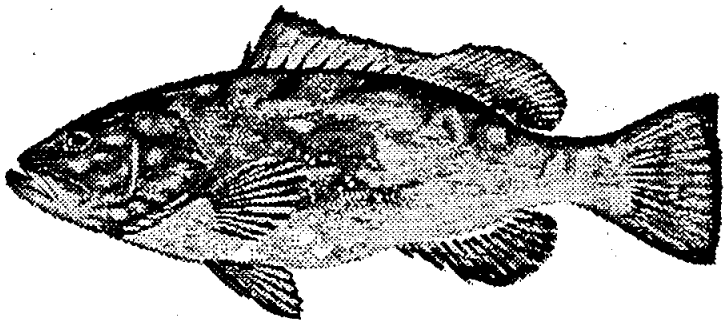
National Marine Fisheries Service
Southeast Fisheries Science Center

Characterization of the Reef Fish Fishery of the Eastern U.S. Gulf of Mexico



Report to the Gulf of Mexico Fishery Management Council
Reef Fish Management Committee

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Prepared by the
Galveston and Miami Laboratories

Section I. Observer Coverage of the Reef Fish Fishery of the Eastern U.S. Gulf of Mexico

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Introduction

In December 1993, in cooperation with the commercial fishing industry and the Gulf of Mexico Fishery Management Council (GMFMC), the National Marine Fisheries Service's (NMFS) Southeast Fisheries Science Center (SEFSC) implemented a scientific observer program to characterize the fish trap and bottom longline fisheries in the eastern U.S. Gulf of Mexico. The primary objective was to quantify and document release mortality and bycatch levels aboard commercial fish trap and bottom longline vessels. Catch and effort data for targeted and bycatch species were collected and analyzed by area, season and gear type. Mortality rates of discarded species were determined for depth, size and method of capture. Mortality estimates for red grouper *(Epinephelus morio)* were further enhanced through tag and release operations. Vessel and gear characteristics, operational costs, fishing locations, and environmental conditions were analyzed.

Materials and Methods

NMFS observers were placed on commercial fish trap and bottom longline vessels operating from Steinhatchee to Dry Tortugas, Florida. The allocation of sampling effort by area was based on available vessels and current effort trends.

Vessel length, hull construction material, gross tonnage, engine horsepower and crew size were obtained for each vessel. For each set (the location of gear placement at a defined time) the type, number and construction material of the fishing gear were recorded. Economic data relative to fuel, oil, ice, bait and associated vessel costs were collected on a per trip basis.

Latitude, longitude, depth, and environmental parameters including water clarity, sea state and bottom type were recorded at the start of each set. Total time the gear remained in the water (soak or fishing time) was calculated.

Fishery-specific data were obtained from each set. Non-target and undersized target species were processed first, recording length, weight and fate prior to release (alive, dead, or unknown). A fish was determined to be alive if it swam, dead if it floated, and unknown if the fate could not be determined (i.e., erratic swimming). Air bladders of live fish were punctured in the same manner as demonstrated by the captain and crew. Retained species were processed, recording length and weight. Sightings of sea turtles were documented.

Length and weight measurements were recorded in metric units and converted to U.S. system equivalents for the purpose of this report. For red grouper, fork lengths were converted to total lengths. After converting, length values were placed into one-inch intervals. Any lengths ranging from 19.000 to 19.999, for example, were categorized as 19 inches. Hence, there is some degree of error based on conversions. Additionally only length measurements are considered, as weight data have not been analyzed.

Selected fishery species in good condition were tagged with vinyl RF dart tags and released. Eleven red grouper are currently being retained at the SEFSC Galveston Laboratory for six months in order to calculate tag retention rates and tag-induced mortality.

Results and Discussion

FISH TRAP

Allocation of Sampling Effort

Twelve trips were made aboard six fish trap vessels between December 1993 and November 1994. Five hundred-seventeen sets were sampled at the locations shown in Figure 1. A total of 10,654 traps were set at the locations shown in Figure 2, with 36 percent of the traps being processed by NMFS observers. The majority of fishing effort occurred in statistical area 3. Based on number, 34 percent of the traps were set in summer (June, July and August), with 24 percent in winter (December, January and February), 22 percent in spring (March, April and May), and 20 percent in fall (September, October and November).

Trip, Vessel, Gear and Economic Characteristics

Data were collected during 81 sea days of observations. Trip length ranged from 3 to 12 days with the average being 6.8 days.

The average overall vessel length was 43.7 feet, ranging between 32 and 53 feet. All vessels were fiberglass. Engine power ranged from 175 to 670 horsepower, with 483.2 horsepower the average. The number of crew (not including the captain) consisted of 1 or 2 individuals.

Trap dimensions ranged from 1.5' x 2.2' x 3.2' (10.6 cubic feet) to 4' x 2' x 2' (16 cubic feet), with 3.5' x 2' x 2' (14 cubic feet) being used most often on a per trip basis. The mesh of the traps was constructed of plastic-coated wire, with mesh sizes of 1.0" x 1.0", 1.5" x 1.5" or 1" x 2", with the latter being used most often. Traps with 1.0" x 1.0" mesh had larger mesh in the trap doors. All traps had biodegradable blow-out panels and escape windows.

Economic data were collected from the vessel operators on a trip-by-trip basis. Not all vessel operators participated in the economic survey.

Fishing Characteristics and Environmental Conditions

The number of traps set at a location varied from 6 to 37, with 20.6 traps the average (± 5.5 s.d.). All traps were set individually at depths ranging from 10 to 22.7 fathoms, with

17.1 fathoms the average (± 2.8 s.d.). Average soak time was 10.0 (± 8.3 s.d.) hours and ranged from 0.8 to 88.9 hours. Three sets with soak times greater than 76 hours were the result of engine problems. The majority of traps were set, tended and retrieved during daylight hours, between 0732 and 2120 hours.

The majority of sets (87%) occurred in 0 to 2 foot seas, with remaining sets occurring in 3 to 5 foot seas. Water clarity ranged from 33 feet to >66 feet, with 29 percent in waters of >66 feet visibility. Bottom type descriptions were obtained from the vessel operator. The majority of sets occurred over shell bottom (47%), with rock (19%), sponge (16%), sand (14%), unknown (3%) and mud (1%) comprised the remaining. A combination of shell and sand commonly occurred, but only the dominant material was recorded.

Species Composition

From the 3,867 fish traps processed from December 1993 through November 1994, a total of 15,148 fish of 63 taxa were sampled (Table 1). Approximately 55.4 percent of the individuals were released alive, 35.2 percent were kept, 7.4 percent were retained for bait, 1.6 percent were released dead and <1 percent were released with an unknown fate. Species composition by fate category are presented in Figure 3.

Seven species accounted for 88 percent of the 8,398 fish released alive. Red grouper comprised the majority with 46 percent. Sand perch *(Diplectrum formosum)*, white grunt *(Haemulon plumieri)*, and lane snapper *(Lutjanus synagris)* each accounted for 10 percent, followed by tomtate *(H. aurolineatum)* at 7 percent, littlehead porgy *(Calamus proridens)* with 3 percent, and knobbed porgy *(C. nodosus)* at 2 percent.

Although red grouper is the primary target species of the fishery, more lane snapper were caught and accounted for 34 percent of the 5,334 individuals kept. Red grouper comprised 22 percent of the kept category followed by white grunt at 14 percent, black seabass *(Centropristis striata)* at 12 percent, littlehead porgy at 9 percent and knobbed porgy and gray triggerfish *(Balistes capriscus)* each at 2 percent. All other species combined accounted for 5 percent.

Tomtate was used most often as bait and accounted for 30 percent of the 1,119 individuals. Other species used for bait included sand perch at 18 percent, lane snapper at 16 percent, knobbed porgy at 10 percent, pinfish *(Lagodon rhomboides)*, vermilion snapper *(Rhomboplites aurorubens)* and spottail pinfish *(Diplodus holbrooki)* each at 7 percent.

Red grouper accounted for 45 percent of the 242 individuals released dead. Jackknife-fish *(Equetus lanceolatus)* comprised 14 percent of this category, followed by lane snapper at 10 percent, white grunt with 7 percent, cubbyu *(E. umbrosus)* at 5 percent, sand perch at 4 percent and orange filefish *(Aluterus schoepfi)* at 2 percent. All other species combined accounted for 13 percent.

The fate of 55 individuals could not be determined. Sixty-two percent were red grouper and 34 percent were lane snapper. Two species, jackknife-fish and gag *(Mycteroperca microlepis)*, accounted for 4 percent of the unknown category.

Red Grouper Size Composition

Of the 5,162 red grouper sampled, 23 percent were kept, 74 percent were released alive, 2 percent were released dead and 1 percent were released with an unknown fate.

Five thousand one hundred thirty-three red grouper were measured and ranged from 8 to 38 inches in total length (Figure 4). The 12-inch category had the highest percentage (14%) of individuals.

Seventy-six percent of the fish collected were less than 20 inches in total length. Of these, 96 percent were released alive, 3 percent released dead, and < 1 percent each were kept or released with an unknown fate. Of the 24 percent of red grouper equal to or greater than 20 inches in total length, 95 percent were kept with 5 percent released alive.

By depth, the largest percentage (22%) of red grouper were caught in 17 fathoms of water, followed by 18 percent each in depths of 18 and 19 fathoms (Figure 5). In 17 fathoms, 47 percent of the individuals were in the 11 to 14-inch size categories. In 18 and 19 fathoms, 46 percent and 42 percent, were in the 11 to 14-inch size categories, respectively.

CPUE (Catch-per-Unit Effort)

Mean CPUE for all species was 0.743 fish per trap hour ($\pm$ 1.043 s.d.). For red grouper, mean CPUE was 0.222 ($\pm$ 0.313 s.d.). For all species combined including red grouper, CPUE was highest (2.891 $\pm$ 2.227) at 12 fathoms (Figure 6). For red grouper, CPUE was highest (0.647 $\pm$ 0.814) at 12 fathoms as well. By season (Figure 7), CPUE for all species was highest during spring (0.922 $\pm$ 1.534 fish per trap hour). CPUE for red grouper was highest during fall (0.372 $\pm$ 0.395 red grouper per trap hour).

Sea Turtles

No sea turtles were captured during the study period aboard fish trap vessels. Forty-one loggerhead *(Caretta caretta),* 11 unidentified, 2 hawksbill *(Eretmochelys imbricata)* and 1 green *(Chelonia mydas)* were sighted at set locations or during travel between sites.

BOTTOM LONGLINE

Allocation of Sampling Effort

Eleven trips were made aboard seven bottom longline vessels from April 1994 through February 1995. Three hundred-eleven sets (227,607 hooks) were sampled at the locations shown in Figure 8. Two hundred thirty-six sets targeted red grouper with the remaining seeking yellowedge grouper *(E. flavolimbatus)* and blueline tilefish *(Caulolatilus microps)* in deeper waters. All hooks were processed. The majority of fishing effort, based on the number of hooks set, occurred in statistical area 3 (Figure 9). By season, 30 percent of the effort occurred in fall, with 29 percent in summer, 28 percent in spring, and 13 percent in winter.

Trip, Vessel, Gear and Economic Characteristics

Data were collected during 105 sea days. Trip length ranged from 2 to 18 days with an average of 9.5 days.

The average overall vessel length was 49.3 feet, ranging between 38 and 62 feet. Six vessels were fiberglass, and one vessel was wood. Engine power ranged from 185 to 671 horsepower, with 271 horsepower the average. The number of crew (not including the captain) consisted of 1 to 3 individuals.

Mainline material was composed of cable or monofilament, with the test or strength of the mainline ranging from 900 to 2,000 pounds. The average test was 1,281. The amount of mainline set at a location varied from 0.9 to 9.0 nautical miles, with 2.4 nautical miles the average. Gangion material was monofilament with length ranging from 1.5 to 6.3 feet, and an average of 2.6 feet. Barbed-circle hooks were used for all sets, with both offset and straight hooks being used. Hooks averaged 2.2 inches in shaft length, and 0.8 inches from the point to the shaft.

Fishing Characteristics and Environmental Conditions

The average number of hooks set at a location was 731.9 (± 378.0 s.d.), varying from 75 to 2100 hooks. The average depth for the 311 sets was 47.8 (± 27.3 s.d.) fathoms, with a range of 18 to 129. The sets targeting red grouper averaged 34.1 fathoms. Fishing time varied from 0.3 to 24.7 hours with 3.0 hours the average (± 2.7 s.d.). The majority of fishing occurred during daylight hours; however, lines were set at all hours.

The majority of sets (64%) occurred in 0 to 2 foot seas, with 32 percent in 3 to 5 foot seas and 4 percent in 6 to 8 foot seas. Water clarity was >66 feet for all sets. The majority of sets occurred over rock bottom (41 %), with shell (21%), coral (21%), unknown (14%), pot hole depression (3%) and mud (<1%) comprising the remaining.

Species Composition

From the 227,607 hooks processed from April 1994 through February 1995, a total of 5,016 fish of 85 taxa were caught (Table 2). Approximately 55.9 percent of the individuals were kept, 28.3 percent were released alive, 9.4 percent were retained for bait, 4.5 percent were released dead and 1.8 percent were released with an unknown fate. Species composition by fate category are presented in Figure 10.

By number, red grouper comprised the majority (51%) of the kept category. Yellowedge grouper accounted for 22 percent, followed by gag and blueline tilefish each at 6 percent, scamp *(M. phenax)* at 4 percent, speckled hind *(E. drummondhayi)* at 2 percent, and red porgy *(Pagrus pagrus)* at 1 percent. All other species combined accounted for 9 percent.

Of the 1,418 individuals released alive, red grouper accounted for 93 percent, followed by clearnose skate *(Raja eglanteria)* at 3 percent, leopard toadfish *(Opsanus pardus)* at 2 percent. All other species combined comprised 3 percent.

Blueline tilefish and southern hake *(Urophycis floridana)* were the species used most often for bait, comprising 23 percent and 14 percent of this category, respectively. These species were generally caught in deep water and used for other deep water sets. Other species used for bait included honeycomb moray *(Gymnothorax saxicola)* comprising 8 percent, great barracuda *(Sphyraena barracuda)* at 7 percent, red grouper at 5 percent and bonito *(Euthynnus alletteratus)* and inshore lizardfish *(Synodus foetens)* each at 4 percent. All other species combined accounted for 35% of the 473 individuals used for bait.

The fate of 92 individuals could not be determined. Ninety-six percent were red grouper with the remaining 4 percent composed of great barracuda, blacknose shark *(Carcharhinus acronotus)* and sandbar shark *(C. plumbeus)*.

Red Grouper Size Composition

Three thousand forty-seven red grouper were caught using longline gear during the study period. Forty-seven percent were kept, 43 percent released alive, 6 percent released dead, 3 percent released with an unknown fate and 1 percent used for bait. A total of 2,958 red grouper were measured and ranged from 10 to 39 inches in total length (Figure 11). The 18-inch category had the highest percentage (10%) of individuals.

Forty-four percent of the fish caught were less than 20 inches in total length. Of these, 83 percent were released alive, 12 percent were released dead, 3 percent were released with an unknown fate and 1 percent were used for bait. Of the 56 percent of red grouper equal to or greater than 20 inches in total length, 85 percent were kept, 13 percent were released alive, 2 percent were released dead and <1 percent were released with an unknown fate. Again, there is some degree of error due to size conversion methods. Also, a common practice of many of the vessel operators was to keep 21 inch and discard 20 inch red grouper due to shrinkage after freezing.

By depth, the largest percentage (37%) of red grouper was caught between 20 and 25 fathoms of water (Figure 12). Forty-two percent of the individuals caught at these depths were in the 15 to 19-inch size categories.

CPUE

Mean CPUE for all species was 0.015 fish per hook hour ($\pm$ 0.017 s.d.). For red grouper, mean CPUE was 0.014 ($\pm$ 0.017 s.d.). For all species combined including red grouper, CPUE was highest (0.025 $\pm$ 0.019) between 31 and 35 fathoms (Figure 13). For red grouper, CPUE was highest (0.024 $\pm$ 0.008) between 18 and 19 fathoms. By season (Figure 14), CPUE for all species was highest during summer (0.024 $\pm$ 0.021 fish per hook hour). CPUE for red grouper was also highest during summer (0.021 $\pm$ 0.018 red grouper per hook hour).

Sea Turtles

No sea turtles were captured during the study period aboard bottom longline vessels. One loggerhead and 3 unidentified sea turtle species were sighted at set locations or during travel between sites.

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Section II. Examination of Gulf Reef Fish Logbook Data, Red Grouper Tagging Results, and Other Observer Studies

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The results and discussion of data collected at-sea by National Marine Fisheries Service (NMFS) observers onboard commercial fish trap and bottom longline vessels fishing in the eastern Gulf of Mexico have been presented in Section I of this report. The purpose of this section is to further characterize these fisheries by summarizing data from the Gulf Reef Fish Logbook Database for the comparable fishing gear, areas, and time period coinciding with observer sampling efforts. In addition, the red grouper tagging segment of this observer study will be discussed, as will previous scientific observer studies involving commercial fish trap and bottom longline gear from waters off the southeastern U.S. coast.

Gulf Reef Fish Logbook Database

METHODS

Beginning early in 1993, the Gulf Reef Fish Logbook Program essentially was conducted as a census (i.e. all participants in the fishery were required to report). Therefore, all fishermen holding permits to fish for or sell species in the Gulf of Mexico Fishery Management Council's reef fish management unit were required to comply with logbook reporting requirements and submit a completed logbook form after the completion of each fishing trip. Data from these forms is computerized into the Gulf Reef Fish Logbook Database by personnel at the Southeast Fisheries Science Center, Miami, Florida.

For the purposes of this study, species landings in the database which were reported as gutted weights were converted to whole or round weight. Grouper species landings were converted from gutted weight to whole weight using the conversion formula (gutted * 1.048) as reported in Goodyear and Schirripa (1993). Other species landings were converted from gutted weight to whole weight using NMFS conversion formulas documented in the General Canvas Landings File Database. Logbook forms reporting no landings were not included in this analysis.

RESULTS AND DISCUSSION

Data from the Gulf Reef Fish Logbook Database were examined for the same time period, statistical areas, and gear types as were sampled during observer trips. For statistical areas 2 through 7, a total of 1,168 fish trap trips were recorded between December 1993 and November 1994; and 1,223 bottom longline trips were recorded between March 1994 and February 1995 (Table 3). In addition, 150 fish trap and 229 bottom longline trips made during the study time period were recorded with no information on area fished. These trips were included in this analysis because state and county codes for catch unloading indicate that statistical areas 2-7 had a high probability

of being the area fished for these trips.

FISH TRAP GEAR

Landings

Reported fish trap landings totaled approximately 2.18 million pounds during the study time period and statistical area coverage. These landings included 79 species or higher taxa and various categories of unclassified organisms (Table 4). Groupers (12 species) dominated landings and accounted for 45.7% of total fish trap landings. Five species or higher taxa accounted for over seventy-eight percent of total fish trap landings (Figure 15). These were: red grouper *(Epinephelus morio)* 42.9%, black sea bass *(Centropristis striata)* 13.5%, unclassified grunts *(Haemulon spp.)* 10.1%, white grunt *(Haemulon plumieri)* 8.6%, and mutton snapper *(Lutjanus analis)* 3.05%. For all reported fish trap trips made during the study time period and area, the mean catch rate was 1,680 lbs. per trip (range 5 - 10,444). The frequency distribution of landings/trip was skewed toward the lower end of the range with the peak of reported landings (236 trips) falling within the 2,000 - 2,499 lbs. class (Figure 16).

Trip Seasonality and Duration

Most fish trap trips (454 or 34.4%) were made during the summer (June-August) (Figure 17). Fall (September-November) was the least active season for fish trap trips (263 or 20.0%). The average trip duration was 3.7 days (range 1 - 32). The frequency distribution of trip duration was skewed toward the lower end of the range, with one day (414 trips) the most frequently reported trip length (Figure 18).

BOTTOM LONGLINE GEAR

Landings

Reported bottom longline landings totaled approximately 4.53 million pounds during the study time period and statistical area coverage. These landings included 91 species or higher taxa and various categories of unclassified fishes (Table 5). Groupers (15 species and an unclassified category) dominated landings and accounted for 70.3% of total bottom longline landings. Five species or higher taxa accounted for 83.0 percent of total bottom longline landings (Figure 19). These were: red grouper 50.3%, unclassified sharks Chondrichthyes 14.7%, yellowedge grouper *(Epinephelus flavolimbatus)* 10.2%, golden tilefish *(Lopholatilus chamaeleonticeps)* 5.1%, and gag *(Mycteroperca microlepis)* 2.8%. For all reported bottom longline trips made during the study time period and area, the mean catch rate was 3,073 lbs. per trip (range 5 - 12,366). The frequency histogram of landings per trip is depicted in Figure 20. Landings in the 2,500 - 2,999 lbs. class (163 trips) were reported most frequently.

Most bottom longline trips (453 or 31.2%) were made during spring (March-May) (Figure 21), while winter (December-February) recorded the fewest bottom longline trips (254 or 17.5%). The mean trip duration was 8.8 days (range 1 - 30). The frequency histogram of trip durations revealed a somewhat erratic pattern (Figure 22). A trip length of 10 days (144 trips) was most frequently reported.

RED GROUPER LANDINGS BY GEAR AND AREA

Red grouper clearly dominated reported landings from fish traps and bottom longline gear in the eastern U.S. Gulf of Mexico during the study period. Further examination of logbook data indicates that statistical area 6 accounted for the majority (40.9%) of the reported 0.94 million lbs. of red grouper landed by fish trap gear, followed by statistical area 3 (28.4%), with the remaining areas contributing less than 15% each (Figure 23). For bottom longline gear, statistical area 5 accounted for 44.9% of the reported 2.29 million lbs. of red grouper landed, followed by area 4 (16.6%), with the remaining areas contributing less than 15% each (Figure 24).

Red Grouper Tagging

Observers onboard the commercial reef fishing vessels tagged and released undersized red grouper. Only healthy fish in good condition were tagged. Release data recorded included: species, tag number, fish length, fish weight, date, depth, location (latitude-longitude), fish condition notes, and whether or not the air bladder was punctured. Undersized red grouper were tagged with the RF dart-type streamer tag which was recently introduced by the NMFS Miami Laboratory Cooperative Game Fish Tagging Program (MLCGFTP). This tag is 5.25 inches long and is composed of a medical-grade nylon dart anchor which is attached to a red colored streamer encased in shrink tubing (NMFS, 1994). Information printed on the tag offered a reward for returning a recaptured tag.

During 12 trips with fish trap vessels (December 1993-November 1994) and 11 trips with bottom longline vessels (March 1994-February 1995), observers tagged 229 and 29 red grouper, respectively. Table 6 depicts numbers of red grouper tagged and released for each gear type by statistical area and release depth. Most red grouper were tagged and released in statistical area 3 (111 of 258, 43.0%). The mean size and release depth for grouper tagged during fish trapping trips was 369 mm FL (range 225 - 520) and 16.6 fathoms (range 10.0 - 20.8). Although not as many red grouper were tagged during bottom longline trips (29 vs 229), tagged fish had a larger mean size, 468 mm FL (range 380 - 520), and were caught from greater mean depths, 31.4 fathoms (range 21.6 - 47.9) than tagged and released red grouper during fish trap trips.

As of July 11, 1995, three recaptures of red grouper tagged during the observer trips have been reported to the MLCGFTP. Table 7 presents the release and recapture data for these three fish. Two red grouper were recaptured from fish tagged during fish trap trip #10 in statistical area 6, and one red grouper was recaptured from fish tagged during fish trap trip #11 in statistical area 3 (Figure 25). The three grouper were at liberty for an average of 268 days (range 201 - 307) with an mean estimated movement of 2.9 nautical miles (range 0.7 - 6.0) and mean length increase of 55 mm (range 39 - 79). Schirripa et al. (1993) reported that in a study of 1,882 tagged red grouper, the return rate after two years was 13 percent with most returns occurring for fish tagged in shallow water (less than 4 fathoms) and within the first three weeks of release. Schirripa et al. (1983) suggested that the relatively high return rate for their study was the result of intense fishing effort within the shallower depth tagging areas. While the recapture rate for the current study so far is significantly lower (1.2%), it should be noted that all of the current study red grouper recaptures have occurred recently (within two months of the date of this report), indicating that more recaptures should be expected in the near future.

Other Fish Trap and Bottom Longline Observer Studies

Scientific observer studies have been conducted aboard fish trap and bottom longline vessels engaged in commercial fishing activities off the southeastern U.S. coast. These include: fish trapping off Dade and Broward counties, Florida from December 1979 through September 1980 (Sutherland and Harper, 1983); fish trapping off Monroe and Collier counties, Florida from November 1979 through September 1980 (Taylor and McMichael, 1983); fish trapping off the southeast Florida coast during May, June and October 1990 (Harper et al., 1994); and bottom longlining in the Gulf of Mexico off the U.S. coast during 1982 and 1983 (Prytherch, 1983). Due to differences in areas fished, fishing methods, type of fishing gear, sample sizes, sampling methods, fishing regulations in effect during sampling, and concerns regarding the reporting of confidential information, it was concluded that detailed comparisons of the current NMFS observer sampling data with previous studies would not be valid. However, comparisons in a generalized manner can be reported. Table 8 presents a general comparison of the observer studies.

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Table 1. Number and fate of fish sampled in fish traps from December 1993 through November 1994.

COMMON NAME	GENUS SPECIES	TOTAL	KEPT	ALIVE	DEAD	BAIT	UNKNOWN
Red Grouper	*Epinephelus morio*	5162	1173	3845	110		34
Lane Snapper	*Lutjanus synagris*	2847	1811	817	25	175	19
White Grunt	*Haemulon plumieri*	1597	736	823	16	22	
Sand Perch	*Diplectrum formosum*	1092	2	876	9	205	
Tomtate	*Haemulon aurolineatum*	969	8	629	1	331	
Black Seabass	*Centropristis striata*	770	666	104			
Littlehead Porgy	*Calamus proridens*	729	463	252		14	
Knobbed Porgy	*Calamus nodosus*	389	122	155		112	
Gray Triggerfish	*Balistes capriscus*	260	118	139	3		
Pinfish	*Lagodon rhomboides*	199		117	1	81	
Vermilion Snapper	*Rhomboplites aurorubens*	145	31	33		81	
Southern Puffer	*Sphoeroides nephelus*	134	32	97		5	
Red Porgy	*Pagrus pagrus*	113	113				
Spottail Pinfish	*Diplodus holbrooki*	100		20	4	76	
Planehead Filefish	*Monacanthus hispidus*	98	3	93	2		
Jackknife-fish	*Equetus lanceolatus*	85		50	34		1
Whitebone Porgy	*Calamus leucosteus*	45	12	33			
Gray Snapper	*Lutjanus griseus*	45	11	33	1		
Pigfish	*Orthopristis chrysoptera*	41		28	2	11	
Gag	*Mycteroperca microlepis*	35	3	30	1		1
Fringed Filefish	*Monacanthus ciliatus*	34		34			
Bandtail Puffer	*Sphoeroides spengleri*	26	11	11	4		
Spotfin Butterflyfish	*Chaetodon ocellatus*	22		19	3		
Yellowtail Snapper	*Ocyurus chrysurus*	21	10	10	1		
Blue Angelfish	*Holacanthus bermudensis*	19		15	4		
Orange Filefish	*Aluterus schoepfi*	17		11	6		
Bank Seabass	*Centropristis ocyurus*	17	2	9	1	5	
Spotted Moray	*Gymnothorax moringa*	17	1	16			
Cubbyu	*Equetus umbrosus*	14		3	11		
Nurse Shark	*Ginglymostoma cirratum*	14		14			
Margate	*Haemulon album*	14		14			
Sand Diver	*Synodus intermedius*	10		9	1		
Black Grouper	*Mycteroperca bonaci*	6	1	5			
Sharksucker	*Echeneis naucrates*	6		6			
Triggerfish/Filefish	*Balistidae*	4		4			
Ocean Triggerfish	*Canthidermis sufflamen*	4		4			
Gray Angelfish	*Pomacanthus arcuatus*	4		3	1		
Reef Butterflyfish	*Chaetodon sedentarius*	3		3			
Leopard Toadfish	*Opsanus pardus*	3		3			
Remora	*Remora remora*	3		3			
Bucktooth Parrotfish	*Sparisoma radians*	3		3			
Least Puffer	*Sphoeroides parvus*	3		3			
Hardhead Catfish	*Arius felis*	2		2			
Blue Runner	*Caranx crysos*	2		1		1	
Red Hogfish	*Decodon puellaris*	2		1	1		
Scamp	*Mycteroperca phenax*	2	2				
Gulf Toadfish	*Opsanus beta*	2		2			
Short Bigeye	*Pristigenys alta*	2	2				
Greater Amberjack	*Seriola dumerili*	2		2			
Inshore Lizardfish	*Synodus foetens*	2		2			
Whitefin Sharksucker	*Echeneis neucratoides*	1		1			
Ocellated Frogfish	*Antennarius ocellatus*	1		1			
Grass Porgy	*Calamus arctifrons*	1		1			
Jolthead Porgy	*Calamus bajonado*	1		1			
Sheepshead Porgy	*Calamus penna*	1		1			
Atlantic Spadefish	*Chaetodipterus faber*	1		1			
Tiger Shark	*Galeocerdo cuvier*	1		1			
Cottonwick	*Haemulon melanurum*	1		1			
Scrawled Cowfish	*Lactophrys quadricornis*	1		1			
Mutton Snapper	*Lutjanus analis*	1	1				
Red Goatfish	*Mullus auratus*	1		1			
Southern Flounder	*Paralichthys lethostigma*	1		1			
Lesser Amberjack	*Seriola fasciata*	1		1			
	TOTALS	15148	5334	8398	242	1119	55
	PERCENTAGES	100%	35.2%	55.4%	1.6%	7.4%	0.4%

Table 2. Number and fate of fish caught on longline gear from April 1994 through February 1995.

COMMON NAME	GENUS SPECIES	TOTAL	KEPT	ALIVE	DEAD	BAIT	UNKNOWN
Red Grouper	*Epinephelus morio*	3047	1422	1320	195	22	88
Yellowedge Grouper	*Epinephelus flavolimbatus*	623	616	1	1	5	
Blueline Tilefish	*Caulolatilus microps*	268	160			108	
Gag	*Mycteroperca microlepis*	174	174				
Scamp	*Mycteroperca phenax*	109	104	5			
Southern Hake	*Urophycis floridana*	66				66	
Clearnose Skate	*Raja eglanteria*	62	12	38		12	
Leopard Toadfish	*Opsanus pardus*	48	2	22	11	13	
Speckled Hind	*Epinephelus drummondhayi*	47	45	2			
Great Barracuda	*Sphyraena barracuda*	45	6		4	33	2
Honeycomb Moray	*Gymnothorax saxicola*	37				37	
Red Porgy	*Pagrus pagrus*	32	29			3	
Bonito	*Euthynnus alletteratus*	30	8		1	21	
Snowy Grouper	*Epinephelus niveatus*	28	28				
Smooth Dogfish Shark	*Mustelus canis*	24	8			16	
Reticulate Moray	*Muraena retifera*	23	1	5	8	9	
Atlantic Sharpnose Shark	*Rhizoprionodon terraenovae*	22	10			12	
Red Snapper	*Lutjanus campechanus*	21	21				
Inshore Lizardfish	*Synodus foetens*	21	1	1		19	
Greater Amberjack	*Seriola dumerili*	18	17			1	
Blacknose Shark	*Carcharhinus acronotus*	18				17	1
Whitebone Porgy	*Calamus leucosteus*	17	9			8	
Mutton Snapper	*Lutjanus analis*	16	16				
Almaco Jack	*Seriola rivoliana*	15	15				
Banded Rudderfish	*Seriola zonata*	12	12				
Sandbar Shark	*Carcharhinus plumbeus*	11	9			1	1
Carolina Hake	*Urophycis earlli*	9				9	
Nurse Shark	*Ginglymostoma cirratum*	8		8			
Silky Shark	*Carcharhinus falciformis*	7	3			4	
Vermillion Snapper	*Rhomboplites aurorubens*	7	1			6	
Tiger Shark	*Galeocerdo cuvier*	7		1		6	
Queen Snapper	*Etelis Oculatus*	6	6				
Black Grouper	*Mycteroperca bonaci*	6	6				
Silk Snapper	*Lutjanus vivanus*	6	5			1	
Pale Spotted Eel	*Ophichthus puncticeps*	6	4		1	1	
Jolthead Porgy	*Calamus bajonado*	6	3			3	
Blackfin Tuna	*Thunnus atlanticus*	6	3			3	
Spotted Moray	*Gymnothorax moringa*	6		2	4		
Night Shark	*Carcharhinus signatus*	6				6	
Warsaw Grouper	*Epinephelus nigritus*	5	5				
Dusky Shark	*Carcharhinus obscurus*	5	5				
Bank Seabass	*Centropristis ocyurus*	5	3	2			
Bigeye Sixgill Shark	*Hexanchus vitulus*	5	1			4	
Margate	*Haemulon album*	4	4				
Blackfin Snapper	*Lutjanus buccanella*	4	4				
Snakefish	*Trachinocephalus myops*	4	1			3	
Gulf Toadfish	*Opsanus beta*	4				4	
Great Hammerhead Shark	*Sphyrna mokarran*	4				4	
Cobia (Ling)	*Rachycentron canadum*	3	3				
Blacktip Shark	*Carcharhinus limbatus*	3	2			1	
King Mackerel	*Scomberomorus cavalla*	3	2			1	
Spinycheek Scorpionfish	*Neomerinthe hemingwayi*	3		2	1		
Sharksucker	*Echeneis naucrates*	3		3			
Spinner Shark	*Carcharhinus brevipinna*	3				3	
Yellow Jack	*Caranx bartholomaei*	2	2				
Tilefish	*Lopholatilus chamaeleonticeps*	2	2				
Cubera Snapper	*Lutjanus cyanopterus*	2	2				
Lane Snapper	*Lutjanus synagris*	2	2				
Common Crevalle Jack	*Caranx hippos*	2	1			1	
Dolphin	*Coryphaena hippurus*	2	1			1	
Sand Perch	*Diplectrum formosum*	2		1		1	
Wahoo	*Acanthocybium solandri*	1	1				
Bearded Brotula	*Brotula barbata*	1	1				
Saucereye Porgy	*Calamus calamus*	1	1				
Ocean Triggerfish	*Canthidermis sufflamen*	1	1				
Bar Jack	*Caranx ruber*	1	1				
Bignose Shark	*Carcharhinus altimus*	1	1				
Blacktail Moray	*Gymnothorax kolpos*	1	1				
Gray Snapper	*Lutjanus griseus*	1	1				
Remora	*Remora remora*	1	1				
Swordfish	*Xiphias gladius*	1	1				
Longspine Squirrelfish	*Holocentrus rufus*	1		1			
Ocean Sunfish	*Mola mola*	1		1			
Florida Smoothhound Shark	*Mustelus norrisi*	1		1			
Margintail Conger	*Paraconger caudilimbatus*	1		1			
Chain Dogfish	*Scyliorhinus retifer*	1		1			
Conger Eel	*Conger oceanicus*	1				1	
Spiny Butterfly Ray	*Gymnura altavela*	1				1	
Bluestriped Grunt	*Haemulon sciurus*	1				1	
Sailfish	*Istiophorus platypterus*	1				1	
Snapper	*Lutjanus spp.*	1			1		
Sand Tiger Shark	*Odontaspis taurus*	1				1	
Wenchman	*Pristipomoides aquilonaris*	1				1	
Chub Mackerel	*Scomber japonicus*	1				1	
Shoal Flounder	*Syacium gunteri*	1				1	
	TOTALS	5016	2806	1418	227	473	92
	PERCENTAGES	100%	55.9%	28.3%	4.5%	9.4%	1.8%

Table 3. Number of trips reported in Gulf Reef Fish Logbook Database for the statistical areas 2 - 7 and using fish trap or bottom longline fishing gears. Fish Trap information is summarized for the time period December 1993 through November 1994. Bottom longline information is summarized for the time period March 1994 through February 1995.

FISH TRAP TRIPS (N=1,318) December 1993 - November 1994

STATISTICAL AREA	SEASON Winter	Spring	Summer	Fall	**TOTAL**
2	38	22	27	21	**108**
3	31	39	69	32	**171**
4	3	1	7	3	**14**
5	8	6	12	4	**30**
6	18	52	110	62	**242**
7	146	159	187	111	**603**
not avail.	46	32	42	30	**150**
TOTAL	**290**	**311**	**454**	**263**	**1,318**

LONGLINE TRIPS (N=1,452) March 1994 - February 1995

STATISTICAL AREA	SEASON Winter	Spring	Summer	Fall	**TOTAL**
2	17	18	10	3	**48**
3	23	39	39	16	**117**
4	48	90	62	60	**260**
5	79	168	129	157	**533**
6	33	38	61	51	**183**
7	14	17	25	26	**82**
not avail.	40	83	53	53	**229**
TOTAL	**254**	**453**	**379**	**366**	**1,452**

Table 4. Reported landings (whole weight pounds) by fish traps for Statistical Areas 2-7 during the time period December 1993 through November 1994. Data are from Gulf Reef Fish Logbook Database.

Species or Higher Taxa	STATISTICAL AREA 2	3	4	5	6	7	not avail.	Total
GROUPER,BLACK	12,662	623		375	2,009	10,220	10,488	36,378
GROUPER,GAG	2,335	1,656	10		1,311	6,051	2,264	13,628
GROUPER,MISTY					943		4	947
GROUPER,NASSAU	19							19
GROUPER,RED	15,826	266,928	7,064	38,437	384,628	124,324	104,317	941,525
GROUPER,SNOWY	184						368	552
GROUPER,YELLOWEDGE	17	684						702
GROUPER,YELLOWFIN	44						19	62
HIND,RED	131					2,392	977	3,500
HIND,ROCK	604						26	630
HIND,SPECKLED	150	33					371	554
SCAMP	2,268				1,688	21	894	4,871
TOTAL GROUPER =	**34,239**	**269,925**	**7,074**	**38,813**	**390,580**	**143,008**	**119,729**	**1,003,368**
SNAPPER,BLACKFIN							8	8
SNAPPER,GRAY	9,936	3,210	15	132	866	1,121	1,736	17,016
SNAPPER,LANE	3,477	29,306	1,009	11	1,357	1,176	3,680	40,015
SNAPPER,MAHOGONY		2						2
SNAPPER,MUTTON	54,685	381				46	10,541	65,653
SNAPPER,RED	300	112			50	888	890	2,240
SNAPPER,SILK	10,332				23	275	2,254	12,883
SNAPPER,VERMILION	150	118	60	104	3,071	2,094	3,119	8,716
SNAPPER,YELLOWTAIL	45,109	1,413	1		22	38	5,781	52,365
UNCL. SNAPPERS	438	240			130	2,818	2,468	6,095
TOTAL SNAPPERS =	**124,426**	**34,783**	**1,085**	**248**	**5,519**	**8,457**	**30,478**	**204,994**
GRUNT,BLUESTRIPED	1,392	41	97		3,261	36,112	561	41,464
GRUNT,FRENCH	187				79	58	541	865
GRUNT,WHITE	809	485	6	164	3,156	171,061	10,443	186,124
MARGATE	3,114	67		187	7,108	28,617	6,833	45,925
MARGATE,BLACK	138		1		90	9,457	606	10,292
UNCL. GRUNTS	1,618	6,547		72	4,641	196,325	11,229	220,431
TOTAL GRUNTS =	**7,258**	**7,140**	**104**	**423**	**18,335**	**441,630**	**30,213**	**505,102**
ALMACO JACK					61	1	21	82
ANGELFISHES						116	6	122
BANDED RUDDERFISH			4					4
BLUE RUNNER	1,434	473			505	524	255	3,191
BLUEFISH						1		1

Table 4 (cont.). Reported landings (whole weight pounds) by fish traps for statistical areas 2-7 during the time period December 1993 through November 1994. Data are from Gulf Reef Fish Logbook Database.

Species or Higher Taxa	STATISTICAL AREA 2	3	4	5	6	7	not avail.	Total
BONITO,ATLANTIC						15		15
COBIA		85	37		139	54	40	356
CREVALLE	347					8	8	364
CUSK						9		9
DOLPHINFISH							6	6
FINFISHES,UNC FOR FOOD	15	652	3,534	11	645	7,259	1,841	13,956
FINFISHES,UNC					12	57	477	546
FLOUNDER,ATLANTIC & GULF				1	24	593	11	629
GREATER AMBERJACK	519				45	1,365	646	2,575
HAKE,ATLANTIC,WHITE,UNC					371	36		407
HOGFISH	8,227	311				3,009	2,305	13,852
KING MACKEREL and CERO	1,410	392	452	21		29	1,180	3,485
KING WHITING						3	5	8
LESSER AMBERJACK	56					76	3	135
MULLETS						1		1
PIGFISH						673	60	733
PORGY,JOLTHEAD	3,062	1,528	7	92	626	1,442	1,572	8,328
PORGY,KNOBBED	1,391	387	27		24	1,531		3,361
PORGY,RED,LARGE		172	40					212
PORGY,RED,UNC	1,712	650		768	16,049	3,132	3,166	25,476
PORGY,WHITEBONE	3,437	904			2,938	14,442	1,543	23,263
PUFFERS					124	10,552	846	11,522
RAYS,UNC						132		132
SAND PERCH					59			59
SCUPS OR PORGIES,UNC	832	793			149	642	278	2,694
SEA BASSE,ATLANTIC,BLACK				30	8,253	262,090	19,742	290,115
SEA CATFISH		46						46
SEA TROUT,GRAY,UNC						513		513
SEA TROUT,WHITE					7	1	154	162
SHARK,BLACKTIP							11	11
SHARK,DOGFISH,UNC						28		28
SHARK,LONGFIN MAKO				6	10			17
SHARK,UNC					8	67		75
SHEEPSHEAD,ATLANTIC						9		9
SHEEPSHEAD,FW						33		33
SPADEFISH						671		671
SPANISH MACKEREL	12			8		4	136	161
SQUIRRELFISHES					10	404	45	459
TILEFISH,BLUELINE	867				16		2,133	3,016
TILEFISH,GOLDEN	416					125	13	554
TRIGGERFISHES	516	60		124	749	1,734	663	3,846
TRIGGERFISH,GRAY	4,795	1,296	11	229	3,985	12,408	3,650	26,375
TRIGGERFISH,OCEAN	1,178					88	10	1,276
TRIGGERFISH,QUEEN	5				252	6		263
TUNA,UNC						12		12

Table 4 (cont.). Reported landings (whole weight pounds) by fish traps for statistical areas 2-7 during the time period December 1993 through November 1994. Data are from Gulf Reef Fish Logbook Database.

Species or Higher Taxa	STATISTICAL AREA 2	3	4	5	6	7	not avail.	Total
WAHOO							16	16
WRECKFISH					69	41		110
TOTAL OTHER FISHES =	**30,232**	**7,750**	**4,113**	**1,289**	**35,131**	**323,938**	**40,845**	**443,297**
CRAB,STONE (CLAWS)				827		308	511	1,705
CRAB,UNC						16		16
LOBSTER,SPINY	151	2					4,355	4,848
OCTOPUS		22			2,272	14,033	1,042	18,298
OYSTER,EASTERN							8	8
TOTAL INVEREBRTATES =	**151**	**24**		**827**	**2,272**	**14,356**	**5,916**	**24,874**
OVERALL TOTAL =	**196,305**	**319,621**	**12,376**	**41,599**	**451,836**	**931,389**	**227,181**	**2,181,635**

Table 5. Reported landings (whole weight pounds) by bottom longline gear for statistical Areas 2-7 during the time period March 1994 through February 1995. Data are from Gulf Reef Fish Logbook Database.

Species or higher taxa	STATISTICAL AREA 2	3	4	5	6	7	not avail.	Total
GROUPERS, UNCL.		254	2,284	1,490			308	4,336
GROUPER,BLACK	4,818	7,933	13,778	32,648	10,949	30,509	16,491	117,127
GROUPER,GAG	6,998	11,563	16,219	52,407	19,318	2,679	15,630	124,815
GROUPER,MARBLED							19	19
GROUPER,MISTY	650	321	1,164	3,885	3,349	3	460	9,832
GROUPER,NASSAU		100						100
GROUPER,RED	54,512	157,618	375,089	1,011,859	311,960	95,042	278,949	2,285,029
GROUPER,SNOWY	1,090	6,011	8,543	18,391	4,391	2,622	7,934	48,982
GROUPER,WARSAW	857	2,651	1,009	2,404	2,463	220	7,000	16,605
GROUPER,YELLOWEDGE	16,824	47,496	117,686	135,181	46,784	18,772	78,779	461,522
GROUPER,YELLOWFIN	2,177	1,085	2,952	6,636	12,336	5,470	14,721	45,377
GROUPER,YELLOWMOUTH		2,174		163			3,180	5,517
HIND,RED		405	231	537			1,293	2,465
HIND,ROCK		1,439	4,008	1,999	2		314	7,763
HIND,SPECKLED	884	5,095	8,693	5,293	2,747	495	500	23,707
SCAMP	1,833	3,882	3,621	13,609	5,757	5,529	5,457	39,688
TOTAL GROUPERS	**90,643**	**248,027**	**555,277**	**1,286,504**	**420,055**	**161,342**	**431,034**	**3,192,882**
SNAPPERS, UNCL.	38	460	1,780	472	4,744	7	3,162	10,663
SNAPPER,BLACK				12				12
SNAPPER,BLACKFIN	47	3,927	1,021	3,668	37		7,537	16,238
SNAPPER,CUBERA		60		102			90	253
SNAPPER,LANE	176	192	167	244	192	5	113	1,091
SNAPPER,GRAY	48	3,109	1,255	2,617	2,134	239	1,416	10,818
SNAPPER,MUTTON	6,898	8,044	1,898	2,861	1,654	163	8,807	30,326
SNAPPER,QUEEN	5	240	100	26		5	47	423
SNAPPER,RED	312	315	367	746	228	61	3,024	5,053
SNAPPER,SILK	1,691	3,299	1,903	2,636	3,266	280	877	13,953
SNAPPER,VERMILION		33	102	319	388	10	1,403	2,255
SNAPPER,YELLOWTAIL	38	28	28	24	3	77	18	216
TOTAL SNAPPERS	**9,254**	**19,709**	**8,623**	**13,729**	**12,647**	**849**	**26,493**	**91,303**
SHARK,ATLANTIC SHARPNOSE			7					7
SHARK,BIGEYE THRESHER							405	405
SHARK,BIGNOSE	81							81
SHARK,BLACKTIP	135	364	7,828	572	132		44,685	53,716
SHARK,BULL							400	400
SHARK,DOGFISH,UNC	99							99
SHARK,DUSKY			350			234		584
SHARK,HAMMERHEAD	684	2,630	3,017	5,240	920	412	893	13,796
SHARK,LEMON							392	392

Table 5 (cont.). Reported landings (whole weight pounds) by bottom longline gear for statistical areas 2-7 during the time period March 1994 through February 1995. Data are from from Gulf Reef Fish Logbook Database.

Species or higher taxa	STATISTICAL AREA 2	3	4	5	6	7	not avail.	Total
SHARK,LEOPARD				1,308				1,308
SHARK,LONGFIN MAKO		4,235	4,181	1,450	1,913	516	2,107	14,400
SHARK,NARROWTOOTH				7				7
SHARK,SAND TIGER				112				112
SHARK,SANDBAR	10,040	4,970	28,747	30,912	7,543	3,074	7,172	92,458
SHARK,UNCL	30,307	86,565	121,704	197,403	74,964	30,378	116,686	658,008
SHARK,UNC,FINS		51	372	1,062	19	38		1,542
TOTAL SHARKS =	**41,347**	**98,816**	**166,205**	**238,067**	**85,491**	**34,652**	**172,740**	**837,317**
TILEFISH,BLUELINE	2,263	4,795	21,340	13,877	5,453	1,544	6,432	55,704
TILEFISH,GOLDEN	5,195	4,423	4,878	88,107	53,511	16,092	58,627	230,833
TILEFISH,UNCLASSIFIED		17	1,944	957			2,974	5,891
TOTAL TILEFISHES =	**7,458**	**9,236**	**28,161**	**102,940**	**58,964**	**17,636**	**68,034**	**292,429**
ALMACO JACK	476	104	216	336	85	45	757	2,020
AMBERJACK			38					38
BANDED RUDDERFISH	6			85	102	12		206
BARRACUDA		11	24	100			8	144
BARRELFISH	42				112			154
BIGEYE SCAD	6							6
BLUE RUNNER				1			21	22
COBIA	310	1,115	1,797	5,371	1,749	366	2,729	13,436
COD,ATLANTIC,UNC							16	16
CREVALLE	31		25				837	893
CUSK			46	110	166		778	1,100
DOLPHINFISH	107	332	219	1,008	441	77	121	2,306
EEL,AMERICAN					6,988			6,988
EEL,CONGER							32	32
FINFISHES,UNC FOR FOOD	874	2,467	2,148	4,285	538	118	603	11,032
GREATER AMBERJACK	2,774	5,586	4,757	6,002	1,205	558	4,109	24,992
GRUNTS, UNC	312	170	24	199		5	116	826
GRUNT,BLUESTRIPED			3	2				5
GRUNT,WHITE		7		41	45			93
HAKE,ATLANTIC,WHITE,UNC		16	312	465	638	361	4,115	5,906
HOGFISH	11			59			75	146
KING MACKEREL and CERO		32	46	472	693	4,730	295	6,268
LESSER AMBERJACK		190	86	201	103	237	308	1,125
MACKEREL,UNC. (Scomber)							19	19
MARGATE	635	1,087	626	826	221	530	1,270	5,196
MARGATE,BLACK	3	178	161	159			67	568

Table 5 (cont.). Reported landings (whole weight pounds) by bottom longline gear for statistical areas 2-7 during the time period March 1994 through February 1995. Data are from from Gulf Reef Fish Logbook Database.

Species or higher taxa	STATISTICAL AREA							
	2	3	4	5	6	7	not avail.	Total
OILFISH					34			34
PADDLEFISH		102					564	666
PERMIT			21	18				38
POMPANO			17	238		8		263
PORGY,JOLTHEAD	87	242	137	739	216		98	1,520
PORGY,KNOBBED	21	44	14	193	5	18	140	435
PORGY,RED,UNC	156	471	974	551	575	57	203	2,988
PORGY,WHITEBONE	336	3	358	449	154	2	551	1,853
PUFFERS						69		69
SCORPIONFISH-THORNYHEADS			27	180	574	346	110	1,238
SCUPS OR PORGIES,UNC		104	14				21	138
SEA BASSE,ATLANTIC,BLACK,UNC					5			5
SEA TROUT,GRAY,SM				164				164
SEA TROUT,WHITE							51	51
SPANISH MACKEREL		18		26			18	61
SQUIRRELFISHES					10			10
SWORDFISH						44	47	90
TRIGGERFISHES				8				8
TRIGGERFISH,GRAY	85	3,196	330	4,078	3,153	339	2,535	13,716
TRIGGERFISH,OCEAN				43		99		141
TRIGGERFISH,QUEEN	16	27		14	10			67
TRIPLETAIL					17			17
TUNA,ALBACORE							12	12
TUNA,BLACKFIN	52	41	223	282	72	170	38	877
TUNA,UNC			22	17	24			62
TUNA,YELLOWFIN	3,800			8		987	43	4,838
WAHOO	100	735	358	1,003	276	165	853	3,489
WRECKFISH							56	56
TOTAL OTHER FISHES =	**10,241**	**16,278**	**13,022**	**27,732**	**18,212**	**9,343**	**21,615**	**116,443**
OVERALL TOTAL =	**158,942**	**392,065**	**771,288**	**1,668,971**	**595,369**	**223,823**	**719,916**	**4,530,373**

Table 6. Number of red grouper tagged and released by depth (fathoms) and statistical area. Undersized red grouper in good health were tagged by NMFS observers during commercial fish trap and bottom longline trips in the eastern U.S. Gulf of Mexico.

FISH TRAP GEAR December 1993 - November 1994

RELEASE DEPTH (FATHOMS)	STATISTICAL AREA 3	4	6	7	TOTAL
10				2	2
11				8	8
12					
13		4			4
14		10			10
15		41			41
16		1	54		55
17		5	6		11
18	50				50
19	41				41
20	6				6
21	1				1
TOTAL	**98**	**61**	**60**	**10**	**229**

BOTTOM LONGLINE GEAR March 1994 - February 1995

RELEASE DEPTH (FATHOMS)	STATISTICAL AREA 3	4	6	TOTAL
22		1		1
23		1		1
24	2			2
25	3			3
26	4			4
27				
28		1		1
29			1	1
30			2	2
31		1	1	2
32				
33			4	4
34				
35			1	1
38	1			1
39	1			1
40		1		1
41	1			1
44	1			1
47		1		1
48		1		1
TOTAL	**13**	**7**	**9**	**29**

Table 7. Red Grouper tag recaptures as of July 11, 1995.
Returns for fish tagged during NMFS observer trips aboard commercial fish trap and bottom longline vessels (eastern U.S. Gulf of Mexico) December 1993 through February 1995.

RECAPTURE # 1 - tagged during Fish Trap trip #11

	TAG NUM	DATE	DEPTH(fms	LATITUDE Degrees	Minutes	LONGITUDE Degrees	Minutes	LENGTH(m	WEIGHT(Kg)
RELEASE =	RF014914	20-Oct-94	est 20	25	48.12	82	32.17	461	1.38
RECAPTURE =	RF014914	09-May-95	est 20	25	50.22	82	32.25	508	3.29

Days at liberty 201 Est. Movement = 2.0 (nautical miles) Est. length(mm) change = +47

RECAPTURE # 2 - tagged during Fish Trap trip #10

	TAG NUM	DATE	DEPTH(fms	LATITUDE Degrees	Minutes	LONGITUDE Degrees	Minutes	LENGTH(m	WEIGHT(Kg)
RELEASE =	RF015033	20-Aug-94	16	28	47.56	84	9.19	480	1.53
RECAPTURE =	RF015033	12-Jun-95	est 16	28	30.00	84	15.00	559	7.25

Days at liberty 296 Est. Movement = 6.0 (nautical miles) Est. length(mm) change = +79

RECAPTURE # 3 - tagged during Fish Trap trip #10

	TAG NUM	DATE	DEPTH(fms	LATITUDE Degrees	Minutes	LONGITUDE Degrees	Minutes	LENGTH(m	WEIGHT(Kg)
RELEASE =	RF015024	19-Aug-94	15.8	28	46.67	84	7.51	420	1.00
RECAPTURE =	RF015024	22-Jun-95	est 16	28	46.64	84	8.83	459	1.25

Days at liberty 307 Est. Movement = 0.7 (nautical miles) Est. length(mm) change = + 39

Table 8. Generalized comparison of the current study with previous scientific observer studies conducted aboard commercial fish trap or bottom longline vessels fishing off the southeastern U.S. coast.

FISH TRAP STUDIES

			SAMPLE INFORMATION					BYCATCH RELEASE INFORMATION			
Source	Study Area	Sampling Period	Sample size (no. traps)	Average Depth Fished (fathoms)	Depth Range (fathoms)	No. fishes caught	No. species caught	Alive number	%	Dead number	%
Sutherland and Harper (1983)	Dade county, Florida	not sampled	--	--	--	--	--	--	--	--	--
	Broward county, Florida	December 1979 - September 1980	538	--	16.4 - 41.2	5,984	104	2,467*	87.1*	472**	2.9**
Taylor and McMichael (1983)	Monroe county, Florida	November 1979 - September 1980	1,694	--	--	10,226	111	326***	53.0***	126***	20.0***
	Collier county, Florida	June 1980	270	8.4	7.6 - 8.6	3,111	28	--	--	--	--
Harper et. al. (1994)	southeastern Florida	May, June, & October 1990	417	25.8	16.6 - 45.0	--	85	1,479	78.5	101	5.4
current study	eastern U.S. Gulf of Mexico	December 1993 - November 1994	3,867	17.1	10.0 - 22.2	15,148	63	8,398	55.4	242	1.6

BOTTOM LONGLINE OBSERVER STUDIES

			SAMPLE INFORMATION					BYCATCH RELEASE INFORMATION			
Source	Study Area	Sampling Period	Sample size (no. hooks)	Average Depth Fished (fathoms)	Depth Range (fathoms)	No. fishes caught	No. species caught	Alive number	%	Dead number	%
Prytherch (1983)	U.S. Gulf of Mexico	1982 - 1983	40,900	--	20 - 170	--	--	--	--	--	--
current study	eastern U.S. Gulf of Mexico	March 1994 - February 1995	227,607	48	18 -129	5,016	85	1,418	28.3	227	4.9

* observed from 396 traps

** determined from 959 observed traps and 538 sampled traps

*** observations of 619 fishes from an unknown number of traps

Figure 1. Location of fish trap sets from December 1993 through November 1994.

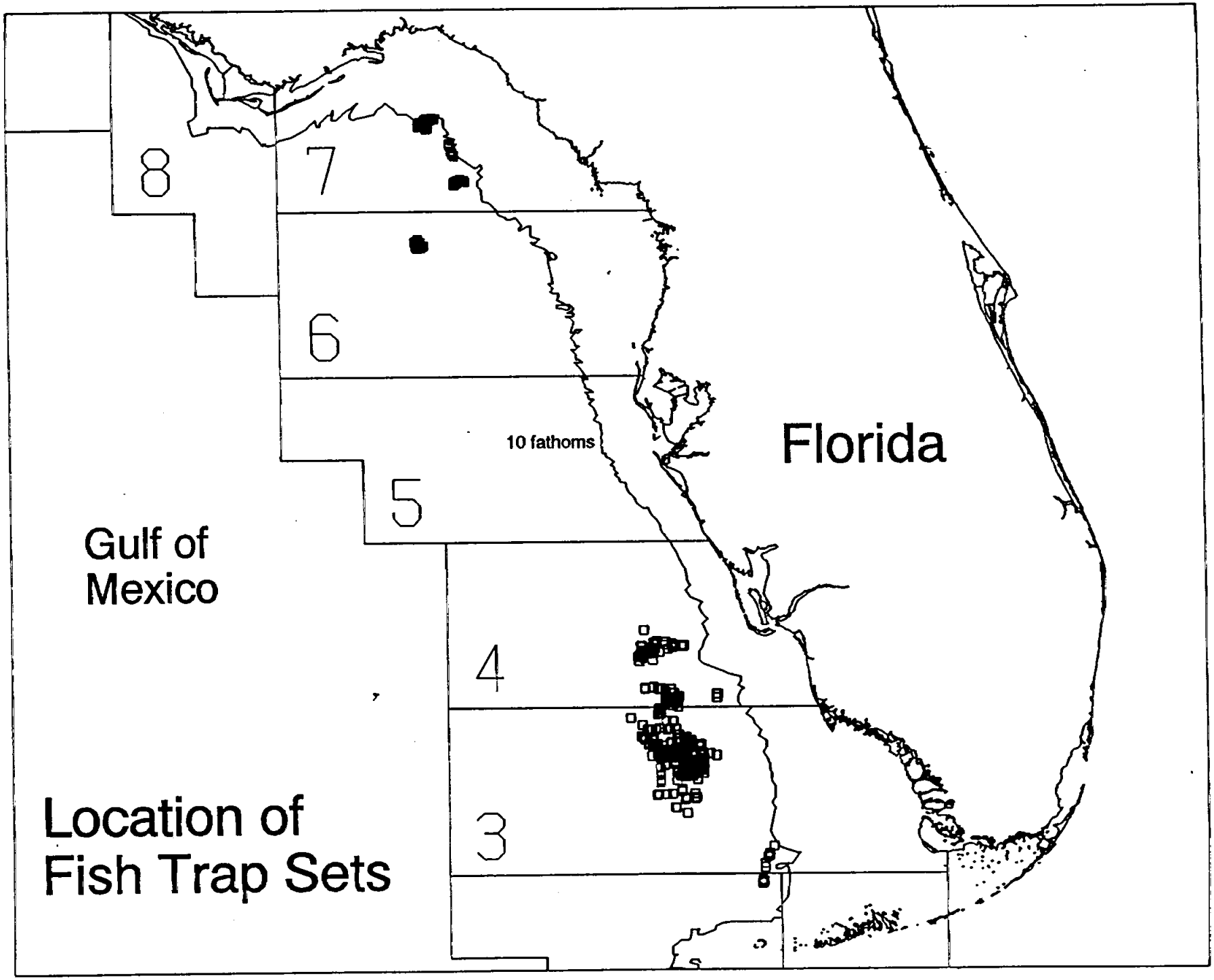


Figure 2. Location of fish traps set by statistical area from December 1993 through November 1994.

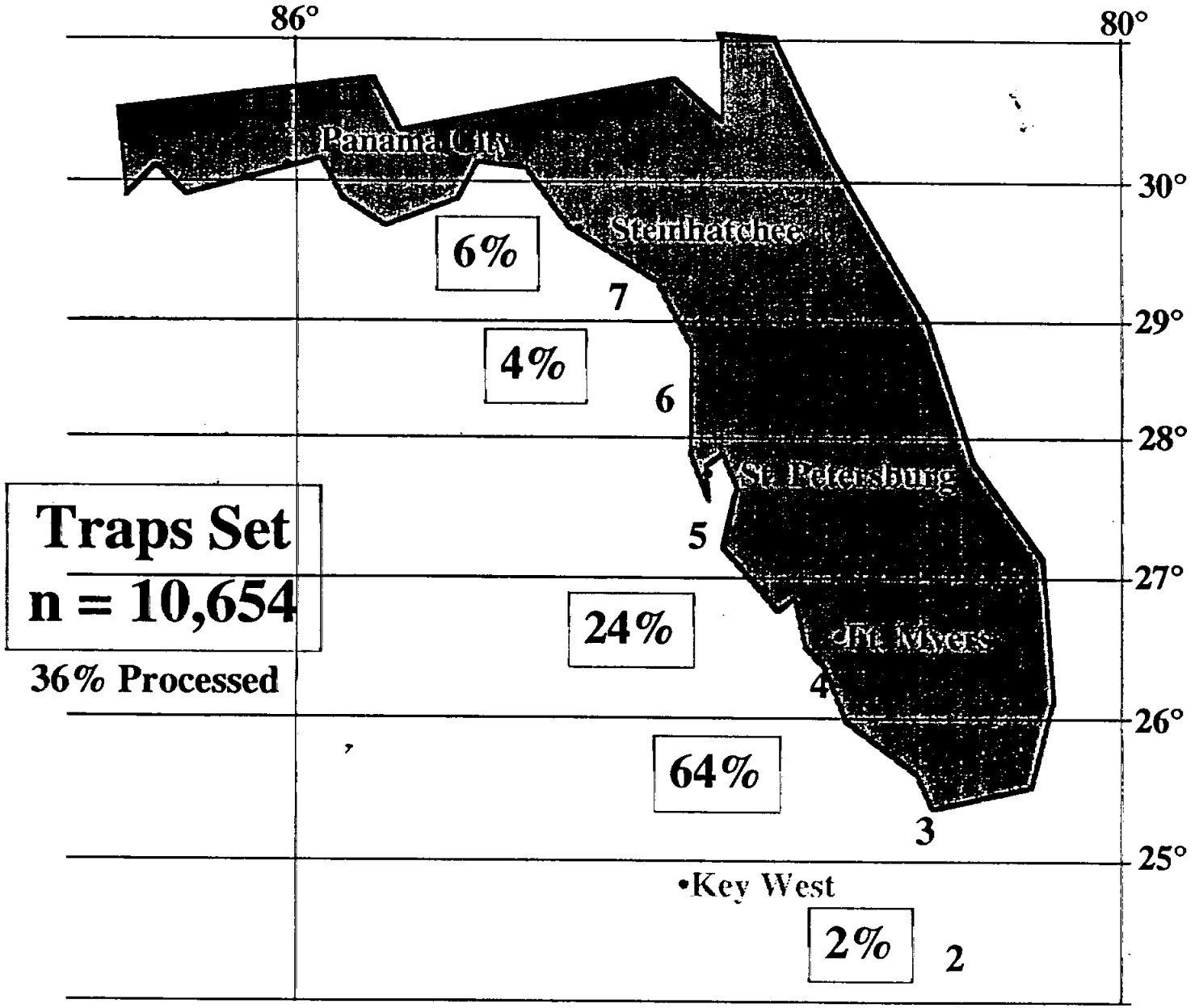
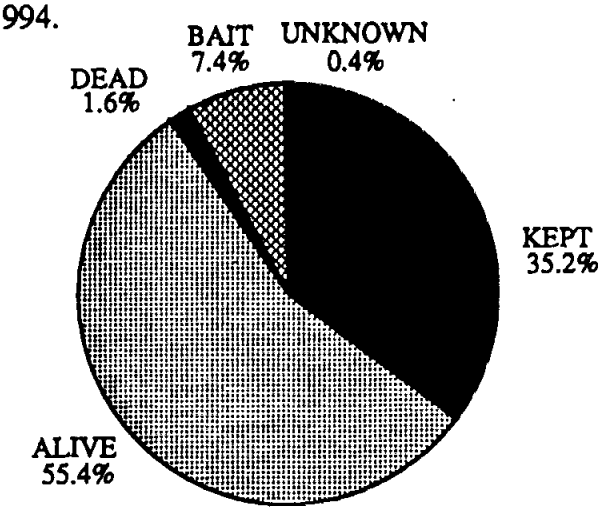
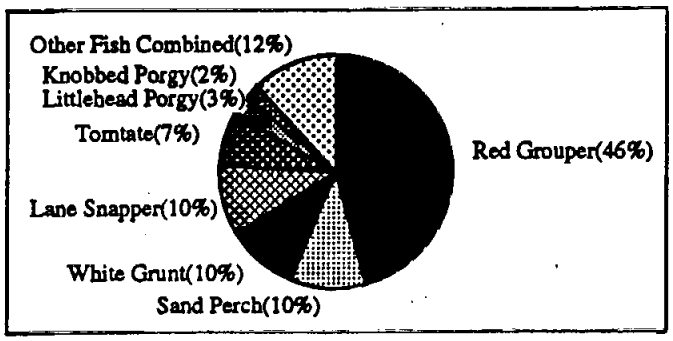
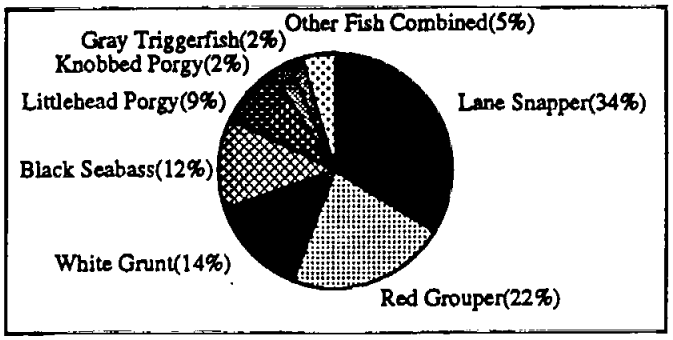


Figure 3. Fate and species composition of fish caught in fish traps from December 1993 through November 1994.

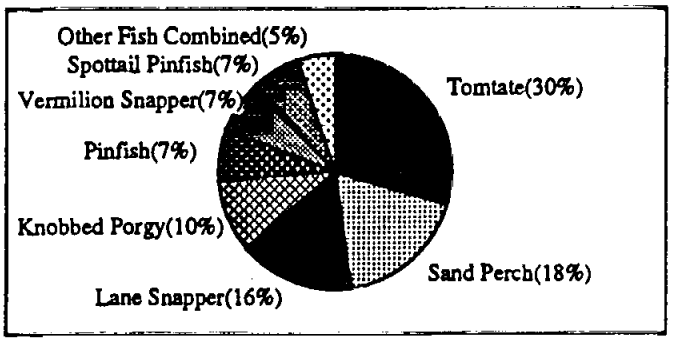




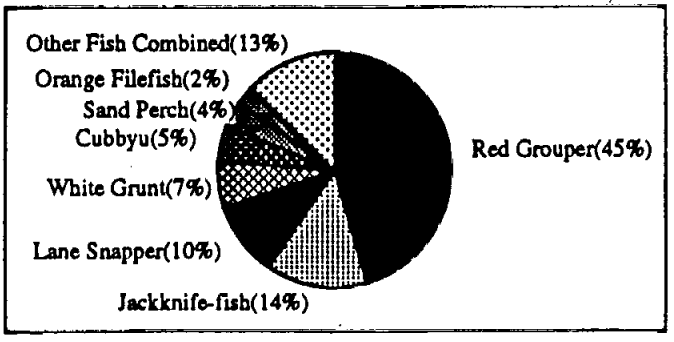
ALIVE
55.4%
n = 8398



KEPT
35.2%
n = 5334



BAIT
7.4%
n = 1119



DEAD
1.6%
n = 242

Figure 4. Size and fate of red grouper collected in fish traps from December 1993 through November 1994.

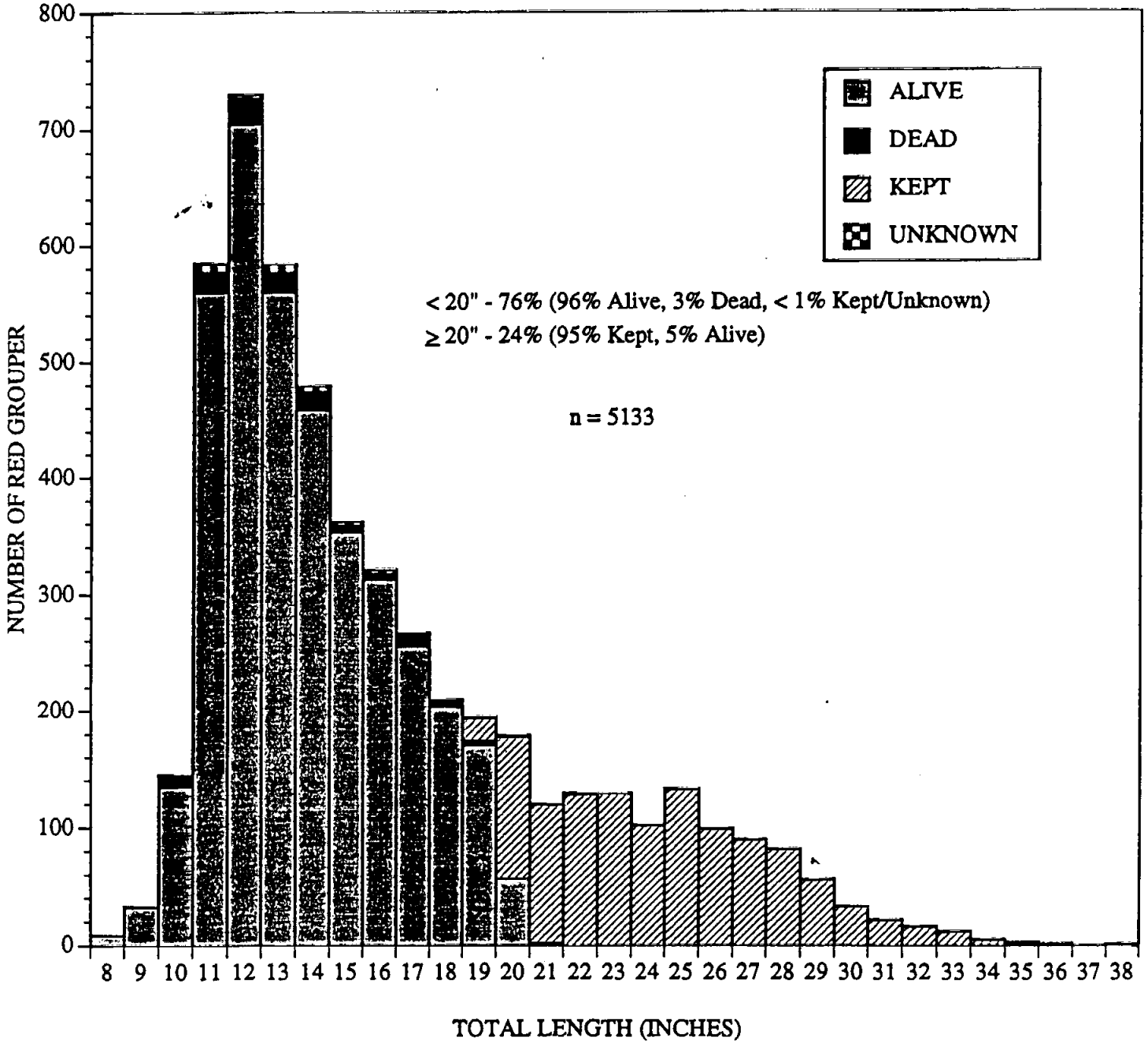


Figure 5. Number of red grouper by depth collected in fish traps from December 1993 through November 1994.

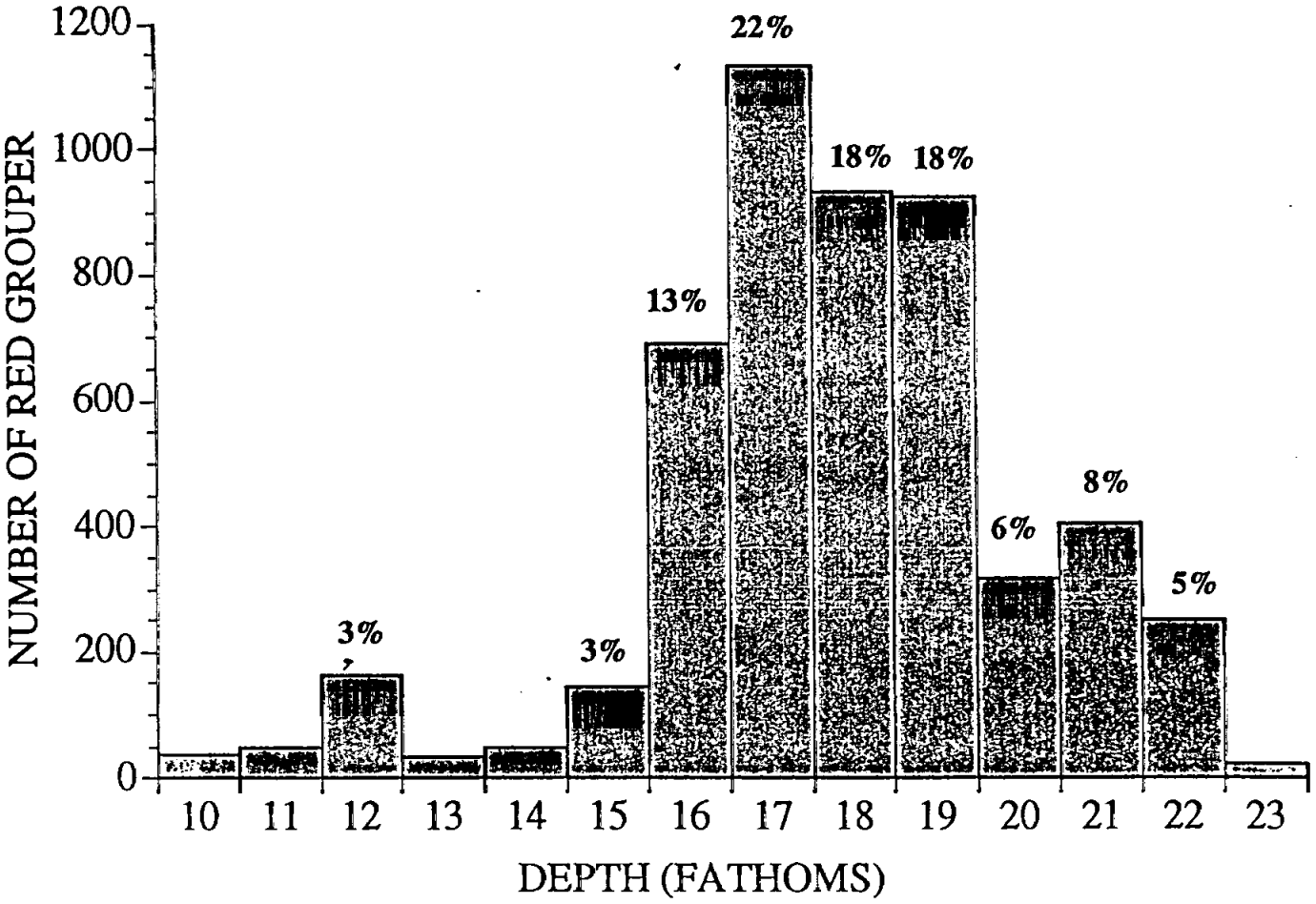


Figure 6. Catch-per-unit-effort (fish per trap hour) by depth (December 1993 - November 1994) for all species combined and red grouper.

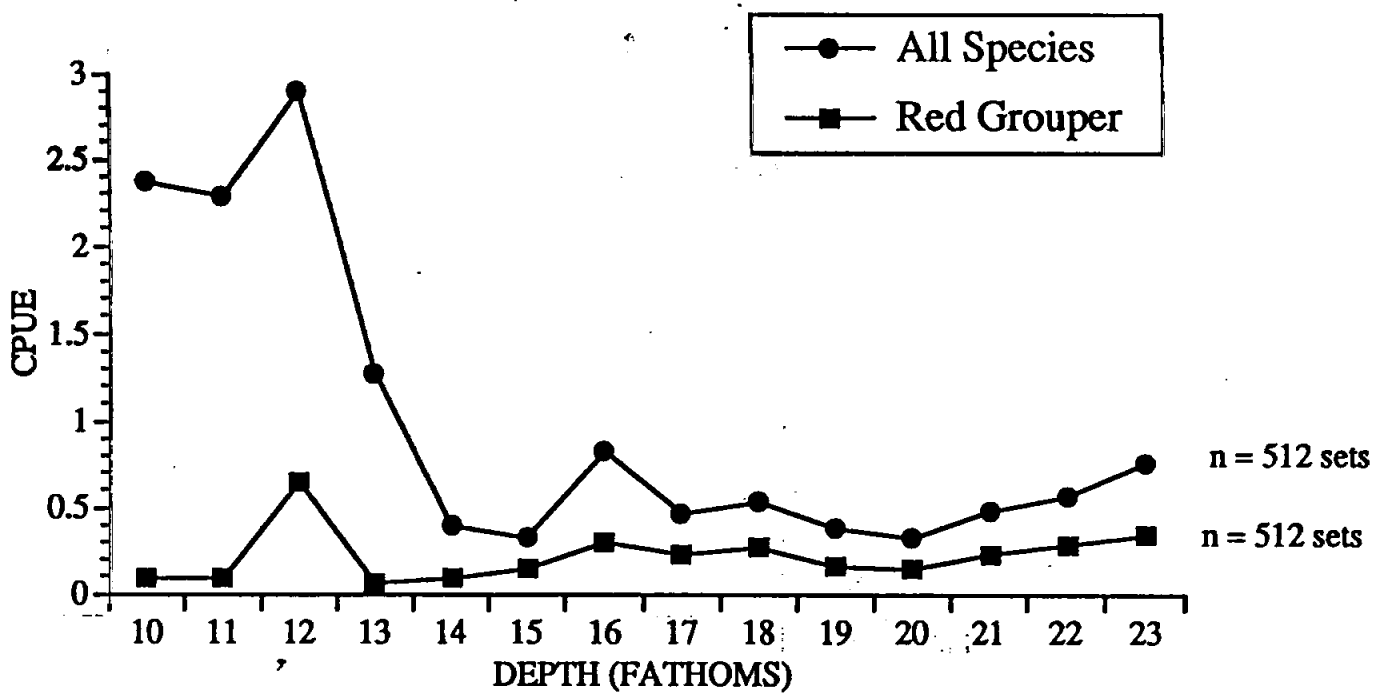


Figure 7. Catch-per-unit-effort (fish per trap hour) by season (December 1993 - November 1994) for all species combined and red grouper.

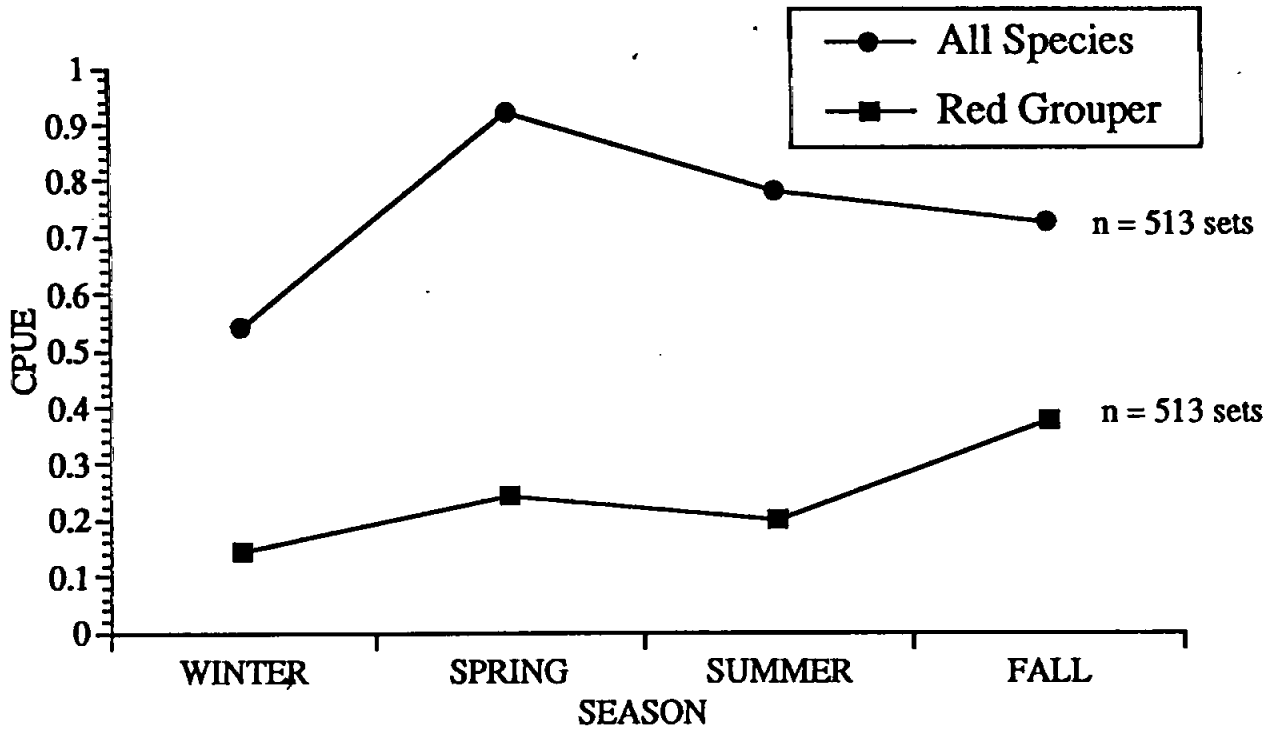


Figure 7. Catch-per-unit-effort (fish per trap hour) by season (December 1993 - November 1994) for all species combined and red grouper.

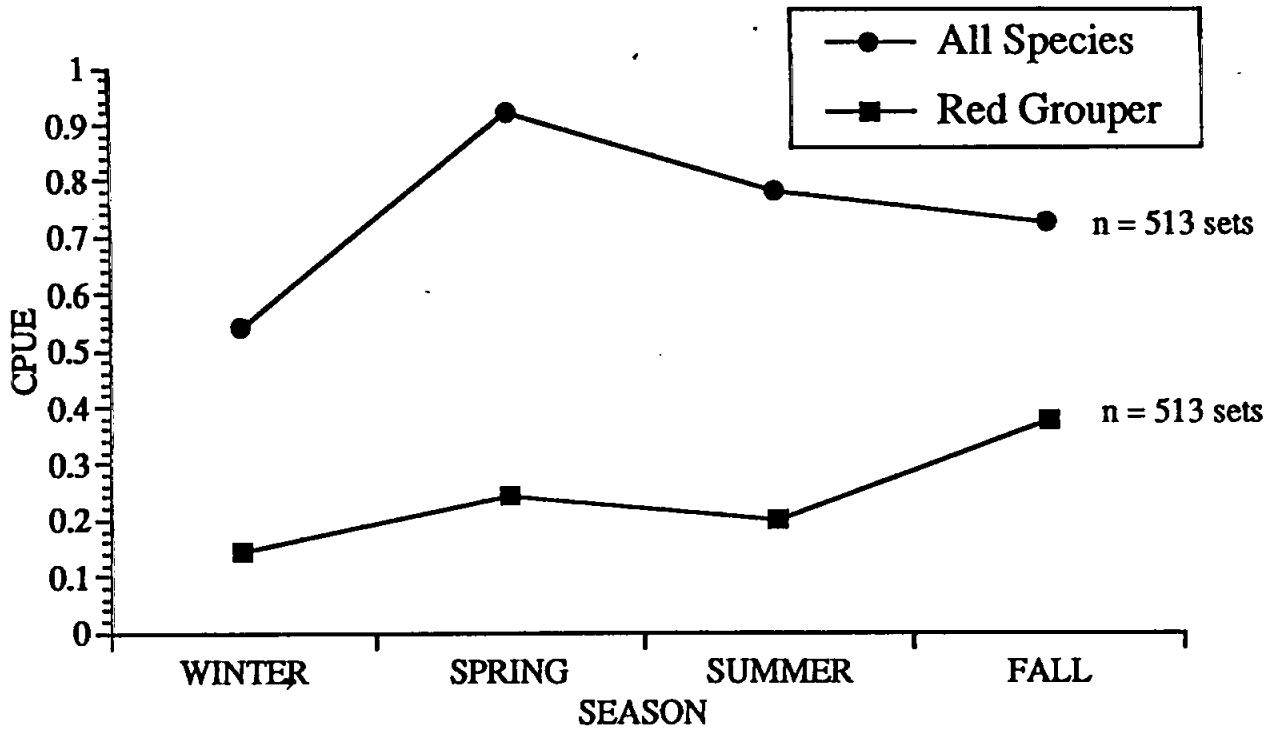


Figure 8. Location of longline sets from April 1994 through February 1995.

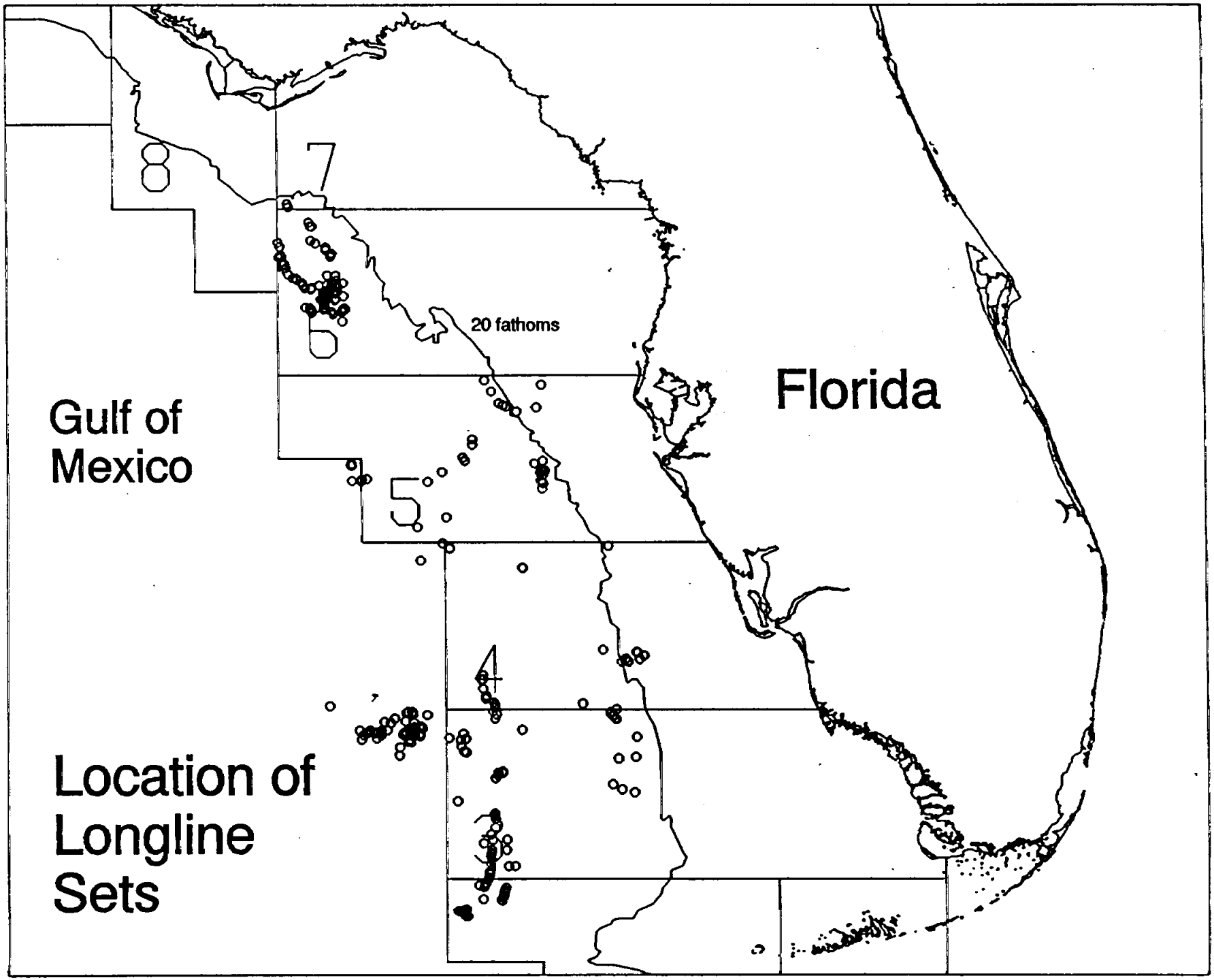


Figure 9. Location of hooks set by statistical area from April 1994 through February 1995.

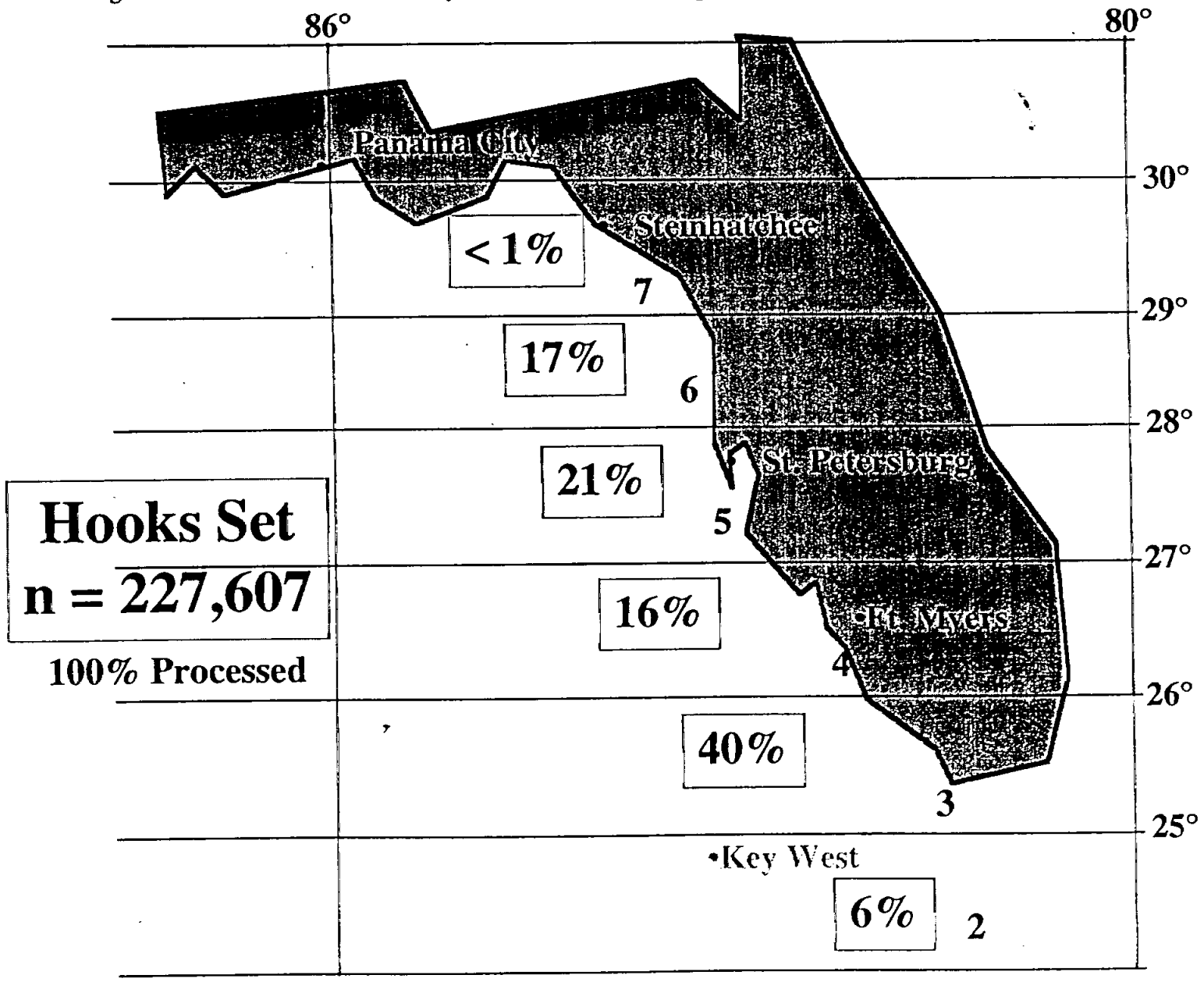
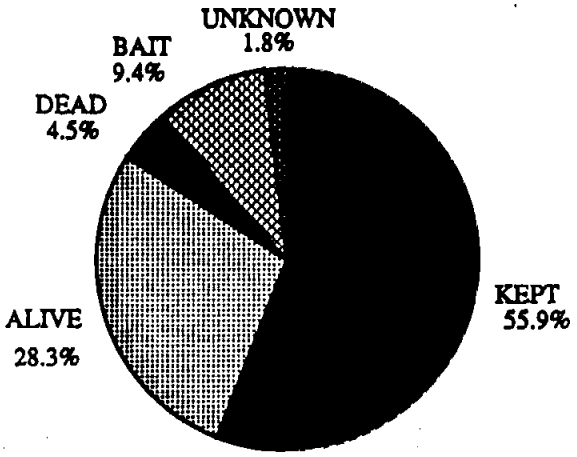
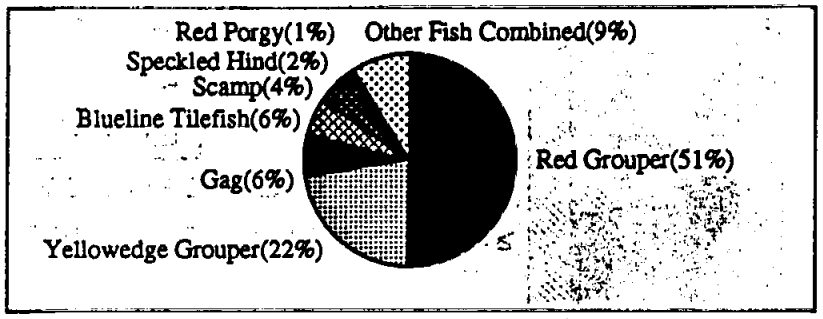
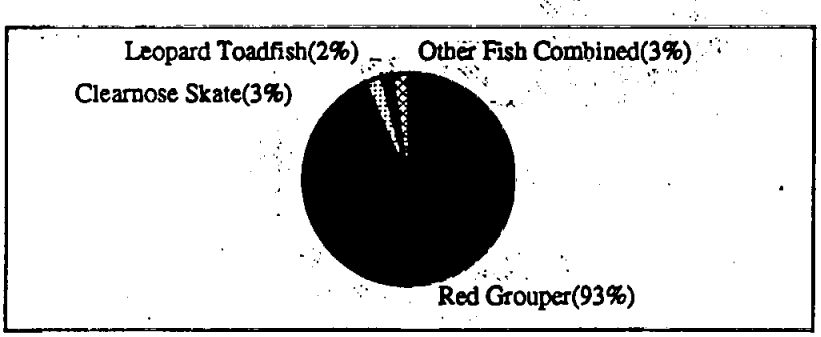


Figure 10. Fate and species composition of fish caught on longline gear from April 1994 through February 1995.

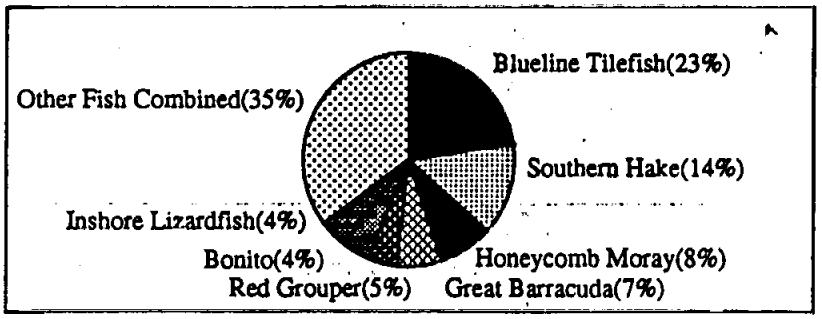




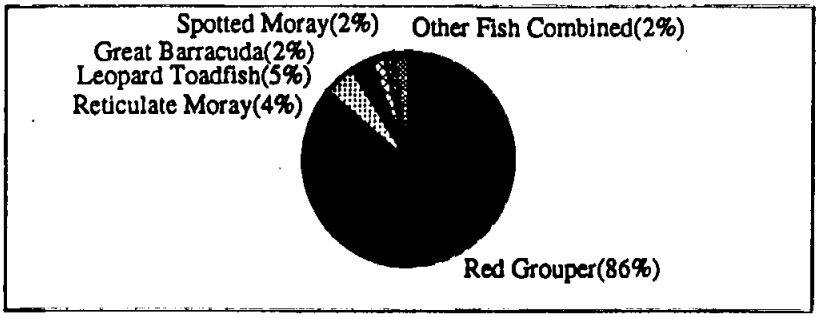
KEPT
n = 2806
55.9%



ALIVE
n = 1418
28.3%



BAIT
n = 473
9.4%



DEAD
n = 227
4.5%

Figure 11. Size and fate of red grouper caught using longline gear from April 1994 through February 1995.

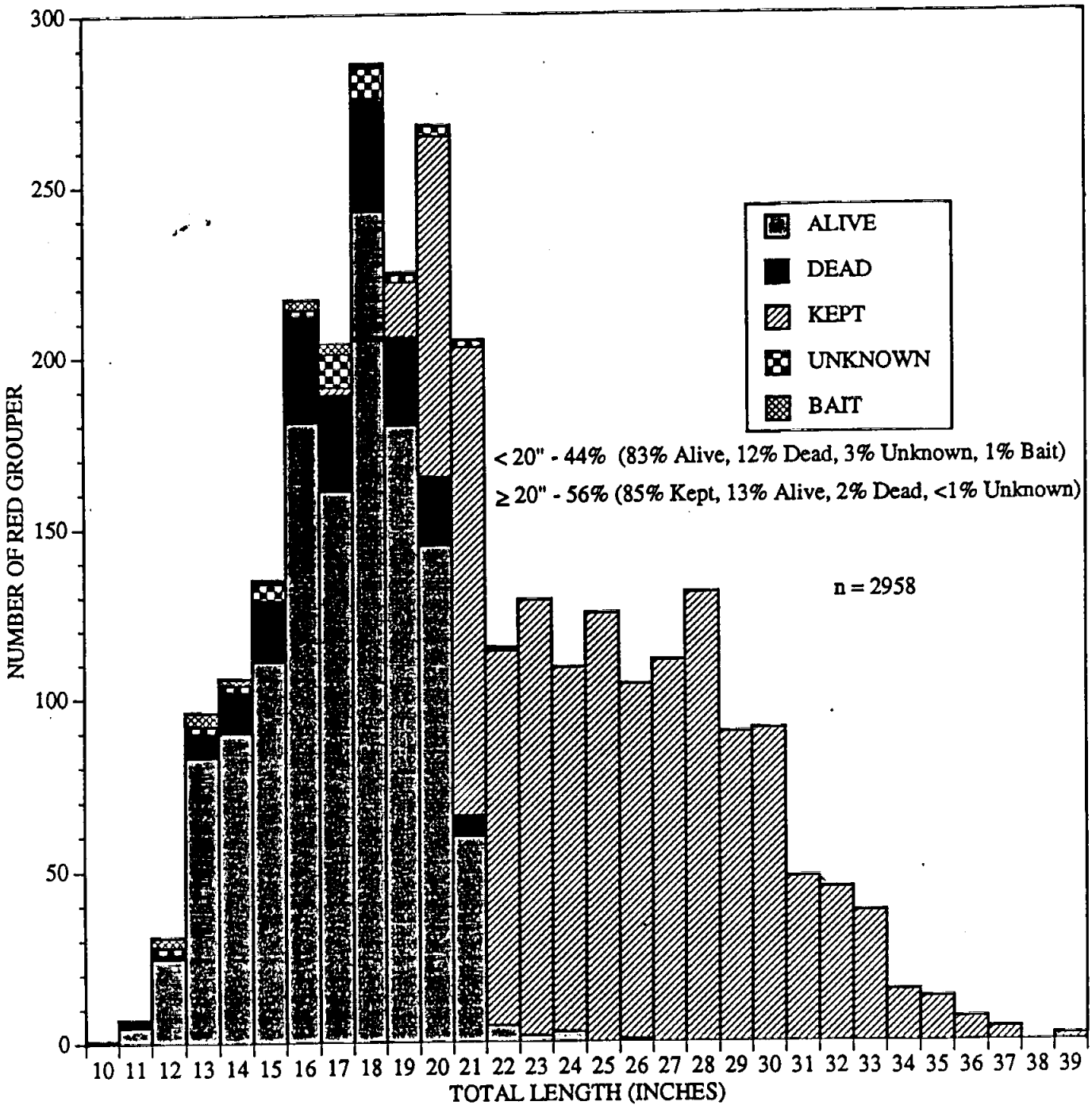


Figure 12. Number of red grouper by depth caught on longline gear from April 1994 through February 1995.

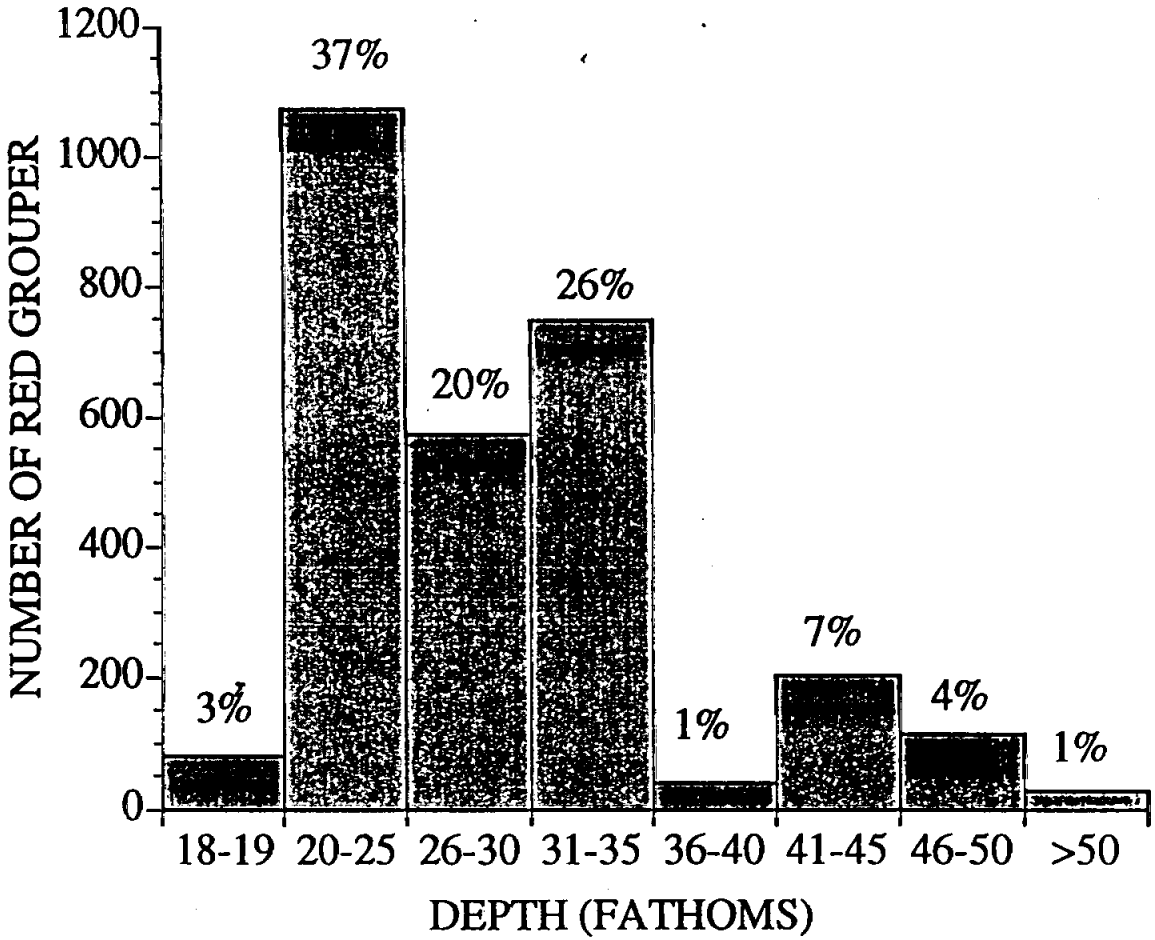


Figure 13. Catch-per-unit-effort (fish per hook hour) by depth (April 1994-February 1995) for all species combined and red grouper.

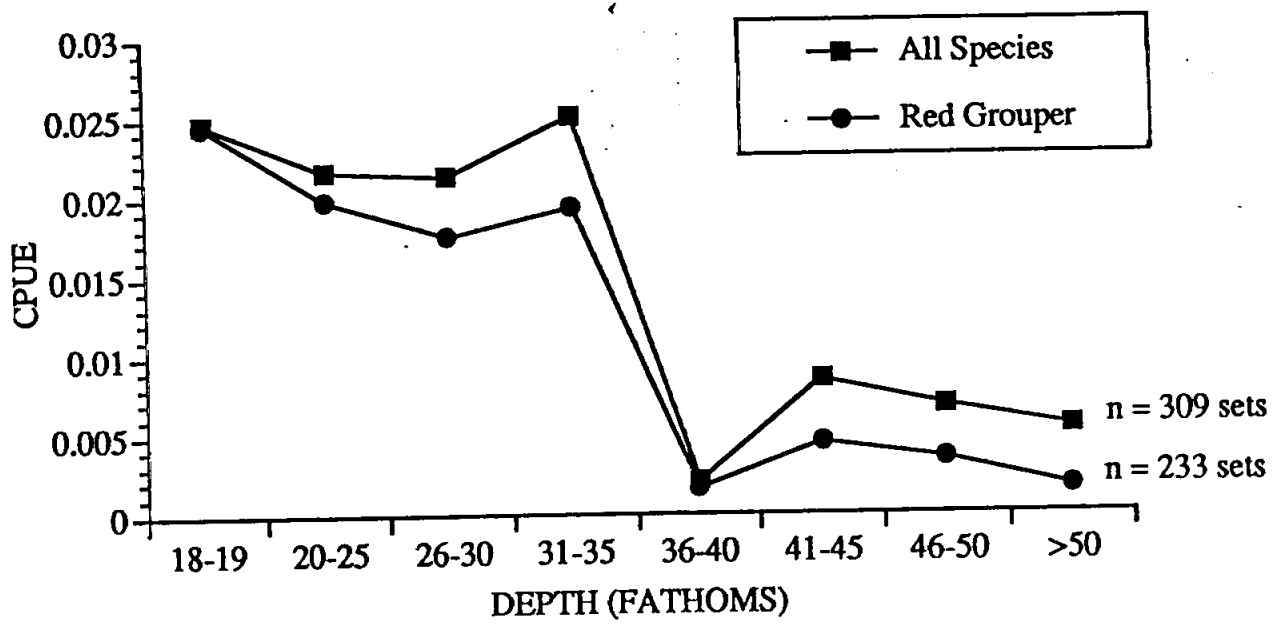


Figure 14. Catch-per-unit-effort (fish per hook hour) by season (April 1994-February 1995) for all species combined and red grouper.

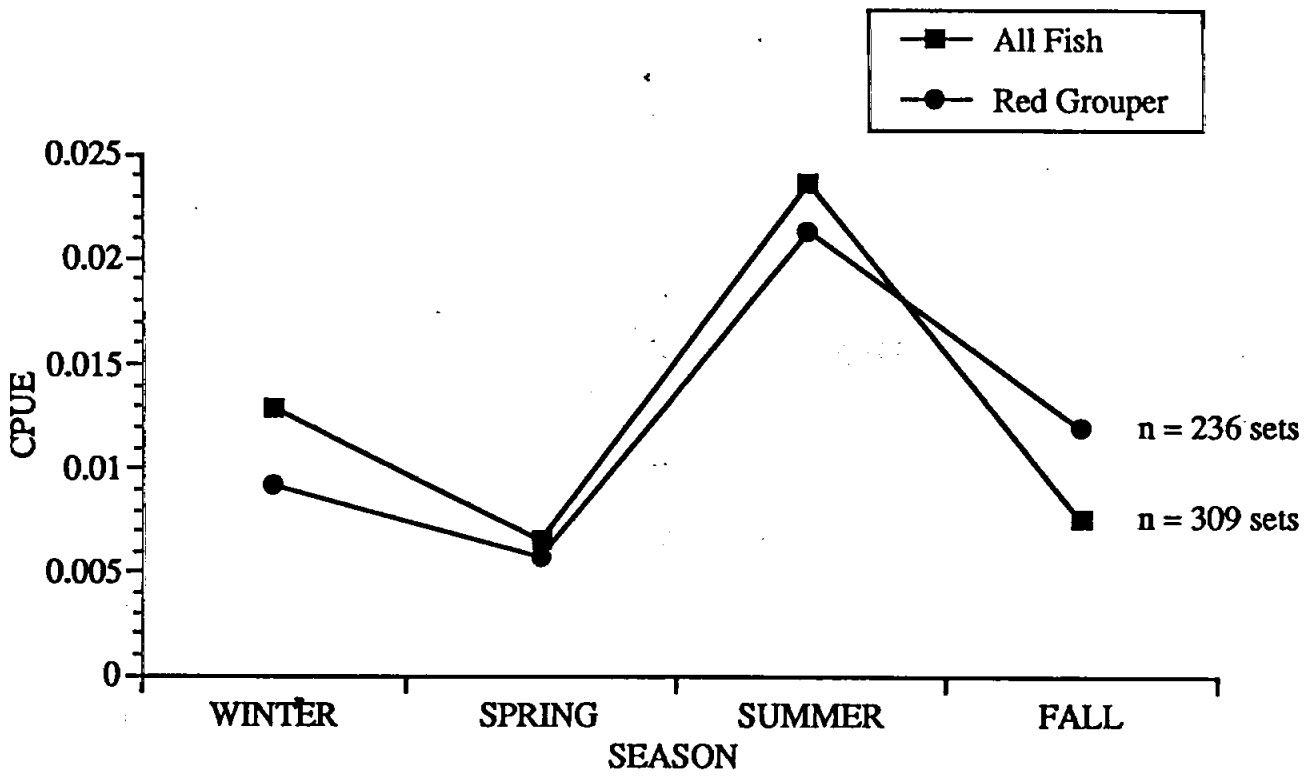


Figure 15. **Reported Gulf Reef Fish Logbook Fish Trap Landings.** Percent contribution of major species or higher taxa to total reported landings by fish trap gear in Statistical Areas 2-7 between December 1993 and November 1994.

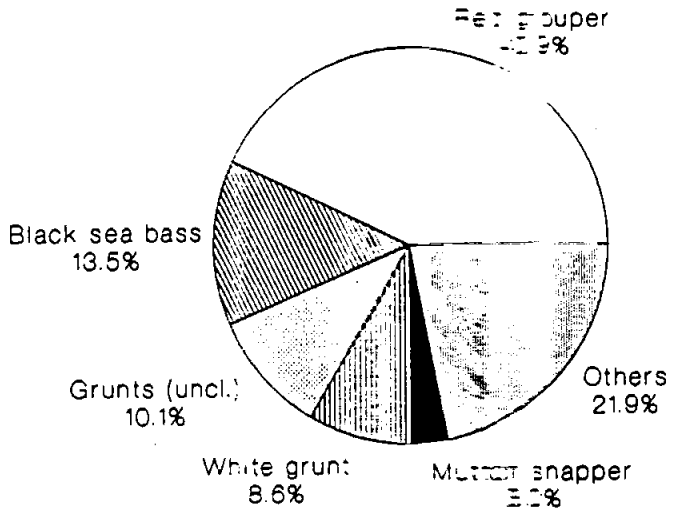


Figure 16. **Reported Gulf Reef Fish Logbook Fish Trap Landings per Trip.** Frequency histogram of number trips by total landings classes. Data are from Gulf Reef Fish Logbook Database for statistical areas 2-7 between December 1992 and November 1994 (Number of trips = 1,138).

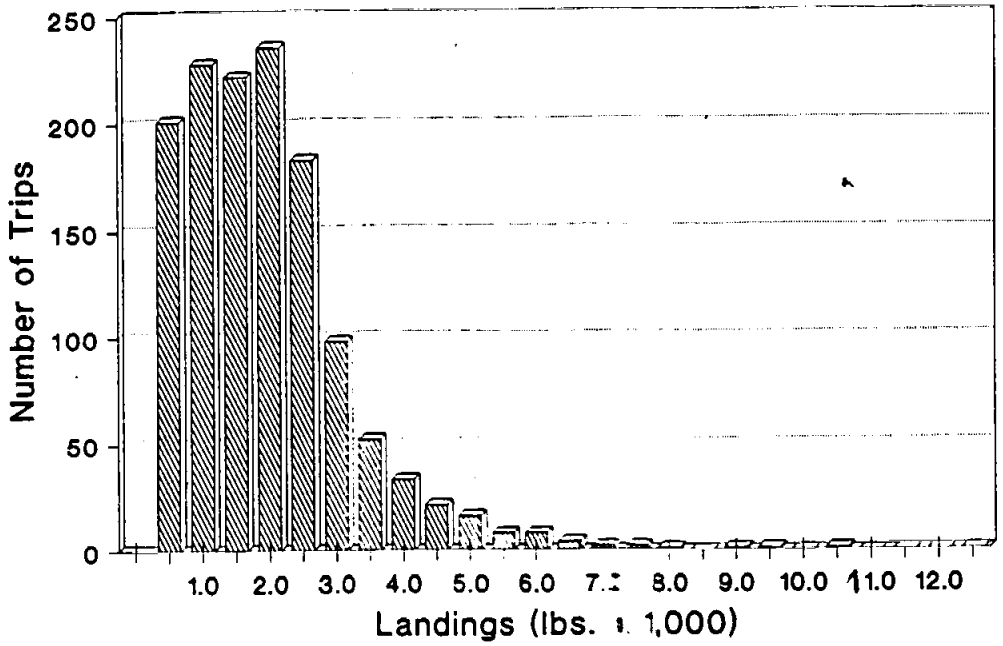


Figure 17. **Reported Fish Trap Trip Seasonality.** Proportion of fish trap trips completed during each season. Data are from Gulf Reef Fish Logbook Database for trips using fish trap gear in statistical areas 2-7 between December 1993 and November 1994 (N = 1,318). Seasons were categorized as follows: WINTER = December, January, and February; SPRING = March, April, and May; SUMMER = June, July, and August; FALL = September, October, and November.

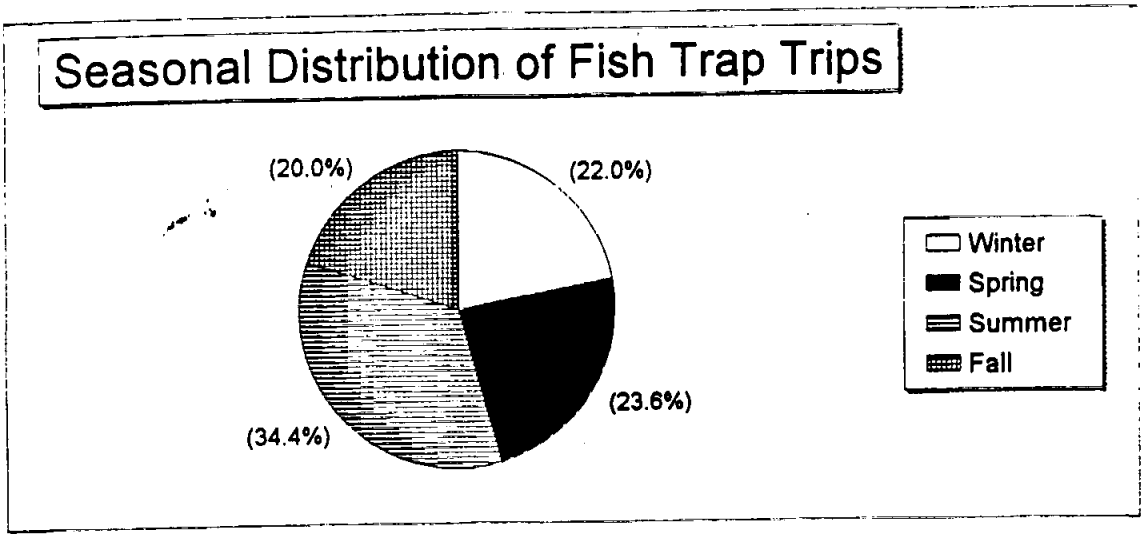


Figure 18. **Reported Gulf Reef Fish Logbook Fish Trap Trip Duration.** Frequency histogram of number trips by trip duration (days). Data are from Gulf Reef Fish Logbook Database for statistical areas 2-7 between December 1992 and November 1994 (Number of trips = 1,138).

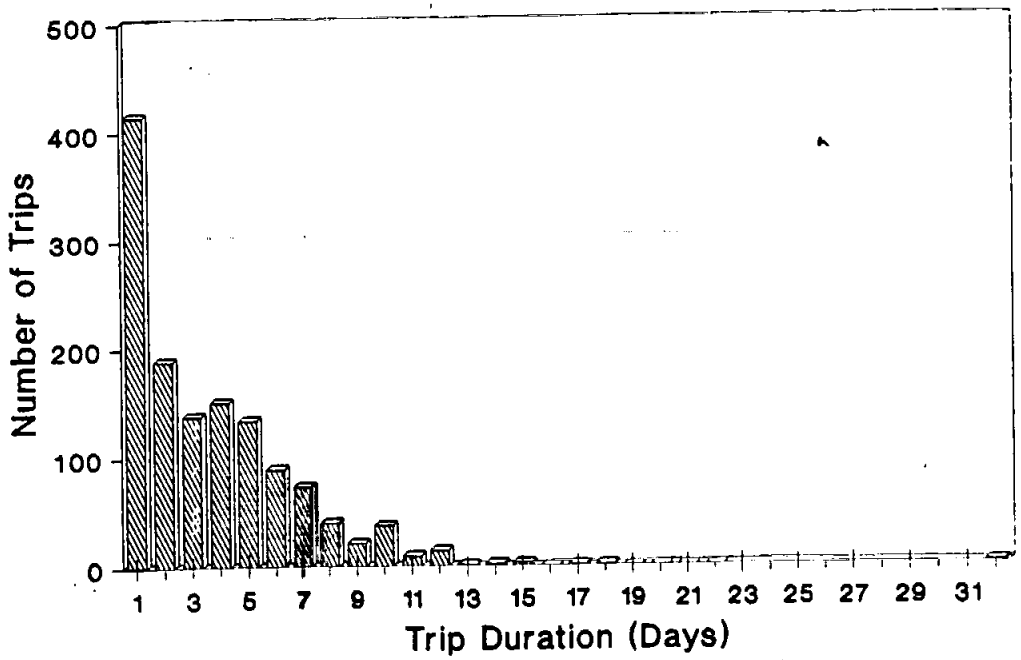


Figure 19. **Reported Gulf Reef Fish Logbook Bottom Longline Landings.** Percent contribution of major species or higher taxa to total reported landings by bottom longline gear in Statistical Areas 2-7 between March 1994 and February 1995.

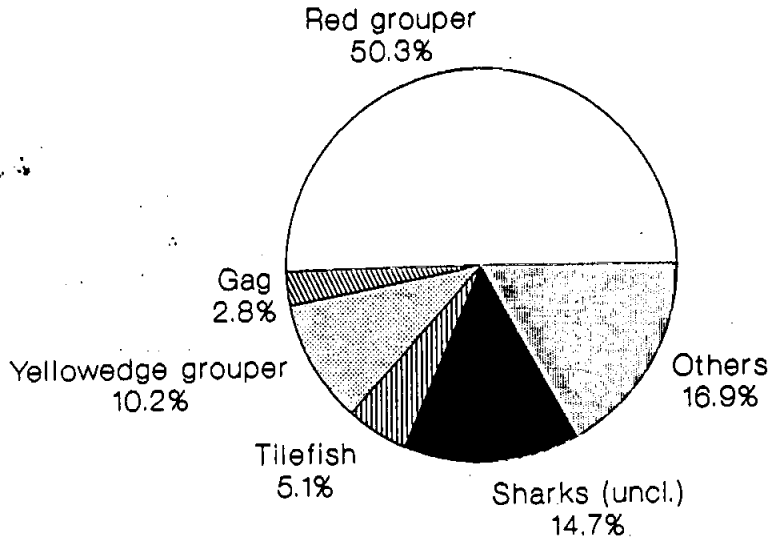


Figure 20. **Reported Gulf Reef Fish Logbook Bottom Longline Landings per Trip.** Frequency histogram of number trips by total landings classes. Data are from Gulf Reef Fish Logbook Database for statistical areas 2-7 between March 1994 and February 1995 (Number of trips = 1,452).

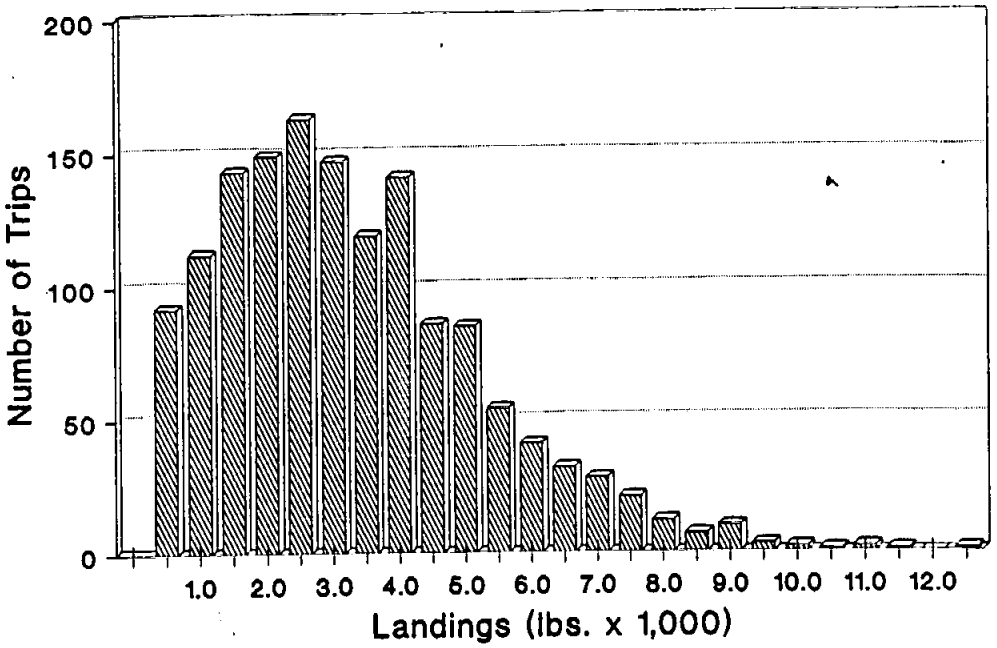


Figure 21. **Reported Bottom Longline Trip Seasonality.** Proportion of bottom longline trips completed during each season. Data are from Gulf Reef Fish Logbook Database for trips using fish trap gear in statistical areas 2-7 between December 1993 and November 1994 (N = 1,452). Seasons were categorized as follows: WINTER = December, January, and February; SPRING = March, April, and May; SUMMER = June, July, and August; FALL = September, October, and November.

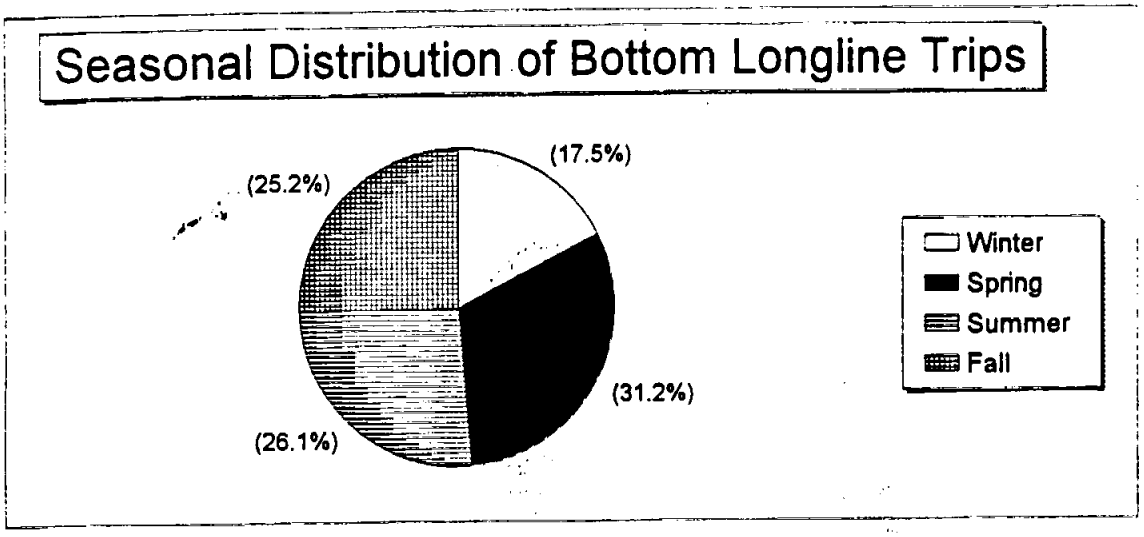


Figure 22. **Reported Gulf Reef Fish Logbook Bottom Longline Trip Duration.** Frequency histogram of number trips by trip duration (days). Data are from Gulf Reef Fish Logbook Database for statistical areas 2-7 between March 1994 and February 1995 (Number of trips = 1,452).

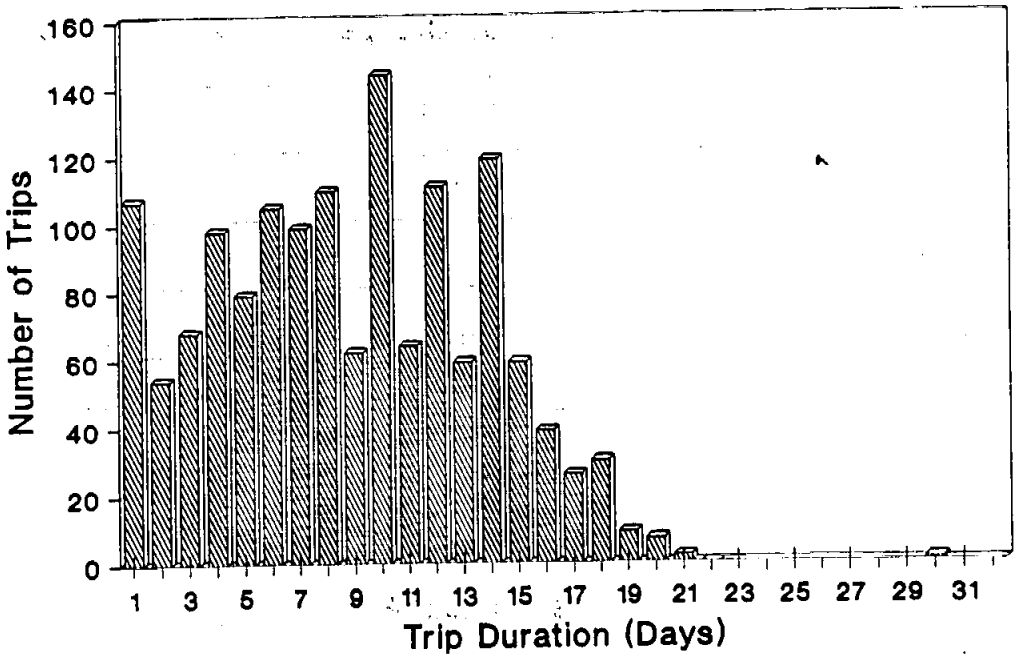


Figure 23. **Reported Red Grouper Landings by Fish Trap Gear.** Percent by Statistical Area of total red grouper landings by fish traps. Data are from Gulf Reef Logbook Database for Statistical Areas 2-7 between December 1993 and November 1994.

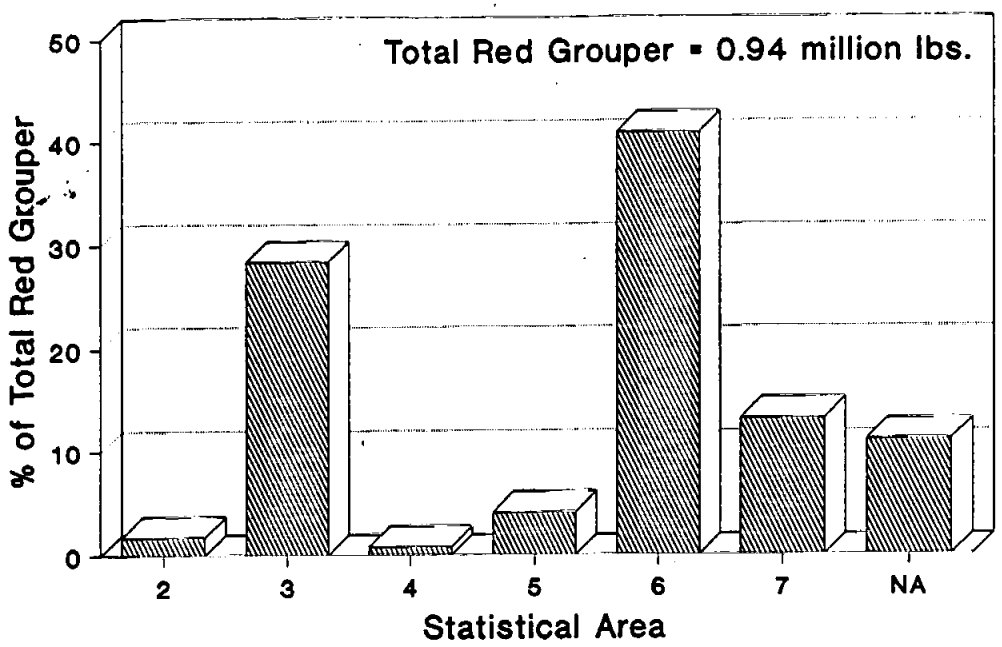


Figure 24. **Reported Grouper Landings by Bottom Longline Gear.** Percent by Statistical Area of total red grouper landings by bottom longline gear. Data are from Gulf Reef Logbook Database for Statistical Areas 2-7 between March 1994 and February 1995.

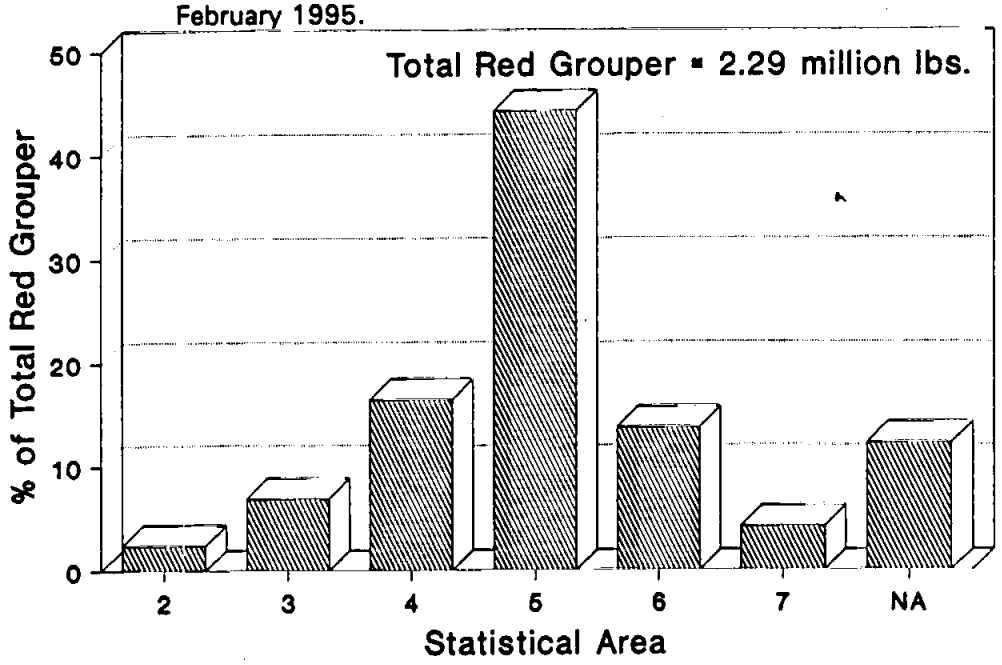
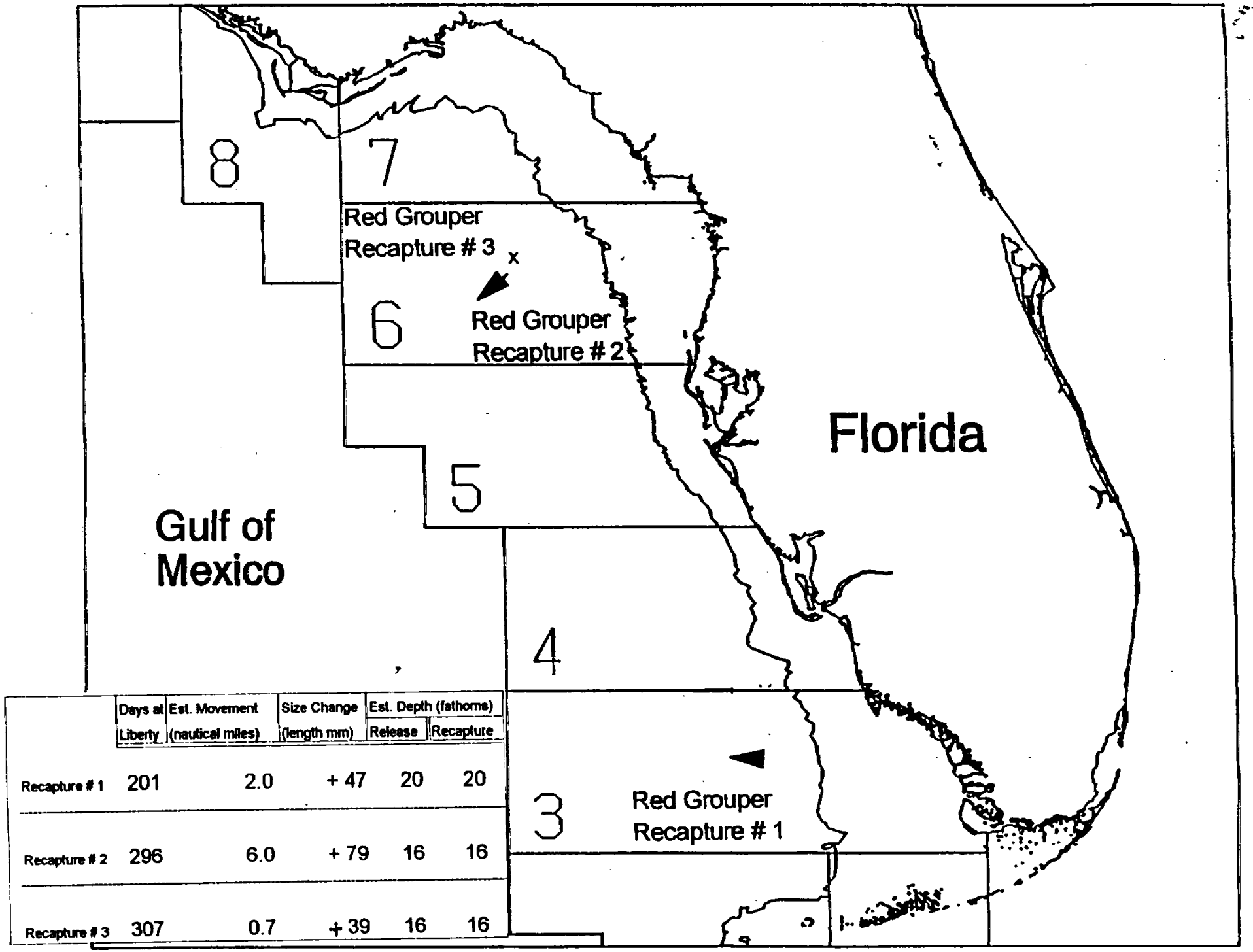


Figure 25. Recapture location and information for 3 red grouper which were tagged during NMFS observer trips.



	Days at Liberty	Est. Movement (nautical miles)	Size Change (length mm)	Est. Depth (fathoms) Release	Recapture
Recapture # 1	201	2.0	+ 47	20	20
Recapture # 2	296	6.0	+ 79	16	16
Recapture # 3	307	0.7	+ 39	16	16

Characterization of the Reef Fish Fishery of the Eastern U.S. Gulf of Mexico
MARFIN Grant No. 95MFIH07

Elizabeth Scott-Denton
National Marine Fisheries Service
Southeast Fisheries Science Center
4700 Avenue U
Galveston, Texas 77551

Supplement to the report "Characterization of the reef fish fishery of the eastern U.S. Gulf of Mexico " MARFIN Grant No. 94MARFIN 17

In December 1993, in cooperation with the commercial fishing industry and the Gulf of Mexico Fishery Management Council (GMFMC), the National Maine Fisheries Service's (NMFS) Southeast Fisheries Science Center (SEFSC) Galveston Laboratory implemented a scientific observer program to characterize the fish trap, bottom longline and hand and power-assisted line (bandit reel) fisheries in the eastern U.S. Gulf of Mexico. The primary objective was to quantify and document release mortality and bycatch levels aboard commercial reef fish vessels. Catch and effort data for targeted and bycatch species were collected and analyzed by area, season and gear type. Mortality rates of discarded species were determined by depth, size, and method of capture. Mortality estimates for red grouper *(Epinephelus morio)* were further enhanced through tag and release operations. Vessel and gear characteristics, operational costs, fishing locations, and environmental conditions were recorded.

NMFS observers were placed on commercial fish trap, bottom longline and bandit-rigged vessels operating primarily off the west coast of Florida, and to a lesser extent off the coast of Louisiana aboard bandit-rigged vessels. The allocation of sampling effort by area was based on available vessels and current effort trends.

Fishery-specific data were obtained from each set. Non-target and undersized target species were processed first, recording length, weight and fate prior to release (alive, dead, or unknown). A fish was determined to be alive if it swam, dead if it floated, and unknown if the fate could not be determined (i.e., erratic swimming). Beginning in 1995, the condition of the fish when brought onboard was recorded and includes the following categories: 1) live - normal appearance with no air expansion; 2) live - air bladder expansion; 3) live - eyes protruding; 4) live - with both air bladder expansion and eyes protruding; 5) dead when brought onboard; or 6) unknown or not recorded. Air bladders of live fish were punctured in the same manner as demonstrated by the captain and crew. Retained species were processed, recording length and weight.

Red grouper in good condition were tagged with vinyl RF dart tags and released. In order to calculate tag retention rates and tag-induced mortality, eleven red grouper were captured in Florida, transported to the SEFSC Galveston Laboratory, tagged and held.

Thirteen trips were made aboard six fish trap vessels between December 1993 and February 1995. Five hundred seventy-six sets were sampled during 96 sea days of observations. Thirty six percent of the 11,999 traps set were processed. A total of 16,943 fish of 64 taxa were sampled (Table 1). Approximately 57.6 percent of the individuals were released alive, 33.8 percent were kept, 1.7 percent were released dead, 6.7 percent retained for bait, and 0.3 percent were released with an unknown fate. Approximately 5,133 red grouper were measured. Lengths ranged from 8 to 38 inches in total length with the 12-inch category having the highest percentage (14%) of individuals.

Twelve trips were made aboard nine bottom longline vessels from April 1994 through May 1995. Three hundred-seventeen sets were sampled during 112 days of sea day observations. Two hundred forty-two sets targeted red grouper with remaining 75 sets seeking yellowedge grouper *(E. flavolimbatus)* and blueline tile fish *(Caulolatilus microps)* in deeper waters. From the 229,467 hooks processed (100%), a total of 5,224 fish of 89 taxa were caught (Table 2). Approximately 56.1 percent of the individuals were kept, 27.8 percent released alive, 4.5 percent released dead, 9.8 percent retained for bait and 1.8 percent released with an unknown fate. Approximately 2,958 red grouper were measured and ranged from 10 to 39 inches in total length. The 18-inch category had the highest percentage (10%) of the individuals.

Sixteen trips were made aboard bandit-rigged vessels during 81 sea days of observations from January through July 1995. Nine trips targeted red grouper and vermilion snapper *(Rhomboplites aurorubens)* off Florida and seven trips were for red snapper *(Lutjanus campechanus)* off Louisiana. Of the 2,806 fish (45 taxa) processed off Florida (Table 3), 54.5 percent were kept, 36.8 percent were released alive, 1.9 percent were released dead, 6.5 percent retained for bait and 0.3 percent released with an unknown fate. Off Louisiana, a total of 716 fish comprised of 16 species were sampled during March 1995 (Table 4). Of these, 46.2 percent of the individuals were kept, 47.3 percent were released alive, 2.4 percent were released dead, 2.4 percent retained for bait, and 1.7 percent were released with an unknown fate. A similar study off Louisiana was conducted by Russell Research Associates, Inc. (RRA) in 1995 aboard bandit-rigged vessels. Table 5 summarizes data collected by RRA observers during 6 trips (21 sea days of observations).

Table 1. Number and fate by species of fish caught in fish traps from December 1993 through February 1995.

COMMON NAME	GENUS SPECIES	TOTAL	KEPT	ALIVE	DEAD	BAIT	UNKNOWN
Red Grouper	*Epinephelus morio*	5901	1308	4419	140		34
Lane Snapper	*Lutjanus synagris*	3093	2012	854	33	175	19
White Grunt	*Haemulon plumieri*	1597	736	823	16	22	
Sand Perch	*Diplectrum formosum*	1261	2	1045	9	205	
Tomtate	*Haemulon aurolineatum*	996	8	656	1	331	
Black Seabass	*Centropristis striata*	770	666	104			
Littlehead Porgy	*Calamus proridens*	729	463	252		14	
Pinfish	*Lagodon rhomboides*	652		570	1	81	
Knobbed Porgy	*Calamus nodosus*	488	164	201		123	
Gray Triggerfish	*Balistes capriscus*	268	118	147	3		
Vermilion Snapper	*Rhomboplites aurorubens*	148	34	33		81	
Southern Puffer	*Sphoeroides nephelus*	143	32	106		5	
Planehead Filefish	*Monacanthus hispidus*	115	3	110	2		
Red Porgy	*Pagrus pagrus*	113	113				
Spottail Pinfish	*Diplodus holbrooki*	100		20	4	76	
Jackknife-fish	*Equetus lanceolatus*	87		51	35		1
Gray Snapper	*Lutjanus griseus*	52	14	37	1		
Whitebone Porgy	*Calamus leucosteus*	46	13	33			
Pigfish	*Orthopristis chrysoptera*	41		28	2	11	
Gag	*Mycteroperca microlepis*	37	4	31	1		1
Fringed Filefish	*Monacanthus ciliatus*	34		34			
Spotfin Butterflyfish	*Chaetodon ocellatus*	30		27	3		
Bandtail Puffer	*Sphoeroides spengleri*	27	11	12	4		
Yellowtail Snapper	*Ocyurus chrysurus*	21	10	10	1		
Blue Angelfish	*Holacanthus bermudensis*	19		15	4		
Spotted Moray	*Gymnothorax moringa*	19	1	18			
Orange Filefish	*Aluterus schoepfi*	17		11	6		
Bank Seabass	*Centropristis ocyurus*	17	2	9	1	5	
Cubbyu	*Equetus umbrosus*	14		3	11		
Nurse Shark	*Ginglymostoma cirratum*	14		14			
Margate	*Haemulon album*	14		14			
Sand Diver	*Synodus intermedius*	11		10	1		
Black Grouper	*Mycteroperca bonaci*	6	1	5			
Sharksucker	*Echeneis naucrates*	6		6			
Triggerfish/Filefish	*Balistidae*	4		4			
Ocean Triggerfish	*Canthidermis sufflamen*	4		4			
Gray Angelfish	*Pomacanthus arcuatus*	4		3	1		
Reef Butterflyfish	*Chaetodon sedentarius*	3		3			
Leopard Toadfish	*Opsanus pardus*	3		3			
Remora	*Remora remora*	3		3			
Bucktooth Parrotfish	*Sparisoma radians*	3		3			
Least Puffer	*Sphoeroides parvus*	3		3			
Hardhead Catfish	*Arius felis*	2		2			
Blue Runner	*Caranx crysos*	2		1		1	
Red Hogfish	*Decodon puellaris*	2		1	1		
Scamp	*Mycteroperca phenax*	2	2				
Gulf Toadfish	*Opsanus beta*	2		2			
Short Bigeye	*Pristigenys alta*	2	2				
Greater Amberjack	*Seriola dumerili*	2		2			
Inshore Lizardfish	*Synodus foetens*	2		2			
Whitefin Sharksucker	*Echeneis neucratoides*	1		1			
Ocellated Frogfish	*Antennarius ocellatus*	1		1			
Grass Porgy	*Calamus arctifrons*	1		1			
Jolthead Porgy	*Calamus bajonado*	1		1			
Sheepshead Porgy	*Calamus penna*	1		1			
Atlantic Spadefish	*Chaetodipterus faber*	1		1			
Tiger Shark	*Galeocerdo cuvier*	1		1			
Cottonwick	*Haemulon melanurum*	1		1			
Scrawled Cowfish	*Lactophrys quadricornis*	1		1			
Mutton Snapper	*Lutjanus analis*	1	1				
Red Goatfish	*Mullus auratus*	1		1			
Southern Flounder	*Paralichthys lethostigma*	1		1			
Lesser Amberjack	*Seriola fasciata*	1		1			
Redband Parrotfish	*Sparisoma aurofrenatum*	1		1			
	TOTALS	16943	5720	9757	281	1130	55
	PERCENTAGES	100%	33.8%	57.6%	1.7%	6.7%	0.3%

Table 2. Number and fate of fish caught on longline gear from April 1994 through May 1995.

COMMON NAME	GENUS SPECIES	TOTAL	KEPT	ALIVE	DEAD	BAIT	UNKNOWN
Red Grouper	*Epinephelus morio*	3080	1446	1322	202	22	88
Yellowedge Grouper	*Epinephelus flavolimbatus*	623	616	1	1	5	
Blueline Tilefish	*Caulolatilus microps*	268	160			108	
Gag	*Mycteroperca microlepis*	176	176				
Scamp	*Mycteroperca phenax*	109	104	5			
Southern Hake	*Urophycis floridana*	66				66	
Clearnose Skate	*Raja eglanteria*	62	12	38		12	
Sandbar Shark	*Carcharhinus plumbeus*	52	49	1		1	1
Leopard Toadfish	*Opsanus pardus*	48	2	22	11	13	
Speckled Hind	*Epinephelus drummondhayi*	47	45	2			
Great Barracuda	*Sphyraena barracuda*	45	6		4	33	2
Greater Amberjack	*Seriola dumerili*	39	17			22	
Nurse Shark	*Ginglymostoma cirratum*	37		37			
Honeycomb Moray	*Gymnothorax saxicola*	37				37	
Blacktip Shark	*Carcharhinus limbatus*	36	34		1	1	
Red Porgy	*Pagrus pagrus*	32	29			3	
Atlantic Sharpnose Shark	*Rhizoprionodon terraenovae*	31	10			21	
Bonito	*Euthynnus alletteratus*	30	8		1	21	
Snowy Grouper	*Epinephelus niveatus*	28	28				
Smooth Dogfish Shark	*Mustelus canis*	24	8			16	
Reticulate Moray	*Muraena retifera*	23	1	5	8	9	
Red Snapper	*Lutjanus campechanus*	21	21				
Inshore Lizardfish	*Synodus foetens*	21	1	1		19	
Tiger Shark	*Galeocerdo cuvier*	19		3		16	
Blacknose Shark	*Carcharhinus acronotus*	18				17	1
Spinner Shark	*Carcharhinus brevipinna*	18	15			3	
Whitebone Porgy	*Calamus leucosteus*	17	9			8	
Mutton Snapper	*Lutjanus analis*	16	16				
Almaco Jack	*Seriola rivoliana*	15	15				
Banded Rudderfish	*Seriola zonata*	12	12				
Dusky Shark	*Carcharhinus obscurus*	9	9				
Carolina Hake	*Urophycis earlii*	9				9	
Silky Shark	*Carcharhinus falciformis*	7	3			4	
Vermilion Snapper	*Rhomboplites aurorubens*	7	1			6	
Jolthead Porgy	*Calamus bajonado*	6	3			3	
Night Shark	*Carcharhinus signatus*	6				6	
Queen Snapper	*Etelis Oculatus*	6	6				
Spotted Moray	*Gymnothorax moringa*	6		2	4		
Silk Snapper	*Lutjanus vivanus*	6	5			1	
Black Grouper	*Mycteroperca bonaci*	6	6				
Pale Spotted Eel	*Ophichthus puncticeps*	6	4		1	1	
Blackfin Tuna	*Thunnus atlanticus*	6	3			3	
Bank Seabass	*Centropristis ocyurus*	5	3	2			
Warsaw Grouper	*Epinephelus nigritus*	5	5				
Bigeye Sixgill Shark	*Hexanchus vitulus*	5	1			4	
Great Hammerhead Shark	*Sphyrna mokarran*	5				5	
Margate	*Haemulon album*	4	4				
Blackfin Snapper	*Lutjanus buccanella*	4	4				
Gulf Toadfish	*Opsanus beta*	4				4	
Snakefish	*Trachinocephalus myops*	4	1			3	
Sharksucker	*Echeneis naucrates*	3		3			
Lemon Shark	*Negaprion brevirostris*	3	3				
Spinycheek Scorpionfish	*Neomerinthe hemingwayi*	3		2	1		
Cobia (Ling)	*Rachycentron canadum*	3	3				
King Mackerel	*Scomberomorus cavalla*	3	2			1	
Yellow Jack	*Caranx bartholomaei*	2	2				
Common Crevalle Jack	*Caranx hippos*	2	1			1	
Bignose Shark	*Carcharhinus altimus*	2	2				
Dolphin	*Coryphaena hippurus*	2	1			1	
Sand Perch	*Diplectrum formosum*	2		1		1	
Tilefish	*Lopholatilus chamaeleonticeps*	2	2				
Cubera Snapper	*Lutjanus cyanopterus*	2	2				
Lane Snapper	*Lutjanus synagris*	2	2				
Red Drum	*Sciaenops ocellatus*	2	1		1		
Wahoo	*Acanthocybium solandri*	1	1				
Spotted Eagle Ray	*Aetobatus narinari*	1		1			
Bearded Brotula	*Brotula barbata*	1	1				
Saucereye Porgy	*Calamus calamus*	1	1				
Bar Jack	*Caranx ruber*	1	1				
Requiem Shark	*Carcharhinidae*	1	1				
Ocean Triggerfish	*Cathidermis sufflamen*	1	1				
Conger Eel	*Conger oceanicus*	1				1	
Blacktail Moray	*Gymnothorax kolpos*	1	1				
Spiny Butterfly Ray	*Gymnura altavela*	1				1	
Bluestriped Grunt	*Haemulon sciurus*	1				1	
Longspine Squirrelfish	*Holocentrus rufus*	1		1			
Sailfish	*Istiophorus platypterus*	1				1	
Gray Snapper	*Lutjanus griseus*	1	1				
Snapper	*Lutjanus spp.*	1			1		
Ocean Sunfish	*Mola mola*	1		1			
Florida Smoothhound Shark	*Mustelus norrisi*	1		1			
Sand Tiger Shark	*Odontaspis taurus*	1				1	
Margintail Conger	*Paraconger caudilimbatus*	1		1			
Wenchman	*Pristipomoides aquilonaris*	1				1	
Remora	*Remora remora*	1	1				
Chub Mackerel	*Scomber japonicus*	1				1	
Chain Dogfish	*Scyliorhinus retifer*	1		1			
Shoal Flounder	*Syacium gunteri*	1				1	
Swordfish	*Xiphias gladius*	1	1				
	TOTALS	5224	2929	1453	236	514	92
	PERCENTAGES	100%	56.1%	27.8%	4.5%	9.8%	1.8%

Table 3. Number and fate of fish collected on bandit gear off Florida from January through July 1995.

COMMON NAME	GENUS SPECIES	TOTAL	KEPT	ALIVE	DEAD	BAIT	UNKNOWN
Vermilion Snapper	*Rhomboplites aurorubens*	1195	868	239		88	
Red Grouper	*Epinephelus morio*	1077	433	593	44		7
Gag	*Mycteroperca microlepis*	87	57	28	2		
Bank Seabass	*Centropristis ocyurus*	78		69	6	3	
Red Porgy	*Pagrus pagrus*	59	2	1		56	
Tomtate	*Haemulon aurolineatum*	56		50		6	
Whitebone Porgy	*Calamus leucosteus*	44	43	1			
Gray Snapper	*Lutjanus griseus*	41	36	5			
Scamp	*Mycteroperca phenax*	25	22	3			
Lane Snapper	*Lutjanus synagris*	21	17	1		3	
Creole-fish	*Paranthias furcifer*	21	21				
Banded Rudderfish	*Seriola zonata*	17		1		16	
Tattler	*Serranus phoebe*	9		9			
Clearnose Skate	*Raja eglanteria*	8		8			
Gray Triggerfish	*Balistes capriscus*	7	6	1			
King Mackerel	*Scomberomorus cavalla*	7	7				
Little Tunny	*Euthynnus alletteratus*	6		4		2	
Leopard Toadfish	*Opsanus pardus*	6		5	1		
Sand Diver	*Synodus intermedius*	5		4		1	
Spotted Moray	*Gymnothorax moringa*	3		3			
Atlantic Sharpnose Shark	*Rhizoprionodon terraenovae*	3	2	1			
Knobbed Porgy	*Calamus nodosus*	2	1			1	
Blacknose Shark	*Carcharhinus acronotus*	2	2				
Sand Perch	*Diplectrum formosum*	2				1	1
Jewfish	*Epinephelus itajara*	2		2			
Mutton Snapper	*Lutjanus analis*	2	2				
Red Snapper	*Lutjanus campechanus*	2	2				
Black Grouper	*Mycteroperca bonaci*	2	2				
Jolthead Porgy	*Calamus bajonado*	1	1				
Littlehead Porgy	*Calamus proridens*	1				1	
Blue Runner	*Caranx crysos*	1		1			
Silky Shark	*Carcharhinus falciformis*	1	1				
Black Seabass	*Centropristis striata*	1	1				
Red Hogfish	*Decodon puellaris*	1		1			
Tiger Shark	*Galeocerdo cuvieri*	1		1			
Nurse Shark	*Ginglymostoma cirratum*	1		1			
White Grunt	*Haemulon plumieri*	1				1	
Pinfish	*Lagodon rhomboides*	1				1	
Reticulated Moray	*Murena retifera*	1			1		
Smooth Dogfish Shark	*Mustelus canis*	1	1				
Yellowtail Snapper	*Ocyurus chrysurus*	1	1				
Porgy	*Sparidae (family)*	1				1	
Spanish Hogfish	*Bodianus rufus*	1	1				
Round Scad	*Decapterus punctatus*	1				1	
Hake	*Urophycis spp.*	1		1			
	TOTALS	2806	1529	1033	54	182	8
	PERCENTAGES	100.0%	54.5%	36.8%	1.9%	6.5%	0.3%

Table 4. Number, fate and condition (when brought onboard) of fish caught using bandit gear off Louisiana from March 2 - 29, 1995.
Source: NMFS Observer Data.

COMMON NAME	GENUS SPECIES	TOTAL	KEPT	Live: Normal Appearance	Live: Air Bladder Expansion	Live: Eyes Protruding	Live: Air Bladder/Eyes Protruding	Dead on Arrival	Unknown or No Data	ALIVE	Live: Normal Appearance	Live: Air Bladder Expansion	Live: Eyes Protruding	Live: Air Bladder/Eyes Protruding	Dead on Arrival	Unknown or No Data	DEAD	Live: Normal Appearance	Live: Air Bladder Expansion	Live: Eyes Protruding	Live: Air Bladder/Eyes Protruding	Dead on Arrival	Unknown or No Data	BAIT	Live: Normal Appearance	Live: Air Bladder Expansion	Live: Eyes Protruding	Live: Air Bladder/Eyes Protruding	Dead on Arrival	Unknown or No Data	UNKNOWN	Live: Normal Appearance	Live: Air Bladder Expansion	Live: Eyes Protruding	Live: Air Bladder/Eyes Protruding	Dead on Arrival	Unknown or No Data
Red Snapper	*Lutjanus campechanus*	614	274	34	231				9	329	32	288				9	8		6				2							3						3
Gray Triggerfish	*Balistes capriscus*	29	24	23	1					1	1																			4						4
Vermilion Snapper	*Rhomboplites aurorubens*	27	25	24	1					1	1																			1						1
Blue Runner	*Caranx crysos*	8																						8	8											
Guaguanche	*Sphyraena guachancho*	8															6	6						2	2											
Tomtate	*Haemulon aurolineatus*	6								2	2													3	3					1						1
Silver Seatrout	*Cynoscion nothus*	5								2	2						3	3																		
Greater Amberjack	*Seriola dumerili*	4								2	2																			2						2
Little Tunny	*Euthynnus alletteratus*	3																						2	2					1						1
Pinfish	*Lagodon rhomboides*	3								1	1													2	2											
Knobbed Porgy	*Calamus nodosus*	2	2	2																																
Cubera Snapper	*Lutjanus cyanopterus*	2	2		2																															
Cobia	*Rachycentron canadum*	2	2	2																																
Sheepshead	*Archosargus probatocephalus*	1								1		1																								
Shortfin Mako	*Isurus oxyrinchus*	1	1	1																																
Lane Snapper	*Lutjanus synagris*	1	1		1																															
	TOTALS	716	331	86	236	0	0	0	9	339	41	289	0	0	0	9	17	9	6	0	0	0	2	17	17	0	0	0	0	0	12	0	0	0	0	0	12
	PERCENTAGES	100.0%	46.2%							47.3%							2.4%							2.4%							1.7%						

Table 5. Number, fate and condition (when brought onboard) of fish caught using bandit gear off Louisiana from February 23 - November 2, 1995.
Source: Russell Research Associates, Inc. Observer Data.

COMMON NAME	GENUS SPECIES	TOTAL	KEPT	Live: Normal Appearance	Live: Air Bladder Expansion	Live: Eyes Protruding	Live: Air Bladder/Eyes Protruding	Dead on Arrival	Unknown or No Data	ALIVE	Live: Normal Appearance	Live: Air Bladder Expansion	Live: Eyes Protruding	Live: Air Bladder/Eyes Protruding	Dead on Arrival	Unknown or No Data	DEAD	Live: Normal Appearance	Live: Air Bladder Expansion	Live: Eyes Protruding	Live: Air Bladder/Eyes Protruding	Dead on Arrival	Unknown or No Data	BAIT	Live: Normal Appearance	Live: Air Bladder Expansion	Live: Eyes Protruding	Live: Air Bladder/Eyes Protruding	Dead on Arrival	Unknown or No Data	UNKNOWN	Live: Normal Appearance	Live: Air Bladder Expansion	Live: Eyes Protruding	Live: Air Bladder/Eyes Protruding	Dead on Arrival	Unknown or No Data
Red Snapper	*Lutjanus campechanus*	376	283	126	97		59		1	90	10	70		10			1		1																	
Vermilion Snapper	*Rhomboplites aurorubens*	123	122	122																				1	1											
Red Porgy	*Pagrus pagrus*	21	21	21																																
Scamp	*Mycteroperca phenax*	19	19	3	7		9																													
Greater Amberjack	*Seriola dumerili*	8	1	1						7	7																									
Gray Triggerfish	*Balistes capriscus*	7	7	2	5																															
Little Tunny	*Euthynnus alletteratus*	6															1				1			5	5											
Almaco Jack	*Seriola rivoliana*	6	5	5						1	1																									
Creole-fish	Paranthias furcifer	5	5	5																																
Bearded Brotula	*Brotula barbata*	5	5			4	1																													
Gulf Hake	*Urophycis cirrata*	4	4	4																																
Blue Runner	*Caranx crysos*	3								1	1													2	2											
Shark	*Carcharhinidae*	3								3	3																									
Atlantic Sharpnose	*Rhizoprionodon terraenovae*	3								3	3																									
Yellowedge Grouper	*Epinephelus flavolimbatus*	2	2			1	1																													
Gray Snapper	*Lutjanus griseus*	2	2	2																																
Yellowmouth Grouper	*Mycteroperca interstitialis*	2	2				2																													
Atlantic Cutlassfish	*Trichiurus lepturus*	1								1						1																				
Lesser Amberjack	*Seriola fasciata*	1	1	1																																
Silky Shark	*Carcharhinus falciformies*	1								1	1																									
Dolphin	*Coryphaena hippurus*	1	1	1																																
Blueline Tilefish	*Caulolatilus microps*	1	1	1																																
Snowy Grouper	*Epinephelus nibeatus*	1	1			1																														
Cobia	*Rachycentron canadum*	1								1	1																									
King Snake Eel	*Ophichthus rex*	1								1	1																									
Yellowtail Snapper	*Ocyurus chrysurus*	1	1	1																																
Lane Snapper	*Lutjanus synagris*	1	1	1																																
Sand Tilefish	*Malacanthus plumieri*	1								1	1																									
Silver Seatrout	*Cynoscion nothus*	1	1		1																															
	TOTALS	607	485	296	110	6	72	0	1	110	29	70	0	10	0	1	2	0	1	0	0	1	0	8	8	0	0	0	0	0	2	0	0	0	0	0	2
	PERCENTAGES	100.0%	79.9%							18.1%							0.3%							1.3%							0.3%						

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southeast Fisheries Science Center
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July 25, 1996

MEMORANDUM FOR: Joe Powers

FROM: Douglas Harper DEH

SUBJECT: Addendum to the report "Characterization of the reef fish fishery of the eastern U.S. Gulf of Mexico"

The subject report contains the results of the National Marine Fisheries Service (NMFS) observer study of the eastern U.S. Gulf of Mexico fish trap fishery from December 1993 through November 1994 and examines the Gulf Reef Fish Logbook database for fish trap trips made during the same time period. The results contained within the report have been recently criticized. One specific criticism concerns the possible practice of study participant fishers altering fishing methods in order to bias study results. As requested, I have conducted further examination of the data with the objective of investigating the question of whether fishers participating in the NMFS study appear to be operating differently when an observer is aboard the fishing vessel as opposed to when no observer is present. Our hypothesis was that any such differences would show up in catch-per-unit-effort data.

Six fish trap fishers participated in the NMFS study by agreeing to station observers, who would collect and record fishery related data, aboard fishing vessels during fish trap trips. The Gulf of Mexico Reef Fish Logbook database was queried for all fish trap trips reported by these six fishermen during the study time period (December 1993 through November 1994). A total of 142 fish trap trips completed by these fishers were reported in the database. Of these 142 trips, 11 trips were identified in which NMFS observers were stationed aboard the commercial fishing vessel and 131 trips in which no observer was present. A scatterplot of total pounds landed by trip duration (days) was prepared for these trips (Figure 1). The regression formulas for the 11 observed trips and 131 non-observed trips were calculated (Table 1). Plotting of the resulting regression generated values (Figure 2) indicates virtually no difference in the expected total landings for the empirical trip duration range for observed and non-observed trips. If there was a difference in fishing methods between observed and non-observed trips, there would be a resultant difference in the computed regression formulas. Therefore, there is strong evidence that fishing methods used by study participants were the same or very similar during observed and non-observed trips. Note, the one very low value for a 1 day trip was beleived to be due to a mechanical breakdown of the vessel.

Table 1. - Results of regression computation (total landings-trip duration) for fish trap trips reported in the Gulf of Mexico Reef Fish Logbook database. Data for six fishers participating in the NMFS observer study were used in the computation. Between November 1994 and November 1994 these six fishers reported 142 fish trap trips in the logbook database (11 trips in which observers were stationed aboard the fishing vessel and 131 trips with no observer present).

NON OBSERVED TRIPS

Regression Output:

Constant		625.9925
Std Err of Y Est		1039.536
R Squared		0.374736
No. of Observations		131
Degrees of Freedom		129
X Coefficient(s)	360.02	
Std Err of Coef.	40.945	

OBSERVED TRIPS

Regression Output:

Constant		579.0193
Std Err of Y Est		1112.154
R Squared		0.649619
No. of Observations		11
Degrees of Freedom		9
X Coefficient(s)	381.73	
Std Err of Coef.	93.450	

Figure 1. - Scatterplot of total pounds landed by trip duration for 142 fish trap trips reported in the Gulf of Mexico Reef Fish Logbook database. The trips were completed by fishers participating in the National Marine Fishery Service scientific observer study between December 1993 and November 1994 in Statistical Areas 2 through 7. The data represented includes 11 trips in which observers were stationed aboard the commercial fishing vessel and 131 trips in which no observer was present.

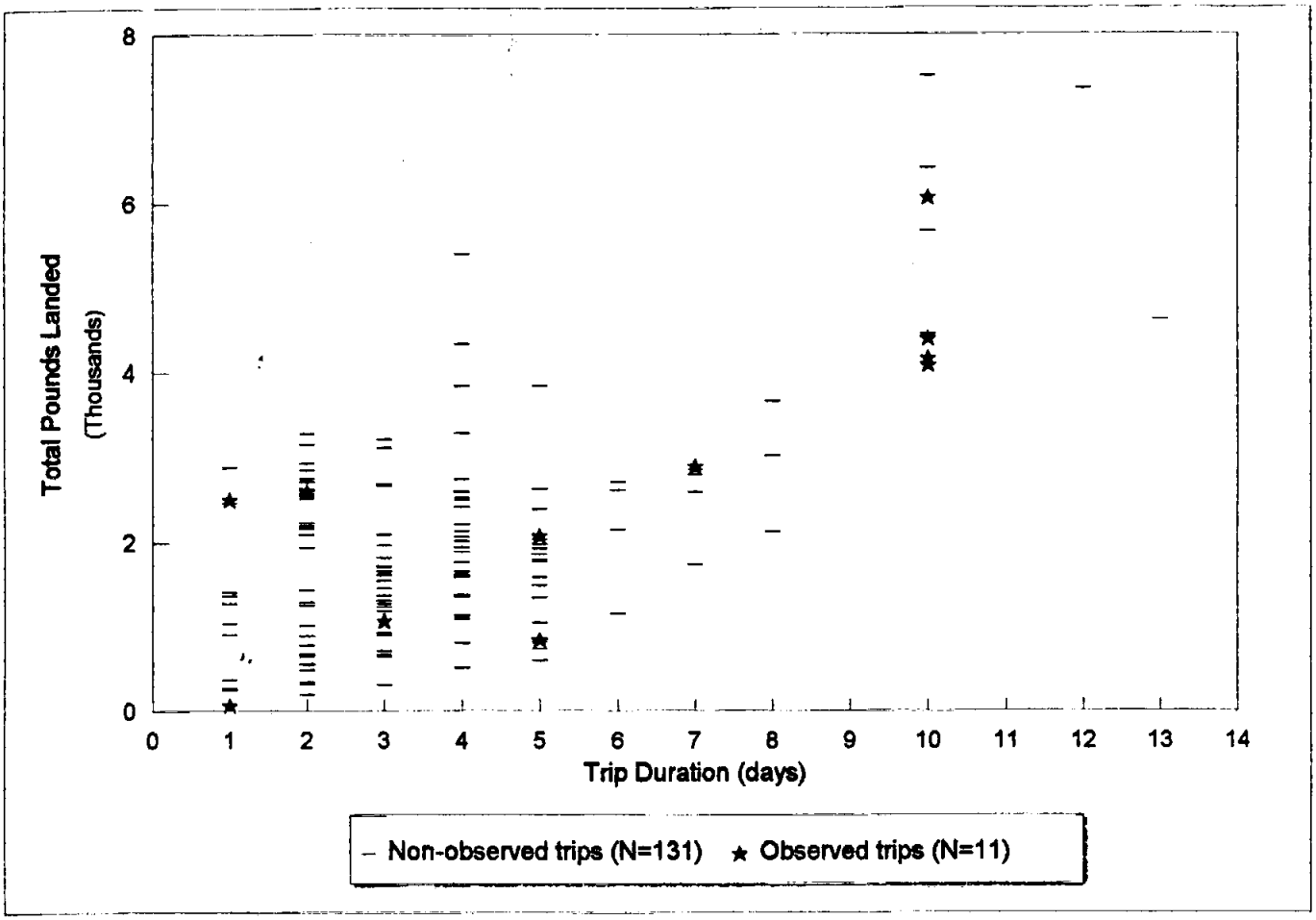

Figure 2. - Regression of total landings (dependent variable) on trip duration (independent variable) from logbook data for the 131 non-observed trips and 11 observed trips completed by fish trap fishers participating in the scientific observer study. Actual total landings values for the 11 observed trips have been superimposed upon graph for reference purposes.