries. The initial steps were selection of the estuaries and species to be studied.

Selection of Estuaries. Estuaries in the Central Gulf of Mexico were initially selected from the *National Estuarine Inventory (NEI) Data Atlas - Volume 1* (NOAA 1985) and NEI Supplement 3 (Shirzad et al. 1989). The nine estuaries (Figure 3) selected for the Central Gulf of Mexico are:

1. Mississippi Sound
2. Lake Borgne
3. Lake Pontchartrain
4. Breton/Chandeleur Sounds
5. Mississippi River
6. Barataria Bay
7. Terrebonne/Timbalier Bays
8. Atchafalaya/Vermilion Bays
9. Calcasieu Lake

Data on spatial and temporal distributions of species were developed and organized based on the tidal fresh (0.0 to 0.5 parts per thousand (ppt)), mixing (0.5 to 25.0 ppt), and seawater (>25.0 ppt) zones delineated for each estuary in the NEI. Not all salinity zones are represented in each estuary of the Central Gulf of Mexico (Figure 3). The lack of seawater zones in some estuaries is primarily due to freshwater inflow from the Mississippi and Atchafalaya Rivers. A representative map (Barataria Bay) from the NEI Supplement 3 (Shirzad et al. 1989) is shown in Appendix 1.

Figure 2. Major steps taken to complete the Central Gulf of Mexico study.



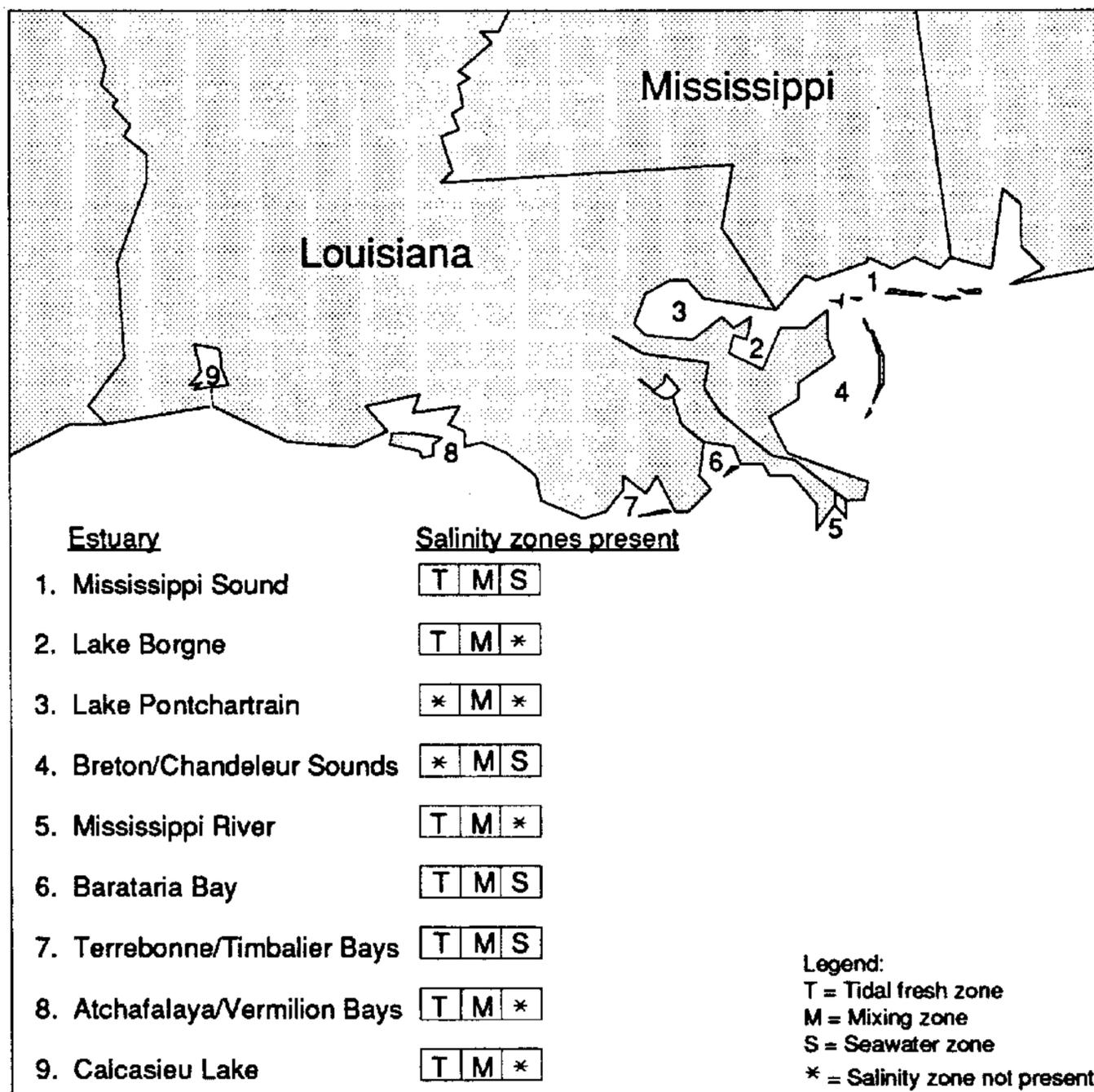
Compiling consistent data nationwide limits the amount of information that may be compiled for each species and estuary. Also, it would be time and cost prohibitive to map each species by life stage for each estuary (Monaco 1986). This framework enables a consistent compilation and organization of available information on the distribution of fishes and invertebrates in estuaries.

Although necessary for this study, the NEI Data Atlas (NOAA 1985) does not contain sufficient information on some physical parameters that affect species distributions. Additional information was compiled on geological history, bottom type, water temperature, tidal and freshwater circulation, and water quality to help understand the reported distribution of organisms. These additional data helped filter out seasonal anomalies and reports of unusual species distributions. Therefore, the information developed represents a species usual spatial and temporal distributions.

Selection of Species. Four criteria were used to identify 43 species that had enough available information for inclusion in the ELMR data base. The four criteria were:

- 1) *Commercial value* - determined by review of catch data and value statistics from NMFS and state agencies (e.g., Gulf menhaden, *Brevoortia patronus*, and shrimp, *Penaeus* species)
- 2) *Recreational value* - defined as a species that recreational fishermen specifically try to catch that may or may not be of commercial importance. Recreational species were determined by consulting regional experts and NMFS reports, e.g., spotted seatrout, *Cynoscion nebulosus*, and red drum, *Sciaenops ocellatus*.
- 3) *Indicator species of environmental stress* - identified from the literature, discussions with fisheries experts, and from monitoring programs such as NOAA's National Status and Trends Program (NOAA 1984). These species (e.g., American oyster,

Figure 3. ELMR Central Gulf of Mexico estuaries and associated salinity zones.



Crassostrea virginica, and Atlantic croaker, *Micropogonias undulatus*) are molluscs or bottom fishes that consume benthic invertebrates or have a strong association with bottom sediments. Their physiological disorders, morphological abnormalities, and bioaccumulation of contaminants, such as heavy metals, indicate episodes of environmental pollution and/or stress.

4) *Ecological value* - based on several attributes, including trophic level, relative abundance, and evidence of its importance as a key predator or prey species, e.g., bay anchovy, *Anchoa mitchilli*.

Table 1. ELMR species list for the central Gulf of Mexico

Scientific name	Common name
<i>Argopecten irradians</i>	bay scallop
<i>Crassostrea virginica</i>	American oyster
<i>Rangia cuneata</i>	common rangia
<i>Mercenaria</i> species	hard clam
<i>Lolliguncula brevis</i>	bay squid
<i>Penaeus aztecus</i>	brown shrimp
<i>Penaeus duorarum</i>	pink shrimp
<i>Penaeus setiferus</i>	white shrimp
<i>Palaemonetes pugio</i>	grass shrimp*
<i>Panulirus argus</i>	spiny lobster
<i>Menippe adina</i>	gulf stone crab
<i>Callinectes sapidus</i>	blue crab
<i>Carcharhinus leucas</i>	bull shark
<i>Megalops atlanticus</i>	tarpon
<i>Alosa alabamae</i>	Alabama shad
<i>Brevoortia patronus</i>	gulf menhaden
<i>Brevoortia smithii</i>	yellowfin menhaden
<i>Dorosoma cepedianum</i>	gizzard shad
<i>Anchoa mitchilli</i>	bay anchovy
<i>Arius felis</i>	hardhead catfish
<i>Cyprinodon variegatus</i>	sheepshead minnow
<i>Fundulus grandis</i>	gulf killifish
<i>Menidia</i> species	Atlantic silversides
<i>Centropomus undecimalis</i>	snook
<i>Pomatomus saltatrix</i>	bluefish
<i>Caranx crysos</i>	blue runner
<i>Caranx hippos</i>	crevalle jack
<i>Trachinotus carolinus</i>	Florida pompano
<i>Lutjanus griseus</i>	gray snapper
<i>Archosargus probatocephalus</i>	sheepshead
<i>Lagodon rhomboides</i>	pinfish
<i>Bairdiella chrysoura</i>	silver perch
<i>Cynoscion arenarius</i>	sand seatrout
<i>Cynoscion nebulosus</i>	spotted seatrout
<i>Leiostomus xanthurus</i>	spot
<i>Micropogonias undulatus</i>	Atlantic croaker
<i>Pogonias cromis</i>	black drum
<i>Sciaenops ocellatus</i>	red drum
<i>Mugil cephalus</i>	striped mullet
<i>Gobiosoma robustum</i>	code goby
<i>Scomberomorus maculatus</i>	spanish mackerel
<i>Paralichthys albigutta</i>	gulf flounder
<i>Paralichthys lethostigma</i>	southern flounder

*daggerblade grass shrimp

Species Life History Summaries. A concise life history summary was written for each species to provide an overview of how and when species use estuaries and what specific habitats they use. The summaries feature species-specific life history characteristics that relate directly to estuarine spatial and temporal distribution and abundance (e.g., many molluscs have particular salinity and substrate preferences). The summaries emphasize estuarine ecology, *in situ* salinity and temperature ranges vital to each species, and life history information for estuarine-dependent life stages. Information for the species life history summaries was gathered primarily from published and unpublished literature. Life history summaries for the Gulf of Mexico will be available as a separate publication (Pattillo et al., in prep.). Examples are included in the Texas and Eastern Gulf of Mexico reports (Monaco et al. 1989; Williams et al. 1990).

Data Sheets. A data sheet was developed for each species in each estuary to enable quick data compilation and presentation. Figure 4 shows the data sheet for bay anchovy, *Anchoa mitchilli* in Barataria Bay. Data sheets were developed by project staff and reviewed by local experts. Data compiled for each species/ life stage included: 1) the salinity zone it occupies (seawater, mixing, or tidal fresh); 2) its monthly distribution in those zones; and 3) its relative abundance in the zones. The ELMR data sheets were entered into a microcomputer data base management system.

The relative abundance of a species was classified using the following categories:

- **Not present:** species or life stage not found, questionable data as to identification of species, and/or recent loss of habitat or environmental degradation suggests absence.
- **No information available:** no existing data available, and after expert review it was determined that even an educated guess would not be appropriate.
- **Rare:** species is present but not frequently encountered.
- **Common:** species is generally encountered but not in large numbers; does not imply an even distribution over a specific salinity zone.
- **Abundant:** species is often encountered in substantial numbers relative to other species.

- **Highly abundant:** species is numerically dominant relative to other species.

Adults were defined as reproductively mature individuals, juveniles as immature but otherwise similar to adults, and spawning adults as those releasing eggs and sperm. There were a few exceptions to these defined life stages, such as parturition (livebearing) in bull shark (*Carcharhinus leucas*), and mating in crabs.

For well-studied species such as shrimp, quantitative data were used to estimate abundance levels. For many species, however, reliable quantitative data were limited. Therefore, regional and local experts

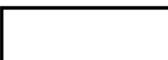
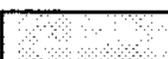
were consulted to estimate relative abundance based on the above criteria. These data represent species relative abundance levels within a specific estuary. Relative abundance levels across a suite of estuaries in the Central Gulf of Mexico have not been determined.

Data Verification. Approximately two years were required to develop the 396 data sheets (Figure 4) and consult with regional and local experts. Each data sheet was reviewed during consultations or by mail. These consultations complemented the published and unpublished literature and data sets compiled by NOAA. Eighteen scientists and managers at eleven institutions or agencies were

Figure 4. Example of a species/estuary data sheet: bay anchovy in Barataria Bay.

Scientific name:	<i>Anchoa mitchilli</i>	Region:	Central Gulf of Mexico
Common name:	Bay anchovy	State:	Louisiana
Estuary name:	Barataria Bay	Investigator:	T. E. Czapla / reviewed

Salinity zone	Life stage	Relative abundance by month												R
		J	F	M	A	M	J	J	A	S	O	N	D	
Tidal fresh 0.0 - 0.5 ppt	Adults	Common												2
	Spawning	Not Present												2
	Juveniles	Common												2
	Larvae	Not Present												2
	Eggs	Not Present												2
Mixing 0.5 - 25.0 ppt	Adults	Abundant												1
	Spawning	Not Present		Abundant								Not Present		1
	Juveniles	Not Present		Abundant								Not Present		1
	Larvae	Not Present		Abundant								Not Present		1
	Eggs	Not Present		Abundant								Not Present		1
Seawater >25.0 ppt	Adults	Not Present		Abundant				Abundant				Not Present		1
	Spawning	Not Present		Abundant								Not Present		1
	Juveniles	Not Present		Abundant								Not Present		1
	Larvae	Not Present		Common		Abundant				Common		Not Present		1
	Eggs	Not Present		Abundant								Not Present		1

Legend:	Relative Abundance:	Data Reliability (R):
	 = Not Present	1 = Highly Certain
	 = Rare	2 = Moderately Certain
	 = Common	3 = Reasonable Inference
	 = Abundant	
	 = Highly Abundant	

consulted. Local experts were especially helpful in providing estuary/species-specific information. They also provided additional references and contacts, and identified additional species to be included in the ELMR data base. The names and affiliations of these experts are listed in Appendix 3.

The Louisiana Department of Fish and Wildlife (LDFW) served as a primary source of data and reviewers of the data sheets because of their extensive estuarine fishery data base and knowledge. Additional consultation and review was provided by experts from colleges and universities with estuarine research and academic programs.

Results

Data Summaries. The information compiled for each species and estuary (387 data sheets) was organized in three data summaries (pp. 17-56). Tables 2 and 3 provide graphic presentations of the spatial and temporal distributions and relative abundance by life stage for each species by estuary. The information shown represents the usual distribution of a species in a particular estuary. Table 4 ranks the relative reliability of the information presented for each species and estuary.

Spatial distribution and relative abundance. Table 2 (pp. 19-26) summarizes the distribution and relative abundance for each species by life stage and each estuary by salinity zone. The highest level of abundance during the year in each estuary is depicted.

Temporal distribution. Table 3 (pp. 27-48) summarizes the temporal distribution of each species by month and life stage for each estuary. This table combines data over the three salinity zones, showing the highest level of abundance for a particular life stage by month.

Seasonal Comparisons. To examine seasonal trends, the numbers of species ranked as "common" or greater were counted for each life stage by month and by salinity zone (Figures 5, 6 and 7). In Figure 5, the number of species was averaged across estuaries and plotted by month. In Figure 6, the number of species was averaged across months and within seasons, allowing a comparison of estuaries. The seawater zone is not represented because less than half of the central Gulf of Mexico estuaries had this zone present. Although not a statistical analysis of abundances, these summaries do provide insights into the seasonal distribution of selected species in these estuaries:

- Fewer species utilize the Central Gulf of Mexico

estuaries during the winter than during any other season. Estuarine utilization by all life stages is highest in the summer and fall (Figures 5 and 6).

- Juveniles and adults utilize the estuaries more than any other life stages (Figures 5 and 6).

- Spawning is important during the spring and summer in the tidal fresh and during the spring and fall in the mixing zone. The summer season supports the greatest number of juveniles and adults in many of these estuaries (Figures 5 and 6).

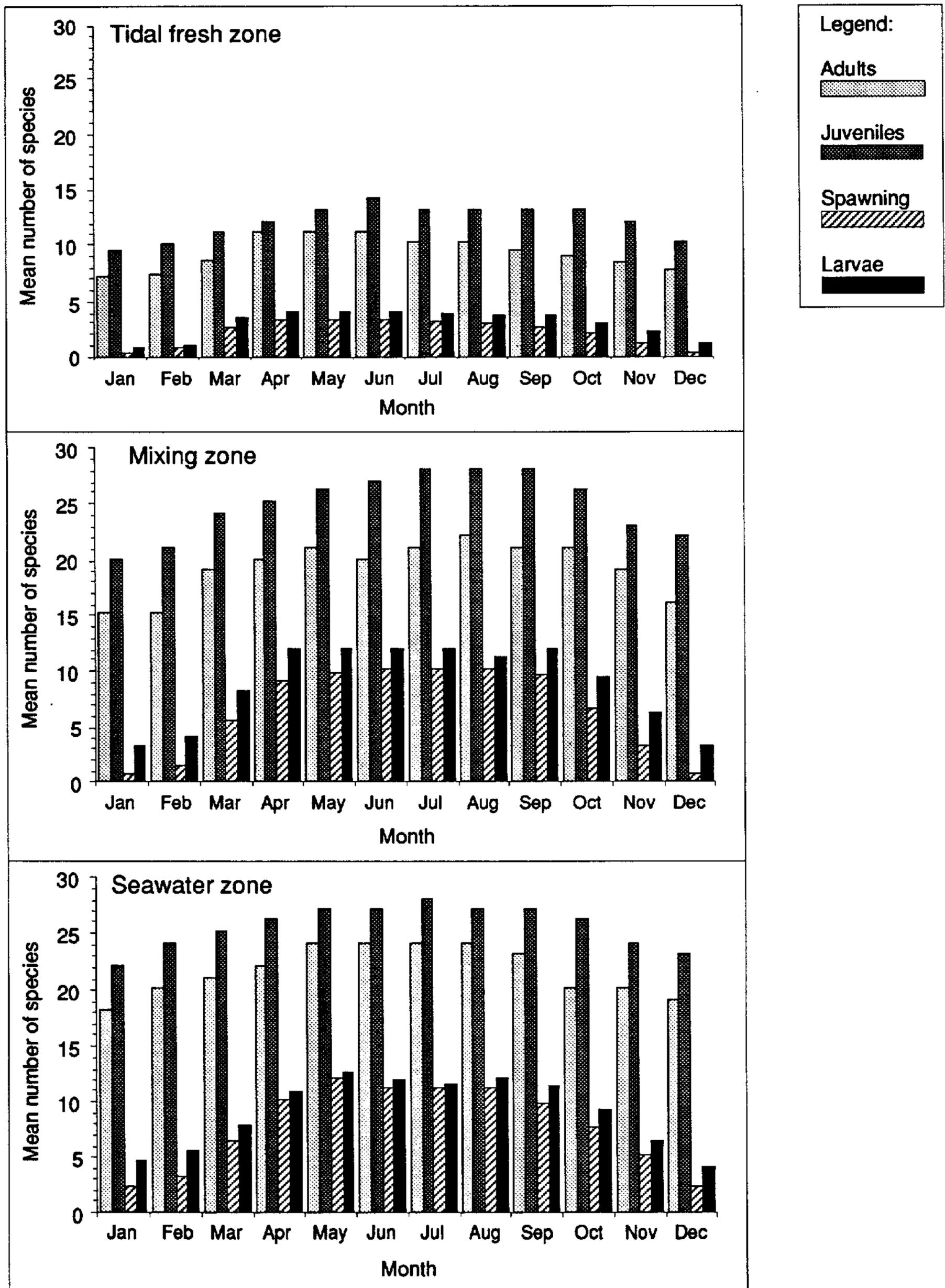
- Although larvae are present throughout the year, the number of species with larvae is fairly consistent from April to September for all salinity zones. Minor peaks occur in April in the tidal fresh zone, May in the seawater zone, and September in the mixing zone (Figure 7).

- The Mississippi River appears to have fewer species than the other estuaries (Figure 6). However, this is the only true riverine system in the Central Gulf of Mexico, and its riverine fauna is probably not well represented by the ELMR species list.

Quantitative Abundances. Louisiana is one of the few states with an ongoing comprehensive fish monitoring program in coastal estuaries. The Louisiana Department of Wildlife and Fisheries began its program in the early 1970's and has continually expanded it. The state of Mississippi has a similar ongoing monitoring program for Mississippi Sound, also initiated in the early 1970's. Both monitoring programs use bag seine, otter trawl, plankton and/or gill net equipment to estimate abundances of fishes and invertebrates. These long-term monitoring programs make it possible to compare the relative abundance of selected species across central Gulf of Mexico estuaries. The annual catch records can be monitored to witness or avoid crashes of particular fisheries, and allow state and federal managers to modify existing regulations as necessary.

The data presented in this section were developed from electronic data provided by the Louisiana Department of Wildlife and Fisheries (LDWF) and the Gulf Coast Research Laboratory (GCRL) in Ocean Springs, Mississippi. The study locations are shown in Figure 8 for LDWF Coastal Study Areas (I-VII) and GCRL's Mississippi Sound study area with the comparable ELMR estuaries. Analyses of data from the 16 ft otter trawls is presented because the trawls are the most common method routinely used by both state agencies. Because of gear bias in catch, the fish caught are primarily juveniles of large species and adults of small species. The data were analyzed

Figure 5. Number of species* in Central Gulf estuaries by salinity zone, life stage, and month.



*number of species with relative abundance of common or greater (Table 3).

Figure 6. Numbers of species ranked as common or greater in tidal fresh zone, by season and estuary.

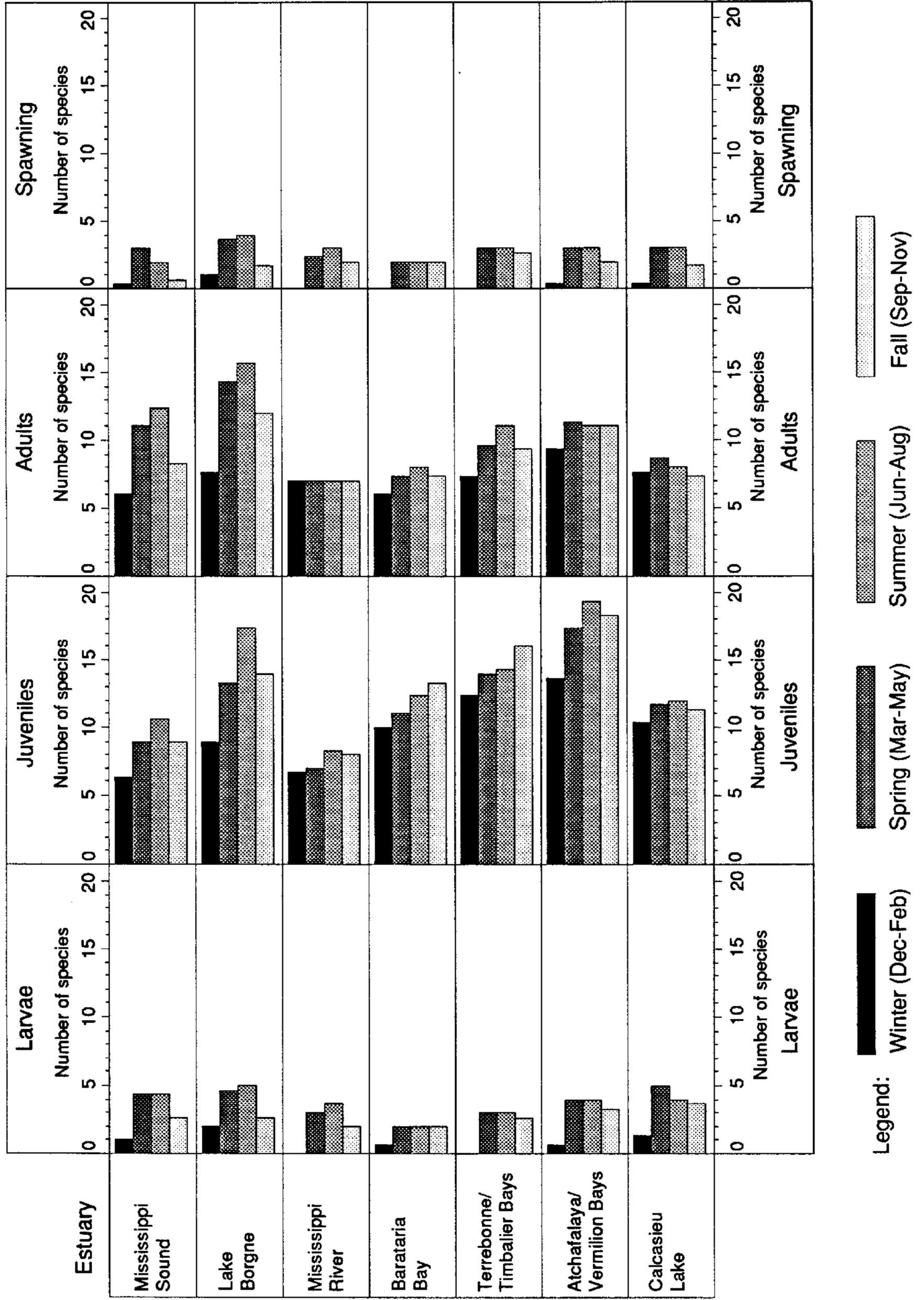


Figure 6 (continued). Numbers of species ranked as common or greater in mixing zone, by season and by estuary.

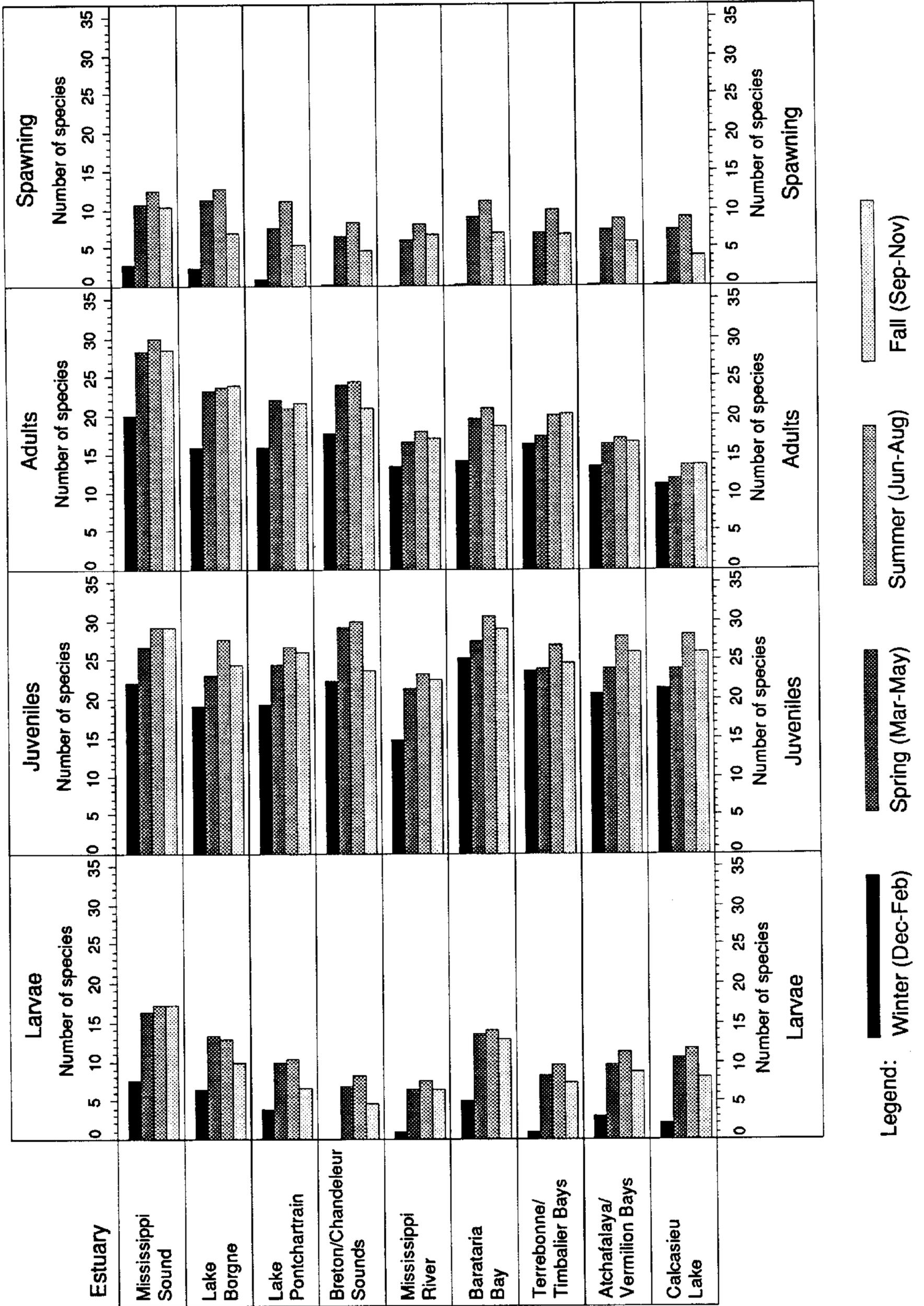
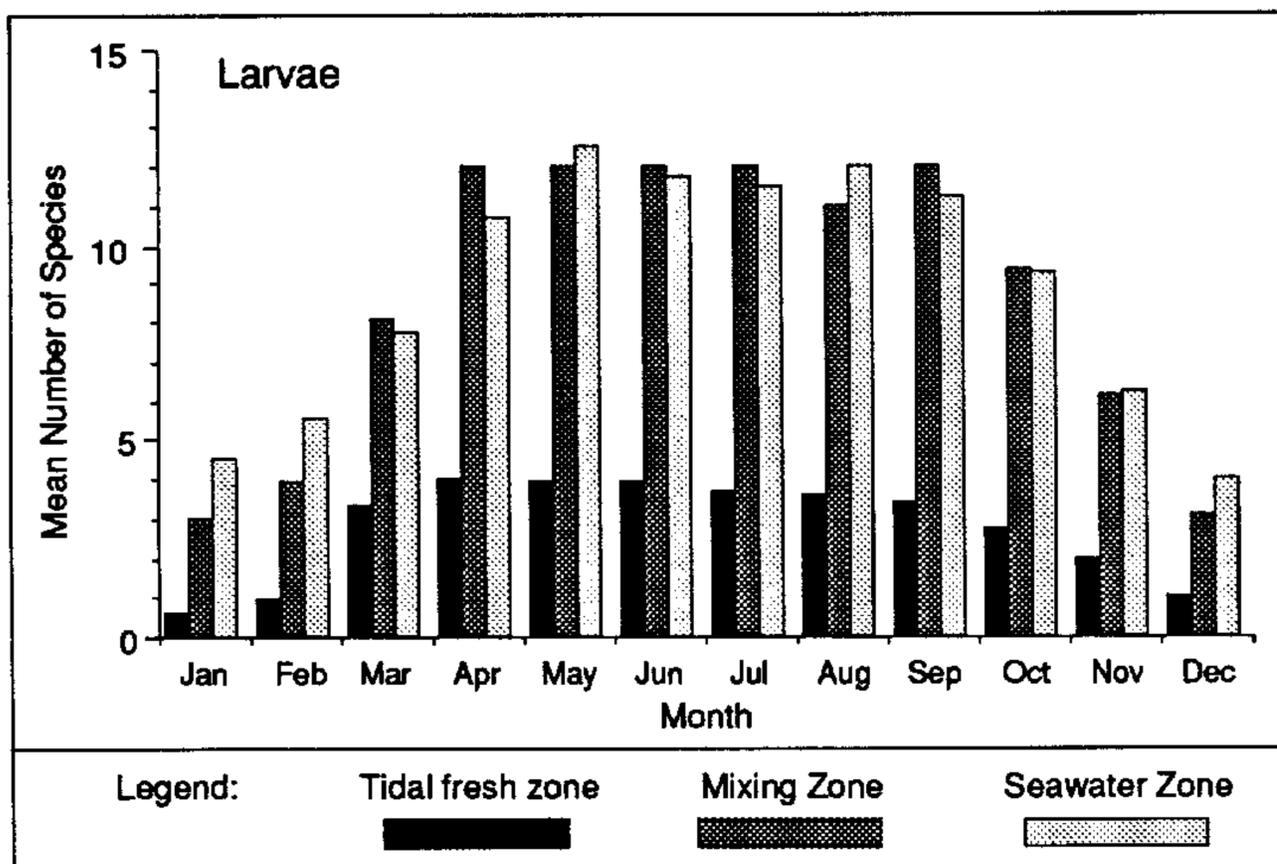


Figure 7. Mean number of species as larvae (averaged across estuaries), by month and salinity zone.



for mean monthly catches by 10 minute trawls. This quantitative information supplements the relative abundance rankings of the ELMR species compiled in this report.

Only a few species are used to show comparisons between estuarine systems along the Central Gulf of Mexico coast. ELMR data are comparable between estuarine systems only when state agency quantitative databases are available to enhance the ELMR data. Without consistent quantitative data, comparisons between salinity zones and species are only feasible **within** an estuarine system.

Brown shrimp (*Penaeus aztecus*) and spot (*Leiostomus xanthurus*) were selected to represent a portion of the data from LDWF and GCRL which were made available to ELMR. The mean monthly commercial catch of brown shrimp usually peaked from May to July (Figure 9a). Comparison of estuarine systems shows that CSA VII (Calcasieu Lake) has the highest peak abundance of brown shrimp, while the other systems all peak about the same time, but at lower levels. Spot usually peaked in March (Figure 9b). The highest relative abundance of spot was in Mississippi Sound.

Figure 8. Comparison of ELMR estuaries with LDWF Coastal Study Areas (I-VII) and GCRL Mississippi Sound (MS) stations.

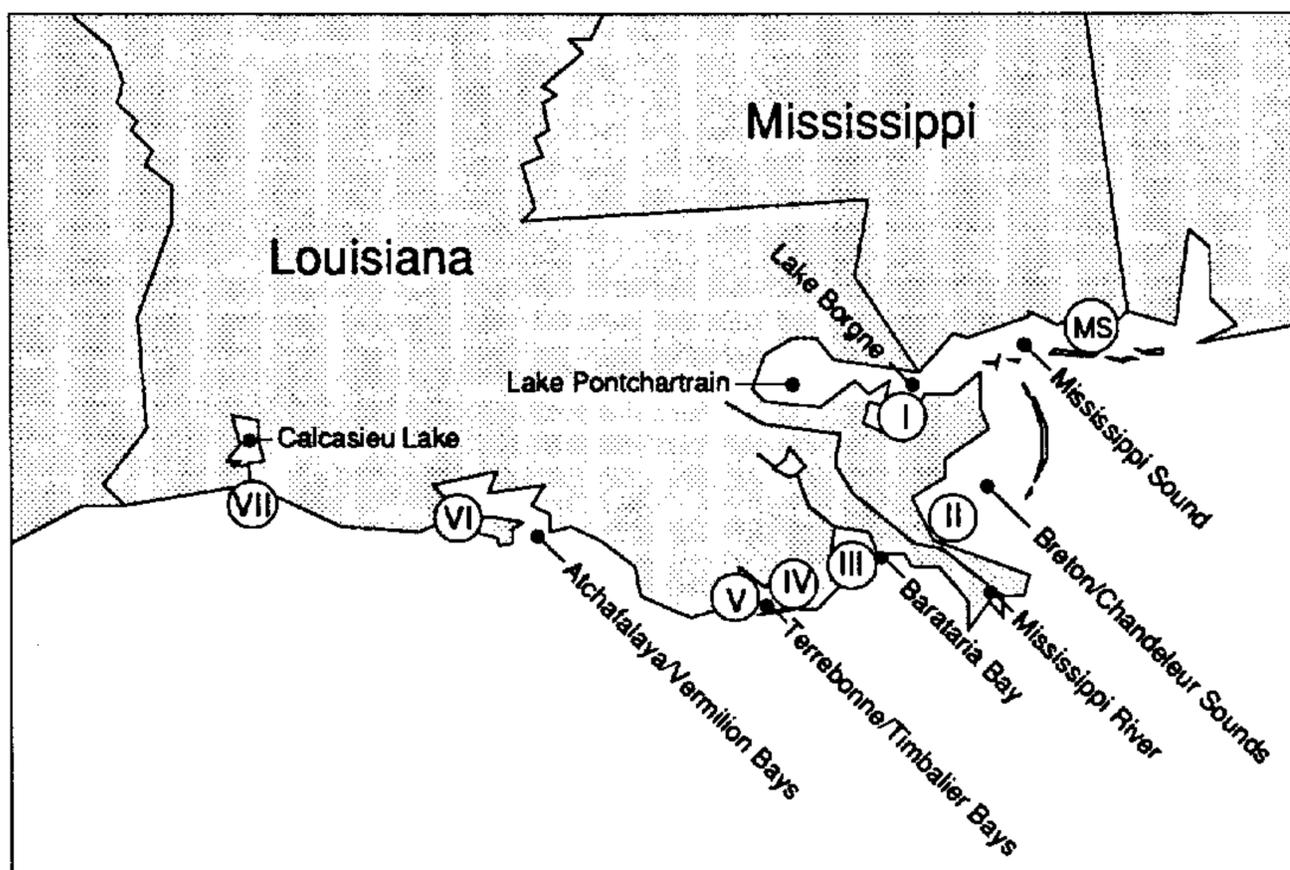
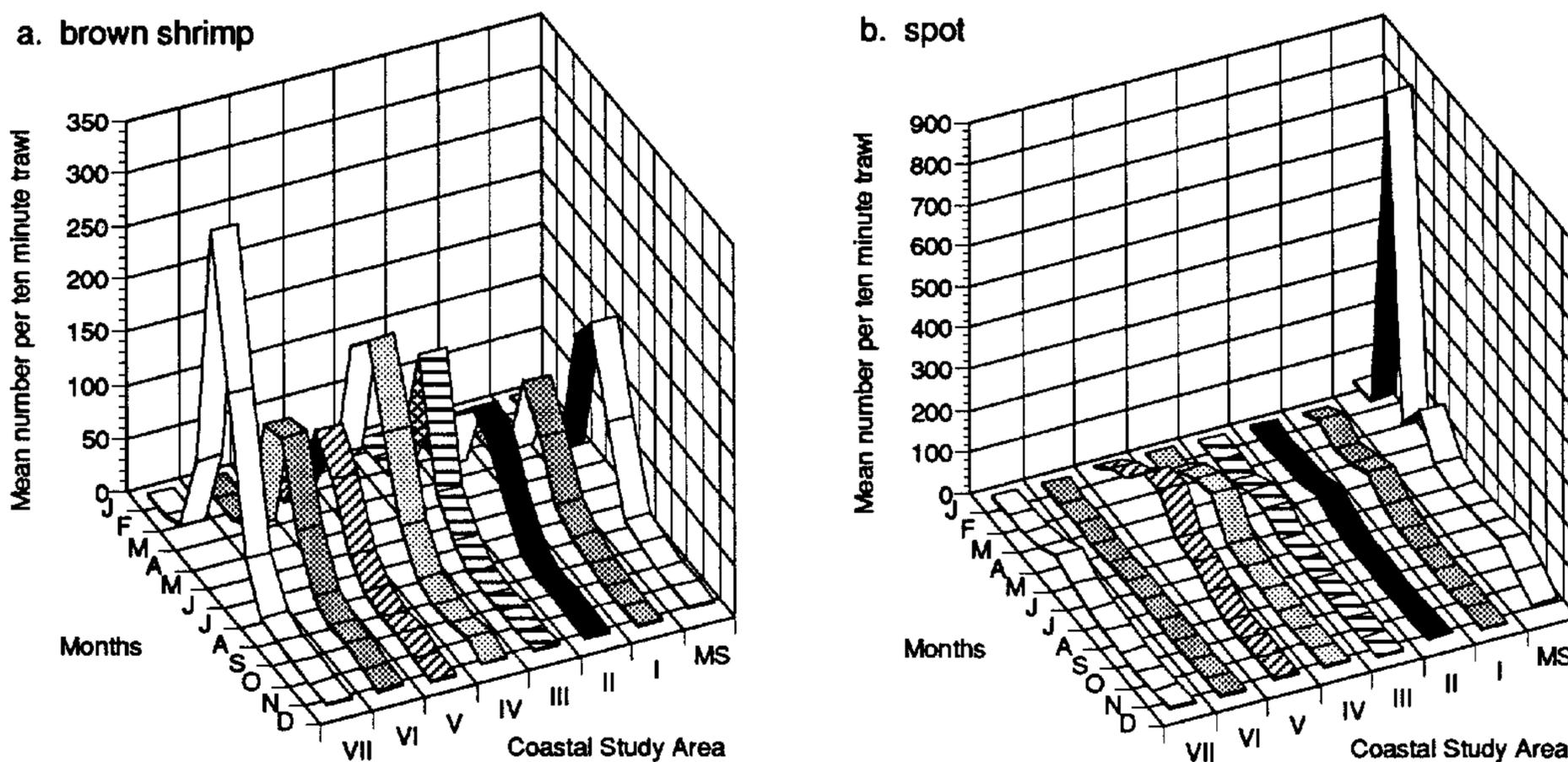


Figure 9. Monthly mean abundances of brown shrimp and spot caught in trawls in LDWF Coastal Study Areas (I-VII) and GCRL Mississippi Sound (MS) stations.



Data Content and Quality

An important aspect of the ELMR program, especially since it is based primarily on published and unpublished literature and consultations, is to determine the quality of available data. For many species, gear selectivity, difficulty in identifying larvae, and difficulty in sampling various habitats has limited the amount of reliable information. Therefore, a deliberate effort was made to assess the overall reliability of the data base so that it could be used appropriately.

Estimates of the reliability of the distribution and abundance information organized by species, life stage, and estuary are presented in Table 4 (pp. 49-56) of the *Data Summary Tables* section. Data reliability was classified using the following categories:

Highly certain: Considerable sampling data available. Distribution, behavior, and preferred habitats well documented within an estuary.

Moderately certain: Some sampling data available for an estuary. Distribution, preferred habitat, and behavior well documented in similar estuaries.

Reasonable inference: Little or no sampling data available. Information on distributions, ecology, and preferred habitats documented in similar estuaries.

The quality and quantity of available data vary by species, life stage, and estuary. For example, a large amount of information is available on shrimp because they are highly valued both commercially and recreationally. For most species, the least amount of information available and poorest quality of data are for the spawning, egg, and larval life stages. Except for a few species (e.g., brown shrimp), very little data has been generated on particular habitat preferences and environmental ranges. This is particularly true for the smaller forage and/or non-commercial fishes and invertebrates. Gear selectivity, inability to correctly identify larval stages, and difficulty of sampling various habitats limits the development and reliability of this information. In addition, life history data are lacking on some of the commercially important sciaenid and pelagic species.

Data reliability was also based on the number of studies conducted on a species within an estuary and whether they represented a time-series data set or were designed to identify and quantify a species' particular life stage. For example, LDWF used different gear types to sample various habitats accurately (Barrett et al. 1978). These data are more reliable due to sampling of specific habitats with consistent and efficient gear. In the case of limited studies, information was occasionally inferred. An opportunity exists to refine the data presented based on additional reviews.

Given that the amount and quality of available information varies by species, by life stage, between estuaries, and even within an estuary, considerable scientific judgment is required to derive or infer spatial and temporal distributions from existing data and available literature. Unfortunately, even the most informed judgment is far from perfect due to the complexity of estuarine systems. Consequently, information on the level of certainty associated with each data element must be presented when synthesizing multiple data sets (Table 4). Appendices 2, 3, and 4 provide a complete summary of the personal communications and primary references used so that readers can track and obtain additional information efficiently.

Variability in Space and Time. Species data were organized according to the salinity zone boundaries developed for each estuary in the NEI data atlas—Volume 1 (NOAA 1985) and NEI Supplement 3 (Shirzad et al. 1989). However, division of an estuary on the basis of salinity is highly variable due to the many interacting factors that affect salinity, such as variations in freshwater inflow, wind, and tides. To compile information on species distribution according to these zones, it is assumed that if a particular salinity zone expands or contracts, the distribution of a mobile species in that zone will correspond to the shift. For example, if increased freshwater inflow shifts the tidal fresh zone further down the estuary, the distribution of a species confined to that zone increases to include the new area. If a species occurs over a wide salinity range, a shift may or may not occur. This information was combined with additional habitat parameters, such as bottom type, to develop species distributional data. The final placement of species in a salinity zone was ultimately determined by where they have actually been observed or captured.

Temporal distributions are often dependent on annual climatic conditions and water currents. Monthly distributional patterns were derived based on the consistent presence of a life stage within a particular month. If a species is only present in an estuary in unusual years (e.g., drought), it was not portrayed as part of that species' spatial or temporal distribution. However, if a species is usually there, even during a restricted time period, it was considered present for the specific month(s). Greater temporal resolution, such as on a biweekly rather than on a monthly basis, was not possible.

Abundance Data. Except for a relatively few important commercial or recreational species, little or no quantitative information is available to determine relative species abundance for a large number of

organisms across estuaries. Therefore, an attempt was made to determine only the relative abundance of a species compared to other species within an individual estuary. For well studied species, e.g., juvenile sciaenids or juvenile penaeids, quantitative data were used to estimate abundance within an estuary. However, in most cases the final level of abundance assigned to a species was determined by asking regional and local experts for opinions based on their knowledge of individual species within an estuary. This effort complemented the quantitative studies, and greatly increased the reliability of the abundance information. It is important to note that the LDWF has a quantitative computerized data base on the distribution and abundance of several species found in Louisiana estuaries. The published information from this data base was a component used to develop the relative abundance information shown in this report. The relative abundance information shown in the data summaries of this report is the best that could be synthesized from the LDWF reports, other studies, and expert reviews.

Salinity and Species Abundance. The Mississippi River divides the Central Gulf of Mexico both physically and biologically. The estuaries east of the Mississippi River (Mississippi Sound and Breton/Chandeleur Sounds) generally have less freshwater inflow, higher salinities, lower turbidity, more seagrass habitat, and are more open to the Gulf of Mexico than the Louisiana estuaries from the Mississippi River westward (Perrett et al. 1971). The lowest salinities and highest turbidity are found in the estuaries directly affected by the Mississippi and Atchafalaya Rivers. However, all of the Louisiana estuaries have relatively low salinities because of the enormous amount of freshwater inflow from the large continental drainage. The effect of varying salinity regimes is often reflected in the distribution and abundance of estuarine and marine species.

Life History Notes. Because of the complex life histories of some species, the following comments are provided to clarify and supplement the information presented in the data summary tables.

Invertebrates. Sessile invertebrates, such as clams and oysters, usually have a patchy rather than a uniform distribution. Therefore, the areal distribution of these organisms may be overestimated, but the salinity zones of colonization are identified. Specific areas may contain acceptable salinities, but suitable bottom habitat for colonization may not exist. Specific habitat requirements and life history characteristics of a number of invertebrate species are provided below:

- *Bay scallop*: Usually associated with seagrass beds and salinities greater than 25 ppt.
- *Rangia*: All life stages occur in salinities below 25 ppt.
- *Hard clam*: Most life stages occur in salinities above 20 ppt.
- *Bay squid*: The lower lethal salinity limit is 17.5 ppt, and bay squid actively avoid salinities that are lower than this. Therefore, the distribution of juveniles and adults will only be from the lower margin of the mixing zone to the seawater zone, and out to the nearshore shelf waters of the Gulf of Mexico.
- *Penaeid shrimp*: Postlarvae and juveniles are the critical life stages utilizing the estuaries. Adults generally move to nearshore spawning grounds, where spawning, egg development, and most of the larval development occur.
- *Grass shrimp*: Fertilized eggs are held on the female's pleopods until hatching.
- *Spiny lobster*: Spiny lobsters are found in the Gulf of Mexico estuaries of southern Florida and southern Texas. Juveniles do not mature to adult stages until 6-8 years of age.
- *Stone crabs*: Usually found in salinities greater than 20 ppt. Males are typically located in nearshore waters, but migrate into the estuaries for mating. Williams and Felder (1986) have distinguished two separate species in the Gulf of Mexico. The Florida stone crab, *Menippe mercenaria*, occurs from Florida Bay to Appalachicola Bay, and the Gulf stone crab, *M. adina* is found from Suwannee River to the Yucatan Peninsula. *M. mercenaria* is not included in this report because it does not occur in the Central Gulf of Mexico estuaries.
- *Blue crab*: Mating usually takes place in the low salinities of the tidal fresh to the upper region of the mixing zone. After mating, females move to the seawater zone, while males often remain in the upper reaches of the estuary. Females brood the eggs (sponge females), and larvae are released in higher salinities. Development through the late zoeal stages occurs offshore. Megalopae are transported back into the estuary and disperse throughout the salinity zones. As they approach maturity, blue crabs seek lower salinities.

Fishes. Aggregating species by salinity zone uses a fundamental habitat parameter. However, a combination of habitat characteristics, such as bottom type, water temperature, and bathymetry, would more accurately indicate species spatial and temporal distributions. Specific habitat requirements and life history characteristics of a number of fishes are presented here:

- *Bull shark*: Development of eggs and larvae are internal, and parturition results in pups of juvenile size (75 cm TL). Therefore, only juveniles and adults (> 2220 cm TL) are found in the estuaries. Fishing gear usually limits the ability to take large sharks. Based on the sizes of sharks captured, it may be inferred that parturition is occurring within the estuaries.
- *Tarpon*: Spawning, egg and larval stages occur well off shore. Juveniles use the estuaries as a nursery ground, often seeking waters of low dissolved oxygen and low salinity.
- *Alabama shad*: Not found west of the Barataria Bay barrier islands in Louisiana.
- *Menhaden*: Juveniles are the predominant life stage utilizing the estuaries. Spawning occurs from the coastline to six miles offshore. Gulf and yellowfin menhaden may hybridize where their ranges overlap.
- *Gizzard shad*: Large juveniles and adults are found in the estuaries, but adults must return to freshwater to spawn. In large rivers there is a migration or "spring run" up the river. Large juveniles that are washed into bays with floods can mature to adulthood, but their upstream migration may be impeded by waterway restrictions.
- *Hardhead catfish*: Eggs and larvae are brooded in the mouths of adult males; therefore, their distribution is determined by the adult population.
- *Bluefish*: Juveniles and adults are the principal life stages found in estuaries. Adults may ascend rivers into brackish waters. Spawning and development of eggs and larvae occur offshore.
- *Creville jack and blue runner*: Juvenile and adult stages occur in estuaries, but other life stages are usually offshore.
- *Florida pompano*: Typically found in nearshore surf and inlet waters, but juveniles and adults do enter the bays. Spawning, eggs, and larvae are

usually offshore.

- *Gray snapper*. Juveniles are typically associated with vegetation in estuaries, particularly seagrass beds and mangroves. Adults, spawning, eggs, and larvae are usually offshore.
- *Sheepshead*: Spawning occurs in nearshore and inlet waters. Larvae are transported towards the estuaries, but usually juvenile size is reached before they enter.
- *Pinfish*: Juveniles are the predominant life stage within estuaries. Adults, spawning, and eggs are usually offshore. Larvae are transported to inlets, but usually attain juvenile size before they enter bays. Subadults and adults may remain in some bays before migrating out to spawning grounds.
- *Sciaenids*: Most sciaenids move to nearshore or offshore waters for spawning, although some may spawn in passes. Larvae may be transported toward estuaries, but may attain juvenile size before they enter. Juveniles develop in the nursery habitats of the bays, then migrate out as subadults. Since some of these species have rather long life spans, several years may be spent in the estuaries as juveniles. As temperatures drop in the winter, they move into deeper waters.
- *Striped mullet*: Estuarine habitat is primarily used by juveniles and adults. They spawn offshore or near passes, and larvae move inshore and into estuaries.
- *Code goby*: Usually associated with seagrasses and higher salinities.
- *Spanish mackerel*: Juveniles and adults occur in estuaries, but other life stages are pelagic and primarily offshore.
- *Flounders*: Previously identified gulf flounder have been re-examined and re-identified. Dr. Thompson (pers. comm.) considered most of the specimens to have been southern flounder, reducing the estimated abundance of gulf flounder in Louisiana estuaries. Spawning, eggs, and larvae are in nearshore waters. Juveniles and larvae migrate into bays for growth and development. Gulf flounder appear to be less likely to ascend into lower salinity water, typically remaining in salinities greater than 20 ppt. Southern flounder are widely distributed. Juveniles and adults migrate according to

temperature, creating "fall runs" to the offshore waters.

Use of ELMR Data

Classifying and Comparing Estuaries. Although the qualitative nature of the distribution data precludes statistical comparisons of species abundances among estuaries, comparisons can be made using data on the presence/absence of species in salinity zones. This information, combined with the spatial and temporal distribution data, is the strength of the data base. Estuaries can be loosely categorized by their physical and chemical characteristics and their associated species assemblages. The relative importance of individual estuaries to specific species may also be determined.

The species found in an estuary are sensitive indicators of both the mean and extreme environmental conditions within that estuary. Estuaries can be classified by the number of species present and by whether the fauna are primarily marine, estuarine, or freshwater. Species assemblages may correlate with physical characteristics, such as bottom substrate, vegetation, and areal and temporal characteristics of salinity zones. The information on species presence/absence or other attributes can be used to determine the faunal similarities and differences among estuaries.

A comparison of estuaries and associated species can identify differing factors among those estuaries that might account for shifts in species distribution and relative abundance, helping to define ecological variables controlling species distributions. For example, a species may show differing salinity ranges among estuaries, suggesting that some other factor, such as temperature, competition, or predation may be regulating its distribution.

Linkages to Marine Ecosystems. Estuaries are home to many aquatic species year-round; however, a large number of species only use estuaries for specific parts of their life histories and spend the rest offshore. Most of these latter species fall into four general categories: 1) diadromous species, which use estuaries as migration corridors and, in some instances, nursery areas; 2) species that use estuaries for spawning, often at specific salinities; 3) species that spawn in marine waters near the mouths of estuaries and depend on tidal- and wind-driven currents to carry eggs, larvae, or early juveniles into estuarine nursery areas; and 4) species that enter estuaries during certain times of year to feed on abundant prey. The importance of an estuary can be assessed by the intensity with which species use

estuarine habitats. Importance can be estimated both by the number of species present as well as the density of specific life stages in estuaries relative to offshore habitats. These data may assist in identifying adverse effects of estuarine degradation on offshore populations.

The presence or absence of members of a set of pre-selected species or species with specific life history strategies can be used to rank the importance of an estuary to these species on a regional basis. For example, if the species group is defined as anadromous fishes that are commercially important offshore, the strength of the offshore-estuarine linkage for each estuary can be established. This can be used to identify estuaries needing special attention or management. Data sets developed in other NOAA programs will enable regional assessments with consistent species information from the head-of-tide in estuaries to the continental shelf. Integration of biological and physical data will significantly improve our ability to identify and define the biological linkages and physical interchanges between estuarine and shelf habitats.

Concluding Comments

This report is part of an effort to capture the Nation's data on fishes and invertebrates in estuaries (see inside front cover). This research is one step in developing an information base to bridge the gap between site-specific estuarine problems and formulating regional management strategies. Filling this gap is more important than ever, as it becomes clear that cumulative effects of small changes in many estuaries may have a total systemic effect throughout the Nation's estuaries and coastal ocean. Compiling and organizing fragments of estuarine information is a difficult task, but is necessary to effectively manage the nation's estuaries. Although the knowledge available to conserve and protect estuaries continues to be limited, the ELMR data base will allow comparisons among species, groups of species, specific life stages and times of year within an estuary, or by geographic regions. When combined with other data sets, the ELMR data base will enable development and testing of ecological hypotheses and identify gaps in our knowledge of estuarine fishes and invertebrates.

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Data Summary Tables

Table 2. Spatial distribution and relative abundance

Table 3. Temporal distribution

Table 4. Data reliability

In each data summary table, species are listed in a phylogenetic order, as in Table 1. Estuaries are listed in a east to west order, from Mississippi Sound, MS, to Calcasieu Lake, LA. At the beginning of each data summary table is an index table showing the page location of each species and estuary within the data summary.

Table 2. Spatial distribution and relative abundance

Index to Table 2. Page location of spatial distribution table for each species and estuary.

Common and Scientific Name	Estuary								
	Mississippi Sound	Lake Borgne	Breton and Chandeleur Sound	Lake Pontchartrain	Mississippi River	Barataria Bay	Terrebonne and Timbalier Bays	Atchafalaya and Vermilion Bays	Calcasieu Lake
Bay scallop (<i>Argopecten irradians</i>) American oyster (<i>Crassostrea virginica</i>) Common rangia (<i>Rangia cuneata</i>) Hard clam (<i>Mercenaria</i> species) Bay squid (<i>Lolliguncula brevis</i>) Brown shrimp (<i>Penaeus aztecus</i>)					p. 20				
Pink shrimp (<i>Penaeus duorarum</i>) White shrimp (<i>Penaeus setiferus</i>) Grass shrimp (<i>Palaemonetes pugio</i>) Spiny lobster (<i>Panulirus argus</i>) Blue crab (<i>Callinectes sapidus</i>) Gulf stone crab (<i>Menippe adina</i>)					p. 21				
Bull shark (<i>Carcharhinus leucas</i>) Tarpon (<i>Megalops atlanticus</i>) Alabama shad (<i>Alosa alabamae</i>) Gulf menhaden (<i>Brevoortia patronus</i>) Yellowfin menhaden (<i>Brevoortia smithi</i>) Gizzard shad (<i>Dorosoma cepedianum</i>)					p. 22				
Bay anchovy (<i>Anchoa mitchilli</i>) Hardhead catfish (<i>Arius felis</i>) Sheepshead minnow (<i>Cyprinodon variegatus</i>) Gulf killifish (<i>Fundulus grandis</i>) Atlantic silversides (<i>Meridia</i> species) Snook (<i>Centropomus undecimalis</i>)					p. 23				
Bluefish (<i>Pomatomus saltatrix</i>) Blue runner (<i>Caranx crysos</i>) Crevalle jack (<i>Caranx hippos</i>) Florida pompano (<i>Trachinotus carolinus</i>) Gray snapper (<i>Lutjanus griseus</i>) Sheepshead (<i>Archosargus probatocephalus</i>)					p. 24				
Pinfish (<i>Lagodon rhomboides</i>) Silver perch (<i>Bairdiella chrysoura</i>) Sand seatrout (<i>Cynoscion arenarius</i>) Spotted seatrout (<i>Cynoscion nebulosus</i>) Spot (<i>Leiostomus xanthurus</i>) Atlantic croaker (<i>Micropogonias undulatus</i>)					p. 25				
Black drum (<i>Pogonias cromis</i>) Red drum (<i>Sciaenops ocellatus</i>) Striped mullet (<i>Mugil cephalus</i>) Code goby (<i>Gobiosoma robustum</i>) Spanish mackerel (<i>Scomberomorus maculatus</i>) Gulf flounder (<i>Paralichthys albigutta</i>) Southern flounder (<i>Paralichthys lethostigma</i>)					p. 26				

Table 2. Spatial distribution and relative abundance

		Central Gulf of Mexico Estuaries																										
		Mississippi Sound			Lake Borgne			Lake Pontchartrain			Breton/Chandeleur Sounds			Mississippi River			Barataria Bay			Terrebonne/Timbalier Bays			Atchafalaya/Vermilion Bays			Calcasieu Lake		
Species/Life Stage		T	M	S	T	M	*	*	M	*	*	M	S	T	M	*	T	M	S	T	M	S	T	M	*	T	M	*
Bay scallop <i>Argopecten irradians</i>	A		○	○									√															
	S		○	○									√															
	J		○	○									√															
	L		○	○									√															
	E		○	○									√															
American oyster <i>Crassostrea virginica</i>	A		○	√		○			○			●	●		√		√	●	○	√	●	○		●			○	
	S		●	●		○			○			●	●		√		√	●	○	√	●	○		●			○	
	J		○	√		○			○			●	●		√		√	●	○	√	●	○		●			○	
	L		●	√		○			○			●	●		√		√	●	○	√	●	○		●			○	
	E		●	○		○			○			●	●		√		√	●	○	√	●	○		●			○	
Common rangia <i>Rangia cuneata</i>	A		○		●	●			○			○		○	○		●	○		○	○			○		√	○	
	S		○		●	●			○			○		○	○		●	○		○	○			○		√	○	
	J		○		●	●			○			○		○	○		●	○		○	○			○		√	○	
	L		○		●	●			○			○		○	○		●	○		○	○			○		√	○	
	E		○		●	●			○			○		○	○		●	○		○	○			○		√	○	
Hard clam <i>Mercenaria species</i>	A		√	○					○	○					○	○					√	√						
	S		√	○					○	○					○	○					√	√						
	J		√	○					○	○					○	○					√	√						
	L		√	○					○	○					○	○					√	√						
	E		√	○					○	○					○	○					√	√						
Bay squid <i>Lolliguncula brevis</i>	A		●	●		○			○	○					○	○					○	○		○			○	
	S		●	●		○			○	○					○	○					○	○		○			○	
	J		○	○		○			○	○					○	○					○	○		○			○	
	L		○	○		○			○	○					○	○					○	○		○			○	
	E		○	○		○			○	○					○	○					○	○		○			○	
Brown shrimp <i>Penaeus aztecus</i>	A	√	●	●		○			○																			
	S	√	●	○		○			○																			
	J	√	●	○	√	●			○		○	○		○	○		○	○		√	○		○	○		○	○	
	L	○	●	○		○			○						○	○								○		○	○	
	E	○	○	○		○			○						○	○								○		○	○	

Relative Abundance

- Highly Abundant
- Abundant
- Common
- √ Rare
- Blank Not Present

Salinity Zone

- T - Tidal Fresh
- M - Mixing
- S - Seawater
- * - Salinity zone not present

Life Stage

- A - Adults
- S - Spawning adults
- J - Juveniles
- L - Larvae
- E - Eggs

Table 2, continued. Spatial distribution and relative abundance

		Central Gulf of Mexico Estuaries																													
		Mississippi Sound			Lake Borgne			Lake Pontchartrain			Breton/Chandeleur Sounds			Mississippi River			Barataria Bay			Terrebonne/Timbalier Bays			Atchafalaya/Vermilion Bays			Calcasieu Lake					
Species/Life Stage		T	M	S	T	M	*	*	M	*	*	M	S	T	M	*	T	M	S	T	M	S	T	M	*	T	M	*			
Pink shrimp <i>Penaeus duorarum</i>	A		○	○								○	○																		
	S		○	○								○	○																		
	J		○	○	√			√				○	●					○	○	√	√		√								
	L		○	○														○	○												
E		○	○																												
White shrimp <i>Penaeus setiferus</i>	A	√	●	●		●			●				○					●	○		○	○	○	●		○	●		○	○	
	S	√	●	●		●			●				○					●	○		○	○	○	●		○	●		○	○	
	J	√	●	●	●	●			●			○	○	○	○		○	●	●	○	●	○	○	●	○	○	●		○	●	
	L	√	○	○								○	○	○	○			○	○		○	○		○			○			○	
E	√	○	○								○	○	○	○			○	○		○	○		○			○			○		
Grass shrimp <i>Palaemonetes pugio</i>	A	○	●	○	√	●			○			○	●	○	○		○	○	○	○	○	○	○	○	○	○	○		○	○	
	S	○	○	○		○			○			○	○	○	○		○	○	○	○	○	○	○	○	○	○	○		○	○	
	J	○	○	○	√	○			○			○	○	○	○		○	○	○	○	○	○	○	○	○	○	○		○	○	
	L	○	○	○		○			○			○	○	○	○		○	○	○	○	○	○	○	○	○	○	○		○	○	
E	○	○	○		○			○			○	○	○	○		○	○	○	○	○	○	○	○	○	○	○		○	○		
Spiny lobster <i>Panulirus argus</i>	A																														
	S																														
	J																														
	L																														
E																															
Blue crab <i>Callinectes sapidus</i>	A	√	●	●	○	●			○			○	○	○	○		○	○	○	○	○	○	○	○	○	○	○		○	○	
	M		○	○		○			○			○	○	○	○		○	○	○	○	○	○	○	○	○	○	○		○	○	
	J	○	○	○	○	○			○			○	○	○	○		○	○	○	○	○	○	○	○	○	○	○		○	○	
	L	○	○	○		○			○			○	○	○	○		○	○	○	○	○	○	○	○	○	○	○		○	○	
S	○	○	○		○			○			○	○	○	○		○	○	○	○	○	○	○	○	○	○	○		○	○		
Gulf stone crab <i>Menippe adina</i>	A		○	○		√			√			○	○		○			√	√		√	○		√			√			√	
	S		○	○		√			√			○	○		○			○	○		○	○		○			○			○	
	J		○	○		√			√			○	○		○			○	○		○	○		○			○			○	
	L		○	○		√			√			○	○		○			○	○		○	○		○			○			○	
E		○	○		√			√			○	○		○			○	○		○	○		○			○			○		
		T	M	S	T	M	*	*	M	*	*	M	S	T	M	*	T	M	S	T	M	S	T	M	*	T	M	*	T	M	*
		Mississippi Sound	Lake Borgne	Lake Pontchartrain	Breton/Chandeleur Sounds	Mississippi River	Barataria Bay	Terrebonne/Timbalier Bays	Atchafalaya/Vermilion Bays	Calcasieu Lake																					
Central Gulf of Mexico Estuaries																															

Relative Abundance
 ● Highly Abundant
 ○ Abundant
 ○ Common
 √ Rare
 Blank Not Present

Salinity Zone
 T - Tidal Fresh
 M - Mixing
 S - Seawater
 * - Salinity zone not present

Life Stage
 A - Adults
 S - Spawning adults
 J - Juveniles
 L - Larvae
 E - Eggs
 M - Mating

Table 2, continued. Spatial distribution and relative abundance

		Central Gulf of Mexico Estuaries																										
		Mississippi Sound			Lake Borgne			Lake Pontchartrain			Breton/Chandeleur Sounds			Mississippi River			Barataria Bay			Terrebonne/Timbalier Bays			Atchafalaya/Vermilion Bays			Calcasieu Lake		
Species/Life Stage		T	M	S	T	M	*	*	M	*	*	M	S	T	M	*	T	M	S	T	M	S	T	M	*	T	M	*
Bull shark <i>Carcharhinus leucas</i>	A	○	○	○	○	○			○			○	●	√	√		√	√	○	√	○	○				√	√	
	M			○																								
	J	○	○	○	○	○			○			○	○	√	√		√	√	√	√	○	○		○		√	√	
	P											○	○				√	√	√	√	√	√				√	√	
Tarpon <i>Megalops atlanticus</i>	A		√	○	√	○			○						○				√		√	√		√				
	S			○																								
	J	√	√	○	√	○			○										√									
	L		√	○																								
Alabama shad <i>Alosa alabamae</i>	A	●	○	√	○	○						√																
	S	●																										
	J	●	○	√	○	○			√																			
	L	●																										
Gulf menhaden <i>Brevoortia patronus</i>	A		●	●	●	●															●	●						
	S																											
	J	●	●	●	●	●			●			●	○	○	○	●	○	○	○	○	○	○	○	○		○	○	
	L		●	●	●	●			○																	○	○	
Yellowfin menhaden <i>Brevoortia smithi</i>	A			√	√				√																			
	S																											
	J				√				√																			
	L																											
Gizzard shad <i>Dorosoma cepedianum</i>	A	●	○	√	●	○			○			○	○	○	○		○	○	○	○	○	○	○	○		○	○	
	S	●			○																							
	J	○	○	√	●	●			○					○	○		○	○		○	○		○	○		○	○	
	L	○			○									○			○			○			○			○		

Relative Abundance

- Highly Abundant
- Abundant
- Common
- √ Rare
- Blank Not Present

Salinity Zone

- T - Tidal Fresh
- M - Mixing
- S - Seawater
- * - Salinity zone not present

Life Stage

- A - Adults
- S - Spawning adults
- J - Juveniles
- L - Larvae
- E - Eggs
- M - Mating
- P - Parturition

Table 2, continued. Spatial distribution and relative abundance

		Central Gulf of Mexico Estuaries																										
		Mississippi Sound			Lake Borgne			Lake Pontchartrain			Breton/Chandeleur Sounds			Mississippi River			Barataria Bay			Terrebonne/Timbalier Bays			Atchafalaya/Vermilion Bays			Calcasieu Lake		
Species/Life Stage		T	M	S	T	M	*	*	M	*	*	M	S	T	M	*	T	M	S	T	M	S	T	M	*	T	M	*
Bay anchovy	A	●	●	●	●	●			●			●	○	○	●		○	●	●	○	●	●	●	●		○	●	
	S	●	●	●	●	●			●			●	○	○	●		○	●	●	○	●	●	●	●		○	●	
<i>Anchoa mitchilli</i>	J	○	●	●	●	●			●			●	○	○	●		○	●	●	○	●	●	●	●		○	●	
	L	√	○	○	●	●			●			●	○		●			●	●		●	●	○	●		○	●	
	E	○	●	○	●	●			●			●	○	○	●			●	●		●	●	○	●		○	●	
Hardhead catfish	A	●	●	○	○	●			○			○	○		●			●	●	○	○	○	○	○		○	○	
	S	●	●	√	○	○			○			○	○		○			○	○	○	○	○	○	○		○	○	
<i>Arius felis</i>	J	●	●	○	○	○			○			○	○		○			○	○	○	○	○	○	○		○	○	
	L	○	○	√	○	○			○			○	○		○			○	○	○	○	○	○	○		○	○	
	E	○	○	√	○	○			○			○	○	○	○			○	○	○	○	○	○	○		○	○	
Sheepshead minnow	A	○	●	○	○	○			○			○	○	○	○		○	○	○	○	○	○	○	○		○	○	
	S	√	○	○	○	○			○			○	○	○	○		○	○	○	○	○	○	○	○		○	○	
<i>Cyprinodon variegatus</i>	J	√	○	○	○	○			○			○	○	○	○		○	○	○	○	○	○	○	○		○	○	
	L	√	○	○	○	○			○			○	○	○	○		○	○	○	○	○	○	○	○		○	○	
	E	√	○	○	○	○			○			○	○	○	○		○	○	○	○	○	○	○	○		○	○	
Gulf killifish	A	○	○	○	○	○			○			○		√	○		○	●	○	○	●	○	○	○		○	○	
	S		○	○	○	○			○			○		√	○		○	●	○	○	●	○	○	○		○	○	
<i>Fundulus grandis</i>	J	√	○	○	○	○			○			○		√	○		○	●	○	○	●	○	○	○		○	○	
	L		○	○	○	○			○			○			○		○	●	○	○	●	○	○	○		○	○	
	E		○	○	○	○			○			○			○		○	●	○	○	●	○	○	○		○	○	
Atlantic silversides	A	○	●	○	○	○			○			○	○	√	○			○	○	○	○	○	○	○		○	○	
	S	○	●	○	○	○			○			○	○	√	○			○	○	○	○	○	○	○		○	○	
<i>Menidia species</i>	J	○	○	○	○	○			○			○	○	√	○			○	○	○	○	○	○	○		○	○	
	L	○	○	○	○	○			○			○	○		○			○	○	○	○	○	○	○		○	○	
	E	○	○	○	○	○			○			○	○		○			○	○	○	○	○	○	○		○	○	
Snook	A																	√										
<i>Centropomus undecimlalis</i>	S																											
	J																											
	L																											
	E																											
		T	M	S	T	M	*	*	M	*	*	M	S	T	M	*	T	M	S	T	M	S	T	M	*	T	M	*
		Mississippi Sound	Lake Borgne			Lake Pontchartrain			Breton/Chandeleur Sounds			Mississippi River			Barataria Bay			Terrebonne/Timbalier Bays			Atchafalaya/Vermilion Bays			Calcasieu Lake				
		Central Gulf of Mexico Estuaries																										

Relative Abundance

- Highly Abundant
- Abundant
- Common
- √ Rare
- Blank Not Present

Salinity Zone

- T - Tidal Fresh
- M - Mixing
- S - Seawater
- * - Salinity zone not present

Life Stage

- A - Adults
- S - Spawning adults
- J - Juveniles
- L - Larvae
- E - Eggs

Table 2, continued. Spatial distribution and relative abundance

		Central Gulf of Mexico Estuaries																													
		Mississippi Sound			Lake Borgne			Lake Pontchartrain			Breton/Chandeleur Sounds			Mississippi River			Barataria Bay			Terrebonne/Timbalier Bays			Atchafalaya/Vermilion Bays			Calcasieu Lake					
Species/Life Stage		T	M	S	T	M	*	*	M	*	*	M	S	T	M	*	T	M	S	T	M	S	T	M	*	T	M	*			
Bluefish	A			○											√																
<i>Pomatomus saltatrix</i>	S			○											√			√	○		√	√			√						√
	J			○								√	√		√			√	○		√	√			√						√
	L			○																											
	E			○																											
Blue runner	A		○	○																											
<i>Caranx crysos</i>	S		○	○															○			√									
	J		○	○															○			√									
	L		○	○															○			√									
	E		○	○															○			√									
Creville jack	A		√	○								○	○					○	○			√									
<i>Caranx hippos</i>	S		√	○								○	○					○	○			√									
	J	√	○	○	○	○			○			○	○		○			○	○		○	○	○	○						○	
	L		○	○																		√									
	E		○	○																		√									
Florida pompano	A			√									○									√									
<i>Trachinotus carolinus</i>	S			√									○									√									
	J		√	○									○					○	○		○	○	√	○			√			○	
	L			○									○									√									
	E			○									○									√									
Gray snapper	A																														
<i>Lutjanus griseus</i>	S																														
	J																														
	L																														
	E																														
Sheepshead	A	○	○	○	○	○			○			○	○	√	○		○	○	○	○	○	○	○	○	○	○	○		√	√	
<i>Archosargus probatocephalus</i>	S	○	○	○	○	○			○			○	○	√	○		○	○	○	○	○	○	○	○	○	○	○		√	√	
	J	√	○	○		○			○			○	○	○	○		○	○	○	○	○	○	○	○	○	○	○		√	○	
	L		○	○																											
	E		√	○																											
		T	M	S	T	M	*	*	M	*	*	M	S	T	M	*	T	M	S	T	M	S	T	M	*	T	M	*	T	M	*
		Mississippi Sound	Lake Borgne			Lake Pontchartrain			Breton/Chandeleur Sounds			Mississippi River			Barataria Bay			Terrebonne/Timbalier Bays			Atchafalaya/Vermilion Bays			Calcasieu Lake							

Relative Abundance

- Highly Abundant
- ⊙ Abundant
- Common
- √ Rare
- Blank Not Present

Salinity Zone

- T - Tidal Fresh
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Life Stage

- A - Adults
- S - Spawning adults
- J - Juveniles
- L - Larvae
- E - Eggs

Table 2, continued. Spatial distribution and relative abundance

		Central Gulf of Mexico Estuaries																													
		Mississippi Sound			Lake Borgne			Lake Pontchartrain			Breton/Chandeleur Sounds			Mississippi River			Barataria Bay			Terrebonne/Timbalier Bays			Atchafalaya/Vermilion Bays			Calcasieu Lake					
Species/Life Stage		T	M	S	T	M	*	*	M	*	*	M	S	T	M	*	T	M	S	T	M	S	T	M	*	T	M	*			
Pinfish <i>Lagodon rhomboides</i>	A	√	●	○	○	●			○																		√			○	
	S		●	○	○	●			○																						
	J	√	●	○	○	●			○			○	○	○			√	○	●		●	●		○					√	○	
	L		●	○																											
Silver perch <i>Bairdiella chrysoura</i>	A	√	●	√	√	●			○			○	○	○				○	●		○	○									
	S		○	√	√	○			○			○	○	○				○	●		○	○				○	○				
	J	○	●	√	√	●			○			○	○	○				○	●		○	○									
	L		○	√	○	○													●			○									
Sand seatrout <i>Cynoscion arenarius</i>	A	○	●	●	●	●			○			○	○					○	○		○	○	√	○						○	
	S		●	○	○	○			○			○	○					○	○		○	○		○			○				
	J	○	●	○	○	○			○			○	○	●				○	○		○	○		○		○	○				
	L	○	●	○	○	○																		○		○	○				
Spotted seatrout <i>Cynoscion nebulosus</i>	A		○	○	○	○			○			○	○	○			√	○	○	√	○	○		○					√	○	
	S		○	○	○	○			○			○	○	○			√	○	○	√	○	○		○					√	○	
	J		○	○	○	○			○			○	○	○			√	○	○	√	○	○		○					√	○	
	L		○	○	○	○			○			○	○	○			√	○	○	√	○	○		○					√	○	
Spot <i>Leiostomus xanthurus</i>	A	○	●	●	√	○			○			○	○	○							○	○									
	S		●	○	○	○			○			○	○	○							○	○									
	J	○	●	○	○	○			○			○	○	○				○	○		○	○		○		○	○		√	○	
	L		●	○	○	○			○			○	○	○				○	○		○	○		○							
Atlantic croaker <i>Micropogonias undulatus</i>	A	○	●	○	○	○			○			○	○																		
	S		○	○	○	○			○			○	○																		
	J	○	○	○	○	○			○			○	○	○			○	○	○	○	○	○		○		○	○		○	○	
	L	○	○	○	○	○			○			○	○	○			○	○	○	○	○	○		○		○	○		○	○	
		T	M	S	T	M	*	*	M	*	*	M	S	T	M	*	T	M	S	T	M	S	T	M	*	T	M	*			
		Mississippi Sound	Lake Borgne	Lake Pontchartrain	Breton/Chandeleur Sounds	Mississippi River	Barataria Bay	Terrebonne/Timbalier Bays	Atchafalaya/Vermilion Bays	Calcasieu Lake																					
Central Gulf of Mexico Estuaries																															

Relative Abundance
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Salinity Zone
 T - Tidal Fresh
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Life Stage
 A - Adults
 S - Spawning adults
 J - Juveniles
 L - Larvae
 E - Eggs

Table 2, continued. Spatial distribution and relative abundance

Species/Life Stage		Central Gulf of Mexico Estuaries																													
		Mississippi Sound			Lake Borgne			Lake Pontchartrain			Breton/Chandeleur Sounds			Mississippi River			Barataria Bay			Terrebonne/Timbalier Bays			Atchafalaya/Vermilion Bays			Calcasieu Lake					
		T	M	S	T	M	*	*	M	*	*	M	S	T	M	*	T	M	S	T	M	S	T	M	*	T	M	*			
Black drum	A		○	○	√	○			○			○	●	√	○		√	○	●		○	●		○			○			○	
<i>Pogonias cromis</i>	S		○	○															√			○									
	J		○	○	√	○			○			○	●	√	○		√	○	○		○	○		○		√	○			○	
	L		○	○		√													√			○									
	E		○	○															√			○									
Red drum	A		○	○		○						●	●				√	√	○		√	√		√			√				
<i>Sciaenops ocellatus</i>	S		○	○								●	●						○			○								●	
	J	√	○	○	○	●			○			●	●	○	○		○	○	○	√	○	○	○	○		○	○				
	L		●	○															○			○									
	E		○	○															○			○									
Striped mullet	A	○	●	●	○	●			○			●	●	○	●		√	○	○	○	○	○	○	○		○	○				
<i>Mugil cephalus</i>	S		○	○								○	○	○	○				○			○									
	J	○	○	○	○	○			○			○	○	○	○		√	○	○	○	○	○	○	○		○	○		√	○	
	L		○	○		√													○			○									
	E		○	○					○										○			○									
Code goby	A		○	○		○			○										√												
<i>Gobiosoma robustum</i>	S		○	○		○			○										√												
	J		○	○		○			○										√												
	L		○	○		○			○										√												
	E		○	○		○			○										√												
Spanish mackerel	A			○									○						○		√	√									
<i>Scomberomorus maculatus</i>	S			○									○						○		√	√									
	J	√	○	○	√			√			○	○		√			○	○		○	○	○	○	○		○	○			○	
	L			○															○												
	E			○															○												
Gulf flounder	A		√	○																											
<i>Paralichthys albigutta</i>	S		√	○																											
	J		√	○																											
	L		√	○																											
	E		√	○																											
Southern flounder	A	√	○	○	√	○			○			○	○		○			○	○		○	○	○	○			○			○	
<i>Paralichthys lethostigma</i>	S		○	○								○	○		○			○	○		○	○	○	○			○			○	
	J	√	○	○	√	○			○			○	○		○			○	○		○	○	○	○			○			○	
	L		○	○																											
	E		○	○																											
		T	M	S	T	M	*	*	M	*	*	M	S	T	M	*	T	M	S	T	M	S	T	M	*	T	M	*			
		Mississippi Sound	Lake Borgne	Lake Pontchartrain	Breton/Chandeleur Sounds	Mississippi River	Barataria Bay	Terrebonne/Timbalier Bays	Atchafalaya/Vermilion Bays	Calcasieu Lake																					

Relative Abundance

- Highly Abundant
- ◎ Abundant
- Common
- √ Rare
- Blank Not Present

Salinity Zone

- T - Tidal Fresh
- M - Mixing
- S - Seawater
- * - Salinity zone not present

Life Stage

- A - Adults
- S - Spawning adults
- J - Juveniles
- L - Larvae
- E - Eggs

Table 3. Temporal distribution and relative abundance

Index to Table 3. Page location of temporal distribution table for each species and estuary.

Common and Scientific Name	Estuary					
	Mississippi Sound Lake Borgne	Breton and Chandeleur Sound	Lake Pontchartrain	Mississippi River Barataria Bay	Terrebonne and Timbalier Bays	Atchafalaya and Vermilion Bays Calcasieu Lake
Bay scallop (<i>Argopecten irradians</i>) American oyster (<i>Crassostrea virginica</i>) Common rangia (<i>Rangia cuneata</i>) Hard clam (<i>Mercenaria</i> species) Bay squid (<i>Lolliguncula brevis</i>) Brown shrimp (<i>Penaeus aztecus</i>)	p. 28	p. 29			p. 30	
Pink shrimp (<i>Penaeus duorarum</i>) White shrimp (<i>Penaeus setiferus</i>) Grass shrimp (<i>Palaemonetes pugio</i>) Spiny lobster (<i>Panulirus argus</i>) Blue crab (<i>Callinectes sapidus</i>) Gulf stone crab (<i>Menippe adina</i>)	p. 31	p. 32			p. 33	
Bull shark (<i>Carcharhinus leucas</i>) Tarpon (<i>Megalops atlanticus</i>) Alabama shad (<i>Alosa alabamae</i>) Gulf menhaden (<i>Brevoortia patronus</i>) Yellowfin menhaden (<i>Brevoortia smithi</i>) Gizzard shad (<i>Dorosoma cepedianum</i>)	p. 34	p. 35			p. 36	
Bay anchovy (<i>Anchoa mitchilli</i>) Hardhead catfish (<i>Arius felis</i>) Sheepshead minnow (<i>Cyprinodon variegatus</i>) Gulf killifish (<i>Fundulus grandis</i>) Atlantic silversides (<i>Menidia</i> species) Snook (<i>Centropomus undecimalis</i>)	p. 37	p. 38			p. 39	
Bluefish (<i>Pomatomus saltatrix</i>) Blue runner (<i>Caranx crysos</i>) Crevalle jack (<i>Caranx hippos</i>) Florida pompano (<i>Trachinotus carolinus</i>) Gray snapper (<i>Lutjanus griseus</i>) Sheepshead (<i>Archosargus probatocephalus</i>)	p. 40	p. 41			p. 42	
Pinfish (<i>Lagodon rhomboides</i>) Silver perch (<i>Bairdiella chrysoura</i>) Sand seatrout (<i>Cynoscion arenarius</i>) Spotted seatrout (<i>Cynoscion nebulosus</i>) Spot (<i>Leiostomus xanthurus</i>) Atlantic croaker (<i>Micropogonias undulatus</i>)	p. 43	p. 44			p. 45	
Black drum (<i>Pogonias cromis</i>) Red drum (<i>Sciaenops ocellatus</i>) Striped mullet (<i>Mugil cephalus</i>) Code goby (<i>Gobiosoma robustum</i>) Spanish mackerel (<i>Scomberomorus maculatus</i>) Gulf flounder (<i>Paralichthys albigutta</i>) Southern flounder (<i>Paralichthys lethostigma</i>)	p. 46	p. 47			p. 48	

Table 3. Temporal distribution

		Central Gulf of Mexico Estuaries																							
Estuary		Mississippi Sound				Lake Borgne				Lake Pontchartrain															
Month		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Species / Life Stage																									
Bay scallop <i>Argopecten irradians</i>	A	[Common]																							
	S					[Common]																			
	J	[Common]																							
	L					[Common]																			
	E					[Common]																			
American oyster <i>Crassostrea virginica</i>	A	[Common]				[Common]				[Common]															
	S	[Abundant]				[Common]				[Common]															
	J	[Common]				[Common]				[Common]															
	L	[Common]				[Common]				[Common]															
	E	[Rare]				[Common]				[Common]															
Common rangia <i>Rangia cuneata</i>	A	[Common]				[Abundant]				[Abundant]															
	S	[Common]				[Abundant]				[Abundant]															
	J	[Common]				[Abundant]				[Abundant]															
	L	[Common]				[Abundant]				[Abundant]															
	E	[Common]				[Abundant]				[Abundant]															
Hard clam <i>Mercenaria species</i>	A	[Common]																							
	S	[Common]																							
	J	[Common]																							
	L	[Common]																							
	E	[Common]																							
Bay squid <i>Lolliguncula brevis</i>	A	[Abundant]				[Abundant]				[Common]															
	S	[Rare]																							
	J	[Abundant]				[Abundant]				[Common]															
	L	[Rare]																							
	E					[Abundant]																			
Brown shrimp <i>Penaeus aztecus</i>	A	[Highly Abundant]				[Abundant]				[Common]															
	S	[Common]				[Common]				[Common]															
	J	[Highly Abundant]				[Abundant]				[Abundant]															
	L	[Abundant]				[Common]				[Common]															
	E	[Abundant]				[Common]				[Common]															
		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
		Mississippi Sound				Lake Borgne				Lake Pontchartrain															
		Central Gulf of Mexico Estuaries																							

Relative Abundance

-  Highly Abundant
-  Abundant
-  Common
-  Rare
- Blank Not Present

Life Stage

- A - Adults
- S - Spawning adults
- J - Juveniles
- L - Larvae
- E - Eggs

Table 3, continued. Temporal distribution

		Central Gulf of Mexico Estuaries																							
Estuary		Breton/Chandeleur Sound				Mississippi River				Barataria Bay															
Month		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Species / Life Stage																									
Bay scallop <i>Argopecten irradians</i>	A	.....																						
	S	.....																						
	J	.....																						
	L	.....																						
	E	.....																						
American oyster <i>Crassostrea virginica</i>	A	[Abundant]				.....				[Abundant]														
	S	[Common]				.....				[Common]														
	J	[Abundant]				.....				[Abundant]														
	L	[Common]				.....				[Common]														
	E	[Common]				.....				[Common]														
Common rangia <i>Rangia cuneata</i>	A	[Common]				[Common]				[Abundant]															
	S	[Common]				[Common]				[Abundant]															
	J	[Common]				[Common]				[Abundant]															
	L	[Common]				[Common]				[Abundant]															
	E	[Common]				[Common]				[Abundant]															
Hard clam <i>Mercenaria species</i>	A	[Common]								[Common]															
	S	[Common]								[Common]															
	J	[Common]								[Common]															
	L	[Common]								[Common]															
	E	[Common]								[Common]															
Bay squid <i>Lolliguncula brevis</i>	A	[Common]								..... [Common]														
	S	[Common]								..... [Common]														
	J	[Common]								..... [Common]														
	L																								
	E																								
Brown shrimp <i>Penaeus aztecus</i>	A					[Common]				[Abundant]															
	S					[Common]				[Abundant]															
	J	[Abundant]				[Common]				[Abundant]															
	L	[Abundant]				[Common]				[Abundant]															
	E	[Abundant]				[Common]				[Abundant]															
		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
		Breton/Chandeleur Sound				Mississippi River				Barataria Bay															
		Central Gulf of Mexico Estuaries																							

Relative Abundance

 Highly Abundant
 Abundant
 Common
 Rare
 Blank Not Present

Life Stage

A - Adults
 S - Spawning adults
 J - Juveniles
 L - Larvae
 E - Eggs

Table 3, continued. Temporal distribution

		Central Gulf of Mexico Estuaries																							
Estuary		Terrebonne/Timbalier Bays				Atchafalaya/Vermilion Bays				Calcasieu Lake															
Month		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Species / Life Stage																									
Bay scallop	A																								
	S																								
<i>Argopecten</i>	J																								
<i>irradians</i>	L																								
	E																								
American oyster	A	[Abundant]				[Abundant]				[Common]															
	S	[Common]				[Common]				[Common]															
<i>Crassostrea</i>	J	[Abundant]				[Abundant]				[Common]															
<i>virginica</i>	L	[Abundant]				[Abundant]				[Common]															
	E	[Abundant]				[Abundant]				[Common]															
Common rangia	A	[Abundant]				[Common]				[Common]															
	S	[Abundant]				[Common]				[Common]															
<i>Rangia</i>	J	[Abundant]				[Common]				[Common]															
<i>cuneata</i>	L	[Abundant]				[Common]				[Common]															
	E	[Abundant]				[Common]				[Common]															
Hard clam	A	.....																						
	S	.....																						
<i>Mercenaria</i>	J	.....																						
species	L	.....																						
	E	.....																						
Bay squid	A	[Common]				[Common]				[Common]															
	S	[Common]				[Common]				[Common]															
<i>Lolliguncula</i>	J	[Common]				[Common]				[Common]															
<i>brevis</i>	L	[Common]				[Common]				[Common]															
	E	[Common]				[Common]				[Common]															
Brown shrimp	A																								
	S																								
<i>Penaeus</i>	J	[Highly Abundant]				[Abundant]				[Common]															
<i>aztecus</i>	L	[Highly Abundant]				[Abundant]				[Common]															
	E	[Highly Abundant]				[Abundant]				[Common]															
		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
		Terrebonne/Timbalier Bays				Atchafalaya/Vermilion Bays				Calcasieu Lake															
		Central Gulf of Mexico Estuaries																							

Relative Abundance

-  Highly Abundant
-  Abundant
-  Common
-  Rare
-  Not Present

Life Stage

- A - Adults
- S - Spawning adults
- J - Juveniles
- L - Larvae
- E - Eggs
- M - Mating

Table 3, continued. Temporal distribution

		Central Gulf of Mexico Estuaries		
Estuary		Mississippi Sound	Lake Borgne	Lake Pontchartrain
Month		J F M A M J J A S O N D	J F M A M J J A S O N D	J F M A M J J A S O N D
Species / Life Stage				
Pink shrimp <i>Penaeus duorarum</i>	A	[Common]		
	S	[Common]		
	J	[Common]	.....	.....
	L	[Common]		
	E	[Common]		
White shrimp <i>Penaeus setiferus</i>	A	[Abundant]	[Common]	[Common]
	S	[Common]		
	J	[Highly Abundant]	[Abundant]	[Highly Abundant]
	L	[Abundant]		
	E	[Common]		
Grass shrimp <i>Palaemonetes pugio</i>	A	[Abundant]	[Abundant]	[Common]
	S	[Common]	[Common]	[Common]
	J	[Common]	[Common]	[Common]
	L	[Common]	[Common]	[Common]
	E	[Common]	[Common]	[Common]
Spiny lobster <i>Panulirus argus</i>	A			
	S			
	J			
	L			
	E			
Blue crab <i>Callinectes sapidus</i>	A	[Highly Abundant]	[Highly Abundant]	[Common]
	M	[Common]	[Common]	[Common]
	J	[Highly Abundant]	[Highly Abundant]	
	L	[Common]	[Common]	.....
	S	[Common]	[Common]	
Gulf stone crab <i>Menippe adina</i>	A	.....	.....	.....
	S	[Common]		
	J	[Common]		
	L	[Common]		
	E	[Common]		
		J F M A M J J A S O N D	J F M A M J J A S O N D	J F M A M J J A S O N D
		Mississippi Sound	Lake Borgne	Lake Pontchartrain
Central Gulf of Mexico Estuaries				

Relative Abundance

- [Highly Abundant] Highly Abundant
- [Abundant] Abundant
- [Common] Common
- Rare
- Blank Not Present

Life Stage

- A - Adults
- S - Spawning adults
- J - Juveniles
- L - Larvae
- M - Mating
- E - Eggs

Table 3, continued. Temporal distribution

		Central Gulf of Mexico Estuaries																							
Estuary		Breton/Chandeleur Sound				Mississippi River				Barataria Bay															
Month		J	F	M	A	J	J	A	S	O	N	D	J	F	M	A	J	J	A	S	O	N	D		
Species / Life Stage																									
Pink shrimp <i>Penaeus duorarum</i>	A	[Common]																							
	S																								
	J	[Common]												[Common]											
	L													[Common]											
	E																								
White shrimp <i>Penaeus setiferus</i>	A	[Common]												[Abundant]											
	S	[Common]												[Abundant]											
	J	[Common]				[Common]								[Common]											
	L	[Common]								[Common]				[Common]											
	E	[Common]								[Common]				[Common]											
Grass shrimp <i>Palaemonetes pugio</i>	A	[Abundant]				[Common]				[Abundant]				[Abundant]											
	S	[Abundant]				[Common]				[Abundant]				[Abundant]											
	J	[Abundant]				[Common]				[Abundant]				[Abundant]											
	L	[Abundant]				[Common]				[Abundant]				[Abundant]											
	E	[Abundant]				[Common]				[Abundant]				[Abundant]											
Spiny lobster <i>Panulirus argus</i>	A																								
	S																								
	J																								
	L																								
	E																								
Blue crab <i>Callinectes sapidus</i>	A	[Abundant]				[Common]				[Abundant]				[Abundant]											
	M	[Abundant]				[Common]				[Abundant]				[Abundant]											
	J	[Abundant]				[Common]				[Abundant]				[Abundant]											
	L	[Abundant]				[Common]				[Abundant]				[Abundant]											
	S	[Abundant]				[Common]				[Abundant]				[Abundant]											
Gulf stone crab <i>Menippe adina</i>	A	[Common]				[Common]				[Common]				[Rare]											
	S	[Common]				[Common]				[Common]				[Rare]											
	J	[Common]				[Common]				[Common]				[Rare]											
	L	[Common]				[Common]				[Common]				[Rare]											
	E	[Common]				[Common]				[Common]				[Rare]											
		J <th>F</th> <th>M</th> <th>A</th> <th>J</th> <th>J</th> <th>A</th> <th>S</th> <th>O</th> <th>N</th> <th>D</th> <th>J</th> <th>F</th> <th>M</th> <th>A</th> <th>J</th> <th>J</th> <th>A</th> <th>S</th> <th>O</th> <th>N</th> <th>D</th>	F	M	A	J	J	A	S	O	N	D	J	F	M	A	J	J	A	S	O	N	D		
		Breton/Chandeleur Sound				Mississippi River				Barataria Bay															
		Central Gulf of Mexico Estuaries																							

Relative Abundance

-  Highly Abundant
-  Abundant
-  Common
-  Rare
- Blank Not Present

Life Stage

- A - Adults
- S - Spawning adults
- J - Juveniles
- L - Larvae
- M - Mating
- E - Eggs

Table 3, continued. Temporal distribution

		Central Gulf of Mexico Estuaries																							
Estuary		Terrebonne/Timbalier Bays				Atchafalaya/Vermilion Bays				Calcasieu Lake															
Month		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Species / Life Stage																									
Pink shrimp	A																								
	S																								
<i>Penaeus duorarum</i>	J																			
	L																								
	E																								
White shrimp	A																							
	S																								
<i>Penaeus setiferus</i>	J																								
	L																								
	E																								
Grass shrimp	A																								
	S																								
<i>Palaemonetes pugio</i>	J																								
	L																								
	E																								
Spiny lobster	A																								
	S																								
<i>Panulirus argus</i>	J																								
	L																								
	E																								
Blue crab	A																								
	M																								
<i>Callinectes sapidus</i>	J																								
	L																								
	S																								
Gulf stone crab	A																								
	S																								
<i>Menippe adina</i>	J																								
	L																								
	E																								
		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
		Terrebonne/Timbalier Bays				Atchafalaya/Vermilion Bays				Calcasieu Lake															
		Central Gulf of Mexico Estuaries																							

Relative Abundance

-  Highly Abundant
-  Abundant
-  Common
-  Rare
-  Not Present

Life Stage

- A - Adults
- S - Spawning adults
- J - Juveniles
- L - Larvae
- E - Eggs
- M - Mating

Table 3, continued. Temporal distribution

		Central Gulf of Mexico Estuaries																																			
Estuary		Mississippi Sound				Lake Borgne				Lake Pontchartrain																											
Month		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Species / Life Stage																																					
Bull shark <i>Carcharhinus leucas</i>	A	[Common]				[Common]				[Common]																											
	M	[Common]				[Common]				[Common]																											
	J	[Common]				[Common]				[Common]																											
	P	[Common]				[Common]				[Common]																											
		[Common]				[Common]				[Common]																											
Tarpon <i>Megalops atlanticus</i>	A	[Common]				[Common]				[Common]																											
	S	[Common]				[Common]				[Common]																											
	J	[Common]				[Common]				[Common]																											
	L	[Common]				[Common]				[Common]																											
	E	[Common]				[Common]				[Common]																											
Alabama shad <i>Alosa alabamae</i>	A	[Abundant]				[Common]				[Common]																											
	S	[Abundant]				[Common]				[Common]																											
	J	[Common]				[Common]				[Common]																											
	L	[Abundant]				[Common]				[Common]																											
	E	[Abundant]				[Common]				[Common]																											
Gulf menhaden <i>Brevoortia patronus</i>	A	[Highly Abundant]				[Abundant]				[Common]																											
	S	[Abundant]				[Abundant]				[Common]																											
	J	[Abundant]				[Abundant]				[Common]																											
	L	[Abundant]				[Abundant]				[Common]																											
	E	[Abundant]				[Abundant]				[Common]																											
Yellowfin menhaden <i>Brevoortia smithi</i>	A	[Rare]				[Rare]				[Rare]																											
	S	[Rare]				[Rare]				[Rare]																											
	J	[Rare]				[Rare]				[Rare]																											
	L	[Rare]				[Rare]				[Rare]																											
	E	[Rare]				[Rare]				[Rare]																											
Gizzard shad <i>Dorosoma cepedianum</i>	A	[Abundant]				[Abundant]				[Common]																											
	S	[Abundant]				[Common]				[Common]																											
	J	[Common]				[Abundant]				[Common]																											
	L	[Common]				[Common]				[Common]																											
	E	[Common]				[Common]				[Common]																											
		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
		Mississippi Sound				Lake Borgne				Lake Pontchartrain																											
		Central Gulf of Mexico Estuaries																																			

Relative Abundance

-  Highly Abundant
-  Abundant
-  Common
-  Rare
-  Not Present

Life Stage

- A - Adults
- S - Spawning adults
- J - Juveniles
- L - Larvae
- E - Eggs
- M - Mating
- P - Parturition

Table 3, continued. Temporal distribution

		Central Gulf of Mexico Estuaries		
Estuary		Breton/Chandeleur Sound	Mississippi River	Barataria Bay
Month		J F M A M J J A S O N D	J F M A M J J A S O N D	J F M A M J J A S O N D
Species / Life Stage				
Bull shark	A		.....
	M			.....
<i>Carcharhinus leucas</i>	J		.....	.....
	P			
Tarpon	A		...	.....
	S			.....
<i>Megalops atlanticus</i>	J			.....
	L			
	E			
Alabama shad	A	.....	
	S			
<i>Alosa alabamae</i>	J			
	L			
	E			
Gulf menhaden	A			
	S			
<i>Brevoortia patronus</i>	J			
	L			
	E			
Yellowfin menhaden	A			
	S			
<i>Brevoortia smithi</i>	J			
	L			
	E			
Gizzard shad	A			.....
	S			
<i>Dorosoma cepedianum</i>	J			.....
	L			
	E			
		J F M A M J J A S O N D	J F M A M J J A S O N D	J F M A M J J A S O N D
		Breton/Chandeleur Sound	Mississippi River	Barataria Bay
		Central Gulf of Mexico Estuaries		

Relative Abundance

- Highly Abundant
- Abundant
- Common
- Rare
- Blank Not Present

Life Stage

- A - Adults
- S - Spawning adults
- J - Juveniles
- L - Larvae
- E - Egg
- M - Mating
- P - Parturition

Table 3, continued. Temporal distribution

		Central Gulf of Mexico Estuaries		
Estuary		Terrebonne/Timbalier Bays	Atchafalaya/Vermilion Bays	Calcasieu Lake
Month		J F M A M J J A S O N D	J F M A M J J A S O N D	J F M A M J J A S O N D
Species / Life Stage				
Bull shark	A	..... [ ] .....		.....
	M	.....		.....
<i>Carcharhinus leucas</i>	J	..... [ ] .....	[ ]	.....
	P			
Tarpon	A	.....	.....
	S			
<i>Megalops atlanticus</i>	J			
	L			
	E			
Alabama shad	A			
	S			
<i>Alosa alabamae</i>	J			
	L			
	E			
Gulf menhaden	A	[]		
	S			
<i>Brevoortia patronus</i>	J	[]	[]	[]
	L		[]	[]
	E		[]	[]
Yellowfin menhaden	A			
	S			
<i>Brevoortia smithi</i>	J			
	L			
	E			
Gizzard shad	A	[]	[]	[] []
	S			
<i>Dorosoma cepedianum</i>	J	[]	[]	[] []
	L			
	E			
		J F M A M J J A S O N D	J F M A M J J A S O N D	J F M A M J J A S O N D
		Terrebonne/Timbalier Bays	Atchafalaya/Vermilion Bays	Calcasieu Lake
		Central Gulf of Mexico Estuaries		

Relative Abundance

-  Highly Abundant
-  Abundant
-  Common
-  Rare
- Blank Not Present

Life Stage

- A - Adults
- S - Spawning adults
- J - Juveniles
- L - Larvae
- E - Eggs
- M - Mating
- P - Parturition

Table 3, continued. Temporal distribution

		Central Gulf of Mexico Estuaries		
Estuary		Mississippi Sound	Lake Borgne	Lake Pontchartrain
Month		J F M A M J J A S O N D	J F M A M J J A S O N D	J F M A M J J A S O N D
Species / Life Stage				
Bay anchovy	A			
<i>Anchoa mitchilli</i>	S			
	J			
	L			
	E			
Hardhead catfish	A			
<i>Arius felis</i>	S			
	J			
	L			
	E			
Sheepshead minnow	A			
<i>Cyprinodon variegatus</i>	S			
	J			
	L			
	E			
Gulf killifish	A			
<i>Fundulus grandis</i>	S			
	J			
	L			
	E			
Atlantic silversides	A			
<i>Menidia species</i>	S			
	J			
	L			
	E			
Snook	A			
<i>Centropomus undecimlalis</i>	S			
	J			
	L			
	E			
		J F M A M J J A S O N D	J F M A M J J A S O N D	J F M A M J J A S O N D
		Mississippi Sound	Lake Borgne	Lake Pontchartrain
		Central Gulf of Mexico Estuaries		

Relative Abundance

- Highly Abundant
- Abundant
- Common
- Rare
- Blank Not Present

Life Stage

- A - Adults
- S - Spawning adults
- J - Juveniles
- L - Larvae
- E - Eggs

Table 3, continued. Temporal distribution

		Central Gulf of Mexico Estuaries																							
Estuary		Breton/Chandeleur Sound				Mississippi River				Barataria Bay															
Month		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Species / Life Stage																									
Bay anchovy <i>Anchoa mitchilli</i>	A	██████████				██████████				██████████															
	S	██████████				██████████				██████████															
	J	██████████				██████████				██████████															
	L	██████████				██████████				██████████															
	E	██████████				██████████				██████████															
Hardhead catfish <i>Arius felis</i>	A	▭				██████████				██████████															
	S	▭				██████████				██████████															
	J	██████████				██████████				██████████															
	L	▭				██████████				██████████															
	E	▭				██████████				██████████															
Sheepshead minnow <i>Cyprinodon variegatus</i>	A	▭				██████████				██████████															
	S	▭				██████████				██████████															
	J	██████████				██████████				██████████															
	L	▭				██████████				██████████															
	E	▭				██████████				██████████															
Gulf killifish <i>Fundulus grandis</i>	A	▭				██████████				██████████															
	S	▭				██████████				██████████															
	J	██████████				██████████				██████████															
	L	▭				██████████				██████████															
	E	▭				██████████				██████████															
Atlantic silversides <i>Menidia species</i>	A	▭				██████████				██████████															
	S	▭				██████████				██████████															
	J	██████████				██████████				██████████															
	L	▭				██████████				██████████															
	E	▭				██████████				██████████															
Snook <i>Centropomus undececimalis</i>	A									.....														
	S																								
	J																								
	L																								
	E																								
		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
		Breton/Chandeleur Sound				Mississippi River				Barataria Bay															
		Central Gulf of Mexico Estuaries																							

Relative Abundance

- ██████████ Highly Abundant
- ██████████ Abundant
- ▭ Common
- Rare
- Blank Not Present

Life Stage

- A - Adults
- S - Spawning adults
- J - Juveniles
- L - Larvae
- E - Eggs

Table 3, continued. Temporal distribution

		Central Gulf of Mexico Estuaries																							
Estuary		Mississippi Sound				Lake Borgne				Lake Pontchartrain															
Month		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Species / Life Stage																									
Bluefish	A	[Common]																							
<i>Pomatomus saltatrix</i>	S																								
	J									[Common]															
	L																								
	E																								
Blue runner	A	[Common]																							
<i>Caranx crysos</i>	S	[Abundant]				[Abundant]																			
	J	[Abundant]				[Abundant]																			
	L	[Abundant]				[Abundant]																			
	E	[Abundant]				[Abundant]																			
Crevalle jack	A	[Common]																							
<i>Caranx hippos</i>	S	[Common]								[Common]															
	J	[Common]								[Common]															
	L	[Common]																							
	E	[Common]																							
Florida pompano	A	[Rare]																							
<i>Trachinotus carolinus</i>	S	[Common]																							
	J	[Abundant]																							
	L	[Common]																							
	E	[Common]																							
Gray snapper	A																								
<i>Lutjanus griseus</i>	S																								
	J																								
	L																								
	E																								
Sheepshead	A	[Common]				[Common]				[Common]															
<i>Archosargus probatocephalus</i>	S	[Common]																							
	J	[Common]				[Abundant]				[Common]															
	L	[Common]																							
	E	[Common]																							
		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
		Mississippi Sound				Lake Borgne				Lake Pontchartrain															
		Central Gulf of Mexico Estuaries																							

Relative Abundance

-  Highly Abundant
-  Abundant
-  Common
-  Rare
- Blank Not Present

Life Stage

- A - Adults
- S - Spawning adults
- J - Juveniles
- L - Larvae
- E - Eggs

Table 3, continued. Temporal distribution

		Central Gulf of Mexico Estuaries																																			
Estuary		Breton/Chandeleur Sound				Mississippi River				Barataria Bay																											
Month		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Species / Life Stage																																					
Bluefish <i>Pomatomus saltatrix</i>	A																																				
	S																																				
	J	.....				.....				... [ ]																		
	L																																				
	E																																				
Blue runner <i>Caranx crysos</i>	A																																				
	S																																				
	J																																				
	L																																				
	E																																				
Crevalle jack <i>Caranx hippos</i>	A	[]								[]																											
	S																																				
	J	[]				[]				[]																											
	L																																				
	E																																				
Florida pompano <i>Trachinotus carolinus</i>	A	[]																																			
	S	[]																																			
	J	[]				[]				[]																											
	L	[]																																			
	E	[]																																			
Gray snapper <i>Lutjanus griseus</i>	A																																				
	S																																				
	J	[]								[]																											
	L																																				
	E																																				
Sheepshead <i>Archosargus probatocephalus</i>	A	[]				[]				[]																											
	S																																				
	J	[]				[]				[]																											
	L																																				
	E																																				
		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
		Breton/Chandeleur Sound				Mississippi River				Barataria Bay																											
		Central Gulf of Mexico Estuaries																																			

Relative Abundance

-  Highly Abundant
-  Abundant
-  Common
-  Rare
- Blank Not Present

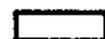
Life Stage

- A - Adults
- S - Spawning adults
- J - Juveniles
- L - Larvae
- E - Eggs

Table 3, continued. Temporal distribution

		Central Gulf of Mexico Estuaries																							
Estuary		Terrebonne/Timbalier Bays				Atchafalaya/Vermilion Bays				Calcasieu Lake															
Month		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Species / Life Stage																									
Bluefish	A																								
<i>Pomatomus saltatrix</i>	S																								
	J	.....				.....				....						
	L																								
	E																								
Blue runner	A																								
<i>Caranx crysos</i>	S																								
	J																								
	L																								
	E																								
Crevalle jack	A	.....																						
<i>Caranx hippos</i>	S	[]				[]				[]															
	J																								
	L																								
	E																								
Florida pompano	A	.....																						
<i>Trachinotus carolinus</i>	S	[ ]				.....				[ ]														
	J																								
	L																								
	E																								
Gray snapper	A																								
<i>Lutjanus griseus</i>	S																								
	J	.....								.....						
	L																								
	E																								
Sheepshead	A	[ ]				[ ]				.....														
<i>Archosargus probatocephalus</i>	S	[]				[]				[]															
	J																								
	L																								
	E																								
		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
		Terrebonne/Timbalier Bays				Atchafalaya/Vermilion Bays				Calcasieu Lake															
		Central Gulf of Mexico Estuaries																							

Relative Abundance

-  Highly Abundant
-  Abundant
-  Common
-  Rare
- Blank Not Present

Life Stage

- A - Adults
- S - Spawning adults
- J - Juveniles
- L - Larvae
- E - Eggs

Table 3, continued. Temporal distribution

		Central Gulf of Mexico Estuaries																							
Estuary		Mississippi Sound				Lake Borgne				Lake Pontchartrain															
Month		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Species / Life Stage																									
Pinfish <i>Lagodon rhomboides</i>	A	[Abundant]				[Common]				[Common]															
	S	[Common]				[Common]				[Common]															
	J	[Abundant]				[Abundant]				[Abundant]															
	L	[Abundant]				[Common]				[Common]															
	E	[Common]				[Common]				[Common]															
Silver perch <i>Bairdiella chrysoura</i>	A	[Highly Abundant]				[Abundant]				[Common]															
	S	[Common]				[Common]				[Common]															
	J	[Highly Abundant]				[Abundant]				[Common]															
	L	[Common]				[Common]				[Common]															
	E	[Common]				[Common]				[Common]															
Sand seatrout <i>Cynoscion arenarius</i>	A	[Highly Abundant]				[Abundant]				[Common]															
	S	[Common]				[Common]				[Common]															
	J	[Abundant]				[Abundant]				[Abundant]															
	L	[Common]				[Common]				[Common]															
	E	[Common]				[Common]				[Common]															
Spotted seatrout <i>Cynoscion nebulosus</i>	A	[Abundant]				[Common]				[Common]															
	S	[Abundant]				[Abundant]				[Common]															
	J	[Abundant]				[Abundant]				[Abundant]															
	L	[Abundant]				[Common]				[Common]															
	E	[Abundant]				[Common]				[Common]															
Spot <i>Leiostomus xanthurus</i>	A	[Highly Abundant]				[Common]				[Common]															
	S	[Abundant]				[Common]				[Common]															
	J	[Highly Abundant]				[Abundant]				[Common]															
	L	[Common]				[Common]				[Common]															
	E	[Highly Abundant]				[Common]				[Common]															
Atlantic croaker <i>Micropogonias undulatus</i>	A	[Abundant]				[Common]				[Common]															
	S	[Abundant]				[Common]				[Common]															
	J	[Highly Abundant]				[Abundant]				[Common]															
	L	[Common]				[Common]				[Common]															
	E	[Abundant]				[Common]				[Common]															
		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
		Mississippi Sound				Lake Borgne				Lake Pontchartrain															
		Central Gulf of Mexico Estuaries																							

Relative Abundance

- [Highly Abundant] Highly Abundant
- [Abundant] Abundant
- [Common] Common
- [Rare] Rare
- [Blank] Not Present

Life Stage

- A - Adults
- S - Spawning adults
- J - Juveniles
- L - Larvae
- E - Eggs

Table 3, continued. Temporal distribution

		Central Gulf of Mexico Estuaries		
Estuary		Breton/Chandeleur Sound	Mississippi River	Barataria Bay
Month		J F M A M J J A S O N D	J F M A M J J A S O N D	J F M A M J J A S O N D
Species / Life Stage				
Pinfish	A			
<i>Lagodon rhomboides</i>	S	Common	Common	Abundant
	J			
	L			
	E			
Silver perch	A	Common	Common	Abundant
<i>Bairdiella chrysoura</i>	S			Abundant
	J	Common	Common	Abundant
	L			Abundant
	E			Abundant
Sand seatrout	A	Common		Common
<i>Cynoscion arenarius</i>	S		Abundant	Abundant
	J	Common	Highly Abundant	Abundant
	L			
	E			
Spotted seatrout	A	Abundant	Abundant	Common
<i>Cynoscion nebulosus</i>	S	Common		Common
	J	Common	Abundant	Common
	L	Common		Common
	E	Common		Common
Spot	A	Common	Abundant	
<i>Leiostomus xanthurus</i>	S			
	J	Abundant	Abundant	Highly Abundant
	L			Abundant
	E			Common
Atlantic croaker	A	Common		
<i>Micropogonias undulatus</i>	S		Highly Abundant	Abundant
	J	Abundant	Highly Abundant	Abundant
	L			Abundant
	E			Abundant
		J F M A M J J A S O N D	J F M A M J J A S O N D	J F M A M J J A S O N D
		Breton/Chandeleur Sound	Mississippi River	Barataria Bay
		Central Gulf of Mexico Estuaries		

Relative Abundance

-  Highly Abundant
-  Abundant
-  Common
-  Rare
- Blank Not Present

Life Stage

- A - Adults
- S - Spawning adults
- J - Juveniles
- L - Larvae
- E - Eggs

Table 3, continued. Temporal distribution

		Central Gulf of Mexico Estuaries		
Estuary		Terrebonne/Timbalier Bays	Atchafalaya/Vermilion Bays	Calcasieu Lake
Month		J F M A M J J A S O N D	J F M A M J J A S O N D	J F M A M J J A S O N D
Species / Life Stage				
Pinfish	A		.....	□
<i>Lagodon rhomboides</i>	S	□	□	□
	J	□		
	L			
	E			
Silver perch	A	□		
<i>Bairdiella chrysoura</i>	S	□	 □
	J	□	□	
	L	□		
	E	□		
Sand seatrout	A	□	□	□
<i>Cynoscion arenarius</i>	S	□	□	□
	J	□	□	□
	L			
	E			
Spotted seatrout	A	□	□	□
<i>Cynoscion nebulosus</i>	S	□	□	□
	J	□	□	□
	L	□	□	□
	E	□	□	□
Spot	A	□		
<i>Leiostomus xanthurus</i>	S			
	J	□	□	□
	L			
	E			
Atlantic croaker	A			
<i>Micropogonias undulatus</i>	S	■	■	■
	J	■	■	■
	L	■	□	
	E	■		
		J F M A M J J A S O N D	J F M A M J J A S O N D	J F M A M J J A S O N D
		Terrebonne/Timbalier Bays	Atchafalaya/Vermilion Bays	Calcasieu Lake
		Central Gulf of Mexico Estuaries		

Relative Abundance

- Highly Abundant
- ▣ Abundant
- Common
- Rare
- Blank Not Present

Life Stage

- A - Adults
- S - Spawning adults
- J - Juveniles
- L - Larvae
- E - Eggs

Table 3, continued. Temporal distribution

		Central Gulf of Mexico Estuaries		
Estuary		Mississippi Sound	Lake Borgne	Lake Pontchartrain
Month		J F M A M J J A S O N D	J F M A M J J A S O N D	J F M A M J J A S O N D
Species / Life Stage				
Black drum <i>Pogonias cromis</i>	A	[Common]	[Rare]	[Common]
	S	[Common]		
	J	[Common]	[Common]	[Common]
	L	[Common]	[Rare]	
	E	[Common]		
Red drum <i>Sciaenops ocellatus</i>	A	[Common]	[Rare]	
	S		[Common]	
	J	[Common]	[Common]	[Common]
	L	[Common]	[Abundant]	
	E	[Common]	[Common]	
Striped mullet <i>Mugil cephalus</i>	A	[Highly Abundant]	[Abundant]	[Common]
	S	[Highly Abundant]		
	J	[Abundant]	[Abundant]	[Abundant]
	L	[Abundant]	[Rare]	
	E	[Abundant]	[Abundant]	
Code goby <i>Gobiosoma robustum</i>	A	[Common]	[Common]	[Common]
	S	[Common]	[Abundant]	[Common]
	J	[Common]	[Abundant]	[Common]
	L	[Common]	[Abundant]	[Common]
	E	[Common]	[Abundant]	[Common]
Spanish mackerel <i>Scomberomorus maculatus</i>	A	[Abundant]		
	S			
	J	[Common]		
	L			
	E			
Gulf flounder <i>Paralichthys albigutta</i>	A	[Common]		
	S	[Common]		
	J	[Common]		
	L	[Common]		
	E	[Common]		
Southern flounder <i>Paralichthys lethostigma</i>	A	[Abundant]	[Common]	[Common]
	S	[Abundant]	[Common]	
	J	[Abundant]	[Common]	[Common]
	L	[Abundant]	[Common]	
	E	[Common]	[Common]	
		J F M A M J J A S O N D	J F M A M J J A S O N D	J F M A M J J A S O N D
		Mississippi Sound	Lake Borgne	Lake Pontchartrain
Central Gulf of Mexico Estuaries				

Relative Abundance

- [Highly Abundant] Highly Abundant
- [Abundant] Abundant
- [Common] Common
- [Rare] Rare
- [Blank] Not Present

Life Stage

- A - Adults
- S - Spawning adults
- J - Juveniles
- L - Larvae
- E - Eggs

Table 3, continued. Temporal distribution

		Central Gulf of Mexico Estuaries																																			
Estuary		Breton/Chandeleur Sound				Mississippi River				Barataria Bay																											
Month		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Species / Life Stage																																					
Black drum <i>Pogonias cromis</i>	A	[Abundant]				[Common]				[Abundant]																											
	S	[Common]				[Common]				[Common]																											
	J	[Abundant]				[Common]				[Common]																											
	L	[Common]				[Common]				[Common]																											
	E	[Common]				[Common]				[Common]																											
		[Common]				[Common]				[Common]																											
Red drum <i>Sciaenops ocellatus</i>	A	[Abundant]				[Common]				[Common]																											
	S	[Common]				[Common]				[Common]																											
	J	[Abundant]				[Common]				[Common]																											
	L	[Common]				[Common]				[Common]																											
	E	[Common]				[Common]				[Common]																											
		[Common]				[Common]				[Common]																											
Striped mullet <i>Mugil cephalus</i>	A	[Abundant]				[Abundant]				[Common]																											
	S	[Common]				[Abundant]				[Common]																											
	J	[Common]				[Abundant]				[Abundant]																											
	L	[Common]				[Common]				[Common]																											
	E	[Common]				[Common]				[Common]																											
		[Common]				[Common]				[Common]																											
Code goby <i>Gobiosoma robustum</i>	A	[Common]				[Common]				[Common]																											
	S	[Common]				[Common]				[Common]																											
	J	[Common]				[Common]				[Common]																											
	L	[Common]				[Common]				[Common]																											
	E	[Common]				[Common]				[Common]																											
		[Common]				[Common]				[Common]																											
Spanish mackerel <i>Scomberomorus maculatus</i>	A	[Common]				[Common]				[Common]																											
	S	[Common]				[Common]				[Common]																											
	J	[Common]				[Common]				[Common]																											
	L	[Common]				[Common]				[Common]																											
	E	[Common]				[Common]				[Common]																											
		[Common]				[Common]				[Common]																											
Gulf flounder <i>Paralichthys albigutta</i>	A	[Common]				[Common]				[Common]																											
	S	[Common]				[Common]				[Common]																											
	J	[Common]				[Common]				[Common]																											
	L	[Common]				[Common]				[Common]																											
	E	[Common]				[Common]				[Common]																											
		[Common]				[Common]				[Common]																											
Southern flounder <i>Paralichthys lethostigma</i>	A	[Abundant]				[Abundant]				[Abundant]																											
	S	[Common]				[Abundant]				[Abundant]																											
	J	[Common]				[Abundant]				[Abundant]																											
	L	[Common]				[Common]				[Common]																											
	E	[Common]				[Common]				[Common]																											
		[Common]				[Common]				[Common]																											
		J <th>F</th> <th>M</th> <th>A</th> <th>M</th> <th>J</th> <th>J</th> <th>A</th> <th>S</th> <th>O</th> <th>N</th> <th>D</th> <td>J<th>F</th><th>M</th><th>A</th><th>M</th><th>J</th><th>J</th><th>A</th><th>S</th><th>O</th><th>N</th><th>D</th> <td>J<th>F</th><th>M</th><th>A</th><th>M</th><th>J</th><th>J</th><th>A</th><th>S</th><th>O</th><th>N</th><th>D</th> </td></td>	F	M	A	M	J	J	A	S	O	N	D	J <th>F</th> <th>M</th> <th>A</th> <th>M</th> <th>J</th> <th>J</th> <th>A</th> <th>S</th> <th>O</th> <th>N</th> <th>D</th> <td>J<th>F</th><th>M</th><th>A</th><th>M</th><th>J</th><th>J</th><th>A</th><th>S</th><th>O</th><th>N</th><th>D</th> </td>	F	M	A	M	J	J	A	S	O	N	D	J <th>F</th> <th>M</th> <th>A</th> <th>M</th> <th>J</th> <th>J</th> <th>A</th> <th>S</th> <th>O</th> <th>N</th> <th>D</th>	F	M	A	M	J	J	A	S	O	N	D
		Breton/Chandeleur Sound				Mississippi River				Barataria Bay																											
		Central Gulf of Mexico Estuaries																																			

Relative Abundance

-  Highly Abundant
-  Abundant
-  Common
-  Rare
-  Not Present

Life Stage

- A - Adults
- S - Spawning adults
- J - Juveniles
- L - Larvae
- E - Eggs

Table 3, continued. Temporal distribution

		Central Gulf of Mexico Estuaries																																			
Estuary		Terrebonne/Timbalier Bays				Atchafalaya/Vermilion Bays				Calcasieu Lake																											
Month		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D												
Species / Life Stage																																					
Black drum	A	[Common]				[Common]				[Common]																											
	S	[Common]																																			
<i>Pogonias cromis</i>	J	[Common]				[Common]				[Common]				[Common]				[Common]																			
	L	[Common]																																			
	E	[Common]																																			
Red drum	A	[Rare]				[Rare]																															
	S																																				
<i>Sciaenops ocellatus</i>	J	[Common]				[Common]				[Abundant]				[Abundant]																							
	L																																				
	E																																				
Striped mullet	A	[Common]	[Common]			[Common]				[Abundant]																											
	S																																				
<i>Mugil cephalus</i>	J	[Abundant]				[Abundant]				[Abundant]				[Abundant]																							
	L																																				
	E																																				
Code goby	A																																				
	S																																				
<i>Gobiosoma robustum</i>	J																																				
	L																																				
	E																																				
Spanish mackerel	A	[Rare]																																			
	S																																				
<i>Scomberomorus maculatus</i>	J	[Common]				[Common]				[Common]																											
	L																																				
	E																																				
Gulf flounder	A																																				
	S																																				
<i>Paralichthys albigutta</i>	J																																				
	L																																				
	E																																				
Southern flounder	A	[Common]				[Common]				[Common]				[Common]																							
	S																																				
<i>Paralichthys lethostigma</i>	J	[Common]				[Common]				[Common]				[Abundant]																							
	L																																				
	E																																				
		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D												
		Terrebonne/Timbalier Bays				Atchafalaya/Vermilion Bays				Calcasieu Lake																											
		Central Gulf of Mexico Estuaries																																			

Relative Abundance

-  Highly Abundant
-  Abundant
-  Common
-  Rare
- Blank Not Present

Life Stage

- A - Adults
- S - Spawning adults
- J - Juveniles
- L - Larvae
- E - Eggs

Table 4. Data reliability

Index to Table 4. Page location of data reliability table for each species and estuary.

Common and Scientific Name	Estuary							
	Mississippi Sound	Lake Borgne	Breton and Chandeleur Sound	Lake Pontchartrain	Mississippi River	Barataria Bay	Terrebonne and Timbalier Bays	Atchafalaya and Vermilion Bays	Calcasieu Lake
Bay scallop (<i>Argopecten irradians</i>) American oyster (<i>Crassostrea virginica</i>) Common rangia (<i>Rangia cuneata</i>) Hard clam (<i>Mercenaria</i> species) Bay squid (<i>Lolliguncula brevis</i>) Brown shrimp (<i>Penaeus aztecus</i>)	p. 50							
Pink shrimp (<i>Penaeus duorarum</i>) White shrimp (<i>Penaeus setiferus</i>) Grass shrimp (<i>Palaemonetes pugio</i>) Spiny lobster (<i>Parulirus argus</i>) Blue crab (<i>Callinectes sapidus</i>) Gulf stone crab (<i>Menippe adina</i>)	p. 51							
Bull shark (<i>Carcharhinus leucas</i>) Tarpon (<i>Megalops atlanticus</i>) Alabama shad (<i>Alosa alabamae</i>) Gulf menhaden (<i>Brevoortia patronus</i>) Yellowfin menhaden (<i>Brevoortia smithi</i>) Gizzard shad (<i>Dorosoma cepedianum</i>)	p. 52							
Bay anchovy (<i>Anchoa mitchilli</i>) Hardhead catfish (<i>Arius felis</i>) Sheepshead minnow (<i>Cyprinodon variegatus</i>) Gulf killifish (<i>Fundulus grandis</i>) Atlantic silversides (<i>Menidia</i> species) Snook (<i>Centropomus undecimalis</i>)	p. 53							
Bluefish (<i>Pomatomus saltatrix</i>) Blue runner (<i>Caranx crysos</i>) Crevaille jack (<i>Caranx hippos</i>) Florida pompano (<i>Trachinotus carolinus</i>) Gray snapper (<i>Lutjanus griseus</i>) Sheepshead (<i>Archosargus probatocephalus</i>)	p. 54							
Pinfish (<i>Lagodon rhomboides</i>) Silver perch (<i>Bairdiella chrysoura</i>) Sand seatrout (<i>Cynoscion arenarius</i>) Spotted seatrout (<i>Cynoscion nebulosus</i>) Spot (<i>Leiostomus xanthurus</i>) Atlantic croaker (<i>Micropogonias undulatus</i>)	p. 55							
Black drum (<i>Pogonias cromis</i>) Red drum (<i>Sciaenops ocellatus</i>) Striped mullet (<i>Mugil cephalus</i>) Code goby (<i>Gobiosoma robustum</i>) Spanish mackerel (<i>Scomberomorus maculatus</i>) Gulf flounder (<i>Paralichthys albigutta</i>) Southern flounder (<i>Paralichthys lethostigma</i>)	p. 56							

Table 4. Data reliability

Species/Life Stage		Central Gulf of Mexico Estuaries								
		Mississippi Sound	Lake Borgne	Lake Pontchartrain	Breton/Chandeleur Sounds	Mississippi River	Barataria Bay	Terrebonne/Timbalier Bays	Atchafalaya/Vermilion Bays	Calcasieu Lake
Bay scallop	A	■	■	■	■	■	■	■	■	■
<i>Argopecten irradians</i>	S	□	■	■	■	■	■	■	■	■
	J	■	■	■	■	■	■	■	■	■
	L	□	■	■	■	■	■	■	■	■
	E	□	■	■	■	■	■	■	■	■
American oyster	A	■	■	■	■	■	□	■	■	
<i>Crassostrea virginica</i>	S	□	■	■	■	■	■	■	■	
	J	■	■	■	■	■	□	■	■	
	L	□	■	■	■	■	■	■	■	
	E	□	■	■	■	■	■	■	■	
Common rangia	A	□	■	■	■	■	■	□	■	
<i>Rangia cuneata</i>	S	□	■	■	■	□	■	□	■	
	J	□	■	■	■	■	■	□	■	
	L	□	■	■	■	□	■	□	■	
	E	□	■	■	■	□	■	□	■	
Hard clam	A	□	■	■	■	■	□	□	■	
<i>Mercenaria species</i>	S	□	■	■	■	■	□	□	■	
	J	□	■	■	■	■	□	□	■	
	L	□	■	■	■	■	□	□	■	
	E	□	■	■	■	■	□	□	■	
Bay squid	A	■	■	□	■	□	■	■	■	
<i>Lolliguncula brevis</i>	S	□	□	■	□	■	□	■	■	
	J	□	■	□	■	□	■	■	■	
	L	□	□	■	□	■	□	■	■	
	E	□	□	■	□	■	□	■	■	
Brown shrimp	A	□	■	■	■	■	■	■	■	
<i>Penaeus aztecus</i>	S	■	■	■	■	■	■	■	■	
	J	□	■	■	■	■	□	■	□	
	L	□	□	□	■	■	□	■	□	
	E	■	■	■	■	■	■	■	■	
		Mississippi Sound	Lake Borgne	Lake Pontchartrain	Breton/Chandeleur Sounds	Mississippi River	Barataria Bay	Terrebonne/Timbalier Bays	Atchafalaya/Vermilion Bays	Calcasieu Lake
Central Gulf of Mexico Estuaries										

Reliability

- Highly Certain
- Moderately Certain
- Reasonable Inference

Life Stage

- A - Adults
- S - Spawning adults
- J - Juveniles
- L - Larvae
- E - Eggs

Table 4, continued. Data reliability

Species/Life Stage		Central Gulf of Mexico Estuaries								
		Mississippi Sound	Lake Borgne	Lake Pontchartrain	Breton/Chandeleur Sounds	Mississippi River	Barataria Bay	Terrebonne/Timbalier Bays	Atchafalaya/Vermilion Bays	Calcasieu Lake
Pink shrimp <i>Penaeus duorarum</i>	A	□	■	■	■	■	□	■	■	■
	S	□	■	■	■	■	■	■	■	■
	J	□	■	■	■	■	■	■	■	■
	L	■	■	■	■	■	■	■	■	■
	E	□	■	■	■	■	□	■	■	■
White shrimp <i>Penaeus setiferus</i>	A	□	■	■	□	■	□	■	■	□
	S	■	■	■	□	■	□	■	■	■
	J	■	■	■	□	■	□	■	■	□
	L	■	■	■	□	■	□	■	■	□
	E	■	■	■	□	■	□	■	■	■
Grass shrimp <i>Palaemonetes pugio</i>	A	□	■	■	■	■	■	■	■	■
	S	□	■	■	■	■	■	■	■	■
	J	□	■	■	■	■	■	■	■	■
	L	□	■	■	■	■	■	■	■	■
	E	□	■	■	■	■	■	■	■	■
Spiny lobster <i>Panulirus argus</i>	A	■	■	■	■	■	■	■	■	■
	S	■	■	■	■	■	■	■	■	■
	J	□	■	■	■	■	■	■	■	■
	L	□	■	■	■	■	■	■	■	■
	E	□	■	■	■	■	■	■	■	■
Blue crab <i>Callinectes sapidus</i>	A	■	■	■	■	■	□	□	■	■
	M	■	□	■	■	□	□	□	■	■
	J	■	■	■	■	■	□	□	■	■
	L	■	■	■	■	■	□	□	■	■
	S	■	■	■	■	□	■	■	■	■
Gulf stone crab <i>Menippe adina</i>	A	■	■	■	■	■	□	□	□	□
	S	■	■	■	■	□	□	□	□	□
	J	■	■	■	■	■	□	□	□	□
	L	■	■	■	■	□	□	□	□	□
	E	■	■	■	■	□	□	□	□	□
		Mississippi Sound	Lake Borgne	Lake Pontchartrain	Breton/Chandeleur Sounds	Mississippi River	Barataria Bay	Terrebonne/Timbalier Bays	Atchafalaya/Vermilion Bays	Calcasieu Lake
Central Gulf of Mexico Estuaries										

Reliability
 ■ Highly Certain
 ■ Moderately Certain
 □ Reasonable Inference

Life Stage
 A - Adults
 S - Spawning adults
 J - Juveniles
 L - Larvae
 E - Eggs
 M - Mating

Table 4 (continued). Data reliability

Species/Life Stage		Central Gulf of Mexico Estuaries								
		Mississippi Sound	Lake Borgne	Lake Pontchartrain	Breton/Chandeleur Sounds	Mississippi River	Barataria Bay	Terrebonne/Timbalier Bays	Atchafalaya/Vermilion Bays	Calcasieu Lake
Bull shark <i>Carcharhinus leucas</i>	A	□	■	■	■	■	□	□	□	□
	M	■	■	■	■	■	■	■	■	□
	J	□	■	■	■	■	□	□	□	□
	P	■	□	■	□	□	□	□	□	□
Tarpon <i>Megalops atlanticus</i>	A	□	■	■	■	■	■	□	□	■
	S	□	■	■	■	■	□	■	■	■
	J	■	■	■	■	■	■	□	■	■
	L	□	■	■	■	■	□	■	■	■
E	□	■	■	■	■	□	■	■	■	
Alabama shad <i>Alosa alabamae</i>	A	□	■	■	■	■	■	■	■	■
	S	■	■	■	■	■	■	■	■	■
	J	□	■	■	■	■	■	■	■	■
	L	■	■	■	■	■	■	■	■	■
E	■	■	■	■	■	■	■	■	■	
Gulf menhaden <i>Brevoortia patronus</i>	A	□	■	■	■	■	□	□	■	■
	S	□	■	■	■	■	■	■	■	■
	J	□	■	■	■	■	□	■	■	□
	L	□	■	□	■	■	■	■	■	□
E	□	■	■	■	■	■	■	■	■	
Yellowfin menhaden <i>Brevoortia smithi</i>	A	■	■	□	■	■	■	■	■	■
	S	□	■	■	■	■	■	■	■	■
	J	□	■	□	■	■	■	■	■	■
	L	□	■	■	■	■	■	■	■	■
E	□	■	■	■	■	■	■	■	■	
Gizzard shad <i>Dorosoma cepedianum</i>	A	■	■	■	■	□	□	□	■	□
	S	■	■	■	■	■	■	■	■	■
	J	□	■	■	■	■	□	□	■	□
	L	□	■	■	■	■	■	■	■	■
E	□	■	■	■	■	■	■	■	■	
		Mississippi Sound	Lake Borgne	Lake Pontchartrain	Breton/Chandeleur Sounds	Mississippi River	Barataria Bay	Terrebonne/Timbalier Bays	Atchafalaya/Vermilion Bays	Calcasieu Lake
Central Gulf of Mexico Estuaries										

Reliability

- Highly Certain
- Moderately Certain
- Reasonable Inference

Life Stage

- A - Adults
- S - Spawning adults
- J - Juveniles
- L - Larvae
- E - Eggs
- M - Mating
- P - Parturition

Table 4 (continued). Data reliability

Species/Life Stage		Central Gulf of Mexico Estuaries								
		Mississippi Sound	Lake Borgne	Lake Pontchartrain	Breton/Chandeleur Sounds	Mississippi River	Barataria Bay	Terrebonne/Timbalier Bays	Atchafalaya Vermilion Bays	Calcasieu Lake
Bay anchovy <i>Anchoa mitchilli</i>	A	■	■	■	■	■	■	■	■	□
	S	■	■	■	■	■	■	■	■	■
	J	□	■	■	■	■	■	■	■	□
	L	□	■	■	■	■	■	■	■	□
Hardhead catfish <i>Arius felis</i>	E	□	■	■	■	■	■	■	■	■
	A	■	■	■	■	■	□	□	□	□
	S	□	■	■	■	■	■	■	■	□
	J	□	■	■	■	■	□	□	□	□
Sheepshead minnow <i>Cyprinodon variegatus</i>	L	□	■	■	■	■	□	□	□	□
	E	□	■	■	□	■	□	□	□	□
	A	■	■	■	□	■	□	□	□	□
	S	□	■	■	□	■	□	□	□	□
Gulf killifish <i>Fundulus grandis</i>	J	□	■	■	□	■	■	■	□	□
	L	□	□	■	□	■	□	□	□	□
	E	□	□	■	□	■	□	■	■	■
	A	□	■	■	□	■	■	■	□	□
Atlantic silversides <i>Menidia species</i>	S	□	■	■	□	■	□	□	□	□
	J	□	■	■	□	■	□	□	□	□
	L	□	■	■	□	■	□	□	□	□
	E	□	■	■	□	■	■	□	□	□
Snook <i>Centropomus undececimialis</i>	A	■	■	■	■	■	□	■	■	■
	S	■	■	■	■	■	□	■	■	■
	J	■	■	■	■	■	□	■	■	■
	L	■	■	■	■	■	□	■	■	■
	E	■	■	■	■	■	□	■	■	■
		Mississippi Sound	Lake Borgne	Lake Pontchartrain	Breton/Chandeleur Sounds	Mississippi River	Barataria Bay	Terrebonne/Timbalier Bays	Atchafalaya Vermilion Bays	Calcasieu Lake
	Central Gulf of Mexico Estuaries									

Reliability

- Highly Certain
- ▣ Moderately Certain
- Reasonable Inference

Life Stage

- A - Adults
- S - Spawning adults
- J - Juveniles
- L - Larvae
- E - Eggs

Table 4 (continued). Data reliability

Species/Life Stage		Central Gulf of Mexico Estuaries								
		Mississippi Sound	Lake Borgne	Lake Pontchartrain	Breton/Chandeleur Sounds	Mississippi River	Barataria Bay	Terrebonne/Timbalier Bays	Atchafalaya/Vermilion Bays	Calcasieu Lake
Bluefish <i>Pomatomus saltatrix</i>	A	□	■	■	■	■	■	■	■	■
	S	□	■	■	■	■	■	■	■	■
	J	□	□	■	■	■	■	■	■	□
	L	□	■	■	■	■	□	■	■	■
	E	□	■	■	■	■	■	■	■	■
Blue runner <i>Caranx crysos</i>	A	■	■	■	■	■	■	■	■	■
	S	■	■	■	■	■	■	■	■	■
	J	■	■	■	□	■	■	□	■	■
	L	□	■	■	■	■	■	■	■	■
	E	□	■	■	■	■	■	■	■	■
Crevalle jack <i>Caranx hippos</i>	A	□	■	■	■	■	■	■	■	■
	S	□	■	■	■	■	■	■	■	■
	J	■	■	■	■	■	■	■	□	□
	L	□	■	■	■	■	■	■	■	■
	E	□	■	■	■	■	■	■	■	■
Florida pompano <i>Trachinotus carolinus</i>	A	□	■	■	■	■	■	□	■	■
	S	□	■	■	■	■	■	■	■	■
	J	■	■	■	■	□	■	□	□	□
	L	□	■	■	■	■	□	■	■	■
	E	□	■	■	■	■	■	■	■	■
Gray snapper <i>Lutjanus griseus</i>	A	■	■	■	■	■	■	■	■	■
	S	■	■	■	■	■	■	■	■	■
	J	■	■	■	■	■	■	■	□	□
	L	■	■	■	■	■	■	■	■	■
	E	■	■	■	■	■	■	■	■	■
Sheepshead <i>Archosargus probatocephalus</i>	A	■	■	■	■	■	■	□	□	□
	S	■	■	■	□	■	□	□	■	■
	J	□	■	■	■	■	■	□	□	□
	L	■	■	■	□	■	□	□	■	■
	E	□	■	■	□	■	□	□	■	■
		Mississippi Sound	Lake Borgne	Lake Pontchartrain	Breton/Chandeleur Sounds	Mississippi River	Barataria Bay	Terrebonne/Timbalier Bays	Atchafalaya/Vermilion Bays	Calcasieu Lake
Central Gulf of Mexico Estuaries										

Reliability

- Highly Certain
- Moderately Certain
- Reasonable Inference

Life Stage

- A - Adults
- S - Spawning adults
- J - Juveniles
- L - Larvae
- E - Eggs

Table 4 (continued). Data reliability

Species/Life Stage		Central Gulf of Mexico Estuaries								
		Mississippi Sound	Lake Borgne	Lake Pontchartrain	Breton/Chandeleur Sounds	Mississippi River	Barataria Bay	Terrebonne/Timbalier Bays	Atchafalaya/Vermilion Bays	Calcasieu Lake
Pinfish <i>Lagodon rhomboides</i>	A	■	■	□	■	■	□	■	□	□
	S	■	■	■	■	■	■	■	■	■
	J	■	■	■	■	■	■	■	□	□
	L	■	■	■	■	■	□	■	■	■
	E	■	■	■	■	■	■	■	■	■
Silver perch <i>Bairdiella chrysoura</i>	A	□	■	□	■	■	■	■	□	□
	S	■	□	□	□	■	□	■	■	■
	J	□	■	□	■	■	■	■	□	□
	L	□	□	□	□	■	□	■	■	■
	E	□	□	□	□	■	□	■	■	■
Sand seatrout <i>Cynoscion arenarius</i>	A	■	■	□	■	■	■	□	□	□
	S	■	□	□	□	■	□	□	■	■
	J	□	■	□	■	■	□	□	□	□
	L	■	□	□	□	■	□	□	■	■
	E	■	□	□	□	■	□	□	■	■
Spotted seatrout <i>Cynoscion nebulosus</i>	A	■	■	■	■	■	□	□	□	□
	S	■	■	■	□	■	□	■	■	■
	J	■	■	■	■	■	□	□	□	□
	L	■	■	■	□	■	□	■	■	■
	E	■	■	■	□	■	□	■	■	■
Spot <i>Leiostomus xanthurus</i>	A	□	■	□	□	■	■	■	■	■
	S	■	■	■	■	■	■	■	■	■
	J	□	■	■	□	■	■	□	□	□
	L	□	■	□	■	■	■	■	■	■
	E	■	■	■	■	■	■	■	■	■
Atlantic croaker <i>Micropogonias undulatus</i>	A	■	■	□	□	■	■	■	■	■
	S	■	■	■	■	■	■	■	■	■
	J	□	■	■	□	□	■	□	□	□
	L	■	■	■	■	■	■	■	■	■
	E	□	■	■	■	■	■	■	■	■
		Mississippi Sound	Lake Borgne	Lake Pontchartrain	Breton/Chandeleur Sounds	Mississippi River	Barataria Bay	Terrebonne/Timbalier Bays	Atchafalaya/Vermilion Bays	Calcasieu Lake
Central Gulf of Mexico Estuaries										

Reliability

- Highly Certain
- ▣ Moderately Certain
- Reasonable Inference

Life Stage

- A - Adults
- S - Spawning adults
- J - Juveniles
- L - Larvae
- E - Eggs

Table 4 (continued). Data reliability

Species/Life Stage		Central Gulf of Mexico Estuaries								
		Mississippi Sound	Lake Borgne	Lake Pontchartrain	Breton/Chandeleur Sounds	Mississippi River	Barataria Bay	Terrebonne/Timbalier Bays	Atchafalaya Vermilion Bays	Calcasieu Lake
Black drum <i>Pogonias cromis</i>	A	□	■	■	■	■	■	■	□	□
	S	■	■	■	□	■	□	■	■	■
	J	■	■	■	□	■	■	■	□	□
	L	■	■	■	□	■	□	■	■	■
	E	■	■	■	□	■	□	■	■	■
Red drum <i>Sciaenops ocellatus</i>	A	□	■	■	■	■	□	□	□	□
	S	■	■	■	□	■	□	■	■	■
	J	□	■	■	■	■	□	■	□	□
	L	■	■	■	□	■	■	■	■	■
	E	■	■	■	□	■	□	■	■	■
Striped mullet <i>Mugil cephalus</i>	A	■	■	□	□	■	□	□	□	□
	S	■	■	■	■	■	■	■	■	■
	J	■	■	■	□	□	□	□	□	□
	L	■	■	■	■	■	□	■	■	■
	E	■	■	■	■	■	■	■	■	■
Code goby <i>Gobiosoma robustum</i>	A	■	■	□	□	■	□	■	□	■
	S	■	□	□	□	■	□	■	□	■
	J	■	■	□	□	■	□	■	□	■
	L	■	□	□	□	■	□	■	□	■
	E	■	□	□	□	■	□	■	□	■
Spanish mackerel <i>Scomberomorus maculatus</i>	A	□	■	■	■	■	■	■	■	■
	S	□	■	■	■	■	■	■	■	■
	J	□	■	■	■	■	□	■	□	□
	L	□	■	■	■	■	■	■	■	■
	E	□	■	■	■	■	■	■	■	■
Gulf flounder <i>Paralichthys albigutta</i>	A	■	■	■	■	■	■	■	■	■
	S	■	■	■	■	■	■	■	■	■
	J	■	■	■	■	■	■	■	■	■
	L	□	■	■	■	■	■	■	■	■
	E	□	■	■	■	■	■	■	■	■
Southern flounder <i>Paralichthys lethostigma</i>	A	□	■	□	■	■	■	□	□	□
	S	■	■	■	■	■	□	■	■	■
	J	□	■	■	■	■	■	□	□	□
	L	□	■	■	■	■	□	■	■	■
	E	■	■	■	■	■	□	■	■	■
		Mississippi Sound	Lake Borgne	Lake Pontchartrain	Breton/Chandeleur Sounds	Mississippi River	Barataria Bay	Terrebonne/Timbalier Bays	Atchafalaya Vermilion Bays	Calcasieu Lake
Central Gulf of Mexico Estuaries										

Reliability

- Highly Certain
- Moderately Certain
- Reasonable Inference

Life Stage

- A - Adults
- S - Spawning adults
- J - Juveniles
- L - Larvae
- E - Eggs

Appendices

- Appendix 1. National Estuarine Inventory map of Barataria Bay
- Appendix 2. Table of references and personal communications
- Appendix 3. Personal communications
- Appendix 4. References

Appendix 1. National Estuarine Inventory Map of Barataria Bay

3.25 Barataria Bay, LA



From NEI Supplement 3 (Shirzad et al. 1989).

Appendix 2. Table of references and personal communications

Species	Mississippi Sound
Bay scallop <i>Argopecten irradians</i>	30 Demoran
American oyster <i>Crassostrea virginica</i>	22, 25, 27, 30, 60, 54, 93, 96 Demoran
Common rangia <i>Rangia cuneata</i>	30, 136 Demoran
Hard clam <i>Mercenaria species</i>	30 Demoran
Bay squid <i>Lolliguncula brevis</i>	13, 19, 30, 147, 155, 176, 192 Warren
Brown shrimp <i>Peneaus aztecus</i>	13, 19, 22, 28, 29, 30, 76, 93, 97, 145, 176, 192, 195, 196 Warren
Pink shrimp <i>Peneaus duorarum</i>	19, 28, 29, 30, 145, 176, 192 Warren
White shrimp <i>Penaeus setiferus</i>	13, 19, 22, 28, 29, 30, 76, 93, 145, 176, 192, 196 Warren
Grass shrimp <i>Palaemonetes pugio</i>	13, 30, 97, 155, 176, 192 Warren
Spiny lobster <i>Panulirus argus</i>	Waller
Blue crab <i>Callinectes sapidus</i>	13, 19, 22, 30, 136, 145, 147, 149, 176, 192 Warren
Gulf stone crab <i>Menippe adina</i>	13, 30
Bull shark <i>Carcharhinus leucas</i>	5, 73, 116, 155 Waller
Tarpon <i>Megalops atlanticus</i>	155 Waller
Alabama shad <i>Alosa alabamae</i>	Warren
Gulf menhaden <i>Brevoortia patronus</i>	5, 13, 19, 30, 61, 93, 97, 145, 148, 161, 176, 192 Warren
Yellowfin menhaden <i>Brevoortia smithii</i>	30 Warren
Gizzard shad <i>Dorosoma cepedianum</i>	Warren
Bay anchovy <i>Anchoa mitchilli</i>	13, 19, 22, 30, 58, 73, 97, 145, 148, 155, 161, 176, 192 Warren
Hardhead catfish <i>Arius felis</i>	5, 13, 19, 30, 58, 73, 97, 99, 145, 161, 176, 190 Warren
Sheepshead minnow <i>Cyprinodon variegatus</i>	30, 33, 73, 97, 145, 176 Warren
Gulf killifish <i>Fundulus grandis</i>	22, 30, 33, 73, 97, 145 Warren
Atlantic silversides <i>Menidia species</i>	13, 19, 30, 33, 73, 78, 145, 161, 176 Warren
Snook <i>Centropomus undecemalis</i>	Waller
Bluefish <i>Pomatomus saltatrix</i>	5, 19, 116, 155, 161 Waller
Blue runner <i>Caranx crysus</i>	30, 73, 155 Warren
Crevalle jack <i>Caranx hippos</i>	5, 13, 19, 30, 73, 116, 145, 155, 161, 176, 192 Warren
Florida pompano <i>Trachinotus carolinus</i>	5, 19, 30, 145, 161, 176 Warren
Gray snapper <i>Lutjanus griseus</i>	19, 161 Warren
Sheepshead <i>Archosargus probatocephalus</i>	5, 13, 19, 30, 61, 73, 97, 116, 145, 161, 176, 192 Warren
Pinfish <i>Lagodon rhomboides</i>	5, 19, 30, 73, 116, 145, 161, 176, 192 Warren
Silver perch <i>Bairdiella chysoura</i>	5, 13, 30, 73, 116, 145, 161, 176, 192 Warren
Sand seatrout <i>Cynoscion arenarius</i>	5, 13, 19, 22, 30, 61, 73, 97, 116, 145, 155, 176, 192 Warren
Spotted seatrout <i>Cynoscion nebulosus</i>	5, 13, 19, 22, 30, 37, 61, 73, 93, 97, 116, 145, 176, 192 Warren
Spot <i>Leiostomus xanthurus</i>	5, 13, 19, 30, 73, 97, 116, 145, 161, 176, 192 Warren
Atlantic croaker <i>Micropogonias undulatus</i>	5, 13, 19, 22, 30, 61, 73, 93, 116, 140, 145, 176, 192 Warren
Black drum <i>Pogonias cromis</i>	5, 13, 19, 22, 25, 30, 61, 93, 116 Warren
Red drum <i>Sciaenops ocellatus</i>	5, 19, 22, 30, 61, 73, 93, 116, 139, 145, 171 Warren
Striped mullet <i>Mugil cephalus</i>	5, 19, 22, 30, 61, 73, 93, 97, 145, 161, 176 Warren
Code goby <i>Gobiosoma robustum</i>	155 Warren
Spanish mackerel <i>Scomberomorus maculatus</i>	5, 13, 19, 30, 116, 145, 155, 161, 176, 192 Warren
Gulf flounder <i>Paralichthys albigutta</i>	19, 30, 73 Warren
Southern flounder <i>Paralichthys lethostigma</i>	5, 13, 19, 30, 61, 73, 116, 145, 161, 192 Warren

Numbers correspond to references listed in Appendix 4, References, pp. 73-82.

Names correspond to individuals listed in Appendix 3, Personal Communications, p. 71.

Appendix 2, continued. Table of references and personal communications

Species	Lake Borgne
Bay scallop <i>Argopecten irradians</i>	Savoie, Soniat
American oyster <i>Crassostrea virginica</i>	22, 27, 54, 93 Savoie, Soniat
Common rangia <i>Rangia cuneata</i>	69 Savoie, Soniat
Hard clam <i>Mercenaria species</i>	Savoie
Bay squid <i>Loliguncula brevis</i>	13, 30, 69, 145 Savoie, Soniat
Brown shrimp <i>Peneaus aztecus</i>	13, 22, 30, 41, 69, 76, 93, 145, 195, 196 Savoie, Soniat
Pink shrimp <i>Peneaus duorarum</i>	30, 145 Savoie, Soniat
White shrimp <i>Penaeus setiferus</i>	13, 22, 30, 41, 76, 93, 145, 196 Savoie, Soniat
Grass shrimp <i>Palaemonetes pugio</i>	13, 30, 69 Savoie, Soniat
Spiny lobster <i>Panulirus argus</i>	Savoie, Soniat
Blue crab <i>Callinectes sapidus</i>	13, 22, 30, 41, 69, 145, 147, 149 Savoie, Soniat
Gulf stone crab <i>Menippe adina</i>	13, 30, 41, 145 Savoie, Soniat
Bull shark <i>Carcharhinus leucas</i>	5, 69 Savoie
Tarpon <i>Megalops atlanticus</i>	Savoie
Alabama shad <i>Alosa alabamae</i>	41 Savoie
Gulf menhaden <i>Brevoortia patronus</i>	5, 13, 22, 30, 41, 69, 93, 145, 162 Savoie
Yellowfin menhaden <i>Brevoortia smithii</i>	Savoie
Gizzard shad <i>Dorosoma cepedianum</i>	33, 41, 69, 126 Savoie
Bay anchovy <i>Anchoa mitchilli</i>	13, 22, 30, 41, 69, 145, 165 Savoie
Hardhead catfish <i>Arius felis</i>	5, 13, 30, 41, 69, 145, 162 Savoie
Sheepshead minnow <i>Cyprinodon variegatus</i>	30, 69, 145 Savoie
Gulf killifish <i>Fundulus grandis</i>	30, 69, 145 Savoie
Atlantic silversides <i>Menidia species</i>	13, 30, 41, 69, 145 Savoie
Snook <i>Centropomus undecemalis</i>	Savoie
Bluefish <i>Pomatomus saltatrix</i>	5 Savoie
Blue runner <i>Caranx crysus</i>	Savoie
Crevalle jack <i>Caranx hippos</i>	5, 13, 30, 41, 69, 145 Savoie
Florida pompano <i>Trachinotus carolinus</i>	5, 30, 69, 145 Savoie
Gray snapper <i>Lutjanus griseus</i>	30 Savoie
Sheepshead <i>Archosargus probatocephalus</i>	4, 5, 13, 30, 41, 69, 145, 162 Savoie
Pinfish <i>Lagodon rhomboides</i>	5, 30, 41, 69, 145, 162 Savoie
Silver perch <i>Bairdiella chysoura</i>	5, 30, 41, 69, 145, 162 Savoie
Sand seatrout <i>Cynoscion arenarius</i>	4, 5, 13, 22, 30, 41, 69, 145, 162 Savoie
Spotted seatrout <i>Cynoscion nebulosus</i>	4, 5, 13, 22, 30, 41, 74, 145, 162, 172 Savoie
Spot <i>Leiostomus xanthurus</i>	5, 13, 30, 41, 141, 145, 162 Savoie
Atlantic croaker <i>Micropogonias undulatus</i>	4, 5, 13, 22, 30, 41, 74, 141, 145, 162 Savoie
Black drum <i>Pogonias cromis</i>	4, 5, 13, 22, 41, 69 Savoie, Soniat
Red drum <i>Sciaenops ocellatus</i>	5, 22, 30, 41, 69, 145, 189 Savoie
Striped mullet <i>Mugil cephalus</i>	4, 5, 22, 30, 41, 68, 127, 145 Savoie
Code goby <i>Gobiosoma robustum</i>	Savoie
Spanish mackerel <i>Scomberomorus maculatus</i>	5, 13, 30, 41, 69, 145 Savoie
Gulf flounder <i>Paralichthys albigutta</i>	Thompson
Southern flounder <i>Paralichthys lethostigma</i>	4, 5, 13, 30, 41, 69, 145, 162 Savoie

Numbers correspond to references listed in Appendix 4, References, pp. 73-82.

Names correspond to individuals listed in Appendix 3, Personal Communications, p. 71.

Appendix 2, continued. Table of references and personal communications

Species	Lake Pontchartrain
Bay scallop <i>Argopecten irradians</i>	Savoie, Soniat
American oyster <i>Crassostrea virginica</i>	54, 56, 121, 174, 181, 182 Savoie, Soniat
Common rangia <i>Rangia cuneata</i>	22, 38, 40, 56, 62, 89, 121, 174, 179, 180, 182 Savoie, Soniat
Hard clam <i>Mercenaria species</i>	Savoie, Soniat
Bay squid <i>Lolliguncula brevis</i>	30, 145 Savoie, Soniat
Brown shrimp <i>Peneaus aztecus</i>	22, 30, 41, 76, 111, 145, 174, 182, 195, 196 Savoie, Soniat
Pink shrimp <i>Peneaus duorarum</i>	30, 145, 174 Savoie, Soniat
White shrimp <i>Penaeus setiferus</i>	22, 30, 38, 40, 41, 76, 111, 127, 145, 174, 184, 198 Savoie, Soniat
Grass shrimp <i>Palaemonetes pugio</i>	30, 111, 127, 174, 182 Savoie, Soniat
Spiny lobster <i>Panulirus argus</i>	Savoie, Soniat
Blue crab <i>Callinectes sapidus</i>	22, 30, 38, 39, 40, 41, 111, 127, 145, 174, 182 Savoie, Soniat
Gulf stone crab <i>Menippe adina</i>	30, 41, 145 Savoie, Soniat
Bull shark <i>Carcharhinus leucas</i>	5, 38, 40, 46, 174 Savoie
Tarpon <i>Megalops atlanticus</i>	46, 174 Savoie
Alabama shad <i>Alosa alabamae</i>	46, 100, 135 Savoie
Gulf menhaden <i>Brevoortia patronus</i>	5, 30, 38, 41, 46, 89, 100, 111, 145, 173, 174, 182 Savoie
Yellowfin menhaden <i>Brevoortia smithii</i>	Savoie
Gizzard shad <i>Dorosoma cepedianum</i>	31, 38, 40, 41, 46, 89, 100, 127, 135, 145, 168, 182 Savoie
Bay anchovy <i>Anchoa mitchilli</i>	22, 31, 38, 40, 41, 46, 89, 100, 111, 135, 145, 174, 182 Savoie
Hardhead catfish <i>Arius felis</i>	5, 30, 38, 40, 41, 46, 89, 100, 111, 116, 145, 174, 182 Savoie
Sheepshead minnow <i>Cyprinodon variegatus</i>	30, 38, 46, 145, 174, 182 Savoie
Gulf killifish <i>Fundulus grandis</i>	22, 30, 46, 100, 145, 174, 182 Savoie
Atlantic silversides <i>Menidia species</i>	30, 38, 40, 41, 46, 89, 100, 135, 145, 174, 182 Savoie
Snook <i>Centropomus undecemalis</i>	Savoie
Bluefish <i>Pomatomus saltatrix</i>	5 Savoie
Blue runner <i>Caranx crysus</i>	Savoie
Crevalle jack <i>Caranx hippos</i>	5, 30, 38, 40, 41, 46, 100, 135, 145, 174, 182 Savoie
Florida pompano <i>Trachinotus carolinus</i>	5, 46 Savoie
Gray snapper <i>Lutjanus griseus</i>	46 Savoie
Sheepshead <i>Archosargus probatocephalus</i>	4, 5, 31, 38, 40, 41, 46, 89, 100, 135, 145, 182 Savoie
Pinfish <i>Lagodon rhomboides</i>	5, 30, 38, 40, 41, 46, 145, 174, 182 Savoie
Silver perch <i>Bairdiella chysoura</i>	5, 30, 38, 40, 41, 46, 145, 174, 182 Savoie
Sand seatrout <i>Cynoscion arenarius</i>	4, 5, 22, 30, 38, 40, 41, 46, 89, 100, 111, 145, 174, 182 Savoie
Spotted seatrout <i>Cynoscion nebulosus</i>	4, 5, 22, 30, 38, 40, 41, 46, 89, 93, 145, 174, 182 Savoie
Spot <i>Leiostomus xanthurus</i>	5, 30, 38, 40, 41, 49, 89, 145, 174, 182 Savoie
Atlantic croaker <i>Micropogonias undulatus</i>	4, 5, 22, 30, 38, 40, 41, 46, 89, 93, 100, 111, 135, 145, 174, 182 Savoie
Black drum <i>Pogonias cromis</i>	4, 5, 22, 30, 38, 40, 41, 46, 93, 100, 145, 174, 182 Savoie
Red drum <i>Sciaenops ocellatus</i>	4, 5, 22, 30, 40, 41, 46, 93, 145, 174, 182 Savoie
Striped mullet <i>Mugil cephalus</i>	5, 22, 30, 38, 40, 41, 46, 89, 93, 100, 127, 135, 145, 174, 182 Savoie
Code goby <i>Gobiosoma robustum</i>	42, 46 Savoie
Spanish mackerel <i>Scomberomorus maculatus</i>	5, 41, 46, 174 Savoie
Gulf flounder <i>Paralichthys albigutta</i>	182 Thompson
Southern flounder <i>Paralichthys lethostigma</i>	4, 5, 30, 38, 40, 41, 46, 89, 100, 120, 135, 145, 174, 182 Savoie

Numbers correspond to references listed in Appendix 4, References, pp. 73-82.

Names correspond to individuals listed in Appendix 3, Personal Communications, p. 71.

Appendix 2, continued. Table of references and personal communications

Species	Breton/Chandeleur Sounds
Bay scallop <i>Argopecten irradians</i>	113, 142 Ancelet
American oyster <i>Crassostrea virginica</i>	27, 53, 54, 93, 113, 142, 154, 177 Ancelet
Common rangia <i>Rangia cuneata</i>	142 Ancelet
Hard clam <i>Mercenaria species</i>	55, 113, 142 Ancelet
Bay squid <i>Lolliguncula brevis</i>	13, 69, 154 Ancelet
Brown shrimp <i>Peneaus aztecus</i>	11, 12, 13, 22, 69, 76, 154, 195, 196 Ancelet
Pink shrimp <i>Peneaus duorarum</i>	113 Ancelet
White shrimp <i>Penaeus setiferus</i>	11, 12, 13, 22, 69, 76, 154, 196 Ancelet
Grass shrimp <i>Palaemonetes pugio</i>	69, 113, 154 Ancelet
Spiny lobster <i>Panulirus argus</i>	Ancelet
Blue crab <i>Callinectes sapidus</i>	13, 22, 69, 113, 154 Ancelet
Gulf stone crab <i>Menippe adina</i>	69, 113 Ancelet
Bull shark <i>Carcharhinus leucas</i>	69, 94, 122 Ancelet
Tarpon <i>Megalops atlanticus</i>	Ancelet
Alabama shad <i>Alosa alabamae</i>	Ancelet
Gulf menhaden <i>Brevoortia patronus</i>	13, 22, 69, 92, 122, 128, 154, 162 Ancelet
Yellowfin menhaden <i>Brevoortia smithii</i>	Ancelet
Gizzard shad <i>Dorosoma cepedianum</i>	13, 69, 122, 126 Ancelet
Bay anchovy <i>Anchoa mitchilli</i>	13, 22, 69, 122, 128, 154, 162 Ancelet
Hardhead catfish <i>Arius felis</i>	13, 69, 122, 128, 154, 162 Ancelet
Sheepshead minnow <i>Cyprinodon variegatus</i>	69, 122, 128, 162 Ancelet
Gulf killifish <i>Fundulus grandis</i>	69, 122, 128, 162 Ancelet
Atlantic silversides <i>Menidia species</i>	69, 122, 128 Ancelet
Snook <i>Centropomus undecemalis</i>	Ancelet
Bluefish <i>Pomatomus saltatrix</i>	128 Ancelet
Blue runner <i>Caranx crysus</i>	80 Ancelet
Crevalle jack <i>Caranx hippos</i>	13, 69, 80, 84, 122, 128, 154 Ancelet
Florida pompano <i>Trachinotus carolinus</i>	69, 80, 128 Ancelet
Gray snapper <i>Lutjanus griseus</i>	128 Ancelet
Sheepshead <i>Archosargus probatocephalus</i>	13, 69, 122, 128, 154, 162 Ancelet
Pinfish <i>Lagodon rhomboides</i>	69, 122, 128, 154, 162 Ancelet
Silver perch <i>Bairdiella chysoura</i>	13, 69, 122, 128, 154, 162 Ancelet
Sand seatrout <i>Cynoscion arenarius</i>	13, 22, 69, 122, 128, 154 Ancelet
Spotted seatrout <i>Cynoscion nebulosus</i>	13, 69, 122, 128, 154 Ancelet
Spot <i>Leiostomus xanthurus</i>	13, 22, 69, 122, 128, 154, 162 Ancelet
Atlantic croaker <i>Micropogonias undulatus</i>	13, 22, 69, 122, 128, 154, 162 Ancelet
Black drum <i>Pogonias cromis</i>	13, 69, 122, 128, 154 Ancelet
Red drum <i>Sciaenops ocellatus</i>	21, 69, 122, 128, 189 Ancelet
Striped mullet <i>Mugil cephalus</i>	69, 122, 126, 128, 162 Ancelet
Code goby <i>Gobiosoma robustum</i>	128 Ancelet
Spanish mackerel <i>Scomberomorus maculatus</i>	69, 122, 128, 154 Ancelet
Gulf flounder <i>Paralichthys albigutta</i>	128 Ancelet, Thompson
Southern flounder <i>Paralichthys lethostigma</i>	13, 69, 81, 122, 128, 162 Ancelet

Numbers correspond to references listed in Appendix 4, References, pp. 73-82.

Names correspond to individuals listed in Appendix 3, Personal Communications, p. 71.

Appendix 2, continued. Table of references and personal communications

Species	Mississippi River
Bay scallop <i>Argopecten irradians</i>	Ancelet
American oyster <i>Crassostrea virginica</i>	142 Ancelet
Common rangia <i>Rangia cuneata</i>	Ancelet
Hard clam <i>Mercenaria species</i>	Ancelet
Bay squid <i>Lolliguncula brevis</i>	Ancelet
Brown shrimp <i>Peneaus aztecus</i>	12, 13, 15, 22, 59, 76, 168 Ancelet
Pink shrimp <i>Peneaus duorarum</i>	Ancelet
White shrimp <i>Peneaus setiferus</i>	12, 15, 59, 76, 168 Ancelet
Grass shrimp <i>Palaemonetes pugio</i>	Ancelet
Spiny lobster <i>Panulirus argus</i>	Ancelet
Blue crab <i>Callinectes sapidus</i>	Ancelet
Gulf stone crab <i>Menippe adina</i>	Ancelet
Bull shark <i>Carcharhinus leucas</i>	122 Ancelet
Tarpon <i>Megalops atlanticus</i>	Ancelet
Alabama shad <i>Alosa alabamae</i>	Ancelet
Gulf menhaden <i>Brevoortia patronus</i>	86, 87, 122, 169, 175, 191 Ancelet
Yellowfin menhaden <i>Brevoortia smithii</i>	Ancelet
Gizzard shad <i>Dorosoma cepedianum</i>	77, 122 Ancelet
Bay anchovy <i>Anchoa mitchilli</i>	122 Ancelet
Hardhead catfish <i>Arius felis</i>	122, 129 Ancelet
Sheepshead minnow <i>Cyprinodon variegatus</i>	122, 134 Ancelet
Gulf killifish <i>Fundulus grandis</i>	122, 134 Ancelet
Atlantic silversides <i>Menidia species</i>	77, 122 Ancelet
Snook <i>Centropomus undecemalis</i>	Ancelet
Bluefish <i>Pomatomus saltatrix</i>	Ancelet
Blue runner <i>Caranx crysus</i>	Ancelet
Crevalle jack <i>Caranx hippos</i>	84, 122 Ancelet
Florida pompano <i>Trachinotus carolinus</i>	Ancelet
Gray snapper <i>Lutjanus griseus</i>	Ancelet
Sheepshead <i>Archosargus probatocephalus</i>	122 Ancelet
Pinfish <i>Lagodon rhomboides</i>	122 Ancelet
Silver perch <i>Bairdiella chysoura</i>	122 Ancelet
Sand seatrout <i>Cynoscion arenarius</i>	122 Ancelet
Spotted seatrout <i>Cynoscion nebulosus</i>	122, 169 Ancelet
Spot <i>Leiostomus xanthurus</i>	85, 122 Ancelet
Atlantic croaker <i>Micropogonias undulatus</i>	86, 122, 169 Ancelet
Black drum <i>Pogonias cromis</i>	122 Ancelet
Red drum <i>Sciaenops ocellatus</i>	122 Ancelet
Striped mullet <i>Mugil cephalus</i>	122 Ancelet
Code goby <i>Gobiosoma robustum</i>	Ancelet
Spanish mackerel <i>Scomberomorus maculatus</i>	122 Ancelet
Gulf flounder <i>Paralichthys albigutta</i>	Ancelet, Thompson
Southern flounder <i>Paralichthys lethostigma</i>	122 Ancelet

Numbers correspond to references listed in Appendix 4, References, pp. 73-82.

Names correspond to individuals listed in Appendix 3, Personal Communications, p. 71.

Appendix 2, continued. Table of references and personal communications

Species	Barataria Bay
Bay scallop <i>Argopecten irradians</i>	Dameier, Schexnayder
American oyster <i>Crassostrea virginica</i>	23, 43, 68, 93, 183 Dameier, Schexnayder
Common rangia <i>Rangia cuneata</i>	23, 153 Dameier, Schexnayder
Hard clam <i>Mercenaria species</i>	Dameier, Schexnayder
Bay squid <i>Loliguncula brevis</i>	13 Dameier, Schexnayder
Brown shrimp <i>Peneaus aztecus</i>	11, 12, 13, 14, 15, 20, 22, 26, 32, 43, 76, 90, 93, 117, 168, 170, 195, 196 Dameier, Schexnayder
Pink shrimp <i>Peneaus duorarum</i>	Dameier, Schexnayder
White shrimp <i>Penaeus setiferus</i>	11, 12, 13, 14, 15, 20, 22, 26, 32, 43, 76, 93, 168, 196 Dameier, Schexnayder
Grass shrimp <i>Palaemonetes pugio</i>	13, 26 Dameier, Schexnayder
Spiny lobster <i>Panulirus argus</i>	Dameier, Schexnayder
Blue crab <i>Callinectes sapidus</i>	13, 22, 26, 43, 118, 200 Dameier, Schexnayder
Gulf stone crab <i>Merippe adina</i>	13 Dameier, Schexnayder
Bull shark <i>Carcharhinus leucas</i>	9, 46, 88 Dameier, Schexnayder
Tarpon <i>Megalops atlanticus</i>	46, 88 Dameier, Schexnayder
Alabama shad <i>Alosa alabamae</i>	46, 71, 88 Dameier, Schexnayder
Gulf menhaden <i>Brevoortia patronus</i>	9, 13, 22, 26, 43, 46, 49, 57, 71, 86, 87, 88, 90, 95, 163, 164, 167, 169, 188, 191, 200 Dameier, Schexnayder
Yellowfin menhaden <i>Brevoortia smithii</i>	Dameier, Schexnayder
Gizzard shad <i>Dorosoma cepedianum</i>	9, 13, 26, 46, 57, 88, 163, 164, 188, 200 Dameier, Schexnayder
Bay anchovy <i>Anchoa mitchilli</i>	9, 13, 22, 26, 43, 46, 57, 71, 88, 95, 164, 188 Dameier, Schexnayder
Hardhead catfish <i>Arius felis</i>	9, 13, 26, 46, 57, 71, 88, 163, 164 Dameier, Schexnayder
Sheepshead minnow <i>Cyprinodon variegatus</i>	9, 26, 43, 46, 57, 70, 71, 88, 163, 164 Dameier, Schexnayder
Gulf killifish <i>Fundulus grandis</i>	9, 26, 43, 46, 57, 70, 71, 88, 163, 164 Dameier, Schexnayder
Atlantic silversides <i>Menidia species</i>	9, 13, 26, 43, 46, 57, 71, 88, 163, 164, 200 Dameier, Schexnayder
Snook <i>Centropomus undecemalis</i>	91 Dameier, Schexnayder
Bluefish <i>Pomatomus saltatrix</i>	26, 46, 57, 71, 88 Dameier, Schexnayder
Blue runner <i>Caranx crysus</i>	71, 80, 88 Dameier, Schexnayder
Crevalle jack <i>Caranx hippos</i>	9, 13, 46, 57, 71, 80, 88, 95, 164 Dameier, Schexnayder
Florida pompano <i>Trachinotus carolinus</i>	6, 9, 13, 17, 18, 46, 57, 71, 80, 88, 164 Dameier, Schexnayder
Gray snapper <i>Lutjanus griseus</i>	9, 46, 88, 164 Dameier, Schexnayder
Sheepshead <i>Archosargus probatocephalus</i>	9, 13, 26, 46, 49, 57, 67, 71, 88, 163, 164 Dameier, Schexnayder
Pinfish <i>Lagodon rhomboides</i>	9, 26, 46, 49, 57, 67, 71, 88, 163, 164 Dameier, Schexnayder
Silver perch <i>Bairdiella chysoura</i>	9, 13, 26, 46, 57, 71, 88, 95, 164 Dameier, Schexnayder
Sand seatrout <i>Cynoscion arenarius</i>	9, 13, 22, 26, 43, 46, 49, 57, 71, 88, 95, 164 Dameier, Schexnayder
Spotted seatrout <i>Cynoscion nebulosus</i>	9, 13, 26, 43, 46, 57, 71, 88, 95, 102, 104, 152, 163, 164, 169 Dameier, Schexnayder
Spot <i>Leiostomus xanthurus</i>	9, 13, 22, 26, 43, 46, 49, 57, 71, 74, 85, 86, 87, 88, 95, 156, 163, 164, 188 Dameier, Schexnayder
Atlantic croaker <i>Micropogonias undulatus</i>	9, 13, 22, 26, 43, 46, 49, 57, 71, 74, 86, 85, 87, 88, 95, 156, 159, 164, 169, 188, 200 Dameier, Schexnayder
Black drum <i>Pogonias cromis</i>	9, 26, 46, 50, 71, 88, 163, 164 Dameier, Schexnayder
Red drum <i>Sciaenops ocellatus</i>	16, 26, 46, 49, 71, 88, 103, 152, 163, 164, 189 Dameier, Schexnayder
Striped mullet <i>Mugil cephalus</i>	9, 26, 43, 46, 49, 71, 88, 163, 164, 200 Dameier, Schexnayder
Code goby <i>Gobiosoma robustum</i>	46, 88 Dameier, Schexnayder
Spanish mackerel <i>Scomberomorus maculatus</i>	9, 13, 26, 46, 48, 49, 71, 88, 164 Dameier, Schexnayder
Gulf flounder <i>Paralichthys albigutta</i>	71, 164 Dameier, Schexnayder, Thompson
Southern flounder <i>Paralichthys lethostigma</i>	9, 13, 26, 46, 57, 71, 72, 88, 95, 164 Dameier, Schexnayder

Numbers correspond to references listed in Appendix 4, References, pp. 73-82.

Names correspond to individuals listed in Appendix 3, Personal Communications, p. 71.

Appendix 2, continued. Table of references and personal communications

Species	Terrebonne/Timbalier Bays
Bay scallop <i>Argopecten irradians</i>	Adkins, Bourgeois, Guillory
American oyster <i>Crassostrea virginica</i>	Adkins, Bourgeois, Guillory
Common rangia <i>Rangia cuneata</i>	Adkins, Bourgeois, Guillory
Hard clam <i>Mercenaria species</i>	63 Adkins, Bourgeois, Guillory
Bay squid <i>Lolliguncula brevis</i>	3, 13 Adkins, Bourgeois, Guillory
Brown shrimp <i>Peneaus aztecus</i>	3, 11, 12, 13, 22, 63, 76, 90, 195, 196 Adkins, Bourgeois, Guillory
Pink shrimp <i>Peneaus duorarum</i>	3, 11, 13 Adkins, Bourgeois, Guillory
White shrimp <i>Penaeus setiferus</i>	3, 11, 12, 13, 22, 76, 131, 196 Adkins, Bourgeois, Guillory
Grass shrimp <i>Palaemonetes pugio</i>	3, 13 Adkins, Bourgeois, Guillory
Spiny lobster <i>Panulirus argus</i>	Adkins, Bourgeois, Guillory
Blue crab <i>Callinectes sapidus</i>	1, 2, 3, 13, 22, 63
Gulf stone crab <i>Menippe adina</i>	2, 3 Adkins, Bourgeois, Guillory
Bull shark <i>Carcharhinus leucas</i>	2, 4 Adkins, Bourgeois, Guillory
Tarpon <i>Megalops atlanticus</i>	4 Adkins, Bourgeois, Guillory
Alabama shad <i>Alosa alabamae</i>	Adkins, Bourgeois, Guillory
Gulf menhaden <i>Brevoortia patronus</i>	2, 3, 13, 22, 90, 146 Adkins, Bourgeois, Guillory
Yellowfin menhaden <i>Brevoortia smithii</i>	Adkins, Bourgeois, Guillory
Gizzard shad <i>Dorosoma cepedianum</i>	2, 3, 13, 146 Adkins, Bourgeois, Guillory
Bay anchovy <i>Anchoa mitchilli</i>	3, 13, 22, 146 Adkins, Bourgeois, Guillory
Hardhead catfish <i>Arius felis</i>	2, 3, 4, 13, 146 Adkins, Bourgeois, Guillory
Sheepshead minnow <i>Cyprinodon variegatus</i>	3 Adkins, Bourgeois, Guillory
Gulf killifish <i>Fundulus grandis</i>	3 Adkins, Bourgeois, Guillory
Atlantic silversides <i>Menidia species</i>	3
Snook <i>Centropomus undecemalis</i>	Adkins, Bourgeois, Guillory
Bluefish <i>Pomatomus saltatrix</i>	2, 3, 4, 146 Adkins, Bourgeois, Guillory
Blue runner <i>Caranx crysus</i>	4 Adkins, Bourgeois, Guillory
Crevalle jack <i>Caranx hippos</i>	2, 3, 4, 13, 146 Adkins, Bourgeois, Guillory
Florida pompano <i>Trachinotus carolinus</i>	2, 4 Adkins, Bourgeois, Guillory
Gray snapper <i>Lutjanus griseus</i>	3, 4 Adkins, Bourgeois, Guillory
Sheepshead <i>Archosargus probatocephalus</i>	2, 3, 4 Adkins, Bourgeois, Guillory
Pinfish <i>Lagodon rhomboides</i>	2, 3, 4, 13
Silver perch <i>Bairdiella chysoura</i>	2, 3, 13, 146 Adkins, Bourgeois, Guillory
Sand seatrout <i>Cynoscion arenarius</i>	2, 3, 13, 22, 146
Spotted seatrout <i>Cynoscion nebulosus</i>	2, 3, 4, 13, 146 Adkins, Bourgeois, Guillory
Spot <i>Leiostomus xanthurus</i>	2, 3, 4, 13, 22, 146 Adkins, Bourgeois, Guillory
Atlantic croaker <i>Micropogonias undulatus</i>	2, 3, 4, 13, 22, 146 Adkins, Bourgeois, Guillory
Black drum <i>Pogonias cromis</i>	2, 3 Adkins, Bourgeois, Guillory
Red drum <i>Sciaenops ocellatus</i>	2, 3, 4, 189 Adkins, Bourgeois, Guillory
Striped mullet <i>Mugil cephalus</i>	2, 3, 13 Adkins, Bourgeois, Guillory
Code goby <i>Gobiosoma robustum</i>	Adkins, Bourgeois, Guillory
Spanish mackerel <i>Scomberomorus maculatus</i>	2, 3, 4, 146 Adkins, Bourgeois, Guillory
Gulf flounder <i>Paralichthys albigutta</i>	Adkins, Bourgeois, Guillory, Thompson
Southern flounder <i>Paralichthys lethostigma</i>	2, 3, 4, 13, 146 Adkins, Bourgeois, Guillory

Numbers correspond to references listed in Appendix 4, References, pp. 73-82.

Names correspond to individuals listed in Appendix 3, Personal Communications, p. 71.

Appendix 2, continued. Table of references and personal communications

Species	Atchafalaya/Vermilion Bays
Bay scallop <i>Argopecten irradians</i>	Juneau, D. Rogers
American oyster <i>Crassostrea virginica</i>	93 Juneau, D. Rogers
Common rangia <i>Rangia cuneata</i>	52, 82, 83, 112, 125 Juneau, D. Rogers
Hard clam <i>Mercenaria species</i>	Juneau, D. Rogers
Bay squid <i>Loligo brevis</i>	13, 119 Juneau, D. Rogers
Brown shrimp <i>Peneaus aztecus</i>	11, 12, 13, 22, 51, 52, 76, 101, 105, 110, 119, 120, 125, 160, 193, 194 Juneau, D. Rogers
Pink shrimp <i>Peneaus duorarum</i>	Juneau, D. Rogers
White shrimp <i>P. setiferus</i>	11, 12, 13, 22, 51, 52, 76, 101, 105, 119, 120, 125, 131, 160, 193, 194, 196 Juneau, D. Rogers
Grass shrimp <i>Palaemonetes pugio</i>	13, 105, 114, 119, 125, 160, 193, 194 Juneau, D. Rogers
Spiny lobster <i>Panulirus argus</i>	Juneau, D. Rogers
Blue crab <i>Callinectes sapidus</i>	13, 22, 51, 52, 105, 114, 119, 125, 143, 160, 193, 194 Juneau, D. Rogers
Gulf stone crab <i>Menippe adina</i>	13, 119 Juneau, D. Rogers
Bull shark <i>Carcharhinus leucas</i>	24, 46, 138 Juneau, D. Rogers
Tarpon <i>Megalops atlanticus</i>	138 Juneau, D. Rogers
Alabama shad <i>Alosa alabamae</i>	Juneau, D. Rogers
Gulf menhaden <i>Brevoortia patronus</i>	13, 22, 44, 45, 46, 47, 51, 52, 114, 119, 125, 138, 144, 160, 178, 193, 194 Juneau, D. Rogers
Yellowfin menhaden <i>Brevoortia smithii</i>	138 Juneau, D. Rogers
Gizzard shad <i>Dorosoma cepedianum</i>	13, 46, 52, 79, 105, 114, 119, 125, 126, 138, 144, 178, 193, 194 Juneau, D. Rogers
Bay anchovy <i>Anchoa mitchilli</i>	13, 22, 46, 52, 105, 114, 119, 125, 138, 144, 160, 178, 194 Juneau, D. Rogers
Hardhead catfish <i>Arius felis</i>	13, 46, 52, 105, 119, 125, 138, 144, 178, 193, 194 Juneau, D. Rogers
Sheepshead minnow <i>Cyprinodon variegatus</i>	46, 105, 114, 119, 138, 160, 178, 193, 194 Juneau, D. Rogers
Gulf killifish <i>Fundulus grandis</i>	46, 105, 114, 119, 138, 160, 178, 194 Juneau, D. Rogers
Atlantic silversides <i>Meridia species</i>	46, 105, 114, 119, 138, 144, 160, 178, 193, 194 Juneau, D. Rogers
Snook <i>Centropomus undecemalis</i>	Juneau, D. Rogers
Bluefish <i>Pomatomus saltatrix</i>	115, 178 Juneau, D. Rogers
Blue runner <i>Caranx crysus</i>	115 Juneau, D. Rogers
Crevalle jack <i>Caranx hippos</i>	46, 51, 105, 114, 119, 138, 144, 178, 194 Juneau, D. Rogers
Florida pompano <i>Trachinotus carolinus</i>	138, 178 Juneau, D. Rogers
Gray snapper <i>Lutjanus griseus</i>	178 Juneau, D. Rogers
Sheepshead <i>Archosargus probatocephalus</i>	13, 46, 51, 52, 114, 105, 119, 120, 138, 144, 178, 193, 194 Juneau, D. Rogers
Pinfish <i>Lagodon rhomboides</i>	46, 52, 105, 114, 119, 125, 138, 144, 178, 193, 194 Juneau, D. Rogers
Silver perch <i>Bairdiella chysoura</i>	13, 46, 105, 114, 119, 125, 138, 144, 178, 194 Juneau, D. Rogers
Sand seatrout <i>Cynoscion arenarius</i>	13, 22, 46, 51, 52, 105, 114, 119, 120, 125, 138, 144, 160, 178, 194 Juneau, D. Rogers
Spotted seatrout <i>Cynoscion nebulosus</i>	13, 46, 51, 52, 105, 109, 119, 125, 138, 144, 178 Juneau, D. Rogers
Spot <i>Leiostomus xanthurus</i>	13, 22, 46, 51, 52, 105, 114, 119, 120, 125, 138, 144, 160, 178, 193, 194 Juneau, D. Rogers
Atlantic croaker <i>Micropogonias undulatus</i>	13, 22, 46, 51, 105, 114, 119, 120, 125, 138, 144, 160, 178, 193, 194 Juneau, D. Rogers
Black drum <i>Pogonias cromis</i>	13, 46, 52, 105, 114, 119, 120, 125, 138, 144, 178, 193, 194 Juneau, D. Rogers
Red drum <i>Sciaenops ocellatus</i>	46, 119, 125, 138, 178, 189, 193, 194 Juneau, D. Rogers
Striped mullet <i>Mugil cephalus</i>	46, 51, 52, 79, 105, 114, 119, 126, 138, 144, 160, 178, 193, 194 Juneau, D. Rogers
Code goby <i>Gobiosoma robustum</i>	Juneau, D. Rogers
Spanish mackerel <i>Scomberomorus maculatus</i>	13, 51, 119, 138, 144, 178 Juneau, D. Rogers
Gulf flounder <i>Paralichthys albigutta</i>	Czapla, Juneau, D. Rogers, Thompson
Southern flounder <i>Paralichthys lethostigma</i>	13, 46, 51, 52, 105, 119, 120, 125, 138, 144, 178, 193, 194 Juneau, D. Rogers

Numbers correspond to references listed in Appendix 4, References, pp. 73-82.

Names correspond to individuals listed in Appendix 3, Personal Communications, p. 71.

Appendix 2, continued. Table of references and personal communications

Species	Calcasieu Lake
Bay scallop <i>Argopecten irradians</i>	Carver, Ferguson, B. Rogers
American oyster <i>Crassostrea virginica</i>	93, 185, 197 Carver, Ferguson, B. Rogers
Common rangia <i>Rangia cuneata</i>	75, 112 Carver, Ferguson, B. Rogers
Hard clam <i>Mercenaria species</i>	Carver, Ferguson, B. Rogers
Bay squid <i>Loliguncula brevis</i>	10, 13, 115, 187 Carver, Ferguson, B. Rogers
Brown shrimp <i>Peneaus aztecus</i>	11, 12, 13, 22, 75, 76, 90, 98, 107, 108, 115, 124, 132, 150, 157, 158, 195, 196 Carver, Ferguson, B. Rogers
Pink shrimp <i>Peneaus duorarum</i>	Carver, Ferguson, B. Rogers
White shrimp <i>Peneaus setiferus</i>	11, 12, 13, 22, 76, 107, 108, 115, 132, 150, 157, 158, 196 Carver, Ferguson, B. Rogers
Grass shrimp <i>Palaemonetes pugio</i>	13, 75, 107, 157, 158 Carver, Ferguson, B. Rogers
Spiny lobster <i>Panulirus argus</i>	Carver, Ferguson, B. Rogers
Blue crab <i>Callinectes sapidus</i>	13, 22, 75, 98, 107, 108, 115, 157, 158 Carver, Ferguson, B. Rogers
Gulf stone crab <i>Menippe adina</i>	13, 158 Carver, Ferguson, B. Rogers
Bull shark <i>Carcharhinus leucas</i>	7 Carver, Ferguson, B. Rogers
Tarpon <i>Megalops atlanticus</i>	Carver, Ferguson, B. Rogers
Alabama shad <i>Alosa alabamae</i>	Carver, Ferguson, B. Rogers
Gulf menhaden <i>Brevoortia patronus</i>	7, 13, 22, 64, 66, 90, 98, 107, 108, 115, 132, 157, 158, 165, 166, 184, 186 Carver, Ferguson, B. Rogers
Yellowfin menhaden <i>Brevoortia smithii</i>	151 Carver, Ferguson, B. Rogers
Gizzard shad <i>Dorosoma cepedianum</i>	7, 13, 64, 107, 151, 158 Carver, Ferguson, B. Rogers
Bay anchovy <i>Anchoa mitchilli</i>	7, 13, 22, 66, 98, 107, 108, 115, 151, 157, 158, 184, 186 Carver, Ferguson, B. Rogers
Hardhead catfish <i>Arius felis</i>	7, 13, 107, 115, 151, 157, 158 Carver, Ferguson, B. Rogers
Sheepshead minnow <i>Cyprinodon variegatus</i>	7, 64, 107, 151, 157, 158 Carver, Ferguson, B. Rogers
Gulf killifish <i>Fundulus grandis</i>	7, 107, 151, 157 Carver, Ferguson, B. Rogers
Atlantic silversides <i>Menidia species</i>	13, 64, 107, 151, 157, 158 Carver, Ferguson, B. Rogers
Snook <i>Centropomus undecemalis</i>	Carver, Ferguson, B. Rogers
Bluefish <i>Pomatomus saltatrix</i>	7 Carver, Ferguson, B. Rogers
Blue runner <i>Caranx crysus</i>	Carver, Ferguson, B. Rogers
Crevalle jack <i>Caranx hippos</i>	13, 115, 151, 158 Carver, Ferguson, B. Rogers
Florida pompano <i>Trachinotus carolinus</i>	17, 18, 115, 158 Carver, Ferguson, B. Rogers
Gray snapper <i>Lutjanus griseus</i>	158 Carver, Ferguson, B. Rogers
Sheepshead <i>Archosargus probatocephalus</i>	7, 13, 107, 115, 151, 158 Carver, Ferguson, B. Rogers
Pinfish <i>Lagodon rhomboides</i>	7, 13, 115, 158 Carver, Ferguson, B. Rogers
Silver perch <i>Bairdiella chysoura</i>	7, 13, 115, 151, 158 Carver, Ferguson, B. Rogers
Sand seatrout <i>Cynoscion arenarius</i>	7, 13, 22, 34, 36, 98, 107, 108, 115, 151, 157, 158, 166, 193 Carver, Ferguson, B. Rogers
Spotted seatrout <i>Cynoscion nebulosus</i>	7, 13, 107, 108, 109, 115, 151, 157, 158 Carver, Ferguson, B. Rogers
Spot <i>Leiostomus xanthurus</i>	7, 13, 22, 34, 36, 107, 108, 115, 151, 158 Carver, Ferguson, B. Rogers
Atlantic croaker <i>Micropogonias undulatus</i>	7, 8, 13, 22, 31, 34, 35, 36, 98, 107, 108, 115, 123, 132, 151, 157, 158, 198, 199 Carver, Ferguson, B. Rogers
Black drum <i>Pogonias cromis</i>	7, 13, 34, 36, 115, 158 Carver, Ferguson, B. Rogers
Red drum <i>Sciaenops ocellatus</i>	7, 13, 107, 115, 151, 157, 158, 189 Carver, Ferguson, B. Rogers
Striped mullet <i>Mugil cephalus</i>	7, 13, 98, 107, 108, 115, 137, 151, 157, 158 Carver, Ferguson, B. Rogers
Code goby <i>Gobiosoma robustum</i>	158 Carver, Ferguson, B. Rogers
Spanish mackerel <i>Scomberomorus maculatus</i>	7, 13, 115, 158 Carver, Ferguson, B. Rogers
Gulf flounder <i>Paralichthys albigutta</i>	158 Carver, Czapla, Ferguson, B. Rogers, Thompson
Southern flounder <i>Paralichthys lethostigma</i>	7, 13, 107, 115, 151, 157, 158 Carver, Ferguson, B. Rogers

Numbers correspond to references listed in Appendix 4, References, pp. 73-82.

Names correspond to individuals listed in Appendix 3, Personal Communications, p. 71.

Appendix 3. Personal communications

Name	Affiliation
Adkins, G.B.	Louisiana Department of Wildlife and Fisheries, Borg, LA
Ancelet, R.	Louisiana Department of Wildlife and Fisheries, New Orleans, LA
Bourgeois, M.	Louisiana Department of Wildlife and Fisheries, Borg, LA
Carver, D.C.	Louisiana Department of Wildlife and Fisheries, Lake Charles, LA
Czapla, T.E.	National Marine Fisheries Service, Galveston, TX
Dameier, J.	Louisiana Department of Wildlife and Fisheries, Baton Rouge, LA
Demoran, W.	Gulf Coast Research Laboratory, Ocean Springs, MS
Ferguson, T.	Louisiana Department of Wildlife and Fisheries, Lake Charles, LA
Guillory, V.	Louisiana Department of Wildlife and Fisheries, Borg, LA
Herke, W.	Louisiana State University, Baton Rouge, LA
Juneau, C.L.	Louisiana Department of Wildlife and Fisheries, New Iberia, LA
Rogers, B.	Louisiana State University, Baton Rouge, LA
Rogers, D.	Louisiana State University, Baton Rouge, LA
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