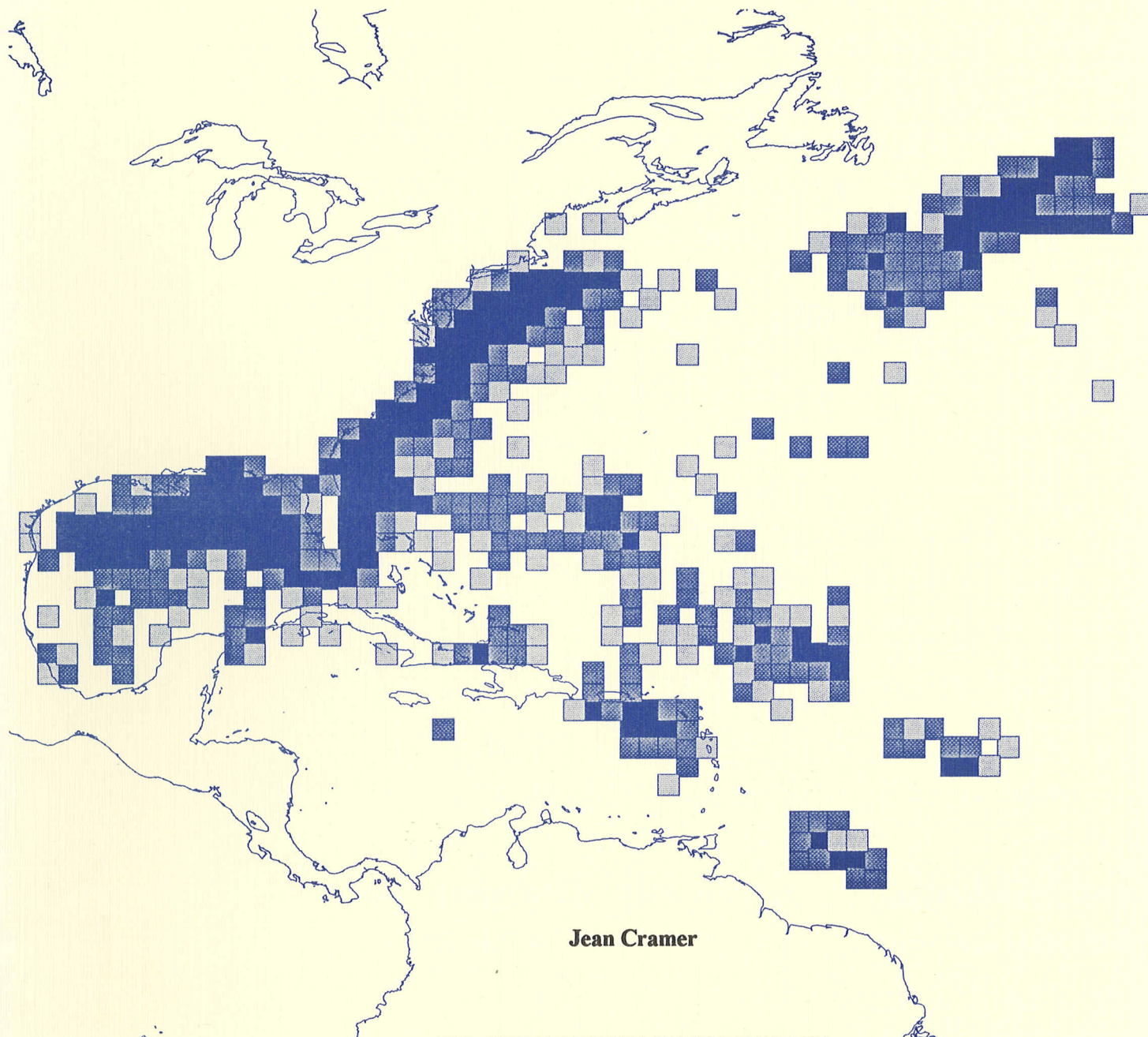




NOAA Technical Memorandum
NMFS-SEFSC-378

LARGE PELAGIC LOGBOOK NEWSLETTER - 1994



Jean Cramer

**U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Southeast Fisheries Science Center
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November 1995

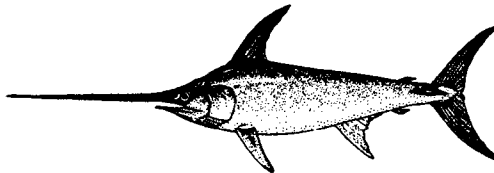


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by

Jean Cramer



U.S. DEPARTMENT OF COMMERCE
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November 1995

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This is the fifth annual Large Pelagic Logbook Newsletter. The primary purpose of this report is to summarize data and activities related to the mandatory large pelagics logbook and observer programs. This newsletter serves as a vehicle for dissemination of information to those directly involved in the fishery. In addition to updating catch, effort, CPUE, and location information, and detailing revisions to logbook reporting in 1996, this year's newsletter includes sections pertaining to swordfish stock status, bycatch, mandatory dealer reporting, the longline observer program, and other related studies.

Comments and suggestions are invited; see section "WHOM TO CONTACT FOR WHAT."

COMPARISON OF 1992 - 1994 LOGBOOK CATCH AND EFFORT DATA

Nine summary tables are included in this newsletter. The numbers of swordfish, tunas, and billfish reported caught, by area, for 1992, 1993 and 1994 (preliminary) are given for longline (Tables 1a-1c), gillnet (Tables 2a-2c) and pairtrawl boats (Tables 3a-3c). Longline effort is reported in hooks and numbers of boats, gillnet and pairtrawl effort is reported in sets and numbers of boats. The longline boat statistics are from logbook reports that were considered to represent all pelagic longline sets including summary records; bottom longline records were excluded.

The gillnet and pairtrawl boat statistics represent all sets that reported fishing those gear types. Some changes in the tabulated data for earlier years and reported previously were due to additional revisions in the database.

Locations of areas are shown in Figure 1. Definitions are as follows: area 1 - Caribbean (CAR), area 2 - Gulf of Mexico (GOM), area 3 - Florida East Coast¹ (FEC), area 4 - South Atlantic Bight¹ (SAB), area 5 - Mid Atlantic Bight¹ (MAB), area 6 - Northeast Coastal¹ (NEC), area 7 - Northeast Distant¹ (NED), area 8 - North Equatorial¹ (NOREQ), and area 9 - OTHER.

¹These are arbitrary areas and do not constitute official geographic areas.

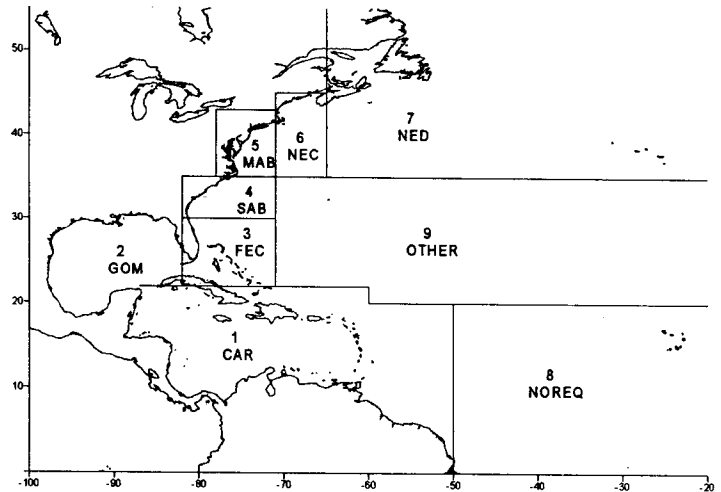


Figure 1. Map designating the nine areas used in analysis of the swordfish logbook data.

Between 1993 and 1994 reported longline effort (hooks) decreased (8%, 14% and 2%) in the GOM, NEC, and NED respectively while effort increased slightly (7%) in the FEC. Larger (20% to 29%) increases were reported in the CAR, SAB, MAB, and OTHER. A very large increase in effort (76%) was reported in the NOREQ (Tables 1a-1c).

Preliminary reported longline effort for 1994 was higher than reported for 1993. The total number of longline boats increased in 1993 but decreased in 1994.

The reported yellowfin tuna catch for the three-year period was approximately 82,000, 63,000 and 69,000 fish, respectively. This represents a 10% increase in numbers of reported yellowfin catch from 1993 to 1994.

In the GOM, the reported catch of yellowfin in numbers increased annually from 1990 through 1992; this trend has reversed from 1992 to 1994. In the MAB, the reported yellowfin catch in numbers increased annually from 1992 through 1994.

In 1992 there were approximately 91,000 swordfish tabulated from longline records (caught = kept + discarded). There were approximately 95,000 swordfish in 1993; and 103,000 swordfish in 1994 (preliminary). The corresponding reported fishing effort for the three years was roughly 7.4, 8.4, and 8.9 million hooks, respectively (Tables 1a-1c). Reported swordfish catch increased 8% from 1993 to 1994 with an increase in the number of reported hooks fished of 6%.

This increase in reported annual swordfish catch by longline boats over the period 1993-1994, is found in all areas except GOM, NEC and NED.

The number of yellowfin tuna reported caught by gillnet boats fluxuated while the number of swordfish reported caught by gillnet boats decreased from 1992 (1134 swordfish and 140 yellowfin) to 1993 (1103 swordfish and 25 yellowfin) to 1994 (777 swordfish and 279 yellowfin) (Tables 2a-2c).

Use of pairtrawls for Atlantic large pelagic fishes expanded from 11 boats (4 pair and one trio) in 1992 12 boats in 1993 (Tables 3a-3c) to 15 boats in 1994. Tables 3a through 3c do not contain information from all pair trawl boats since all boats did not submit set records. Reported pairtrawl effort occurred in SAB, MAB and NEC. Reported catches by pairtrawl vessels of swordfish, yellowfin tuna bigeye tuna and albacore increased from 1993 (263 swordfish, 931 yellowfin, 956 bigeye and 4151 albacore) to 1994 (462 swordfish, 1825 yellowfin, 1,989 bigeye and 8,262 albacore).

REPORTED FISHING LOCATIONS IN 1992, 1993, AND 1994

The location of reported fishing effort by year for 1992-1994 is shown in Figures 2-4. The general pattern for reported sets is similar across the three years.

CPUE DATA

Tables 4a-4c represent 1992, 1993, and 1994 (preliminary) data, respectively, for swordfish and

yellowfin tuna. These data are yearly totals, by areas as (defined in Figure 1) for: number of fish Kept; number Discarded dead and Discarded alive; Kept+Discarded; effort in HOOKS; the Number of sets; and the average of the individual catch rates, $AV(C/E)$ (equivalent to average CPUE). This summary includes all gears that reported fishing with hooks that were not thought to be summary records.

The totals reported in tables 1a through 1c are different from the totals in tables 4a through 4c because different criteria were used in selecting the records to be used. Tables 1a through 1c represent data from longline boats only including summary reports filed by longline boats. Tables 4a through 4c represent all records that reported hooks except summary reports. Gears represented include but are not limited to longline, bottom longline boats rod and reel boats.

No attempt has been made in this summary to standardize the data for factors not related to fish abundance, but known to affect the CPUE values. These analyses are carried out for the purpose of stock assessments, and are reported elsewhere. Thus the data summarized here are considered to represent nominal CPUE.

The highest average reported nominal CPUEs for swordfish in 1994 was in the NOREQ, which exceeded the other areas of traditionally high catch rates. The reported catch rates in 1992 for the CAR FEC, SAB NED and the NOREQ were, respectively, approximately 2.2 fish/100 hooks, 2.5 fish/100 hooks, 3.4 fish/100 hooks, 3.2 fish/100 , and 1.3 fish/100 hooks (Table 4a); in 1993 approximately 2.3 fish/100 hooks, 3.0 fish/100 hooks, 2.3 fish/100 hooks, 2.7 fish/100 hooks and 1.4 fish/100 hooks (Table 4b); and in 1994 (preliminary) approximately 2.5 fish/100 hooks, 2.8 fish/100 hooks, 2.0 fish/100 hooks, 2.6 fish/100 hooks and 3.3 fish/100 hooks (Table 4c).

Average reported CPUEs for yellowfin, on an annual basis, were consistently high from the GOM fishery. The reported catch rates in the GOM in 1991 were approximately 3.6 fish/100 hooks (Table

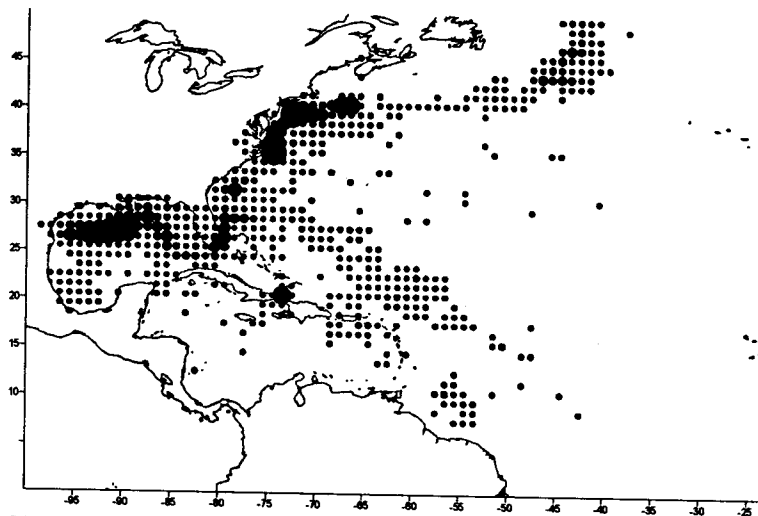


Figure 2. Location and density of reported effort in 1992.

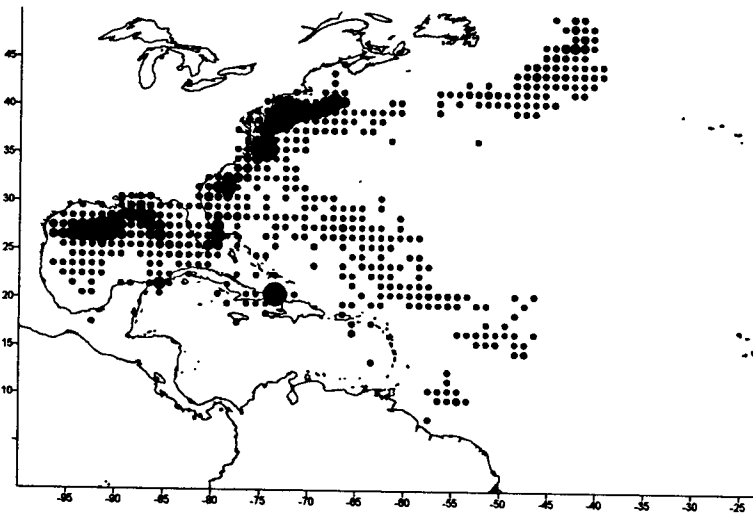


Figure 3. Location and density of reported effort in 1993

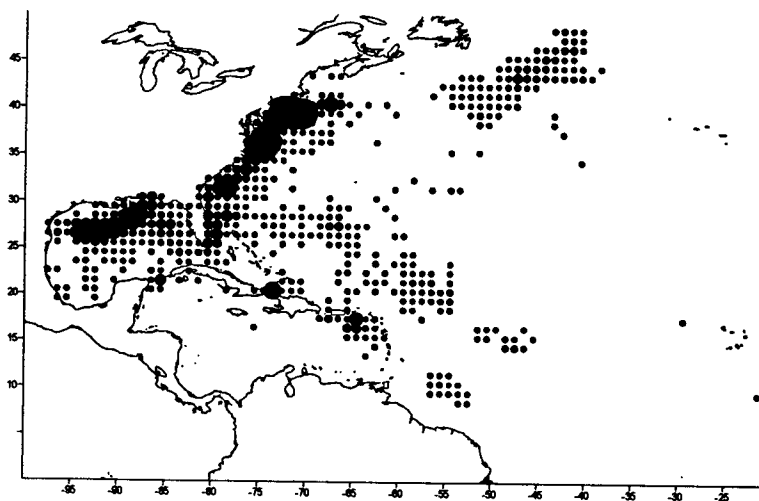


Figure 4. Location and density of reported effort in 1994.

4a); in 1993 approximately 1.2 fish/100 hooks (Table 4b); and in 1994 approximately 2.7 fish/100 hooks (Table 4c). The highest CPUE reported for 1992 was 3.7 fish/100 hooks in OTHER. The CPUE in OTHER in 1993 and 1994 was 2.1 fish/100 hooks and 0.4 fish/100 hooks.

Monthly reported CPUEs for swordfish, yellowfin, bigeye, and albacore from 1987 to 1994 are shown in Figures 5a -5d. The error bars represent 2 standard deviations from the mean. In the yellowfin figure, the vertical axis does not allow the full length of the error bars to be shown in all months.

NUMBERS OF PERMITTED VESSELS

A compilation of activity related to the vessels permitted during the period 1987 through 1994 is presented in Table 5. "Fished" implies a vessel submitted at least one positive fishing report during that year, "Caught Swordfish" means the vessel reported catching at least one swordfish during that year and "Caught Swordfish in 5 months" means the vessel reported catching at least one swordfish per month in at least five months of that year. "Hooks Reported" includes all submitted logbooks whether or not they represented single pelagic longline sets, summary records, bottom longline records, or sets with less than 100 hooks. For this reason, these numbers are higher than the numbers in Tables 1a-1c.

SWORDFISH STOCK STATUS

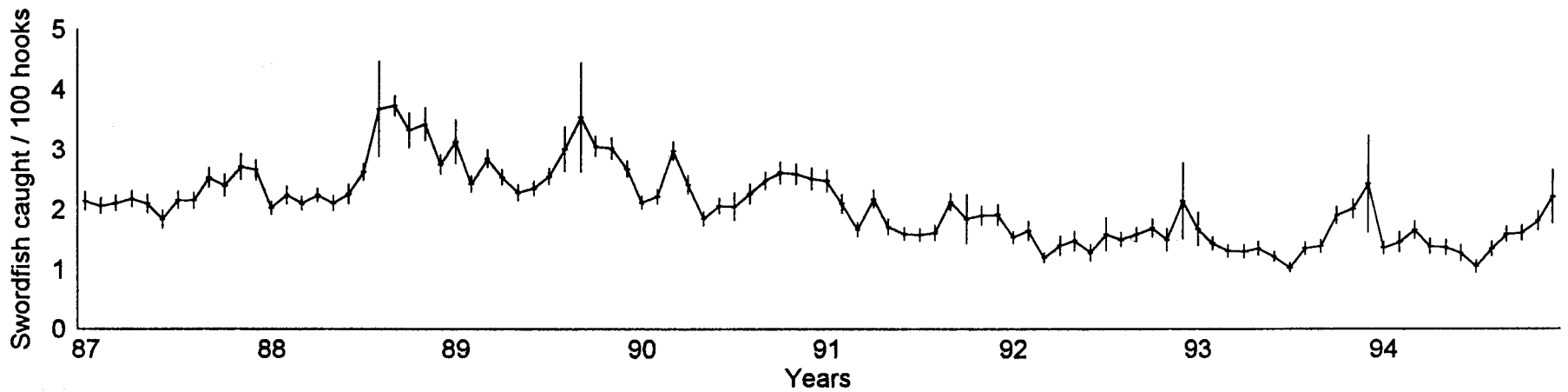
In 1994, the status of the North Atlantic swordfish resource was assessed by ICCAT using both non-equilibrium stock production models and virtual population analyses based on catch and CPUE data through 1993. In 1995, the stock production model was rerun by ICCAT using revised catch data through 1993. The 1994 base case assessments and 1995 revision all indicate that the North Atlantic swordfish resource has continued to decline despite reductions in total reported North Atlantic landings from peak values in 1987. Catch reductions in the North Atlantic have not resulted in

reductions in the fishing mortality rate because recent landings have exceeded surplus production. The decline in stock size is reflected in declining CPUE's for several fisheries. An updated estimate of maximum sustainable yield from production model analyses is 27.6 million lbs (12,500 MT) whole wt (with estimates ranging from 11.5 to 37.3 million lbs. whole wt). North Atlantic swordfish landings have consistently exceeded 27.6 million lbs whole weight since 1981; preliminary estimates of landings in 1994 were about 34.6 million lbs (15,600 MT) whole wt.

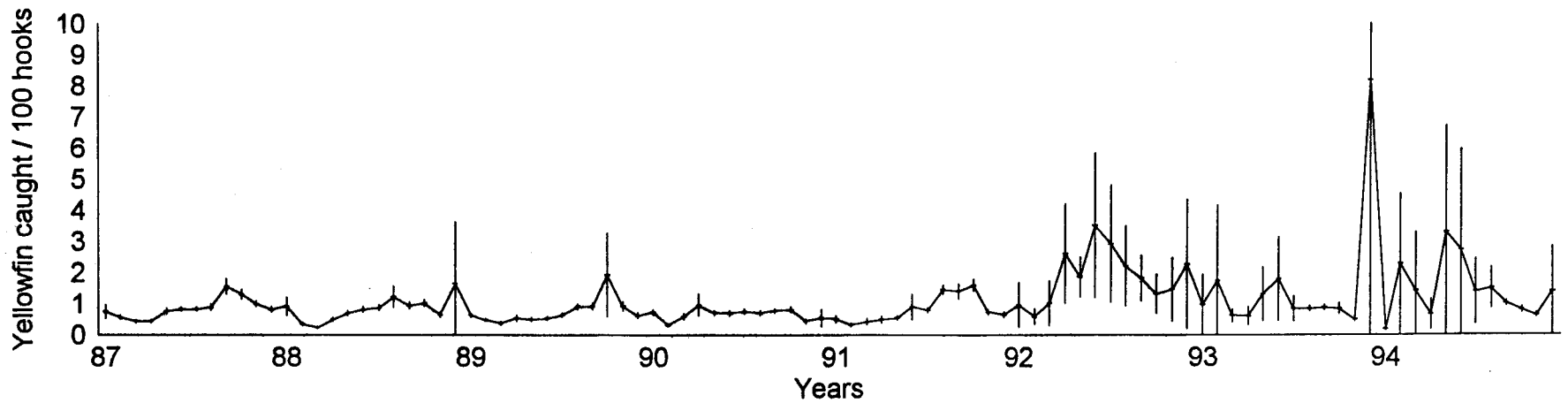
A summary of the resource status as estimated by the 1995 ICCAT is shown in the table 6. In the north Atlantic, ICCAT estimated that at the beginning of 1994, the exploitable swordfish biomass was about 67% of the level needed to produce MSY (estimates ranged from 48-108%). Furthermore, the estimates of fishing mortality rates for the most recent year (1993) were too high to allow the resource to recover to MSY levels. ICCAT estimated that catches in 1994 and probably in 1995, were also too high to prevent further declines in the north Atlantic swordfish resource status. Although the status of the swordfish resource in the south Atlantic was not assessed, ICCAT observed that the high catch levels and decreasing CPUE trends in the south Atlantic suggest a situation not unlike that in the North Atlantic

MANDATORY REPORTING IN THE ATLANTIC LARGE PELAGIC FISHERY

Federal regulations require that both fishermen and dealers assist the conservation and management of large pelagic species by providing statistics on fishing activity and seafood production respectively. Fishermen are required to submit data on daily fishing activity and catch, which includes individual carcass weights for the swordfish and other large pelagic species. Dealers are required to provide summary data on the landings (purchases) by market or size category and the price or value for the respective categories. Both fishermen and dealers are required to maintain an active Federal permit to fish for or purchase swordfish.



**Figure 5a. Monthly Swordfish CPUE's
1987 -1994**



**Figure 5b. Monthly Yellowfin CPUE's
1987 -1994**

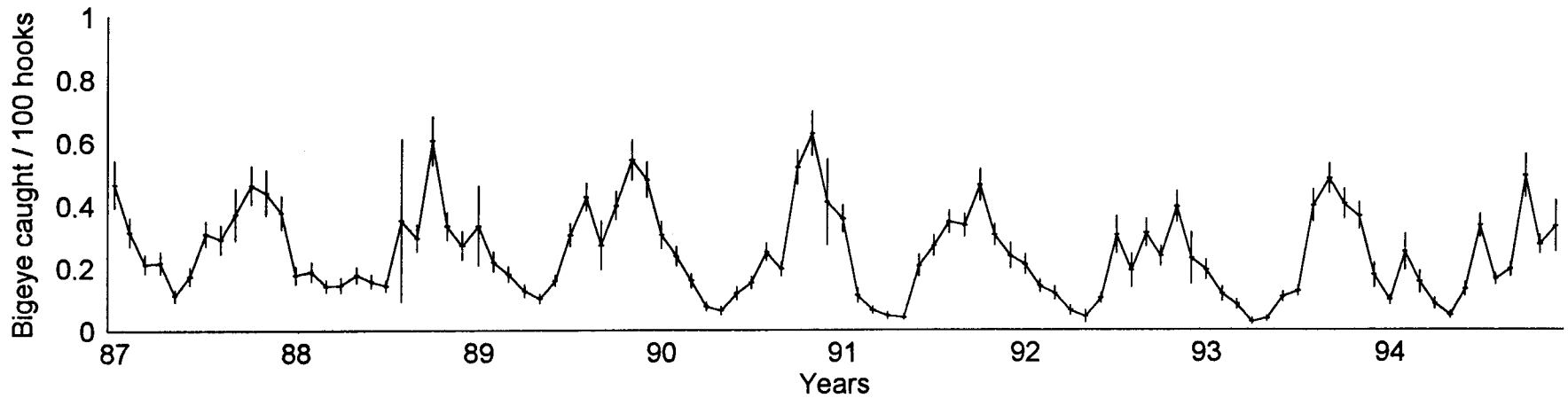


Figure 5c. Monthly Bigeye CPUE's
1987 -1994

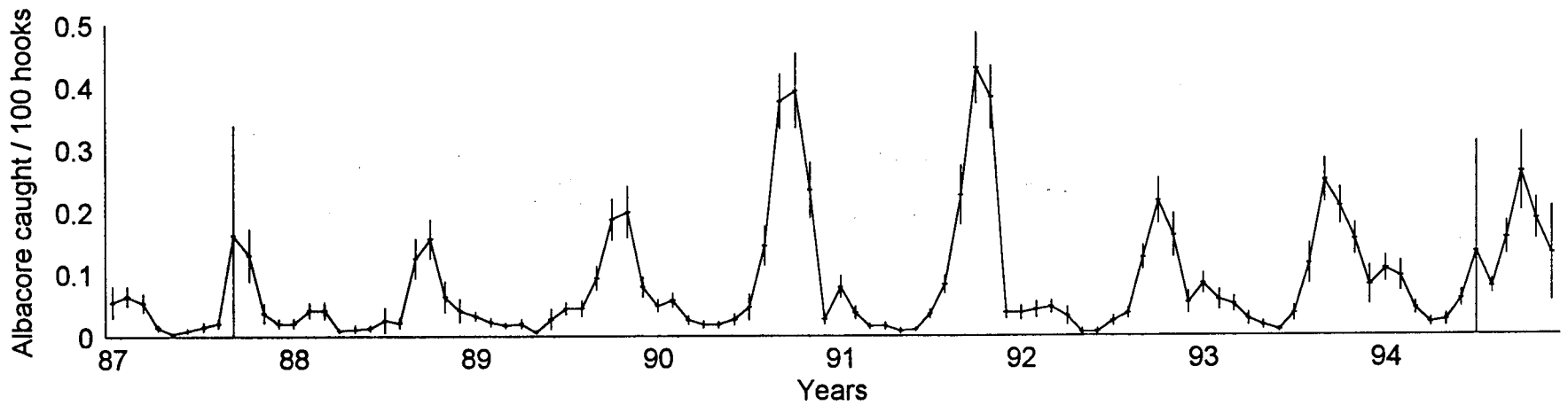


Figure 5d. Monthly Albacore CPUE's
1987 -1994

Fishermen Reporting.

All fishermen that fish for and land swordfish are required to have an active permit and report the catches from every set or daily trip. In addition to a completed logbook sheet for every set, fishermen are required to submit a copy of the weigh-out or sales receipt that provide the weights for the individual swordfish and other large pelagic species that are caught on the fishing trip. If either of these requirements are not met, the vessel is not in compliance and the vessel's permit can be revoked or denied at the annual renewal.

If the vessel did not fish during a calendar month, a "no-fishing" report must be submitted.

All logbook reports and weigh-outs are to be submitted to the

Southeast Fisheries Science Center
Logbook Program
P.O. Box 491740
Key Biscayne, Florida 33149-9915

Questions or clarifications can be directed to Logbook Program at the Southeast Fisheries Science Center, telephone number (305) 361-4581 or (305) 361-4463.

At sometime during 1994, active permits for the large pelagic fishery were issued to 1,243 vessels. These permits were not necessarily active during the entire calendar year, nor did all of these vessels actively fish for or catch large pelagic species. During this year, the National Marine Fisheries Service intensified efforts to assure that 100% of the active permit holders complied with the logbook reporting required. If logbooks were not submitted for the 12 month reporting prior to the expiration of the permit, the application for renewal was denied until all reporting was brought up to date.

Dealer Reporting.

Permitted dealers are required to provide reports twice a month to the Science and Research Director for either the Northeast Region or the Southeast Region, depending on the dealer's geographical location. Complete and timely information from dealers is critical because these data are used to monitor the fishery quota for swordfish. Dealers are instructed to provide the U.S. Coast Guard documentation or state registration number for every vessel from who they purchased swordfish during each two week reporting period. This information is used to check the dealer data against the daily catch data submitted by fishermen. This cross reference helps the SEFSC determine that all landings are included in the quota monitoring process and it also guards against potential double counting.

Reports should be mailed to:

Science and Research Director
Southeast Fisheries Science Center
National Marine Fisheries Service
75 Virginia Beach Drive
Miami, Florida 33149

Attention: A. Bertolino

except for a dealer whose principal place of business is in an Atlantic coastal state from Maine through Virginia. The appropriate address for those dealers is:

Northeast Regional Office
National Marine Fisheries Service
1 Blackburn Dr, Gloucester, MA
01930

Attention: Greg Power

At sometime during calendar year 1994, an active Federal dealer permit was issued to 258 dealers. Of this total, 110 dealers had their primary

location in the Northeast Region and the remaining 148 dealers had their primary location in the Southeast Region, which includes the Caribbean. Overall, compliance with the reporting requirements has been good in this area. However, dealers that do not cooperate with the NMFS and do not submit the required bi-monthly reports will have their application for a permit renewal denied, and NMFS Law Enforcement will be notified. It should be noted that a report is required for every two week period, even if large pelagic species were not purchased. If no purchases were made, the respective Center Director must be informed. In the Southeast Region, a form so-stating must be submitted.

SWORDFISH LANDINGS

The Southeast Fisheries Science Center (SEFSC), Miami Laboratory, is responsible for compiling the landings of swordfish from mandatory reporting data. The monthly reported landings for 1990 -1994 may be found in Table 7. Swordfish landing have decreased each year since 1990.

Monthly cumulative annual landings of swordfish are compared in Figure 6 for years 1990-1994. Yearly U.S. swordfish landings declined from 1990 to 1994. At least part of the decline since 1990 resulted from imposition of the 41 pound minimum size regulation.

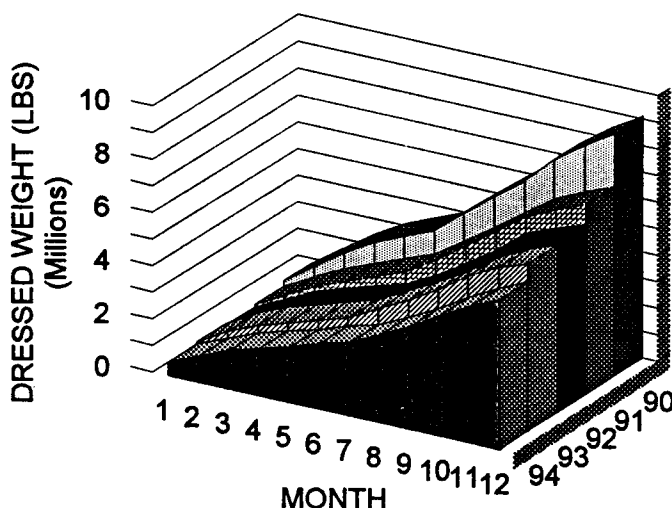


Figure 6. SWORDFISH LANDINGS

SWORDFISH LANDED IN THE U.S.

<u>Year</u>	<u>1,000 lbs. Dressed wt.</u>	<u>1,000 lbs. Whole wt.</u>
1989	10,582	14,075
1990	9,107	12,112
1991	7,142	9,499
1992	6,383	8,489
1993	6,274	8,345
1994	5,578	7,419

SWORDFISH < 41 LBS DRESSED WEIGHT - PERCENT LANDED

The percentage of fish landed less than 41 lbs dressed weight has decreased since 1989 (Figure 7). In 1989 and 1990 the highest number of fish landed were in the 21-41 lb category. In 1991 this peak shifted to the 41-60 lb category where it has remained.

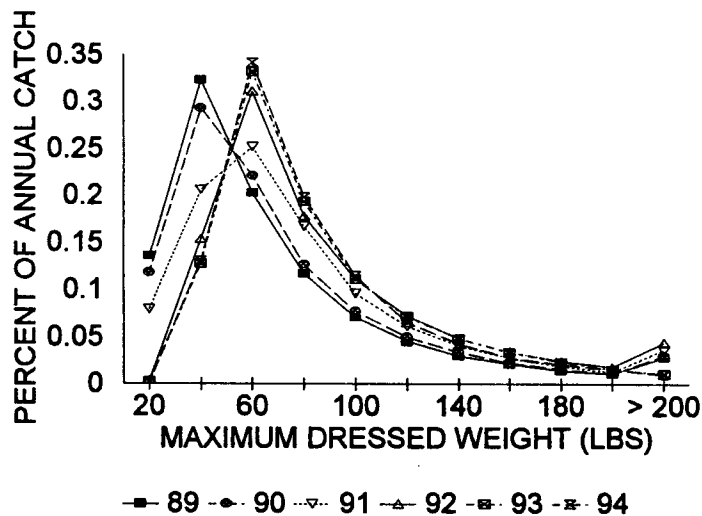


Figure 7. U.S. CATCH AT SIZE

SWORDFISH < 41 LBS DRESSED WEIGHT - NUMBER AND PERCENT LANDED BY MONTH BY AREA

The cumulative percent of fish landed less than 41 lbs dressed weight from all areas and all months fell from 41% in 1990 to 13% in 1993

(Table 9). The within area percentage landed catch of fish less than 41 lbs decreased in all areas between 1991 and 1994 (Table 9). The highest numbers of undersize fish landed in 1994 were from in the GOM and FEC (Tables 8, 9 & 10).

Records from 1994 were grouped by one degree square areas and quarter in order to identify areas and times with high rates of discarding of undersized swordfish (all discarded swordfish are assumed to be undersized). A discard ratio was calculated and CPUEs were averaged for each one degree square and quarter. The discard ratio is taken as:

$$\text{Discard Ratio} = (\text{swod} + \text{swoa}) / (\text{swod} + \text{swoa} + \text{land})$$

where *swod* is number of swordfish discarded dead, *swoa* is the number of swordfish discarded alive and *land* is the sum of the numbers of swordfish, tuna and sharks kept.

One degree square areas with discard ratios equal to or above 50% were plotted on maps for each quarter in 1994 . Very few one degree square areas with discard ratios above 50% were found in quarter 1; but discard ratios were more frequent in quarters 2, 3 and 4 (Figure 9).

SWORDFISH SIZE FREQUENCY

The proportion of swordfish landed which were less than 41 lbs dressed weight in size frequency samples from U.S. longline vessels, decreased from 1989 through 1993 (Figure 8). This decrease resulted from the minimum size measure put in place in mid 1991.

BYCATCH ESTIMATION

Comparison of scientific observer data with the daily reported catch and effort data indicated that the daily reports may under represent the actual number of fish that were discarded dead.. The observer sampling data supports estimates of 0.5, 0.8, 0.9, and 1.1 million lbs. Whole wt. of swordfish

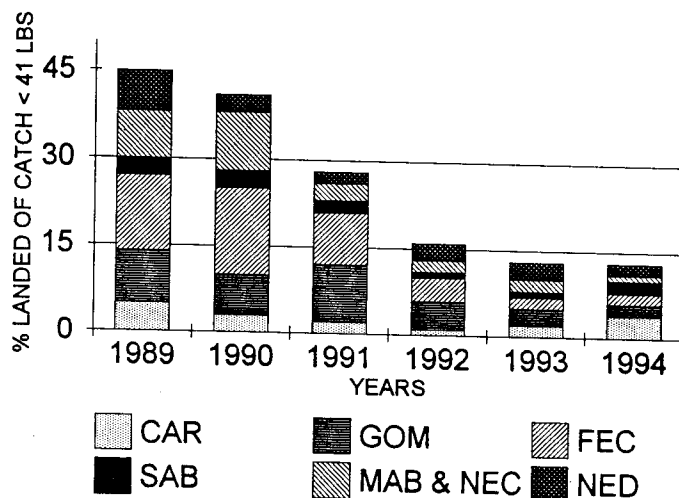


Figure 8. SWORDFISH SIZE FREQUENCY

caught and thrown back dead in 1991, 1992, 1993 and 1994 respectively. Estimates of the catch in numbers of all species were made based on scientific observer catch rate observations and total effort from daily reports for the 1993 season (Table 15). These estimates were reported to ICCAT in 1995.

NEW ANALYSES BASED ON SWORDFISH LOGBOOK DATA

SWORDFISH REPRODUCTION

The National Marine Fisheries Service (NMFS) Miami Laboratory, initiated a reproductive study of the western Atlantic swordfish in 1990. The goals of the study were to determine the spawning season, the spawning areas and the reproductive capacity of this species. Because earlier studies were generally limited to small sample sizes or confined to isolated geographical areas of the Atlantic Ocean, this recent effort has provided a broad cross section of the U.S. and Venezuelan fisheries harvesting the western Atlantic swordfish resource. Thus, offering a more comprehensive study on the reproductive aspects of the western Atlantic swordfish.

During the sampling period (April 1990 - June 1995) a total of 14,662 swordfish samples were collected aboard commercial fishing vessels in the Northwest Atlantic between 5°N and 55°N. The

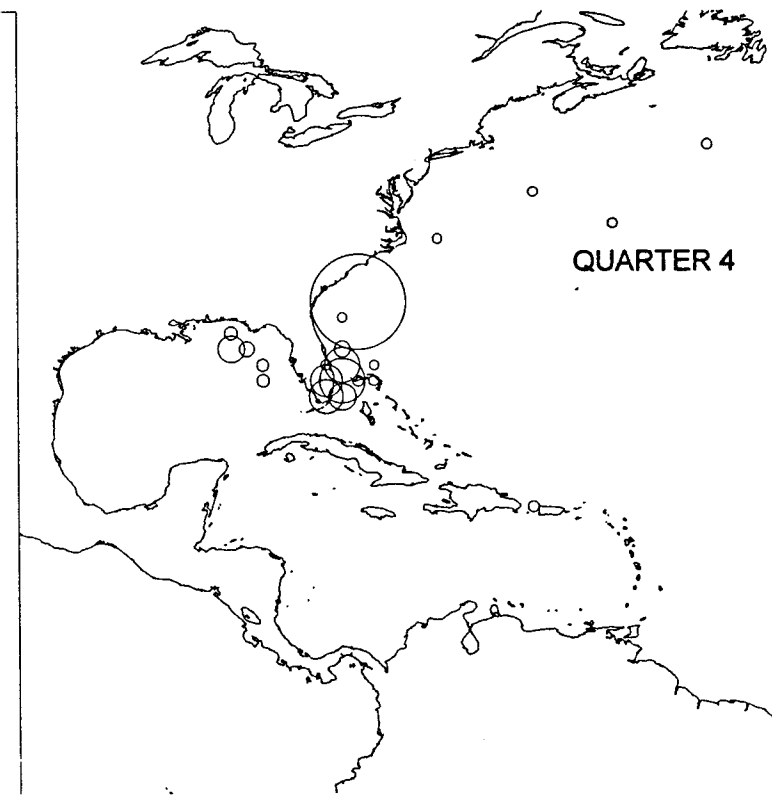
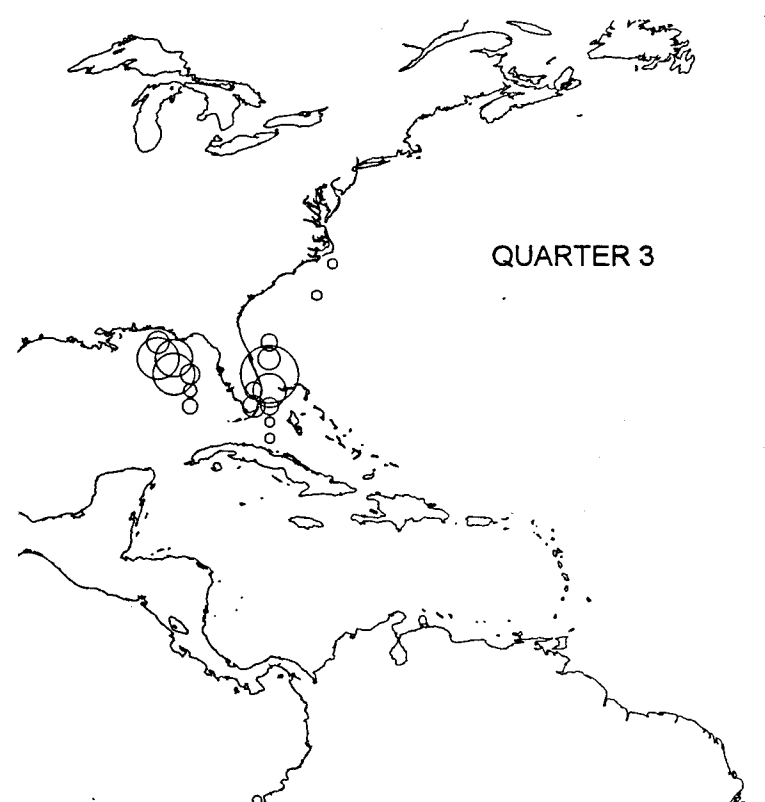
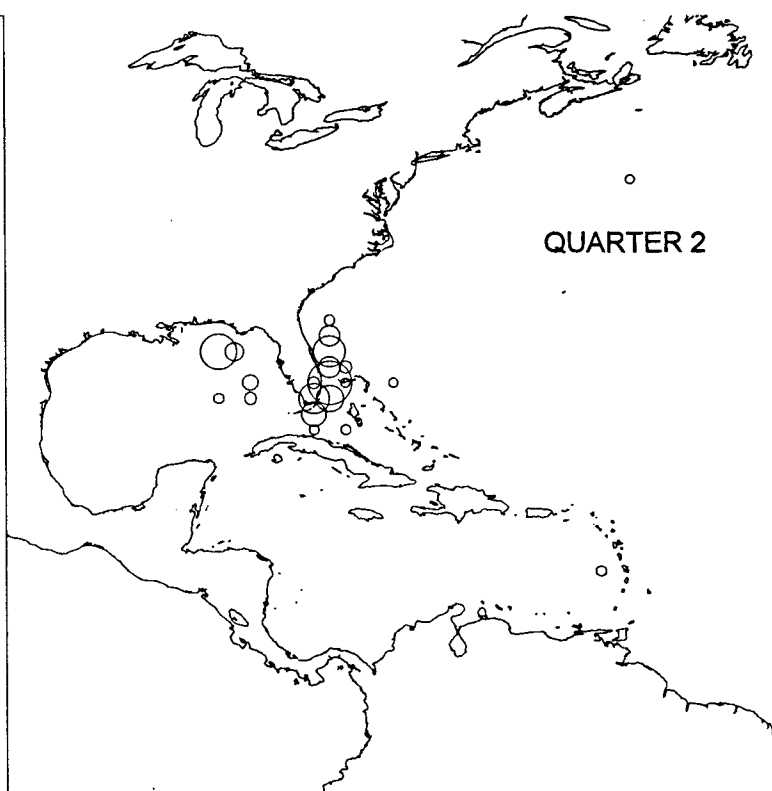
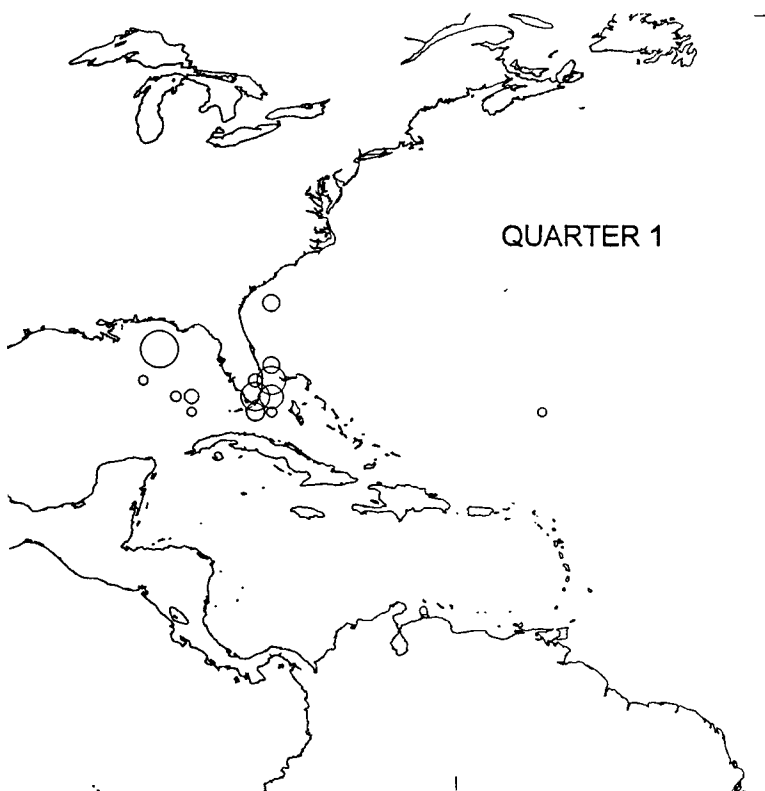


Figure 9. U.S. Longline locations where the number of swordfish discarded was equal to or greater than the number of fish landed in each one degree square and quarter in 1994. Circles are proportional to the number of swordfish discarded.

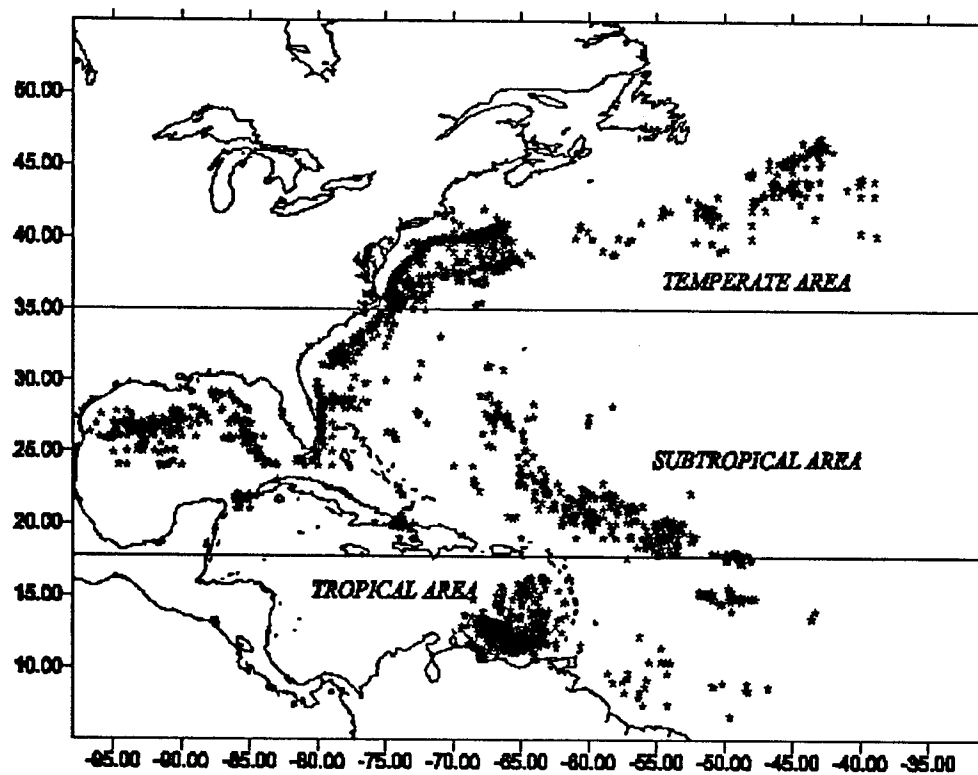


Figure 10. Catch locations of swordfish specimens .

method of collection of the reproductive material for this study along with the associated morphometric data was provided through observer programs in the eastern United States and Venezuela and cooperative captains and crews of commercial fishing vessels. The data were stratified for analysis by three geographical areas (temperate, subtropical and tropical) based on the different average temperature regimes. A total of 6,723 specimens used in the reproductive analysis came from the subtropical area (Fig. 10) where the majority of the reproductive activity takes place, and from the subtropical area north of 13°N and off east of the Antillean Arc.

This study revealed that the minimum length at maturity observed for females was 150 cm LJFL and for males was 105 cm LJFL. The estimated proportion of mature females appeared to increase rapidly with size after reaching 50 % maturity which was estimated at 179 cm LJFL, and all females sampled were mature by 195 cm LJFL.

The estimated proportion of mature males increases more rapidly than the females, attaining fifty percent maturity at 129 cm LJFL, and all males sampled over 145 cm LJFL were mature. The presence of swordfish with mature ovaries throughout the year indicates the spawning season is protracted. Active mature females (considered to spawn within weeks or days) were found during all months, except July (where only one specimen was collected). However, the main spawning season appears to be from December through June, as revealed by the occurrence of females with hydrated oocytes (egg type in its final stage prior to ovulation and spawning) in their ovaries. Although the spawning intensity varies within the season as the number of females with hydrated oocytes increases in January, February and May. The main spawning area, that we observed, appears to be localized south of the Sargasso Sea and east of the Antillean Arc (Fig. 11). Other important spawning areas are localized in the Windward Passage, the Yucatan Channel and off the Southeast coast of the United States. New data for

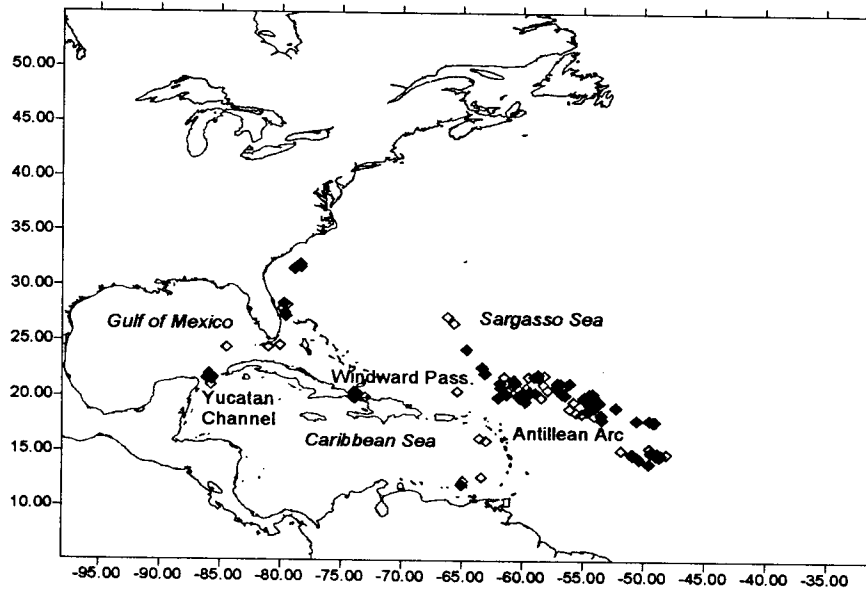


Figure 11. Catch locations of females with hydrated oocytes.

1995 revealed that swordfish south of the Sargasso Sea continue to spawn through May as far south as 13°N. At the beginning of the spawning season (December - February), spawning takes place from 19°N to 23°N, although in several geographical locations (Fig. 11). As the season progresses (March - June), evidence suggests spawning continues at a higher latitudinal range (24°N - 34°N) in waters close to shore and at lower latitudes (17°N - 13°N) in middle Atlantic waters. The reproductive capacity of swordfish revealed to be astounding. Swordfish is a batch spawner, which is a fish that spawns its eggs in successive batches during the spawning season. The batch fecundity of swordfish can vary from 1 million egg per batch for a female of 160 cm LJFL to 9 million eggs per batch for a female of 250 cm LJFL, which indicates a wide range in batch fecundity in relation to body size. It was also estimated that on average the spawning frequency was once every three days. However due to the varying intensity in spawning female swordfish in the different geographical areas, most likely the three day average spawning frequency may be consistent during the height of the spawning season (January - February) and as the fish expends its energy and moves to other areas, the spawning frequency would probably lessen in time.

SWORDFISH GROWTH

As an extension of the reproductive study in swordfish, anal swordfish spines were collected for an age and growth study that would validate the aging procedure in swordfish (Ehrhardt *et al.* 1995).

Age determination of swordfish was carried out on anal spine sections using a method developed by Berkeley and Houde (1983). However, the validation of this aging procedure is an essential prerequisite for the development of the catch-at-age matrices and growth determination. Of the 2,353 anal spines collected during the sampling period only a total of 1,523 anal spine sections were used, of which all sections exhibited clear, unambiguous growth marks which could be measured (Fig. 12). Of those, 819 corresponded to females and 704 to males. Information on section radius and annular band radius were used in the age validation analysis following a procedure developed by Ehrhardt (1992).

It was proposed that if rings seen on spine sections are in fact valid indicators of age, then they should form during a fairly constrained period at the same time every year. Results of the study show seasonal trends in the growth rate of Relative Marginal Increments (RMI) and the maximum

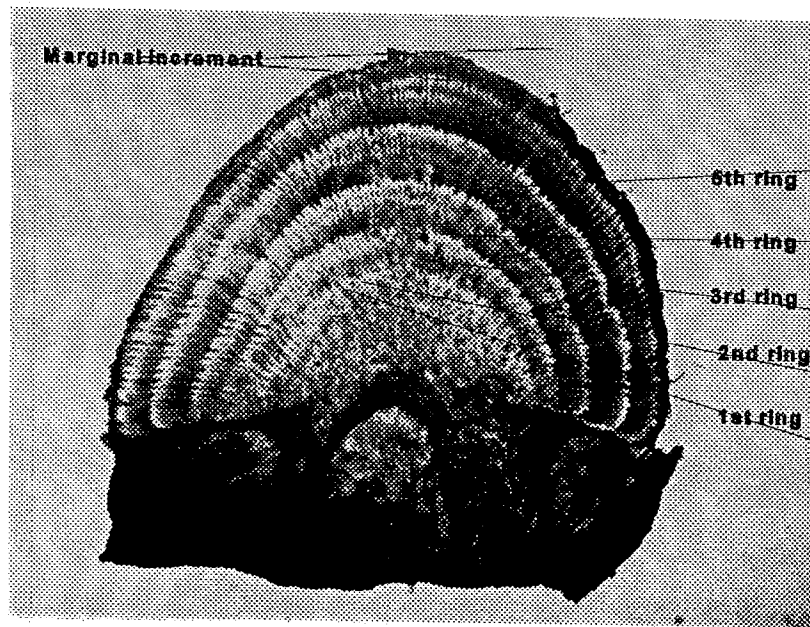


Figure 12. Major features of spine section

deposition of RMI. In the case of females the values increase continuously from March to a maximum in August and then decrease conspicuously until October, remaining consistently low from October to January. Growth of marginal increments among females appears to be lowest during the months of February and March which corresponds to the time of peak spawning. Conversely, the time of maximum marginal increment growth corresponds with the peak of the feeding season (July-September), when most North Atlantic females are found in the northernmost range of their distribution. In the case of males monthly values show a less conspicuous seasonal trend in growth relative to those observed among females. In males, the growth pattern appears to be initiated in March and reaches a maximum in August, decreasing during the late summer months, and then the RMI parameter values remain slightly lower from October to January. This characteristic could be due to male swordfish not carrying out as extensive feeding migrations as displayed by female swordfish; a theory which appears to be corroborated by observations of lower numbers of males relative to females in landings from higher latitudes. Ehrhardt et. al. (1995) concluded that ring formations found in swordfish anal spine sections represent annual events associated with the dynamics of growth. In terms of growth, the study concluded, swordfish are characterized by having

dimorphic growth, where females show faster growth rates after an estimated age of 2 years and appear to attain larger sizes than males.

CATCH AT AGE BY SEX

Data from 9,752 swordfish, collected by U.S. and Venezuelan scientists was used to examine swordfish sex ratio at size differences among years, areas, and quarters and to develop catch at size by sex for the U.S. In general, sex ratio at size appeared to be relatively consistent across years (1991-1994). There was some indication that in the subtropics in the first half of the year, thought to be a swordfish spawning area and season, males were relatively more abundant than females in the 160-180 cm range.

Analysis of observations of the number of swordfish by sex and size using maximum likelihood statistics for differences in sex ratio at size indicated that area, year, and quarter were all statistically significant. However, the maximum likelihood score for the area factor was about ten times as large as the year and quarter factors. Area was the only factor used in development of the catch at size by sex since the significance of the year and quarter factors were considered to mainly be reflective of the high sensitivity of the test which was due to large sample sizes.

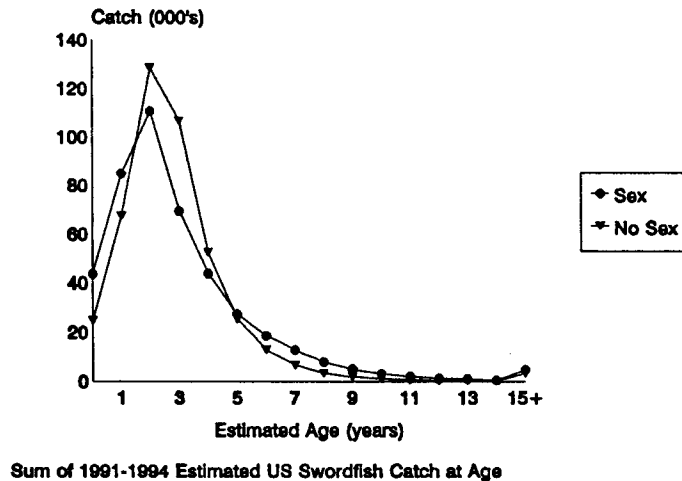


Figure 13. Differences between estimated catch at age for U.S. fisheries (1991-1994) when using sex-specific (circles) catch at size and growth midels compared to no sex-specific information (triangles).

U. S. swordfish catch at age was calculated using one growth curve for all fish and using sex specific growth curves. Catch at age calculations using sex specific growth curves, compared to catch at age calculations using one growth curve, resulted in fewer fish at ages 2-4, more fish younger than age 2 and more fish older than age 4 (Figure 13).

The implications of this result in terms of assessing the status of the swordfish resource have yet to be fully considered. However, it has been recognized by ICCAT for some time, that incorporating sex-specific catch at size into assessment analyses would provide a basis for improvements in stock status advise. The research summarized above provides an operational method for doing sex-specific analyses and may provide other nations with methods for estimating catch at age by sex. In fact, ICCAT has strongly recommended that the next (1996) swordfish assessment consider the implications of sex-specific analysis.

PELAGIC OBSERVER PROGRAM

The National Marine Fisheries Service (NMFS) continues its scientific observer sampling of the U.S. large pelagic fleet, as mandated by the U.S. Swordfish Fisheries Management Plan. Scientific observers are placed aboard vessels participating in the Atlantic large pelagic fisheries by the Southeast Fisheries Science Center (SEFSC) and the Northeast Fisheries Science Center (NEFSC). The Pelagic Observer Program (POP) coverage generally occurs on, but is not limited, to vessels fishing in the Atlantic south of Virginia. The scientific observer program contracted and monitored by the NEFSC provides coverage of the large pelagic fleet fishing the waters of the Mid-Atlantic Bight to the Grand Banks.

Operating in association with the POP, the Russell Research Association (RRA) observer program funded through a NMFS Marine Fisheries Initiative grant (MARFIN) has been

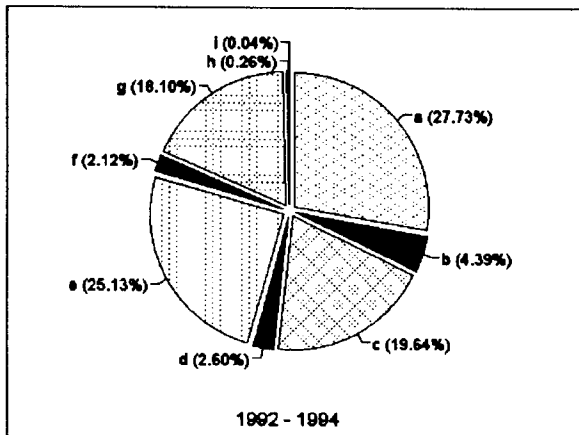


Figure 15. Catch reported by scientific observers on U.S. longline vessels: swordfish (a), billfish (b), yellowfin, bigeye and bluefin tuna (c), other tunas (d), sharks and rays (e), unknown species (f), finfish (g), marine turtles (h), and marine mammals (i).

vital in helping to describe the longline fishery in the Gulf of Mexico. RRA observers, who received training at the SEFSC Miami facility and collect similar data, have made a major contribution in the collection of data from the Gulf of Mexico. Observers from RRA concentrate primarily on the Louisiana Mississippi River Delta ports because of their familiarity with vessel operations within that area.

A scientific observer is placed on board the vessel to record detailed information on gear characteristics, the location and time of the gear set and retrieval, environmental conditions, the condition and status of the animals caught by the gear (alive or dead, kept or discarded), as well as morphometric measurements (length and weight) and sex identification when possible. Observers also record the occasional interaction of marine mammals and sea turtles. The collection of biological samples (anal finrays, heads, reproductive, heart tissue, etc.) from some animals are used to support research studies to learn more about fish biology and life history behavior.



Figure 14. NMFS observer on U.S. longline fishing boat.

Catch data collected between May of 1992 and December of 1994 by the POP has been summarized in a recently published newsletter (NOAA Technical Memorandum, NMFS-SEFSC-377) and is available upon request. The program will likely continue its coverage during 1995 and 1996, but possibly at a reduced level due to reductions in funding for the activity.

REVISIONS TO LOGBOOK REPORTING FOR 1996

Three forms will be used for pelagic logbook reports in 1996, a trip summary form, a set form, and a no fishing form. The trip summary form is designed to collect information pertaining to an entire trip such as port of landing, dealers sold to and economic information. The set form is the same as the 1995 logbook forms minus information pertaining to an entire trip. The no fishing form will be used to report no fishing activity for a month under the following permits: swordfish, shark, gulf reef fish and South Atlantic snapper-groupers (Figures 15-19).

Monthly reporting for individuals holding a Swordfish permit will be considered complete and in compliance with the regulations only if 1) the trip summaries for each trip completed during the month, individual set records for each set made during the trip(s), and tally records for all fish sold are provided or 2) a no fishing report is provided.

Again, as noted on the new logbook forms, use of the current year forms will be necessary for compliance. Further, all old forms should be destroyed upon receipt of the 1996 forms.

WHOM TO CONTACT FOR WHAT

Any questions concerning Atlantic large pelagic resources swordfish projects at the Southeast Fisheries Science Center, NMFS, can be directed to Dr. Gerald Scott at (305) 361-4596. Questions concerning processing and analyzing the logbook data can be directed to Dr. Jean Cramer at (305) 361-4493. Information concerning permits can be directed to Ed Burgess at (813) 893-3722. Those needing 1993 logbooks can contact Ernie Snell at (305) 361-4462. Questions about the observer program should be directed to Dennis Lee (305) 361-4247 or Cheryl Brown (305) 361-4275. If you have comments on this newsletter, or other comments, you can write them on your logbook reports or send them to Dr. Jean Cramer, SEFSC, NMFS, 75 Virginia Beach Drive, Miami, FL 33149.

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Figure 15. 1996 Pelagic Logbook - Trip Summary Form (The Blue Book)

DUPLICATE COPY - PLEASE RETAIN FOR YOUR RECORDS

OMB # 0648-0016

expires 9/30/97

**1996 Pelagic Logbook -
Trip Summary Form**

NMFS USE ONLY

Vessel Name: _____
Official Number: _____
date of departure: _____
date of first set: _____
date of last set: _____
date of landing: _____
Dealer name(s): _____

Captain's Signature: _____
Contact Telephone: _____
Port/State of departure: _____
Number of days fished: _____
Number of sets made: _____
Port/State of landing: _____
Dealer permit number(s): _____

Total cost of trip: _____ total \$
Owners share: _____ total \$
Captains share: _____ total \$
Number of crew _____

Fuel: _____ Gals _____ \$/Gal
Bait: _____ lbs. _____ \$/lb.
Ice: _____ lbs _____ \$/lb.
Groceries: _____ total cost

Average crew share: _____ \$/crew member
Light Sticks: _____ number used _____ \$/light stick
Freight/Handling Expenses: _____ total cost

Attach tally sheet and set forms. Mail should be postmarked not later than 7th day after sale of fish.

Monthly reporting for individuals holding a Swordfish permit will be considered complete and in compliance with the regulations only if 1) the trip summaries for each trip completed during the month, individual set records for each set made during the trip(s), and tally records for all fish sold are provided or 2) a no fishing report is provided.

DATA PROVIDED ARE CONFIDENTIAL

Monthly reporting for individuals holding a Swordfish permit will be considered complete and in compliance with the regulations only if 1) the trip summaries for each trip completed during the month, individual set records for each set made during the trip(s), and tally records for all fish sold are provided or 2) a no fishing report is provided. This booklet includes pelagic logbook summary forms and no-fishing forms.

Figure 16. INSTRUCTIONS FOR PELAGIC LOGBOOK TRIP SUMMARY FORMS

**IMPORTANT INSTRUCTIONS
FOR PELAGIC LOGBOOK TRIP SUMMARY FORMS**

A single trip report consists of a completed summary form, individual set forms for each set made during the trip, and tally records for all fish sold.

Please print all information clearly.

Record the following:

Vessel Name, Captain's Signature

Official Number (U.S. Coast Guard documentation or state registration number as recorded on permit application)

Contact telephone (telephone number of person responsible for vessel's records)

vessel's Port and State of departure

date of departure (calendar date on which the trip started)

date of first set (first calendar day that fishing gear was used on this trip)

date of last set (last calendar day that fishing gear was set on this trip)

number of days fished (number of days that fishing gear was used during this trip)

number of sets made (number of time fishing gear was set during this trip)

date of landing (calendar date that vessel returned to port)

vessel's Port and State of landing

Dealer name(s), and Dealer Swordfish permit number(s).

number of crew members(number of people in entire crew excluding the captain)

Enter the amounts and unit price in U.S. dollars of the following items:

Fuel - gallons purchased for trip and price per gallon

Bait - pounds purchased for trip and price per pound

Ice - pounds purchased for trip and price per pound

Light Sticks - number purchased for trip and price per light stick

Enter the cost in U.S. dollars of the following :

Freight and Handling Expenses - total cost of freight and handling expenses for trip

Groceries - total cost of groceries purchased for trip.

Owner's share - total payment made to owner of fishing vessel (if not owner operated) for this trip

Captain's share - total payment made to captain for this fishing trip

Average crew share - total payment made to the entire crew (excluding captain) divided by the number of crew

Total cost of trip - total of all costs incurred for this fishing trip including but not limited to all items listed on this form plus expenditures for gear and vessel maintenance.

Attach tally sheet and set forms. Mail should be postmarked not later than 7th day after sale of fish

**IMPORTANT INSTRUCTIONS
FOR NO-FISHING FORMS**

If you did no fishing for which a Swordfish permit was required during an entire month, a No-fishing form must be completed for that month and mailed to the Southeast Fisheries Service. One No-fishing form may be used to report no fishing in the Swordfish/large pelagic, South Atlantic snapper-grouper, Gulf of Mexico reef fish, and shark fisheries. Please check the space in front of each fishery in which you hold an active permit and in which you did not fish.

Figure 17. PELAGIC LOGBOOK SET FORM (The White Book)

1996 PELAGIC LOGBOOK – Set Form								
Official Vessel Number: _____								
TARGET: ☐ Swordfish ☐ Yellowfin ☐ Bigeye ☐ Mixed Tuna ☐ Sharks ☐ Other (list) _____ GEAR: ☐ Pelagic Longline ☐ Bottom Longline ☐ Handline ☐ Harpoon ☐ Gillnet ☐ Rod & Reel ☐ Pair Trawl ☐ Other (list) _____								
SET DATE: _____ / _____ / 1996					HAULBACK DATE: _____ / _____ / 1996			
Begin Set: _____ : _____ am pm		End Set: _____ : _____ am pm		Begin Haulback: _____ : _____ am pm		End Haulback: _____ : _____ am pm		
Latitude at beginning: _____ N		Longitude at beginning: _____ W		Surface Water Temp: _____ F				
LONGLINE:				GILLNET:		PAIR TRAWL:		
No. of Hooks: _____		Use Line Thrower? ☐ Y ☐ N		Mesh size (in): _____		Fishing Circle Mesh Size (cm): _____		
No. Hooks between Floats: _____		Were You Tending/Rebaiting books before haulback? ☐ Y ☐ N If Yes, Number of hooks rebated: _____		Total Net Length (fm): _____		No. Meshes at Fish Circle: _____		
No. of Light Sticks: _____				Fishing Depth Range (fm): _____ to _____		Smallest Mesh Size (cm): _____		
Mainline Length (nm): _____						Cod End Mesh Size (cm): _____		
Gangion Length (fm): _____						Official Number of Pair Vessel: _____		
Floatline Length (fm): _____		Bait Used: ☐ Live ☐ Dead ☐ Artificial						
SWORDFISH and TUNA:					Shark (Total Number):			
	No. Kept	No. Thrown Back:		Est. Lbs. Kept		No. Kept	No. Thrown Back:	
		Alive	Dead				Alive	Dead
SWORDFISH					PELAGIC SHARK:			
					Blue			
					Mako, Longfin			
					Mako, Shortfin			
					Oceanic Whitetip			
					Porbeagle			
					Thresher, Bigeye			
					Thresher, Common			
					Other			
OTHER SPECIES (Total Number):					COASTAL SHARK:			
	No. Kept	No. Thrown Back:			Bignose			
		Alive	Dead		Blacktip			
					Dusky			
					Hammerhead, Great			
					Hammerhead, Scalloped			
					Hammerhead, Smooth			
					Night			
					Sandbar			
					Silky			
					Spinner			
					Tiger			
					White			
					OTHER			
SEA TURTLES (Total Number):								
	Involved	Injured	Dead		Involved	Injured	Dead	
					Kemp's Ridley			
					Hawksbill			
					Unknown			
COMMENTS:								

**Figure 18. INSTRUCTIONS FOR PELAGIC LOGBOOK SET FORM
Revised (8-95)**

**DATA PROVIDED ARE
CONFIDENTIAL.**

IMPORTANT INSTRUCTIONS

Please print all information clearly.

DESTROY OLD FORMS. USE ONLY CURRENT YEAR FORMS.

-----Please use a separate log sheet for each set.

Record the, **Official Vessel Number.**

Designate primary **Target species.**

Record **Gear Used.**

Record **Set Date** (calendar day when set began) and **Haulback Date** Enter Times when using longlines or gillnets for:

- **Begin Set and Begin Haulback** (designate AM or PM)
- **End Set and End Haulback** (designate AM or PM)

At the start of each set, record the location to the nearest degree of **LAT** (Latitude) and **LON** (Longitude), and the **Surface Water Temperature**, in degrees Fahrenheit.

Enter the following data for each set if using **Longline gear**:

- **Number of hooks set**
- **Number of hooks between floats**
- **Number of light sticks**
- **Length of Mainline** (in miles)
- **Length of Gangions** (in fathoms)
- **Length of Floatline** (in fathoms)
- **Did you use a line thrower?**
- **Were you tending or rebaiting hooks before haulback?** If yes, specify how many hooks were rebaited.
- **Bait:** indicate Live, Dead or Artificial.

Enter the following data for each set if using **Gillnet**:

- **Mesh Size** (in inches)
- **Total drift gillnet net length** (in fathoms)
- **Fishing Depth Range** (Depth of top and of Bottom of net in fathoms)

Enter the following data for each set if using **Pair Trawl**

Pair trawl vessels should fill out a daily form for each set made. Species information should be filled out only by the vessel that hauls back the net.

- **Fishing Circle Mesh Size** (in centimeters)
- **Number of Meshes Around Fishing Circle** (do not include gores)
- **Smallest Mesh Size** (in centimeters)
- **Cod End Mesh Size** (in centimeters)
- **Official number of other vessel in pair**

Record **Estimated total dressed weight** (in pounds) of swordfish and tuna kept.

Record **NUMBERS OF SWORDFISH, TUNAS, SHARKS AND OTHER SPECIES KEPT AND THROWN BACK.** Specify the number of fish that were thrown back Alive and the number thrown back Dead.

Record **NUMBERS OF SEA TURTLES INVOLVED**

- **Total Number Involved.** Write down the total number of each sea turtle species that were caught in, or interacted with, your fishing gear for the period of your report.
- **Number Injured.** Write down the number of each sea turtle species that were injured while in, or by, your fishing gear.
- **Number Dead.** Write down the number of each sea turtle species that were observed to be dead while in, or by, your fishing gear.

Mail original logs to NMFS at the end of the fishing trip in pre-addressed envelopes along with the Trip Summary Form and weighout slip. Mailing should be postmarked not later than the 7th day after the sale of the catch.

Monthly reporting for individuals holding a Swordfish permit will be considered complete and in compliance with the regulations only if 1) the trip summaries for each trip completed during the month, individual set records for each set made during the trip(s), and tally records for all fish sold are provided or 2) a no fishing report is provided.

Figure 19. NO FISHING FORM.

OMB # 0648-0016 Expires 9/30/97

**NO-FISHING REPORTING FORM
SOUTHEAST REGION LOGBOOK PROGRAM**

VESSEL NUMBER: _____ VESSEL NAME: _____

During the MONTH of _____, 199_, the above vessel did not fish in
the following fisheries (more than one can be checked):

___ Swordfish/large pelagic

___ South Atlantic snapper-grouper

___ Gulf of Mexico reef fish

___ Shark

Captain/Owner Signature: _____

Telephone No. () _____

Table 1. TOTAL NUMBER OF SWORDFISH, TUNA, AND BILLFISH REPORTED CAUGHT BY LONGLINE BOATS, BY AREA, AND EFFORT IN NUMBER OF HOOKS, FROM THE SWORDFISH MANDATORY LOGBOOKS, FOR (a) 1992, (b) 1993 and (c)1994 (PRELIMINARY). NUMBERS CAUGHT REPRESENT KEPT PLUS DISCARDED (DEAD OR ALIVE). SEE FIGURE 1 FOR DESIGNATION OF AREAS. (SWD=SWORDFISH; YFT=YELLOWFIN; BET=BIGEYE; BFT=BLUEFIN; ALB=ALBACORE; WHM=WHITE MARLIN; BUM=BLUE MARLIN; SAI=SAILFISH.)

1a. 1992										
Area	SWD	YFT	BET	BFT	ALB	WHM	BUM	SAI	HOOKS	BOATS
CAR	10291	2122	760	23	284	595	880	317	525596	50
GOM	11649	48548	434	703	311	794	846	546	2567168	138
FEC	17063	1081	2295	41	239	202	426	539	730998	95
SAB	10709	2172	198	4	106	143	252	142	363084	69
MAB	7168	19377	4608	439	3501	496	151	27	1397696	92
NEC	5285	7581	2146	416	1309	405	158	4	839013	67
NED	26538	736	3685	94	509	221	21	2	840529	38
NOREQ	104	117	52	1	4	4	12	0	6357	3
OTHER	1915	398	440	18	353	105	30	8	152453	35
TOTAL	90722	82132	14618	1739	6616	2965	2776	1585	7422894	265

1b. 1993										
Area	SWD	YFT	BET	BFT	ALB	WHM	BUM	SAI	HOOKS	BOATS
CAR	13463	1627	802	4	377	433	900	154	639076	55
GOM	12748	39644	644	151	190	839	825	955	2670472	142
FEC	16991	900	989	16	373	245	376	742	628106	94
SAB	13961	3538	205	48	78	114	421	334	653512	93
MAB	7842	12548	9964	204	5592	666	274	31	1804219	104
NEC	4046	3268	3988	965	1715	628	250	12	895113	70
NED	23333	500	4149	248	463	56	23	1	831046	37
NOREQ	410	70	146	1	55	14	35	0	30506	6
OTHER	2588	887	627	26	892	105	31	2	236225	44
TOTAL	95382	62982	21514	1663	9735	3100	3135	2231	8388275	296

1c. 1994										
Area	SWD	YFT	BET	BFT	ALB	WHM	BUM	SAI	HOOKS	BOATS
CAR	18984	2831	1212	11	467	381	1218	119	819282	47
GOM	12585	31963	316	135	128	545	622	995	2457872	115
FEC	17437	799	1861	49	443	206	334	478	695054	87
SAB	15062	4418	146	133	117	199	429	308	821669	83
MAB	8746	21603	10623	216	4779	829	106	30	2160995	105
NEC	4012	5593	5153	904	2749	235	63	4	767060	59
NED	21000	448	2203	52	933	14	15	0	812318	35
NOREQ	1752	86	177	0	282	17	86	0	53612	5
OTHER	3451	1412	904	74	1120	122	53	25	304664	49
TOTAL	103029	69153	22595	1574	11018	2548	2926	1959	8892526	282

Table 2. TOTAL NUMBER OF SWORDFISH, TUNA, AND BILLFISH REPORTED CAUGHT BY GILLNET BOATS, BY AREA, AND EFFORT IN NUMBER OF SETS AND NUMBER OF BOATS, FROM THE SWORDFISH MANDATORY LOGBOOKS, FOR (a) 1992, (b) 1993 and 1994 (PRELIMINARY). NUMBERS CAUGHT REPRESENT KEPT PLUS DISCARDED (DEAD OR ALIVE). SEE FIGURE 1 FOR DESIGNATION OF AREAS. (SWD=SWORDFISH; YFT=YELLOWFIN; BET=BIGEYE; BFT=BLUEFIN; ALB=ALBACORE; WHM=WHITE MARLIN; BUM=BLUE MARLIN; SAI=SAILFISH.)

2a. 1992										
Area	SWD	YFT	BET	BFT	ALB	WHM	BUM	SAI	SETS	BOATS
MAB	207	17	1	0	12	0	0	0	65	3
NEC	894	123	22	24	12	1	0	6	121	14
NED	8	0	0	0	0	0	0	0	2	2
OTHER	25	0	0	0	0	0	0	0	2	1
TOTAL	1134	140	23	24	24	1	0	6	190	17

2b. 1993										
Area	SWD	YFT	BET	BFT	ALB	WHM	BUM	SAI	SETS	BOATS
MAB	13	0	1	0	0	0	0	0	1	1
NEC	178	1	0	0	0	0	0	0	27	1
NED	897	24	11	0	142	1	0	0	115	12
OTHER	15	0	0	0	0	0	0	0	4	1
TOTAL	1103	25	12	0	142	1	0	0	147	13

2c. 1994										
Area	SWD	YFT	BET	BFT	ALB	WHM	BUM	SAI	SETS	BOATS
MAB	0	0	1	0	0	0	0	0	1	1
NEC	53	206	0	1	377	0	0	0	34	6
NED	724	73	43	12	88	0	1	0	117	11
TOTAL	777	279	44	13	465	0	1	0	152	13

Table 3. TOTAL NUMBER OF SWORDFISH, TUNA, AND BILLFISH CAUGHT BY PAIR TRAWLS, BY AREA, AND EFFORT IN NUMBER OF SETS AND NUMBER OF BOATS, FROM THE SWORDFISH MANDATORY LOGBOOKS, FOR (a) 1992, (b) 1993 and (c) 1994 (PRELIMINARY). NUMBERS CAUGHT REPRESENT KEPT PLUS DISCARDED (DEAD OR ALIVE). SEE FIGURE 1 FOR DESIGNATION OF AREAS. (SWD=SWORDFISH; YFT=YELLOWFIN; BET=BIGEYE; BFT=BLUEFIN; ALB=ALBACORE; WHM=WHITE MARLIN; BUM=BLUE MARLIN; SAI=SAILFISH.)

3a. 1992										
AREA	SWD	YFT	BET	BFT	ALB	WHM	BUM	SAI	SETS	BOATS
MAB	283	1081	742	1	5756	0	0	0	269	7
NEC	38	194	96	0	571	0	0	0	70	6
TOTAL	321	1275	838	1	6327	0	0	0	339	8

3b. 1993										
AREA	SWD	YFT	BET	BFT	ALB	WHM	BUM	SAI	SETS	BOATS
MAB	184	631	636	0	3134	3	1	0	239	13
NEC	79	300	320	4	1017	0	0	0	147	11
TOTAL	263	931	956	4	4151	3	1	0	386	13

3c. 1994										
AREA	SWD	YFT	BET	BFT	ALB	WHM	BUM	SAI	SETS	BOATS
SAB	3	8	36	0	66	0	0	0	4	1
MAB	452	1811	1945	4	8133	10	0	0	351	11
NEC	7	6	8	0	63	0	0	0	13	7
TOTAL	462	1825	1989	4	8262	10	0	0	368	11

Table 4. YEARLY TABULATIONS FOR SWORDFISH AND YELLOWFIN TUNA FOR (a) 1992, (b) 1993 AND (c) 1994 (PRELIMINARY). THE AREAS ARE DEFINED IN FIGURE 1. INFORMATION INCLUDES NUMBER OF FISH KEPT PLUS DISCARDED (K&D); PERCENTAGE KEPT (%K), PERCENTAGE DISCARDED DEAD (%D DEAD), PERCENTAGE DISCARDED ALIVE (%D LIVE); EFFORT IN HOOKS (HOOKS); NUMBER OF SETS (N); AND AVERAGE OF THE INDIVIDUAL CATCH RATES [AVG(C/E)] , EQUIVALENT TO CPUE IN # OF FISH/100 HOOKS.

4a. 1992			SWORDFISH					YELLOWFIN				
AREA	HOOKS	N	K&D	%K	%D DEAD	%D LIVE	AVG C/E	K&D	%K	%D DEAD	%D LIVE	AVG C/E
CAR	561139	1205	10724	79	11	8	2.195	2365	94	0	5	0.360
GOM	3205298	4850	13205	53	28	17	0.817	53477	90	2	6	3.647
FEC	794146	2753	17947	57	27	14	2.509	1138	94	1	3	0.123
SAB	401654	1126	11433	56	32	10	3.352	2305	95	2	2	0.494
MAB	1478001	2575	7410	58	21	19	0.552	19818	95	2	2	1.433
NEC	887175	1383	5570	68	15	15	0.714	7881	97	0	1	0.927
NED	853029	1255	26596	82	7	9	3.164	807	94	0	4	0.099
NOREQ	8057	13	105	95	0	3	1.288	118	72	0	27	1.418
OTHER	174700	297	2186	94	2	3	1.287	628	98	0	1	3.670
TOTAL	8363199	15457	95176	67	19	12	1.557	88537	92	2	5	1.632

4b. 1993			SWORDFISH					YELLOWFIN				
AREA	HOOKS	N	K&D	%K	%D DEAD	%D LIVE	AVG C/E	K&D	%K	%D DEAD	%D LIVE	AVG C/E
CAR	639076	1443	13441	82	10	6	2.268	1622	89	5	5	0.234
GOM	3033150	4110	12562	51	34	13	0.765	38669	94	2	3	1.298
FEC	672060	2214	16960	45	38	15	3.015	900	91	1	7	0.114
SAB	836476	1804	13940	53	31	15	2.293	3577	94	2	3	0.450
MAB	1906384	2875	7834	45	31	22	0.442	12545	88	3	7	0.782
NEC	895113	1244	4034	68	18	13	0.498	3266	93	2	4	0.377
NED	830296	1132	23329	86	6	6	2.768	456	94	0	5	0.431
NOREQ	30506	48	410	93	0	5	1.368	70	100	0	0	0.226
OTHER	238375	386	2564	87	6	6	1.241	901	98	0	1	2.138
TOTAL	9081436	15256	95074	65	22	12	1.494	62006	92	2	4	0.707

4c. 1994			SWORDFISH					YELLOWFIN				
AREA	HOOKS	N	K&D	%K	%D DEAD	%D LIVE	AVG C/E	K&D	%K	%D DEAD	%D LIVE	AVG C/E
CAR	823210	1715	19050	82	9	7	2.468	2842	94	3	2	0.316
GOM	2993968	4031	13863	38	38	22	0.958	33672	96	2	1	2.711
FEC	775858	2370	17416	40	41	17	2.810	809	94	0	5	0.096
SAB	1053890	2148	15497	46	38	14	2.028	4428	92	1	5	0.408
MAB	2390521	3486	8802	47	27	25	0.401	21930	92	3	4	1.020
NEC	789080	1072	4019	46	26	27	0.557	5756	91	1	7	1.070
NED	817697	1068	20994	82	9	7	2.582	593	97	0	1	0.091
NOREQ	53612	83	1752	91	4	4	3.281	86	97	2	0	0.171
OTHER	307348	512	3456	89	4	6	1.171	1253	98	0	0	0.356
TOTAL	10005184	16485	104849	60	25	14	1.500	71369	94	2	3	1.066

Table 5. NUMBERS OF PERMITTED VESSELS

YEAR	FISHED	CAUGHT SWORDFISH	CAUGHT SWORDFISH IN 5 MONTHS	HOOKS REPORTED
1987	296	273	180	6,556,416
1988	387	337	210	7,009,508
1989	455	415	250	7,941,675
1990	416	362	209	7,500,450
1991	333	303	175	7,746,917
1992	335	295 303	137	9,040,117
1993	430	384 305	142	9,634,432
1994	495	458 304	167	10,252,001

Table 6. ATLANTIC SWORDFISH RESOURCE STATUS SUMMARY

	North Atlantic	South Atlantic
Maximum Sustainable Yield	12,500(5,200-16,900MT) ¹	not estimated
Current (1994) Yield	15,642 MT	17,174 MT
Current (1994) Replacement Yield	11,500 MT	not estimated
Relative Biomass(B_{1994}/B_{MSY})	0.67 (0.48-1.08) ¹	not estimated
Relative Fishing Mortality:		
F_{1994}/F_{MSY}	1.88 (1.04-4.83) ¹	not estimated
F_{1994}/F_{max}	1.69	not estimated
$F_{1994}/F_{0.1}$	3.09	not estimated
Management Measures in Effect	25 kg minimum size; Country-specific quotas	Limit catch to 1993 or 1994 levels

¹ 80% Confidence interval range in parenthesis

Table 7. MONTHLY SWORDFISH LANDINGS IN LBS DRESSED WEIGHT FROM 1990 TO 1994.

YEAR	MONTH						
	JAN	FEB	MAR	APR	MAY	JUN	
1990	839,178	794,926	760,177	631,254	493,183	449,220	
1991	613,177	619,188	554,422	465,789	416,747	432,630	
1992	514,101	575,942	520,299	374,432	358,252	317,612	
1993	561,698	648,585	470,918	341,690	365,752	337,134	
1994	484,972	472,599	458,475	327,608	299,262	383,626	
	MONTH						TOTAL
	JUL	AUG	SEPT	OCT	NOV	DEC	
1990	895,303	888,258	851,158	1,053,476	806,843	644,159	9107135
1991	709,718	773,515	816,558	766,909	527,175	446,311	7142139
1992	561,906	731,830	727,037	891,336	423,457	387,010	6383214
1993	582,835	585,084	647,994	755,021	589,865	387,627	6274203
1994	290,811	539,202	560,993	672,465	592,585	495,542	5578140

Table 8. PERCENTAGE OF ANNUAL U.S. SWORDFISH LANDED CATCH < 41 LBS BY AREAS (TOTAL ANNUAL CATCH OF SWORDFISH IN AREA/ TOTAL ANNUAL CATCH OF SWORDFISH IN ALL AREAS).

YEAR	AREA							SUM
	CAR	GOM	FEC	SAB	MAB	NEC	NED	
1989	13	18	24	5	8	9	23	100
1990	15	12	30	5	14	11	14	101
1991	16	21	23	4	9	7	21	101
1992	15	18	20	5	9	8	25	100
1993	18	14	15	9	7	7	30	100
1994	28	9	14	10	9	4	25	99

Table 9. PERCENTAGE OF ANNUAL US SWORDFISH LANDED CATCH < 41 LBS BY AREAS (ANNUAL OF CATCH OF SWORDFISH < 41 LBS IN AREA / TOTAL ANNUAL CATCH OF SWORDFISH IN ALL AREAS).

YEAR	AREA							SUM
	CAR	GOM	FEC	SAB	MAB	NEC	NED	
1989	5	9	13	3	5	3	7	45
1990	3	7	15	3	7	3	3	41
1991	2	10	9	2	2	1	2	28
1992	1	5	4	1	1	1	3	16
1993	2	3	2	1	1	1	3	13
1994	4	2	2	2	1	0	2	13

Table 10. PERCENTAGE OF SWORDFISH LANDED CATCH < 41 LBS WITHIN AREAS (ANNUAL CATCH OF SWORDFISH < 41 LBS IN AREA / ANNUAL CATCH OF SWORDFISH IN AREA).

YEAR	AREA						
	CAR	GOM	FEC	SAB	MAB	NEC	NED
1989	36	53	55	66	61	33	32
1990	23	60	52	60	50	24	22
1991	15	51	39	53	22	10	8
1992	9	26	21	24	10	11	10
1993	9	20	15	16	14	8	11
1994	13	21	15	15	13	11	9

Table 11. 1993 catch estimated from observer catch rates and reported effort.

1993 Estimated Fish Catch in Longline Fishing Effort

Area	Common Name	Scientific Name	Num Est	Prop. Kept	Proportion		Pct of Catch
					Discarded Dead	Alive	
Caribbean	swordfish	Xiphius gladius	16887	0.86	0.09	0.05	49.50
Caribbean	dolphin fish	Coryphaenidae	3865	0.83	0.01	0.16	11.36
Caribbean	lancetfish	Alephosauridae	2716	0.00	0.88	0.12	7.96
Caribbean	escolar	Lepidocybium flavobrunneum	2072	0.50	0.33	0.17	6.07
Caribbean	blue shark	Prionace glauca	1184	0.01	0.07	0.91	3.47
Caribbean	silky shark	Carcharhinus falciformis	1027	0.03	0.61	0.36	3.01
Caribbean	bigeye tuna	Thunnus obesus	1027	0.53	0.34	0.14	3.01
Caribbean	yellowfin tuna	Thunnus albacares	800	0.70	0.22	0.09	2.34
Caribbean	albacore tuna	Thunnus alalunga	678	0.97	0.03	0.00	1.98
Caribbean	white marlin	Tetrapturus albidus	575	0.00	0.27	0.73	1.68
Caribbean	blue marlin	Makaira nigricans	539	0.00	0.26	0.74	1.59
Caribbean	oilfish	Ruvetus pretiosus	417	0.38	0.29	0.33	1.23
Caribbean	longnose spearfish	Tetrapturus pfluegeri	383	0.00	0.50	0.50	1.13
Caribbean	Atlantic sailfish	Istiophorus platypterus	244	0.00	0.57	0.43	0.72
Caribbean	oceanic whitetip shark	Carcharhinus longimanus	227	0.00	0.54	0.46	0.66
Caribbean	shark	Carcharinidae	191	0.00	0.00	1.00	0.56
Caribbean	bigeye thresher shark	Alopias superciliosus	174	0.20	0.40	0.40	0.51
Caribbean	wahoo	Acanthocybium solandri	156	0.78	0.11	0.11	0.46
Caribbean	skates/rays	Chondrichthyes	156	0.00	0.11	0.89	0.46
Caribbean	barracuda	Sphyrnaidae	122	0.00	0.29	0.71	0.36
Caribbean	spearfish	Tetrapturus spp	87	0.20	0.80	0.00	0.26
Caribbean	tiger shark	Galeocerdo cuvieri	70	0.25	0.00	0.75	0.20
Caribbean	snake mackerel	Trichiuridae	52	0.00	1.00	0.00	0.15
Caribbean	shortfin mako	Isurus oxyrinchus	52	0.33	0.00	0.67	0.15
Caribbean	tuna		52	0.00	0.33	0.67	0.15
Caribbean	bigeye cigarfish	Cubiceps spp	34	1.00	0.00	0.00	0.10
Caribbean	puffer	Tetraodontidae	34	0.00	0.50	0.50	0.10
Caribbean	dusky shark	Carcharhinus obscurus	34	0.00	0.00	1.00	0.10
Caribbean	scalloped hammerhead	Sphyrna lewini	34	0.00	0.00	1.00	0.10
Caribbean	skipjack tuna	Katsuwonus pelamis	34	0.00	1.00	0.00	0.10
Caribbean	blackfin tuna	Thunnus atlanticus	34	0.00	1.00	0.00	0.10
Caribbean	squid	Myopsidae	17	0.00	0.00	1.00	0.05
Caribbean	fish		17	0.00	0.00	1.00	0.05
Caribbean	longfin mako	Isurus paucus	17	0.00	1.00	0.00	0.05
Caribbean	bonito	Sarda sarda	17	0.00	0.00	1.00	0.05
Grand Banks	blue shark	Prionace glauca	50610	0.00	0.43	0.57	57.76
Grand Banks	swordfish	Xiphius gladius	26222	0.79	0.15	0.06	29.41
Grand Banks	bigeye tuna	Thunnus obesus	4994	0.79	0.12	0.09	5.60
Grand Banks	shortfin mako	Isurus oxyrinchus	3058	0.57	0.11	0.32	3.43
Grand Banks	albacore tuna	Thunnus alalunga	917	0.09	0.65	0.26	1.03
Grand Banks	skates/rays	Chondrichthyes	713	0.00	0.06	0.94	0.80
Grand Banks	lancetfish	Alephosauridae	713	0.00	0.76	0.24	0.80
Grand Banks	dolphin fish	Coryphaenidae	451	0.77	0.00	0.23	0.51
Grand Banks	escolar	Lepidocybium flavobrunneum	204	0.00	0.50	0.50	0.23
Grand Banks	yellowfin tuna	Thunnus albacares	146	0.90	0.10	0.00	0.16
Grand Banks	bluefin tuna	Thunnus thynnus	131	0.22	0.78	0.00	0.15
Grand Banks	oilfish	Ruvetus pretiosus	116	0.00	0.38	0.63	0.13
Grand Banks	fish		116	0.00	0.14	0.86	0.13
Grand Banks	pelagic stingray	Dasyatis violacea	102	0.00	0.00	1.00	0.11
Grand Banks	longnose spearfish	Tetrapturus pfluegeri	44	0.00	0.33	0.67	0.05
Grand Banks	blue marlin	Makaira nigricans	29	0.00	1.00	0.00	0.03
Grand Banks	white marlin	Tetrapturus albidus	29	0.00	1.00	0.00	0.03
Grand Banks	sunfish	Mola sp	29	0.00	0.00	1.00	0.03
Grand Banks	scalloped hammerhead	Sphyrna lewini	15	0.00	1.00	0.00	0.02
Grand Banks	porbeagle shark	Lamna nasus	15	1.00	0.00	0.00	0.02
Grand Banks	bigeye thresher shark	Alopias superciliosus	15	0.00	0.00	1.00	0.02

Grand Banks	common thresher shark	Alopias vulpinus	15	1.00	0.00	0.00	0.02
Grand Banks	ocean sunfish	Mola mola	15	0.00	0.00	1.00	0.02
Gulf of Mexico	yellowfin tuna	Thunnus albacares	29024	0.91	0.07	0.02	34.43
Gulf of Mexico	swordfish	Xiphias gladius	13247	0.32	0.50	0.18	15.71
Gulf of Mexico	lancetfish	Alephisaauridae	6419	0.00	0.80	0.20	7.61
Gulf of Mexico	skates/rays	Chondrichthyes	6116	0.00	0.07	0.93	7.25
Gulf of Mexico	escolar	Lepidocybium flavobrunneum	4402	0.72	0.19	0.08	5.22
Gulf of Mexico	dolphin fish	Coryphaenidae	4126	0.88	0.04	0.08	4.89
Gulf of Mexico	Atlantic sailfish	Istiophorus platypterus	3190	0.00	0.74	0.26	3.78
Gulf of Mexico	silky shark	Carcharhinus falciformes	2043	0.05	0.56	0.39	2.42
Gulf of Mexico	wahoo	Acanthocybium solandri	2017	0.96	0.03	0.01	2.39
Gulf of Mexico	white marlin	Tetrapturus albidus	1885	0.00	0.66	0.34	2.24
Gulf of Mexico	blue marlin	Makaira nigricans	1384	0.00	0.47	0.53	1.65
Gulf of Mexico	shark	Carcharinidae	1094	0.02	0.08	0.89	1.30
Gulf of Mexico	bigeye tuna	Thunnus obesus	883	0.94	0.06	0.00	1.05
Gulf of Mexico	blackfin tuna	Thunnus atlanticus	830	0.35	0.52	0.13	0.99
Gulf of Mexico	pomphret	Bramidae	646	0.33	0.35	0.33	0.77
Gulf of Mexico	skipjack tuna	Katsuwonus pelamis	619	0.21	0.77	0.02	0.74
Gulf of Mexico	tuna		606	0.00	0.96	0.04	0.72
Gulf of Mexico	eel	Ophichthidae	580	1.00	0.00	0.00	0.69
Gulf of Mexico	blacktip shark	Carcharhinus limbatus	540	0.02	0.34	0.63	0.64
Gulf of Mexico	dusky shark	Carcharhinus obscurus	474	0.33	0.22	0.44	0.56
Gulf of Mexico	oilfish	Ruvetus pretiosus	395	0.27	0.53	0.20	0.47
Gulf of Mexico	sunfish	Mola sp	290	0.00	0.00	1.00	0.34
Gulf of Mexico	oceanic whitetip shark	Carcharhinus longimanus	290	0.05	0.41	0.55	0.34
Gulf of Mexico	scalloped hammerhead	Sphyrna lewini	277	0.00	0.67	0.33	0.33
Gulf of Mexico	shortfin mako	Isurus oxyrinchus	264	0.70	0.15	0.15	0.31
Gulf of Mexico	bigeye thresher shark	Alopias superciliosus	250	0.42	0.21	0.37	0.30
Gulf of Mexico	fish		237	0.00	0.00	1.00	0.28
Gulf of Mexico	tiger shark	Galeocerdo cuvieri	224	0.12	0.00	0.88	0.27
Gulf of Mexico	bluefin tuna	Thunnus thynnus	198	0.27	0.47	0.27	0.24
Gulf of Mexico	longnose spearfish	Tetrapturus pfluegeri	132	0.00	0.90	0.10	0.16
Gulf of Mexico	snake mackerel	Trichiuridae	132	0.20	0.50	0.30	0.16
Gulf of Mexico	bonito	Sarda sarda	132	0.10	0.70	0.20	0.16
Gulf of Mexico	billfish	Istiophoridae	119	0.00	0.44	0.56	0.14
Gulf of Mexico	barracuda	Sphyraenidae	119	0.44	0.22	0.33	0.14
Gulf of Mexico	bigeye cigarfish	Cubiceps sp	119	0.22	0.44	0.33	0.14
Gulf of Mexico	little tunny	Euthynnus alletteratus	119	0.00	0.89	0.11	0.14
Gulf of Mexico	puffer	Tetraodontidae	92	0.00	0.29	0.71	0.11
Gulf of Mexico	longfin mako	Isurus paucus	92	0.43	0.43	0.14	0.11
Gulf of Mexico	sandbar shark	Carcharhinus milberti	79	0.33	0.33	0.33	0.09
Gulf of Mexico	albacore tuna	Thunnus alalunga	66	1.00	0.00	0.00	0.08
Gulf of Mexico	sand tiger shark	Odontaspis taurus	53	0.00	0.25	0.75	0.06
Gulf of Mexico	spinner shark	Carcharhinus brevipinna	53	0.00	0.25	0.75	0.06
Gulf of Mexico	opah	Lampris guttatus	40	0.67	0.00	0.33	0.05
Gulf of Mexico	blue shark	Prionace glauca	26	0.50	0.00	0.50	0.03
Gulf of Mexico	bull shark	Carcharhinus leucas	26	0.00	1.00	0.00	0.03
Gulf of Mexico	smooth hammerhead	Sphyrna zygaena	26	0.00	0.50	0.50	0.03
Gulf of Mexico	hammerhead	Sphyrna spp	26	0.00	0.00	1.00	0.03
Gulf of Mexico	common thresher shark	Alopius vulpinus	26	0.00	0.50	0.50	0.03
Gulf of Mexico	spearfish	Tetrapturus sp	13	0.00	0.00	1.00	0.02
Gulf of Mexico	cobia	Rachycentron canadum	13	0.00	0.00	1.00	0.02
Gulf of Mexico	amberjack	Seriola sp	13	1.00	0.00	0.00	0.02
Gulf of Mexico	grouper	Epinephelus sp	13	1.00	0.00	0.00	0.02
Gulf of Mexico	thresher shark	Alopias sp	13	0.00	1.00	0.00	0.02
NE Coastal	blue shark	Prionace glauca	16257	0.00	0.10	0.90	18.56
NE Coastal	bigeye tuna	Thunnus obesus	13775	0.90	0.08	0.02	15.72
NE Coastal	yellowfin tuna	Thunnus albacares	11540	0.77	0.15	0.09	13.17
NE Coastal	swordfish	Xiphias gladius	8415	0.38	0.45	0.17	9.61
NE Coastal	dolphin fish	Coryphaena sp	5899	0.98	0.01	0.01	6.73
NE Coastal	pelagic stingray	Dasyatis violacea	5723	0.00	0.05	0.95	6.53
NE Coastal	albacore tuna	Thunnus alalunga	3382	0.91	0.08	0.00	3.86
NE Coastal	sandbar shark	Carcharhinus plumbeus	3172	0.91	0.01	0.08	3.62
NE Coastal	fish		2400	0.03	0.22	0.74	2.74

NE Coastal	white marlin	Tetrapturus albidus	2341	0.00	0.42	0.58	2.67
NE Coastal	dusky shark	Carcharhinus obscurus	2259	0.58	0.14	0.28	2.58
NE Coastal	lancetfish	Alepisaurus sp	2177	0.01	0.60	0.39	2.48
NE Coastal	hammerhead shark	Sphyrna sp	2013	0.61	0.20	0.19	2.30
NE Coastal	Atl sharpnose shark	Rhizoprionodon terranova	1990	0.54	0.12	0.34	2.27
NE Coastal	shortfin mako	Isurus oxyrinchus	1627	0.47	0.04	0.49	1.86
NE Coastal	bluefin tuna	Thunnus thynnus	562	0.12	0.61	0.27	0.64
NE Coastal	blue marlin	Makaira nigricans	433	0.00	0.56	0.44	0.50
NE Coastal	tiger shark	Galeocerdo cuvier	421	0.00	0.08	0.92	0.48
NE Coastal	tuna		339	0.14	0.80	0.06	0.39
NE Coastal	rougthead stingray	Dasyatis centroura	304	0.00	0.00	1.00	0.35
NE Coastal	blacktip shark	Carcharhinus limbatus	257	0.00	0.73	0.27	0.30
NE Coastal	shark		234	0.00	0.41	0.59	0.27
NE Coastal	escolar	Lepidocybium flavobrunneum	211	0.12	0.59	0.29	0.24
NE Coastal	common thresher shark	Alopias vulpinus	140	0.25	0.08	0.67	0.16
NE Coastal	manta ray	Manta birostris	129	0.00	0.00	1.00	0.15
NE Coastal	Mola	Mola sp	94	0.00	0.00	1.00	0.11
NE Coastal	red drum	Sciaenops ocellatus	82	1.00	0.00	0.00	0.09
NE Coastal	bigeye thresher shark	Alopias superciliosus	82	0.14	0.29	0.57	0.09
NE Coastal	big scale pomphret	Taratichtys longipi	70	0.00	0.33	0.67	0.08
NE Coastal	silky shark	Carcharhinus falciformis	70	0.17	0.50	0.33	0.08
NE Coastal	blackfin tuna	Thunnus atlanticus	70	0.67	0.33	0.00	0.08
NE Coastal	ocean sunfish	Mola mola	59	0.00	0.00	1.00	0.07
NE Coastal	longfin mako shark	Isurus paucus	59	0.00	0.20	0.80	0.07
NE Coastal	skipjack tuna	Katsuwonus pelamis	59	0.00	1.00	0.00	0.07
NE Coastal	king mackerel	Scomberomorus cavalla	47	1.00	0.00	0.00	0.05
NE Coastal	torpedo ray	Torpedo nobiliana	47	0.00	0.00	1.00	0.05
NE Coastal	scalloped hammerhead	Sphyrna lewini	47	0.00	1.00	0.00	0.05
NE Coastal	wahoo	Acanthocybium solanderi	47	1.00	0.00	0.00	0.05
NE Coastal	little tunny	Euthynnus alletteratus	35	0.33	0.67	0.00	0.04
NE Coastal	bonito	Sarda sarda	23	0.50	0.50	0.00	0.03
NE Coastal	opah	Lampris guttatus	23	0.00	0.00	1.00	0.03
NE Coastal	greater amberjack	Seriola dumerili	12	1.00	0.00	0.00	0.01
NE Coastal	bluefish	Pomatomus saltatrix	12	1.00	0.00	0.00	0.01
NE Coastal	cobia	Rachycentron canadum	12	1.00	0.00	0.00	0.01
NE Coastal	northern puffer	Tetraodontidae	12	0.00	0.00	1.00	0.01
NE Coastal	bull shark	Carcharhinus leucas	12	0.00	0.00	1.00	0.01
NE Coastal	oceanic whitetip shark	Carcharhinus longimanus	12	0.00	0.00	1.00	0.01
NE Coastal	lemon shark	Megapron brevirostris	12	0.00	0.00	1.00	0.01
NE Coastal	basking shark	Cetorhinus maximus	12	0.00	0.00	1.00	0.01
Southeastern	swordfish	Xiphus gladius	29794	0.45	0.44	0.11	41.72
Southeastern	dolphin fish	Coryphaenidae	10674	0.98	0.01	0.01	14.95
Southeastern	yellowfin tuna	Thunnus albacares	5316	0.76	0.16	0.08	7.44
Southeastern	silky shark	Carcharhinus falciformis	4994	0.33	0.42	0.26	6.99
Southeastern	Atlantic sailfish	Istiophorus platypterus	2401	0.00	0.54	0.46	3.36
Southeastern	bigeye tuna	Thunnus obesus	1822	0.76	0.04	0.20	2.55
Southeastern	dusky shark	Carcharhinus obscurus	1522	0.09	0.47	0.44	2.13
Southeastern	white marlin	Tetrapturus albidus	1372	0.00	0.54	0.46	1.92
Southeastern	albacore tuna	Thunnus alalunga	1222	0.98	0.00	0.02	1.71
Southeastern	shark	Carcharhinidae	1157	0.00	0.30	0.70	1.62
Southeastern	blue marlin	Makaira nigricans	1136	0.00	0.21	0.79	1.59
Southeastern	escolar	Lepidocybium flavobrunneum	1072	0.35	0.32	0.33	1.50
Southeastern	scalloped hammerhead	Sphyrna lewini	986	0.07	0.43	0.50	1.38
Southeastern	blue shark	Prionace glauca	900	0.00	0.07	0.93	1.26
Southeastern	tiger shark	Galeocerdo cuvieri	664	0.00	0.06	0.94	0.93
Southeastern	sandbar shark	Carcharhinus milberti	664	0.26	0.27	0.47	0.93
Southeastern	lancetfish	Alepisauridae	643	0.00	0.57	0.43	0.90
Southeastern	oilfish	Ruvettus pretiosus	600	0.11	0.39	0.50	0.84
Southeastern	wahoo	Acanthocybium solandri	514	0.92	0.04	0.04	0.72
Southeastern	oceanic whitetip shark	Carcharhinus longimanus	429	0.10	0.15	0.75	0.60
Southeastern	hammerhead	Sphyrna sp	386	0.00	0.55	0.45	0.54
Southeastern	barracuda	Sphyraenidae	364	0.00	0.18	0.82	0.51
Southeastern	blacktip shark	Carcharhinus limbatus	300	0.00	0.93	0.07	0.42
Southeastern	blackfin tuna	Thunnus atlanticus	257	0.58	0.25	0.17	0.36
Southeastern	shortfin mako shark	Isurus oxyrinchus	257	0.75	0.00	0.25	0.36
Southeastern	bigeye thresher shark	Alopias superciliosus	236	0.00	0.55	0.45	0.33

Southeastern	fish		214	0.10	0.30	0.70	0.30
Southeastern	great hammerhead	Sphyrna mokarran	171	0.00	0.25	0.75	0.24
Southeastern	bonito	Sarda sarda	171	0.00	1.00	0.00	0.24
Southeastern	skates/rays	Chondrichthyes	150	0.00	0.00	1.00	0.21
Southeastern	puffer	Tetraodontidae	129	0.33	0.17	0.50	0.18
Southeastern	common thresher shark	Alopias vulpinus	86	0.00	0.50	0.50	0.12
Southeastern	longnose spearfish	Tetrapturus pfluegeri	64	0.00	0.33	0.67	0.09
Southeastern	longfin mako shark	Isurus paucus	64	0.00	0.33	0.67	0.09
Southeastern	bluefin tuna	Thunnus thynnus	64	0.33	0.67	0.00	0.09
Southeastern	tuna		64	0.00	0.67	0.33	0.09
Southeastern	bigeye cigarfish	Cubiceps sp	43	0.00	0.00	1.00	0.06
Southeastern	snake mackerel	Trichiuridae	43	0.00	1.00	0.00	0.06
Southeastern	pomphret	Bramidae	43	0.00	0.00	1.00	0.06
Southeastern	sunfish	Mola sp	43	0.00	0.00	1.00	0.06
Southeastern	bull shark	Carcharhinus leucas	43	0.00	0.50	0.50	0.06
Southeastern	night shark	Carcharhinus signatus	43	0.00	0.50	0.50	0.06
Southeastern	spearfish	Tetrapturus sp	21	0.00	0.00	1.00	0.03
Southeastern	mako shark	Isurus sp	21	0.00	0.00	1.00	0.03
Southeastern	spinner shark	Carcharhinus brevipinna	21	1.00	0.00	0.00	0.03
Southeastern	skipjack tuna	Katsuwonus pelamis	21	0.00	1.00	0.00	0.03
Southeastern	little tunny	Euthynnus alletteratus	21	0.00	0.00	1.00	0.03

1993 Estimated Catch of Marine Mammals, Marine Turtles, and Birds in Longline Effort

Area	Common Name	Scientific Name	Num Est	Prop. Kept	Proportion Discarded		Pct of Catch
					Dead	Alive	
Caribbean	loggerhead turtle	Caretta caretta	70	0.00	0.00	1.00	0.20
Caribbean	leatherback turtle	Dermochelys coriacea	17	0.00	0.00	1.00	0.05
Grand Banks	leatherback turtle	Dermochelys coriacea	306	0.00	0.00	1.00	0.34
Grand Banks	loggerhead turtle	Caretta caretta	131	0.00	0.00	1.00	0.15
Grand Banks	bottlenose dolphin	Tursiops truncatus	15	0.00	0.00	1.00	0.02
Grand Banks	green turtle	Chelonia mydas	15	0.00	0.00	1.00	0.02
Gulf of Mexico	leatherback turtle	Dermochelys coriacea	158	0.00	0.00	1.00	0.19
Gulf of Mexico	green turtle	Chelonia mydas	13	0.00	0.00	1.00	0.02
Gulf of Mexico	loggerhead turtle	Caretta caretta	13	0.00	0.00	1.00	0.02
Gulf of Mexico	grampus	Grampus griseus	13	0.00	1.00	0.00	0.02
Gulf of Mexico	turtle spp		13	0.00	0.00	1.00	0.02
NE Coastal	leatherback turtle	Dermochelys coriacea	328	0.00	0.00	1.00	0.37
NE Coastal	pilot whale	Globicephala sp	164	0.00	0.00	1.00	0.19
NE Coastal	loggerhead turtle	Caretta caretta	59	0.00	0.00	1.00	0.07
NE Coastal	grampus	Grampus griseus	23	0.00	0.00	1.00	0.03
NE Coastal	gull	Larus sp	12	0.00	0.00	1.00	0.01
NE Coastal	turtle spp		12	0.00	.	.	0.01
Southeastern	loggerhead turtle	Caretta caretta	86	0.00	0.25	0.75	0.12
Southeastern	leatherback turtle	Dermochelys coriacea	86	0.00	0.00	1.00	0.12
Southeastern	pilot whale	Globicephala sp	21	0.00	0.00	1.00	0.03

1993 Estimated Fish Catch in Gillnet Fishing Effort

Area	Common Name	Scientific Name	Num Est	Prop. Kept	Proportion Discarded		Pct of Catch
					Dead	Alive	
NE Coastal	swordfish	Xiphias gladius	916	0.98	0.02	0.00	54.59
NE Coastal	little tunny	Euthynnus alletteratus	145	0.02	0.97	0.01	8.64
NE Coastal	albacore tuna	Thunnus alalunga	110	0.98	0.02	0.00	6.56
NE Coastal	blue shark	Prionace glauca	62	0.00	0.66	0.34	3.69
NE Coastal	shortfin mako	Isurus oxyrinchus	50	0.92	0.08	0.00	2.98
NE Coastal	yellowfin tuna	Thunnus albacares	33	0.92	0.08	0.00	1.97
NE Coastal	skipjack tuna	Katsuwonus pelamis	28	0.67	0.33	0.00	1.67
NE Coastal	hammerhead shark	Sphyrna sp	22	0.00	1.00	0.00	1.31

NE Coastal	dusky shark	Carcharhinus obscurus	18	0.00	0.36	0.64	1.07
NE Coastal	bigeye tuna	Thunnus obesus	13	1.00	0.00	0.00	0.77
NE Coastal	Mola	Mola sp	12	0.00	0.00	1.00	0.71
NE Coastal	basking shark	Cetorhinus maximus	9	0.00	1.00	0.00	0.53
NE Coastal	manta ray	Manta birostris	9	0.00	0.14	0.86	0.53
NE Coastal	ocean sunfish	Mola mola	9	0.00	0.00	1.00	0.53
NE Coastal	bluefish	Pomatomus saltatrix	5	0.75	0.25	0.00	0.30
NE Coastal	bigeye thresher	Alopias superciliosus	4	0.00	1.00	0.00	0.24
NE Coastal	bluefin tuna	Thunnus thynnus	4	0.33	0.67	0.00	0.24
NE Coastal	longfin mako	Isurus paucus	3	1.00	0.00	0.00	0.18
NE Coastal	bonito	Sarda sarda	1	0.00	1.00	0.00	0.07
NE Coastal	blue marlin	Makaira nigricans	1	0.00	1.00	0.00	0.06
NE Coastal	shark		1	0.00	0.00	1.00	0.06
NE Coastal	tuna		1	0.00	1.00	0.00	0.06
NE Coastal	tiger shark	Galeocerdo cuvier	1	0.00	1.00	0.00	0.06
NE Coastal	torpedo ray	Torpedo nobiliana	1	0.00	0.00	1.00	0.06
NE Coastal	remora	Echeneidae	1	0.00	-	-	0.06
NE Coastal	pelagic stingray	Dasyatis violacea	1	0.00	0.00	1.00	0.06

1993 Estimated Catch of Marine Mammals, Marine Turtles, and Birds in Gillnet Effort

Area	Common Name	Scientific Name	Num Est	Prop. Kept	Proportion Discarded		Pct of Catch
					Dead	Alive	
NE Coastal	common dolphin	Delphinus delphis	148	0.00	0.97	0.03	8.89
NE Coastal	striped dolphin	Stenella coeruleoalba	17	0.00	1.00	0.00	1.01
NE Coastal	pilot whale	Globicephala sp	14	0.00	0.91	0.09	0.83
NE Coastal	bottlenose dolphin	Tursiops truncatus	8	0.00	1.00	0.00	0.48
NE Coastal	leatherback turtle	Dermochelys coriacea	8	0.00	0.17	0.83	0.48
NE Coastal	loggerhead turtle	Caretta caretta	8	0.00	0.00	1.00	0.48
NE Coastal	Atl spotted dolphin	Stenella plagiodon	3	0.00	1.00	0.00	0.18
NE Coastal	Atl whiteside dolphin	Lagenorhynchus acutus	3	0.00	1.00	0.00	0.18
NE Coastal	hawksbill turtle	Eretmochelys imbrica	3	0.00	0.00	1.00	0.18
NE Coastal	humpback whale	Megaptera novaeangliae	1	0.00	1.00	0.00	0.06
NE Coastal	grampus	Grampus griseus	1	0.00	1.00	0.00	0.06
NE Coastal	northern right whale	Eubalaena glacialis	1	0.00	0.00	1.00	0.06
NE Coastal	beaked whale	Mesoplodon sp	1	0.00	1.00	0.00	0.06
NE Coastal	goosebeaked whale	Ziphius cavirostris	1	0.00	1.00	0.00	0.06
NE Coastal	harbor porpoise	Phocoena phocoena	1	0.00	1.00	0.00	0.06