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NOAA Technical Memorandum

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THE OCCURRENCE OF LIFE STAGES OF SOME RECREATIONAL MARINE FISHES IN ESTUARIES OF THE GULF OF MEXICO

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May 1980

U.S. DEPARTMENT OF COMMERCE
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May 1980

U.S. DEPARTMENT OF COMMERCE
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PREFACE

This report summarizes the results of a project that was conducted in 1974-75. In addition to the information that we sought, our efforts produced an extensive bibliography on fishes in the estuaries of the Gulf of Mexico. Some of our colleagues suggested that we include additional species and that we update the references. The unlikelihood of our doing so becomes more apparent with the passage of time. We therefore present this version of our report with the hope that others may find it useful.

THE OCCURRENCE OF LIFE STAGES OF SOME RECREATIONAL MARINE FISHES IN ESTUARIES OF THE GULF OF MEXICO

Many recreationally and commercially important marine fishes are dependent upon estuaries at some time in their life cycle. Most of these species have life histories wherein the adults spawn offshore, and the young move into estuaries to feed and grow (Gunter 1961, 1967). The life histories of the commercially important species are sufficiently known to permit estimates of the portion of the catches which are estuarine dependent. A number of authors have made such estimates (Gunter 1967; Lindall 1973; McHugh 1966, 1967; Skud and Wilson 1960; Sykes 1964, 1965, 1968; Sykes and Finucane 1966; Thompson 1968; and others). Estimates as high as 90% have been made for commercial species in the Gulf of Mexico (Skud and Wilson 1960; Thompson 1968). Comparable percentages for recreational species are more difficult to estimate owing to the lack of both adequate catch data and sufficient biological information.

We reviewed what was known of the distribution and occurrence of the various life stages of recreational fishes in estuaries along the U.S. coast of the Gulf of Mexico. We examined various publications and tallied, by species and by life stages, those recreational fishes that had been reported in estuaries. The presence of a species in an estuary does not necessarily imply its dependence upon that habitat; it may be an adventitious visitor (McHugh 1967). But, if the life history is not fully known, we may be in error in identifying adventitious visitors. Therefore, we included all of the selected species of recreational fishes in our tally.

The selection of species as recreational fishes is admittedly subjective. Agreement is difficult to obtain, because a fish may be considered a recreational species in one area, but not in another, and also because a fish may be considered a recreational species by one fisherman, but not by another. We made our selections from the List of Common and Scientific Names of Fishes from the United States and Canada (Bailey 1970). A total of sixty-eight species was selected (Table 1).

Definitions of larva and juvenile were those generally used by biologists, such as by Mansueti and Hardy (1967):

Larva - "Young fish between time of hatching and attainment of adult fin-ray complement."

Juvenile - "Young fish after attainment of full adult counts and before sexual maturation."

Adult is the stage at which sexual maturity is attained. Many references gave sizes of fishes without stating the life stages. In such cases, we determined life stages by referring to other authors who had given both the sizes and life stages.

The literature citations are presented alphabetically and numerically. Numerical references are used in the appendix tables for convenience.

For our purpose the estuarine areas of the U.S. coast of the Gulf of Mexico included all bays, harbors, sounds, lakes, and lagoons which were connected directly to the Gulf of Mexico. The seaward boundary was the imaginary line connecting the points of land marking the entrance or entrances to the embayments. The estuarine areas of the Gulf of Mexico were delimited as follows: The Florida coast was divided into four areas following the demarcations of McNulty et al. (1972); the Alabama coast was considered one area; the Mississippi coast was considered one area; the Louisiana coast was divided into two areas; and the coast of Texas was divided into three areas. The boundaries of the eleven estuarine areas, as illustrated in Figure 1, are as follows:

I. Rio Grande River through Laguna Madre

II. Corpus Christi Bay to Freeport

III. Freeport through Sabine River

IV. Louisiana coast west of Mississippi River

V. Louisiana coast east of Mississippi River

VI. Mississippi coast

VII. Alabama coast

VIII. Perdido Bay to Lighthouse Point

IX. Lighthouse Point through Anclote Key

X. Anclote River to Cape Romano

XI. Cape Romano through Florida Bay

The sixty-eight species consisted of eleven sharks and fifty-seven bony fishes (Table 1). The sharks were included, because shark fishing is becoming increasingly popular. All of the eleven sharks give birth to live young, and therefore, they do not have egg and larval stages. Eight of the eleven had their juvenile and adult stages reported in estuaries (Table 1). The nurse shark (Ginglymostoma cirratum) had only its adult stage reported, while the sandbar shark (Carcharhinus milberti) had only its juvenile stage reported; both of these, plus the smooth hammerhead (Sphyrna zygaena), were also reported in estuaries by authors who did not state sizes or life stages. Of the bony fishes, three species had all stages from egg to adult present in estuaries. These three were the two marine catfishes (Arius felis and Bagre marinus), the males of which incubate the eggs in their mouths, and the black drum (Pogonias cromis), which has been found to spawn in the bays and lagoons of Texas. Of the remaining fifty-four, twenty-six species had their larval, juvenile, and adult stages reported in estuaries; twenty-five had their juvenile and adult stages reported. One (the bonefish, Albula vulpes) had its larval and juvenile stages reported in estuaries (one report did not state size or life stage of the bonefish--see appendix tables); two (the greater amberjack, Seriola dumerili, and the guaguanche, Sphyraena guachancho)

had only their juvenile stage reported in estuaries (several references of the guaguanche did not state size of life stage).

In each estuarine area, the number of species was lowest for eggs, second lowest for larvae, third lowest for adults, and highest for juveniles (Table 2). Thus, additional credence is provided to the importance of estuaries as nursery grounds for juvenile recreational fishes (Gunter 1961, 1967). The few reports of eggs and larvae result from several factors: one, some of the species spawn offshore; two, eggs and larvae are difficult to identify; and three, relatively few studies have been conducted on ichthyoplankton in estuaries of the Gulf of Mexico. Those studies that have been made were either lacking in specific identifications, or were limited to larvae of a certain family, or were limited in sampling (Arnold, Wheeler, and Baxter 1960; Gillespie 1971; Jannke 1971; Kelly and Dragovich 1968; Perry and Christmas 1973; Swingle 1971). More systematic studies of ichthyoplankton would yield information on the importance of estuaries as spawning grounds.

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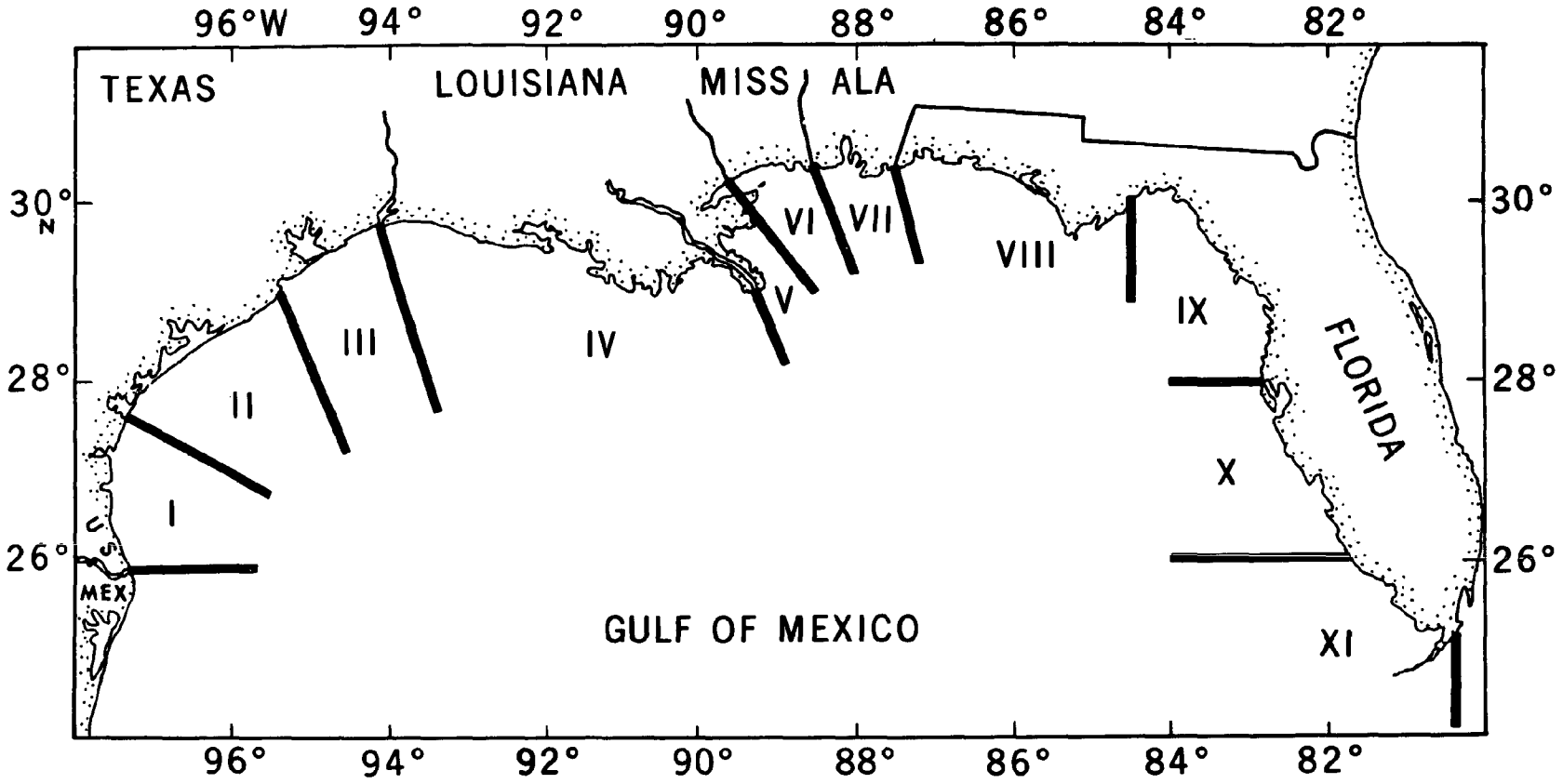

Figure 1.--Estuarine areas of the U.S. coast of the Gulf of Mexico.

Table 1.--Occurrence of life stages of selected recreational fishes in estuarine areas of the U.S. coast of the Gulf of Mexico. "x" indicates occurrence has been reported in the literature.

Life Stage	Egg	Larva	Juvenile	Adult	Unspecified
Orectolobidae - carpet sharks					
Nurse shark (*Ginglymostoma cirratum*)				x	x
Carcharhinidae - requiem sharks					
Finetooth shark (*Aprionodon isodon*)			x	x	x
Blacknose shark (*Carcharhinus acronotus*)			x	x	x
Bull shark (*Carcharhinus leucas*)			x	x	x
Blacktip shark (*Carcharhinus limbatus*)			x	x	x
Sandbar shark (*Carcharhinus milberti*)			x		x
Atlantic sharpnose shark (*Rhizoprionodon terraenovae*)			x	x	x
Sphyrnidae - hammerhead sharks					
Scalloped hammerhead (*Sphyrna lewini*)			x	x	x
Great hammerhead (*Sphyrna mokarran*)			x	x	x
Bonnethead (*Sphyrna tiburo*)			x	x	x
Smooth hammerhead (*Sphyrna zygaena*)					x

Table 1.--Occurrence of life stages of selected recreational fishes in estuarine areas of the U.S. coast of the Gulf of Mexico. "x" indicates occurrence has been reported in the literature. (cont'd)

Life Stage	Egg	Larvae	Juvenile	Adult	Unspecified
Elopidae - tarpons					
Ladyfish (*Elops saurus*)		x	x	x	x
Tarpon (*Megalops atlantica*)		x	x	x	x
Bonefish (*Albula vulpes*)		x	x		x
Clupeidae - herrings					
Alabama shad (*Alosa alabamae*)			x	x	x
Skipjack herring (*Alosa chrysochloris*)			x	x	x
Ariidae - sea catfishes					
Sea catfish (*Arius felis*)	x	x	x	x	x
Gafftopsail catfish (*Bagre marinus*)	x	x	x	x	x
Centropomidae - snooks					
Tarpon snook (*Centropomus pectinatus*)					x
Snook (*Centropomus undecimalis*)			x	x	x
Percichthyidae - temperate basses					
Striped bass (*Morone saxatilis*)			x	x	x

Table 1.--Occurrence of life stages of selected recreational fishes in estuarine areas of the U.S. coast of the Gulf of Mexico. "x" indicates occurrence has been reported in the literature. (cont'd)

Life Stage	Egg	Larva	Juvenile	Adult	Unspecified
Serranidae - sea basses					
Southern sea bass (*Centropristis melana*)			x	x	x
Rock sea bass (*Centropristis philadelphica*)			x	x	x
Jewfish (*Epinephelus itajara*)			x	x	x
Gag (*Mycteroperca microlepis*)			x	x	x
Red grouper (*Epinephelus morio*)			x	x	x
Pomatomidae - bluefishes					
Bluefish (*Pomatomus saltatrix*)			x	x	x
Rachycentridae - cobias					
Cobia (*Rachycentron canadum*)			x	x	x
Carangidae - jacks and pompanos					
Blue runner (*Caranx crysos*)			x	x	x
Crevalle jack (*Caranx hippos*)			x	x	x
Greater amberjack (*Seriola dumerili*)				x	
Florida pompano (*Trachinotus carolinus*)		x	x	x	x
Permit (*Trachinotus falcatus*)			x	x	x

Table 1.--Occurrence of life stages of selected recreational fishes in estuarine areas of the U.S. coast of the Gulf of Mexico. "x" indicates occurrence has been reported in the literature. (cont'd)

Life Stage	Egg	Larva	Juvenile	Adult	Unspecified
Lutjanidae - snappers					
Red snapper (Lutjanus campechanus)			x	x	x
Gray snapper (Lutjanus griseus)			x	x	x
Lane snapper (Lutjanus synagris)			x	x	x
Lobotidae - tripletails					
Tripletail (Lobotes surinamensis)			x	x	x
Gerreidae - mojarras					
Striped mojarra (Diapterus plumieri)			x	x	x
Pomadasyidae - grunts					
Tomtate (Haemulon aurolineatum)			x	x	x
White grunt (Haemulon plumieri)			x	x	x
Pigfish (Orthopristis chrysoptera)		x	x	x	x
Sparidae - porgies					
Sheepshead (Archosargus probatocephalus)		x	x	x	x
Pinfish (Lagodon rhomboides)		x	x	x	x

Table 1.--Occurrence of life stages of selected recreational fishes in estuarine areas of the U.S. coast of the Gulf of Mexico. "x" indicates occurrence has been reported in the literature. (cont'd)

Life Stage	Egg	Larva	Juvenile	Adult	Unspecified
Sciaenidae - drums					
Silver perch (*Bairdiella chrysura*)		x	x	x	x
Sand seatrout (*Cynoscion arenarius*)		x	x	x	x
Spotted seatrout (*Cynoscion nebulosus*)		x	x	x	x
Spot (*Leiostomus xanthurus*)		x	x	x	x
Southern kingfish (*Menticirrhus americanus*)		x	x	x	x
Minkfish (*Menticirrhus focaliger*)		x	x	x	x
Black drum (*Pogonias cromis*)	x	x	x	x	x
Atlantic croaker (*Micropogon undulatus*)		x	x	x	x
Red drum (*Sciaenops ocellata*)		x	x	x	x
Ephippidae - spadefishes					
Atlantic spadefish (*Chaetodipterus faber*)		x	x	x	x
Mugilidae - mullets					
Striped mullet (*Mugil cephalus*)		x	x	x	x
White mullet (*Mugil curema*)		x	x	x	x
Fantail mullet (*Mugil trichodon*)		x	x	x	x

Table 1.--Occurrence of life stages of selected recreational fishes in estuarine areas of the U.S. coast of the Gulf of Mexico. "x" indicates occurrence has been reported in the literature. (cont'd)

Life Stage	Egg	Larva	Juvenile	Adult	Unspecified
Sphyraenidae - barracudas					
Guaguanche (*Sphyraena guachancho*)			x		x
Great barracuda (*Sphyraena barracuda*)		x	x	x	x
Northern sennet (*Sphyraena borealis*)			x	x	x
Scombridae - mackerels and tunas					
Little tunny (*Euthynnus alletteratus*)			x	x	x
King mackerel (*Scomberomorus cavalla*)			x	x	x
Spanish mackerel (*Scomberomorus maculatus*)		x	x	x	x
Bothidae - lefteye flounders					
Gulf flounder (*Paralichthys albigutta*)		x	x	x	x
Southern flounder (*Paralichthys lethostigma*)		x	x	x	x
Balistidae - triggerfish and filefishes					
Gray triggerfish (*Balistes capriscus*)		x	x	x	x
Orange filefish (*Aluterus schoepfi*)			x	x	x
Tetraodontidae - puffers					
Southern puffer (*Sphoeroides nephelus*)		x	x	x	x

Table 2. Numbers of selected recreational fishes by life stages reported in estuarine areas of the U.S. coast of the Gulf of Mexico.

State	TX			LA		MS	AL	FL			
Estuarine Area	I	II	III	IV	V	VI	VII	VIII	IX	X	XI
Egg	2	2	1	1	0	0	0	2	0	1	2
Larva	10	20	15	12	6	1	9	11	8	10	11
Juvenile	20	43	27	35	24	21	49	54	38	45	41
Adult	17	24	20	22	17	15	33	46	24	34	32
Unspecified[1/]	13	3	9	5	2	25	1	3	14	7	5

1/ Number of species reported only as present, size or life stage not specified.

Appendix Table A.--References to life stages of selected recreational fishes in estuarine areas of the U.S. coast of the Gulf of Mexico : Texas. E = egg; L = larva; J = juvenile; A = adult; U = unspecified.

Family - Species	TEXAS I Rio Grande River through Laguna Madre					TEXAS II Corpus Christi Bay to Freeport					TEXAS III Freeport through Sabine River				
	E	L	J	A	U	E	L	J	A	U	E	L	J	A	U
Orectolobidae - carpet sharks															
Nurse shark (Ginglymostoma cirratum)															
Carcharhinidae - requiem sharks															
Finetooth shark (Aprionodon isodon)					249			106 125					16 106		
Blacknose shark (Carcharinus acronotus)								125		14					
Bull shark (Carcharhinus leucas)					16			125 183		16 124 129				16	212
Blacktip shark (Carcharhinus limbatus)			46		16 249			125	97					16	212 225 226 229
Sandbar shark (Carcharhinus milberti)															
Atlantic sharpnose shark (Rhizoprionodon terraenovae)								125							
Sphyrnidae - hammerhead sharks															
Scalloped hammerhead (Sphyrna lewini=S. diplana)								125							212
Great hammerhead (Sphyrna mokarran)									16 125						
Bonnethead (Sphyrna tiburo)					16 32			16 97 125 129							16 212
Other hammerheads (Sphyrna spp.)					16 32										16
Elopidae - tarpons															
Ladyfish (Elops saurus)		34	34 46	34 46	31 32 102 119		123 125	97 123 125 188 217	97	68 98 99 183		4 69 88	81 226		20 191 212 214 225 227
Tarpon (Megalops atlantica)					31 32 46 249			14 97	183	168 251 257			14		21
Bonefish (Albula vulpes)							125	125				212			
Clupeidae - herrings															
Alabama shad (Alosa alabamae)															
Skipjack herring (Alosa chrysochloris)															
Ariidae - sea catfishes															
Sea catfish (Arius felis)	31 32 46			31 32 46	102 119 249	68 97	88 145	24 25 68 97 126 127 145	25 88 97 127 145	80 105 168 183 251	69 225 229	59 69 81 91 229	59 81 91 229	59 81 88 91 225 229	20 54 143 144 212 228

Appendix Table A.--References to life stages of selected recreational fishes in estuarine areas of the U.S. coast of the Gulf of Mexico: Texas. E = egg; L = larva; J = juvenile; A = adult; U = unspecified.

Family - Species	TEXAS I Rio Grande River through Laguna Madre					TEXAS II Corpus Christi Bay to Freeport					TEXAS III Freeport through Sabine River				
	E	L	J	A	U	E	L	J	A	U	E	L	J	A	U
Gafftopsail catfish (Bagre marinus)			46		31 32 80 249		127	25 97 127	97	68 124 168 251		59 81	59 81 226 231	226 231	54 69 191 193 212 213 225 227
Centropomidae - snooks															
Tarpon snook (Centropomus pectinatus)															
Snook (Centropomus undecimalis)			46		31 32			15		257					
Percichthyidae - temperate basses															
Striped bass (Morone saxatilis)															
Serranidae - sea basses															
Southern sea bass (Centropristis melana)															
Rock sea bass (Centropristis philadelphica)								125 185	185	15					212
Jewfish (Ephinephelus itajara)					32			183							212
Gag (Mycteroperca microlepis)															15
Red grouper (Ephinephelus morio)															
Pomatomidae - bluefishes															
Bluefish (Pomatomus saltatrix)					102			97 125 266		183 257			4		212 228
Rachycentridae - cobias															
Cobia (Rachycentron canadum)								15 125		183 257			212		
Carangidae - jacks and pompanos															
Blue runner (Caranx crysos)			46		32					168					212
Crevalle jack (Caranx hippos)			32 249	32 249	46			25 97 125 217		68 98 168 257			4 226	4	20 69 191 212 227 229
Greater amberjack (Seriola dumerili)															
Florida pompano (Trachinotus carolinus)			34	34	32 249			66 125 183 257		99 168			4 176 227	4	191 212 229
Permit (Trachinotus falcatus)										15 99					
Lutjanidae - snappers															
Red snapper (Lutjanus campechanus)															

Appendix Table A.--References to life stages of selected recreational fishes in estuarine areas of the U.S. coast of the Gulf of Mexico: Texas. E = egg; L = larva; J = juvenile; A = adult; U = unspecified.

Family - Species	TEXAS I Rio Grande River through Laguna Madre					TEXAS II Corpus Christi Bay to Freeport					TEXAS III Freeport through Sabine River				
	E	L	J	A	U	E	L	J	A	U	E	L	J	A	U
Gray snapper (Lutjanus griseus)								88 97 168 188		13 15 105					13 212
Lane snapper (Lutjanus synagris)								88					4		212
Lobotidae - tripletails															
Tripletail (Lobotes surinamensis)					11 249			15	97	11				226	11 212 227 229
Gerreidae - mojarras															
Striped mojarra (Diapterus plumieri)															
Pomadasyidae - grunts															
Tomtate (Haemulon aurolineatum)															
White grunt (Haemulon plumieri)															
Pigfish (Orthopristis chrysoptera)			25 34 249	25 34 249	31 32 35 46 119		65 125	24 25 88 97 125 129	97	35 68 80 124 128 168 197 251			4 176 226	176	20 35 69 88 191 212 214 228
Sparidae - porgies															
Sheepshead (Archosargus probatocephalus)			32 34 35 37 38 39 40 41 42 46 113 259	25 34 35 37 39 40 41 42 113 114 115 259	33 116 249			35 38 40 41 42 97 125 151 152 178 180 188 196 197 245 246 247 259	25 35 37 40 41 42 97 145 151 178 179 180 196 245 246 247 259	32 68 80 105 116 124 128 168 183 257 260	4	35 37 38 40 41 42 191 192 214 259 261	4 35 37 38 40 41 42 192 259 261	20 69 144 193 212
Pinfish (Lagodon rhomboides)	65		25 34 65 119 249	34 249	24 31 32 35 46 51 102 114 142		65 66	24 25 52 57 65 66 97 125 129 154 296 298	24 25 97 125 154 296 298	35 51 68 80 98 99 105 124 145 168 179 197 245 246 251 297	4	81 128 176 191 214 226	176 225	35 51 54 69 143 144 212 227 229

Appendix Table A.--References to life stages of selected recreational fishes in estuarine areas of the U.S. coast of the Gulf of Mexico: Texas. E = egg; L = larva; J = juvenile; A = adult; U = unspecified.

Family - Species	TEXAS I Rio Grande River through Laguna Madre					II Corpus Christi Bay to Freeport					III Freeport through Sabine River				
	E	L	J	A	U	E	L	J	A	U	E	L	J	A	U
Sciaenidae - drums															
Silver perch (Bairdiella chrysura)			25 32 34	32 34	24 46 119 249		125	25 97 125 145 217 232	24 25 88 97 145	68 80 98 105 124 128 168 244 251		4	81 231	176 226 231	69 143 191 212 214 227 228
Sand seatrout (Cynoscion arenarius)				34 46	31 32 33 249			24 25 80 97 125 127 145 151 251	25 80 97 145 251	68 124 168 244 260		4	59 81 91 191 226 227 229 231	91 229	20 54 55 69 193 212 214 225
Spotted seatrout (Cynoscion nebulosus)	217	32 34 35 36 37 38 39 40 41 42 46 113 114 115 119 217 249 259	31 32 34 35 36 37 38 39 40 41 42 46 113 114 115 119 249 259	33 102 116 118 244 274		152 217	26 35 37 38 40 41 42 56 57 58 97 125 151 152 178 179 180 183 188 196 197 217 245 246 247 251 259	35 37 38 40 41 42 56 57 58 97 151 178 179 180 183 196 245 246 247 251 259	33 68 80 98 105 116 124 155 168 244 257 260 274		4	35 37 38 40 41 42 81 143 144 191 192 226 259 261	4 35 37 40 41 42 143 144 192 233 259 261	54 69 116 193 212 214 225 227 229 274
Spot (Leiostomus xanthurus)	34 217	25 31 34 46 119 217 249	32 34 46 119 249	24 114 244		65 80 217	24 25 57 80 88 97 125 127 128 145 151 155 217	97	68 98 105 124 168 179 244		4 59 91 213	54 59 69 81 88 91 147 176 191 213 225 226 227 229 230 287	59 91 147 176 213 226	20 55 119 143 144 212 214
Southern kingfish (Menticirrhus americanus)						125	97 125	97	80 99 124 168 183 244			88 214 227		20 69 116 191 212 229	

Appendix Table A.--References to life stages of selected recreational fishes in estuarine areas of the U.S. coast of the Gulf of Mexico: Texas. E = egg; L = larva; J = juvenile; A = adult; U = unspecified.

Family - Species	TEXAS I Rio Grande River through Laguna Madre					TEXAS II Corpus Christi Bay to Freeport					TEXAS III Freeport through Sabine River				
	E	L	J	A	U	E	L	J	A	U	E	L	J	A	U
Minkfish (Menticirrhus focaliger)															
Black drum (Pogonias cromis)	250	32 34 65 217	32 34 36 37 38 39 40 41 42 46 113 115 249 250 259	35 36 37 38 39 40 41 42 113 114 115 119 259	31 33 102 116 118 240 244	250	65 125 152 217	35 37 38 40 41 42 56 57 58 97 151 152 178 179 180 183 188 196 197 217 245 246 247 259	35 37 38 40 41 42 56 58 97 151 178 179 183 188 196 217 245 246 247 259	80 98 105 116 244 251 257 260		4	35 37 38 40 41 42 81 143 144 176 191 192 214 226 259 261	35 37 40 41 42 176 192 259 261	54 69 116 193 212 225 227 229
Atlantic croaker (Micropogon undulatus)		34 65	25 31 32 34 46 65	25 32 35 46 259	24 33 102 113 114 119 244 249		65 66 125 217 251	24 25 57 65 66 80 97 127 129 145 155 217 251	24 25 35 57 80 97 129 145 178 257 259	56 68 98 105 124 151 168 179 188 196 197 244 245 246 257 260		4 59 69 91 147 191 213	20 54 59 69 81 88 91 147 176 191 213 225 226 227 229 230 231 233 287	4 35 54 69 79 81 91 147 176 191 192 226 227 229 231 259 261	55 143 144 193 212
Red drum (Sciaenops ocellata)		36 217	31 32 34 35 36 37 38 39 40 41 42 46 65 113 114 115 119 217 249 250 259	31 32 33 35 36 37 38 39 40 41 42 113 114 115 119 142 249 250 259 293	102 116 118		65 125 152 178 217	35 37 38 40 41 42 56 57 58 97 125 152 178 179 180 183 188 196 197 217 245 246 247 250 251 259	35 37 38 40 41 42 56 58 97 151 178 179 183 196 245 246 247 250 251 259	98 99 116 128 155 257 260		4	35 37 38 40 41 42 81 143 144 191 192 226 231 259 261	4 35 37 38 40 41 42 144 192 226 259 261	54 116 193 212 214 227 229

Appendix Table A.--References to life stages of selected recreational fishes in estuarine areas of the U.S. coast of the Gulf of Mexico: Texas. E = egg; L = larva; J = juvenile; A = adult; U = unspecified.

Family - Species	TEXAS I Rio Grande River through Laguna Madre					TEXAS II Corpus Christi Bay to Freeport					TEXAS III Freeport through Sabine River				
	E	L	J	A	U	E	L	J	A	U	E	L	J	A	U
Ephippidae - spadefishes															
Atlantic spadefish (*Chaetodipterus faber*)		65			32		125	24 97 125	65 88 97	68 80 168			4 69 81 88 226 231	4	20 191 212 227
Mugilidae - mullets															
Striped mullet (*Mugil cephalus*)		97	31 97 119	31 46 97 119	32 102 105 114 190 249		26 65 97 98 125 273	25 97 98 120 126 128 145 217 232 273	145 243	68 80 99 105 124 168 190 251			4 88 91 214 225 226	4 226	20 54 69 143 144 191 212 227 246
White mullet (*Mugil curema*)		97	97	97	32 46 249		26 97 125	97 125 232		98 99 168 190	226 228	176 225 226 227 228			54 212
Fantail mullet (*Mugil trichodon*)															
Sphyraenidae - barracudas															
Guaguanche (*Sphyraena guachancho*)					15			97 125		106					
Great barracuda (*Sphyraena barracuda*)							125								
Northern sennet (*Sphyraena borealis*)								125							
Scombridae - mackerels and tunas															
Little tunny (*Euthynnus alletteratus*)															
King mackerel (*Scomberomorus cavalla*)					32					257					
Spanish mackerel (*Scomberomorus maculatus*)			34 46		32 102 249		125	125	97 125	68 168 183 257			227		212 229
Bothidae - lefteye flounders															
Gulf flounders (*Paralichthys albigutta*)					32 119 249		125	251	97 125	14 151					69 212

Appendix Table A.--References to life stages of selected recreational fishes in estuarine areas of the U.S. coast of the Gulf of Mexico: Texas. E = egg; L = larva; J = juvenile; A = adult; U = unspecified.

Family - Species	TEXAS I Rio Grande River through Laguna Madre					TEXAS II Corpus Christi Bay to Freeport					TEXAS III Freeport through Sabine River				
	E	L	J	A	U	E	L	J	A	U	E	L	J	A	U
Southern flounder (*Paralichthys lethostigma*)			25	31	102		125	24	35	14		59	4	4	14
			31	34	119			35	42	68		191	35	35	69
			32	35	249			37	56	80			37	42	193
			34	36				38	57	98			38	59	212
			35	39				40	58	124			40	192	214
			37	42				41	97	128			41	259	225
			38	46				42	151	168			42	261	227
			39	113				56	178	183			59		231
			40	115				57	179				81		
			41	142				58	188				88		
			42	259				97	196				143		
			46					145	245				144		
			113					151	246				191		
			115					178	247				192		
			259					179	251				259		
								180	259				261		
								188							
								196							
								197							
								245							
								246							
								247							
								251							
								259							
Balistidae - triggerfishes and filefishes															
Gray triggerfish (*Balistes capriscus*)															
Orange filefish (*Aluterus schoepfi*)					249			125							
Tetraodontidae - puffers															
Southern puffer (*Sphoeroides nephelus*)					119			24		15			226		20
					249			25		68			229		69
								125		124					143
								217		127					191
										251					212
															214
															225
															227

Appendix Table B.--References to life stages of selected recreational fishes in estuarine areas of the U.S. coast of the Gulf of Mexico: Louisiana, Mississippi, and Alabama. E = egg; L = larva; J = juvenile; A = adult; U = unspecified.

Family-Species	LOUISIANA IV West of Mississippi River					LOUISIANA V East of Mississippi River					MISSISSIPPI VI Mississippi Coast					ALABAMA VII Alabama Coast				
	E	L	J	A	U	E	L	J	A	U	E	L	J	A	U	E	L	J	A	U
Orectolobidae - carpet sharks																				
Nurse shark (Ginglymostoma cirratum)																				
Carcharhinidae - requiem sharks																				
Finetooth shark (Aprionodon isodon)															60				266 295	
Blacknose shark (Carcharhinus acronotus)															60			266 295		
Bull shark (Carcharhinus leucas)			49 74	74	202			75		87					60			295		
Blacktip shark (Carcharhinus limbatus)															60			295		266
Sandbar shark (Carcharhinus milberti)																				
Atlantic sharpnose shark (Rhizoprionodon terraenovae)																		295	295	
Sphyrnidae - hammerhead sharks																				
Scalloped hammerhead (Sphyrna lewini= S. diplana)															60			295		
Great hammerhead (Sphyrna mokarran)																		295		
Bonnethead (Sphyrna tiburo)													90		60			295		266
Other hammerheads (Sphyrna spp.)															60					
Elopidae - tarpons																				
Ladyfish (Elops saurus)	121 202		220 248		78 89 107 294	121		74 75 220 248					90 158		60	267 295		266 267 295	295	
Tarpon (Megalops atlantica)					202								90 210		60			266	295	
Bonefish (Albula vulpes)																				
Clupeidae - herrings																				
Alabama shad (Alosa alabamae)					89														295	
Skipjack herring (Alosa chrysochloris)			82 220	219 220	218					87 121									295	
Ariidae - sea catfishes																				
Sea catfish (Arius felis)	82 219 220		82 219 220	82 219 220	78 89 121 218 282 283	220		74 75 220	74 75 220	87 121			90	90	60	194		194 266 267 295	194 266 267 295	223 268

Appendix Table B.--References to life stages of selected recreational fishes in estuarine areas of the U.S. coast of the Gulf of Mexico: Louisiana, Mississippi, and Alabama. E = egg; L = larva; J = juvenile; A = adult; U = unspecified.

Family-Species	LOUISIANA IV West of Mississippi River					LOUISIANA V East of Mississippi River					MISSISSIPPI VI Mississippi Coast					ALABAMA VII Alabama Coast				
	E	L	J	A	U	E	L	J	A	U	E	L	J	A	U	E	L	J	A	U
Gafftopsail catfish (Bagre marinus)	96	219 220	82 96 219 220	96 202 220	78 89 107 121 218 282 283 294		220	220	74 220	87 121 241			158		60	267		194 266 295	266 267 295	268
Centropomidae - snooks																				
Tarpon snook (Centropomus pectinatus)																				
Snook (Centropomus undecimalis)																				
Percichthyidae - temperate basses																				
Striped bass (Morone saxatilis)															60 172			266 295		
Serranidae - sea basses																				
Southern sea bass (Centropristis melana)																				
Rock sea bass (Centropristis philadelphica)			82 185	185 220	283			185	185 220				90	158	60			266 295	266 295	
Jewfish (Epinephelus itajara)																				
Gag (Mycteroperca microlepis)																		295	295	
Red grouper (Epinephelus morio)																				
Pomatomidae - bluefishes																				
Bluefish (Pomatomus saltatrix)			82 220	220						89					60				295	266
Rachycentridae - cobias																				
Cobia (Rachycentron canadum)			82												60			266	295	
Carangidae - jacks and pompanos																				
Blue runner (Caranx crysos)			220		89									90	60			266		
Crevalle jack (Caranx hippos)			96 219 220		78 89 121 202 218 283 294			74 75 220		87 121			90		60			266 267 295		
Greater amberjack (Seriola dumerili)																				

Appendix Table B.--References to life stages of selected recreational fishes in estuarine areas of the U.S. coast of the Gulf of Mexico: Louisiana, Mississippi, and Alabama. E = egg; L = larva; J = juvenile; L = larva; U = unspecified.

Family-Species	LOUISIANA IV West of Mississippi River					LOUISIANA V East of Mississippi River					MISSISSIPPI VI Mississippi Coast					ALABAMA VII Alabama Coast				
	E	L	J	A	U	E	L	J	A	U	E	L	J	A	U	E	L	J	A	U
Florida pompano (Trachinotus carolinus)			21 82 220		78 89 202			220		87					60			266 295		
Permit (Trachinotus falcatus)					89										60			266 295		
Lutjanidae - snappers																				
Red snapper (Lutjanus campechanus)															60			266 295	295	
Gray snapper (Lutjanus griseus)			220		283			220					158		60			266 267 295		
Lane snapper (Lutjanus synagris)			82 220												60			266 295		
Lobotidae - tripletails																				
Tripletail (Lobotes surinamensis)			220		11 12 89 202										11 60			295	295	11
Gerreidae - mojarras																				
Striped mojarra (Diapterus plumieri)																				
Pomadasyidae - grunts																				
Tomtate (Haemulon aurolineatum)																				266
White grunt (Haemulon plumieri)																				
Pigfish (Orthopristis chrysoptera)			82 220	82									90		60			295		266
Sparidae - porgies																				
Sheepshead (Archosargus probatocephalus)			82 219	82 219	78 89 116 121 202 218 294			87	75 87	116 121 241				90 158	60			266 267	267 295	268
Pinfish (Lagodon rhomboides)	202		82 219 220	82 219 220	51 78 82 121 218 294			74 75 220	74 75 220	51 87 121 241			90 158	90	51 60 209	267		267 295	267 295	51 136 223 266

Appendix Table B.--References to life stages of selected recreational fishes in estuarine areas of the U.S. coast of the Gulf of Mexico: Louisiana, Mississippi, and Alabama. E = egg; L = larva; J = juvenile; A = adult; U = unspecified.

Family-Species	LOUISIANA IV West of Mississippi River					LOUISIANA V East of Mississippi River					MISSISSIPPI VI Mississippi Coast					ALABAMA VII Alabama Coast				
	E	L	J	A	U	E	L	J	A	U	E	L	J	A	U	E	L	J	A	U
Sciaenidae - drums																				
Silver perch (Bairdiella chrysura)		202	82 96 202 219 220	82 96 220	78 89 121 218 283 294			74 75 220	74 75 220	87 121 167 241			90 159	159	60 209		266	267 295	267 295	
Sand seatrout (Cynoscion arenarius)		202	82 96 218 219 220	82 218 219 220	78 89 107 116 121 282 283 294			74 75 220	74 75 220	87 116 121 167			61 158	61 158	60			266 267 295	267 295	
Spotted seatrout (Cynoscion nebulosus)			74 75 82 88 96 219 220	74 75 82 96 187 202 220 239	78 89 116 121 218 274 282 283			87 220	87 220 264	116 121 167			90 158	158	60 116 210 274			266 267 295	295	116 268 274
Spot (Leiostomus xanthurus)		121 202	82 88 96 121 202 218 219 220	96 121 218 219 220	78 89 107 282 283 294		73 213	73 74 75 121 213 220 263	74 75 121 213 220 263	87 167 241			90 158	90 158	60 205 209		267	136 201 266 267 295	201 266 267 295	223 268 289
Southern kingfish (Menticirrhus americanus)		202	82 219 220	82 220	78 89 96 116 218 283			220	220	87 116 167 241			90 158	158	60 116 206			266 295	266	
Minkfish (Menticirrhus focaliger)			82		218			87	87						60			266 295		
Black drum (Pogonias cromis)			75 219 220	202 220	89 107 116 282 283 294			74 220	74 220	116 121 167					60			267 295	295	266
Atlantic croaker (Micropogon undulatus)	96 121 156 202 282		5 78 82 88 96 121 156 202 218 219 220 282	82 121 218 219 220	89 107 283 294	73 74 75 121 213 265		73 74 75 87 121 213 220 265	75 87 121 213 220 265	167 241			61 108 208	61 90 208 211	60 209		201	201 266 267 295	201 266 267 295	136 223 289

Appendix Table B.--References to life stages of selected recreational fishes in estuarine areas of the U.S. coast of the Gulf of Mexico: Louisiana, Mississippi, and Alabama. E = egg; L = larva; J = juvenile; A = adult; U = unspecified.

Family-Species	LOUISIANA IV West of Mississippi River					LOUISIANA V East of Mississippi River					MISSISSIPPI VI Mississippi Coast					ALABAMA VII Alabama Coast				
	E	L	J	A	U	E	L	J	A	U	E	L	J	A	U	E	L	J	A	U
Red drum (Sciaenops ocellata)			74 75 220	74 75 202	116 283 294			22 87 220 238	22 23 87 238	116 167			90 158 238	238	60 116			266	268	
Ephippidae - spadefishes																				
Atlantic spadefish (Chaetodipterus faber)		82	82 219 220	82 220	78 89 121 202 218 282			220	220	87 121 241					60 209			266 267 295	267 295	
Mugilidae - mullets																				
Striped mullet (Mugil cephalus)	121 220		75 88 121 219 220	75 121 202 219 220	78 89 107 218 294	121 220		74 121 220	74 121 220	87 116 167 241	90		90 158 210	90 108 210	60 116 207 209	267		266 267 295	266 267 295	116 223 289
White mullet (Mugil curema)					121 282								90 210	90	60 209	267		266 267	295	
Fantail mullet (Mugil trichodon)																				
Sphyraenidae - barracudas																				
Guaguanche (Sphyraena guachancho)			220												60			266		
Great barracuda (Sphyraena barracuda)			82 220												60			90 266	295	
Northern sennet (Sphyraena borealis)					89										60			266	295	
Scombridae - mackerels and tunas																				
Little tunny (Euthynnus alletteratus)																			295	
King mackerel (Scomberomorus cavalla)			220												60			266 295	295	
Spanish mackerel (Scomberomorus maculatus)			82 219 220	82	89 202 218			220		87					60			266 295		
Bothidae - lefteye flounders																				
Gulf flounder (Paralichthys albigutta)			220	220	89 282								90		60				266 295	
Southern flounder (Paralichthys lethostigma)	202		82 219 220	82 202 219 220	78 96 121 218 282 294			74 75 220	74 75 220	87 121 241			76	76	60 209			267 295	267 295	266

Appendix Table B.--References to life stages of selected recreational fishes in estuarine areas of the U.S. coast of the Gulf of Mexico: Louisiana, Mississippi, and Alabama. E = egg; L = larva; J = juvenile; A = adult; U = unspecified.

Family-Species	LOUISIANA IV West of Mississippi River					LOUISIANA V East of Mississippi River					MISSISSIPPI VI Mississippi Coast					ALABAMA VII Alabama Coast				
	E	L	J	A	U	E	L	J	A	U	E	L	J	A	U	E	L	J	A	U
Balistidae - triggerfishes and filefishes																				
Gray triggerfish (Balistes capriscus)															60			295		
Orange filefish (Aluterus schoepfi)															60			266 295		
Tetraodontidae - puffers																				
Southern puffer (Sphoeroides nephelus)			219 220		89 202 218 282			220		87					60			266 295		

Appendix Table C.--References to life stages of selected recreational fishes in estuarine areas of the U.S. coast of the Gulf of Mexico: Florida. E = egg; L = larva; J = juvenile; A = adult; U = unspecified.

Family-Species	FLORIDA VIII Perdido Bay to Lighthouse Point					IX Lighthouse Point to Anclote Key					X Anclote Key to Cape Romano					XI Cape Romano to Florida Bay				
	E	L	J	A	U	E	L	J	A	U	E	L	J	A	U	E	L	J	A	U
Orectolobidae - carpet sharks																				
Nurse shark (Ginglymostoma cirratum)				288											258					131 278
Carcharhinidae - requiem sharks																				
Finetooth shark (Aprionodon isodon)				146 288	181 182					181 182				62						
Blacknose shark (Carcharhinus acronotus)			181	181 288	182			50 181	181	182					7					
Bull shark (Carcharhinus leucas)				288	181					181			258	258				203 204		
Blacktip shark (Carcharhinus limbatus)			146 288	146 288	181 182 216					181 182					7 258			236		237 275 278
Sandbar shark (Carcharhinus milberti)			146 288		181					181										
Atlantic sharpnose shark (Rhizoprionodon terraenovae)				146 288	181 182					181 182					7					
Sphyrnidae - hammerhead sharks																				
Scalloped hammerhead (Sphyrna lewini=S. diplana)			146 288		181				224	181 182			256							
Great hammerhead (Sphyrna mokarran)														16	7					
Bonnethead (Sphyrna tiburo)			224	224	216			195		181 182			88 292		7 93 258			163		131
Other hammerheads (Sphyrna spp.)			146 288		181				224	181										
Elopidae - tarpons																				
Ladyfish (Elops saurus)	281	146 288	288	112 116 181 182			149 195 302			94 181 182		83 292	8 84 88 104 222 224 258 292		7 30 45 162 173 262		203 204 236 237 278	117 163 203 204 236 237 278	236	63 131 150 242 274
Tarpon (Megalops atlantica)		280 281		146 181 182 288						153 181 182 215			88 258		45 262 279		278	117 203 204 236 275 278	275	131 134 237 242
Bonefish (Albula vulpes)				288														236		

Appendix Table C.--References to life stages of selected recreational fishes in estuarine areas of the U.S. coast of the Gulf of Mexico: Florida. E = egg; L = larva; J = juvenile; A = adult; U = unspecified.

Family-Species	FLORIDA VIII Perdido Bay to Lighthouse Point					IX Lighthouse Point to Anclote Key					X Anclote Key to Cape Romano					XI Cape Romano to Florida Bay				
	E	L	J	A	U	E	L	J	A	U	E	L	J	A	U	E	L	J	A	U
Clupeidae - herrings																				
Alabama shad (Alosa alabamae)			157 186	157 186	165															
Skipjack herring (Alosa chrysochloris)																				
Ariidae - sea catfishes																				
Sea catfish (Arius felis)	281	281 288	2 146 281 288	112 146 281 288	70 137 165 181 182		195	195	195	95 173 181 182	292	292	8 84 104 292	8 30 84 104 292	7 85 88 93 162 164 173	236		163 173 203 236	163 173 203 204 236	63 131 237
Gafftopsail catfish (Bagre marinus)	281	281 288	146 281 288	112 146 281 288	137 181 184 216		195	195	195 215 224	94 95 181 182 302		258	104 292	88 258 292	7 93 262	203		236 237	203 204 237	117 275 277 278
Centropomidae - snooks																				
Tarpon snook (Centropomus pectinatus)																				204
Snook (Centropomus undecimalis)			288	67	181 182 299					153			8 84 88 104 177 234 258 290 292	8 84 104 235 285 292	7 19 30 45 85 173 198 262 279			117 163 177 236 278 290	163 177 236 278	131 204 237 242 275 277
Percichthyidae - temperate basses																				
Striped bass (Morone saxatilis)				10					10											
Serranidae - sea basses																				
Southern sea bass (Centropristis melana)			112 299	112	181 199 200			173 195 224	173 195 224	181 182 302			258 292	285 292	7 173				161 163	
Rock sea bass (Centropristis philadelphica)					165													2 112	2	
Jewfish (Epinephelus itajara)			112					50					99 292	99	162 258 262			203 236 278	278	117 131 134 204 237 253 275
Gag (Mycteroperca microlepis)			2 112 299	2	182			195 224					169 273 292		7 173			163		131 150 278
Red grouper (Ephinephelus morio)			2	112	181 182					181 182			273 292		262					216

Appendix Table C.--References to life stages of selected recreational fishes in estuarine areas of the U.S. coast of the Gulf of Mexico: Florida.
E = egg; L = larva; J = juvenile; A = adult; U = unspecified.

Family-Species	FLORIDA																			
	VIII Perdido Bay to Lighthouse Point					IX Lighthouse Point to Anclote Key					X Anclote Key to Cape Romano					XI Cape Romano to Florida Bay				
	E	L	J	A	U	E	L	J	A	U	E	L	J	A	U	E	L	J	A	U
Pomatomidae - bluefishes																				
Bluefish (Pomatomus saltatrix)			184	146 288	112 116 137 153 181 182 200			195		94 181 182 224			3 258 292	3	7 116 262					
Rachycentridae-cobias																				
Cobia (Rachycentron canadum)			77 112 146	112	181 182			195	224	181 182			8 84		7			236		131 237 278
Carangidae-jacks and pompanos																				
Blue runner (Caranx crysos)			2	17 146 288	112 116 181 182 199 200 216					181 182					7 255 258 262			163		131 278
Crevalle jack (Caranx hippos)			2 146 281	112	70 116 137 165 181 182 199 200 288			195 224	224	94 95 181 182			8 88 104 234 258 273 292		7 85 116 253 255 262 279			163 203 204 236	203 236 277	117 131 134 173 237 275
Greater amberjack (Seriola dumerili)			112																	
Florida pompano (Trachinotus carolinus)			2 112 146		137 181 182		195	195		181 182			104 273	86	7 18 262					278
Permit (Trachinotus falcatus)					165			53 149 173 195					7 28 88 88 104 173 273 292	86 173	234 262			88 163 236		173
Lutjanidae-snappers																				
Red snapper (Lutjanus campechanus)			2 112 288		137															
Gray snapper (Lutjanus griseus)			2 112 146 281 288	112	70 137 165			149 195 224	195	173 182 285			8 84 88 104 258 292	8 84 292	7 30 47 116 173 262 279			71 163 203 204 236 278	71 163 203 204 236	48 63 64 117 131 134 150 173 237 242 275 277

Appendix Table C.--References to life stages of selected recreational fishes in estuarine areas of the U.S. coast of the Gulf of Mexico: Florida. E = egg; L = larva; J = juvenile; A = adult; U = unspecified.

Family-Species	FLORIDA																			
	VIII Perdido Bay to Lighthouse Point					IX Lighthouse Point to Anclote Key					X Anclote Key to Cape Romano					XI Cape Romano to Florida Bay				
	E	L	J	A	U	E	L	J	A	U	E	L	J	A	U	E	L	J	A	U
Lane snapper (Lutjanus synagris)			2					224					104 234 258 292	292	7 88 93 132 173 262			163 236 275 278	278	63 64 131 173 237 276
Lobotidae-tripletails																				
Tripletail (Lobotes surinamensis)			112		11 97 299			195		11				292	11 258			236 278		
Gerreidae-mojarras																				
Striped mojarra (Diapterus plumieri)													30 104 244 258 273 292	8 30 84 104 244 258 273 292	7 45 162			203 204 236	163 203 204 236	173 237 278 291
Pomadasyidae-grunts																				
Tomtate (Haemulon aurolineatum)			112	112				224					292					163 278	163	
White grunt (Haemulon plumieri)			2	2 112	165 181 182 216			53 195 224		94 95 181 182			258 292		7 262 279			163 236 278	163	237 275
Pigfish (Orthopristis chrysoptera)	281		112 146 184 215 281	112	137 165 181 182 199 200			53 94 95 149 173 195 224	173	51 181 182 302			8 84 88 104 173 222 258 292	8 84 173 292	7 47 85 93 162 164 262			63 163 236 278	163 278	64 131 173 237 275
Sparidae-porgies																				
Sheepshead (Archosargus probatocephalus)			112 288	112 146 288	2 137 165 181 182			149 195	19 149 195 224	17 94 181 182			30 104 258 273 292	8 17 84 88 273	7 47 85 93 116 162 164 173 198 253 255 262 279 285			117 203 236 278	117 236 278	63 64 131 173 204 237 242 277

Appendix Table C.--References to life stages of selected recreational fishes in estuarine areas of the U.S. coast of the Gulf of Mexico: Florida.
E = egg; L = larva; J = juvenile; A = adult; U = unspecified.

Family-Species	FLORIDA																			
	VIII Perdido Bay to Lighthouse Point					IX Lighthouse Point to Anclote Key					X Anclote Key to Cape Romano					XI Cape Romano to Florida Bay				
	E	L	J	A	U	E	L	J	A	U	E	L	J	A	U	E	L	J	A	U
Pinfish (Lagodon rhomboides)			51 111 112 146 281 288	111 112 184 288	2 70 137 145 165 181 182 199 200 216		1	1 51 53 94 95 149 173 195 215 224 302	1 51 94 95 149 173 195 302	181 182 209			8 28 29 30 51 84 85 88 104 173 222 258 292	8 28 84 104 173 258 292	7 93 145 162 164 198 253 255 262 276			63 109 163 173 203 204 236 278	163 173 236 275 278	51 64 131 150 237 301
Sciaenidae-drums																				
Silver perch (Bairdiella chrysura)			2 146 281	2 112 146 281	70 165 184 199 200 216		1 53	1 53 94 95 149 173 195 215 224	1 53 94 95 149 173 195 215 224	51 153 302			8 84 88 104 173 222 258 292	8 30 84 88 104 173 292	7 93 162 164 254 255 279		141 203 204	163 173 204 236 237 278	163 173 203 236 237 278	63 64 275 301
Sand seatrout (Cynoscion arenarius)			2 281	281 288	112 146 165 166 181 182 184 199 200			149 195 215 224		94 95 166 181 182 200			103 104 222 258 273 292	104 273 292	7 116 162 164 173		141	163	236	237
Spotted seatrout (Cynoscion nebulosus)			2 112 146 184 281 288	2 112 187 281 288	70 116 137 165 166 181 199 200			1 53 149 153 173 187 189 195 224	17 18 19 153 173 187 189 195	94 95 116 166 181 182 274 285 302			8 30 84 104 173 187 258 273 292	8 17 18 19 84 138 173 187 273 292	7 93 116 122 162 164 198 255 262 274 279 285		141 236	117 139 163 173 203 204 236 278	117 139 173 203 204 278	48 63 131 134 237 242 274 275 277 285
Spot (Leiostomus xanthurus)	112 281		2 72 112 184 281 288	2 112 184 281 288	116 165 181 182 199 200 223		95	51 95 149 173 195 215 224 302	95 173 195 302	94 116 153 181 182	30 148 258 273		8 28 30 84 85 88 104 173 222 258 273 292	8 84 104 173 273	7 93 116 162 164			141 163 278	278	275
Southern kingfish (Menticirrhus americanus)			2 146	146	116 165 181 182 184 199 200			195 215 224	195 224	95 173 181 182			104 258 292	104 222 292	7 88 162 164 173		141	163	163	173

Appendix Table C.--References to life stages of selected recreational fishes in estuarine areas of the U.S. coast of the Gulf of Mexico: Florida. E = egg; L = larva; J = juvenile; A = adult; U = unspecified.

Family-Species	FLORIDA																			
	VIII Perdido Bay to Lighthouse Point					IX Lighthouse Point to Anclote Key					X Anclote Key to Cape Romano					XI Cape Romano to Florida Bay				
	E	L	J	A	U	E	L	J	A	U	E	L	J	A	U	E	L	J	A	U
Minkfish (Menticirrhus focaliger)		112	112 146 281		181 182 200					181 182			222 258		7 28 104					
Black drum (Pogonias cromis)			146	112	70 137 181 182 250			149		181 182			8 84 104 258 273 292	273 292	7 85 162 164 198		141	236	163 278	237 242 275 277
Atlantic croaker (Micropogon undulatus)		281	110 111 146 184 281 288	2 111 112 146 281 288	137 165 181 182 199 200 223			195 215	195 215	153 181 182 302		104	88 104 222 258 292	88	7 164				236	237 275 278
Red drum (Sciaenops ocellata)			146 281 288	112 288	70 116 137 165 181 182 200			149 195		94 95 116 153 181 182 215 301		30	8 17 19 30 84 88 104 222 258 273 292	17 88 273	7 28 47 85 116 162 164 173 198 262 279		141 203 275	117 140 203 204 236 237 278	117 140 275 278 300	48 63 131 173 242
Ephippidae-spadefishes																				
Atlantic spadefish (Chaeodipterus faber)			2 112 146 281 288	2 112 288	165 181 182 184 200 216			149 195 215 224	195	94 95 173 181 182		258	8 104 258 292	17 258 292	7 84 86 88 93 162 164 173 234 262			163 236 278	163 236 278	63 131 173 237 275
Mugilidae-mullets																				
Striped mullet (Mugil cephalus)	72 112 146 281		2 9 43 44 72 112 133 215 281 288	2 43 44 72 112 133 281 288	70 116 119 135 137 181 182 200 216	95 149 224		43 44 95 133 149 173 195	43 44 133 173 195 286	94 116 135 181 182	84 104 222 258 273		8 28 84 104 133 173 258 273 292	8 27 29 84 85 133 173 286 292	7 30 45 47 116 122 135 164 262 272 279			133 163 173 236	88 163 173 236 278	63 117 131 150 203 204 237 275
White mullet (Mugil curema)	146 281		2 146 281	2 112	70 181 182 216 288	149		149 195		181 182	88 104		8 28 84 88 104 258 273 292	258	7 30 116 262 272 279	88 163		88 163 278		131 150 236 237 275

Appendix Table C.--References to life stages of selected recreational fishes in estuarine areas of the U.S. coast of the Gulf of Mexico: Florida. E = egg; L = larva; J = juvenile; A = adult; U = unspecified.

Family-Species	FLORIDA																			
	VIII Perdido Bay to Lighthouse Point					IX Lighthouse Point to Anclote Key					X Anclote Key to Cape Romano					XI Cape Romano to Florida Bay				
	E	L	J	A	U	E	L	J	A	U	E	L	J	A	U	E	L	J	A	U
Fantail mullet (Mugil trichodon)			2					149		173		258	8 84 173 234 258 273	8 84 173 258	7 272			163 173	163 173	
Sphyraenidae-barracudas																				
Guaguanche (Sphyraena guachancho)																				
Great barracuda (Sphyraena barracuda)		112	112	2	288			149 224		153			258					18 203 204 236 278		63 131 237 275
Northern sennet (Sphyraena borealis)			2 112 281 299	112	182								258 292							
Scombridae-mackerels and tunas																				
Little tunny (Euthynnus alletteratus)			112	112						173										
King mackerel (Scomberomorus cavalla)			112		181 182 216 288					153 181 182					116 258			236		237
Spanish mackerel (Scomberomorus maculatus)			146 281	112 288	116 137 181 182			195	195	94 153 173 181 182 200 224			258 273 292	273	7 116 262					242 275 278
Bothidae-lefteye flounders																				
Gulf flounder (Paralichthys albigutta)		112	2 112 288	2 112 288	137 146 165 181 182 200 216			95 149 195 215 224	195	94 173 181 182			8 28 84 88 222 258 292	8 84 104 130 222 258 292	7 42 47 85 93 164 173 198 254 279			163 236	163 236	63 237
Southern flounder (Paralichthys lethostigma)			2 112 281 288	2 112 146 288	165 181 182 216					181 182 215 302			88 104						278	

Appendix Table C.--References to life stages of selected recreational fishes in estuarine areas of the U.S. coast of the Gulf of Mexico: Florida. E = egg; L = larva; J = juvenile; A = adult; U = unspecified.

Family-Species	FLORIDA																			
	VIII Perdido Bay to Lighthouse Point					IX Lighthouse Point to Anclote Key					X Anclote Key to Cape Romano					XI Cape Romano to Florida Bay				
	E	L	J	A	U	E	L	J	A	U	E	L	J	A	U	E	L	J	A	U
Balistidae-triggerfishes and filefishes																				
Gray triggerfish (Balistes capriscus)			112	112	181 182 199					181 182					258		236			237
Orange filefish (Aluterus schoepfi)			112 281	112	165			195	195	94 95			258 292	258 292	93 173			236 278	163 278	275
Tetraodontidae-puffers																				
Southern puffer (Sphoeroides nephelus)			2 112 146 281 288	2 112	165 182			53 95 149 195 224	195	94 173 182			8 84 88 104 222 258 292	8 84 292	7 94 132 162 164 173	236		88 163 236 278	163 236 278	63 131 173 237 275

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