Charterboat Catch and Effort From Southeastern U.S. Waters, 1983

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Introduction

In 1982, a pilot survey was initiated at the Southeast Fisheries Center's Panama City Laboratory (SEFC-PC) using charterboat captains to obtain fishing data (Williams et al., 1984; Brusher et al., 1984). In 1983, the survey was expanded to include charterboats along the coastal and offshore waters of the southeastern United States (From North Carolina to the Florida Keys), the Gulf of Mexico (from the Florida Keys to Texas), and the U.S. Caribbean Sea (U.S. Virgin Islands and Puerto Rico).

Marine fish resources within the described areas (Fig. 1) are diverse and are exploited by recreational and commercial fishermen. Sampling within the private recreational boat fisheries group would be difficult because of the numerous docking and landing site problems and costly because of the number and categories of boats in the sampling

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frame. Within the charterboat fishery where recreational fishermen hire a captain and vessel for purposes of fishing, dockage and landing sites are limited, and the number of boats is usually smaller. These two factors have led researchers to select charterboat captains for obtaining marine recreational fish catch. Estimating catch per boat fishing hour (CPH) from a recreational boat fishery is less expensive than estimating total catch and effort and can provide a basis for monitoring relative abundance of species.

Personnel at the Panama City Laboratory have conducted four marine recre-

ABSTRACT—In 1983, charterboat captains from coastal areas of the southeastern United States, Gulf of Mexico, and Caribbean Sea were contracted to provide daily catch and effort data. A total of 348,976 pelagic and demersal fish were caught during 46,921.5 hours of fishing. Species catch and catch per boat fishing hour (CPH) are presented by year, month, and location. These data are compared with the data obtained in a 1982 charterboat survey.

Major species caught by trolling were dolphin, Coryphaena hippurus; king mackerel, Scomberomorus cavalla; Spanish mackerel, S. maculatus; little tunny, Euthynnus alletteratus; blue runner, Caranx crysos; Atlantic bonito, Sarda sarda; bluefish, Pomatomus saltatrix; great barracuda, Sphyraena barracuda; yellowfin tuna, Thunnus albacares; and blackfin tuna, T. atlanticus. Major species caught by methods other than trolling included red snapper, Lutjanus campechanus; black sea bass, Centropristis striata; Atlantic croaker, Macropogonias undulatus; sand seatrout, Cynoscion arenarius; seatrouts, Cynoscion spp.; vermillion snapper, Rhomboplites aurorubens; porgies, Sparidae; gray triggerfish, Balistes capriscus; greater amberjack, Seriola dumerili; and grunts, Haemulidae. CPH and species varied between survey areas.
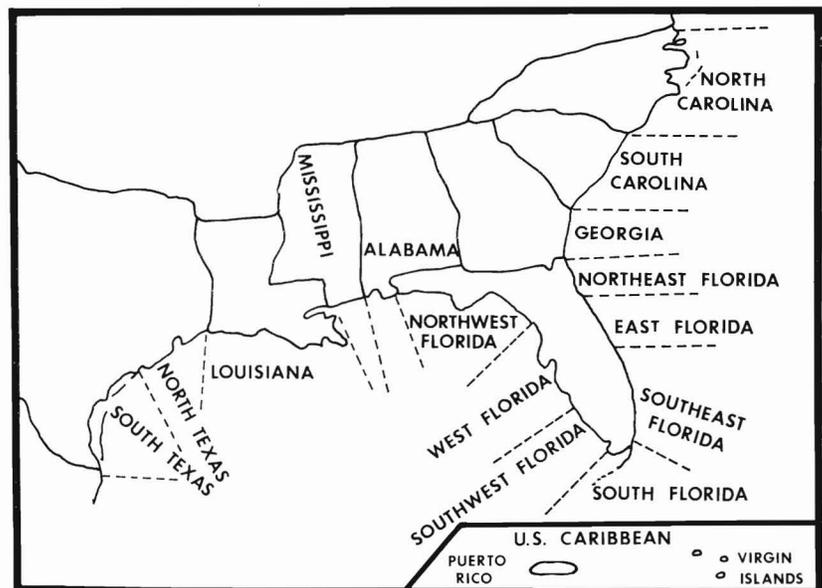

Figure 1.—Geographical areas used in reporting 1983 charterboat catch and effort from the southeastern United States and the U.S. Caribbean Sea.

ational boat fishing surveys: In 1975 (Brusher et al., 1977); 1976 (Brusher, n.d.[1]); 1982 (Williams et al., 1984a, Brusher et al., 1984); and 1983 (Williams et al., 1984b). The objectives of these surveys were to: 1) Evaluate and improve methods of obtaining CPH from charterboat captains throughout the southeastern United States, and 2) obtain biological information and determine geographic and seasonal availability of various recreationally caught marine species.

The 1975 and 1976 studies (Brusher et al., 1977; Brusher[1]) relied on voluntary participation by boat owners and boat captains. The results indicated that this survey method (even with monthly reward systems) was neither efficient nor reliable. The 1982 survey proved more successful because charterboat captains were contracted to provide timely catch and effort data. Also, the 1982 survey data indicated the feasibility of establishing a long-term data base concerning the availability of coastal, reef, and oceanic fishes of the southeastern United States, the Gulf of Mexico, and the U.S. Caribbean Sea. As a result, the 1983 survey was expanded in areas as well as in number of charterboats. In this report, we describe the expanded survey, highlight the results, and provide detailed CPH data for each species throughout the entire area.

Methods

Charterboats were surveyed because they are an easily identified and important component of recreational fisheries, and fishing effort is relatively consistent since charterboat captains are professional fishermen whose livelihood depends on angling success.

For this survey, charterboats were defined as a vessel available to an angler or group of anglers for which a fee is paid for the use of the captain and vessel. Letters describing our survey goals were sent to 972 charterboat captains operating in the marine waters of the southeastern United States, the Gulf of Mexico and the U.S. Caribbean Sea. We

asked captains to indicate their interest in being considered as participants in the survey. From 164 positive returns, 100 were randomly selected which represented about 10 percent of the full-time charterboat captains within each of 16 areas (Fig. 1). Each captain was contracted to provide SEFC-PC with daily catch and effort data at the end of each week. Captains were paid each month only if all weekly logs for that month were received by project personnel.

The survey began on 27 March 1983 and ended on 3 December 1983, except in southeast Florida, south Florida, southwest Florida, west Florida, Louisiana, and the U.S. Caribbean Sea, where coverage extended through 31 December 1983. Some captains voluntarily submitted catch and effort data before the official starting date of 27 March, and their data have also been included in our analysis.

The cooperation we received from the majority of survey captains was excellent. Their recordkeeping was very thorough as was their promptness in submitting weekly logs. If captains failed to respond in a timely fashion, they were replaced with another captain from the original list. Twelve captains were replaced from April 1983 through November 1983.

Each captain was provided with a logbook which included log forms (Fig. 2) for reporting daily records of their catch and effort, and monthly invoice statements. A fishing week was from Sunday through Saturday and log forms (self-addressed and postpaid) were returned on Monday or Tuesday of the next week.

Upon receipt of the log form, data were documented as to date received, and each charterboat was identified by numeric code. Combinations of fishing zones were coded per the 1982 survey (Williams et al., 1984). Hours of fishing were rounded to the nearest 0.5 hour, and all fish species were assigned a numeric code. The captains were contacted by telephone to correct inaccurate or incomplete logs before the data were entered into the computer. All species were listed by the names in Robins et al. (1980). Suspected identification problems were resolved by sending FAO

species identification sheets (Fischer, 1978) to captains.

After all log forms were corrected and numerically coded, data were "posted" into the SEFC-PC minicomputer to maintain a response file. After all log forms were posted, data were entered into the Burroughs[2] time-sharing system (located at the NMFS Northwest and Alaska Fisheries Center, Seattle, Wash., verified, corrected, and then transferred to archival storage. Data analysis provided total catch and CPH. CPH was computed by dividing the total catch per species by the total boat hours of fishing.

Data can be reported by individual boats or by combined boats, by individual areas or by combined areas, by trolling or by nontrolling fishing methods, by fishing zone(s), by daily, weekly, monthly, or yearly intervals, and by any combination(s) of the above. Computer capabilities give unlimited analytical capacity to represent statistically any species or species group.

Charterboat Characteristics

Charterboats ranged in length from 24 to 58 feet and were powered by outboard or inboard (twin or single screw) engines. Trolling boats fished 1-8 lines, but usually 4. If other fishing methods were used, 1-20 lines were fished with 4-6 being typical.

White marlin, blue marlin, dolphin, king mackerel, Spanish mackerel, sailfish, and amberjack were reported as target species when trolling, while black sea bass, seatrout, snappers, and groupers were reported as target species when using other fishing techniques.

Fishing effort in an area was affected by 1) the target species sought by charterboat clients and 2) the inshore/offshore bottom topography. For example, the 100-fathom depth is closer to the coastlines of North Carolina, southeast Florida, south Florida, northwest Florida, south Texas, and the U.S. Caribbean Sea. More boats in these areas fished for oceanic or pelagic species than did charterboats off southwest Florida, west Florida, or Louisiana. In those areas,

1983 CHARTER BOAT SURVEY

Please fill in the requested information for each day of week

Charter Boat Name _____

Day	Sunday		Monday		Tuesday		Wednesday		Thursday		Friday		Saturday		Comments
Area Location Number(s)															
Fishing Method	Troll	Bottom	Troll	Bottom	Troll	Bottom	Troll	Bottom	Troll	Bottom	Troll	Bottom	Troll	Bottom	
Hours Actually Fished															

SPECIES — NUMBER CAUGHT

1 King mackerel
2 Cobia (ling)
3 Spanish mackerel
4 Redfish
5 Bluefish
6 Little tunny (bonito)
7 Blue runner (hardtail)
8 Atlantic bonito
9 Ladyfish (skipjack)
10 Tarpon
11 Great barracuda
12 Crevalle jack
13 Greater amberjack
14 Red snapper
15 Black sea bass
16 Scamp
17 Gag grouper (black)
18 Red grouper
19 Black grouper
20 Gray triggerfish
21 Yellowfin tuna
22 Wahoo
23 Blackfin tuna
24 Dolphin
25
26
27
28
29
30

NOAA FORM 75-700

Figure 2.—Logform used for reporting catch and effort from the 1983 charterboat survey of southeastern United States and the U.S. Caribbean Sea.

the dominant fishing method was geared toward the capture of reef or demersal species. Off Louisiana, a technique called "fly-lining," where live bait is fished from anchored vessels was used. Trolling effort was reported from all 16 areas, and fishing effort other than trolling was reported in all areas except the U.S. Caribbean Sea.

Results

Charterboat captains reported 3,479 of the 3,503 available boat fishing weeks. Within 10 days after a fishing week the response rate (i.e., receipt of logs) was over 60 percent, within 20 days over 70 percent and by 30 days over 90 percent. In 1983, we obtained 99.3 percent of the logs for which we contracted. Captains reported fishing a total of 46,921.5 hours, of which 31,122.0 hours (66.3 percent) were spent trolling and 15,799.5 hours (33.7 percent) were spent other than trolling (Table 1). Of the reported total fishing effort, 58.3 percent was in zone 3 (waters >10 fathoms), 19.0 percent was in zone 2 (waters <10 fathoms), 9.1 percent was in zone 1 (bay or estuarine waters), and 13.6 percent was in zones 4 through 7 (combinations of zones 1, 2, and 3).

Evaluation of total fishing effort showed that along the coastal waters of the Atlantic, south Florida had the greatest total fishing effort (32.4 percent), followed by North Carolina (22.1 percent), and east Florida (16.0 percent). In the Gulf of Mexico, northwest Florida had the greatest total fishing effort (28.4 percent), followed by southwest Florida (15.9 percent), and south Texas (11.9 percent). There was general agreement between the percentage of total fishing effort in different zones reported in 1982 (Brusher et al., 1984) and this survey.

During this survey, 348,976 pelagic and demersal fish specimens were caught (Tables 2 and 3), of which 111,664, representing 84 species and species groups, were taken by trolling and 237,312, representing 107 species and species groups, were taken by other methods. Of the reported 128 taxa, 15 were caught only by trolling, and 37 only by methods other than trolling.

Table 1.—Total fishing hours by area, zone, and method of fishing during 1983 charterboat survey off southeastern United States and in the U.S. Caribbean Sea.

Area	1 Estuarine	2 Oceanic (<10 fm)	3 Oceanic (>10 fm)	4 Estuarine and oceanic (<10 fm)	5 Estuarine and oceanic (>10 fm)	6 Oceanic (all depths)	7 Estuarine and oceanic (all depths)	Total
			Hours trolling and (other fishing)					
North Carolina	270.5 (83.0)	245.5 (57.0)	3,896.5 (213.0)	16.0 (4.0)	— (—)	70.0 (18.0)	— (—)	4,498.5 (375.0)
South Carolina	— (—)	638.5 (99.0)	144.5 (72.0)	— (—)	— (—)	48.5 (249.0)	— (—)	859.5 (420.0)
Georgia	— (—)	100.5 (60.0)	69.5 (55.5)	— (—)	— (—)	10.5 (1.5)	— (—)	180.5 (117.0)
Florida (NE)	20.0 (149.5)	166.0 (43.0)	105.0 (68.0)	— (39.0)	— (—)	249.0 (3.0)	— (—)	540.0 (302.5)
Florida (E)	7.0 (1.0)	35.0 (53.5)	1,833.0 (413.5)	— (—)	— (—)	1,198.0 (3.5)	— (—)	3,073.0 (471.5)
Florida (SE)	86.0 (14.0)	115.0 (41.0)	3,258.5 (295.5)	— (—)	16.5 (1.0)	273.0 (37.0)	— (—)	3,749.0 (388.5)
Florida (S)	34.5 (130.5)	232.0 (161.5)	5,111.0 (506.5)	4.5 (240.5)	— (—)	556.5 (180.5)	— (—)	5,938.5 (1,219.5)
Florida (SW)	53.0 (2,040.5)	33.0 (1,026.0)	— (214.0)	— (104.5)	— (11.0)	— (463.5)	— (—)	86.0 (3,859.5)
Florida (W)	5.5 (776.5)	801.0 (410.0)	113.5 (223.0)	— (—)	— (—)	175.5 (7.0)	— (—)	1,095.5 (1.416.5)
Florida (NW)	323.5 (—)	1,210.0 (436.5)	1,148.0 (2,706.5)	304.0 (17.0)	— (—)	603.5 (289.0)	14.0 (—)	3,603.0 (3,449.0)
Alabama	12.0 (—)	701.0 (141.0)	69.0 (282.0)	6.0 (—)	12.0 (—)	481.5 (377.0)	— (—)	1,281.5 (800.0)
Mississippi	— (—)	733.5 (79.5)	12.0 (9.0)	— (—)	— (—)	3.0 (6.0)	— (—)	748.5 (94.5)
Louisiana	5.0 (10.0)	23.0 (20.0)	518.5 (1,868.5)	— (—)	— (5.0)	103.5 (14.0)	— (5.0)	650.0 (1,922.5)
Texas (N)	— (27.0)	164.0 (199.0)	331.5 (385.5)	— (—)	— (—)	7.0 (1.0)	— (—)	502.5 (612.5)
Texas (S)	9.0 (210.5)	820.0 (64.5)	1,638.0 (43.5)	— (31.0)	— (—)	123.5 (1.5)	— (—)	2,590.5 (351.0)
U.S. Caribbean	— (—)	— (—)	1,748.5 (—)	5.0 (—)	— (—)	— (—)	— (—)	1,753.5 (—)
Totals	826.0 (3,442.5)	6,008.0 (2,901.5)	19,997.0 (7,356.0)	335.5 (436.0)	28.5 (17.0)	3,913.0 (1,641.5)	14.0 (5.0)	31,122.0 (15,799.5)

[1]Dashes indicate no effort within this fishing zone for this area.

Table 2.—Number of each species or species group caught by trolling during 1983 charterboat survey off southeastern United States and the U.S. Caribbean Sea.

Common name	Scientific name	Total	Common name	Scientific name	Total
Dolphin	*Coryphaena hippurus*	24,047	Gray snapper	*Lutjanus griseus*	20
King mackerel	*Scomberomorus cavalla*	19,733	Lizardfishes	Synodontidae	20
Spanish mackerel	*Scomberomorus maculatus*	14,847	Bar jack	*Caranx ruber*	19
Little tunny	*Euthynnus alletteratus*	11,133	Atlantic mackerel	*Scomber scombrus*	17
Blue runner	*Caranx crysos*	9,361	Dusky shark	*Carcharhinus obscurus*	16
Atlantic bonito	*Sarda sarda*	7,065	Remoras	Echeneidae	16
Bluefish	*Pomatomus saltatrix*	4,997	Snowy grouper	*Epinephelus niveatus*	15
Great barracuda	*Sphyraena barracuda*	4,460	Scamp	*Mycteroperca phenax*	14
Yellowfin tuna	*Thunnus albacares*	4,438	Leatherjacket	*Oligoplites saurus*	14
Blackfin tuna	*Thunnus atlanticus*	2,087	Tilefishes	Malacanthidae	14
Crevalle jack	*Caranx hippos*	1,441	Red grouper	*Epinephelus morio*	12
Greater amberjack	*Seriola dumerili*	1,049	Bull shark	*Carcharhinus leucas*	11
Wahoo	*Acanthocybium solanderi*	950	Sea basses	Serranidae	11
Ladyfish	*Elops saurus*	942	Atlantic cutlassfish	*Trichiurus lepturus*	10
Red drum	*Sciaenops ocellatus*	564	Horse-eye jack	*Caranx latus*	10
Cobia	*Rachycentron canadum*	455	Silky shark	*Carcharhinus falciformis*	10
Skipjack tuna	*Euthynnus pelamis*	427	Tripletail	*Lobotes surinamensis*	10
Sailfish	*Istiophorus platypterus*	370	Flounder	*Paralichthys* sp.	9
Yellowtail snapper	*Ocyurus chrysurus*	285	Finetooth shark	*Carcharhinus isodon*	8
White marlin	*Tetrapturus albidus*	279	Menhaden	*Brevoortia* sp.	8
Cero	*Scomberomorus regalis*	248	Tigar shark	*Galeocerdo cuvieri*	7
Albacore	*Thunnus alalunga*	230	Mako	*Isurus* sp.	7
Red snapper	*Lutjanus campechanus*	203	Rainbow runner	*Elagatis bipinnulata*	6
Gray triggerfish	*Balistes capriscus*	178	Bluefin tuna	*Thunnus thynnus*	5
Sharks	Squaliformes	164	Snappers	Lutjanidae	5
Black sea bass	*Centropristis striata*	156	Almaco jack	*Seriola rivoliana*	4
Blue marlin	*Makaira nigricans*	151	Bigeye scad	*Selar crumenophthalmus*	4
Hammerhead shark	*Sphyrna* sp.	151	Houndfish	*Tylosurus crocodilus*	3
Black grouper	*Mycteroperca bonaci*	129	Sheepshead	*Archosargus probatocephalus*	3
Blacktip shark	*Carcharhinus limbatus*	124	Atlantic moonfish	*Selene setapinnis*	1
Vermilion snapper	*Rhomboplites aurorubens*	102	Atlantic spadefish	*Chaetodipterus faber*	1
Lesser amberjack	*Seriola fasciata*	81	Black drum	*Pogonias cromis*	1
Gag	*Mycteroperca microlepis*	69	Bonnethead	*Sphyrna tiburo*	1
Porgies	Sparidae	67	Cownose ray	*Rhinoptera bonasus*	1
Tarpon	*Megalops atlanticus*	56	Hardhead catfish	*Arius felis*	1
Atlantic sharpnose shark	*Rhizoprionodon terraenovae*	51	Permit	*Trachinotus falcatus*	1
Seatrout	*Cynoscion* sp.	50	Sandbar shark	*Carcharhinus plumbeus*	1
Mutton snapper	*Lutjanus analis*	48	Searobins	Triglidae	1
Lane snapper	*Lutjanus synagris*	47	Spinner shark	*Carcharhinus brevipinna*	1
Grunts	Haemulidae	36	Swordfish	*Xiphias gladius*	1
Yellow jack	*Caranx bartholomaei*	30	Sand seatrout	*Cynoscion arenarius*	1
Sand perch	*Diplectrum* sp.	24			
Bigeye tuna	*Thunnus obesus*	21	Total		111,664

Table 3.—Number of each species or species group caught by methods other than trolling during 1983 charterboat survey off southeastern United States.

Common name	Scientific name	Total	Common name	Scientific name	Total
Red snapper	*Lutjanus campechanus*	50,766	Cusk-eels	Ophidiidae	51
Black sea bass	*Centropristis striata*	36,610	Leatherjackets	Balistidae	49
Atlantic croaker	*Micropogonias undulatus*	23,714	Lesser amberjack	*Seriola fasciata*	48
Sand seatrout	*Cynoscion arenarius*	18,452	Toadfish	*Opsanus* sp.	48
Seatrouts	*Cynoscion* spp.	14,408	Gafftopsail catfish	*Bagre marinus*	38
Vermilion snapper	*Rhomboplites aurorubens*	13,477	Wrasses	Labridae	36
Porgies	Sparidae	13,247	Bigeye scad	*Selar crumenophthalmus*	34
Gray triggerfish	*Balistes capriscus*	13,114	Almaco jack	*Seriola rivoliana*	33
Greater amberjack	*Seriola dumerili*	8,093	Cero	*Scomberomorus regalis*	33
Grunts	Haemulidae	4,127	Rainbow runner	*Elagatis bipinnulata*	33
Red grouper	*Epinephelus morio*	3,831	Permit	*Trachinotus falcatus*	27
Gag	*Mycteroperca microlepis*	3,169	Palometa	*Trachinotus goodei*	24
Spotted seatrout	*Cynoscion nebulosus*	2,871	Remoras	Echeneidae	23
Gray snapper	*Lutjanus griseus*	2,263	Nurse shark	*Ginglymostoma cirratum*	18
Ladyfish	*Elops saurus*	2,245	Wahoo	*Acanthocybium solanderi*	18
Red drum	*Sciaenops ocellatus*	2,233	Blackfin tuna	*Thunnus atlanticus*	16
Bluefish	*Pomatomus saltatrix*	2,108	Puffers	Tetraodontidae	16
King mackerel	*Scomberomorus cavalla*	2,014	Yellow jack	*Caranx bartholomaei*	15
Dolphin	*Coryphaena hippurus*	1,980	Dusky shark	*Carcharhinus obscurus*	14
Yellowtail snapper	*Ocyurus chrysurus*	1,807	Lemon shark	*Negaprion brevirostris*	14
Crevalle jack	*Caranx hippos*	1,753	Sailfish	*Istiophorus platypterus*	14
Blue runner	*Caranx crysos*	1,701	Bonefish	*Albula vulpes*	13
Pinfish	*Lagodon rhomboides*	1,100	Soapfish	*Rypticus* sp.	11
Little tunny	*Euthynnus alletteratus*	1,018	Bull shark	*Carcharhinus leucas*	7
Kingfish	*Menticirrhus* sp.	974	Bonnethead	*Sphyrna tiburo*	6
Spanish mackerel	*Scomberomorus maculatus*	855	Jewfish	*Epinephelus itajara*	6
Hardhead catfish	*Arius felis*	812	Tiger shark	*Galeocerdo cuvieri*	6
Scamp	*Mycteroperca phenax*	769	Atlantic sharpnose shark	*Rhizoprionodon terraenovae*	5
Sheepshead	*Archosargus probatocephalus*	647	Yellowfin tuna	*Thunnus albacares*	5
Lane snapper	*Lutjanus synagris*	637	Houndfish	*Tylosurus crocodilus*	4
Tarpon	*Megalops atlanticus*	605	Lizardfishes	Synodontidae	4
Cobia	*Rachycentron canadum*	554	Morays	Muraenidae	4
Sharks	Squaliformes	545	Yellowfin grouper	*Mycteroperca venenosa*	4
Sand perch	*Diplectrum* sp.	409	Atlantic moonfish	*Selene setapinnis*	3
Black grouper	*Mycteroperca bonaci*	382	Horse-eye jack	*Caranx latus*	3
Snappers	Lutjanidae	365	Lookdown	*Selene vomer*	3
Great barracuda	*Sphyraena barracuda*	363	African pompano	*Alectis ciliaris*	2
Mutton snapper	*Lutjanus analis*	284	Codfishes	Gadidae	2
Snowy grouper	*Epinephelus niveatus*	262	Sennet	*Sphyraena* sp.	2
Atlantic bonito	*Sarda sarda*	246	Spot	*Leiostomus xanthurus*	2
Silver perch	*Bairdiella chrysoura*	245	Atlantic guitarfish	*Rhinobatos lentiginosus*	1
Blacktip shark	*Carcharhinus limbatus*	209	Flyingfishes	Exocoetidae	1
Tilefishes	Malacanthidae	197	Leatherjacket	*Oligoplites saurus*	1
Flounder	*Paralichthys* sp.	181	Mako	*Isurus* sp.	1
Warsaw grouper	*Epinephelus nigritus*	142	Sand lance	*Ammodytes* sp.	1
Snook	*Centropomus* sp.	123	Sand tiger	*Odontaspis taurus*	1
Sea basses	Serranidae	122	Searobins	Triglidae	1
Black drum	*Pogonias cromis*	121	Shrimp eel	*Ophichthus gomesi*	1
Angelfishes	Pomacanthidae	119	Silky shark	*Carcharhinus falciformis*	1
Florida pompano	*Trachinotus carolinus*	83	Skates	Rajidae	1
Atlantic spadefish	*Chaetodipterus faber*	72	Skipjack tuna	*Euthynnus pelamis*	1
Hammerhead shark	*Sphyrna* sp.	65			
Tripletail	*Lobotes surinamensis*	63	Total		237,312
Stingrays	Dasyatidae	55			

Trolling produced an average of 3.6 fish per boat hour. The ten most abundantly caught fishes (areas combined) by number and percent of total trolling catch were: Dolphin, 24,047 (21.5 percent); king mackerel, 19,733 (17.7 percent); Spanish mackerel, 14,847 (13.3 percent); little tunny, 11,133 (10.0 percent); blue runner, 9,361 (8.4 percent); Atlantic bonito, 7,065 (6.3 percent); bluefish, 4,997 (4.5 percent); great barracuda, 4,460 (4.0 percent); yellowfin tuna, 4,438 (4.0 percent); and blackfin tuna, 2,087 (1.9 percent).

Fishing methods other than trolling produced an average of 15.0 fish per boat hour, with 67.4 percent of this type of fishing effort spent fishing off southwest, west, and northwest Florida, and Louisiana. The ten most abundantly caught fish (combined areas) were: Red snapper, 50,766 (21.4 percent); black sea bass, 36,610 (15.4 percent); Atlantic croaker, 23,714 (10.0 percent); sand seatrout, 18,452 (7.8 percent); unidentified seatrout, 14,408 (6.1 percent); vermilion snapper, 13,477 (5.7 percent); unidentified porgies, 13,248 (5.6 percent); gray triggerfish, 13,144 (5.5 percent); greater amberjack, 8,093 (3.4 percent); and un-identified grunts, 4,127 (1.7 percent).

Catches per boat hour and species caught by trolling varied between survey areas (Tables 4 and 5). In the U.S. south Atlantic and the U.S. Caribbean Sea, king mackerel and little tunny were among the top ten species in each area. Dolphin and great barracuda were among the top ten in all but one area. In the Gulf of Mexico, Spanish mackerel, king mackerel, and little tunny were among the top ten species in each area, with blue runner in seven of eight areas, and crevalle jack and Atlantic bonito in six of eight areas.

Table 4.—Ten most abundant species caught by trolling in each area off the U.S. south Atlantic coast and in the U.S. Caribbean during 1983 charterboat survey.

Area, rank, and species	Number caught	CPH	Percent of total catch w/i area	Area, rank, and species	Number caught	CPH	Percent of total catch w/i area	Area, rank, and species	Number caught	CPH	Percent of total catch w/i area
North Carolina				**Georgia (cont.)**				**Southeast Florida (cont.)**			
1 Dolphin	7,669	1.71	37.08	10.5 Cobia	8	0.00	1.66	4 Little tunny	737	0.20	7.99
2 Yellowfin tuna	4,086	0.91	19.75	10.5 Wahoo	8	0.00	1.66	5 Great barracuda	723	0.19	7.84
3 King mackerel	3,361	0.75	16.25		482		100.00	6 Spanish mackerel	448	0.12	4.86
4 Bluefish	2,949	0.66	14.26					7 Blackfin tuna	222	0.06	2.41
5 Little tunny	743	0.17	3.59	**Northeast Florida**				8 Blue runner	204	0.05	2.21
6 Spanish mackerel	430	0.10	2.08	1 Little tunny	480	0.89	37.94	9 Wahoo	158	0.04	1.71
7 Wahoo	281	0.06	1.36	2 King mackerel	238	0.44	18.81	10 Hammerhead shark	145	0.04	1.57
8 Albacore	230	0.05	1.11	3 Bluefish	144	0.27	11.38		8,549		92.67
9 White marlin	207	0.05	1.00	4 Spanish mackerel	125	0.23	9.88				
10 Blackfin tuna	188	0.04	0.91	5 Great barracuda	101	0.19	7.98	**South Florida**			
	20,144		97.39	6 Crevalle jack	67	0.13	5.30	1 Dolphin	9,229	1.55	59.62
				7 Greater amberjack	40	0.07	3.16	2 Great barracuda	1,652	0.28	10.67
South Carolina				8 Yellow jack	26	0.05	2.06	3 Blackfin tuna	1,291	0.22	8.34
1 Bluefish	909	1.08	35.83	9 Atlantic bonito	11	0.02	0.87	4 Little tunny	779	0.13	5.29
2 King mackerel	520	0.62	20.50	10 Cutlassfish	10	0.02	0.79	5 King mackerel	580	0.10	3.75
3 Spanish mackerel	409	0.48	16.12		1,242		98.17	6 Atlantic bonito	310	0.05	2.00
4 Crevalle jack	211	0.25	8.32					7 Yellowtail snapper	235	0.04	1.52
5 Great barracuda	93	0.11	3.67	**East Florida**				8 Wahoo	221	0.04	1.43
6 Red drum	72	0.09	2.84	1 King mackerel	4,383	1.43	34.50	9 Cero	212	0.04	1.36
7 Dolphin	68	0.08	2.68	2 Little tunny	2,464	0.80	19.40	10 Skipjack tuna	211	0.04	1.36
8 Yellowfin tuna	59	0.07	2.33	3 Atlantic bonito	1,714	0.56	13.49		14,720		95.34
9 Greater amberjack	51	0.06	2.01	4 Great barracuda	1,417	0.46	11.15				
10 Little tunny	45	0.05	1.77	5 Dolphin	1,012	0.33	7.97	**U.S. Caribbean**			
	2,437		96.07	6 Spanish mackerel	694	0.23	5.46	1 Dolphin	130	0.07	21.89
				7 Blue runner	293	0.10	2.31	2 Great barracuda	104	0.06	17.51
Georgia				8 Bluefish	142	0.05	1.12	3 Blue marlin	77	0.04	12.96
1 King mackerel	102	0.57	21.17	9.5 Greater amberjack	80	0.03	0.63	4 Little tunny	57	0.03	9.60
2 Little tunny	89	0.49	18.46	9.5 Lesser amberjack	80	0.03	0.63	5 King mackerel	54	0.03	9.09
3 Great barracuda	86	0.48	17.84		12,279		96.66	6 Yellowfin tuna	27	0.02	4.55
4 Bluefish	60	0.33	12.45					7 Wahoo	24	0.01	4.04
5 Spanish mackerel	37	0.21	7.68	**Southeast Florida**				8 Skipjack tuna	23	0.01	3.87
6 Vermilion snapper	35	0.19	7.26	1 Dolphin	3,555	0.95	38.54	9 Cero	22	0.01	3.70
7 Dolphin	24	0.13	4.98	2 Atlantic bonito	1,232	0.33	13.36	10 Lizardfish	19	0.01	3.20
8 Greater amberjack	18	0.10	3.73	3 King mackerel	1,125	0.30	12.20		537		90.41
9 Black sea bass	15	0.08	3.11								

Table 5.—Ten most abundant species caught by trolling in each area of the Gulf of Mexico during 1983 charterboat survey.

Area, rank, and species	Number caught	CPH	Percent of total catch w/i area	Area, rank, and species	Number caught	CPH	Percent of total catch w/i area	Area, rank, and species	Number caught	CPH	Percent of total catch w/i area
Southwest Florida				**Northwest Florida (cont.)**				**Louisiana (cont.)**			
1 Spanish mackerel	104	1.20	38.95	10 Gray triggerfish	164	0.05	0.78	4 Little tunny	238	0.37	6.14
2 Crevalle jack	63	0.73	23.60		20,696		97.92	5 Blue runner	146	0.23	3.77
3 Ladyfish	34	0.40	12.73					6 Yellowfin tuna	93	0.14	2.40
4 Blue runner	28	0.33	10.49	**Alabama**				7 Red drum	88	0.14	2.27
5 Bluefish	20	0.23	7.49	1 Spanish mackerel	1,994	1.56	38.10	8 Bluefish	85	0.13	2.19
6.5 Red drum	8	0.09	3.00	2 Little tunny	1,215	1.00	23.22	9 Crevalle jack	42	0.07	1.08
6.5 Little tunny	8	0.09	3.00	3 Blue runner	645	0.50	12.33	10 Blackfin tuna	34	0.05	0.88
8.5 King mackerel	1	0.01	0.37	4 King mackerel	601	0.47	11.48		3,763		97.04
8.5 Atlantic bonito	1	0.01	0.37	5 Atlantic bonito	368	0.29	7.03				
	267		100.00	6 Greater amberjack	119	0.09	2.27	**North Texas**			
				7 Bluefish	93	0.07	1.78	1 King Mackerel	1,093	2.18	35.88
West Florida				8 Ladyfish	60	0.05	1.15	2 Dolphin	688	1.37	22.59
1 Spanish mackerel	1,610	1.47	45.73	9 Cobia	41	0.03	0.78	3 Little tunny	487	0.97	15.99
2 Little tunny	614	0.56	17.44	10 Red snapper	31	0.02	0.59	4 Spanish mackerel	203	0.40	6.66
3 Blue runner	436	0.40	12.38		5,167		98.73	5 Greater amberjack	157	0.31	5.15
4 King mackerel	395	0.36	11.22					6 Atlantic bonito	80	0.16	2.63
5 Great barracuda	152	0.14	4.32	**Mississippi**				7 Unidentified sharks	78	0.16	2.56
6 Crevalle jack	104	0.10	2.95	1 Spanish mackerel	5,501	7.35	76.07	8 Cobia	61	0.12	2.00
7 Gag	40	0.04	1.14	2 Blue runner	389	0.52	5.38	9 Crevalle jack	54	0.11	1.77
8 Greater amberjack	38	0.04	1.08	3 Red drum	317	0.42	4.38	10 Blue runner	50	0.10	1.64
9 Ladyfish	30	0.03	0.85	4 Little tunny	304	0.41	4.20		2,951		96.87
10 Atlantic bonito	26	0.02	0.74	5 Crevalle jack	203	0.27	2.81				
	3,445		97.85	6 Ladyfish	196	0.26	2.71	**South Texas**			
				7 King mackerel	123	0.16	1.70	1 King mackerel	1,576	0.61	36.01
Northwest Florida				8 Red snapper	65	0.09	0.90	2 Little tunny	626	0.24	14.30
1 Blue runner	7,109	2.00	33.63	9 Cobia	47	0.06	0.65	3 Crevalle jack	512	0.20	11.70
2 King mackerel	4,934	1.37	23.34	10 Blacktip shark	31	0.04	0.43	4 Dolphin	317	0.12	7.24
3 Atlantic bonito	2,893	0.80	13.69		7,176		99.23	5 Blackfin tuna	238	0.10	5.44
4 Little tunny	2,247	0.62	10.63					6 Atlantic bonito	237	0.10	5.42
5 Spanish mackerel	1,434	0.40	6.78	**Louisiana**				7 Spanish mackerel	189	0.07	4.32
6 Ladyfish	587	0.16	2.78	1 Spanish mackerel	1,649	2.54	42.52	8 Yellowfin tuna	141	0.05	3.22
7 Dolphin	583	0.16	2.76	2 Dolphin	741	1.14	19.11	9 Wahoo	73	0.03	1.67
8 Bluefish	479	0.13	2.27	3 King mackerel	647	1.00	16.68	10 Cobia	10	0.03	0.23
9 Greater amberjack	266	0.07	1.26						3,919		89.55

Table 6.—Ten most abundant species caught by other than trolling in each area off the U.S. south Atlantic coast during 1983 charterboat survey.

Area, rank, and species	Number caught	CPH	Percent of total catch w/i area	Area, rank, and species	Number caught	CPH	Percent of total catch w/i area	Area, rank, and species	Number caught	CPH	Percent of total catch w/i area
North Carolina				**Georgia (cont.)**				**East Florida (cont.)**			
1 Black sea bass	12,067	32.18	73.49	5 King mackerel	58	0.50	4.96	8 Blue runner	142	0.30	2.83
2 Unidentified porgies	2,470	6.59	15.04	6 Dolphin	30	0.26	2.57	9 Snowy grouper	80	0.17	1.59
3 Unidentified grunts	1,234	3.29	7.52	7 Greater amberjack	28	0.24	2.40	10 Bluefish	70	0.15	1.39
4 Red snapper	432	1.15	2.63	8 Red drum	8	0.07	0.68				
5 Unidentified snappers	70	0.19	0.43	9.5 Cobia	7	0.06	0.60		4,420		87.93
6 Gag	61	0.16	0.37	9.5 Great barracuda	7	0.06	0.60				
7 Wrasses	21	0.06	0.13					**Southeast Florida**			
8 King mackerel	14	0.04	0.09		1,155		98.81	1 Greater amberjack	392	1.01	23.31
9 Vermilion snapper	11	0.03	0.07					2 Unidentified snappers	197	0.51	11.71
10 Toadfish	8	0.02	0.05	**Northeast Florida**				3 Snowy grouper	178	0.46	10.58
				1 Black sea bass	1,147	3.79	56.73	4 Blue runner	158	0.41	9.39
	16,388		99.82	2 Whiting	163	0.54	8.06	5 Unidentified tilefish	145	0.37	8.62
				3 Unidentified seatrout	152	0.50	7.52	6 Vermilion snapper	78	0.20	4.64
South Carolina				4 Bluefish	139	0.46	6.87	7 Dolphin	62	0.16	3.69
1 Black sea bass	20,620	50.79	90.74	5 Hardhead catfish	88	0.29	4.35	8 Spanish mackerel	60	0.15	3.57
2 Unidentified porgies	783	1.93	3.45	6 Red drum	57	0.19	2.82	9 Lane snapper	43	0.11	2.56
3 Vermilion snapper	651	1.60	1.99	7.5 Pinfish	45	0.15	2.23	10 Yellowtail snapper	42	0.11	2.50
4 Red snapper	251	0.62	1.11	7.5 Unidentified sharks	45	0.15	2.23				
5 Bluefish	137	0.34	0.60	9 Unidentified porgies	34	0.11	1.68		1,355		80.57
6 Scamp	114	0.28	0.50	10 Sheepshead	27	0.09	1.34				
7 Gray triggerfish	107	0.26	0.47					**South Florida**			
8 Gag	43	0.11	0.19		1,897		93.83	1 Yellowtail snapper	1,176	0.96	22.53
9 Unidentified sharks	10	0.03	0.04					2 King mackerel	612	0.50	11.72
10 Greater amberjack	3	0.01	0.01	**East Florida**				3 Unidentified grunts	459	0.38	8.79
				1 Black sea bass	2,083	4.42	41.44	4 Greater amberjack	314	0.26	6.02
	22,719		99.10	2 Vermilion snapper	457	0.97	9.09	5 Gray snapper	283	0.23	5.42
				3 Unidentified grunts	444	0.94	8.83	6 Mutton snapper	262	0.22	5.02
Georgia				4 Gray triggerfish	298	0.63	5.93	7 Blue runner	252	0.21	4.83
1 Vermilion snapper	534	4.56	45.68	5 Red snapper	294	0.62	5.85	8 Great barracuda	203	0.17	3.89
2 Bluefish	213	1.82	18.22	6 Yellowtail snapper	287	0.61	5.71	9 Ladyfish	157	0.13	3.01
3 Red snapper	187	1.60	16.00	7 Greater amberjack	265	0.56	5.27	10 Crevalle jack	146	0.12	2.80
4 Black sea bass	83	0.71	7.10								
									3,864		74.01

Shown in Tables 6 and 7 are the top ten species caught by methods other than trolling. Along the U.S. south Atlantic, black sea bass, vermilion snapper, and greater amberjack were caught in five of eight areas, while red snapper was reported in four of eight areas. In the Gulf of Mexico, seatrouts (both spotted and unidentified) and gray triggerfish were among the top ten species in five of eight areas with red drum and gag in four of eight areas.

Monthly CPH's for species in each of the 16 surveyed areas were computed. In this paper, only the results for each area's five most abundantly caught species in the U.S. south Atlantic and the Caribbean (Tables 8 and 9) and in the Gulf of Mexico (Tables 10 and 11) were compared. For example, in the U.S. south Atlantic, king mackerel were most abundant (CPH >2) during October and November off North Carolina, December off northeast Florida, and August and November off east Florida (Table 8). The Gulf of Mexico provided good catches of king mackerel (CPH >2) in December off west Florida, August and September off northwest Florida, January, February, and September off Louisiana, and in June, July, and August off north Texas (Table 10). Generally, king mackerel monthly CPH was highest in the Gulf of Mexico during summer months, while off the U.S. south Atlantic and in the U.S. Caribbean, CPH's were greatest in the fall. Another example shows Spanish mackerel caught along the U.S. south Atlantic (CPHs <2) but appearing to be more abundant (CPH >3) in Gulf waters, especially off Mississippi (Tables 8 and 10). A final example shows dolphin, the most abundant troll-caught species in 1983, caught most often in late spring and early summer in all surveyed areas with over 89 percent of this species caught in U.S. south Atlantic and Caribbean waters (Tables 8 and 10).

Monthly CPH data for fishes caught by methods other than trolling show a more defined relative abundance by area. Black sea bass was taken intermittently throughout the fishing season (Table 9) but was abundant only in spring along the U.S. south Atlantic areas (North Carolina through east Florida). In the Gulf of Mexico, however, black sea bass was not abundant, but red snapper was abundant from late summer through early fall, especially in the northern Gulf (Table 11). In the Caribbean area, trolling was the only recorded fishing method.

The mackerels and tunas (Scombridae) made up 54.8 percent of the troll catch, pointing out the dominance of these coastal pelagic species to the southeastern United States. For fishing methods other than trolling, snappers (Lutjanidae) with 29.3 percent, sea basses (Serranidae) with 19.3 percent, and drums (Sciaenidae) with 26.6 percent of the total catch emphasized the importance of those demersal species.

Table 7.—Ten most abundant species caught by other than trolling in each area in the Gulf of Mexico during 1983 charterboat survey.

Area, rank, and species	Number caught	CPH	Percent of total catch w/i area
Southwest Florida			
1 Unidentified seatrout	4,961	1.29	22.30
2 Red grouper	3,358	0.87	15.11
3 Gray snapper	1,507	0.39	6.78
4 Unidentified grunts	1,406	0.36	6.32
5 Ladyfish	1,398	0.36	6.29
6 Red drum	1,312	0.34	5.90
7 Gag	1,213	0.31	5.45
8 Spotted seatrout	1,081	0.28	4.86
9 Crevalle jack	1,070	0.28	4.81
10 Hardhead catfish	660	0.17	2.97
	17,966		81.79
West Florida			
1 Spotted seatrout	936	0.66	14.64
2 Gag	502	0.35	7.85
3 Ladyfish	469	0.33	7.34
4 Black sea bass	464	0.33	7.26
5 Spanish mackerel	420	0.30	6.57
6 Unidentified seatrout	389	0.28	6.08
7 Crevalle jack	387	0.27	6.05
8 Unidentified grunts	337	0.24	5.27
9 Red drum	293	0.21	4.58
10 Red grouper	257	0.18	4.02
	4,454		69.66
Northwest Florida			
1 Red snapper	13,340	3.87	26.03
2 Vermilion snapper	11,461	3.32	22.37
3 Unidentified porgies	9,694	2.81	18.92
4 Gray triggerfish	8,504	2.47	16.60
5 Greater amberjack	4,485	1.30	8.75
6 Gag	1,179	0.34	2.30
7 Little tunny	506	0.15	0.99
8 Scamp	452	0.13	0.88
9 Dolphin	402	0.12	0.78

Area, rank, and species	Number caught	CPH	Percent of total catch w/i area
Northwest Florida (cont.)			
10 Blue runner	267	0.08	0.52
	50,290		98.14
Alabama			
1 Red snapper	7,070	8.84	68.65
2 Gray triggerfish	1,771	2.21	17.20
3 Greater amberjack	637	0.80	6.19
4 Unidentified grunts	213	0.27	2.07
5 Vermilion snapper	165	0.21	1.60
6 Spadefish	111	0.14	1.08
7 Silver perch	91	0.11	0.88
8 Black sea bass	45	0.06	0.44
9 Gag	33	0.04	0.32
10 Gray snapper	30	0.04	0.29
	10,166		98.72
Mississippi			
1 Whiting	472	5.00	41.96
2 Spotted seatrout	286	3.03	25.42
3 Red snapper	163	1.73	14.49
4 Sand seatrout	70	0.74	6.22
5 Unidentified sharks	50	0.53	4.44
6 Ladyfish	30	0.32	2.67
7 Little tunny	17	0.18	1.51
8 Blue runner	10	0.11	0.89
9 Blacktip shark	8	0.09	0.64
10 Cobia	7	0.07	0.62
	1,113		98.86
Louisiana			
1 Atlantic croaker	23,261	12.29	28.11
2 Red snapper	23,199	12.07	28.04
3 Sand seatrout	17,785	9.25	21.49
4 Unidentified seatrout	8,407	4.37	10.16

Area, rank, and species	Number caught	CPH	Percent of total catch w/i area
Louisiana (cont.)			
5 Gray triggerfish	1,835	0.95	2.22
6 Greater amberjack	1,595	0.83	1.93
7 Dolphin	1,313	0.68	1.59
8 Bluefish	934	0.49	1.13
9 King mackerel	907	0.47	1.10
10 Pinfish	780	0.41	0.94
	80,016		96.71
North Texas			
1 Red snapper	4,867	8.00	70.17
2 Bluefish	401	0.66	5.78
3 Gray triggerfish	209	0.34	3.01
4 King mackerel	195	0.32	2.81
5 Little tunny	194	0.32	2.80
6 Unidentified seatrout	191	0.31	2.75
7 Spotted seatrout	160	0.26	2.31
8 Unidentified sharks	144	0.24	2.08
9 Cobia	140	0.23	2.02
10 Red drum	66	0.11	0.95
	6,567		94.68
South Texas			
1 Red snapper	621	1.77	30.16
2 Spotted seatrout	383	1.09	18.60
3 Sand seatrout	223	0.64	10.83
4 Unidentified seatrout	222	0.63	10.78
5 Red drum	156	0.44	7.58
6 Atlantic croaker	87	0.25	4.23
7 Gray triggerfish	70	0.20	3.40
8 Greater amberjack	64	0.18	3.11
9 Bluefish	30	0.10	1.46
10.5 Sheepshead	20	0.06	0.97
10.5 Black drum	20	0.06	0.97
	1,896		91.19

Table 8.—Mean catch per boat hour by month for five most abundant species caught by trolling off each U.S. south Atlantic and Caribbean area during 1983 charterboat survey.

Area and species	January	February	March	April	May	June	July	August	September	October	November	December
North Carolina												
Dolphin	—	—	—	0.00	0.95	3.31	3.29	1.42	0.88	0.43	0.00	0.00
Yellowfin tuna	—	—	—	0.00	0.99	1.83	1.37	0.78	0.28	0.39	0.00	0.00
King mackerel	—	—	—	0.03	1.16	0.32	0.11	0.06	0.32	2.83	2.94	1.75
Bluefish	—	—	—	12.01	2.37	0.07	0.00	0.02	0.00	0.27	2.20	4.13
Little tunny	—	—	—	0.19	0.23	0.11	0.08	0.05	0.14	0.39	0.61	0.38
South Carolina												
Bluefish	—	—	—	2.53	1.62	1.17	1.47	1.07	0.06	0.52	0.84	—
King mackerel	—	—	—	0.63	0.89	0.29	0.23	0.28	1.02	1.33	0.89	—
Spanish mackerel	—	—	—	0.00	0.13	1.28	0.37	0.60	0.64	0.07	0.00	—
Crevalle jack	—	—	—	0.00	0.00	0.42	0.27	0.59	0.00	0.10	0.00	—
Great barracuda	—	—	—	0.00	0.00	0.07	0.20	0.18	0.18	0.02	0.00	—
Georgia												
King mackerel	—	—	—	—	0.40	0.47	0.96	0.45	0.80	—	—	—
Little tunny	—	—	—	—	0.24	0.16	0.21	0.86	0.67	—	—	—
Great barracuda	—	—	—	—	0.00	0.36	0.35	0.81	0.00	—	—	—
Bluefish	—	—	—	—	1.28	0.63	0.13	0.00	0.00	—	—	—
Spanish mackerel	—	—	—	—	0.00	0.00	0.00	0.50	0.00	—	—	—
Northeast Florida												
Little tunny	—	—	—	1.93	1.39	0.40	0.55	0.86	0.81	0.58	0.33	1.14
King mackerel	—	—	—	0.09	0.66	0.66	0.46	0.31	0.22	0.23	0.00	2.14
Bluefish	—	—	—	0.53	0.43	0.01	0.05	0.04	0.47	0.07	2.15	0.00
Spanish mackerel	—	—	—	0.46	0.41	0.09	0.09	0.20	0.38	0.18	0.00	0.00
Great barracuda	—	—	—	0.00	0.04	0.14	0.34	0.42	0.34	0.07	0.00	0.00

Continued on next page.

Table 8.—Continued.

Area and species	January	February	March	April	May	June	July	August	September	October	November	December
East Florida												
King mackerel	—	—	0.42	1.12	1.12	1.22	0.88	2.16	1.42	1.06	3.22	1.05
Little tunny	—	—	0.00	0.36	0.80	0.57	0.93	1.91	0.75	0.44	0.58	0.12
Atlantic bonito	—	—	0.21	0.49	0.32	0.25	0.67	1.07	0.99	0.13	0.45	0.27
Great barracuda	—	—	0.64	0.19	0.11	0.21	0.41	0.55	0.63	0.21	0.17	2.14
Dolphin	—		0.10	0.32	0.26	0.78	0.39	0.17	0.23	0.38	0.15	0.40
Southeast Florida												
Dolphin	—	—	0.13	0.76	0.98	2.25	0.56	0.39	1.79	0.60	0.28	0.60
Atlantic bonito	—	—	0.00	0.02	0.09	0.06	0.35	1.47	0.42	0.17	0.31	0.47
King mackerel	—	—	0.00	0.12	0.17	0.09	0.14	0.48	0.31	0.58	0.64	0.38
Little tunny	—	—	0.00	0.09	0.02	0.04	0.20	0.77	0.30	0.19	0.19	0.13
Great barracuda	—	—	0.00	0.03	0.05	0.14	0.30	0.42	0.17	0.30	0.23	0.30
South Florida												
Dolphin	0.08	0.29	0.00	1.46	2.83	3.19	1.09	1.15	1.45	0.63	0.17	0.27
Great barracuda	0.46	0.35	0.71	0.27	0.09	0.06	0.20	0.51	0.51	0.44	0.37	0.34
Blackfin tuna	0.06	0.00	0.00	0.39	0.25	0.27	0.12	0.17	0.19	0.25	0.12	0.20
Little tunny	0.23	0.29	0.08	0.14	0.15	0.07	0.28	0.16	0.19	0.02	0.07	0.05
King mackerel	0.56	1.88	0.00	0.02	0.00	0.00	0.01	0.03	0.00	0.12	0.30	0.50
U.S. Caribbean Sea												
Dolphin	—	—	0.84	0.16	0.12	0.07	0.01	0.00	0.04	0.00	0.09	0.06
Great barracuda	—	—	0.00	0.06	0.07	0.03	0.04	0.05	0.10	0.11	0.05	0.16
Blue marlin	—	—	0.02	0.00	0.00	0.07	0.11	0.06	0.03	0.01	0.01	0.00
Little tunny	—	—	0.00	0.00	0.03	0.02	0.00	0.00	0.01	0.02	0.07	0.46
King mackerel	—	—	0.00	0.04	0.02	0.02	0.02	0.01	0.05	0.06	0.06	0.07

Table 9.—Mean catch per boat hour by month for five most abundant species caught by other than trolling off each U.S. south Atlantic area during 1983 charterboat survey.

Area and species	March	April	May	June	July	August	September	October	November	December
North Carolina										
Black sea bass	—	36.47	46.40	25.70	34.60	26.21	31.12	0.00	28.00	—
Porgies	—	5.75	10.26	5.02	8.90	5.32	5.45	3.00	4.52	—
Grunts	—	0.51	0.60	4.07	6.33	3.85	5.12	0.00	0.00	—
Red snapper	—	0.00	0.00	0.00	0.00	6.29	0.00	7.00	0.00	—
Snappers	—	0.00	0.00	0.00	0.00	0.00	1.43	0.00	0.00	—
South Carolina										
Black sea bass	—	9.85	56.39	80.73	49.07	65.46	41.51	—	—	—
Porgies	—	1.12	2.59	0.00	0.00	0.36	4.25	—	—	—
Vermilion snapper	—	0.00	0.00	0.00	0.14	1.38	4.48	—	—	—
Red snapper	—	0.00	0.43	1.00	1.14	0.72	0.57	—	—	—
Bluefish	—	0.95	1.32	0.00	0.00	0.00	0.00	—	—	—
Georgia										
Vermilion snapper	—	9.33	0.51	5.56	4.24	0.00	0.00	—	—	—
Bluefish	—	0.00	2.64	4.89	0.00	0.00	0.00	—	—	—
Red snapper	—	4.67	1.15	0.09	0.00	0.00	0.00	—	—	—
Black sea bass	—	0.00	1.41	0.76	0.48	0.33	0.00	—	—	—
King mackerel	—	0.33	0.08	0.22	1.57	2.33	0.00	—	—	—
Northeast Florida										
Black sea bass	—	3.99	21.48	5.28	6.25	0.34	0.00	4.05	0.14	—
Kingfish	—	1.07	0.00	0.30	1.00	0.28	0.96	0.65	0.11	—
Seatrout	—	0.01	0.00	0.00	0.00	0.00	0.67	1.35	1.57	—
Bluefish	—	0.28	0.00	0.02	0.00	0.00	0.00	0.00	1.60	—
Hardhead catfish	—	0.74	0.00	0.40	0.25	0.00	0.00	0.09	0.00	—
East Florida										
Black sea bass	4.63	7.95	5.42	2.32	3.42	3.84	4.29	4.25	0.28	0.00
Vermilion snapper	0.00	0.91	0.82	0.36	1.01	0.26	2.20	2.44	1.03	0.00
Grunts	0.00	0.51	1.24	0.19	1.01	1.18	0.00	6.07	0.00	0.00
Gray triggerfish	0.50	0.68	0.27	0.77	0.35	0.42	0.86	2.04	0.00	0.00
Red snapper	0.00	0.34	0.44	0.62	0.21	0.68	1.66	1.31	0.21	0.67
Southeast Florida										
Greater amberjack	—	0.85	2.83	0.51	0.04	0.00	0.00	0.14	0.46	0.67
Snappers	—	0.11	0.00	0.00	0.00	0.00	0.00	2.95	2.71	1.33

Table 9.—Continued.

Area and species	Mean catch per boat hour									
	March	April	May	June	July	August	September	October	November	December
Southeast Florida (cont.)										
Snowy grouper	—	0.05	0.11	0.82	1.13	1.01	1.39	1.22	0.00	0.30
Blue runner	—	0.03	1.20	0.00	0.08	0.00	0.00	0.03	1.54	0.00
Tilefish	—	0.19	0.46	0.51	0.49	0.78	1.13	0.00	0.04	0.42
South Florida										
Yellowtail snapper	0.70	1.06	0.25	0.00	4.44	1.72	1.59	1.14	0.63	0.44
King mackerel	0.05	0.07	0.04	0.00	0.00	0.15	0.09	0.29	0.58	2.46
Grunts	0.00	0.75	0.34	0.00	0.84	0.04	0.28	0.10	0.13	0.26
Greater amberjack	0.55	0.41	0.25	0.36	0.30	0.43	0.09	0.05	0.09	0.19
Gray snapper	0.00	0.13	0.11	0.02	0.30	0.24	0.21	0.40	0.66	0.16

Table 10.—Mean catch per boat hour by month for five most abundant species caught by trolling off each Gulf of Mexico area during 1983 charterboat survey.

Area and species	Mean catch per boat hour											
	January	February	March	April	May	June	July	August	September	October	November	December
Southwest Florida												
Spanish mackerel	—	—	—	0.56	—	—	—	1.33	0.00	1.47	1.00	—
Crevalle jack	—	—	—	0.00	—	—	—	0.00	0.00	0.98	1.00	—
Ladyfish	—	—	—	0.00	—	—	—	0.00	0.00	0.56	0.00	—
Blue runner	—	—	—	0.00	—	—	—	0.00	0.00	0.46	0.00	—
Bluefish	—	—	—	1.00	—	—	—	0.00	0.00	0.00	0.00	—
West Florida												
Spanish mackerel	—	—	—	0.64	1.14	1.56	1.73	1.47	1.77	2.33	2.35	0.03
Little tunny	—	—	—	0.28	0.26	0.55	0.29	0.66	0.92	0.64	0.36	3.39
Blue runner	—	—	—	0.28	1.20	0.51	0.11	0.08	0.55	0.28	0.03	0.00
King mackerel	—	—	—	0.51	0.25	0.22	0.18	0.12	0.10	0.20	0.53	3.13
Great barracuda	—	—	—	0.23	0.07	0.34	0.19	0.21	0.27	0.02	0.00	0.00
Northwest Florida												
Blue runner	—	—	0.00	0.00	7.68	6.39	0.01	0.05	0.02	0.01	0.00	—
King mackerel	—	—	0.00	0.00	0.01	0.35	1.82	2.47	2.34	0.68	0.03	—
Atlantic bonito	—	—	0.00	0.00	2.84	2.74	0.17	0.06	0.04	0.19	0.53	—
Little tunny	—	—	0.00	0.00	0.35	1.29	0.95	0.44	0.36	0.53	0.09	—
Spanish mackerel	—	—	0.00	1.07	1.70	0.38	0.18	0.07	0.06	0.12	0.56	—
Alabama												
Spanish mackerel	—	—	—	1.73	0.98	1.41	1.21	2.13	3.50	0.22	0.27	—
Little tunny	—	—	—	0.00	0.88	0.76	0.65	1.22	1.36	1.46	1.09	—
Blue runner	—	—	—	0.00	0.42	1.34	0.43	0.38	0.32	0.01	0.00	—
King mackerel	—	—	—	0.00	0.08	0.15	0.86	0.69	0.75	0.14	0.00	—
Atlantic bonito	—	—	—	0.02	0.58	0.65	0.38	0.02	0.00	0.05	0.18	—
Mississippi												
Spanish mackerel	—	—	—	11.33	9.86	11.84	10.57	2.86	2.01	0.08	—	—
Blue runner	—	—	—	0.00	0.36	0.65	0.81	0.63	0.15	0.00	—	—
Red drum	—	—	—	0.00	0.26	0.23	0.19	0.76	0.71	0.73	—	—
Little tunny	—	—	—	0.00	0.14	0.57	0.63	0.51	0.15	0.23	—	—
Crevalle jack	—	—	—	0.24	0.06	0.29	0.25	0.39	0.29	0.58	—	—
Louisiana												
Spanish mackerel	0.00	0.00	—	—	1.31	0.01	1.68	3.34	6.45	3.99	0.26	—
Dolphin	0.00	0.00	—	—	8.13	1.23	1.99	1.94	0.00	0.00	0.00	—
King mackerel	2.03	2.49	—	—	0.00	0.00	0.00	0.82	2.10	1.34	1.16	—
Little tunny	0.08	0.19	—	—	0.31	0.00	0.13	0.52	0.56	0.86	0.52	—
Blue runner	0.00	0.00	—	—	0.00	0.05	0.11	0.29	0.23	0.66	0.10	—
North Texas												
King mackerel	—	—	—	0.50	1.43	2.27	2.90	2.43	0.91	0.14	0.00	—
Dolphin	—	—	—	0.00	2.92	0.82	0.08	3.17	0.07	0.00	0.00	—
Little tunny	—	—	—	0.00	0.10	0.61	1.84	1.18	0.40	0.36	0.00	—
Spanish mackerel	—	—	—	0.00	0.10	0.08	0.15	0.85	0.73	0.50	1.00	—
Greater amberjack	—	—	—	0.00	0.51	0.60	0.45	0.00	0.00	0.43	0.00	—
South Texas												
King mackerel	—	—	—	0.15	0.25	0.53	0.71	0.92	0.71	0.40	0.29	0.20
Little tunny	—	—	—	0.87	0.37	0.14	0.13	0.16	0.46	0.30	0.36	1.20
Crevalle jack	—	—	—	0.23	0.51	0.31	0.13	0.08	0.06	0.02	0.23	0.00
Dolphin	—	—	—	0.02	0.05	0.11	0.17	0.15	0.14	0.14	0.01	0.00
Blackfin tuna	—	—	—	0.01	0.05	0.02	0.06	0.07	0.34	0.02	0.07	0.00

Table 11.—Mean catch per boat hour by month for five most abundant species caught by other than trolling off each Gulf of Mexico area during 1983 charterboat survey.

Area and species	January	February	March	April	May	June	July	August	September	October	November	December
Southwest Florida												
Seatrout	—	—	—	3.18	0.96	1.33	1.58	1.33	0.55	0.82	0.86	0.39
Red grouper	—	—	—	0.15	0.14	0.45	0.87	1.84	1.26	2.13	1.26	0.69
Gray snapper	—	—	—	0.11	0.06	0.09	0.10	0.39	0.69	0.87	1.14	0.73
Grunts	—	—	—	0.42	0.20	0.13	0.39	0.39	0.39	0.54	0.55	0.57
Ladyfish	—	—	—	0.79	0.26	0.20	0.24	0.27	0.15	0.16	0.66	0.69
West Florida												
Spotted seatrout	—	—	0.00	0.51	0.10	0.28	0.31	1.52	0.86	1.22	0.42	0.90
Gag	—	—	2.27	0.16	0.58	0.37	0.14	0.41	0.38	0.15	0.40	0.31
Ladyfish	—	—	0.00	0.51	0.39	0.24	0.22	0.26	0.30	0.68	0.27	0.27
Black sea bass	—	—	0.91	0.18	0.17	0.05	0.03	0.01	0.13	0.12	1.53	1.09
Spanish mackerel	—	—	0.00	0.01	0.15	0.01	0.04	0.01	0.08	0.78	1.94	0.00
Northwest Florida												
Red snapper	—	—	3.60	3.12	2.36	3.19	3.54	4.64	5.14	5.15	7.08	—
Vermilion snapper	—	—	2.80	1.60	1.86	2.52	2.88	4.92	6.59	3.42	4.95	—
Porgies	—	—	4.80	3.95	3.27	2.16	2.47	3.45	3.00	2.26	0.68	—
Gray triggerfish	—	—	0.00	1.64	1.71	1.96	2.20	2.35	3.50	3.99	3.88	—
Greater amberjack	—	—	0.80	0.68	1.45	2.23	1.25	1.05	1.44	0.70	0.90	—
Alabama												
Red snapper	—	—	—	6.19	4.68	6.70	8.45	9.11	12.94	13.54	9.05	—
Gray triggerfish	—	—	—	2.31	3.43	1.82	1.90	1.55	1.94	3.06	1.70	—
Greater amberjack	—	—	—	0.14	1.23	1.89	0.76	0.57	0.36	0.51	0.48	—
Grunts	—	—	—	0.66	0.15	0.25	0.08	0.17	0.31	0.10	1.00	—
Vermilion snapper	—	—	—	0.00	0.08	0.22	0.09	0.26	0.41	0.27	0.43	—
Mississippi												
Kingfish	—	—	—	0.00	14.75	0.00	0.00	0.00	—	0.00	—	—
Spotted seatrout	—	—	—	0.00	0.00	4.41	4.14	2.86	—	8.20	—	—
Red snapper	—	—	—	9.67	1.88	0.00	0.71	3.33	—	0.00	—	—
Sand seatrout	—	—	—	0.00	1.19	0.00	1.43	0.00	—	0.80	—	—
Sharks	—	—	—	0.00	0.00	0.00	3.57	0.00	—	0.00	—	—
Louisiana												
Atlantic croaker	11.29	11.97	13.20	12.51	3.51	4.48	6.12	11.42	13.33	23.01	19.64	21.45
Red snapper	2.19	3.39	5.07	4.51	13.86	10.55	15.85	16.02	20.83	10.45	6.57	2.88
Sand seatrout	0.00	1.55	0.00	0.00	1.73	1.09	1.80	5.31	6.25	13.47	28.22	43.51
Seatrout	14.67	15.35	18.64	20.05	0.56	1.28	0.38	0.00	0.00	1.90	13.42	22.39
Gray triggerfish	0.14	0.65	0.82	0.33	3.13	1.24	0.57	0.63	0.84	1.28	0.64	0.54
North Texas												
Red snapper	—	—	—	7.67	5.46	6.71	4.30	8.74	9.66	13.57	14.24	16.62
Bluefish	—	—	—	0.03	0.00	0.66	0.05	1.71	1.71	0.98	0.62	0.69
Gray triggerfish	—	—	—	0.87	0.32	0.45	0.03	0.38	0.42	0.57	0.35	0.31
King mackerel	—	—	—	0.00	0.14	1.27	0.23	0.27	0.19	0.00	0.03	0.00
Little tunny	—	—	—	0.00	0.37	0.21	0.50	0.59	0.44	0.00	0.00	0.00
South Texas												
Red snapper	—	—	—	2.53	1.55	0.06	10.00	7.63	1.26	3.17	0.26	0.00
Spotted seatrout	—	—	—	0.00	1.07	2.03	0.00	0.00	0.00	1.38	0.98	4.57
Sand seatrout	—	—	—	0.00	1.11	0.20	0.00	0.00	0.00	0.64	1.15	5.71
Seatrout	—	—	—	0.89	0.00	0.00	0.00	0.00	0.58	0.00	2.07	0.00
Red drum	—	—	—	0.26	0.48	0.28	0.00	0.00	0.23	0.74	0.21	1.57

Discussion

Caution must be exercised in generalizing from the 1983 data for several reasons: 1) Effort distribution by fishing zone and fishing method may not be representative of the overall fishery for any particular area; 2) our classification of methods other than trolling includes bottom fishing, drift fishing (where the bait is allowed to "drift" with the prevailing current), and fly-lining, where such methods can produce catches of pelagic species; 3) the CPH from any area within the surveyed area could reflect seasonal target species preferred by charterboat clients rather than actual species abundance; 4) although obvious species identification errors were corrected, the geographical scope of the survey area undoubtedly caused some confusion as to the common names of certain species. For example, "albacore" in North Carolina could be either little tunny, *Euthynnus alletteratus*; skipjack tuna, *E. pelamis*; or the true albacore, *Thunnus alalunga*. Thus, there may be some species misidentifications in other areas. These and other problems are being rectified for future surveys as project personnel and captains become more familiar with survey objectives and methods.

Our success in 1983 indicates that charterboat CPH is obtainable and may be used in indicating the abundance of

Table 12.—Species composition of catches by trolling between areas surveyed during 1982 and 1983 charterboat surveys off the southeastern United States.

Area	Top ten species (1982)	CPH	Top ten species (1983)	CPH
North Carolina	Dolphin	3.83	Dolphin	1.71
	Bluefish	1.69	Yellowfin tuna	0.91
	Yellowfin tuna	0.79	King mackerel	0.75
	King mackerel	0.35	Bluefish	0.66
	Little tunny	0.19	Little tunny	0.17
	White marlin	0.05	Spanish mackerel[1]	0.10
	Wahoo	0.04	Wahoo	0.06
	Blackfin tuna	0.03	Albacore	0.05
	Atlantic bonito[1]	0.02	White marlin	0.05
	Albacore	0.01	Blackfin tuna	0.04
	Hours fished = 1,368.0		Hours fished = 4,498.5	
South Florida	Dolphin	1.70	Dolphin	1.55
	Great barracuda	0.59	Great barracuda	0.28
	Yellowtail snapper	0.13	Blackfin tuna[1]	0.22
	Cero	0.11	Little tunny	0.13
	King mackerel	0.11	King mackerel	0.10
	Little tunny	0.10	Atlantic bonito	0.05
	Atlantic bonito	0.07	Yellowtail snapper	0.04
	Wahoo	0.03	Wahoo	0.04
	Black grouper[1]	0.03	Cero	0.04
	Sailfish[1]	0.03	Skipjack tuna[1]	0.04
	Hours fished = 1,370.0		Hours fished = 5,938.5	
Northwest Florida	Blue runner	1.81	Blue runner	2.00
	Spanish mackerel	1.68	King mackerel	1.37
	Little tunny	1.12	Atlantic bonito	0.80
	King mackerel	0.72	Little tunny	0.62
	Bluefish	0.55	Spanish mackerel	0.40
	Dolphin	0.36	Ladyfish	0.16
	Atlantic bonito	0.20	Dolphin	0.16
	Ladyfish	0.11	Bluefish	0.13
	Greater amberjack	0.09	Greater amberjack	0.07
	Red drum[1]	0.03	Gray triggerfish[1]	0.05
	Hours fished = 576.5		Hours fished = 3,603.0	
Louisiana	Dolphin	9.19	Spanish mackerel	2.54
	Spanish mackerel	1.20	Dolphin	1.14
	Red drum	0.66	King mackerel	1.00
	Little tunny	0.65	Little tunny	0.37
	Blue runner	0.48	Blue runner	0.23
	Crevalle jack	0.25	Yellowfin tuna[1]	0.14
	Wahoo[1]	0.19	Red drum	0.14
	Bluefish	0.18	Bluefish	0.13
	King mackerel	0.11	Crevalle jack	0.07
	Cobia[1]	0.03	Blackfin tuna[1]	0.05
	Hours fished = 302.5		Hours fished = 650.0	
South Texas	King mackerel	1.28	King mackerel	0.61
	Spanish mackerel	0.52	Little tunny	0.24
	Dolphin	0.14	Crevalle jack	0.20
	Crevalle jack	0.11	Dolphin	0.12
	Cobia	0.07	Blackfin tuna[1]	0.09
	Atlantic sharpnose shark[1]	0.06	Atlantic bonito[1]	0.09
	Red snapper[1]	0.04	Spanish mackerel	0.07
	Blacktip shark[1]	0.04	Yellowfin tuna[1]	0.05
	Little tunny	0.03	Wahoo[1]	0.03
	Unidentified sharks[1]	0.01	Cobia	0.03
	Hours fished = 771.0		Hours fished = 2,590.5	

[1]Species change from 1982 to 1983.

Table 13.—Species composition of catches by other than trolling between areas in areas surveyed during 1982 and 1983 charterboat surveys of the southeastern United States.

Area	Top ten species (1982)	CPH	Top ten species (1983)	CPH
South Florida	Yellowtail snapper	2.64	Yellowtail snapper	0.96
	Greater amberjack	1.84	King mackerel[1]	0.50
	Lane snapper[1]	0.57	Grunts[1]	0.38
	Red grouper[1]	0.40	Greater amberjack	0.26
	Gray snapper	0.26	Gray snapper	0.23
	Great barracuda	0.09	Mutton snapper[1]	0.22
	Cobia[1]	0.02	Blue runner[1]	0.21
	Atlantic bonito[1]	0.02	Great barracuda	0.17
	Warsaw grouper[1]	0.02	Ladyfish[1]	0.13
	Jewfish[1]	0.02	Crevalle jack[1]	0.12
	Hours fished = 57.5		Hours fished = 1,219.5	
Louisiana	Atlantic croaker	6.20	Atlantic croaker	12.29
	Red snapper	3.69	Red snapper	12.07
	Sand seatrout	2.62	Sand seatrout	9.25
	Dolphin	2.54	Seatrout	4.37
	Seatrout	0.80	Gray triggerfish	0.96
	Blue runner[1]	0.65	Greater amberjack[1]	0.83
	Gray triggerfish	0.63	Dolphin	0.68
	King mackerel	0.52	Bluefish	0.49
	Bluefish	0.37	King mackerel	0.47
	Blacktip shark[1]	0.21	Pinfish[1]	0.41
	Hours fished = 785.5		Hours fished = 1,922.5	
South Texas	Red snapper	1.39	Red snapper	1.77
	Red drum	0.81	Spotted seatrout	1.09
	Spotted seatrout	0.30	Sand seatrout	0.64
	Seatrout	0.21	Seatrout	0.63
	Sheepshead	0.08	Red drum	0.44
	Ladyfish[1]	0.04	Atlantic croaker[1]	0.25
	Warsaw grouper	0.01	Gray triggerfish	0.20
	Hours fished = 76.5		Greater amberjack[1]	0.18
			Bluefish[1]	0.09
			Sheepshead	0.06
			Hours fished = 351.0	

[1]Species change from 1982 to 1983.

species. Area comparisons of the top ten species caught by different fishing methods showed remarkably small differences in composition between 1982 and 1983 even though effort increased almost fourfold (Tables 12 and 13). Species CPH between areas during the 2-year period, however, did change for each fishing method. For example, dol-phin made up 45.4 percent of the total troll catch in 1982 but only 21.4 percent in 1983. We further noted that in 1983, dolphin CPH was lower within each comparable area from the 1982 survey. Does this mean an overall decline in dolphin populations off the southeastern United States? These values may or may not be significant. Only the continued collection of this type of data will have the potential to indicate abundance trends.

As previously pointed out, difficulties in analyzing marine recreational catch data are numerous. For example, the highly migratory patterns of coastal and oceanic pelagic fishes make annual surveys difficult to interpret. Multiple-year

surveys, on the other hand, using a small segment of the recreational fishery (charterboats), can contribute to the management of these fisheries by establishing long-term data sets which reflect the relative abundance of any species in time and space.

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