

# Results From the 1984 and 1985 Charterboat Surveys in Southeastern U.S. Waters and the U.S. Caribbean Sea

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## Introduction

In 1982, the Panama City Laboratory of the National Marine Fisheries Service's Southeast Fisheries Center initiated a catch and effort survey of charterboat captains (Brusher et al., 1984). Charterboat captains are an easily identifiable component of marine recreational fisheries; their livelihood depends on a high frequency of fishing trips and repeated angling success. The charterboat survey, with some modifications, has been run annually with each year's results finalized by mid-February of the following year (Williams et al., 1984a, b, 1985; Brusher and Palko, 1986). The computerized data were subjected to continuous quality control. The result was a reporting system designed to provide data relatively quickly. The objectives of these surveys were to determine the rela-

tive abundance and distribution of coastal pelagic and demersal fishes by collecting daily catch and effort data (CPUE) from a segment of the recreational fishery.

This report describes the 1984 and 1985 surveys and examines the catch and effort data submitted by charterboat captains located along coastal areas of the southeastern United States and the U.S. Caribbean Sea.

## Methods

The 1984 survey (Fig. 1) did not cover the 16 areas that were sampled in 1983, but involved captains located in the following coastal areas: North Carolina, east Florida (Daytona Beach through Ft. Pierce), southeast Florida (Stuart through

Miami), south Florida (Florida Keys), southwest Florida (Everglades through Bonita Springs), west Florida (Ft. Myers through Crystal River), northwest Florida (Cedar Key through Pensacola), Louisiana, south Texas (Rockport through Port Isabel), and the U.S. Caribbean (Puerto Rico, U.S. Virgin Islands). In 1985, all 16 areas were sampled. The selection of, and the contractual agreements with, these captains have been described by Brusher and Palko (1985).

In both 1984 and 1985, the surveys

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**ABSTRACT**—In 1984 and 1985, surveys of southeastern U.S. waters, including the Gulf of Mexico and the U.S. Caribbean Sea, were conducted to gather catch and effort records from charterboat captains located along coastal areas. Captains were contracted to supply daily records of fishing activity. During the 2-year period, 10,380 fishing trips, 48,231 hours of fishing effort were expended and 342,258 fishes were caught. Species, catches, and catch-per-boat-fishing-hour (CPH) are presented by year, month, and area. Major species groups caught by trolling included mackerels and tunas (*Scombridae*), while other-than-trolling methods caught mostly snappers (*Lutjanidae*), groupers (*Serranidae*), and croakers (*Sciaenidae*). Annual response rates for returning log forms for the 1984 and 1985 surveys were 98.8 and 95.7 percent, respectively.

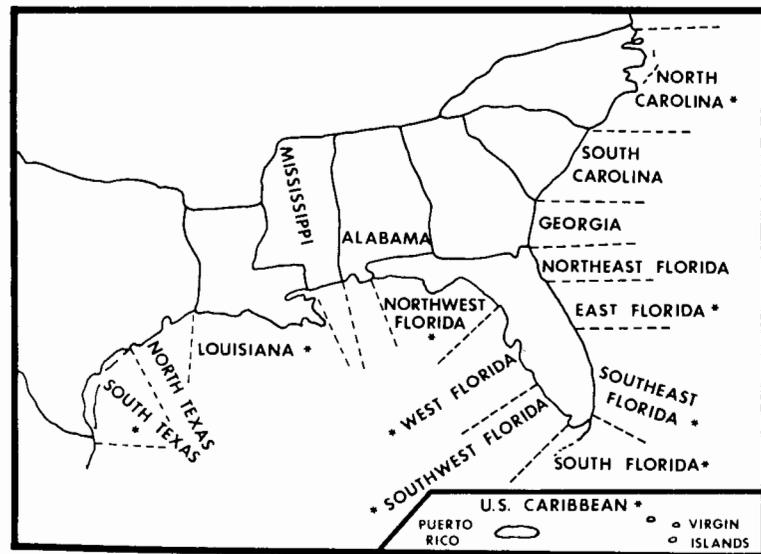


Figure 1.—Coastal areas used in reporting 1984 (\*) and 1985 charterboat catch and effort from southeastern U.S. waters, the Gulf of Mexico, and the U.S. Caribbean Sea.



**Table 1.—Total fishing hours by area, zone, and method of fishing during the 1984 charterboat survey off the southeastern United States and in the U.S. Caribbean Sea.**

Area	Hours trolling and other fishing <sup>1</sup> by fishing zones							Totals
	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)	
North Carolina	23.0 (-) <sup>2</sup>	811.0 (8.5)	904.5 (88.0)	- (-)	3.0 (-)	36.0 (-)	- (-)	1,777.5 (96.5)
Florida (E)	2.0 (-)	24.0 (6.0)	764.5 (353.5)	- (1.5)	- (-)	1,477.5 (15.0)	- (-)	2,268.0 (376.0)
Florida (SE)	- (-)	6.0 (-)	646.5 (173.0)	- (-)	- (-)	94.0 (4.0)	- (-)	746.5 (177.0)
Florida (S)	- (19.5)	271.5 (54.0)	2,064.0 (231.0)	- (-)	- (-)	441.5 (5.5)	7.0 (-)	2,784.0 (310.0)
Florida (SW)	- (786.0)	38.5 (296.5)	- (203.5)	- (109.5)	- (-)	- (-)	- (-)	38.5 (1,395.5)
Florida (W)	13.5 (407.5)	1,156.5 (543.0)	73.0 (110.5)	29.0 (17.5)	- (-)	292.0 (9.0)	- (-)	1,564.0 (1,087.5)
Florida (NW)	65.0 (7.0)	245.5 (111.5)	156.0 (926.0)	4.0 (-)	- (-)	- (9.5)	- (-)	470.5 (1,054.0)
Louisiana	- (9.0)	75.5 (25.0)	184.0 (2,231.5)	- (-)	- (4.0)	11.0 (90.5)	- (-)	270.5 (2,360.0)
Texas (S)	- (22.0)	24.0 (61.0)	810.0 (1,225.5)	- (-)	- (-)	24.0 (-)	- (-)	858.0 (1,308.5)
U.S. Caribbean	2.0 (-)	- (-)	3,347.0 (-)	- (-)	- (-)	- (-)	- (-)	3,349.0 (-)
Totals	105.5 (1,251.0)	2,652.5 (1,105.5)	8,949.5 (5,542.5)	33.0 (128.5)	3.0 (4.0)	2,376.0 (133.5)	7.0 (-)	14,126.5 (8,165.0)

<sup>1</sup>Other fishing data is given in parentheses.

<sup>2</sup>Dashes indicate no effort within this fishing zone for this area.

**Table 2.—Total fishing hours by area, zone, and method of fishing during the 1985 charterboat survey off the southeastern United States and in the U.S. Caribbean Sea.**

Area	Hours trolling and other fishing <sup>1</sup> by fishing zones						Totals
	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)	
North Carolina	7.5 (-) <sup>2</sup>	134.5 (47.0)	1,491.0 (37.5)	- (-)	- (-)	4.5 (-)	1,637.5 (84.5)
South Carolina	14.5 (8.0)	172.5 (31.0)	339.5 (1.0)	- (-)	- (-)	31.0 (-)	557.5 (40.0)
Georgia	16.0 (84.0)	114.5 (155.0)	58.0 (71.5)	- (-)	- (-)	- (-)	188.5 (310.5)
Florida (NE)	9.0 (182.0)	152.5 (99.5)	186.0 (52.5)	21.0 (-)	- (-)	167.5 (-)	536.0 (334.0)
Florida (E)	- (5.0)	13.0 (35.5)	663.5 (367.5)	- (-)	- (-)	951.0 (103.0)	1,627.5 (511.0)
Florida (SE)	- (3.0)	18.0 (14.0)	1,261.0 (484.0)	- (4.0)	- (-)	41.0 (9.0)	1,320.0 (514.0)
Florida (S)	- (38.5)	283.5 (142.0)	1,457.5 (354.5)	- (-)	3.0 (-)	413.0 (128.5)	2,157.0 (663.5)
Florida (SW)	- (861.0)	36.0 (319.5)	- (363.0)	- (86.0)	- (-)	- (-)	36.0 (1,629.5)
Florida (W)	- (-)	912.0 (667.0)	143.5 (375.5)	- (-)	- (-)	17.0 (40.0)	1,072.5 (1,082.5)
Florida (NW)	125.5 (-)	56.5 (66.5)	167.0 (1,396.0)	4.0 (3.0)	6.0 (-)	- (9.5)	359.0 (1,475.0)
Alabama	2.0 (2.0)	148.0 (24.5)	75.0 (398.5)	16.0 (3.0)	222.0 (8.0)	121.0 (20.5)	584.0 (456.5)
Mississippi	5.0 (3.5)	678.0 (261.0)	26.5 (47.5)	- (-)	- (-)	- (-)	709.5 (312.0)
Louisiana	11.0 (-)	222.5 (-)	199.5 (805.5)	- (-)	- (-)	34.5 (17.0)	467.5 (822.5)
Texas (N)	- (22.0)	118.0 (99.0)	328.5 (168.5)	12.0 (3.0)	- (-)	324.0 (13.5)	782.5 (306.0)
Texas (S)	19.0 (190.5)	600.0 (66.5)	688.0 (21.0)	12.5 (-)	- (-)	79.5 (8.5)	1,399.0 (286.5)
U.S. Caribbean	- (-)	7.5 (-)	3,670.0 (-)	- (-)	- (-)	- (-)	3,677.5 (-)
Totals	209.5 (1,399.5)	3,667.0 (2,028.0)	10,754.5 (4,944.0)	65.5 (99.0)	231.0 (8.0)	2,184.0 (349.5)	17,111.5 (8,828.0)

<sup>1</sup>Other fishing data is given in parentheses.

<sup>2</sup>Dashes indicate no effort within this fishing zone for this area.

up to six fishermen, trolled no more than four lines, and bottom fished using from six to eight lines. This definition described vessel characteristics for most surveyed areas, especially where running times to offshore fishing grounds (>10 fathoms) were short. However, in areas such as Louisiana, where running times to deeper depth zones were often 2-3 hours, some charterboats carried 10-20 passengers, especially when using "other fishing" methods. These "other fishing" methods included bottom fishing, flylining, or drift fishing whereby unweighted live or dead bait were fished from anchored or drifting vessels. Bottom fishing, where weighted live or dead baits

were fished, was the most frequent other-fishing method used.

## Results

The 1984 data, published by Williams et al. (1985), and the 1985 data, published by Brusher and Palko (1986), included catch and effort records from both contracted and volunteer captains. For this paper, we used only data from contracted captains to indicate species composition and species abundances between fishing areas.

In 1984, 51 charterboat captains reported their catches and effort from 4,676 trips. They submitted 1,241 weekly logs of the 1,255 total possible logs (98.9 per-

cent response rate). A trip was defined as an absence from a dock during which at least one of two fishing methods was used in a 24-hour day. Captains reported fishing a total of 22,291.5 hours, of which 14,126.5 hours (63.4 percent) were spent trolling and 8,165.0 hours (36.6 percent) were spent other fishing (Table 1).

In 1985, 57 captains submitted 1,639 weekly logs, and reported 5,704 trips (94.3 percent response rate). They fished a total of 25,939.5 hours, of which 17,111.5 hours (66.0 percent) were spent trolling and 8,828.0 hours (34.0 percent) were spent other fishing (Table 2).

The 1984 data showed that 6.1 percent

**Table 3.—Number of each species making up at least 0.5% of the total caught by trolling during the 1984 charterboat survey off the southeastern United States and the U.S. Caribbean.**

Common name	Scientific name	Catch	Percent of total catch	Common name	Scientific name	Catch	Percent of total catch
Dolphin	<i>Coryphaena hippurus</i>	8,578	21.0	Yellowtail snapper	<i>Ocyurus chrysurus</i>	400	1.0
Spanish mackerel	<i>Scomberomorus maculatus</i>	5,698	14.0	Wahoo	<i>Acanthocybium solanderi</i>	364	0.9
King mackerel	<i>Scomberomorus cavalla</i>	5,380	13.2	Greater amberjack	<i>Seriola dumerili</i>	333	0.8
Little tunny	<i>Euthynnus alletteratus</i>	4,784	11.7	Crevalle jack	<i>Caranx hippos</i>	318	0.8
Bluefish	<i>Pomatomus saltatrix</i>	3,064	7.5	Black sea bass	<i>Centropristis striata</i>	288	0.7
Great barracuda	<i>Sphyaena barracuda</i>	2,820	6.9	Skipjack tuna	<i>Euthynnus pelamis</i>	269	0.7
Blue runner	<i>Caranx crysos</i>	2,598	6.4	Cero	<i>Scomberomorus regalis</i>	215	0.5
Atlantic bonito	<i>Sarda sarda</i>	1,984	4.9	Black grouper	<i>Mycteroperca bonaci</i>	209	0.5
Blackfin tuna	<i>Thunnus atlanticus</i>	1,098	2.7	Sailfish	<i>Istiophorus platypterus</i>	207	0.5
Yellowfin tuna	<i>Thunnus albacares</i>	793	1.9	Total		39,399	96.6

**Table 4.—Number of each species or species group making up at least 0.5 percent of the total caught by other fishing during the 1984 charterboat survey off the southeastern United States.**

Common name	Scientific name	Catch	Percent of total catch	Common name	Scientific name	Catch	Percent of total catch
Sand seatrout	<i>Cynoscion arenarius</i>	55,574	34.9	Spotted seatrout	<i>Cynoscion nebulosus</i>	2,071	1.3
Atlantic croaker	<i>Micropogonias undulatus</i>	29,232	18.4	Dolphin	<i>Coryphaena hippurus</i>	1,795	1.1
Red snapper	<i>Lutjanus campechanus</i>	14,468	9.1	Gray snapper	<i>Lutjanus griseus</i>	1,435	0.9
Black sea bass	<i>Centropristis striata</i>	8,516	5.4	Grunts	Haemulidae	1,429	0.9
Seatrouts	<i>Cynoscion</i> spp.	8,417	5.3	Blue runner	<i>Caranx crysos</i>	1,275	0.8
King mackerel	<i>Scomberomorus cavalla</i>	3,474	2.2	Silver seatrout	<i>Cynoscion nothus</i>	1,232	0.8
Gray triggerfish	<i>Balistes capricus</i>	3,337	2.1	Sheepshead	<i>Archosargus probatocephalus</i>	1,207	0.8
Greater amberjack	<i>Seriola dumerili</i>	3,264	2.1	Crevalle jack	<i>Caranx hippos</i>	1,202	0.8
Red drum	<i>Sciaenops ocellatus</i>	3,043	1.9	Red grouper	<i>Epinephelus morio</i>	1,123	0.7
Gag	<i>Mycteroperca microlepis</i>	2,546	1.6	Ladyfish	<i>Elops saurus</i>	1,083	0.7
Bluefish	<i>Pomatomus saltatrix</i>	2,378	1.5	Vermilion snapper	<i>Rhomboplites aurorubens</i>	1,047	0.7
Porgies	Sparidae	2,257	1.4	Total		146,405	95.4

**Table 5.—Number of each species or species group making up at least 0.5 percent of the total caught by trolling during the 1985 charterboat survey off the southeastern United States and the U.S. Caribbean.**

Common name	Scientific name	Catch	Percent of total catch	Common name	Scientific name	Catch	Percent of total catch
Spanish mackerel	<i>Scomberomorus maculatus</i>	11,864	21.9	Crevalle jack	<i>Caranx hippos</i>	843	1.6
Dolphin	<i>Coryphaena hippurus</i>	9,990	18.5	Red snapper	<i>Lutjanus campechanus</i>	774	1.4
King mackerel	<i>Scomberomorus cavalla</i>	9,183	17.0	Blackfin tuna	<i>Thunnus atlanticus</i>	593	1.1
Little tunny	<i>Euthynnus alletteratus</i>	4,943	9.1	Red drum	<i>Sciaenops ocellatus</i>	474	0.9
Blue runner	<i>Caranx crysos</i>	2,735	5.1	Cero	<i>Scomberomorus regalis</i>	429	0.8
Great barracuda	<i>Sphyaena barracuda</i>	2,658	4.9	Wahoo	<i>Acanthocybium solanderi</i>	397	0.7
Atlantic bonito	<i>Sarda sarda</i>	2,427	4.5	Black grouper	<i>Mycteroperca bonaci</i>	358	0.7
Yellowfin tuna	<i>Thunnus albacares</i>	2,014	3.7	Sharks	Squaliformes	290	0.5
Greater amberjack	<i>Seriola dumerili</i>	935	1.7	Total		51,752	95.7
Bluefish	<i>Pomatomus saltatrix</i>	845	1.6				

of the total fishing effort in all areas occurred in estuarine areas, 16.8 percent in oceanic waters  $\leq 10$  fathoms, 64.6 percent in oceanic waters  $> 10$  fathoms, and 12.5 percent in combinations of the above. The 1985 data showed that for all areas 6.2 percent of the total fishing occurred in estuarine waters, 22.0 percent in waters  $\leq 10$  fathoms, 60.5 percent in  $> 10$  fathoms, and 11.3 percent in combinations.

In 1984, trolling was the dominant fishing method used by charterboat cap-

tains off North Carolina (94.9 percent); east (85.8 percent), southeast (80.8 percent), west (59.0 percent), and south (90.0 percent) Florida; and the U.S. Caribbean (100 percent). Other fishing methods were used most frequently off southwest (97.3 percent) and northwest (69.1 percent) Florida, Louisiana (89.7 percent), and south Texas (60.4 percent).

Trolling was the prevalent fishing method in 1985 in North Carolina (95.1 percent), South Carolina (93.3 percent); northeast (61.6 percent), east (76.1 per-

cent), southeast (72.0 percent), and south (76.5 percent) Florida; Alabama (56.1 percent), Mississippi (69.5 percent); north (71.9 percent) and south (83.0 percent) Texas; and the U.S. Caribbean (100.0 percent). Other fishing was the prevalent method in Georgia (62.2 percent); southwest (97.8 percent) and northwest (80.4 percent) Florida; and Louisiana (63.8 percent). West Florida fishing effort was almost equally divided between trolling (49.8 percent) and other fishing (50.2 percent).

Table 6.—Number of each species or species group making up at least 0.5 percent of the total caught by other fishing during the 1985 charterboat survey off the southeastern United States.

Common name	Scientific name	Catch	Percent of total catch	Common name	Scientific name	Catch	Percent of total catch
Sand seatrout	<i>Cynoscion arenarius</i>	14,817	16.8	Red drum	<i>Sciaenops ocellatus</i>	1,367	1.5
Red snapper	<i>Lutjanus campechanus</i>	7,693	8.7	Blue runner	<i>Caranx crysos</i>	1,310	1.5
Black sea bass	<i>Centropristis striata</i>	7,567	8.6	Ladyfish	<i>Elops saurus</i>	1,179	1.3
Gag	<i>Myxeroperca microlepis</i>	6,018	6.8	Sheepshead	<i>Archosargus probatocephalus</i>	1,151	1.3
Atlantic croaker	<i>Micropogonias undulatus</i>	5,634	6.4	Bluefish	<i>Pomatomus saltatrix</i>	1,030	1.2
Gray triggerfish	<i>Balistes capricus</i>	4,873	5.5	Little tunny	<i>Euthynnus alletteratus</i>	973	1.1
Yellowtail snapper	<i>Ocyurus chrysurus</i>	3,542	4.0	King mackerel	<i>Scomberomorus cavalla</i>	908	1.0
Greater amberjack	<i>Seriola dumerili</i>	3,495	4.0	Atlantic bonito	<i>Sarda sarda</i>	899	1.0
Red grouper	<i>Epinephelus morio</i>	3,364	3.8	Sharks	Squaliformes	614	0.7
Porgies	Sparidae	3,022	3.4	Pinfish	<i>Lagodon rhomboides</i>	575	0.7
Gray snapper	<i>Lutjanus griseus</i>	3,019	3.4	Crevalle jack	<i>Caranx hippos</i>	565	0.6
Seatrouts	<i>Cynoscion</i> spp.	3,013	3.4	Lane snapper	<i>Lutjanus synagris</i>	509	0.6
Vermilion snapper	<i>Rhomboplites aurorubens</i>	2,894	3.3	Kingfishes	<i>Menticirrhus</i> spp.	456	0.5
Grunts	Haemulidae	1,959	2.2	Total		84,087	95.2
Spotted seatrout	<i>Cynoscion nebulosus</i>	1,641	1.9				

Table 7.—Ten most abundant species caught by trolling in each area off the southeastern United States and in the U.S. Caribbean during the 1984 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				East Florida cont.				South Florida cont.			
1 Bluefish	2,831	1.59	26.4	9 Bluefish	110	0.05	1.7	4 Atlantic bonito	668	0.24	7.3
2 Spanish mackerel	2,465	1.39	23.0	10 Greater amberjack	107	0.05	1.6	5 King mackerel	523	0.19	5.7
3 King mackerel	1,825	1.03	17.0		6,371		96.1	6 Yellowtail snapper	397	0.14	4.4
4 Dolphin	1,717	0.97	16.0	Southeast Florida				7 Black grouper	184	0.07	2.0
5 Yellowfin tuna	618	0.35	5.8	1 Dolphin	326	0.44	23.3	8 Cero	141	0.05	1.5
6 Blue runner	459	0.26	4.3	2 Atlantic bonito	191	0.26	13.6	9 Little tunny	138	0.05	1.5
7 Black sea bass	285	0.16	2.7	3 Great barracuda	150	0.20	10.7	10 Mutton snapper	110	0.04	1.2
8 Little tunny	152	0.09	1.4	4 Spanish mackerel	140	0.19	10.0		8,396		92.0
9 Albacore	106	0.06	1.0	5 Little tunny	136	0.18	9.7	U.S. Caribbean			
10 Wahoo	48	0.03	0.4	6 Blue runner	102	0.14	7.3	1 Little tunny	528	0.16	28.5
	10,506		98.0	7 King mackerel	89	0.12	6.4	2 King mackerel	351	0.10	19.0
East Florida				8 Skipjack tuna	71	0.10	5.1	3 Great barracuda	223	0.07	12.0
1 King mackerel	1,168	0.52	17.6	9 Sailfish	54	0.07	3.9	4 Dolphin	213	0.06	11.5
2 Little tunny	1,098	0.48	16.6	10 Bluefish	33	0.04	2.4	5 Blue marlin	140	0.04	7.6
3 Dolphin	1,069	0.47	16.1		1,292		92.4	6 Wahoo	85	0.03	4.6
4 Blue runner	1,007	0.44	15.2	South Florida				7 Yellowfin tuna	65	0.02	3.5
5 Great barracuda	806	0.36	12.2	1 Dolphin	4,211	1.51	46.2	8 Blackfin tuna	60	0.02	3.2
6 Atlantic bonito	749	0.33	11.3	2 Great barracuda	1,195	0.43	13.1	9 Cero	53	0.02	2.9
7 Spanish mackerel	135	0.06	2.0	3 Blackfin tuna	829	0.30	9.1	10 Skipjack tuna	48	0.01	2.6
8 Gag	122	0.05	1.8						1,766		95.4

Table 8.—Ten most abundant species caught by trolling in each area of the Gulf of Mexico during the 1984 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				Louisiana cont.			
1 Spanish mackerel	130	3.38	63.1	1 Blue runner	638	1.36	28.3	7 Yellowfin tuna	24	0.09	1.1
2 Bluefish	68	1.77	33.0	2 Little tunny	636	1.35	28.2	8 Wahoo	12	0.04	0.5
3 Unidentified seatrouts	8	0.21	3.9	3 King mackerel	334	0.71	14.8	9.5 Blackfin tuna	4	0.01	0.2
	206		100.0	4 Dolphin	177	0.38	7.9	9.5 Cobia	4	0.01	0.2
West Florida				5 Atlantic bonito	164	0.35	7.3		2,229		99.7
1 Spanish mackerel	2,098	1.34	46.0	6 Spanish mackerel	106	0.23	4.7	South Texas			
2 Little tunny	729	0.47	16.0	7 Unidentified porgies	31	0.07	1.4	1 Little tunny	1,005	1.17	60.8
3 King mackerel	677	0.43	14.9	8 Gray triggerfish	30	0.06	1.3	2 King mackerel	155	0.18	9.4
4 Great barracuda	390	0.25	8.6	9.5 Greater amberjack	29	0.06	1.3	3 Blackfin tuna	136	0.16	8.2
5 Atlantic bonito	168	0.11	3.7	9.5 Wahoo	29	0.06	1.3	4 Dolphin	76	0.09	4.6
6 Blue runner	161	0.10	3.5		2,174		96.5	5 Blue runner	68	0.08	4.1
7 Crevalle jack	115	0.07	2.5	Louisiana				6 Yellowfin tuna	64	0.07	3.9
8 Dolphin	42	0.03	0.9	1 Dolphin	747	2.76	33.4	7 Atlantic bonito	29	0.03	1.8
9 Greater amberjack	34	0.02	0.7	2 Spanish mackerel	572	2.11	25.6	8 Wahoo	26	0.03	1.6
10 Gag	33	0.02	0.7	3 Little tunny	346	1.28	15.5	9 Great barracuda	23	0.03	1.4
	4,447		97.5	4 King mackerel	248	0.92	11.1	10 Skipjack tuna	22	0.03	1.3
				5 Red drum	193	0.71	8.6		1,604		97.1
				6 Blue runner	79	0.29	3.5				

Table 9.—Ten most abundant species caught by trolling in each area off the southeastern United States and U.S. Caribbean during the 1985 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	3,102	1.89	41.3	9 Greater amberjack	15	0.08	2.1	4 Great barracuda	155	0.12	12.4
2 Yellowfin tuna	1,778	1.09	23.7	10 Bluefish	12	0.06	1.7	5 Blue runner	88	0.07	7.0
3 King mackerel	1,739	1.06	23.1		720		99.4	6 Sailfish	45	0.03	3.6
4 Spanish mackerel	294	0.18	3.9	Northeast Florida			7 Bluefish	33	0.02	2.6	
5 Bluefish	178	0.11	2.4	1 King mackerel	301	0.56	22.7	8 Greater amberjack	32	0.02	2.6
6 Atlantic bonito	119	0.07	1.6	2 Greater amberjack	248	0.46	18.7	9 Little tunny	30	0.02	2.4
7 Wahoo	78	0.05	1.0	3 Great barracuda	211	0.39	15.9	10 Hammerhead shark	25	0.02	2.0
8 Greater amberjack	60	0.04	0.8	4 Spanish mackerel	173	0.32	13.1		1,128		90.1
9 Great barracuda	43	0.03	0.6	5 Bluefish	126	0.24	9.5	South Florida			
10 Little tunny	40	0.02	0.5	6 Silver seatrout	60	0.11	4.5	1 Dolphin	3,033	1.41	43.7
	7,431		98.9	7 Kingfishes	40	0.07	3.0	2 Great barracuda	781	0.36	11.2
South Carolina			East Florida			U.S. Caribbean					
1 King mackerel	619	1.11	48.5	1 Blue runner	1,166	0.72	23.0	1 Little tunny	492	0.13	25.6
2 Spanish mackerel	166	0.30	13.0	2 Little tunny	1,054	0.65	20.8	2 King mackerel	359	0.10	18.6
3 Great barracuda	99	0.18	7.8	3 King mackerel	956	0.59	18.9	3 Great barracuda	280	0.08	14.5
4 Little tunny	98	0.18	7.7	4 Dolphin	704	0.43	13.9	4 Dolphin	266	0.07	13.8
5 Dolphin	83	0.15	6.5	5 Great barracuda	551	0.34	10.9	5 Yellowfin tuna	124	0.03	6.4
6 Yellowfin tuna	64	0.11	5.0	6 Atlantic bonito	236	0.14	4.7	6 Cero	107	0.03	5.6
7 Atlantic bonito	49	0.09	3.8	7 Spanish mackerel	88	0.05	1.7	7 Wahoo	104	0.03	5.4
8 Greater amberjack	40	0.07	3.1	8 Sailfish	87	0.05	1.7	8 Blue marlin	61	0.02	3.2
9 Wahoo	31	0.06	2.4	9 Bluefish	84	0.05	1.7	9 Blackfin tuna	39	0.01	2.0
10 Gray triggerfish	10	0.02	0.8	10 Wahoo	42	0.03	0.8	10 Sailfish	17	0.00	0.9
	1,259		98.6	Southeast Florida				1,849		96.0	
Georgia			1 Atlantic bonito			278	0.21	22.2			
1 Spanish mackerel	184	0.98	25.4	2 King mackerel	229	0.17	18.3				
2 King mackerel	179	0.95	24.7	3 Dolphin	213	0.16	17.0				
3 Great barracuda	167	0.89	23.1								
4 Little tunny	66	0.35	9.1								
5 Crevalle jack	45	0.24	6.2								
6 Black sea bass	18	0.10	2.5								
7.5 Dolphin	17	0.09	2.3								
7.5 Ladyfish	17	0.09	2.3								

Table 10.—Ten most abundant species caught by trolling in each area of the Gulf of Mexico during the 1985 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			Alabama			Louisiana cont.					
1 Spanish mackerel	63	1.75	36.6	1 Spanish mackerel	430	0.74	31.0	6 Crevalle jack	132	0.28	2.2
2 Ladyfish	54	1.50	31.4	2 Little tunny	374	0.64	26.9	7 Dolphin	26	0.06	0.4
3 Bluefish	50	1.39	29.1	3 King mackerel	329	0.56	23.7	8 Blackfin tuna	21	0.04	0.3
4 Crevalle jack	5	0.14	2.9	4 Atlantic bonito	69	0.12	5.0	9 Wahoo	18	0.04	0.3
	172		100.0	5 Blue runner	61	0.10	4.4	10 Yellowfin tuna	14	0.03	0.2
West Florida			Mississippi			North Texas					
1 Spanish mackerel	1,234	1.15	36.3	1 Spanish mackerel	4,217	5.94	73.1	1 Dolphin	1,969	2.52	36.9
2 Little tunny	564	0.53	16.6	2 Atlantic bonito	434	0.61	7.5	2 King mackerel	1,135	1.45	21.3
3 King mackerel	408	0.38	12.0	3 King mackerel	249	0.35	4.3	3 Red snapper	732	0.94	13.7
4 Great barracuda	336	0.31	9.9	4 Red drum	224	0.32	3.9	4 Atlantic bonito	556	0.71	10.4
5 Atlantic bonito	165	0.15	4.9	5 Blue runner	210	0.30	3.6	5 Bluefish	208	0.27	3.9
6 Blue runner	156	0.15	4.6	6 Crevalle jack	203	0.29	3.5	6 Spanish mackerel	175	0.22	3.3
7 Dolphin	127	0.12	3.7	7 Ladyfish	70	0.10	1.2	7 Unidentified sharks	136	0.17	2.5
8 Crevalle jack	99	0.09	2.9	8 Bluefish	57	0.08	1.0	8 Blue runner	84	0.11	1.6
9 Unidentified lizard fishes	80	0.07	2.4	9 Cobia	11	0.02	0.8	9 Crevalle jack	67	0.09	1.3
10 Greater amberjack	71	0.07	2.1	11 Bluefish	10	0.02	0.7	10 Greater amberjack	49	0.06	0.9
	3,240		95.4	11 Greater amberjack	10	0.02	0.7		5,111		95.8
Northwest Florida			Louisiana			South Texas					
1 Spanish mackerel	546	1.52	33.1	1 Spanish mackerel	4,224	9.04	70.4	1 King mackerel	1,498	1.07	40.5
2 Blue runner	443	1.23	26.9	2 Little tunny	734	1.57	12.2	2 Little tunny	801	0.57	21.6
3 King mackerel	159	0.44	9.6	3 King mackerel	391	0.84	6.5	3 Dolphin	249	0.18	6.7
4 Greater amberjack	154	0.43	9.3	4 Red drum	246	0.53	4.1	4 Crevalle jack	183	0.13	4.9
5 Dolphin	100	0.28	6.1	5 Blue runner	183	0.39	3.0	5 Blue runner	173	0.12	4.7
6 Atlantic bonito	75	0.21	4.6					6 Atlantic bonito	168	0.12	4.5
7 Bluefish	45	0.13	2.7					7 Atlantic sharpnose shark	142	0.10	3.8
8 Skipjack tuna	32	0.09	1.9					8 Unidentified sharks	129	0.09	3.5
9 Gag	24	0.07	1.5					9 Greater amberjack	112	0.08	3.0
10 Ladyfish	23	0.06	1.4					10 Blackfin tuna	43	0.03	1.2
	1,601		97.1						3,498		94.4

Table 11.—Ten most abundant species caught by other fishing in each area off the southeastern United States during the 1984 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
<b>North Carolina</b>				<b>East Florida cont.</b>				<b>Southeast Florida cont.</b>			
1 Black sea bass	6,344	65.74	91.5	5 Greater amberjack	229	0.61	7.2	9 Dusky shark	9	0.05	2.5
2 Unidentified porgies	417	4.32	6.0	6 Snowy grouper	125	0.33	3.9	10 Blue runner	8	0.05	2.2
3 Unidentified sand perches	56	0.58	0.8	7 Gray triggerfish	89	0.24	2.8		321		88.9
4 Unidentified grunts	27	0.28	0.4	8.5 Scamp	76	0.20	2.4	<b>South Florida</b>			
5 Red snapper	19	0.20	0.3	8.5 Spotted seatrout	76	0.20	2.4	1 King mackerel	590	1.90	57.7
6 King mackerel	16	0.17	0.2	10 Unidentified tilefishes	75	0.20	2.4	2 Yellowtail snapper	133	0.43	13.0
7 Spottail pinfish	11	0.11	0.2		2,721		85.9	3 Unidentified grunts	52	0.17	5.1
8.5 Albacore	8	0.08	0.1	<b>Southeast Florida</b>				4 Unidentified porgies	29	0.09	2.8
8.5 Gag	8	0.08	0.1	1 Unidentified snappers	108	0.61	29.9	5 Red grouper	26	0.08	2.5
10 Gray triggerfish	7	0.07	0.1	2 Vermillion snapper	41	0.23	11.4	6 Gray snapper	24	0.08	2.3
	6,913		99.7	3 Unidentified tilefishes	39	0.22	10.8	7 Mutton snapper	22	0.07	2.2
<b>East Florida</b>				4.5 Almaco jack	32	0.18	8.9	8.5 Black grouper	19	0.06	1.9
1 Black sea bass	942	2.51	29.8	4.5 Greater amberjack	32	0.18	8.9	8.5 Blue runner	19	0.06	1.9
2 Vermillion snapper	525	1.40	16.6	6 Snowy grouper	29	0.16	8.0	10 Cero	18	0.06	1.8
3 Red snapper	299	0.80	9.4	7 Hammerhead shark	12	0.07	3.3		932		91.2
4 Unidentified grunts	285	0.76	9.0	8 Gray triggerfish	11	0.06	3.0				

Table 12.—Ten most abundant species caught by other fishing in each area of the Gulf of Mexico during the 1984 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
<b>Southwest Florida</b>				<b>West Florida cont.</b>				<b>Louisiana cont.</b>			
1 Gag	1,100	0.79	10.7	9 Ladyfish	210	0.19	3.8	4 Unidentified seatrouts	7,475	3.17	6.6
2 Spotted seatrout	1,064	0.76	10.3	10 Red grouper	190	0.17	3.5	5 Red drum	2,258	0.96	2.0
3 Unidentified seatrouts	916	0.66	8.9		5,018		91.3	6 Blue fish	2,200	0.93	1.9
4 Ladyfish	850	0.61	8.3	<b>Northwest Florida</b>				7 Dolphin	1,465	0.62	1.3
5 Sheepshead	818	0.59	8.0	1 Gray triggerfish	1,621	1.54	18.0	8 Gray triggerfish	1,330	0.56	1.2
6 Red grouper	810	0.58	7.9	2 Red snapper	1,559	1.48	17.3	9 King mackerel	993	0.42	0.9
7 Gray snapper	774	0.55	7.5	3 Unidentified porgies	1,379	1.31	15.3	10 Greater amberjack	948	0.40	0.8
8 Unidentified grunts	612	0.44	6.0	4 Greater amberjack	1,262	1.20	14.0		112,059		98.9
9 Silver perch	528	0.38	5.1	5 Gag	778	0.74	8.6	<b>South Texas</b>			
10 Greater amberjack	510	0.37	5.0	6 Little tunny	546	0.52	6.1	1 Red snapper	1,706	1.30	25.4
	7,982		77.7	7 Blue runner	506	0.48	5.6	2 King mackerel	1,675	1.28	24.9
<b>West Florida</b>				8 Dolphin	252	0.24	2.8	3 Silver seatrout	870	0.66	12.9
1 Black sea bass	1,137	1.05	20.7	9 Scamp	198	0.19	2.2	4 Crevalle jack	729	0.56	10.8
2 Spotted seatrout	902	0.83	16.4	10 King mackerel	185	0.18	2.1	5 Atlantic spadefish	482	0.37	7.2
3 Gray snapper	583	0.54	10.6		8,286		92.0	6 Atlantic bonito	277	0.21	4.1
4 Gag	524	0.48	9.5	<b>Louisiana</b>				7 Atlantic sharpnose shark	268	0.20	4.0
5 Unidentified grunts	447	0.41	8.1	1 Sand seatrout	55,334	23.45	48.8	8 Gray triggerfish	114	0.09	1.7
6 Sheepshead	389	0.36	7.1	2 Atlantic croaker	29,220	12.38	25.8	9 Red drum	92	0.07	1.4
7 Silver seatrout	362	0.33	6.6	3 Red snapper	10,836	4.59	9.6	10 Blacktip shark	87	0.07	1.3
8 Red drum	274	0.25	5.0						6,300		93.7

During the 1984 survey, 199,836 fishes were caught. The trolling catch of 40,776 fishes, which represented 66 species or species groups, was made up mostly of coastal (88.8 percent) and oceanic (7.6 percent) pelagics (Table 3). Other fishing techniques produced 159,060 fishes, representing 108 species or species groups, of which 89.3 percent were demersal (Table 4).

In 1985, 142,419 fishes were caught. Troll-caught fishes numbered 54,090, which represented 82 species or species groups, of which 89.4 percent were coastal pelagic and 7.1 percent were

oceanic pelagic (Table 5). Other fishing techniques caught 88,329 fishes, representing 102 species or species groups, of which 81.8 percent were demersal (Table 6).

The CPH of the top ten species varied by method and by area in both 1984 and 1985 (Tables 7-14). For both years, and in all areas, the importance of scombrids (tunas and mackerels) in trolling catches was apparent (Tables 7-10), while catches using other fishing techniques showed the importance of snappers (lutjanids), groupers (serranids), and croakers (sciaenids), (Tables 11-14).

## Discussion and Summary

Aside from providing fishing information on what can be caught by recreational user groups in given locations, the data from charterboat surveys can be used to investigate variations and trends in seasonality and abundance of coastal pelagic and demersal fishes. For example, CPUE data are now available for five areas (North Carolina, south and north-west Florida, Louisiana, and south Texas) of the southeastern United States from 1982 through 1985. All 16 coastal areas now have at least two years of

Table 13.—Ten most abundant species caught by other fishing in each area off the southeastern United States during the 1985 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	3,473	41.10	97.6	7 Greater amberjack	85	0.27	3.6	9 Atlantic sharpnose shark	86	0.17	1.8
2 Unidentified porgies	60	0.71	1.7	8 Unidentified sharks	82	0.26	3.5	10 Snowy grouper	72	0.14	1.5
3 Gag	15	0.18	0.4	9 Ladyfish	43	0.14	1.8		4,033		85.3
4 King mackerel	6	0.07	0.2	10 Blacktip shark	36	0.12	1.5	Southeast Florida			
5 Crevalle jack	2	0.02	0.1		2,210		93.2	1 Little tunny	104	0.20	24.9
6 Cobia	1	0.01	0.0	Northeast Florida				2 Hammerhead shark	43	0.08	10.3
	3,557		100.0	1 Black sea bass	504	1.51	24.9	3 Spanish mackerel	41	0.08	9.8
South Carolina				2 Unidentified seatrouts	366	1.10	18.1	4 Greater amberjack	39	0.08	9.3
1 Black sea bass	40	1.00	47.1	3 Kingfish	353	1.06	17.4	5 Sailfin	34	0.07	8.1
2 Greater amberjack	21	0.53	24.7	4 Sheephead	289	0.87	14.3	6 Blue runner	28	0.05	6.7
3 Blacktip shark	6	0.15	7.1	5 Bluefish	169	0.51	8.3	7 Great barracuda	25	0.05	6.0
4.5 Great barracuda	4	0.10	4.7	6 Red drum	89	0.27	4.4	8 Dolphin	19	0.04	4.5
4.5 Unidentified sharks	4	0.10	4.7	7 Unidentified sharks	61	0.18	3.0	9 Unidentified snappers	16	0.03	3.8
6.5 Atlantic spadefish	3	0.08	3.5	8 Unidentified flounders	34	0.10	1.7	10 Atlantic bonito	13	0.03	3.1
6.5 Bluefish	3	0.08	3.5	9 Gray triggerfish	32	0.10	1.6		362		86.5
8 Hammerhead shark	2	0.05	2.4	10 Red snapper	24	0.07	1.2	South Florida			
9.5 King mackerel	1	0.03	1.2		1,921		94.9	1 Yellowtail snapper	1,190	1.79	30.0
9.5 Spanish mackerel	1	0.03	1.2	East Florida				2 Gray snapper	517	0.78	13.0
	85		100.1	1 Yellowtail snapper	788	1.53	16.7	3 Mutton snapper	268	0.40	6.8
Georgia				2 Black sea bass	695	1.35	14.7	4 Blue runner	234	0.35	5.9
1 Black sea bass	805	2.59	33.9	3 Unidentified grunts	630	1.22	13.3	5 Greater amberjack	181	0.27	4.6
2 Vermillion snapper	570	1.84	24.0	4 Vermillion snapper	543	1.05	11.5	6 Little tunny	163	0.25	4.1
3 Bluefish	215	0.69	9.1	5 Blue runner	354	0.69	7.5	7.5 Crevalle jack	144	0.22	3.6
4 Red snapper	159	0.51	6.7	6 Red snapper	325	0.63	6.9	7.5 King mackerel	144	0.22	3.6
5 Great barracuda	111	0.36	4.7	7 Gray triggerfish	298	0.58	6.3	9 Vermillion snapper	81	0.12	2.0
6 King mackerel	104	0.33	4.4	8 Greater amberjack	242	0.47	5.1	10 Ladyfish	78	0.12	2.0
									3,000		75.6

Table 14.—Ten most abundant species caught by other fishing in each area of the Gulf of Mexico during the 1985 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 Red grouper	2,382	1.46	19.0	9 Scamp	208	0.14	1.4	4 Red snapper	1,644	1.99	6.1
2 Gray snapper	1,648	1.01	13.2	10 Dolphin	172	0.12	1.2	5 Yellowtail snapper	700	0.85	2.6
3 Spotted seatrout	1,159	0.71	9.3		13,919		97.0	6 Red drum	547	0.66	2.0
4 Ladyfish	1,008	0.62	8.1	Alabama				7 Bluefish	528	0.64	2.0
5 Gag	807	0.50	6.5	1 Red snapper	1,623	3.56	46.1	8 Pinfish	474	0.57	1.8
6 Sheephead	805	0.49	6.4	2 Gray triggerfish	747	1.64	21.2	9 Unidentified sharks	299	0.36	1.1
7 Yellowtail snapper	760	0.47	6.1	3 Gag	473	1.04	13.4	10 King mackerel	244	0.30	0.9
8 Unidentified seatrouts	623	0.38	5.0	4 Vermillion snapper	324	0.71	9.2	North Texas			
9 Greater amberjack	593	0.36	4.7	5 Greater amberjack	95	0.21	2.7	1 Red snapper	1,551	5.07	58.1
10 Lane snapper	350	0.21	2.8	6 Unidentified porgies	92	0.20	2.6	2 Little tunny	212	0.69	7.9
	10,135		81.1	7 Unidentified grunts	44	0.10	1.2	3 King mackerel	153	0.50	5.7
West Florida				8 Cobia	24	0.05	0.7	4 Atlantic bonito	140	0.46	5.2
1 Gag	2,182	2.02	29.1	9 Red grouper	16	0.04	0.5	5 Greater amberjack	116	0.38	4.3
2 Black sea bass	1,983	1.83	26.4	10 Scamp	13	0.03	0.4	6 Gray triggerfish	112	0.37	4.2
3 Gray snapper	815	0.75	10.9		3,451		98.0	7 Sand seatrout	96	0.31	3.6
4 Red grouper	723	0.67	9.6	Mississippi				8 Black sea bass	48	0.16	1.8
5 Unidentified grunts	573	0.53	7.6	1 Sand seatrout	887	2.84	31.2	9 Bluefish	43	0.14	1.6
6 Gray triggerfish	234	0.22	3.1	2 Atlantic bonito	513	1.64	18.0	10 Atlantic sharpnose shark	37	0.12	1.4
7 Unidentified porgies	148	0.14	2.0	3 Red snapper	470	1.51	16.5		2,508		93.8
8 Unidentified squirrelfishes	112	0.10	1.5	4 Spotted seatrout	296	0.95	10.4	South Texas			
9 Greater amberjack	108	0.10	1.4	5 Blacktip shark	196	0.63	6.9	1 Red drum	344	1.20	45.6
10 Yellowtail snapper	104	0.10	1.4	6 Unidentified sharks	88	0.28	3.1	2 Spotted seatrout	149	0.52	19.8
	6,982		93.0	7 Crevalle jack	75	0.24	2.6	3 Red snapper	62	0.22	8.2
Northwest Florida				8 Red drum	62	0.20	2.2	4 Ladyfish	33	0.12	4.4
1 Gray triggerfish	3,076	2.09	21.4	9 Gray triggerfish	52	0.17	1.8	5 Blacktip shark	29	0.10	3.8
2 Unidentified porgies	2,441	1.65	17.0	10 Bluefish	36	0.12	1.3	6 Hardhead catfish	23	0.08	3.1
3 Gag	2,303	1.56	16.1		2,675		94.0	7 Pinfish	19	0.07	2.5
4 Greater amberjack	1,991	1.35	13.9	Louisiana				8 Unidentified flounders	17	0.06	2.3
5 Red snapper	1,759	1.19	12.3	1 Sand seatrout	13,864	16.76	51.9	9 Atlantic spadefish	14	0.05	1.9
6 Vermillion snapper	1,364	0.92	9.5	2 Atlantic croaker	5,608	6.78	21.0	10 Unidentified seatrouts	10	0.03	1.3
7 Little tunny	334	0.23	2.3	3 Unidentified seatrouts	1,963	2.37	7.3		700		92.9
8 Blue runner	271	0.18	1.9								

CPUE information (Fig. 1). Similarly, annual variations in relative abundance of several species may be examined, such as king mackerel (Trent et al., 1987) and Spanish mackerel (Palko et al., 1987). However, geographic comparisons are not always possible for demersal species due to differences in distribution or occurrence (e.g., yellowtail snapper in south Florida, black sea bass on the Atlantic coast, red grouper in south and southwest Florida, and Atlantic croaker or sand seatrout in Louisiana). The latter, however, may be a function of target species, and may reflect fishermen preference within areas. Other limitations of survey data have been previously discussed by Brusher et al. (1984) and Brusher and Palko (1985).

In summary, the data from the 1982 through 1985 charterboat surveys provided information on catches and effort, which in turn permits examination of seasonal and geographic abundance of fishes caught by trolling and by other fishing methods.

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