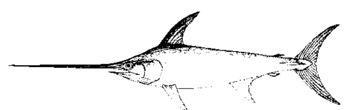
LCS05/06-DW-05

NOAA Technical Memorandum
NMFS-SEFSC-486

SEFSC PELAGIC OBSERVER PROGRAM DATA SUMMARY FOR 1992-2000

by

Lawrence R. Beerkircher, Cheryl J. Brown, and Dennis W. Lee



U.S. DEPARTMENT OF COMMERCE
Donald L. Evans, Secretary

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
Conrad C. Lautenbacher Jr., Administrator

National Marine Fisheries Service
William T. Hogarth, Assistant Administrator for Fisheries

JULY 2002

NOTICE

THIS REPORT SHOULD BE CITED AS FOLLOWS:

Beerkircher, L.R., C.J. Brown, and D.W. Lee. 2002. SEFSC Pelagic Observer Program Data Summary for 1992-2000. NOAA TECHNICAL MEMORANDUM NMFS-SEFC-486: 26 p.

Contribution SFD-01/02-165 from the Southeast Fisheries Science Center, Miami Laboratory, Sustainable Fisheries Division.

COPIES MAY BE OBTAINED BY WRITING:

Pelagic Observer Program
National Marine Fisheries Service
Southeast Fisheries Science Center
Miami Laboratory
75 Virginia Beach Drive
Miami, FL 33149

National Technical Information Center
5825 Port Royal Road
Springfield VA 22161
(800) 553-6847 or (703) 605-6000
http://www.ntis.gov

INTRODUCTION

In 1992, the National Marine Fisheries Service (NMFS) initiated scientific sampling of the U.S. large pelagic fisheries longline fleet, as mandated by the U.S. Swordfish Fisheries Management Plan and subsequently the Atlantic Highly Migratory Species Fishery Management Plan (1998). Scientific observers were placed aboard vessels participating in the Atlantic large pelagic fishery by the Southeast Fisheries Science Center (SEFSC) and the Northeast Fisheries Science Center (NEFSC). In 1997, the SEFSC assumed sole responsibility for observer coverage of the pelagic longline fleet, however, observers associated with the NEFSC assisted with coverage of vessels in the northeast region in 1997, 1999, and 2000. Although this report will refer to the Pelagic Observer Program (POP) located at the SEFSC Miami Laboratory, the summary data presented in this report reflect the combined efforts of the SEFSC and NEFSC.

As described in previous documents (Lee et al. 1994, 1995, Lee and Brown 1998), observer coverage by the POP since 1992 has been based on NMFS-employed observers, independent contracted personnel, and personnel supplied by contract companies. The POP has also been assisted by observers employed by Russell Research Associates, Inc. (RRA), which was funded through a Marine Fisheries Initiative grant (MARFIN). This MARFIN program was vital in helping the SEFSC describe the longline fishery of the Gulf of Mexico from 1993 to 1995. RRA observers, who also received training at the SEFSC Miami facility, made a major contribution in the collection of statistical and biological data from the Gulf of Mexico. These observers concentrated primarily on the Mississippi River Delta (Louisiana) ports because of their familiarity with vessel operations within that area.

The SEFSC POP trains scientific observers to record detailed information concerning gear characteristics, location and time the gear is set and retrieved, environmental conditions, status and action of the marine life caught by the gear (alive or dead, kept or discarded), as well as morphometric measurements (length and weight) and sex identification of the animal. Observers also record incidental interactions with marine mammals, sea turtles, and sea birds. Collections of biological samples (anal fin rays, heads, reproductive tissue, vertebral centrae, etc.) from some species are used to support research studies directed at critical questions about fish biology and life history.

The data collected are used by scientists in a variety of ways. Observer catch and effort data help confirm and augment the information provided through the mandatory submission of Pelagic Logbook forms by vessel owners and operators. This information is also important in evaluating the effectiveness of management measures, as well as providing information for evaluating the stock status of harvested swordfish and other marine species.

The purpose of this document is to provide a general overview of the POP and summary of data collected in the northwestern Atlantic by the SEFSC and NEFSC, 1992- 2000.

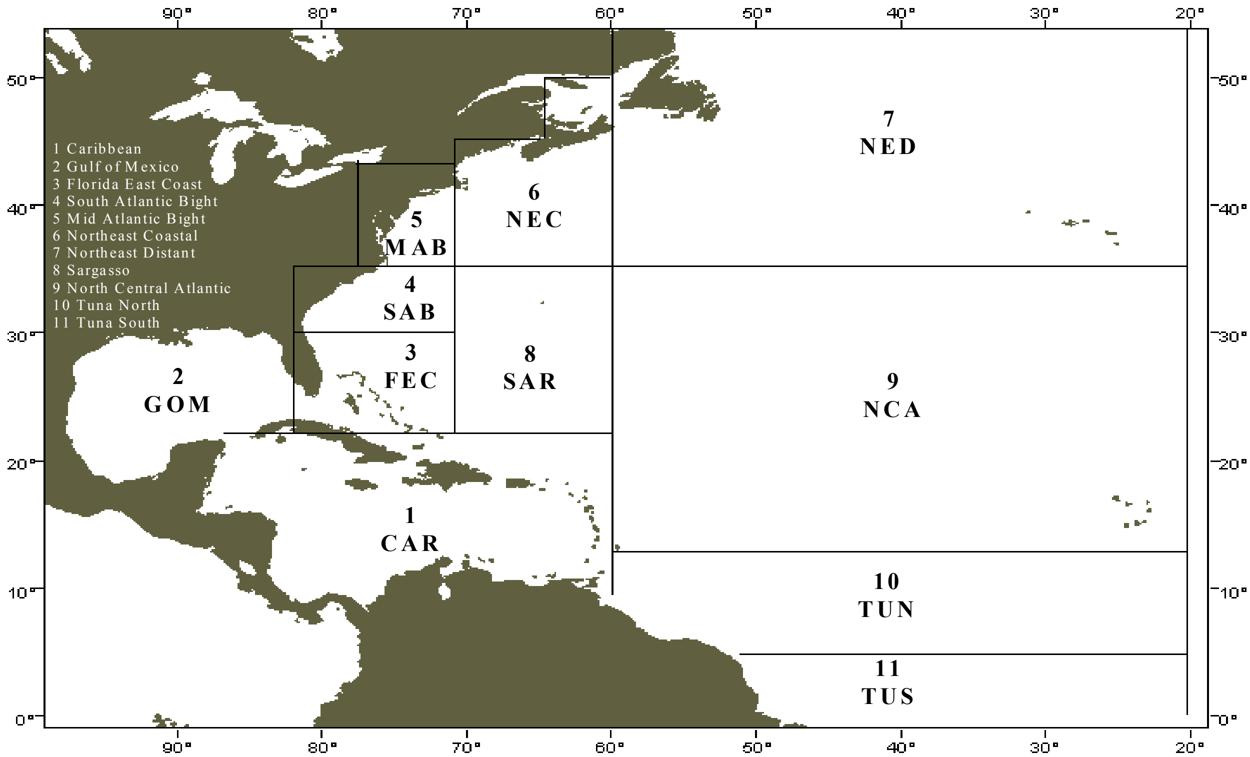


Figure 1. The fishing area definitions used in classifying the U.S. pelagic longline effort.

OBSERVER PERSONNEL

Observers receive training in sampling techniques, first aid and marine safety, as well as how to conduct themselves professionally in the field. They are also made aware that living conditions aboard ocean-going vessels can be variable (e.g. bunk accommodations, shower or toilet facilities). While an observer is aboard your vessel, the operator and crew must allow the observer time to collect statistical and biological data, however, any delay in the normal routine of processing the fish should be minimal.

VESSEL SELECTION

In order to obtain a representative, scientific sample of the fleet fishing effort, a list of randomly selected pelagic longline vessels is generated for each geographical area (Figure 1) and quarter for the current year, based upon reports of their effort (number of sets) from the Pelagic Logbook forms and landing records from the previous year.

The objective of the selection is to achieve a representative, 5% cross section of the fishing effort in each fishing area and during each calendar quarter of the year (a 5% sampling fraction roughly corresponds to 600 sets observed per year). The chance of selecting an individual vessel depends on fishing effort that particular vessel reported by area and quarter in the previous year. Due to the need of a 5% coverage for each quarter and area that the fleet fishes, an individual vessel could be selected for observation as many as four times in a year. Beginning in 2002, the observer coverage rate is being increased to 8 %, thus increasing the probability of an individual vessel being selected in multiple and/or consecutive quarters during any given year.

Observer coverage on a vessel becomes mandatory under U.S. fishery regulations when vessel owners and operators, permitted for the fishery, are selected and notified in writing. A letter of selection signed by the SEFSC Center Director is mailed to the selected fishery permit holder.

SELECTION LETTER

The SEFSC selection letter states that the POP coordinator must be notified by the vessel owners/operators, in writing, of **each fishing trip** using pelagic longline gear during the time period stated in the letter. It also specifies the minimum number of sets required by the POP in order for that vessel to fulfill its obligation for observer coverage. Planning and coordination of observer coverage prior to each trip departure is very important. For convenience, each selection letter is mailed with a trip notification form that, when returned prior to a trip, provides the POP coordinator with written information concerning the vessel's name, captain, contact persons and phone numbers, communications and safety equipment available aboard the vessel, and information about the vessel's location, dates, and times of departure and return. The form can also be used to inform the POP coordinator when a vessel is active in another fishery, under repair, or no longer fishing. The written notification is necessary to document owner or operator efforts to comply with mandatory coverage. Telephone calls are helpful, after written notification, to determine other specific details prior to the deployment of the observer to meet the vessel. It is important to keep in mind that observer coverage by the SEFSC is based on a minimum number of sets per selected vessel (specified in the selection letter) and additional coverage may be required if the trip is shorter than expected.

SAFETY EXAMINATION DECAL

The Observer Health and Safety Regulations (50 CFR 600) became effective in June 1998 and require vessels that are subject to mandatory observer coverage to display a current Commercial Fishing Vessel Safety Examination decal. Two notices of the requirement have been distributed to permit holders, the latest distribution occurring in December 2001. Dockside examinations are free and the decal is valid for two years. Vessels owners or operators who need to have their vessels examined in order to comply with the regulations should contact the local U.S. Coast Guard or the observer office for the phone number of the closest Marine Safety Office Dockside Examiner.

VESSEL NON-COMPLIANCE

The Atlantic Highly Migratory Species Fisheries Management Plan (50 CFR 635) specifies that once notified in writing, the owner and/or the operator must keep the SEFSC informed of their fishing activities and trip departures during the period of selection. Vessel owners/operators must also understand an observer assigned to monitor a fishing trip can be a male or female due to federal regulations prohibiting discrimination in hiring and/or contracting practices. In general, the lack of bathroom facilities, privacy, or sparse living conditions aboard a vessel is not sufficient grounds to prohibit observer coverage by either a male or a female observer. Once arrangements have been made by the SEFSC office to assign an observer to a vessel, the vessel operator must wait until the observer has arrived. Advance notification of departure times and locations can prevent any unnecessary delays. If the vessel departs once observer coverage has been arranged or if the operator rejects an observer present for boarding, this will be documented and the vessel name submitted for non-compliance to the NMFS Southeast Regional Office (SERO) which is responsible for issuing annual permits for participation in the fishery and to the NMFS Enforcement Office responsible for enforcing federal fisheries regulations. Permit holders, owners, and/or operators of vessels can also be identified to SERO for observer non-compliance for non-communication with the coordinator's office (Lack of verbal or written notification of departures or fishing activities), hindrance of the observer in completing his/her data collection duties, and/or harassment during the observed trip. Submission of a vessel owner or operator's name for observer non-compliance is not taken lightly and is only initiated when the circumstances leave no alternative. However, once submission occurs, the observer program personnel do not control actions taken by SERO and NMFS Enforcement office. It is the intent of this program to seek a good working relationship between the scientific personnel involved in the data collection and the daily routine of the vessel crew.

DATA COLLECTION FORMS

In order to record data needed to describe the catch and effort of the longline fishery, the POP observer must complete three data forms (Appendix 1). The first is called the "Longline Gear Characteristic Log", which is used to record the type of mainline used, length of drop line, number and length of gangions, make and model of hooks used, as well as the number of floats, high fliers, and radio beacons used. The second data form is the "Longline Haul Log", which is used to describe fishing effort. This form allows the observer to record the length, location and time duration for each set and haulback, as well as environmental information, the speed at which the vessel sets the gear, and type of bait used. The last of the data forms is called the "Large Pelagic Individual Animal Log". This data sheet allows the observer to record the species of fish caught, condition of the catch (alive, dead, damaged, or unknown) when brought to the vessel, and the final disposition of the catch (kept, thrown-back, finned, etc.). When an animal is brought onboard the vessel, the observer will verify species identification and record length measurements. A final weight of the carcass is recorded during unloading at the dock. This weight is matched to the length measurements on the data sheets using a specially numbered tag to identify the carcass of primary interest.

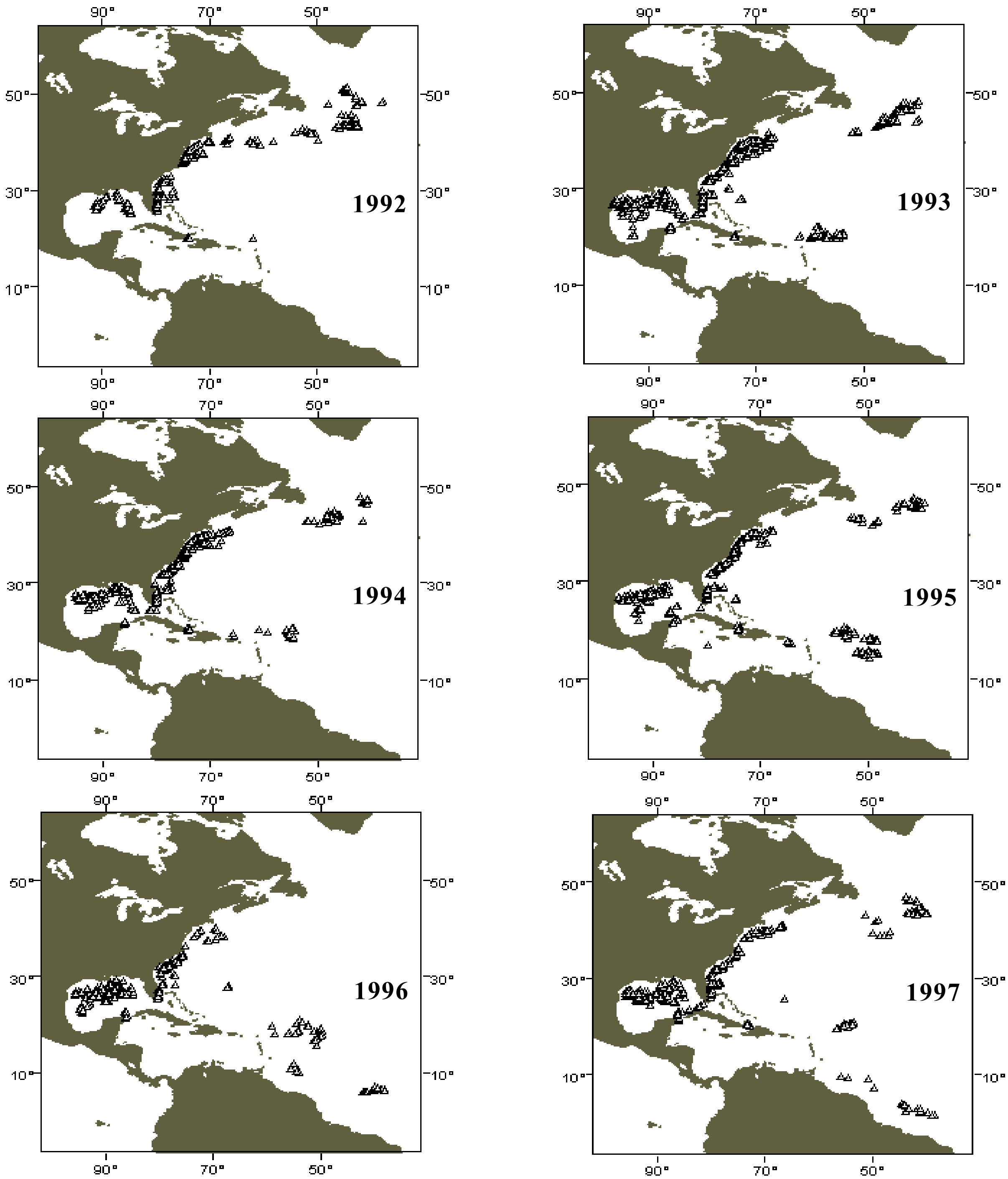


Figure 2. Locations of hauls observed by SEFSC and NEFSC observers, 1992-2000.

Figure 2. Locations of sets observed by SEFSC and NEFSC observers, 1992-2000.

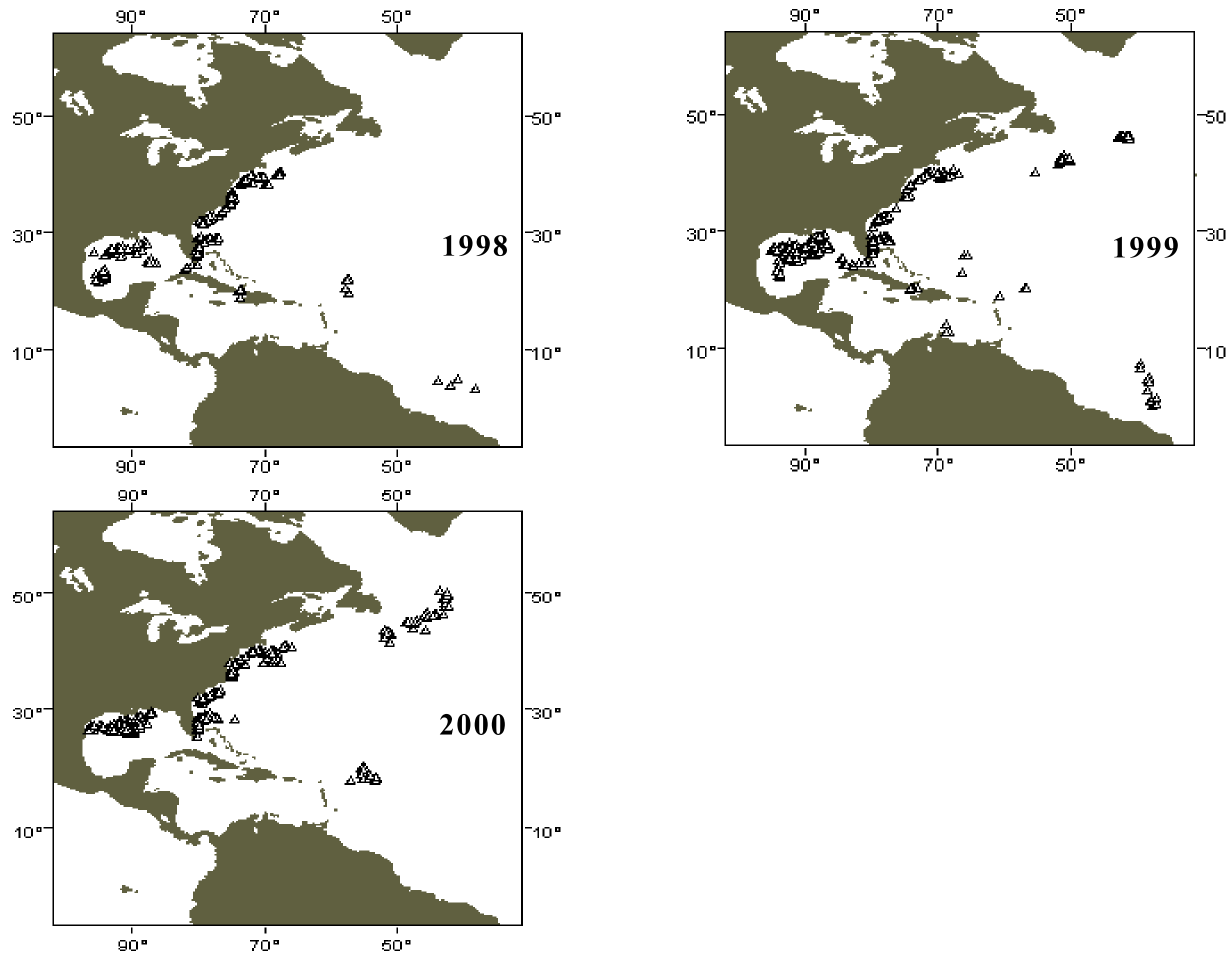


Figure 2. (Continued)

DATA SUMMARY
1992 - 1996

Vessel Coverage

From May 1992 through December 2000, scientific observers associated with the SEFSC and NEFSC observed a total of 638 pelagic longline trips in waters of the northwest Atlantic Ocean (Table 1). In total, observers spent 7,898 days-at-sea during which 4,462 sets and 4,501 hauls were observed (Figure 2 and Table 1). POP procedure is to count any haul that is interrupted intentionally to allow the gear to soak longer, or that is interrupted for weather or mechanical problems for longer than 6 hours, as a “split haul” (i.e. a set that has two or more hauls associated with it). This accounts for the discrepancy between numbers of sets and numbers of hauls.

Of the trips monitored, a total of 206 vessels were observed at least once during this time period. Data from 4 trips were excluded from analysis in this report because the gear was set as bottom longline and directed at shark species.

Based on the POP experience, scheduling fishing and fishing trips are not always predictable. Excluding the difficulties of communication with owners or operators concerning fishing trip departures, scheduling of an observed trip on any selected vessel can also be hindered by mechanical repairs, weather, crew or captain replacement, activity in another fishery, as well as availability of an observer for an observed fishing trip. Given all of the variables that can affect scheduling an observed trip, the POP from 1992 to 2000 was successful in observing an overall average of 81% of the target number of sets.

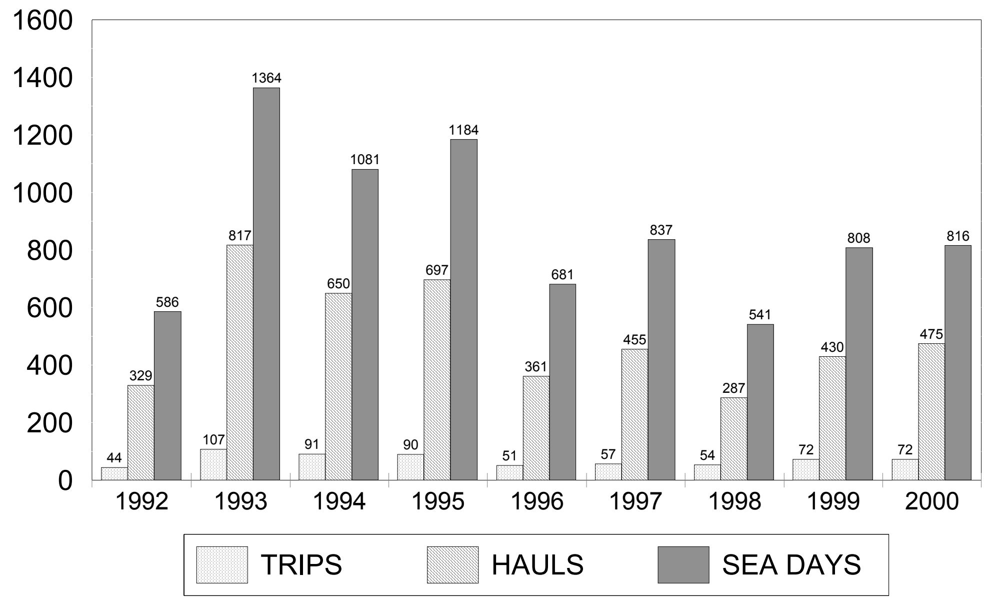


Figure 3. POP observer effort, 1992 - 2000.

Given the transit time to and from the fishing grounds and the effort (in days) spent fishing, a POP observer spent an average of 1.8 days at sea for each set observed (Figure 3, Table 1).

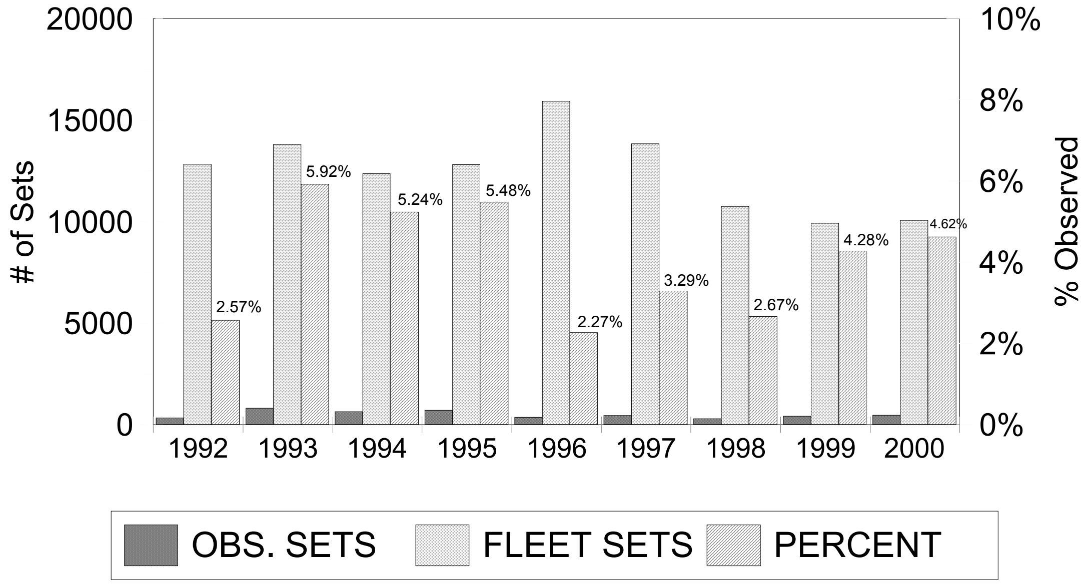


Figure 4. Comparison of total observed sets recorded by the POP, the sets reported by the U.S. pelagic longline fleet through pelagic logbook forms, and percent coverage achieved by year, 1992 - 2000.

The overall average percent coverage was over 4 percent for all years combined (Figure 4). The years in Figure 4 when the percent coverage was over 5 percent (1993-1995), both regional observer programs were operating at funding levels of about $1.2 million per year. The fall off in the percent coverage in 1996-2000 reflects a reduction in funding for the program.

Species Observed

The presence of a scientific observer onboard a commercial longline vessel provides an opportunity for collecting valuable information for monitoring both the fishery and the stocks being harvested. The data forms, as previously mentioned, provide scientists with basic information concerning gear configuration, baits used, number of hooks set, and the environmental parameters associated with a particular set. Equally important, the observers record data concerning the species of fish encountered, their size, sex and status (kept, discarded, etc).

Data collected during a fishing trip are entered into a computer usually within 7 days upon the observer's return to port. Data are screened for accuracy during the debriefing meeting with the observer followed by data entry. Audit programs are used by the POP that help to catch data entry errors (e.g. dead fish entered as released alive, etc.). Because of the ongoing refinement of the quality assurance programs, the accuracy of the observer database is increasingly improved.

Summarizing the 1992-2000 catch data, observer personnel identified a total of 155,172 fish, marine mammals, sea turtles and birds to genus or species level (Figure 5; Tables 2 and 3).

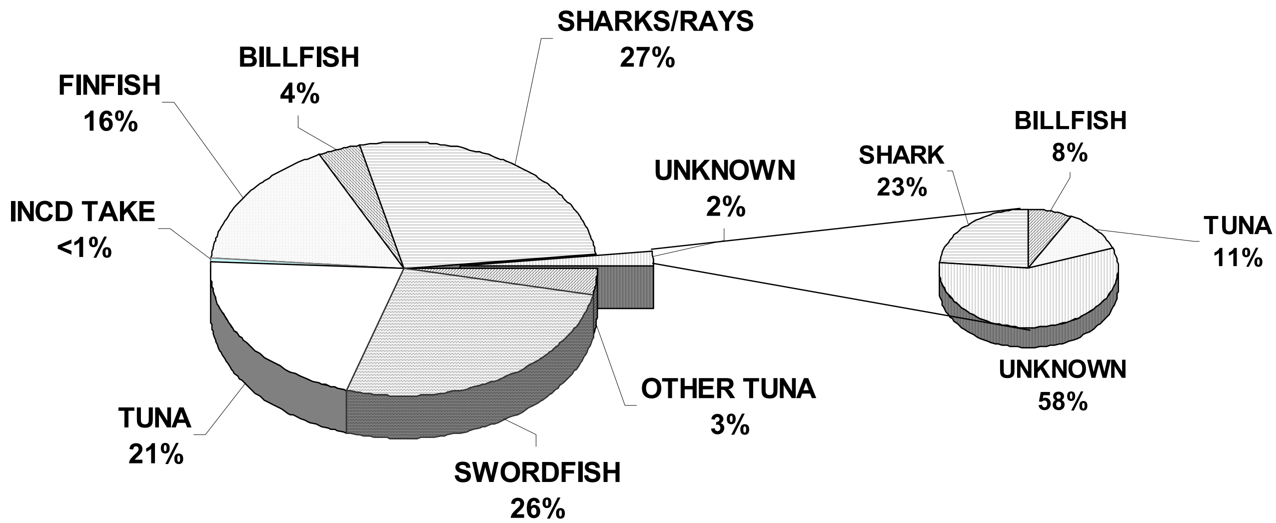


Figure 5. Species composition of the 155,172 animals observed by general category groups (except cephalopods) by the POP, 1992-2000. The incidental take (marine mammals, turtles, and sea birds) represents about one half of 1% of the total catch in the POP database. The tuna category is comprised of yellowfin, bigeye and bluefin.

This total includes 3155 fish in the "UNKNOWN" category that could only be identified to a general fish category, (i.e. unknown tuna, unknown shark, etc) but the observer was able to determine the alive/dead status. In addition, the Incidental Take (INCD TAKE) (Figure 5; Table 3) includes 118 marine mammals (6% released dead), 739 sea turtles (<1% released dead), and 84 seabirds (70% released dead). The overall total excludes 11 squid, which were not included in Figure 5.

Although a wide variety of fish were caught by the observed longline vessels, only about six species were routinely valued as a marketable product. These primary species (swordfish, yellowfin tuna, bigeye tuna, bluefin tuna, mahi-mahi, and shortfin mako) comprise about 57% by number (N=87,851) of the total observed catch. Of the total observed fish (Figure 5), swordfish made up 26% by number of the catch; while yellowfin, bigeye, and bluefin tunas, combined, made up 21% by number of the observed catch. Sharks and rays, a bycatch of the tuna and swordfish fishery, made up the other major portion of the pelagic longline catch, about 27% by number.

Observation of the status (alive/dead) of fish caught is an important component needed for assessing the effectiveness of some fishery management tools, like minimum sizes. The observer records the status (alive, dead, damaged) of the fish as it is brought alongside the vessel (Tables 2 and 3) and whether it is kept or thrown back. From these data, mortality of discards can be estimated (Table 4). In general, these proportions are similar to the alive/dead proportions for various Atlantic pelagic species caught on longline reported in the literature (Farber and Lee, 1991; Hoey, 1992; Lee et al., 1994, 1995).

Gear Characteristics

Observer coverage took place in all of the 11 geographical areas shown in Figure 1. As an overview of the observed longline gear deployed, the shortest average length of mainline set on an observed trip was 4.3 nautical miles (NM) while the longest average set during a trip was 45.5 NM. Additionally, during the 4,501 hauls observed, a total of 2,981,073 hooks were recorded (Table 1).

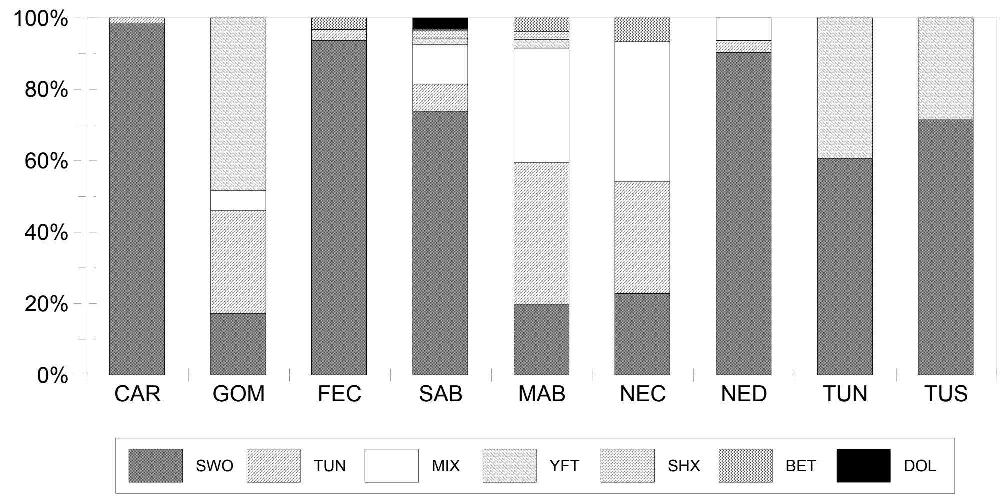


Figure 6. Indicated target species for hauls observed, by area (see Fig. 1). SWO = swordfish, TUN = mixed tunas, MIX = any combination (usually a combination of swordfish and a tuna species), YFT = yellowfin, SHX = sharks, BET = bigeye tuna, and DOL = mahi-mahi. The SAR and NCA areas are not shown because swordfish was the target species in 100 % of the hauls observed in those areas.

Indicated target species for hauls was highly variable among different areas; however, swordfish was the indicated target species for over 80% of the hauls observed in the CAR, FEC, NED, SAR, and NCA (Fig 6). Tuna or a mixture of tuna and swordfish made up the majority of indicated target species in sets observed in the GOM, MAB, and NEC. The target species information given here should not be used to characterize the entire fleet's effort. For example, it had been the policy of the POP to only place observers on vessels that were using pelagic longline gear to target swordfish or tunas and vessel owners or operators who reported they were using pelagic longline gear to target sharks or mahi-mahi were generally waived from coverage. For this reason the proportional fleet effort by pelagic longliners directed at species other than swordfish or tunas is probably higher than indicated here. The shark or mahi-mahi directed sets that were observed by POP personnel were generally the result of a captain deciding to switch target species from swordfish or tuna during the trip. Note that current POP policy is to observe any pelagic longline set, regardless of target species.

Variation in hook fishing depth (i.e. length of float line plus length of gangion) is quite variable among vessel operators. It should be understood that actual fishing depth of the baited hook is unknown due to influences by ocean currents and environmental conditions. However, given an assumed fishing depth based on float line and gangion length, three general groupings can be found depending on the geographic areas where fishing takes place.

The average minimum and maximum depths of the baited hooks are similar for the MAB, NEC, and NED (Table 5), with a range from 12 to 19 fathoms (22-35 m) for the three geographical areas. This represents the shallowest of the three general fishing depth groupings observed. Generally speaking, observed vessels fishing in the waters of the MAB and NEC target more on tuna species while the NED is typically directed more at swordfish (Fig. 6). The second grouping includes the GOM, FEC, SAB, and TUS, with a range of 19 to 37 fathoms (35-67 m). Vessels observed fishing in the waters off the southeast U.S. (FEC and SAB) and down below 5 degrees of latitude (TUS) target mostly swordfish, with yellowfin generally found as a by-catch, whereas observed vessels in the GOM primarily target yellowfin tuna with a by-catch of swordfish. The deepest fishing depth grouping includes the CAR, SAR, NCA, and TUN with a range of 32 to 46 fathoms (58-84 m). Observed effort in these areas was almost completely directed at swordfish. These data suggest that fishing depths depends more on the area fished rather than target species. For example, observed hook fishing depth was shallowest in the NED and deepest in the CAR but in both areas the target species was swordfish.

Observers also recorded various kinds of bait (species) used during fishing activities. Generally speaking, the technique of fishing “dead bait” (bait brought aboard the vessel frozen and then thawed prior to use) is the prevalent bait method used in all geographical areas (Table 5). On any given set, most crews fish a single species of bait. The primary “dead bait” species recorded for observed sets were Atlantic mackerel (*Scomber scombrus*) and squid (*Illex* spp). Other frozen baits recorded on some of the trips observed, were from the Clupeidae (herring and shad) or Carangidae (scad) families. Although the technique of placing “dead bait” on hooks is used in the Gulf of Mexico, another baiting technique commonly observed on the Asian-American vessels in that region between 1992 and 2000 was the use of “live bait”. These “live bait” species, caught at sea near oil platforms, were kept alive onboard the vessels in holding tanks. The vessel crews were opportunistic as to the bait utilized and were concerned more with availability and quantity of bait than a preference for a particular bait. Therefore, this technique could use multiple species for a given set or fishing trip. The predominant “live bait” species utilized by the Asian-American fleet included bigeye scad (*Selar crumenophthalmus*), chub mackerel (*Scomber japonicus*), and Spanish sardines (*Sardinella aurita*).

As previously reported in Lee et al. (1995), squid and mackerel continue to be the preferred bait kind (83% of hauls observed) associated with the “dead bait” technique observed in the longline fishery for all areas (Table 5), with squid being the most common bait in all geographical areas. In the GOM area where both baiting techniques occur, only 21% of the hauls observed used the “live bait” technique. The “live bait” technique was used generally by Asian-American fishers targeting primarily yellowfin tuna. Regulations that became effective September 1, 2000, prohibited the use of live bait on pelagic longlines in the Gulf of Mexico in order to reduce bycatch.

RECENT POP RESEARCH STUDIES UNDERWAY

Numerous analyses of the POP data are conducted in support of determining the status of fishery resources. Below are summarized a few POP research studies underway making use of the specimen materials collected through the POP.

Yellowfin Tuna Reproduction

The SEFSC Pelagic Observer Program has supported an Atlantic yellowfin tuna reproductive study that was initiated in 1998 under the direction of Dr. Freddy Arocha of the Instituto Oceanographico de Venezuela, Universidad de Oriente in Venezuela. Between May 1994 and December 1999, 133 gonad samples were collected for this study from yellowfin tuna caught by longline, purse seine, and bait boat through the cooperation of various captains and crews, POP personnel, and personnel from the Fondo Nacional de Investigaciones Agropecuarias (FONAIAP) in Venezuela. Some of the results from the study follow (see Arocha et al. 2000, 2001 for further information):

1) The spawning yellowfin population in the region seems to form two groups: one group consists of smaller females from the Gulf of Mexico; and the second consists of larger specimens in the southeastern Caribbean Sea.

2) Spawning of female yellowfin in the western North Atlantic takes place in the Gulf of Mexico from May to August and in the southeastern Caribbean Sea from July to November.

3) During the spawning season, female yellowfin are multiple spawners producing ova (eggs) in batches for dispersion, with an average spawning frequency of 46 times or about one spawn every three days.

4) Batch fecundity estimates of the hydrated oocytes (ready to spawn eggs) for female yellowfin tuna ranged from 1.2×10^6 oocytes from a 132 cm (FL) and 70 lbs (dwt) specimen to 4.0×10^6 oocytes from a 142 cm (FL) and 92 lbs specimen.

The above highlights are just a few preliminary findings from Dr. Arocha's work; updates of his results may be reported at future ICCAT meetings.

Swordfish Age and Growth

In addition to the yellowfin reproductive work, Dr. Arocha of the Instituto Oceanographico de Venezuela, Universidad de Oriente is working with the SEFSC in the analysis of anal fin spines collected from swordfish in the northwestern Atlantic Ocean. From 1996 to 2000, the POP has collected 2,573 fin spines (1,138 male and 1,435 female). Dr. Arocha will be analyzing these samples in order to update age and growth models for swordfish. Results from analysis of spines collected through the year 1998 are expected to be reported in the form of a working document at an upcoming ICCAT meeting.

Shark Age and Growth

In 1999 and 2000 the POP began collecting vertebral centrae from sharks; 68 centrae (primarily from silky and shortfin mako sharks) were sent to Dr. John Carlson of the SEFSC Panama City laboratory. Information from these centrae and other collection efforts will be used by Dr. Carlson to develop or update age and growth models for future shark population assessments.

Tag Release and Recapture

The Cooperative Tagging Center (CTC) is located at the Miami Laboratory, Miami, FL. The purpose of the CTC is to provide tags to those wishing to participate in the tag release program, and to collect, archive, and analyze data collected from returned specimens. In order to study movements, as well as gain insight into growth rate, longevity, and mortality rates of highly migratory species, the CTC needs the assistance of individuals and organizations that are willing to tag on a voluntary basis. Mr. Dennis Lee is the CTC contact for the commercial fishing community. For the purpose of providing a large number of tags (not to exceed 50 tags per request) to the commercial fishing community, fishermen are asked to contact Mr. Lee. For persons tagging for the first time, a form will be provided which will need to be completed and mailed to the Miami Laboratory. Once the form has been received, a minimum of 25 tags will be provided the first time. If a tagger is already in the CTC database, up to 50 tags may be issued at one time. Keep in mind, however, that the Miami Laboratory reserves the right to limit tag quantity provided.

As mentioned, tag recaptured fish are extremely important in providing information needed for studies of age, growth, migration and mortality rates of fish populations. Because the observer or the captain and crew do not have ready access to tag release data, all dead fish with a tag should be considered extremely important. Examples of the types of information obtained from recaptured fish follow:

1) A tag-recaptured swordfish was caught in January 1997, by a longline vessel while a POP observer was aboard. From the tag recapture number (#R347231), it was determined that the swordfish had been at large for 15 months. The fish had been tagged by a longline captain in the mid Atlantic Bight and was recaptured off the Yucatan Peninsula.

2) A longline vessel recaptured a white marlin in 1997 (tag #BF107716) that had been at-large for 19 months. It had been tagged off Cape Hatteras and recaptured off the northeastern coast of Brazil.

3) A longliner with a POP observer on board recaptured a night shark in 1997 (tag #M191271) that had been at-large for 3 years. It had been tagged by a NMFS observer just off Cape Hatteras, and recaptured in the South Atlantic Bight.

The above are a few of the interesting tag recaptures that took place with a POP observer on board the vessel. It is important for everyone to understand that the recapture of a tagged fish can be a treasure chest of information and lend much insight into the life history biology of a fish. In some cases, it can extend what we know about a fish's longevity. We appreciate all those that do participate and are willing to assist anyone who wants to get started.

ACKNOWLEDGMENTS

The Miami Laboratory Pelagic Observer Program is grateful to vessel owners, operators, and crews that have participated in the observer program. Without their overall cooperation, the collection of catch and effort data, as well as biological samples would have been difficult. Special acknowledgment is given to the help provided by port agents and observer personnel of the SEFSC and NEFSC, as well as observer personnel from Manomet Observatory, RRA, FONAIAP, and Johnson Controls Inc (JCI). We also graciously thank the captains, crews, and individuals associated with the Blue Water Fishermen's Association in providing assistance to the program research activities.

LITERATURE CITED

Arocha, F., D.W. Lee, L.A. Marcano, and J.S. Marcano. 2000. Preliminary studies on the spawning of yellowfin tuna, *Thunnus albacares*, in the western central Atlantic. International Commission for the Conservation of Atlantic Tunas, Collective Volume of Scientific Papers 51:538-552.

Arocha, F., D.W. Lee, L.A. Marcano, and J.S. Marcano. 2001. Update information on the spawning of yellowfin tuna, *Thunnus albacares*, in the western central Atlantic. International Commission for the Conservation of Atlantic Tunas, Collective Volume of Scientific Papers 52:167-176.

Farber, M. I. and D. W. Lee. 1991. A statistical procedure for estimating the mortality on discarded billfish caught by longline gear. International Commission for the Conservation of Atlantic Tunas, Collective Volume of Scientific Papers 35:113-119.

Hoey, J.J. 1992. By catch in U.S. Atlantic longline fisheries for swordfish and tuna. Blue Water Fishermen's Association Newsletter, March 16, 1992. 7p.

Lee, D.W. , C.J. Brown, A. J. Catalano, J.R. Grubich, T. W. Greig, R. J. Miller, and M.T. Judge. 1994. SEFSC pelagic longline observer program data summary for 1992-1993. NOAA Technical Memorandum NMFS-SEFSC-347. 19p.

Lee, D.W., C.J. Brown, and T.L. Jordan. 1995. SEFSC pelagic longline observer program data summary for 1992-1994. NOAA Technical Memorandum NMFS-SEFSC-373. 19p.

Lee, D.W., and C.J. Brown. 1998. SEFSC pelagic observer program data summary for 1992-1996. NOAA Technical Memorandum NMFS-SEFSC-408. 21p.

For more information

Information on the observer program or for scheduling an observer trip, please contact the Pelagic Observer Program Coordinator, Dennis Lee:

(Office) 800 858-0624 (FAX) 305 361-4562

Address: Southeast Fisheries Science Center
Miami Laboratory
75 Virginia Beach Drive
Miami, FL 33149

General information or questions about programs concerning dealer reporting, logbook submission, or the tagging program, persons should contact the NMFS Miami Laboratory's main office telephone number (305) 361-4200. The following contact persons are provided:

DEALER REPORTING: Andy Bertolino
PELAGIC LOGBOOK REPORTING: Andy Bertolino
GAMEFISH TAGGING PROGRAM: Dr. Eric Prince - 800 473-3936
Fish tagging liaison (commercial fisheries): Dennis Lee 305 361-4247

Information on fishing permits or regulation should be directed to the NMFS Southeast Regional Office, St. Petersburg, FL. or Northeast Regional Office Gloucester, MA.

REGULATIONS AND PERMITS BRANCH: (813) 570-5326

National Marine Fisheries Service
Southeast Regional Office
9721 Executive Center Drive, N
St. Petersburg, FL 33702

TUNA PERMITS: 1-888-872-8862 (automated)

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

Highly Migratory Species (HMS) regulatory information can also be found on the internet at:

http://www.nmfs.noaa.gov/sfa/hmspg.html

Table 1. Number of vessels covered, trips, sets observed, days spent at sea, total hooks set, and percent of sets observed from the total sets required for 5% coverage of the fishing effort, 1992-2000.

POP OBSERVER COVERAGE
1992-2000

YEAR	VESSELS OBSERVED	TRIPS	SETS OBSERVED	DAYS AT SEA	TOTAL HOOKS SET	% of SETS TARGETED[1]
1992	42	44	329	586	197,919	51%
1993	82	107	817	1364	534,969	>100%
1994	75	91	650	1,081	421,487	>100%
1995	74	90	686	1,184	484,944	>100%
1996	47	51	356	681	223,387	45%
1997	53	57	448	837	315,592	66%
1998	49	54	287	541	180,962	53%
1999	55	72	424	808	291,553	86%
2000	62	72	465	816	330,260	92%
OVERALL	206[2]	638	4,462	7,898	2,981,073	N/A
YEARLY MEAN:	60	71	496	878	331,230	81%

[1] % of Sets Targeted = (Sets Observed/Sets Targeted) x 100

[2] Overall Vessels Observed includes no duplications among years. Yearly totals of Vessels Observed include no duplications within that year.

Table 2. Numbers of alive, dead, and damaged (shark bitten) swordfish, billfish, tunas, and sharks when brought along side the boat as recorded by POP observers while deployed aboard U.S. pelagic longline vessels, 1992-2000.

GROUP	COMMON NAME	ALIVE	DEAD	DAMAGED
SWORDFISH	SWORDFISH	8,498	30,553	1,843
TUNA	BIGEYE	4,181	3,700	732
	BLUEFIN	304	534	50
	YELLOWFIN	11,588	9,579	1,819
BILLFISH	ATLANTIC SAILFISH	633	992	49
	MARLIN BLUE	823	467	32
	MARLIN WHITE	1,123	1,018	47
	SPEARFISH LONGNOSE	52	91	1
	SPEARFISH ROUNDSCALE	3	21	1
	SPEARFISH SPP.	66	63	1
SHARKS				
Small Coastal	ATLANTIC SHARPNOSE	78	111	13
Large Coastal	BLACKTIP	36	74	0
	BULL	22	12	0
	HAMMERHEAD GREAT	31	48	1
	HAMMERHEAD SCALLOPED	219	300	10
	HAMMERHEAD SMOOTH	1	4	0
	HAMMERHEAD SPP.	267	205	3
	LEMON	1	0	0
	NURSE	1	0	0
	SANDBAR	554	113	1
	SILKY	994	1,665	20
	SPINNER	12	7	1
	TIGER	528	20	0
Pelagic	BLUE	19,268	3,647	76
	MAKO SHORTFIN	1,119	492	14
	MAKO SPP.	384	155	0
	PORBEAGLE	19	14	0
	THRESHER	22	13	0
	THRESHER COMMON	66	28	0
	WHITETIP OCEANIC	251	108	0
Prohibited	BASKING	1	0	0
	BIGNOSE	13	26	2
	DUSKY	1,047	719	14
	MAKO LONGFIN	56	48	1
	NIGHT	144	540	12
	REEF	5	2	0
	SAND TIGER	3	1	0
	THRESHER BIGEYE	216	156	2

Others	COLLARED DOGFISH	1	1	0
	CROCODILE	114	45	2
	DOGFISH	33	1	0
	DOGFISH SMOOTH	29	3	1
	DOGFISH SPINEY	19	0	2
	SKATES/RAYS	6,329	52	3

Table 3. Numbers of alive, dead, and damaged (shark bitten) finfish, other tunas, marine mammals, marine turtles and unknown species groups when brought along side the boat as recorded by POP observers while deployed aboard U.S. commercial longline vessels, 1992-1996.

GROUP	COMMON NAME	ALIVE	DEAD	DAMAGED
TUNA OTHER	ALBACORE	546	2,308	204
	BLACKFIN	363	781	50
	BONITO	10	51	2
	LITTLE TUNNY	69	248	4
	SKIPJACK	30	579	17
FINFISH	AMBERJACK SPP.	4	1	1
	BARRACUDA	145	29	3
	BIGEYE CIGARFISH SPP.	54	67	3
	BLUEFISH	23	44	3
	COBIA	4	0	0
	CUTLASS FISH	3	0	0
	DEALFISH	1	6	0
	DOLPHIN FISH SPP.	9,693	2,763	210
	DRUM RED	7	0	0
	ESCOLAR	1,883	2,001	131
	GOOSEFISH	1	0	0
	GROUPER SPP.	0	1	0
	HADDOCK	1	1	0
	HERRING	1	0	0
	JACK CREVALLE	1	0	0
	JACK SPP.	3	2	0
	LANCETFISH SPP.	960	3,555	440
	MACKERAL ATLANTIC	1	2	0
	MACKEREL CHUB	0	6	0
	MACKERAL FRIGATE	2	2	0
	MACKEREL KING	8	25	3
	MACKEREL SNAKE	39	159	15
	MISC FINFISH	223	120	4
	OILFISH	437	272	18
	OPAH	16	16	0
	POMFRET SPP.	143	130	5
	PUFFER SPP.	82	7	1
	RAINBOW RUNNER	2	3	0
	REMORA	11	1	0
	SEABASS BLACK	0	1	0
	SNAPPER BLACKFIN	0	1	0
	SUNFISH SPP.	407	6	1
	TARPON	1	0	0
	TRIGGERFISH	3	0	0
	TRIPLETAIL	1	1	0
	WAHOO	180	963	63

MARINE MAMMAL	BEAKED WHALE	1	0	0
	COMMON DOLPHIN	2	0	0
	DOLPHIN	1	0	0
	DOLPHIN ATLANTIC SPOTTED	1	0	0
	DOLPHIN BOTTLENOSE	4	0	0
	DOLPHIN PANTROPIC SPOTTED	2	0	0
	DOLPHIN RISSOS	24	4	0
	DOLPHIN SPINNER SHORT	1	0	0
	MARINE MAMMAL	3	0	0
	PILOT WHALE	67	3	0
	PILOT WHALE SHORTFIN	2	0	0
	WHALE	1	0	0
	WHALE KILLER	1	0	0
	WHALE PYGMY SPERM	1	0	0
MARINE TURTLE	KEMPS RIDLEY	2	0	0
	TURTLE	18	0	0
	TURTLE GREEN	14	1	0
	TURTLE HAWKSBILL	3	0	0
	TURTLE LEATHERBACK	294	1	0
	TURTLE LOGGERHEAD	400	3	0
SEA BIRD	GANNET NORTHERN	6	1	0
	GULL	2	8	0
	GULL BLACKBACKED	1	3	0
	GULL HERRING	0	7	0
	GULL LAUGHING	1	0	0
	SEA BIRD	15	33	0
	SHEARWATER GREATER	0	6	0
	STORM PETREL	0	1	0
UNKNOWN	BILLFISH	117	98	35
	SHARK	605	122	6
	TUNA	47	45	258
	UNKNOWN	1,598	52	36

Table 4. Numbers of alive and dead fish of 6 species recorded by POP observers while deployed aboard U.S. commercial longline vessels, 1992-2000.

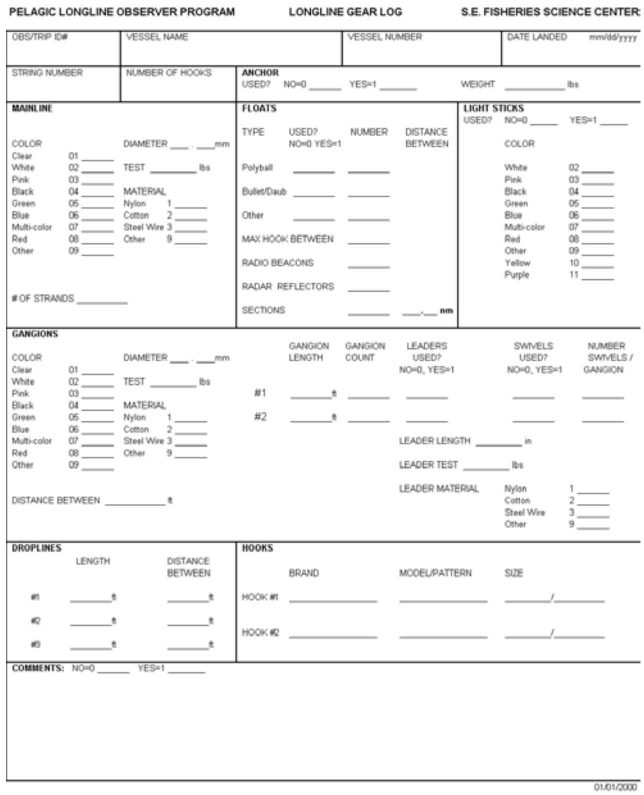
COMMON NAME	DISCARDED ALIVE (A)	DISCARDED DEAD (D)	PROPORTION DEAD D / (D + A)
Swordfish	4,311	13,417	0.757
Bigeye Tuna	423	885	0.677
Yellowfin Tuna	750	2105	0.737
Blue Marlin	784	506	0.392
White Marlin	1,086	1,068	0.496
Sailfish	591	1,051	0.640

Table 5. Average hook depth (minimum and maximum in fathoms) and kind of baits observed on U.S. commercial longline vessels by geographical area, 1992-2000. Baits used were: Atlantic mackerel (*Scomber scombrus*)=M, squid (*Illex sp.*)=Sq, herring (*Clupeidae sp.*)=H, Spanish sardine (*Sardinella aurita*)=Sa, bigeye scad (*Selar crumenophthalmus*)=Sc, and other =O (species not identified or artificial bait used). Bait type indicates sets fished using dead bait (stored frozen then thawed) and live bait (bait caught at sea and alive on hook).

Areas Fished	Total Hauls	Average Hook Depth (fathoms) MIN	MAX	Bait Kind (by numbers of sets) M	Sq	H	Sa	Sc	O	Bait Type DEAD	LIVE
CAR	177	34	46	26	151	0	0	0	0	177	0
GOM	1383	30	37	132	515	113	407	212	4	1100	283
FEC	503	24	33	178	319	1	2	0	3	503	0
SAB	529	19	28	151	378	0	0	0	0	529	0
MAB	775	13	18	154	609	9	0	0	3	775	0
NEC	403	12	19	36	365	0	0	0	2	403	0
NED	411	12	15	29	382	0	0	0	0	411	0
SAR	13	32	44	1	12	0	0	0	0	13	0
NCA	239	37	41	12	227	0	0	0	0	239	0
TUN	33	36	39	0	33	0	0	0	0	33	0
TUS	35	31	34	0	35	0	0	0	0	35	0

Appendix 1.

(A) Longline gear characteristics log form.


PELAGIC LONGLINE OBSERVER PROGRAM LONGLINE GEAR LOG S.E. FISHERIES SCIENCE CENTER

OBS/TRIP ID# | VESSEL NAME | VESSEL NUMBER | DATE LANDED mm/dd/yyyy

STRING NUMBER | NUMBER OF HOOKS | ANCHOR USED? NO=0 ______ YES=1 ______ WEIGHT __________ lbs

MAINLINE

COLOR: Clear 01 ____, White 02 ____, Pink 03 ____, Black 04 ____, Green 05 ____, Blue 06 ____, Multi-color 07 ____, Red 08 ____, Other 09 ____

DIAMETER ___ . ___mm

TEST ________ lbs

MATERIAL: Nylon 1 ____, Cotton 2 ____, Steel Wire 3 ____, Other 9 ____

OF STRANDS ________

FLOATS

TYPE | USED? NO=0 YES=1 | NUMBER | DISTANCE BETWEEN

Polyball ______ ______

Bullet/Daub ______ ______

Other ______ ______

MAX HOOK BETWEEN ______

RADIO BEACONS ______

RADAR REFLECTORS ______

SECTIONS ______ ___.___ nm

LIGHT STICKS

USED? NO=0 ____ YES=1 ____

COLOR: White 02 ____, Pink 03 ____, Black 04 ____, Green 05 ____, Blue 06 ____, Multi-color 07 ____, Red 08 ____, Other 09 ____, Yellow 10 ____, Purple 11 ____

GANGIONS

COLOR: Clear 01 ____, White 02 ____, Pink 03 ____, Black 04 ____, Green 05 ____, Blue 06 ____, Multi-color 07 ____, Red 08 ____, Other 09 ____

DIAMETER ___ . ___mm

TEST ________ lbs

MATERIAL: Nylon 1 ____, Cotton 2 ____, Steel Wire 3 ____, Other 9 ____

DISTANCE BETWEEN __________ ft

	GANGION LENGTH	GANGION COUNT	LEADERS USED? NO=0, YES=1	SWIVELS USED? NO=0, YES=1	NUMBER SWIVELS / GANGION
#1	______ft	______	______	______	______
#2	______ft	______	______	______	______

LEADER LENGTH ________ in

LEADER TEST ________ lbs

LEADER MATERIAL: Nylon 1 ____, Cotton 2 ____, Steel Wire 3 ____, Other 9 ____

DROPLINES

	LENGTH	DISTANCE BETWEEN
#1	______ft	______ft
#2	______ft	______ft
#3	______ft	______ft

HOOKS

	BRAND	MODEL/PATTERN	SIZE
HOOK #1	__________	__________	______/______
HOOK #2	__________	__________	______/______

COMMENTS: NO=0 ______ YES=1 ______

01/01/2000

(B) Longline haul log form

PELAGIC LONGLINE OBSERVER PROGRAM — LONGLINE HAUL LOG — SOUTHEAST FISHERIES SCIENCE CENTER

OBS/TRIP ID	VESSEL NAME	VESSEL NUMBER	DATE LANDED mm/dd/yyyy	HAUL #	GEAR CODE	PAGE# 1 OF ______

HAUL OBS?	CATCH?	INC TAKE?	WEATHER	WIND SPEED (KN)	WIND DIRECTION (°)	WAVE HEIGHT (FT)	REVERSE HAUL?	GEAR COND	STRING NUMBER
NO 0____ YES 1____	NO 0____ YES 1____	NO 0____ YES 1____					NO 0____ YES 1____		

MAINLINE LENGTH (NM)	SET SPEED (KN)	BOTTOM DEPTH RANGE (FM)	HOOK DEPTH RANGE (FM)	TOTAL ADD. WEIGHT	TARGET SPECIES ABBR.	SOAK DURATION

ITEMS USED?

TYPE	NO	YES	NUMBER
Floats	0____	1____	____
Light Sticks	0____	1____	____
Rattlers	0____	1____	____
Surface Lights	0____	1____	____
Radio Beacons	0____	1____	____
Radar Reflectors	0____	1____	____
Additional Line Wts.	0____	1____	____

NUMBER OF HOOKS

SET	____
LOST	____
TENDED	____
REBAITED	____

BAIT INFORMATION

	NUMBER	LBS	KIND	TYPE	COND
# 1					
# 2					
# 3					

SET/HAUL INFO		DATE mm/dd/yyyy	TIME 24 hours	POSITION INFORMATION BEARING/LATITUDE	N OR S	BEARING/LONGITUDE	E OR W	TEMP fahrenheit	DURATION hours
SET	BEGIN							.	
SET	END							.	.
HAUL	BEGIN							.	
HAUL	END							.	.

COMMENTS: NO 0____ YES 1____

1/1/2002

(C) Large pelagics individual animal log form.

SOUTHEAST FISHERIES SCIENCE CENTER
INDIVIDUAL ANIMAL LOG

01-01-2000

Obs/Trip Identifier	Vessel Name	Vessel Number	Date of Haul mm/dd/yyyy / /	Haul Number	Page ____ of ____

CARCASS Tag Number	SPECIES Name (Abbr)	SPECIES Code	Photo Taken	STATUS Unknown (0) Alive (1) Dead (2) Damage (3)	ACTION Unknown (0) Kept (1) Released dead (2) Released alive (3) Finned (4) Lost (5) Tended (6)	LENGTH MEASUREMENTS (cm) #1	#2	#3	Code	Actual Dressed Weight (Lbs)	SEX U (0) M (1) F (2)	TAG NUMBER OR SAMPLE INFORMATION	TAG CODE TR (1) TT (2) RC (3)	Est. Round Weight (Lbs)