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ANNUAL REPORT OF THE HAWAII-BASED LONGLINE FISHERY FOR 2000

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PREFACE

The Western Pacific Regional Fishery Management Council (WPRFMC) developed the fishery management plan (FMP) for pelagic species in accordance with the Magnuson-Stevens Fishery Conservation and Management Act of 1976. This FMP, which regulates the U.S. domestic fisheries for tunas, swordfish, marlins, and other pelagic species in the Western Pacific region, was first implemented by the National Oceanic and Atmospheric Administration (NOAA), National Marine Fisheries Service (NMFS) on March 23, 1987.

The Fishery Monitoring and Economics Program (FMEP) of the Honolulu Laboratory, Southwest Fisheries Science Center, NMFS, NOAA, collects biological and economic information from U.S. domestic longline fishing vessels permitted to fish within the western Pacific U.S. Exclusive Economic Zones. This report focuses on information from federally permitted domestic longline vessels based in Hawaii.

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INTRODUCTION

The Hawaii-based longline fishery is the largest commercial fishery in Hawaii with effort by this fishery spread throughout the central north Pacific. This fishery yielded pelagic landings of 24 million pounds and generated ex-vessel revenues estimated at $50 million in 2000. Landings decreased by 5 million pounds from 1999 but higher fish prices increased by ex-vessel revenue by $3 million. Tunas (*Thunnus* spp.), broadbill swordfish (*Xiphias gladius*), and sharks (Carcharhinidae, Alopiidae, Sphyrnidae, and Laminidae) were the dominant components of the longline landings.

Recent developments regarding the Hawaii-based longline fleet are discussed in this report. Descriptions of data sources, data management procedures, and data shortcomings are provided. Nonconfidential data summaries on fleet activity, effort, catch, catch-per-unit-effort (CPUE), landings, revenue, average prices, size of fish, and fishery interactions with endangered and protected species are presented. Finally, this report updates longline statistics for the entire period covered by the Federal longline logbook program (1991-2000) and the shoreside market sampling program (1987-2000).

RECENT DEVELOPMENTS

The most important issues facing the Hawaii-based longline fishery over the past 2 years have involved conservation of sea turtles, sea birds, and sharks. Sea turtles and sea birds are sometimes incidentally hooked or entangled on longline gear. Interactions with these protected species occur at a higher rate with “shallow-set” swordfish longline gear in comparison to the “deeper-set” tuna longline gear. Shallow-set longline gear also catches more sharks than deep-set gear.

A lawsuit filed by the Earthjustice Legal Defense Fund in February 1999 brought sea turtle interactions to the forefront although National Marine Fisheries Service (NMFS) Honolulu Laboratory (HL) scientists identified the issue as early as 1994 (Balazs and Pooley, 1995). This suit, filed on behalf of the Center for Marine Conservation and the Turtle Island Restoration Network alleged that NMFS failed to follow the proscribed National Environmental Policy Act (NEPA) process and challenged NMFS’s determinations under the Endangered Species Act (ESA) that continued conduct of the Hawaii-based longline fishery was not likely to jeopardize long-term existence of leatherback, loggerhead, olive ridley, and green sea turtles (Center for Marine Conservation v. NMFS (D. Haw.) Civ. No. 99-00152 DAE (CMC v. NMFS). The Federal Court in Honolulu issued an injunction on November 23, 1999, that led to the temporary closing of certain waters north of Hawaii to fishing by Hawaii-based pelagic longline vessels and also required all vessel operators to follow specific procedures for handling and releasing turtles (64 FR 72290 December 27, 1999, and 65 FR 37917 June 19, 2000). Subsequent Court orders, including one on June 23, 2000, required NMFS to curtail longline fishing for swordfish, increase observer coverage to 20% of all longline trips, and prepare an Environmental Impact Statement (EIS). NMFS completed the EIS for the Pelagic Fisheries of the Western Pacific Region on March 30, 2001

(NMFS, 2001). The Final Environmental Impact Statement (FEIS) contains the Agency's preferred alternative, which included a series of actions to mitigate the fishery's adverse impacts on sea turtles. These measures, which were accepted by the Court, include a prohibition on swordfish-style longline fishing and a seasonal area closure in waters south of Hawaii (from 0º to 15ºN and 145ºW to 180º during April and May). The definition of swordfish-style longline fishing for management puposes included two sectors of the fishery: swordfish and mixed-target longline fishing. Tuna-style fishing, defined as setting at least 15 branch lines between floats and using float lines at least 20 m long to achieve a maximum main line depth of at least 100 m, is the only style of longline fishing allowed under the current regulations. These measures are expected to substantially decrease the number of interactions for all species of turtles, but are also expected to reduce the Hawaii longline fishery's ex-vessel gross revenue by 10-40% depending on the ability of vessels targeting swordfish using shallow sets to shift their effort and employing deeper-set tuna techniques.

The NMFS Honolulu Laboratory has been involved in research concerning longline-sea turtle interactions since the early 1990s. NMFS is required by the ESA to identify methods to eliminate or reduce these interactions to the greatest practicable extent possible. Kleiber (1998) presented estimates of sea turtle interactions and mortalities in the Hawaii longline fishery. McCracken (2000) employed similar methods to update the estimates for the year 1999. A series of laboratory and field experiments are also planned to investigate mitigation techniques.

Meanwhile, the Western Pacific Regional Fishery Management Council (Council) developed an amendment to its Pelagic Species Fishery Management Plan (FMP) to mitigate sea bird interactions and submitted the final framework document to NMFS for approval on December 15, 1999 (Cousins, pers. comm.). The Council's efforts concerning sea bird mitigation were superseded by the U.S. Fish and Wildlife Service (USFWS) when the latter agency initiated an ESA BO on interactions between the longline fishery and sea birds, particularly the endangered short-tailed albatross. This BO was completed on November 2000 and required Hawaii-based longline boats fishing north of 23ºN to use a variety of mitigation measures anticipated to reduce the level of sea bird interactions. These measures were largely based on NMFS and Council research. In February 1999, NMFS scientists conducted at-sea trials aboard the National Oceanic and Atmospheric Administration (NOAA) ship *Townsend Cromwell* to test seabird mitigation measures. The measures included the use of bird-scaring streamers, blue-dyed bait, and weighted branch lines (Boggs, 2001). Similar trials were undertaken on commercial fishing vessels in a project conducted by the Council (McNamara et al., 1999).

Education was also one of the requirements of mitigating interactions with protected species. Annual training workshops focusing on mitigation measures and handling techniques for both the sea turtle and sea birds have been planned and attendance in this workshop is mandatory for vessel operators to be certified participants in the Hawaii longline fishery.

Sharks, though incidentally caught in the Hawaii-based longline fishery, represent a large component of the longline catch. Though the demand for shark flesh is relatively small in Hawaii (limited primarily to mako and thresher sharks), fins were valuable as an export product to Asian markets. Shark fins were usually sold for cash, and the payments were distributed among crew members. Blue sharks retained for fins represented the majority of shark landings from 1993 to 2000. However, the practice of finning sharks by the longline fishery became controversial among shark conservationists, some fishermen, and the public seeking to have the practice banned. Consequently, in June 2000, the State of Hawaii prohibited the practice of finning sharks unless the fins were attached to the carcass and a Federal Act, similar to the state ban, was signed by the President in December 2000. A few vessels have returned to port with shark carcasses hoping there would be buyers willing to initiate and develop a market for blue shark flesh, but no such market has developed to date.

DATA SOURCES

The NMFS Fishery Monitoring and Economics Program (FMEP) relied exclusively on shoreside sampling for longline vessel activity and landings estimates from 1987 to 1991 (Ito, 1992). A Federal logbook system for domestic longliners operating in the western Pacific region was then implemented in November 1990. Logbook collection and summary procedures are documented in Dollar and Yoshimoto (1991). Therefore, the time spans covered in some summaries in this annual report differ according to the source of data. Additional information can be found at http://www.nmfs.hawaii.edu/fmpi/fmep/index.htm.

Longline vessels operators are required to submit daily logbook data to NMFS after concluding each trip. The quality of the logbook data is maintained by checking suspect entries prior to keypunching. FMEP personnel verify validity of suspected errors with the vessel operators or verified when cross checking the data with market or observer data. This report includes selected revisions to logbook data that rectify prior errors. Data in this report supersede previous summaries. These updates to the data bases have not changed any pattern revealed in previous reports but have improved the accuracy of the data. Improving the quality of the logbook data is an ongoing process.

Detailed information on vessel operations, area of fishing, fishing effort, catch-per-unit-effort (CPUE), and interactions with protected species are based on Federal longline logbook data. Longline trips are categorized as one of three trip types according to species targeted: swordfish, tuna, or mixed (targeting both swordfish and tuna). Trip target information is obtained by FMEP personnel from dockside interviews with the captain or lead fisherman. When the captain was unavailable for an interview or the log sheets were mailed in, trip type was determined by evaluating the set times, number of hooks and light sticks, area fished, duration of trip, catch composition, and previous history of trip types for that particular vessel.

In general, swordfish and mixed trip operators begin setting their gear in the evening, do not use a line thrower, set two to five hooks between floats, use squid for bait, attach light sticks to branchlines, soak the gear overnight, and haul the following morning. Setting the gear without a liner thrower keeps the gear relatively close to the ocean surface. A vessel's operator determines area of fishing and what fish are to be targeted. For management purposes in the FEIS and BO, both swordfish and mixed-target trips are included in the category of swordfish fishing. During 1989-94, when there was more interest in longlining for swordfish, one of the distinguishing characteristics that separated swordfish-targeted trips and mixed-targeted trips was the ratio of light sticks to hooks. Swordfish-targeted trips usually used a light stick-to-hook ratio of 1:1; whereas, mixed-targeted trips used a ratio ranging from 1:5 to 1:3. After longline vessels that targeted swordfish using the 1:1 light stick-to-hook ratio left Hawaii in 1994 and 1995, using a lower light stick-to-hook ratio was adopted as for targeting swordfish. Interestingly, techniques typically used to target swordfish or mixed species were successfully used to fish for bigeye tuna. In contrast, tuna trips typically set and soak gear in the day, use a line thrower, attach 15-30+ hooks between floats, use sanma for bait, use no light sticks, and haul gear in the afternoon. The Hawaii-based longline also catches a variety of other nontarget miscellaneous pelagic species, but almost all that catch has been marketed very successfully (Table 1).

Mean weight of fish, weight-frequency distribution, and average fish prices are based on shoreside sampling. Currently, shoreside sampling occurs twice a week when FMEP and Hawaii Division of Aquatic Resources (HDAR) fishery biologists collect biological and economic data at the United Fishing Agency (UFA), a public fish auction where most of the longline landings are unloaded and sold. In addition, similar information has been collected from seafood brokers who handle longline catch in Honolulu.

Weights of individual fish were recorded. When processing or loss from damage has occurred, the weight was raised to an estimated whole (round) weight. Landings and revenue estimates were computed by two methods. The estimates were computed by extrapolating from the number of days sampled at the auction and brokers to the total number of days the market was in operation during 1987-91. During this period the shoreside sampling captured about 75% to 90% of the business days that the market was operating. Landing estimates for 1992-2000 were based on the mean whole weight for each species from shoreside sampling and the corresponding number of fish kept from the longline logbooks. Mean weights and ex-vessel prices differed considerably among the three trip types. The overall mean weight and ex-vessel price were weighted to account for these differences. The implementation and continuation of the logbook program led to less effort dedicated to collecting data from the shoreside sample; however, the sample size still represented 20% to 35% of the logbook totals for the major billfish and tuna species.

Mako and thresher shark fins and carcasses were usually kept, whereas only the fins from blue and other shark species were kept. Currently, there is no market in Hawaii for blue and miscellaneous shark carcasses, and only a few sharks other than mako and thresher sharks were observed at the shoreside sampling site throughout the 14-year sampling period. Although carcasses of blue and other species of shark are discarded at sea, by logbook definition finning represents a kept and landed fish. Shark catch was estimated by multiplying the average weight of sharks from observer data collected during 1990-91 (Dollar, 1994) by the number of sharks (including those finned) kept, according to the logbook. This procedure for estimating round weight of kept blue sharks was developed as a crude method to estimate shark biomass so that shark landings could be represented in the tables as a whole weight, like all other species tabulated, regardless of product form. Shark landings are represented as estimated whole weight of the sharks kept for carcasses and fins only.

LONGLINE VESSEL OPERATIONS

There are 164 Federal limited entry permits issued for the Hawaii-based longline fishery. The number of active vessels has rapidly increased from 37 vessels in 1987 to a high of 141 vessels in 1991 (Fig. 1) [1]. This number then leveled off at about 120 vessels from 1992 through 1994, declined slightly to 103 vessels in 1996, and increased to 125 vessels in 2000. The Hawaii-based longline vessels are categorized into three size classes: small (<56 ft), medium (56-74 ft), and large vessels (>74 ft). Most of the vessels operating in the Hawaii-based longline fishery are medium- or large-sized vessels. There were 61 medium, 48 large, and 16 small vessels active in 2000. In general, the number of medium and large vessels has increased gradually from 1997, while the participation of small vessels has been on the decline since 1991.

The following is a summary of vessel entry and exit patterns for 2000:

Total active vessels in 1999:		119
Total entries:		+15
New vessels:	9	
Reactivated:	6	
Total exits:		-9
Inactive:	5	
Left Hawaii:	2	
Sank:	2	
Total active vessels in 2000:		125

[1] Number of vessels, number of trips, and average number of days fished per trip are based on date of landing (DOL), or when a longline trip returned to port. Active vessels indicate longline vessels taking at least one trip during the calendar year.

The entry and exit patterns in the Hawaii-based longline fishery were more dynamic than the net addition of four vessels in 2000. Fifteen vessels that had been either inactive (six vessels) or new entrants (nine vessels) landed fish in Hawaii in 2000. Seven of the nine new vessels were in the medium size class. Among the six reactivated vessels, three were from the West Coast and had previous experience fishing for swordfish and tunas in Hawaii. Nine vessels which fished in 1999 did not longline at all in 2000. Two vessels left Hawaii to fish elsewhere, while the remaining nine vessels stayed in Hawaii but were inactive throughout the year. Five medium vessels, two large vessels, and two small vessels left the longline fishery in 2000. One noticeable development in the longline fishery during the past 3 years has been the departure of longline vessels late in the year where boats relocated to California to fish for swordfish in the fall then returned to Hawaii in the winter or spring of the following year. Thirty-seven Hawaii-based longline vessel transited to California in the latter part of 2000, up from 33 vessels in 1999.

Longline Vessel Trip Activity

Trips made by Hawaii-based longliners decreased slightly to 1,103 trips in 2000 (Table 2). Although there was not much change in number of trips from 1992, targeting strategies have changed substantially. Swordfish trip activity has subsided substantially from nearly 300 trips during 1991-94 to 37 trips in 2000 (Fig. 2). In contrast, the number of tuna trips increased from 458 trips in 1992 to 814 trips in 2000. The number of mixed trips decreased substantially from 823 trips in 1991, stabilized at about 300 trips from 1995 through 1999, and decreased to 252 in 2000.

Longline trip activity was high during the first, second, and fourth quarters (Fig. 3) primarily because of high catch rates of bigeye tuna and swordfish. Fishermen elected to target swordfish during the first and second quarters when swordfish migrate relatively close to the Hawaiian Islands. Trip activity is lowest in the third quarter because of poor catch rates for both swordfish and tuna, consequently, vessel owners and operators usually schedule annual maintenance during this quarter. Activity increases in the fourth quarter when bigeye tuna catch rates improve and prices for sashimi (raw fish) increase during the holiday season. This high level of longlining typically carries over into the first quarter of the following year.

The number of miles traveled to the first set was determined by calculating the distance from Honolulu and the location of the first set from the logbook data. These calculations include those swordfish and mixed trips embarking from California that fish on their way to Hawaii. The average miles to first set for the fleet has ranged from 318 miles in 1991 to 557 miles in 2000 (Table 2). Swordfish trips usually traveled farther from Hawaii to make their first set (879 miles in 2000) while tuna trips traveled shorter distances to their first set (472 miles in 2000).

Average number of days fished per trip for the fleet increased gradually from 1991 through 2000 (Table 2). Swordfish trips consistently fished more days than all other trip types, increasing from an average of 10.7 days per trip in 1991 to 15.5 days per trip in 2000. The average number of days fished per trip for tuna and mixed trips also increased during 1991-2000. Swordfish trips fished an average of 3 to 5 days longer than tuna or mixed trips because swordfish can be kept fresh longer than tuna.

FISHING EFFORT

Number of Sets

Fishing effort[2] was summarized by numbers of sets (number of days fished) and by numbers of hooks set. Overall, the variation in total sets was quite small over the 10-year monitoring period. The total days fished fluctuated from 12,635 sets in 1991 to a low of 10,799 sets in 1994 and increased to a high of 12,921 sets in 2000 (Table 3). The number of sets fished for swordfish trips was substantially higher during 1991-94, while only 555 swordfish sets were made in 2000. Sets on tuna trips have more than doubled from 3,879 sets in 1992 to 9,041 sets in 2000, and mixed trips made 3,325 sets in 2000.

Number of Hooks Set

The total number of hooks set fluctuated between 11.7 to 13.0 million during 1991-94 and rose to a record 20.3 million hooks in 2000 (Table 4). The difference in the average number of hooks set per day fished among trip types was substantial: tuna trips set about 2.5 times the number of hooks per day fished than did swordfish or mixed trips. Tuna, mixed, and swordfish trips accounted for 85%, 13%, and 2% of the total number of hooks set in 2000, respectively. In general, hooks set by tuna trips have increased steadily and account for most of the effort expended by the Hawaii-based longline fishery. Tuna trips set 17.2 million hooks in 2000; in contrast, hooks set on swordfish trips decreased 89% from 1993 to only 0.4 million hooks in 2000. Hooks set on mixed trips decreased from 4.7 million in 1991 to 1.5 million in 1994. Hooks set on mixed trips were stable from 1995 through 2000 at 2.5-3.1 million hooks, with 2.6 million hooks in 2000.

The hooks set by area show where the effort was distributed in the major areas. Forty-seven percent of the hooks were set outside the Exclusive Economic Zone (EEZ), followed by the main Hawaiian Islands (MHI) EEZ (28%) in 2000. Hooks set in U.S. possessions, primarily in the vicinity of Kingman Reef, Palmyra Atoll, and Johnston Atoll accounted for 15% of the effort, while hooks set in the Northwestern Hawaiian Islands (NWHI) EEZ made up only 10% of the effort in 2000. Hooks set outside the EEZ increased from 4.1 million hooks in 1994 to 9.5 million hooks in 2000 (Fig. 4). Hooks set in the MHI EEZ ranged from 4.9 million to 7.1 million over the 10-year period, with 5.7 set in the MHI EEZ in 2000. Hooks set in the NWHI EEZ increased from 0.7 million hooks in 1992, peaked at 4.1 million hooks in 1997, and decreased gradually to 2.1

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[2]These units of effort are based on date of haul, i.e., the actual date of fishing operations. This is to ensure that these detailed units of measurements are summarized within the actual time period and not included in a time period in which the operations of a trip are concluded (i.e., date of landing).

million hooks in 2000. Hooks set by area in 2000 reveal that the most hooks were set south of the Hawaiian Islands between Johnston Atoll, Kingman Reef, and Palmyra Atoll (Fig. 5). There was no effort due north of the main Hawaiian Islands above 28ºN and between 150°-168°W in 2000 because of the Court-ordered area closure imposed on November 23, 1999. However, there was small effort distributed both east and west of the area closure.

The average number of hooks per set in 2000 was 1,570 hooks (Table 5), representing a 60% increase from the average number of hooks per set in 1991. Tuna sets are responsible for this increase because they set more hooks per day fished than swordfish or mixed trips. Moreover, the number of hooks set per day fished on tuna trips has increased 56% from 1991 while the number of hooks set on swordfish and mixed trips has remained relatively unchanged. Since shallow sets; i.e., swordfish and mixed sets, have been restricted, the number of hooks per set is expected to reflect the number of hooks set on tuna trips for the foreseeable future.

CATCH

Catch from the logbook data is summarized in numbers of several pelagic fish species. Catch is equal to the sum of fish kept, released, and discarded and was grouped into major categories; i.e., billfish, tunas, and miscellaneous pelagic species. Catch declined for all species except for yellowfin tuna and mahimahi during 2000 (Table 6).

Billfish Catch

Swordfish comprises the largest billfish catch of the Hawaii-based longline fishery (Fig. 6), and rose from 1991 to peak in 1993. Following a dramatic decline in 1994, swordfish catch remained about the same and declined by 3% in 2000. Most swordfish were caught on swordfish-directed trips during 1991-95, but were primarily taken on mixed trips from 1996 through 2000. Swordfish catch was consistently lowest for tuna-directed trips and in any given year, tuna trips account for less than 7% of the total number of swordfish caught by the Hawaii-based longline fleet. Swordfish catch was highest in the first two quarters of the year (January-June) and was typically low in the latter part of the year. The Federal Court closed prime swordfish grounds north of the Hawaiian Islands in December 1999. This ruling did not affect the swordfish catch as much as fishing behavior the following year. Longline fishermen maintained high catches of swordfish in the first half of 2000 by fishing in areas surrounding the area closure. Swordfish catch in the first and second quarters typically accounted for almost 70% of the annual catch of swordfish. In mid-2000 another Court ruling was implemented which focused on reducing the level of turtle interactions by restricting swordfish-directed effort. This ruling had a considerable effect on swordfish-directed effort and swordfish catch in the last two quarters of 2000, which were close to or at record lows. Throughout the last decade, most of the swordfish (63-83%) were caught outside of the U.S. EEZ (Table 7). The NWHI EEZ was typically the next highest area of catch, followed by the MHI EEZ. Swordfish catch was highest just northeast of Midway Island in 2000 (Fig. 7).

Blue marlin showed no apparent trend in catch ranging from 4,012 in 1991 to 8,806 in 1995. In 2000, blue marlin catch (4,509 fish) decreased 35% from the previous year. Blue marlin catch was typically highest in the second quarter. Most of the blue marlin were caught on tuna trips. The lowest catches of blue marlin were caught on swordfish trips. Tuna trips accounted for 43% to 71% of the total blue marlin catch. Blue marlin catch was highest in the MHI EEZ during 1991-97 but slightly higher blue marlin catches were observed outside of the U.S. EEZ from 1998 through 2000 (Fig. 8).

Striped marlin catch varied substantially from year to year, with a decreasing trend over the 10-year monitoring period. Striped marlin catch ranged from a high of 26,967 fish in 1991 to a low of 7,939 fish in 2000 and was highest in the fourth quarter, slightly lower in the first and second quarters, and lowest in the third quarter. Tuna trips account for 65-80% of the total striped marlin catch, which was much higher in the MHI EEZ fom 1991 to 1996. Catch, however, became more evenly apportioned among the areas of the MHI EEZ, NWHI EEZ, and outside the EEZ from 1997 through 2000. Striped marlin catch was slightly higher in the area between the Hawaiian Islands and Johnston Atoll (Fig. 9).

Tuna Catch

Bigeye tuna was the largest component of the tuna catch (Fig. 10) increasing from 40,923 fish in 1991, peaking at 98,795 fish in 1998, and declining to 74,493 fish in 2000. Bigeye tuna catch was highest in the fourth quarter and declined to a low in the third quarter. Most of the bigeye tuna catch was taken on tuna trips (74-87% during 1994-present) with highest bigeye tuna catches in the MHI EEZ from 1991 to 1996. The NWHI EEZ had slightly better bigeye tuna catches in 1997, with the most bigeye tuna catches outside the EEZ from 1998 through 2000. Catch in the EEZ of U.S. possessions was usually low but became exceptionally high in 1998, and in 2000 was highest east of Johnston Atoll and southwest of the Big Island (Fig. 11).

Yellowfin tuna catch has fluctuated from year to year in a general upward pattern peaking at 38,379 fish in 2000. Longline catch of yellowfin tuna did not change much over the course of a typical year; slightly higher catches occurred in the first quarter then declined gradually into a low in the fourth quarter. However, in 2000, there were record third and fourth quarter catches of 14,215 and 11,212, respectively. Mixed trips had the highest yellowfin tuna catch in 1991 and 1992, but tuna trips accounted for most of the yellowfin tuna catch. Yellowfin tuna catches were typically highest in the MHI EEZ from 1991 to 1996 and were slightly better outside the EEZ in 1997 and 1998. The highest yellowfin tuna catch was observed in the EEZ of other U.S. possessions (Kingman Reef and Palmyra Atoll) in 1999 and 2000 (Fig. 12).

Albacore catch increased fivefold from 1991 to 1997 (14,051 to 71,084 fish), with 39,777 fish caught in 2000. Albacore catch also rose as a result of increasing albacore catch north of the Hawaiian Islands on swordfish trips during 1992-94. The increase in catch from 1995 resulted from albacore caught on tuna trips. The recent increase in demand for albacore was driven by a growing fresh albacore market on the U.S.

mainland. Albacore has also established itself as an affordable fresh fish product available on a consistent basis in local supermarkets. Albacore catch has usually been better in the second and fourth quarters and slightly lower in the first and third quarters. The highest albacore catches occurred outside the EEZ with substantial catches also made in the MHI EEZ: an area east of Johnston Atoll had the highest albacore catch in 2000 (Fig. 13).

Catches of Miscellaneous Pelagic Species

Mahimahi catch showed a high degree of variability throughout 1991-2000. Catch ranged from 22,183 to 59,813 fish. Tuna trips and mixed trips accounted for most of the mahimahi catch, the highest catches usually outside of the EEZ, with substantial catches in the MHI EEZ. In general, ono catch increased, to peak in 1999. Tuna trips account for most of the ono catch, which was high in the MHI EEZ during 1991-94 but which has been higher outside the EEZ since 1995. Opah (moonfish) catch increased consistently from 1991 to 1999, but decreased in 2000. Rising opah catch is a result of increasing effort directed towards tuna since tuna trips typically accounted for over 95% of the opah catch. The highest opah catches were in the MHI EEZ during 1991-98 and were slightly higher outside of the EEZ in 1999 and 2000.

Shark Catch

Sharks have consistently dominated the longline catch throughout the entire logbook monitoring program. Shark catch increased from 1991 and peaked at 154,608 fish in 1993 (Table 8), dropping in 1994 and gradually decreasing through 2000. Much of the decline in shark catch from 1993 was related to the reduction in effort directed toward swordfish. Shark catch by swordfish trips was most prominent during 1991-94, but then shifted to mixed trips during 1996 and 1997 because of a decrease in swordfish effort. Though mixed trips accounted for substantial shark catches after 1997, sharks caught on tuna trips were greater than any other trip type from 1997 to 2000. Shark catch is substantially higher outside the EEZ in comparison to other areas. Blue shark typically made up over 90% of the shark catch (Fig. 14). The area of the highest blue shark catch in 2000 was east of Johnston Atoll (Fig. 15). The remainder of the shark catch is composed of mako, thresher, and other miscellaneous shark species. The percentage of sharks retained (kept for their fins or flesh) increased from 3% in 1991 to 65% in 1999. Most of the sharks were retained for their fins only. Sharks retained dropped significantly to 37% in 2000. This decrease occurred in the latter half of 2000 after the passage of a State of Hawaii law that prohibited landing shark fins not attached to a carcass. A similar law was also passed by the Federal government on December 2000.

Catch Composition

Sharks were the largest component of total catch and constituted 20% of the longline catch in 2000 (Fig. 16A). Bigeye tuna catch was the second largest component at 19% and was followed by mahimahi (14%). Albacore and yellow fin tuna each comprised 10% of the catch in 2000. Swordfish was the seventh largest component at 9%

while marlins comprised only 5% of the catch.

The composition of the catch was considerably different between swordfish and tuna trip types (Figs. 16B-D). In 2000, swordfish, sharks, and mahimahi were the major components of the catch for swordfish trips. Swordfish and sharks each constituted about a third of the catch, while mahimahi accounted for 20% of the catch. Catch components of swordfish trips were relatively specific: the remainder of the catch made up only 14%. The composition of the catch on tuna trips was diverse. Bigeye tuna, sharks, and yellowfin tuna were the principal components of the tuna trips catch making up about a quarter of the catch followed by sharks at 17%. Yellowfin tuna accounted for a larger portion of the catch in 2000 increasing to 13% of the catch on tuna trips. Tuna trips have the highest percentage of marlin and the lowest percentage of swordfish of all trip types. The catch composition of mixed trips was similar to the composition of swordfish trips. Mahimahi, swordfish and sharks were the major components of the mixed trip catch, with each species representing about a quarter of the catch.

Catch composition differed by area (Figs. 17A-D). Bigeye tuna, mahimahi, and sharks were the largest components of the catch in the MHI EEZ, making up over 60% of the catch. The bigeye and mahimahi composition in the MHI EEZ accounted for the highest percentage of all areas. Sharks, bigeye tuna, and swordfish were the largest catch components in the NWHI EEZ with sharks and swordfish composition representing a higher percentage than all other areas. Marlin composition was also highest in the NWHI, although it comprised only 9% of the catch. Sharks and bigeye tuna were the largest catch components outside of the EEZ, followed by mahimahi and swordfish. Yellowfin tuna was the dominant component of the catch in the EEZ of U.S. possessions making up over a third of the catch in that area. The majority of the yellowfin tuna produced in the EEZ were caught near Kingman Reef and Palmyra Atoll. Albacore and sharks were the next two largest components of the catch. Swordfish catch was negligible in this area.

CATCH-PER-UNIT-EFFORT (CPUE)

CPUE from logbook data is measured as number of fish per 1,000 hooks. No dramatic changes were apparent in overall CPUE (all trip types combined) for 2000 (Table 9). However, overall catch rates did not reflect the change over time with respect to targeting strategies (trip types) and area fished by the longline fleet. Therefore, overall CPUE has been determined not to be an accurate measure of fishery performance or availability of fish. For these types of information, CPUE indices were calculated separately to account for targeting strategy or area of fishing.

Billfish CPUE

Swordfish trips consistently had the highest CPUE for swordfish. The swordfish CPUE for swordfish trips fell from 15.4 fish per 1,000 hooks in 1991 to a low of 10.3 in 1994 and recovered to 15.4 in 1997. Swordfish CPUE remained at about 14.5 from 1998 through 2000, with swordfish catch rates slightly higher in the fall and winter, with a modest decrease in the spring and summer months. Swordfish CPUE was higher in the NWHI EEZ and outside of the EEZ. Swordfish CPUE in these areas have shown a general decline due to an overall increasing effort toward tuna which has a substantially lower swordfish CPUE. Swordfish CPUE was lowest in the EEZ of U.S. possessions, fishing areas south of the Hawaiian Islands.

Blue marlin catch rates for all trip types were low with CPUE typically below 0.5 fish per 1,000 hooks. Mixed trips had slightly higher CPUEs than the other trip types, at 0.5 to 1.3 fish per thousand hooks throughout 1991-2000. Blue marlin catch rates on mixed trips peaked in the summer months, which coincided with the blue marlin troll fishery season. There was no clear pattern with respect to blue marlin CPUE and area, although CPUE in the MHI EEZ was slightly higher when compared to the other areas.

Striped marlin CPUE was higher on tuna trips from 1992-1996, then became slightly higher on mixed trips during 1997-2000. Striped marlin CPUE on tuna trips is highest during the fall and winter months and lowest during the summer months. Although by only a modest margin, striped marlin CPUE was consistently highest in the NWHI EEZ.

Tuna CPUE

Tuna-targeted trips usually had the highest CPUEs for bigeye tuna although mixed trips had comparable, sometimes higher, catch rates. Bigeye tuna CPUE for tuna trips rose from 4.4 fish per 1,000 hooks in 1995 and peaked at 6.1 in 1998 then declined to 3.8 in 2000. Bigeye tuna CPUE was highest in the fall and decreased thereafter to a low in the summer. There was no one EEZ area that had consistently higher catch rates in comparison to other areas, and there was no significant difference in bigeye tuna CPUE with respect to area in 2000.

Mixed trips typically had better yellowfin tuna catch rates in comparison to tuna and swordfish trips. However, tuna trips caught more yellowfin tuna and had a higher yellowfin tuna CPUE than mixed trips in 2000. Yellowfin tuna CPUE on mixed trips peaked in the summer months, which is around the same time as the troll and handline yellowfin tuna season. Yellowfin tuna CPUE is substantially highest in the EEZ of U.S. possessions, due primarily to longlining for tunas far south in the EEZ of Palmyra Atoll and Kingman Reef.

Albacore CPUE declined for all trip types in 2000. Swordfish trips usually had the highest CPUE for albacore. Albacore CPUE on tuna trips also showed a noteworthy increase from 0.9 fish per thousand hooks in 1992 to 5.1 in 1997, peaking in the second quarter and then declining throughout the remainder of the year. Albacore CPUE was usually highest outside the EEZ, although high albacore catch rates were also observed in the EEZ of U.S. possessions, particularly Johnston Atoll.

Shark CPUE

Sharks had the highest catch rate of all species caught by the Hawaii-based longline fleet. The fleet mean CPUE for sharks peaked at the height of the swordfish fishery in 1993 and declined over time as less effort was directed toward swordfish. Shark CPUE on swordfish trips was higher than shark CPUE on tuna and mixed trips. The low shark CPUE for swordfish trips (13.9 fish) in 2000 was due to the court-ordered area closure and restrictions on longlining for swordfish. Outside the EEZ and the NWHI EEZ were the areas with the highest shark CPUEs. A general decline in shark CPUE has occurred in these two areas because of the shift in effort from swordfish (which has high shark CPUE) toward tunas (which has the lowest shark CPUE). Shark CPUE was highest in the third quarter and this increase was attributed to vessels targeting swordfish fishing far up in the North Pacific where blue sharks are highly abundant. Ocean conditions there were usually calm during this time of the year which allows vessels to fish farther north than usual.

LANDINGS

Total landings decreased from 28 million pounds in 1998 and 1999 to 24 million pounds in 2000 (Table 11). Shark and billfish accounted for most of the decrease (down 3 million and 1 million pounds, respectively) (Fig. 18). Tunas at 44% was the dominant component of the landings. Billfish was the second largest component (33%) of which swordfish comprised 27% of the total landings. Sharks, usually delivered in a headed-and-gutted or fins-only form, were extrapolated to an estimated whole weight. Shark landings were the third largest component (14%), followed by miscellaneous pelagic species (8%).

MARKET

Ex-vessel Revenue

Total ex-vessel revenue of the Hawaii-based longline fishery was $50 million in 2000 (Table 12) for an increase of almost $3 million from the previous year (Fig. 19). Tuna revenue ($31 million) increased by $4 million from the previous year and accounted for 62% of the total revenue. Billfish, at $15 million, was second highest of which swordfish comprised $13 million of this total. Miscellaneous pelagic species, predominantly mahimahi and opah, were in excess of $3 million. Ex-vessel revenue of sharks (both finned and whole products) was less than $1 million. Although sharks are a considerable component of the landings, they represent less than 2% of the total ex-vessel revenue.

Average Price

Ex-vessel prices per pound are based on actual or estimated whole weight. Average prices per pound for major pelagic species in Table 13 are aggregate nominal ex-vessel prices. The ex-vessel price for swordfish was the highest of all billfish. The price for swordfish in Hawaii is determined by the U.S. mainland market since most of the swordfish landed in Hawaii is packed in insulated air freight containers and flown to destinations across the continental U.S. The local market for swordfish has grown as the frequency of its availability became increasingly noticeable in fish market displays and local restaurant menus. The overall supply of swordfish in Hawaii became scarce due to the restrictions on swordfish-directed longlining in the latter part of 2000. The amount of swordfish marketed locally is still thought to be very small in relation to the volume exported. The price for swordfish increased from its low of $1.70 in 1998 to $2.00 in 2000. This low in 1998 was related to the boycott on swordfish by upscale restaurants on the East Coast, which was initiated in response to the decline in Atlantic swordfish stock. The average price for blue marlin varied little throughout 1987-2000: the average price was $1.30 in 2000. The average price for striped marlin was higher than blue marlin with a peak average price of $1.80 in 2000. Marlin is one of the most affordable local fresh fish species and is commonly found at retail markets and restaurants year round.

The average price for each of the major tunas species increased in 2000. Based on the difference in average ex-vessel price paid for tunas, the market ranks northern bluefin tuna, bigeye tuna, yellowfin tuna, and albacore in decreasing order of desirability (Bartram et al., 1996). Most of the few bluefin tuna that are caught by Hawaii-based longliners are exported to Japan. The average price for this species has been significantly higher than that for all the other major tuna species. Average price for bluefin tuna was $10.40 a pound in 2000, up by almost $4.00 a pound from the previous year. Bigeye tuna and yellowfin tuna, more abundant, but only a few select fish have met the high standards set by the Japan export market. Most of the good-grade tunas have been either marketed to the mainland or sold to fine local restaurants in Hawaii. Bigeye tuna prices increased slightly to $3.60 in 2000. The average price for yellowfin tuna also increased modestly to $2.80. The average price for albacore was up to $1.50. Although albacore landings have grown substantially from the early 1990s, the average price remains relatively steady.

Fresh mahimahi and ono have been in demand by Hawaii restaurants and local markets (Takenaka et al., 1984) and more recently, opah (moonfish) and monchong (pomfrets) have also established a reputation in some of Hawaii’s finer restaurants. The average price for mahimahi was $1.70 in 2000. In contrast, ono received the highest average price of all miscellaneous pelagic species at $2.20 in 2000. The average price for opah rose to $1.60 in 2000.

SIZE OF FISH

The average size of landed longline-caught fish is expressed in round (whole) weights. Processed fish (e.g., headed, gutted, and finned swordfish) were also raised to an estimated round (whole) weight. Fish released alive or discarded are not represented in the size summaries and the weight of individual fish could not be directly linked to the exact area of capture. However, change in fish size is often related to increasing catches from certain areas which were previously lightly exploited. Therefore, the mean weight of fish and subsequent changes in mean weight over time by location are referenced in general terms.

Longlining was exclusively directed toward tunas during 1987-88, and swordfish was caught incidentally. During this time the mean weight of swordfish was below 130 pounds (Table 14). As the effort for targeting swordfish increased from 1989 to its peak in 1993, mean weight of swordfish increased to over 170 pounds. This increased further to 188 pounds in 1999 and 185 pounds in 2000. Swordfish-directed trips had the largest mean weight for swordfish (Table 15) and mixed trips landed swordfish with mean weights comparable to swordfish-directed trips. Tuna trips had the widest year-to-year variation in mean weight and often landed the smallest swordfish.

Blue marlin has been one of the largest pelagic fish species landed by the Hawaii-based longline fleet. Mean weight of blue marlin was usually between 150-170 pounds except in 1997 when it dropped to 134 pounds. Blue marlin mean weight was 158 pounds in 2000, and the largest blue marlin were landed by swordfish and mixed trips.

Striped marlin is one of the smaller billfish and the interannual variation in mean weight of striped marlin throughout the 13-year sampling period (1987-2000) was only 11 pounds. Mean weight of striped marlin was 59 pounds in 2000. Swordfish trips, which fish predominantly north of the Hawaiian Islands, consistently had the highest mean weights for striped marlin.

The mean weight of bigeye tuna ranged between 64-88 pounds, rising from 64 pounds in 1996 to 80 pounds in 2000. Swordfish trips, which fished mostly north of the Hawaiian Islands, caught the largest tunas. Tuna trips, in contrast, had smallest mean weights for bigeye tuna, usually a 10-20-pound difference in mean weight between the two trip types. The mean weight of bigeye tuna based on tuna trips taken rose from 64 pounds in 1996 to 79 pounds in 2000. No clear pattern was apparent with respect to bigeye tuna mean weight over time on swordfish and mixed trips.

A general decline in mean weight, which can be attributed to increasing catches of smaller sized yellowfin tuna by tuna-directed fishing trips in the area near Kingman Reef and Palmyra Atoll has occurred. Mean weight for yellowfin tuna fell from over 100 pounds in the late 1980s and early 1990s to 62 pounds in 1999. Yellowfin tuna mean weight was 67 pounds in 2000. Mixed trips typically caught yellowfin tuna in the third quarter, which coincides with the troll and handline yellowfin tuna season and usually caught the largest yellowfin tuna of all trip types. Tuna trips had high catches of yellowfin tuna in the first and second quarters from fishing activity near Kingman Reef and Palmyra Atoll, but also caught the smallest fish.

The mean weight of albacore declined from 63 pounds in 1987 to 41 pounds in 1994. This decline is related to increasing incidental catches of small albacore north of the Hawaiian Islands by longliners targeting swordfish. As swordfish-directed effort declined and tuna effort increased during 1995-2000, the mean size of albacore began to increase and stabilized. Mean weight of albacore was 55 pounds in 2000. Tuna longliners have the ability to target albacore when fish are abundant. Tuna trips typically had the largest mean weights for albacore while swordfish trips consistently had the smallest mean weights.

Bluefin tuna was the largest tuna with the greatest variation in annual mean weight of all the tunas caught and landed by the Hawaii-based longline fishery. Incidental catches of bluefin tuna were predominantly on swordfish trips with fishing activity occurring north of the Hawaiian Islands. The mean weight of bluefin tuna was at a low of 165 pounds in 2000.

Mean weight of mahimahi ranged from 10-23 pounds while the mean weight for ono had a narrower range of between 30 and 36 pounds. Opah were relatively large with the mean weight ranging from 97-111 pounds. No long-term trends with respect to mean size for these three species were apparent.

Weight-frequency Distribution

Weight-frequency histograms were computed for swordfish, blue marlin, striped marlin, bigeye tuna, yellowfin tuna, and albacore from the shoreside sample data. The sample data for these species represented 28% (swordfish) to 32% (striped marlin and yellowfin tuna) when compared to total fish landed from logbook data. These weight-frequencies, from sample data, were corrected in proportion to the numbers for each trip type from the logbook to account for the differences in sizes of the catch. Histograms for swordfish, blue marlin, yellowfin tuna, and albacore represented typical peak seasonal landings that fell within a given calender year. In contrast, the typical peak seasonal landings for bigeye tuna and striped marlin began in one calendar year and extended into the following year.

The dominant mode of swordfish in 2000 was in the 51-75-pound weight class, with a secondary mode in the 176-200-pound weight class (Fig. 20). The dominant mode of fish typically occurs below the 101-125-pound weight class. The mode of small fish that emerged in 1996 appeared to shift over 1 or 2 increments each year up to a point at which it showed up as a weak secondary mode in 2000. Prior to 1989, longliners targeting tunas accounted for all of the longline landings of swordfish in the Hawaii fishery (Kawamoto et al., 1989). These incidental catches of swordfish by longliners targeting tunas consisted primarily of small fish (<26 pounds). The distribution of swordfish larger than 25 pounds was rather flat, with only a few fish above 300 pounds. With the increasing success of longliners catching swordfish in 1989, swordfish histograms showed a greater representation of large fish between 26 and 200 pounds. The distribution of fish gradually tapers off above 200 pounds. The frequency of very large swordfish (>475 pounds) appear from 1989 and comprise about 2% of the fish caught from 1992 to 2000.

Blue marlin showed no substantial changes in the weight-frequency distribution throughout 1987-2000 (Fig. 21). The dominant mode for blue marlin consistently fell in the 101-125-pound increment except when a slightly larger size class of fish appeared as the dominant mode in 1990. A higher than usual frequency of fish in the 76-100-pound weight class and a very low frequency of blue marlin above 200 pounds occurred in 2000.

The weight-frequency distribution was predominantly between 76 and 150 pounds.

The weight-frequency distribution of striped marlin showed a prominent mode of fish in the 31-35-pound category in 2000 (Fig. 22). The distribution was relatively flat with a very weak mode at 66-70 pounds. Weight-frequency distributions of striped marlin were bimodal, except in 1987 when striped marlin were evenly distributed across a wide range of sizes. A strong mode of small fish appeared in 1988 and 1989. In the years when a bimodal distribution was present, small striped marlin were typically between 21 and 40 pounds, while a flatter more broadly distributed secondary mode of large striped marlin was between 51 and 80 pounds. The frequency of striped marlin diminished above 90 pounds.

Bigeye tuna weight classes varied across a wide range in 2000. The weight-frequency histogram for bigeye tuna shows a weak mode at 41-50 pounds and a flat distribution up to 100 pounds, tapering off gradually thereafter (Fig. 23). Strong modes of small bigeye tuna occurred in 1994 and 1996. A low frequency of large bigeye tuna was apparent in 1996. Bigeye tuna weight-frequencies with even, bimodal distributions appeared in 1988, 1990, 1991, 1993, and 1997. The frequency of bigeye tuna above 100 pounds diminished and was particularly flat in 1997.

The yellowfin tuna histogram shows a dominant mode of fish in the 66-70 pounds class and a substantial representation of fish between 21-55 pounds in 2000 (Fig. 24). A comparison of yellowfin tuna histograms by year showed distributions with a high degree of variation: unimodal, bimodal, and sometimes trimodal distributions. The distribution of yellowfin tuna usually began to taper off above 150 pounds; however, percent frequency of these large fish has decreased from 27% in 1990 to less than 1% in 2000. Increasing catches of small yellowfin tuna in the EEZ of other U.S. possessions by tuna trips from 1994 continued this decrease.

The albacore histogram in 2000 shows a broad flat distribution of fish between 44-66 pounds. The distribution of albacore showed distinct periods of change throughout 1987-2000 (Fig. 25). The distribution of albacore was predominantly large fish during 1987-90 when longline effort was directed predominantly towards tunas. The following 4 years showed albacore with wider and flatter distributions as longline effort shifted predominantly toward swordfish. The change in weight-frequency distribution was attributed to the increased landings of small fish caught by swordfish and mixed longline trips fishing in higher latitudes of the North Pacific. Albacore distribution was substantially different in 1995-98 when the distribution became more bell-shaped as a result of most of the longline effort shifting toward tunas. The distribution became unimodal in 1995 and the dominant mode observed in 1995 shifted over three increments in 1996 and two increments in 1997 and 1998. Distribution in 1999 was bimodal with peaks in 45-46 weight class and 63-64-pound weight class.

INTERACTIONS WITH ENDANGERED AND PROTECTED SPECIES

Interactions are defined in this report as any endangered or threatened species caught (hooked or entangled) in longline fishing gear. Interactions between longline gear and protected marine species were summarized from the daily longline logbook data. A more detailed protected species interaction section was added to the logbooks in 1995. However, suspected underreporting of interactions with protected species (turtles in particular) led to the establishment of the mandatory observer program (DiNardo, 1993). Fishermen who were not trained to identify different protected species may have contributed to incorrect reporting of interactions. Fishermen also fear retribution and self incrimination if they logged interactions. Consequently, there are species identification and underreporting problems in the summary of protected species interactions presented in this section. They are presented here for the record; NMFS relies on the observer program to estimate protected species interactions.

Forty-two different Hawaii-based longline vessels reported interactions with protected species on 56 different trips in 2000 (Table 16). Reported interactions occurred on 184 sets (165,818 hooks) out of a possible 751 sets (764,078 hooks) for these 56 trips. A total of 279 interactions with endangered or protected marine species were reported. It is unlawful to retain any endangered or protected species; therefore, interactions are reported as animals released or lost. The condition of animals upon release is categorized as either alive, injured, or dead.

Two hundred and twenty-five interactions involved seabirds, all of which were albatrosses (*Diomedea* spp.). The exact species of albatross was unknown because there is no distinction between albatross species in the protected species interaction section of the logbooks. A high rate of mortality was reported with seabirds: 70% were reported dead upon retrieval, 13% were reported released alive but injured, and 16% were reported released alive in good condition.

Interactions with turtles represented the second most frequent type of interaction. Again it is important to remember that these turtles were identified by fishermen and not by trained technicians. Of 48 reported turtle interactions, 15 were loggerhead turtles, 15 were green sea turtles, 9 were olive ridley turtles, and 7 were leatherback turtles. In addition, two turtle interactions occurred in which the species could not be positively identified. The initial condition of most turtles upon retrieval appeared good. Seventy-three percent of the turtles were reported as alive, 13% of the turtles were reported as released injured, and 15% of the turtles were reported dead upon retrieval. Four green sea turtles and three olive ridley turtles were reported to be dead upon retrieval.

Six incidents of interactions with cetaceans were reported in 2000. These incidents involved three interactions with dolphins, two interactions with whales, and one interaction with a false killer whale. All interactions with cetaceans were reported released alive/uninjured. No interactions with monk seals were reported.

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Table 1.--List of common and scientific names of fishes and endangered or protected species caught by or interacted with fishing vessels in the Hawaii-based longline fishery.

Common name	Scientific Name
	PELAGIC MANAGEMENT UNIT SPECIES
Billfishes	
Swordfish	*Xiphias gladius*
Black marlin	*Makaira indica*
Blue marlin	*Makaira mazara*
Striped marlin	*Tetrapturus audax*
Shortbill spearfish	*T. angustirostris*
Sailfish	*Istiophorus platypterus*
Tunas	
Bigeye tuna	*Thunnus obesus*
Albacore	*T. alalunga*
Yellowfin tuna	*T. albacares*
Northern bluefin tuna	*T. thunnus orientalis*
Skipjack tuna	*Katsuwonus pelamis*
Kawakawa	*Euthynnus affinis*
Sharks	
Blue shark	*Prionace glauca*
Big eye thresher	*Alopias superciliosus*
Short fin mako	*Isurus oxyrinchus*
Oceanic white tip	*Carcharhinus longimanus*
Tiger shark	*Galeocerdo cuvieri*
Miscellaneous sharks	Families Carcharhinidae, Alopiidae, Sphyrnidae, and Laminidae
Miscellaneous PMUS	
Mahimahi	*Coryphaena hippurus*
Ono (wahoo)	*Acanthocybium solandri*
Opah (moonfish)	*Lampris guttatus*
Monchong (pomfret)	Family Bramidae
Oilfish (walu)	Family Gempylidae
	MISCELLANEOUS PELAGICS
Lancet fish	*Alepisaurus* ferox
Barracuda	*Sphyraena barracuda*
Brown stingray	*Dasyatis violacea*
	PROTECTED SPECIES
Hawaiian monk seal	*Monachus schauinslandi*
Humpback whale	*Megaptera novaeangliae*
Dolphins	Family Delphinidae
Green turtle	*Chelonia mydas*
Olive ridley turtle	*Lepidochelys olivacea*
Hawksbill turtle	*Eretmochelys imbricata*
Leatherback turtle	*Dermochelys coriacea*
Laysan albatross	*Diomedea immutabilis*
Black-footed albatross	*D. nigripes*
Brown booby	*Sula leucogaster plotus*

Table 2.--Hawaii-based longline vessel activity*, 1991-2000.

Year	Number of active vessels	Trips	Average miles to first set	Maximum miles to first set	Average number of days fished per trip
Fleet					
1991	141	1,671	318	1,792	7.6
1992	123	1,266	424	1,871	9.1
1993	122	1,192	465	2,122	10.3
1994	125	1,106	430	2,814	10.0
1995	110	1,125	441	2,097	10.3
1996	103	1,100	367	2,037	10.5
1997	105	1,125	332	1,973	10.5
1998	114	1,140	422	1,611	10.9
1999	119	1,137	388	1,791	11.4
2000	125	1,103	557	1,949	11.7
Swordfish trips					
1991	98	292	585	1,792	10.7
1992	66	277	733	1,871	12.7
1993	79	319	820	2,122	13.7
1994	74	310	833	2,814	13.4
1995	44	136	884	2,097	13.3
1996	32	91	790	2,037	12.7
1997	26	78	623	1,973	14.2
1998	32	84	708	1,522	14.6
1999	31	65	821	1,791	12.5
2000	18	37	879	1.945	15.5
Tuna trips					
1991	104	556	240	1,508	7.8
1992	55	458	260	1,156	8.4
1993	61	542	222	1,432	8.8
1994	83	568	252	945	8.9
1995	78	682	273	945	10.1
1996	76	658	284	1,866	10.3
1997	83	745	288	1,002	10.1
1998	92	760	384	1,154	10.4
1999	87	776	313	1,160	11.1
2000	90	814	472	1.461	11.0
Mixed trips					
1991	94	823	276	1,408	6.3
1992	72	531	404	1,543	7.7
1993	59	331	522	1,616	9.6
1994	51	228	323	1,298	8.0
1995	49	307	397	1,609	9.3
1996	51	351	410	1,547	10.3
1997	44	302	365	1,323	10.7
1998	50	296	439	1,611	11.4
1999	50	296	490	1,723	11.8
2000	50	252	674	1,747	13.3

*Based on date of landing from NMFS logbooks.

Table 3.--Number of days fished* by the Hawaii-based longline fleet, 1991-2000.

		Trip type			Area			
Year	Total	Swordfish trips	Tuna trips	Mixed trips	Main Hawaiian Islands	Northwestern Hawaiian Islands	U.S. possessions	Outside EEZ
1991	12,635	3,184	4,280	5,171	6,213	1,258	55	5,109
1992	11,546	3,531	3,879	4,136	4,145	753	13	6,635
1993	12,318	4,322	4,747	3,249	4,409	1,277	---	6,630
1994	10,799	4,098	5,041	1,660	4,442	1,929	140	4,288
1995	11,732	1,848	6,964	2,920	5,454	1,695	98	4,485
1996	11,638	1,157	6,786	3,695	4,634	2,021	134	4,837
1997	11,846	1,076	7,549	3,221	3,840	2,657	255	5,093
1998	12,506	1,223	7,874	3,409	3,493	2,214	1,057	5,732
1999	12,776	815	8,566	3,395	4,041	1,680	550	6,502
2000	12,921	555	8,929	3,355	3,628	1,456	1,447	6,390

*Sets based on date of haul from NMFS logbooks.

Table 4.–Millions of hooks set* by the Hawaii-based longline fleet, 1991-2000.

		Trip type			Area			
Year	Total	Swordfish trips	Tuna trips	Mixed trips	Main Hawaiian Islands	Northwestern Hawaiian Islands	U.S. possessions	Outside EEZ
1991	12.33	2.38	5.22	4.73	6.85	1.06	0.05	4.36
1992	11.72	2.81	5.25	3.65	4.88	0.69	0.02	6.13
1993	13.03	3.76	6.46	2.82	5.55	1.31	---	6.16
1994	12.00	3.51	7.04	1.45	5.45	2.23	0.19	4.13
1995	14.19	1.47	10.22	2.51	7.14	2.00	0.15	4.90
1996	14.40	0.93	10.39	3.08	5.90	2.86	0.22	5.41
1997	15.56	0.84	12.21	2.52	5.06	4.10	0.44	5.97
1998	17.37	1.02	13.49	2.86	4.97	3.10	1.92	7.36
1999	19.12	0.67	15.41	3.03	6.55	2.38	1.07	9.11
2000	20.27	0.42	17.01	2.67	5.74	2.05	3.02	9.47

*Number of hooks set based on date of haul from NMFS logbooks.

Table 5.--Average number of hooks set* per day fished, 1991-2000.

Year	Fleet mean	Swordfish trips	Tuna trips	Mixed trips
1991	980	750	1,220	910
1992	1,010	800	1,350	880
1993	1,060	870	1,360	870
1994	1,110	860	1,400	870
1995	1,210	790	1,470	860
1996	1,240	790	1,530	830
1997	1,310	780	1,620	780
1998	1,390	830	1,710	840
1999	1,500	820	1,800	890
2000	1,570	755	1,900	790

*Average number of hooks set based on date of haul from NMFS logbooks.

Table 6.--Hawaii-based longline catch* (number of fish) by trip type, 1991-2000.

Year	Billfish: Swordfish	Billfish: Blue marlin	Billfish: Striped marlin	Billfish: Other billfish	Tunas: Bigeye tuna	Tunas: Yellowfin tuna	Tunas: Albacore	Miscellaneous: Mahimahi	Miscellaneous: Ono	Miscellaneous: Opah	Miscellaneous: Sharks
Fleet											
1991	66,289	4,012	26,967	12,464	40,923	13,269	14,051	39,525	2,735	3,079	71,183
1992	74,314	4,518	16,049	5,668	43,904	7,879	19,813	56,684	2,448	3,293	94,897
1993	79,554	5,124	18,210	5,681	54,803	16,062	30,460	26,018	4,442	4,515	154,608
1994	43,345	4,677	11,292	5,117	48,102	13,516	31,129	33,017	2,513	5,090	114,656
1995	37,428	8,806	22,554	11,771	59,947	23,650	45,789	59,813	6,565	6,367	101,292
1996	38,225	6,685	15,789	7,806	63,575	17,586	57,329	23,311	4,461	7,315	100,992
1997	39,682	8,255	12,637	9,024	79,784	29,045	71,084	49,319	8,312	8,254	85,838
1998	43,776	5,350	14,347	11,516	98,795	21,721	48,833	22,183	8,281	9,184	99,919
1999	37,974	4,936	14,417	17,111	80,332	16,970	67,303	44,349	10,278	12,399	87,576
2000	37,023	4,509	7,939	9,011	74,493	38,379	39,775	57,775	7,751	7,036	79,363
Swordfish trips											
1991	36,516	348	3,709	641	5,453	1,876	3,631	8,609	152	44	37,880
1992	41,503	564	2,184	375	4,533	1,301	8,680	13,448	176	87	55,507
1993	48,920	1,073	3,781	648	9,086	2,552	14,472	8,753	475	102	100,075
1994	36,245	724	1,569	277	3,541	1,453	15,701	9,181	140	29	82,155
1995	18,865	950	1,007	231	3,440	1,651	8,096	9,908	241	23	40,436
1996	13,216	174	465	133	1,335	659	5,397	2,111	208	41	23,807
1997	12,956	330	484	144	2,628	1,569	2,416	8,607	243	12	11,936
1998	14,791	294	431	73	2,373	761	2,502	1,558	126	13	23,466
1999	9,787	154	411	63	1,241	479	2,945	3,160	160	4	12,116
2000	6,061	71	224	36	892	215	926	3,541	34	5	5,807
Tuna trips											
1991	2,156	1,693	15,860	5,652	19,328	3,646	5,831	11,365	2,013	2,788	8,906
1992	1,400	1,922	11,271	3,771	24,895	2,781	4,519	8,796	1,773	3,122	12,599
1993	1,372	2,661	11,895	4,252	30,205	9,552	10,348	9,776	3,557	4,372	16,533
1994	1,118	2,074	8,699	4,305	38,877	8,164	14,273	14,318	2,280	5,032	15,621
1995	2,225	4,960	17,959	9,995	44,803	14,487	32,633	24,293	5,785	6,151	28,917
1996	1,720	3,912	12,170	6,602	49,116	11,767	41,318	10,662	3,758	7,023	30,086
1997	1,669	5,004	9,198	8,173	69,319	19,185	61,702	17,794	7,186	8,093	32,717
1998	2,631	3,389	11,424	10,177	82,664	17,274	40,754	11,337	7,388	9,044	41,672
1999	2,411	3,231	11,005	15,379	67,494	13,803	54,463	22,858	9,056	11,676	43,551
2000	1,887	3,166	5,498	8,063	64,359	35,210	34,439	22,079	7,297	6,775	45,248
Mixed trips											
1991	27,617	2,206	9,182	6,544	16,142	7,747	4,589	19,551	570	247	24,397
1992	31,411	2,032	2,594	1,522	14,476	3,797	6,614	34,440	499	84	26,791
1993	29,262	1,390	2,534	781	15,512	3,958	5,640	7,489	410	41	38,000
1994	5,982	1,879	1,024	535	5,684	3,899	1,155	9,518	93	29	16,880
1995	16,338	2,896	3,588	1,545	11,704	7,512	5,060	25,612	539	193	31,939
1996	23,289	2,599	3,154	1,071	13,124	5,160	10,614	10,538	495	251	47,099
1997	25,057	2,921	2,955	707	7,837	8,291	6,966	22,918	883	149	41,185
1998	26,354	1,667	2,492	1,266	13,758	3,686	5,577	9,288	767	127	34,781
1999	25,776	1,551	3,001	1,669	11,597	2,688	9,895	18,331	1,062	719	31,909
2000	29,711	1,223	1,959	682	8,713	2,687	4,328	31,296	351	242	28,173

*Based on date of haul from NMFS logbooks.

Table 7.--Hawaii-based longline catch* (number of fish) by area, 1991-2000.

Year	Billfish				Tunas			Miscellaneous			
	Swordfish	Blue marlin	Striped marlin	Other billfish	Bigeye tuna	Yellowfin tuna	Albacore	Mahimahi	Ono	Opah	Sharks
Main Hawaiian Islands EEZ											
1991	13,598	2,881	18,117	8,197	22,517	7,150	5,763	17,672	1,885	2,569	13,295
1992	7,102	2,761	9,838	3,368	22,982	3,846	3,979	13,313	1,194	2,387	11,748
1993	4,388	2,720	10,426	3,440	25,031	8,895	6,496	9,366	2,641	3,261	12,955
1994	2,842	3,344	6,494	3,213	27,022	6,815	10,833	17,660	1,332	3,626	14,455
1995	5,262	4,168	12,472	6,900	31,899	13,018	18,271	30,410	2,656	4,041	22,560
1996	4,634	3,556	7,163	3,404	29,803	7,715	19,259	11,676	1,527	3,094	19,418
1997	4,873	4,085	4,193	3,662	21,397	10,982	19,025	11,660	2,525	2,847	16,476
1998	4,721	1,698	4,856	4,254	26,723	4,678	12,482	7,664	2,305	3,585	14,685
1999	2,357	1,709	5,607	6,691	29,203	4,835	23,805	11,654	2,579	5,161	17,449
2000	2,510	1,557	2,438	3,486	21,546	5,240	5,952	17,586	1,201	2,759	16,561
Northwestern Hawaiian Islands EEZ											
1991	9,472	342	3,845	1,082	4,473	1,375	481	2,003	134	70	10,604
1992	5,228	244	1,776	330	2,624	396	311	2,321	77	187	9,042
1993	9,565	509	2,861	754	7,760	2,019	1,413	2,279	198	398	17,507
1994	9,752	554	2,679	719	10,726	2,015	5,592	3,037	227	707	28,346
1995	8,400	1,379	5,076	1,557	9,011	3,630	5,097	5,836	902	939	19,915
1996	3,987	1,114	4,184	1,651	15,409	2,451	12,738	1,995	659	2,388	16,539
1997	5,148	1,519	4,109	2,250	30,168	5,139	17,118	6,321	1,789	2,887	17,921
1998	10,611	1,217	5,757	2,927	16,629	2,713	6,802	3,527	761	1,862	20,152
1999	6,182	1,053	3,515	2,400	9,672	1,581	6,261	4,316	763	1,431	15,150
2000	6,679	418	2,309	1,082	7,660	1,395	2,969	6,458	224	750	11,446
U.S. Possessions											
1991	25	17	60	45	374	439	30	84	21	0	237
1992	16	7	1	7	70	42	0	6	8	0	223
1993	---	---	---	---	---	---	---	---	---	---	---
1994	53	37	173	55	1,127	1,649	151	37	77	24	705
1995	21	94	121	94	460	583	296	252	206	5	895
1996	17	86	192	93	766	1,184	1,612	49	155	57	756
1997	33	194	255	293	2,070	1,932	4,054	591	328	206	1,503
1998	174	308	307	450	17,666	6,313	3,784	831	1,127	258	5,892
1999	102	315	438	619	4,514	5,737	4,514	542	1,499	179	3,463
2000	234	762	733	916	7,483	21,788	8,766	1,202	1,916	448	8,307
Outside EEZ											
1991	43,194	1,008	6,730	3,511	13,559	4,305	7,777	19,766	695	440	47,047
1992	61,968	1,506	4,434	1,963	18,228	3,595	15,523	41,044	1,169	719	73,884
1993	65,601	1,895	4,920	1,486	22,008	5,147	22,551	14,367	1,600	856	124,139
1994	30,698	742	1,946	1,130	9,227	3,037	14,553	12,283	877	733	71,150
1995	23,745	3,165	4,885	3,220	18,577	6,419	22,125	23,315	2,801	1,382	57,922
1996	29,495	1,878	4,250	2,658	17,588	6,227	23,719	9,507	2,116	1,776	64,081
1997	29,627	2,457	4,080	2,819	26,149	10,990	30,887	30,730	3,668	2,314	49,935
1998	28,269	2,125	3,408	3,872	37,762	8,004	25,621	10,157	4,068	3,462	59,180
1999	29,323	1,857	4,857	7,401	36,883	4,817	35,659	27,743	5,435	5,628	51,475
2000	27,600	1,772	2,459	3,527	37,804	9,956	22,088	32,529	4,410	3,079	43,049

*Based on date of haul from NMFS logbooks.

Table 8.--Hawaii-based longline incidental shark catch* (number of fish), 1991-2000.

Species	Number caught	Number released	Number Kept: Finned	Number Kept: Whole	Percent retained	Percent finned
Blue sharks						
1991	65,481	65,481	0	0	0	0
1992	89,292	88,315	977	0	1.1	1.1
1993	150,216	135,861	14,355	0	9.6	9.6
1994	110,187	95,783	14,404	0	13.1	13.1
1995	94,881	64,696	30,185	0	31.8	31.8
1996	96,214	54,982	41,149	83	42.9	42.8
1997	80,008	34,087	45,704	217	57.4	57.1
1998	91,228	35,771	55,410	47	60.8	60.7
1999	78,091	26,095	51,915	81	66.6	66.4
2000	71,655	44,479	26,690	486	37.9	37.2
Total						
1991	71,183	68,894	1,082	1,207	4.9	1.5
1992	94,897	91,292	2,362	1,243	3.8	2.5
1993	154,608	137,846	15,473	1,289	10.8	10.0
1994	114,656	98,119	15,374	1,163	14.4	13.4
1995	101,292	67,760	32,842	690	33.1	32.4
1996	100,992	57,254	43,109	629	43.3	42.7
1997	85,838	36,496	48,552	790	57.5	56.6
1998	99,919	39,062	60,083	774	60.9	60.1
1999	87,576	29,308	57,286	982	66.5	65.4
2000	79,363	48,480	29,492	1,391	38.9	36.9

*Based on date of haul from NMFS logbooks.

Table 9.--Hawaii-based longline catch-per-unit-effort[*] (number of fish per 1,000 hooks) by trip type, 1991-2000.

	Billfish				Tunas			Miscellaneous			
Year	Swordfish	Blue marlin	Striped marlin	Other billfish	Bigeye tuna	Yellowfin tuna	Albacore	Mahimahi	Ono	Opah	Sharks
Fleet mean											
1991	5.38	---	---	---	3.32	1.08	1.14	3.21	0.22	0.25	5.77
1992	6.34	0.39	1.37	0.48	3.75	0.67	1.69	4.84	0.21	0.28	8.10
1993	6.11	0.39	1.40	0.43	4.21	1.23	2.34	2.00	0.34	0.35	11.87
1994	3.61	0.39	0.94	0.43	4.01	1.13	2.59	2.75	0.21	0.42	9.56
1995	2.64	0.62	1.59	0.83	4.22	1.67	3.23	4.22	0.46	0.45	7.14
1996	2.65	0.46	1.10	0.54	4.41	1.22	3.98	1.62	0.31	0.51	7.01
1997	2.55	0.53	0.81	0.58	5.13	1.87	4.57	3.17	0.53	0.53	5.52
1998	2.52	0.31	0.83	0.66	5.69	1.25	2.81	1.28	0.48	0.53	5.75
1999	1.99	0.26	0.75	0.89	4.20	0.89	3.52	2.32	0.54	0.65	4.58
2000	1.83	0.22	0.39	0.44	3.68	1.89	1.96	2.85	0.38	0.35	3.92
Swordfish trips											
1991	15.36	---	---	---	2.29	0.79	1.53	3.62	0.06	0.02	15.94
1992	14.76	0.20	0.78	0.13	1.61	0.46	3.09	4.78	0.06	0.03	19.74
1993	13.03	0.29	1.01	0.19	2.42	0.68	3.85	2.33	0.13	0.03	26.65
1994	10.34	0.21	0.45	0.08	1.01	0.41	4.48	2.62	0.04	0.01	23.43
1995	12.87	0.65	0.69	0.16	2.35	1.13	5.52	6.76	0.16	0.02	27.58
1996	14.17	0.19	0.50	0.14	1.43	0.71	5.79	2.26	0.23	0.04	25.52
1997	15.41	0.39	0.58	0.17	3.13	1.87	2.87	10.24	0.29	0.01	14.20
1998	14.50	0.29	0.42	0.07	2.33	0.75	2.45	1.53	0.12	0.01	23.01
1999	14.62	0.23	0.61	0.10	1.85	0.72	4.40	4.72	0.24	0.01	18.10
2000	14.46	0.17	0.53	0.09	2.13	0.51	2.21	8.45	0.08	0.01	13.85
Tuna trips											
1991	0.41	---	---	---	3.70	0.70	1.12	2.18	0.39	0.53	1.71
1992	0.27	0.37	2.15	0.72	4.74	0.53	0.86	1.67	0.34	0.59	2.40
1993	0.21	0.41	1.84	0.66	4.68	1.48	1.60	1.51	0.55	0.68	2.56
1994	0.16	0.29	1.24	0.62	5.52	1.16	2.03	2.03	0.32	0.71	2.22
1995	0.22	0.49	1.76	0.98	4.39	1.42	3.19	2.38	0.57	0.60	2.83
1996	0.17	0.38	1.17	0.64	4.73	1.13	3.98	1.03	0.36	0.68	2.90
1997	0.14	0.41	0.75	0.67	5.68	1.57	5.05	1.46	0.59	0.66	2.68
1998	0.20	0.25	0.85	0.75	6.13	1.28	3.02	0.84	0.55	0.67	3.09
1999	0.16	0.21	0.71	0.99	4.38	0.90	3.53	1.48	0.59	0.76	2.83
2000	0.11	0.18	0.33	0.48	3.77	2.06	2.02	1.32	0.43	0.39	2.64
Mixed trips											
1991	5.84	---	---	---	3.41	1.64	0.97	4.13	0.12	0.05	5.16
1992	8.60	0.56	0.71	0.42	3.96	1.04	1.81	9.43	0.14	0.02	7.33
1993	10.39	0.49	0.90	0.28	5.51	1.41	2.00	2.66	0.15	0.01	13.50
1994	4.12	1.30	0.71	0.37	3.92	2.69	0.80	6.56	0.06	0.02	11.64
1995	6.52	1.16	1.43	0.62	4.67	3.00	2.02	10.22	0.21	0.08	12.74
1996	7.56	0.84	1.02	0.35	4.26	1.68	3.45	3.42	0.16	0.08	15.30
1997	9.96	1.16	1.17	0.28	3.12	3.30	2.77	9.11	0.35	0.06	16.37
1998	9.22	0.58	0.87	0.44	4.81	1.29	1.95	3.25	0.27	0.04	12.16
1999	8.50	0.51	0.99	0.55	3.82	0.89	3.26	6.04	0.35	0.24	10.52
2000	11.03	0.48	0.75	0.27	3.30	1.03	1.56	11.95	0.13	0.09	10.65

[*]Based on date of haul from NMFS logbooks.

Table 10.--Hawaii-based longline catch-per-unit-effort* (number of fish per 1,000 hooks) by area, 1991-2000.

	Billfish				Tunas			Miscellaneous			
Year	Swordfish	Blue marlin	Striped marlin	Other billfish	Bigeye tuna	Yellowfin tuna	Albacore	Mahimahi	Ono	Opah	Sharks
Main Hawaiian Islands EEZ											
1991	1.98	---	---	---	3.29	1.04	0.84	2.58	0.28	0.37	1.94
1992	1.46	0.57	2.02	0.69	4.71	0.79	0.82	2.73	0.24	0.49	2.41
1993	0.79	0.49	1.88	0.62	4.51	1.60	1.17	1.69	0.48	0.59	2.33
1994	0.52	0.61	1.19	0.59	4.96	1.25	1.99	3.24	0.24	0.67	2.65
1995	0.74	0.58	1.75	0.97	4.47	1.82	2.56	4.26	0.37	0.57	3.16
1996	0.79	0.60	1.21	0.57	5.05	1.31	3.26	1.98	0.26	0.52	3.29
1997	0.96	0.81	0.83	0.72	4.23	2.17	3.76	2.31	0.50	0.56	3.26
1998	0.95	0.34	0.98	0.85	5.38	0.94	2.51	1.54	0.46	0.72	2.95
1999	0.36	0.26	0.86	1.02	4.46	0.74	3.63	1.78	0.39	0.79	2.66
2000	0.44	0.27	0.43	0.61	3.76	0.91	1.04	3.07	0.21	0.48	2.89
Northwestern Hawaiian Islands EEZ											
1991	8.96	---	---	---	4.23	1.30	0.46	1.90	0.13	0.07	10.03
1992	7.53	0.35	2.56	0.48	3.78	0.57	0.45	3.34	0.11	0.27	13.02
1993	7.33	0.39	2.19	0.58	5.94	1.55	1.08	1.75	0.15	0.30	13.41
1994	4.38	0.25	1.20	0.32	4.82	0.91	2.51	1.36	0.10	0.32	12.74
1995	4.20	0.69	2.54	0.77	4.51	1.82	2.55	2.92	0.45	0.47	9.96
1996	1.39	0.39	1.46	0.58	5.39	0.86	4.46	0.70	0.23	0.84	5.79
1997	1.26	0.37	1.00	0.55	7.36	1.25	4.18	1.54	0.44	0.70	4.37
1998	3.43	0.39	1.86	0.94	5.37	0.88	2.20	1.14	0.25	0.60	6.51
1999	2.60	0.44	1.48	1.01	4.06	0.66	2.63	1.81	0.32	0.60	6.36
2000	3.26	0.20	1.13	0.53	3.74	0.68	1.45	3.15	0.11	0.37	5.59
U.S. Possessions											
1991	0.46	---	---	---	6.93	8.14	0.56	1.56	0.39	0.00	4.39
1992	1.00	0.44	0.06	0.44	4.37	2.62	0.00	0.37	0.50	0.00	13.91
1993	---	---	---	---	---	---	---	---	---	---	---
1994	0.28	0.19	0.90	0.29	5.87	8.58	0.79	0.19	0.40	0.12	3.67
1995	0.14	0.61	0.79	0.61	3.00	3.80	1.93	1.64	1.34	0.03	5.83
1996	0.08	0.38	0.86	0.41	3.43	5.30	7.21	0.22	0.69	0.25	3.38
1997	0.07	0.44	0.58	0.67	4.69	4.37	9.18	1.34	0.74	0.47	3.40
1998	0.09	0.16	0.16	0.23	9.18	3.28	1.97	0.43	0.59	0.13	3.06
1999	0.09	0.29	0.41	0.57	4.20	5.34	1.47	0.50	1.40	0.17	3.22
2000	0.08	0.25	0.24	0.30	2.48	7.22	2.91	0.40	0.64	0.15	2.75
Outside EEZ											
1991	9.90	---	---	---	3.11	0.99	1.78	4.53	0.16	0.10	10.78
1992	10.12	0.25	0.72	0.32	2.98	0.59	2.53	6.70	0.19	0.12	12.06
1993	10.64	0.31	0.80	0.24	3.57	0.83	3.66	2.33	0.26	0.14	20.14
1994	7.44	0.18	0.47	0.27	2.24	0.74	3.53	2.89	0.21	0.18	17.24
1995	4.84	0.65	1.00	0.66	3.79	1.31	4.51	4.76	0.59	0.28	11.82
1996	5.46	0.35	0.79	0.49	3.25	1.15	4.39	1.76	0.39	0.33	11.86
1997	4.96	0.41	0.68	0.48	4.38	1.84	5.17	5.15	0.61	0.39	8.37
1998	3.84	0.29	0.46	0.53	5.13	1.09	3.48	1.38	0.55	0.47	8.04
1999	3.22	0.20	0.53	0.81	4.05	0.53	3.92	3.05	0.60	0.62	5.65
2000	2.92	0.19	0.26	0.37	3.99	1.05	2.33	3.44	0.47	0.33	4.55

*Based on date of haul from NMFS logbooks.

Table 11.--Hawaii's longline landings* (X 1,000 pounds) of selected pelagic species 1987-2000.

	Billfish				Tunas				Miscellaneous				
Year	Swordfish	Blue marlin	Striped marlin	Other marlin	Bigeye tuna	Yellowfin tuna	Albacore	Bluefin tuna	Mahimahi	Ono	Opah	Sharks	Grand total
1987	50	110	600	100	1,800	580	330	---	50	50	150	40	3,890
1988	50	230	1,110	150	2,730	1,310	680	---	40	90	180	100	6,720
1989	620	780	1,350	290	3,180	2,170	550	---	180	200	270	200	9,940
1990	5,370	830	1,190	130	3,340	2,420	390	---	370	80	250	220	14,730
1991	9,940	650	1,460	150	3,420	1,620	690	---	560	100	270	320	19,480
1992	12,570	770	1,010	310	3,280	760	740	80	590	90	320	410	21,110
1993	13,030	750	1,040	220	4,680	1,390	970	90	320	140	450	1,740	25,010
1994	7,000	800	720	220	3,940	1,340	1,100	50	380	90	520	1,760	18,140
1995	5,980	1,260	1,200	400	4,520	2,160	1,940	60	570	200	630	3,470	22,720
1996	5,520	1,030	920	250	3,940	1,390	2,610	50	380	140	760	4,330	21,550
1997	6,350	1,070	780	320	5,400	2,520	3,630	50	520	240	820	5,010	27,140
1998	7,190	870	830	380	7,110	1,590	2,450	40	340	260	920	6,210	28,630
1999	6,840	790	800	530	6,000	1,040	3,250	20	680	340	1,210	6,270	28,350
2000	6,500	690	440	340	5,790	2,510	2,030	10	720	250	690	3,300	23,810

*Estimated from NMFS and HDAR shoreside sampling and NMFS logbook data.

Table 12.--Hawaii's longline ex-vessel revenue* (X $1,000) by species, 1987-2000.

	Billfish				Tunas				Miscellaneous				
Year	Swordfish	Blue marlin	Striped marlin	Other marlin	Bigeye tuna	Yellowfin tuna	Albacore	Bluefin tuna	Mahimahi	Ono	Opah	Sharks	Grand Total
1987	170	140	810	200	6,680	1,510	520	---	100	150	240	60	10,640
1988	170	190	1,190	250	9,590	3,390	910	---	110	250	270	100	16,500
1989	1,460	700	1,570	310	11,500	5,460	730	---	430	470	350	120	23,250
1990	11,980	780	1,650	140	12,350	6,320	590	---	630	210	330	120	35,310
1991	20,570	520	1,420	320	13,080	4,420	910	40	690	210	310	170	42,910
1992	24,000	830	1,300	320	11,860	2,300	840	1,070	820	200	350	230	44,380
1993	26,580	630	1,080	200	16,750	3,870	1,100	1,270	430	270	400	590	53,360
1994	16,450	1,030	1,240	260	14,620	3,860	1,280	820	530	230	580	650	41,800
1995	13,640	1,120	1,070	300	15,110	6,050	2,040	1,020	780	310	590	1,280	43,610
1996	13,740	1,030	1,140	230	14,110	4,250	3,390	880	770	300	810	1,790	42,730
1997	14,040	910	980	310	17,390	6,740	4,460	800	640	370	940	2,020	50,070
1998	11,940	1,090	990	250	21,060	3,980	3,040	250	580	490	960	1,480	46,640
1999	12,920	920	1,100	470	20,020	2,600	3,800	150	1,280	620	1,390	1,470	47,400
2000	12,740	870	790	420	20,780	7,020	3,000	90	1,230	530	1,110	850	50,150

*Estimates from NMFS and HDAR shoreside sampling and NMFS logbook data.

Table 13.--Hawaii's longline ex-vessel prices* (based on estimated whole weight) by species, 1987-2000.

	Billfish			Tunas				Miscellaneous				
Year	Swordfish	Blue marlin	Striped marlin	Bigeye tuna	Yellowfin tuna	Albacore	Bluefin tuna	Mahimahi	Ono	Opah	Mako	Thresher
1987	3.30	1.20	1.40	3.70	2.60	1.60	---	2.30	2.90	1.60	1.70	0.80
1988	3.30	0.90	1.10	3.50	2.60	1.40	---	2.80	2.70	1.50	1.20	0.80
1989	2.40	0.90	1.20	3.60	2.50	1.30	---	2.40	2.30	1.30	0.90	0.40
1990	2.20	0.90	1.40	3.70	2.60	1.50	---	1.70	2.60	1.30	0.70	0.40
1991	2.10	0.80	1.00	3.80	2.70	1.30	8.70	1.30	2.10	1.10	0.80	0.60
1992	1.90	1.10	1.30	3.60	3.00	1.10	12.60	1.40	2.40	1.10	0.90	0.53
1993	2.00	0.80	1.00	3.60	2.80	1.10	13.80	1.40	1.90	0.90	0.80	0.70
1994	2.40	1.30	1.70	3.70	2.90	1.20	15.60	1.40	2.70	1.10	0.80	0.70
1995	2.30	0.90	0.90	3.30	2.80	1.10	18.10	1.40	1.60	0.90	0.40	0.30
1996	2.50	1.00	1.20	3.60	3.10	1.30	18.30	2.10	2.10	1.10	0.50	0.40
1997	2.20	0.90	1.30	3.20	2.70	1.20	15.60	1.20	1.60	1.10	0.40	0.30
1998	1.70	1.30	1.20	3.00	2.50	1.20	7.00	1.70	1.90	1.00	0.40	0.20
1999	1.90	1.20	1.40	3.30	2.50	1.20	6.50	1.90	1.80	1.20	0.50	0.20
2000	2.00	1.30	1.80	3.60	2.80	1.50	10.40	1.70	2.20	1.60	0.60	0.30

*Estimates from on NMFS and HDAR shoreside sampling and NMFS logbook data.

Table 14.--Mean whole weight of catch* (in pounds), 1987-2000.

	Billfish			Tunas				Miscellaneous				
Year	Swordfish	Blue marlin	Striped marlin	Bigeye tuna	Yellowfin tuna	Albacore	Bluefin tuna	Mahimahi	Ono	Opah	Mako	Thresher
Fleet												
1987	129	161	66	77	82	63	---	21	33	111	124	97
1988	119	157	57	83	103	60	---	20	32	108	137	122
1989	130	165	62	77	104	62	---	23	35	104	161	158
1990	152	199	62	81	122	61	---	19	36	98	162	167
1991	153	173	58	85	118	52	185	15	32	97	135	180
1992	178	175	66	77	99	45	192	11	35	98	144	176
1993	171	157	64	88	93	44	203	13	33	101	147	199
1994	163	171	64	81	97	41	190	12	34	103	153	164
1995	171	157	58	79	95	51	271	10	31	101	178	172
1996	157	154	58	64	80	53	223	17	31	105	177	156
1997	163	134	66	71	89	55	239	13	30	103	161	160
1998	176	165	60	74	76	55	177	16	32	101	177	171
1999	188	164	55	75	62	52	202	16	34	98	177	202
2000	185	158	59	80	67	55	165	14	32	100	182	162

*Estimates from on NMFS and HDAR shoreside sampling and NMFS logbook data.

Table 15.--Mean whole weight of catch* (in pounds) by trip type, 1991-2000.

Year	Billfish: Swordfish	Billfish: Blue marlin	Billfish: Striped marlin	Tunas: Bigeye tuna	Tunas: Yellowfin tuna	Tunas: Albacore	Tunas: Bluefin tuna	Miscellaneous: Mahimahi	Miscellaneous: Ono	Miscellaneous: Opah	Miscellaneous: Mako	Miscellaneous: Thresher
Swordfish trips												
1991	165	183	72	97	124	44	164	15	35	104	107	161
1992	193	278	83	95	101	38	195	10	37	78	131	235
1993	180	174	77	83	93	33	184	13	36	100	141	261
1994	173	202	84	95	95	30	205	11	40	76	119	196
1995	186	158	77	87	100	47	191	8	32	81	157	---
1996	169	239	82	111	109	49	225	19	38	88	233	---
1997	166	108	97	85	108	43	238	12	36	102	74	---
1998	182	148	109	98	113	48	230	14	39	76	139	123
1999	192	215	86	98	95	47	251	14	37	94	210	---
2000	195	261	76	90	84	41	176	17	49	86	171	---
Tuna trips												
1991	83	153	51	76	88	58	---	14	31	97	155	188
1992	77	143	59	71	68	56	159	14	34	99	157	157
1993	121	145	59	84	87	58	220	13	32	101	153	189
1994	91	157	60	77	81	49	247	12	34	104	176	167
1995	129	152	56	75	80	51	342	12	30	101	181	176
1996	144	143	56	64	64	53	201	16	31	105	173	194
1997	166	134	61	69	75	55	---	14	29	103	166	156
1998	126	147	56	71	70	56	---	16	32	101	175	166
1999	133	152	51	74	56	52	---	17	33	98	177	216
2000	127	143	53	79	65	55	167	15	32	100	179	159
Mixed trips												
1991	142	187	66	91	132	49	192	15	34	96	151	185
1992	162	179	81	81	120	45	192	10	39	99	140	193
1993	158	169	75	100	107	36	217	13	37	113	142	209
1994	119	175	68	94	129	57	154	12	39	96	142	148
1995	160	164	65	91	123	47	224	10	35	94	182	137
1996	151	165	62	58	113	51	249	17	33	95	174	127
1997	161	137	78	84	115	48	239	12	34	101	160	173
1998	176	206	74	83	97	50	163	16	33	92	200	188
1999	191	183	64	78	89	50	163	15	35	99	157	168
2000	186	190	73	85	95	49	162	13	35	104	209	182

*Estimates from on NMFS and HDAR shoreside sampling and NMFS logbook data.

Table 16.--Western Pacific longline logbook summary for protected species interactions for January 2000 to December 2000.
(Vessels landing or based in Hawaii)
Report: Date of haul; All areas–All species

Trip Information

Number of vessels reporting interactions	42
Number of trips reporting interactions	56
Number of sets reporting interactions	184
Total number of sets on trips with interactions	751
Total number of hooks on sets with interactions	165,818
Total number of hooks on trips with interactions	764,078

Reported Protected Species Interactions

Species	Alive/Uninjured	Injured	Dead	Total
Seals/Sea lions	0	0	0	0
Monk seals	0	0	0	0
Other seals	0	0	0	0
Sea lions	0	0	0	0
Total	0	0	0	0
Whales/Dolphins				
Humpback whales	0	0	0	0
False killer whales	1	0	0	1
Other whales	2	0	0	2
Dolphins	3	0	0	3
Total	6	0	0	6
Turtles				
Green turtles	8	3	4	15
Hawksbill turtles	0	0	0	0
Leatherback turtles	7	0	0	7
Loggerhead turtles	12	3	0	15
Olive ridley turtles	6	0	3	9
Unidentified turtles	2	0	0	2
Total	35	6	7	48
Birds				
Albatross	37	30	158	225
Booby	0	0	0	0
Other seabirds	0	0	0	0
Total	37	30	158	225
Other species	0	0	0	0

Date and time of summary: 03/07/01 (11:33:36)

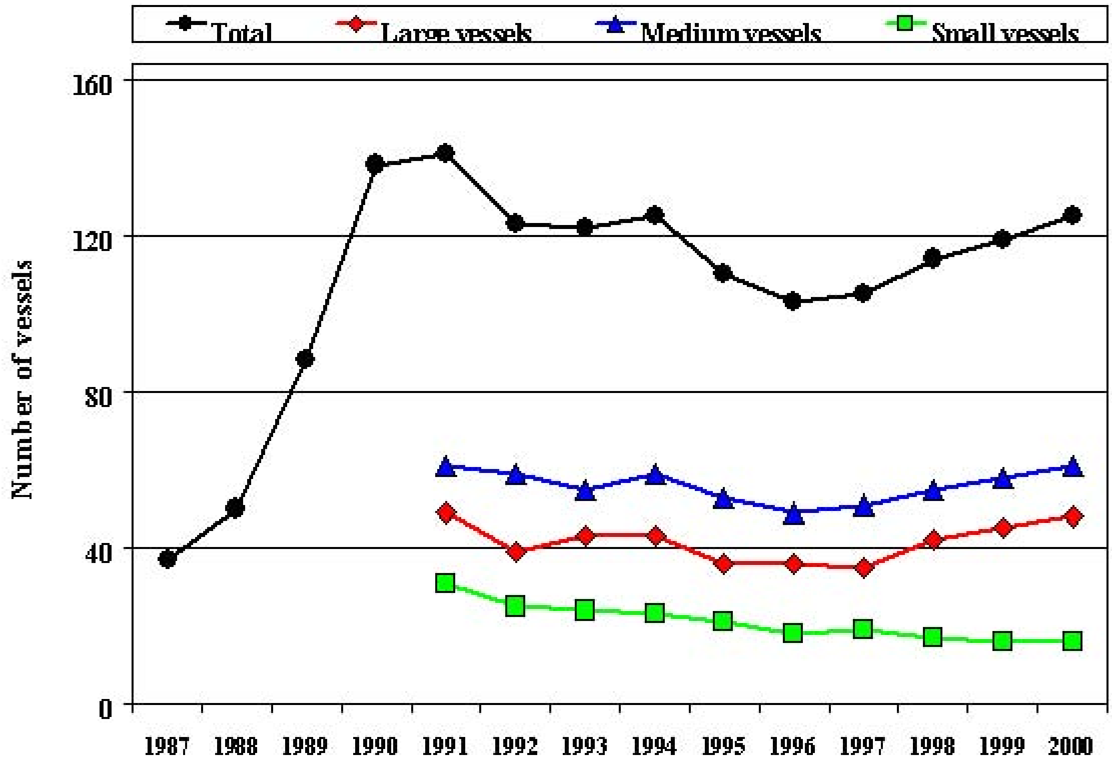

Figure 1.–Number of active Hawaii-based longline vessels, 1987-2000.

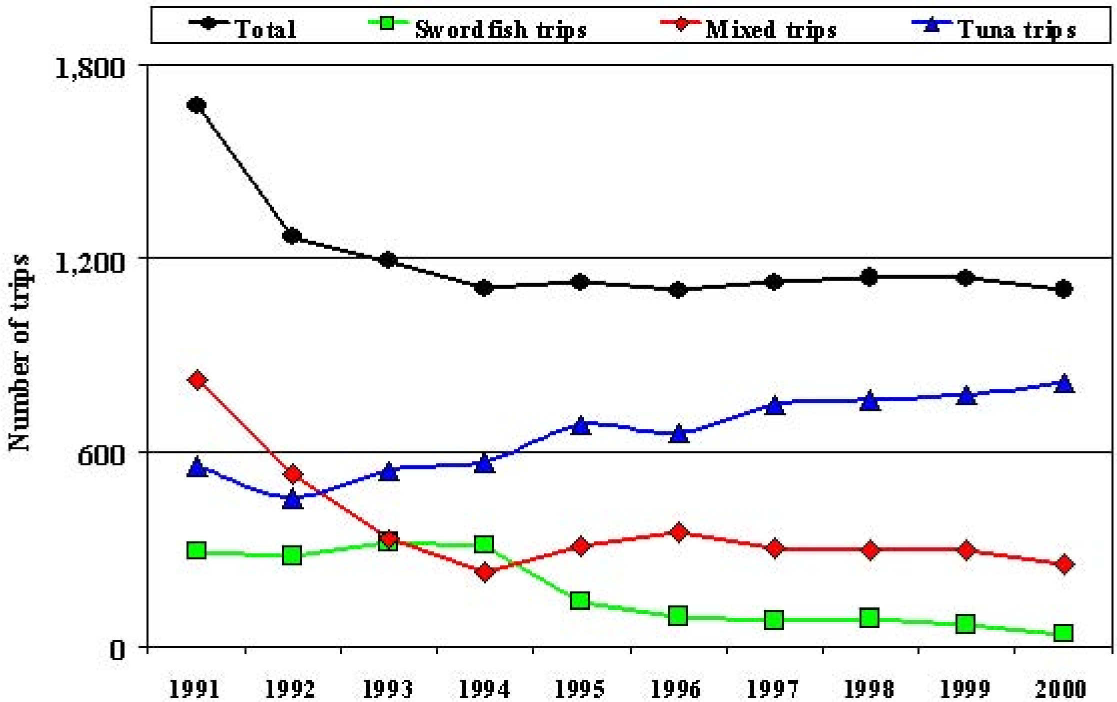

Figure 2.–Number of trips by Hawaii-based longline vessels, 1991-2000.

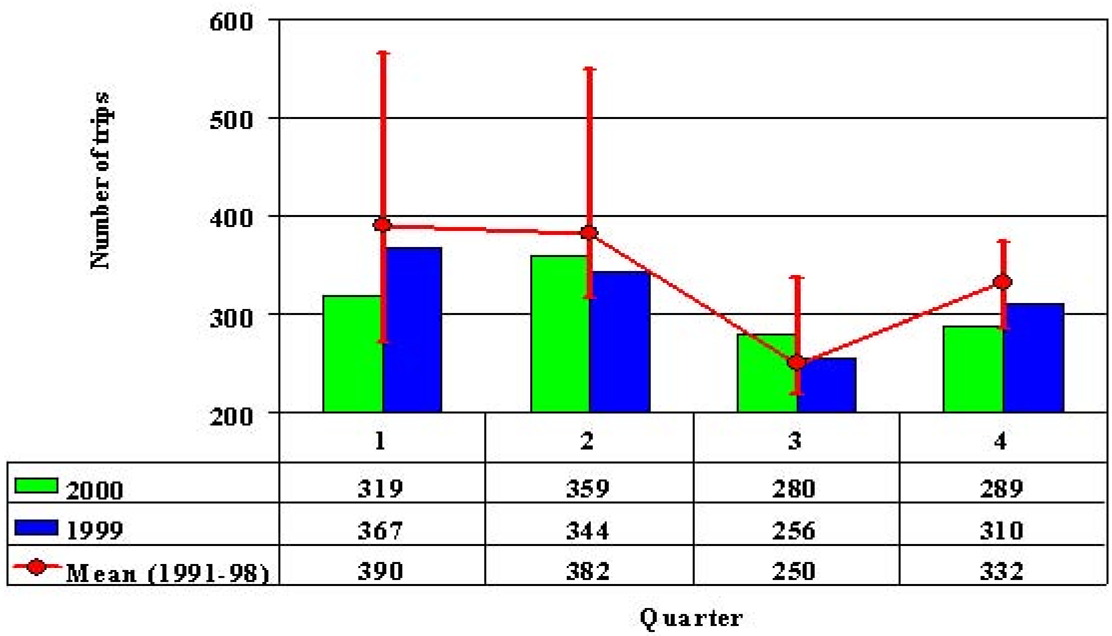

Figure 3.–Number of trips by quarter, 1991-2000.

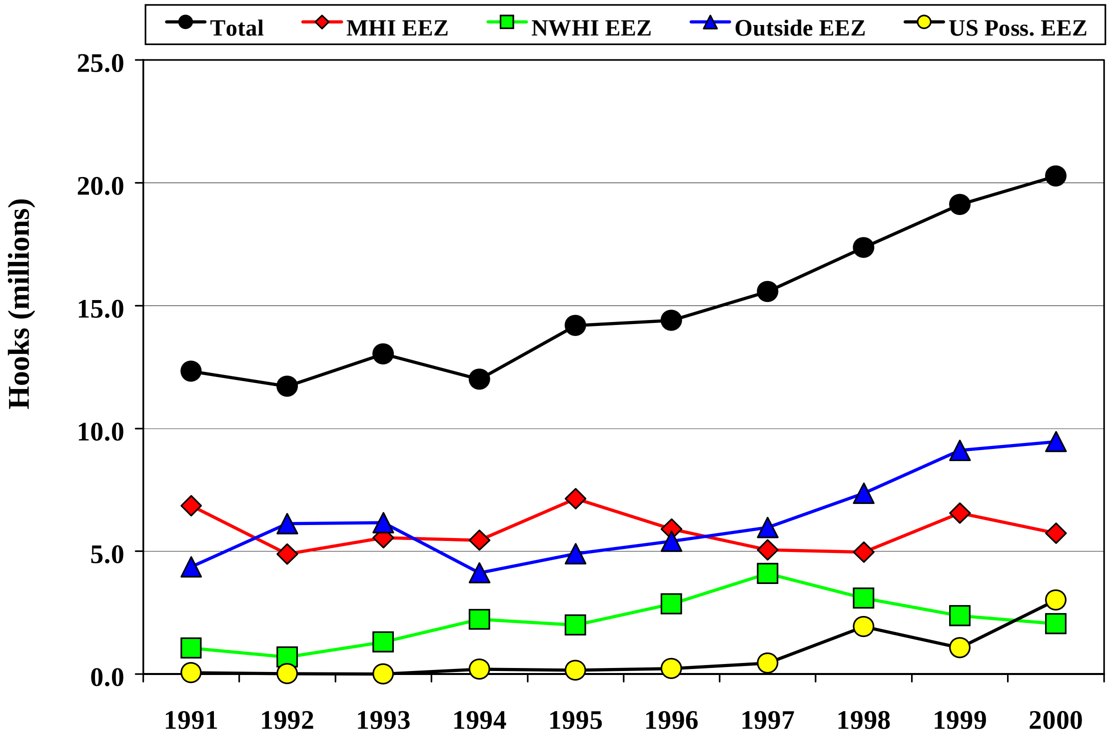

Figure 4.–Number of hooks set by the Hawaii-based longline fishery, 1991-2000.

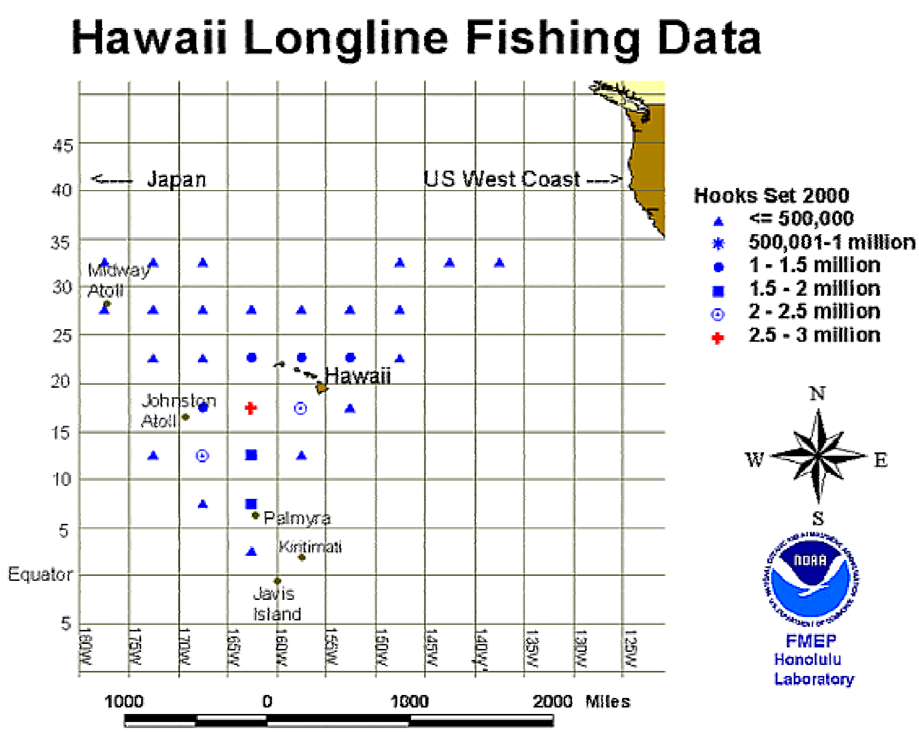

Figure 5.–Number of hooks set by area, 2000.

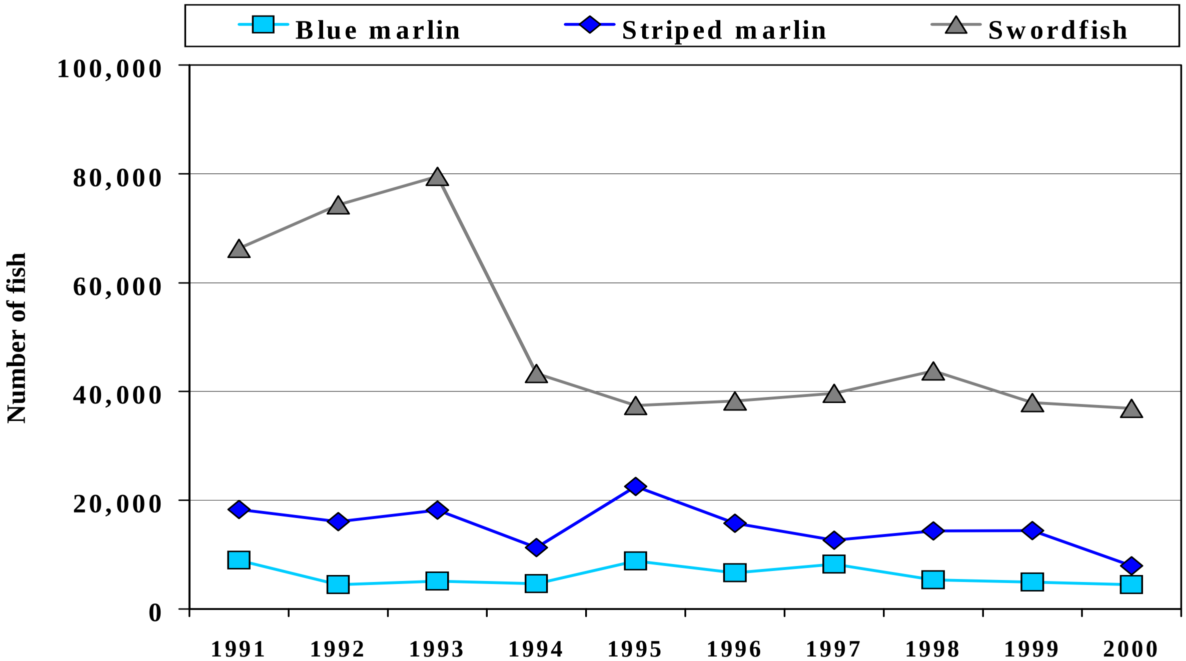

Figure 6.–Billfish catch by the Hawaii-based longline fishery, 1991-2000.

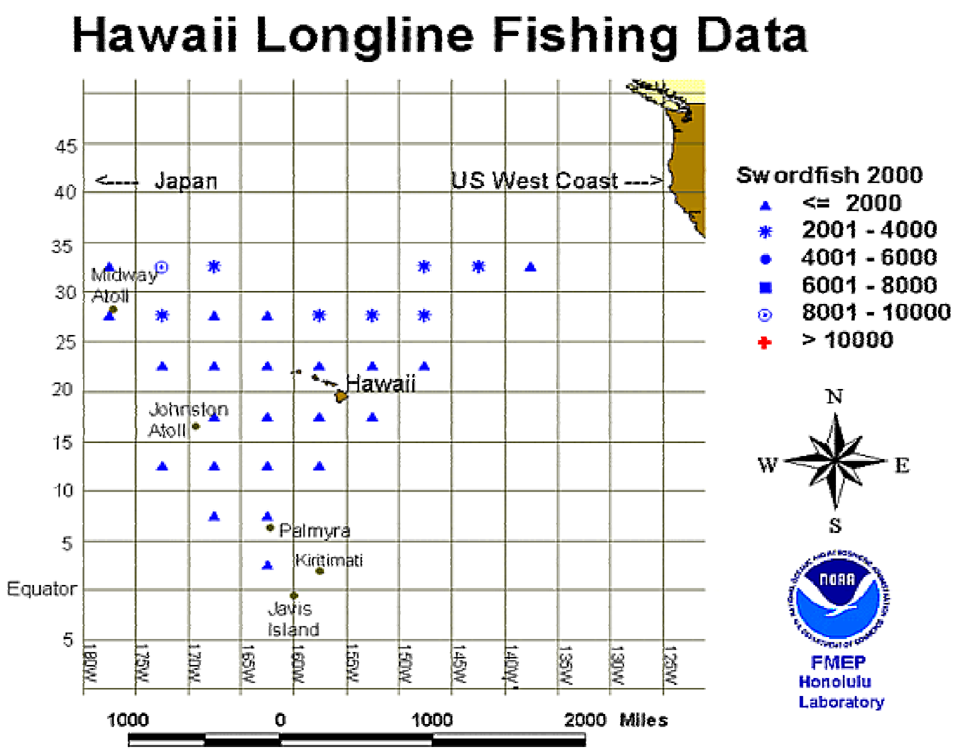

Figure 7.–Swordfish catch by the Hawaii-based longline fishery, 2000.

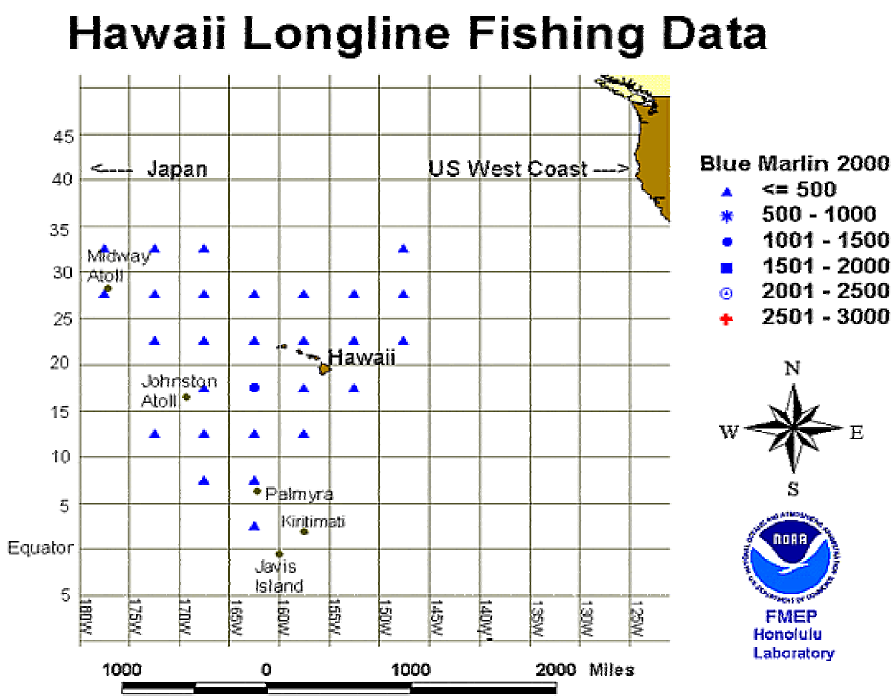

Figure 8.–Blue marlin catch by the Hawaii-based longline fishery, 2000.

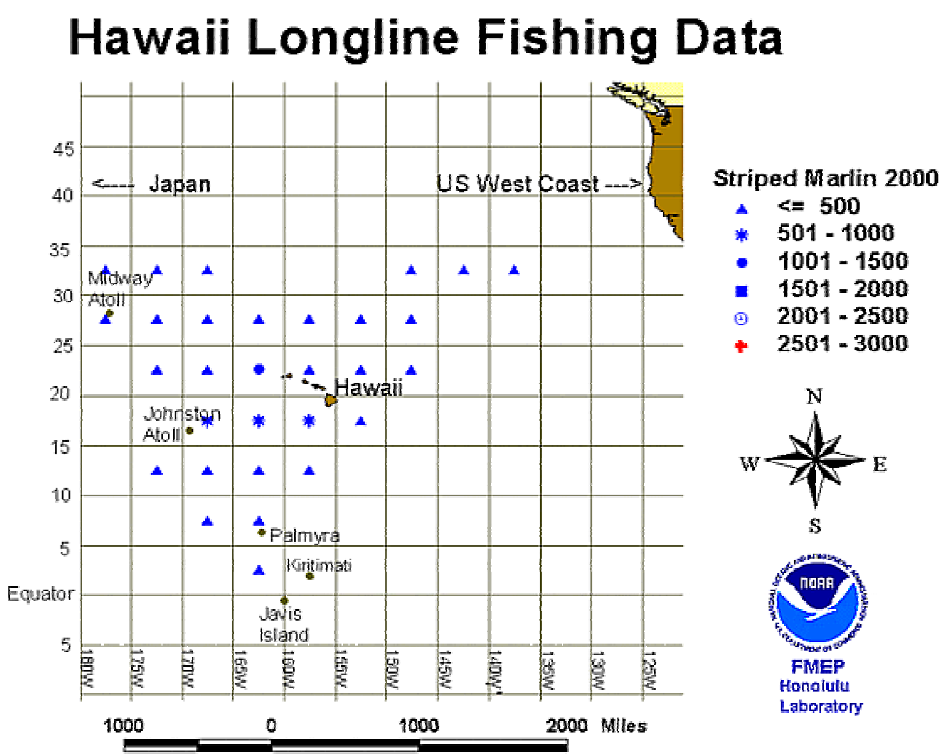

Figure 9.–Striped marlin catch by the Hawaii-based longline fishery, 2000.

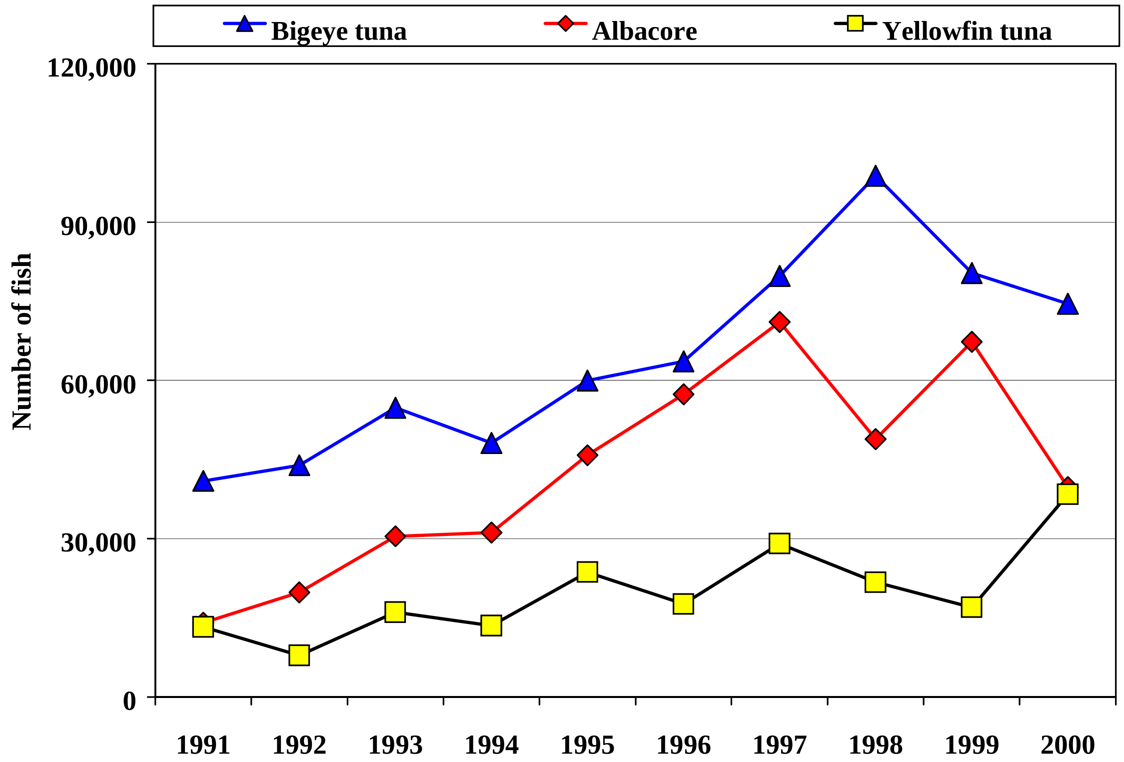

Figure 10.–Tuna catch by the Hawaii-based longline fishery, 1991-2000.

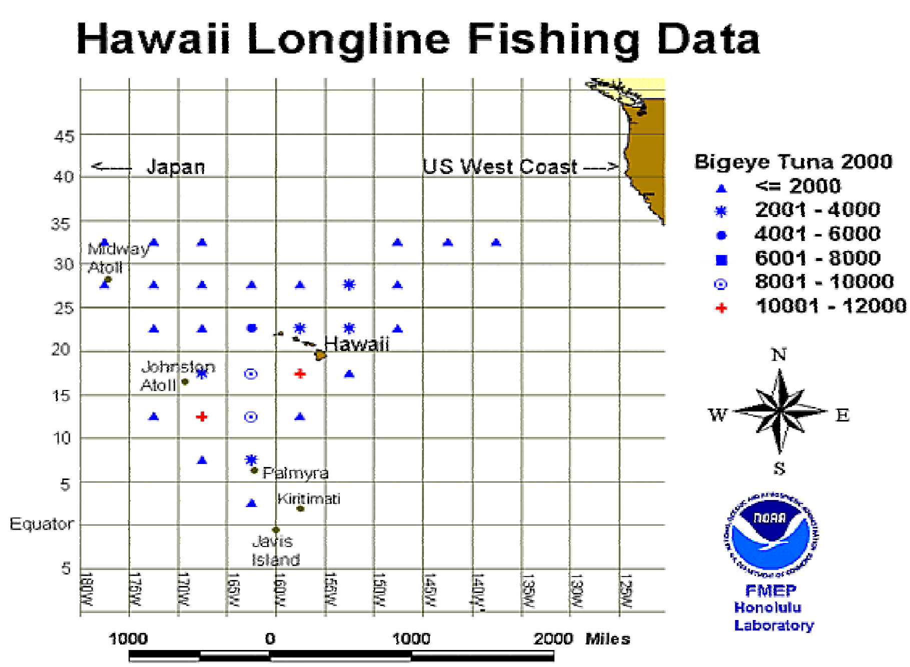

Figure 11.–Bigeye tuna catch by the Hawaii-based longline fishery, 2000.

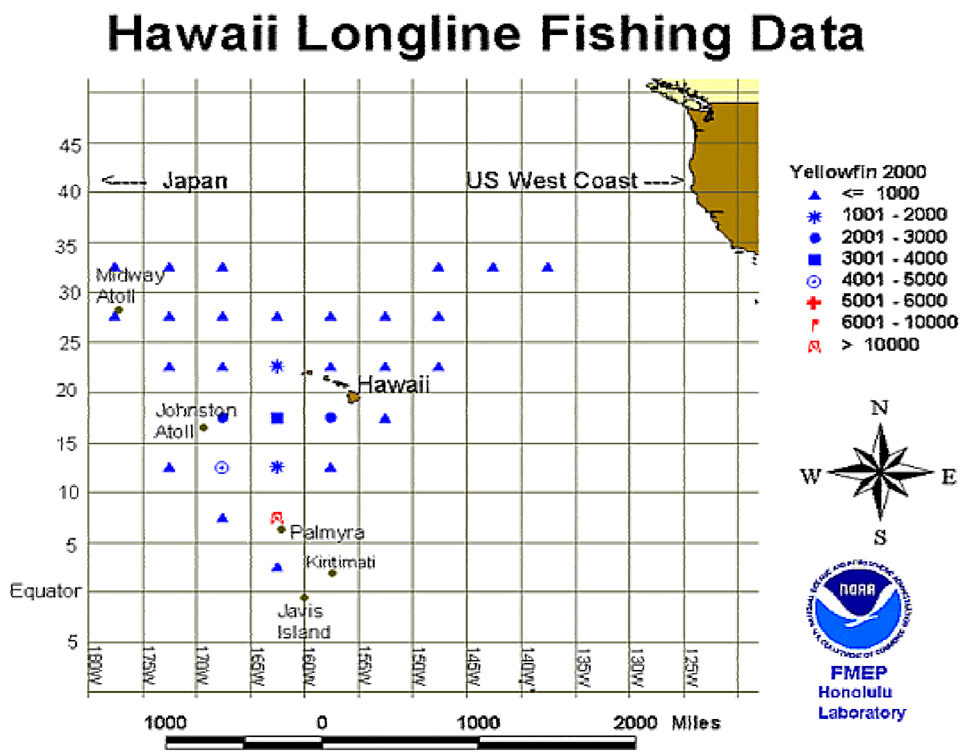

Figure 12.–Yellowfin tuna catch by the Hawaii–based longline fishery, 2000.

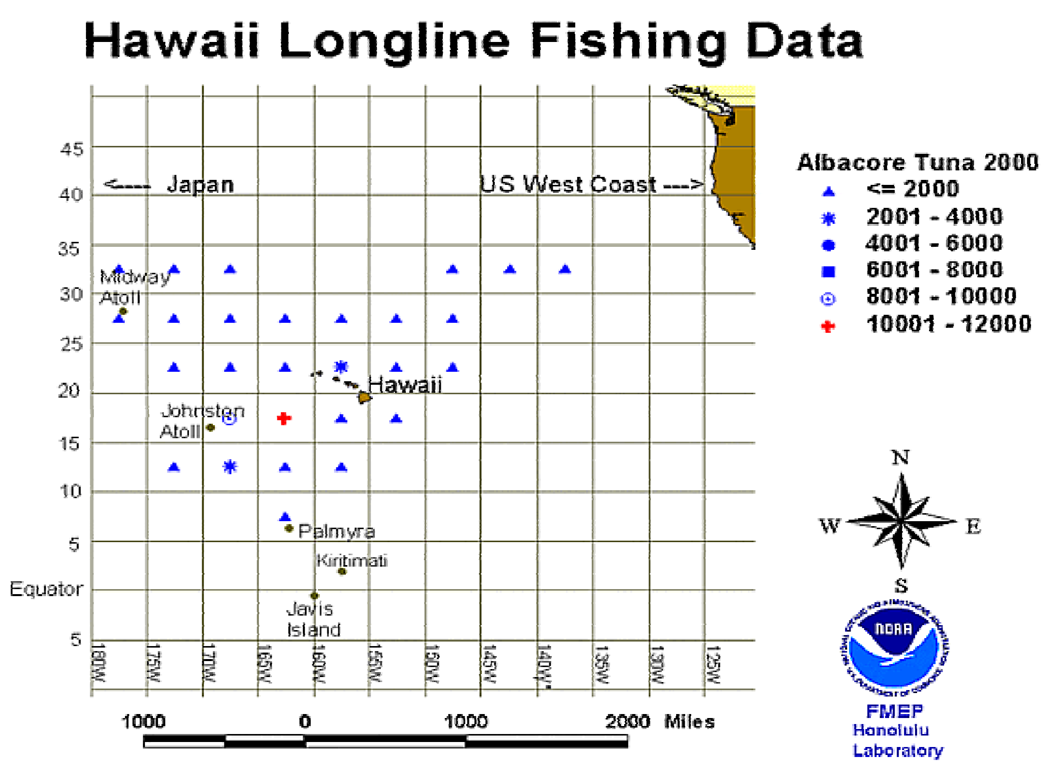

Figure 13.–Albacore catch by the Hawaii-based longline fishery, 2000.

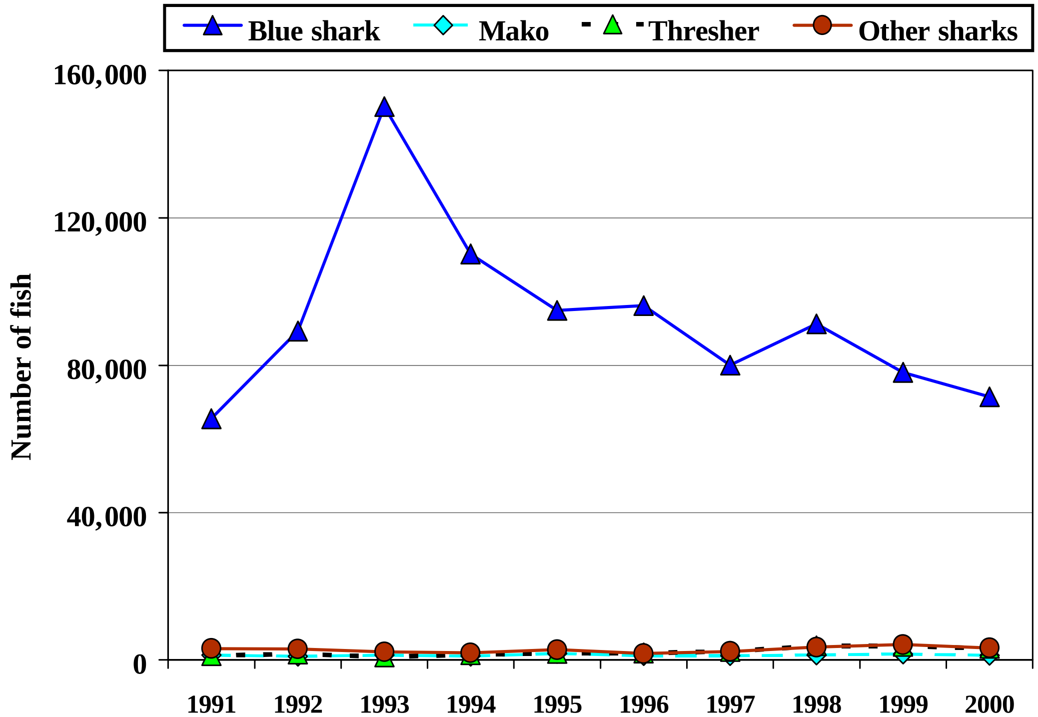

Figure 14.–Shark catch by the Hawaii–based longline fishery, 1991-2000.

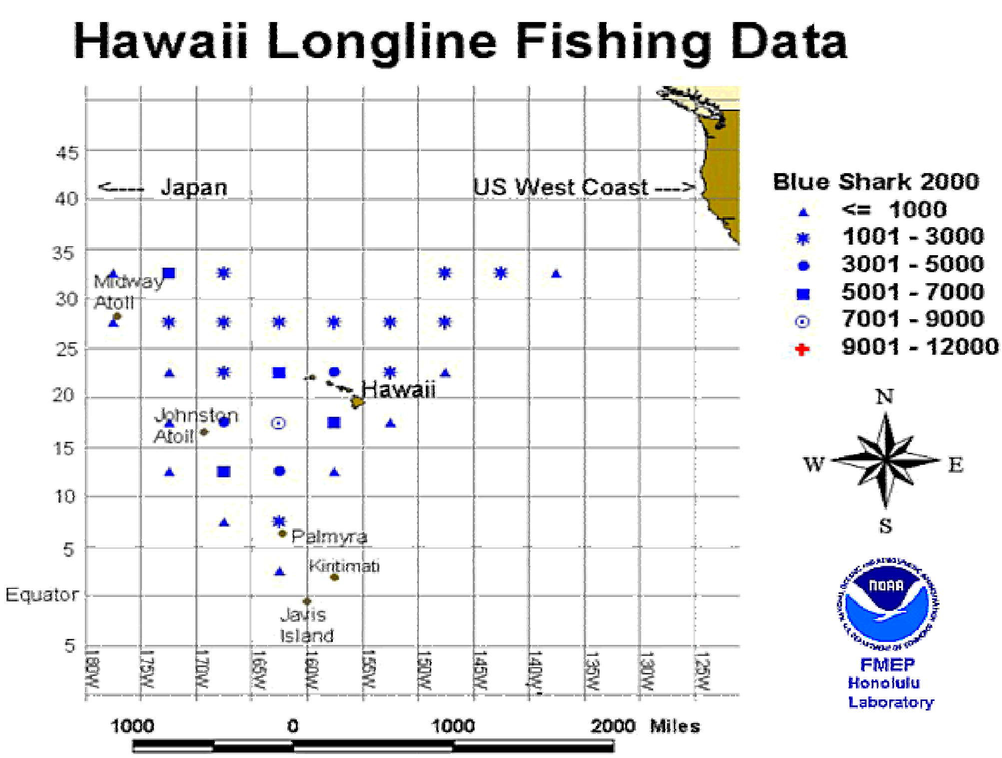

Figure 15.–Blue shark catch by the Hawaii-based longline fishery, 2000.

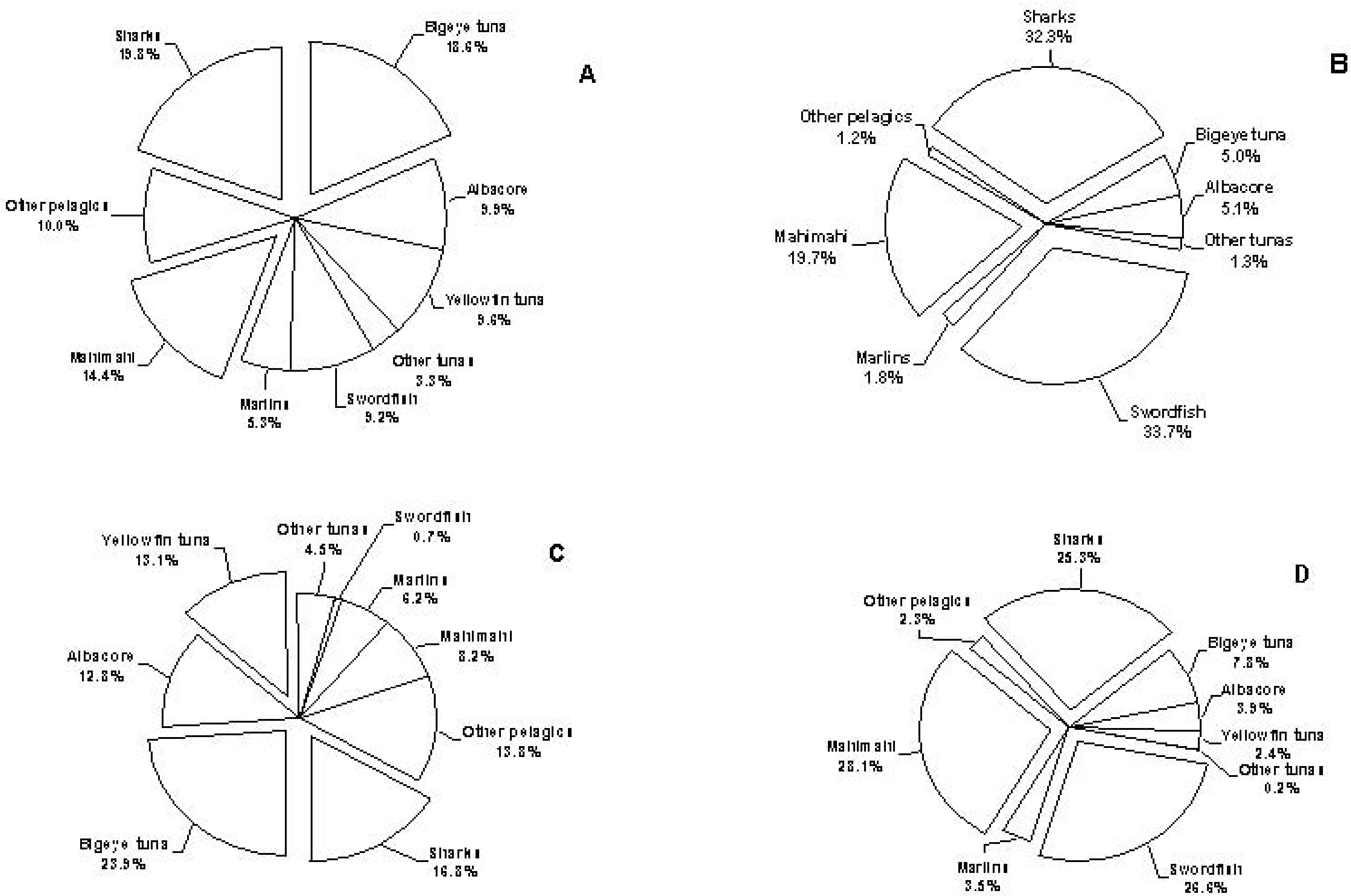

Figure 16.–Species composition of (A) the total catch (B) swordfish-target trip catch, (C) Tuna-target trip catch, (D)mixed target trip catch, 2000.

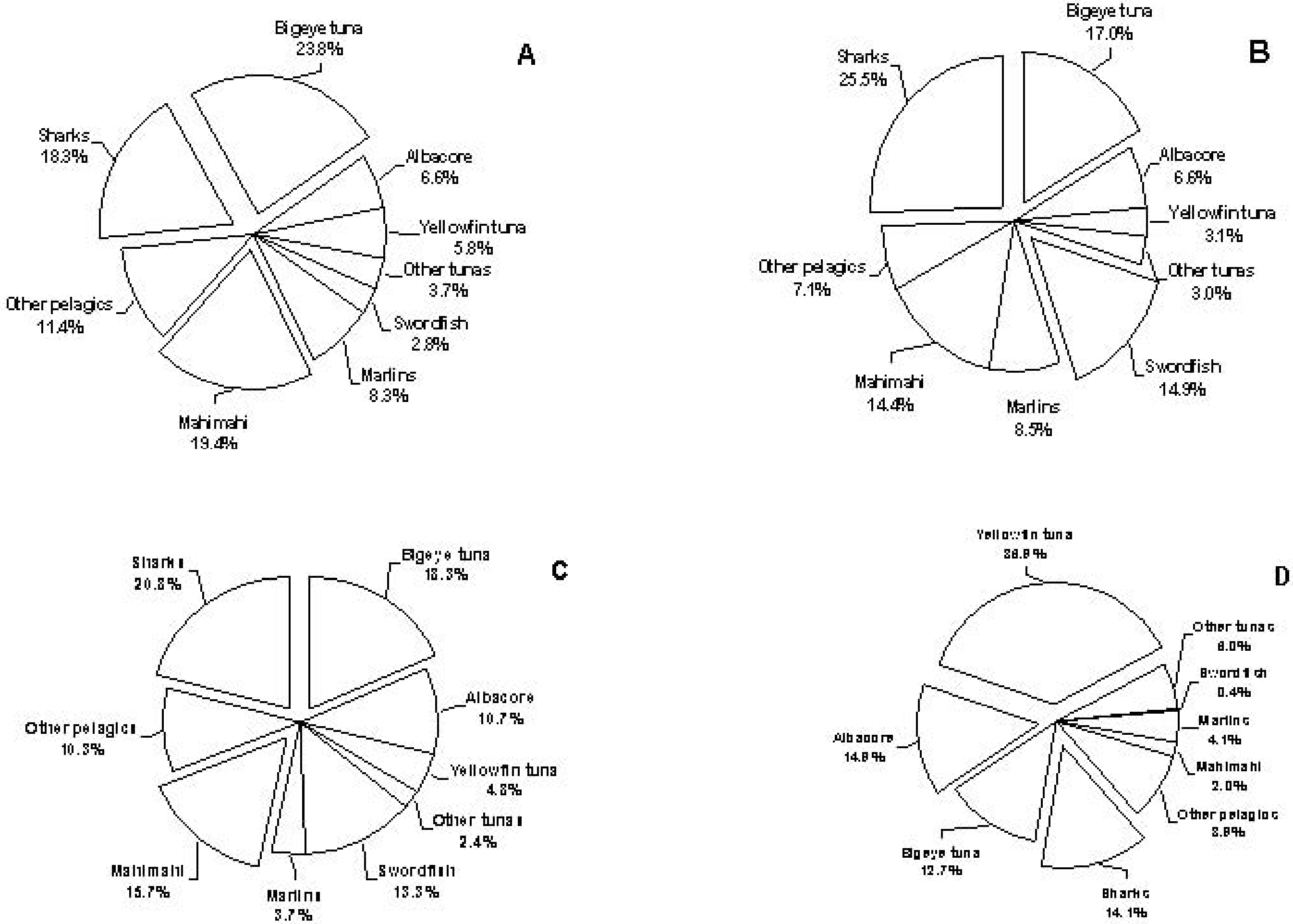

Figure 17.–Species composition of the catch in the (A) main Hawaiian Islands Exclusive Economic Zone (EEZ), (B) northwestern Hawaiian Islands EEZ, (C) outside the EEZ, and the EEZ of U.S. possessions, 2000.

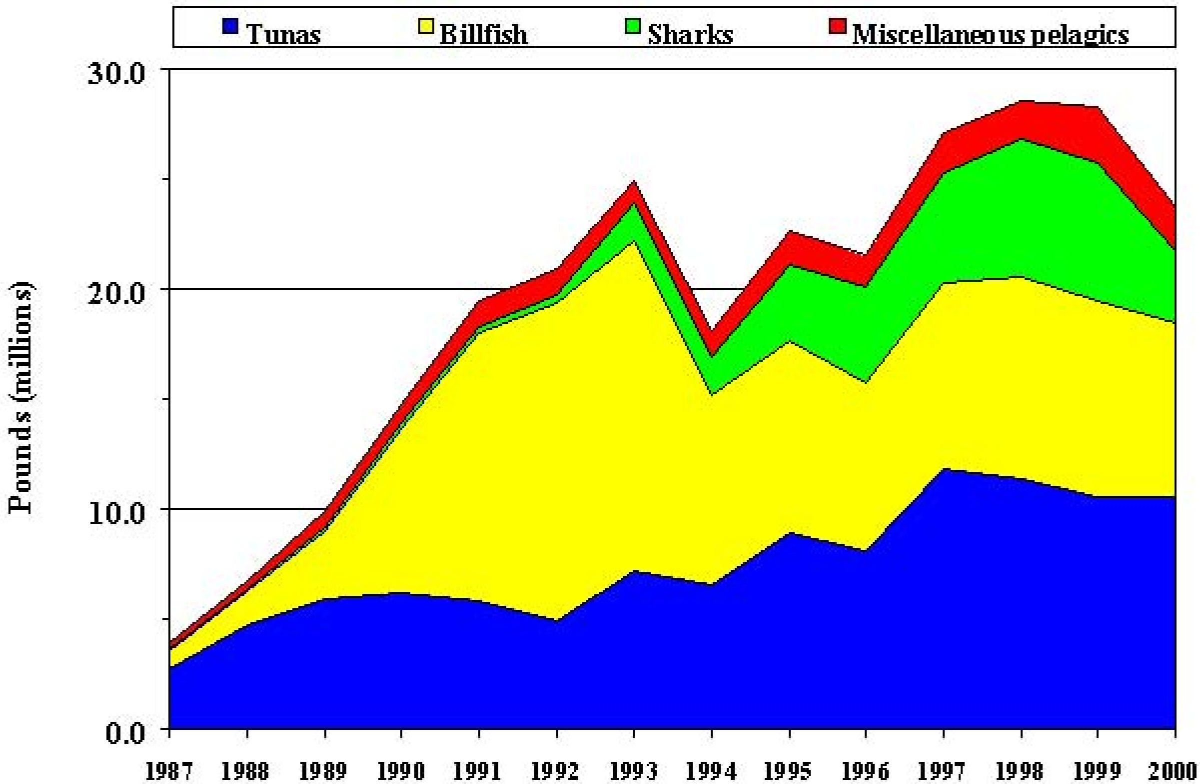

Figure 18.–Longline landings by major pelagic groups, 1987-2000.

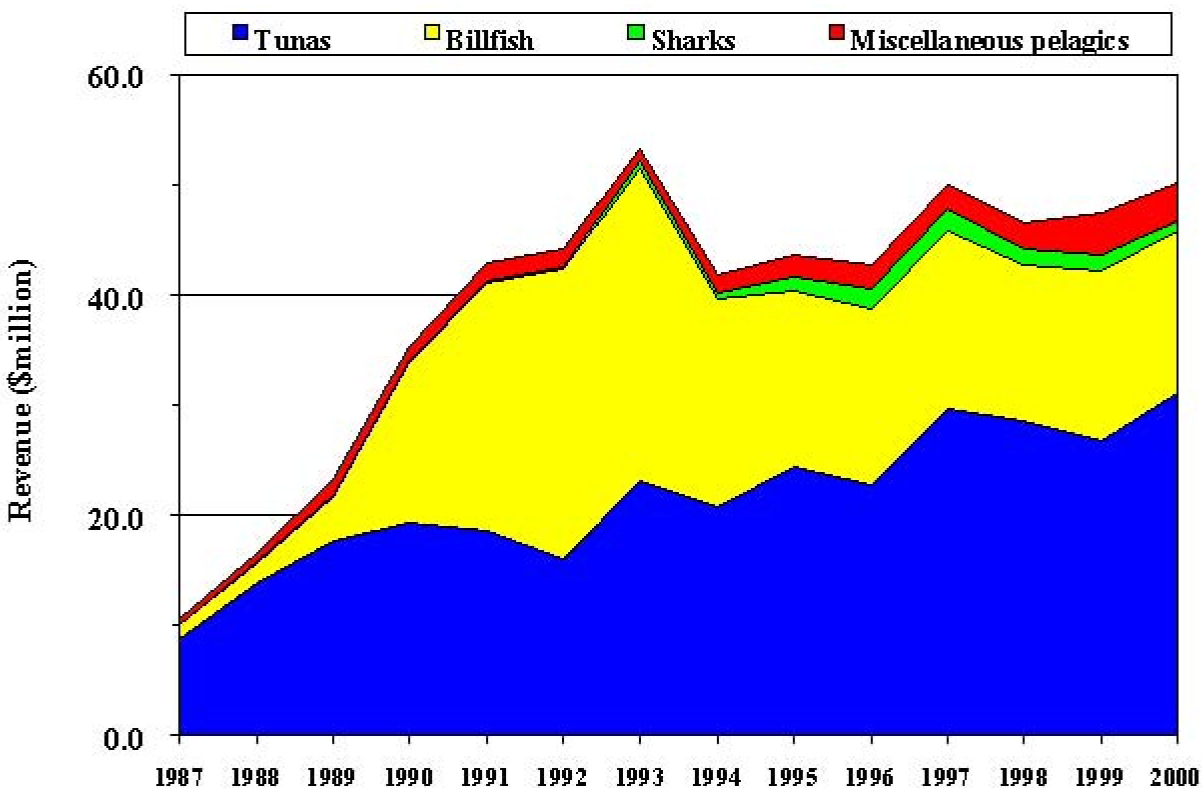

Figure 19.–Longline ex-vessel revenue by major pelagic groups, 1987-2000.

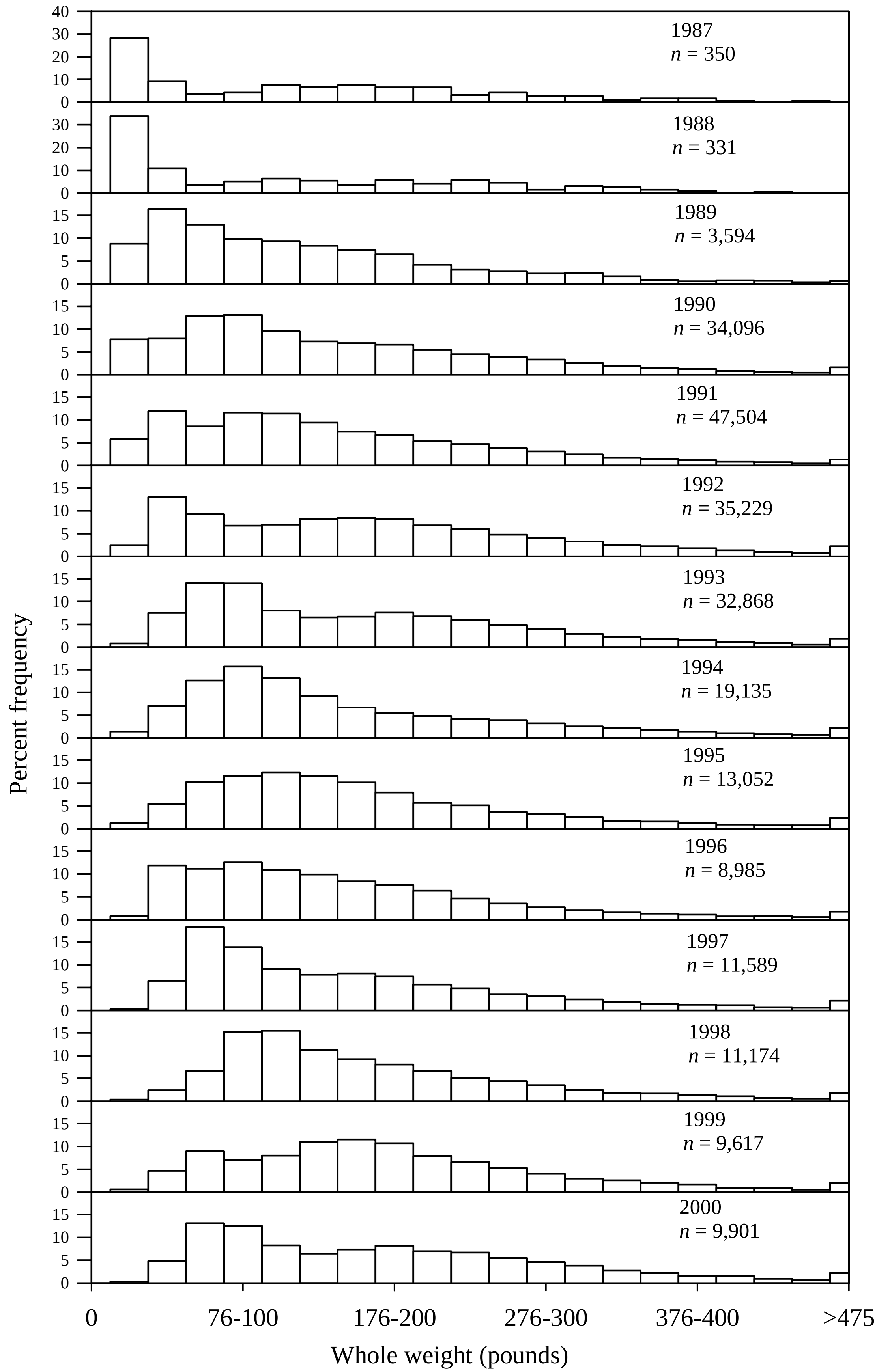

Figure 20.--Swordfish weight-frequency histograms, 1987-2000.

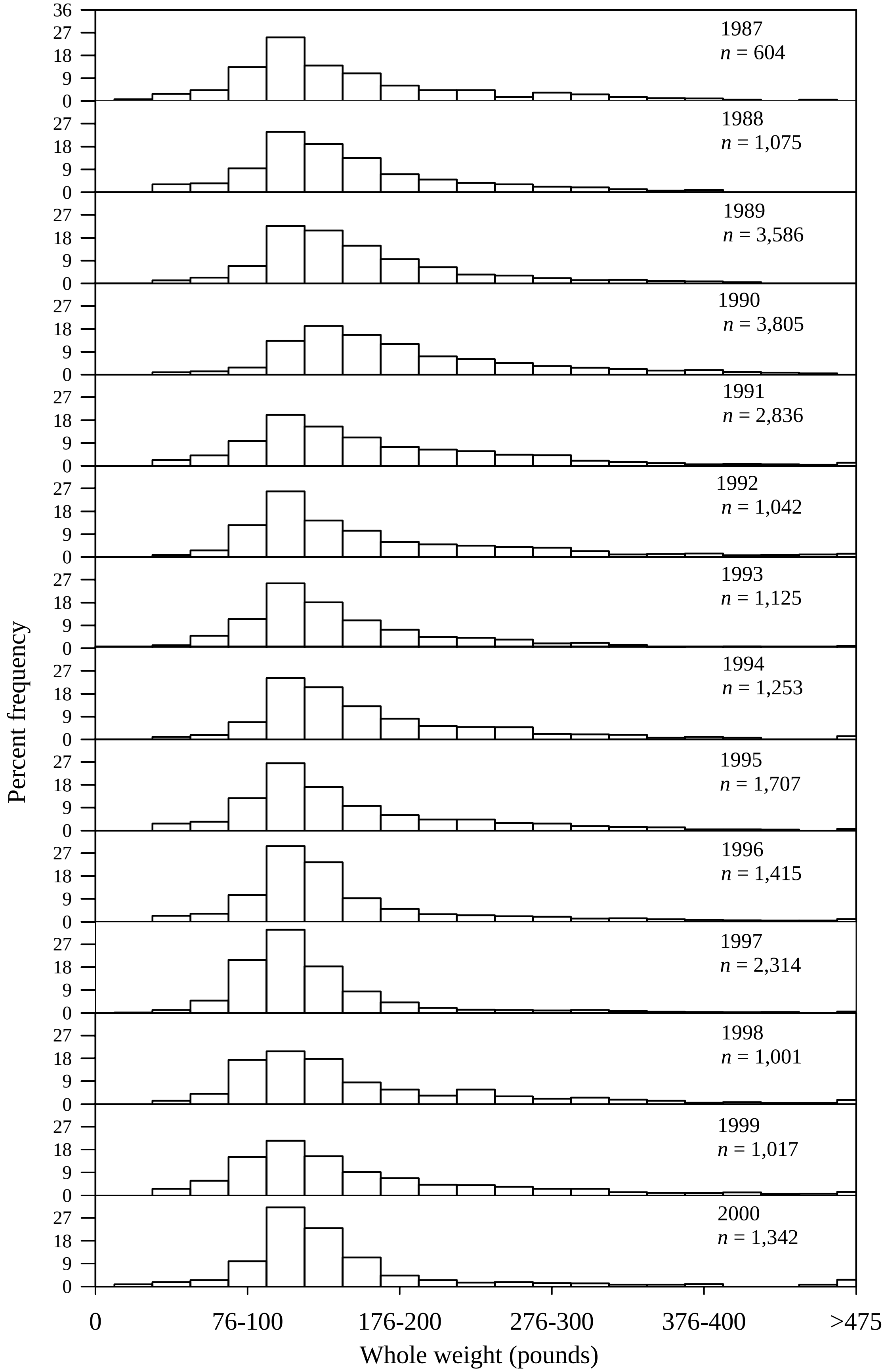

Figure 21.--Blue marlin weight-frequency histograms, 1987-2000.

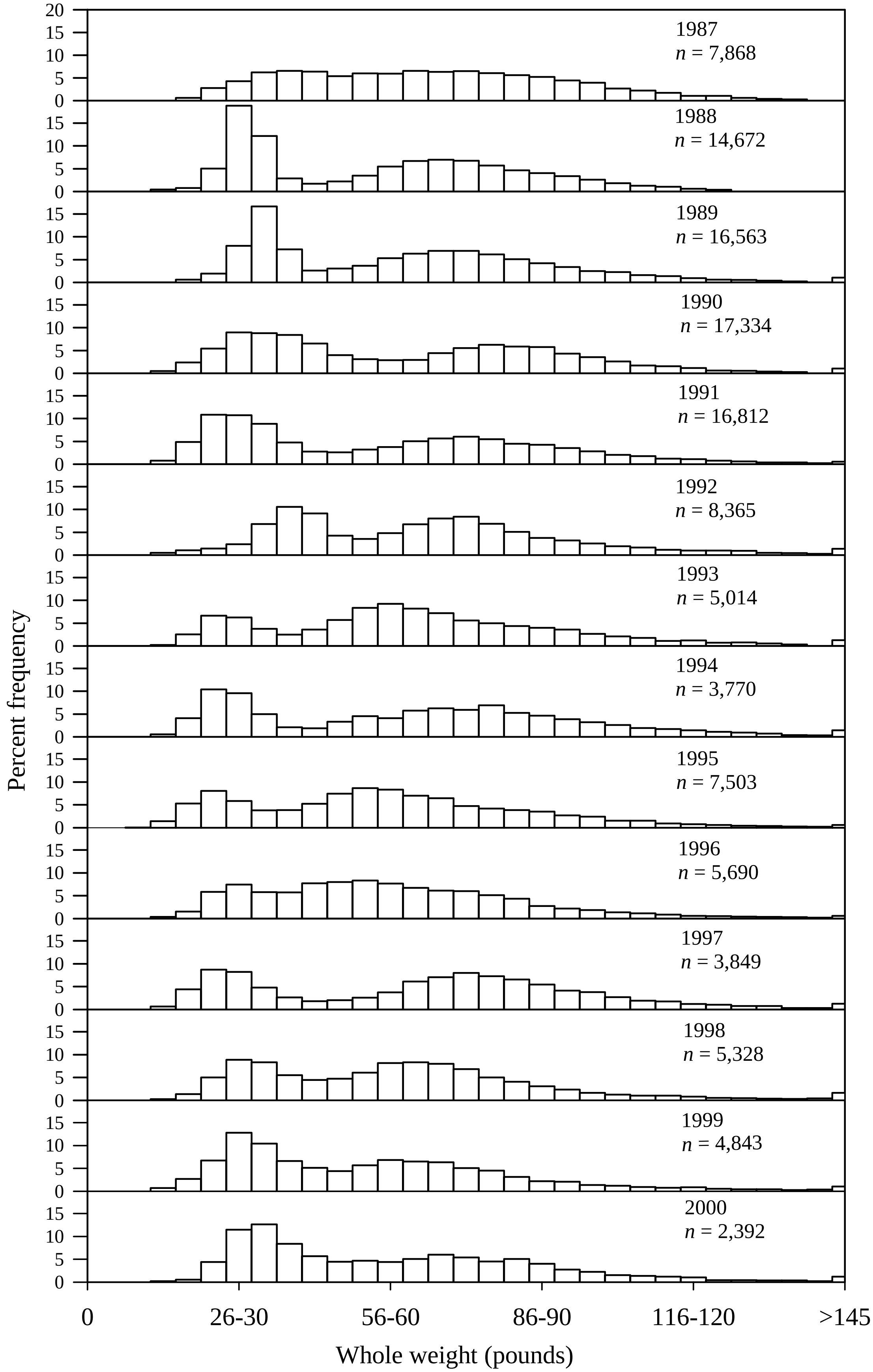

Figure 22.--Striped marlin weight-frequency histograms, 1987-2000.

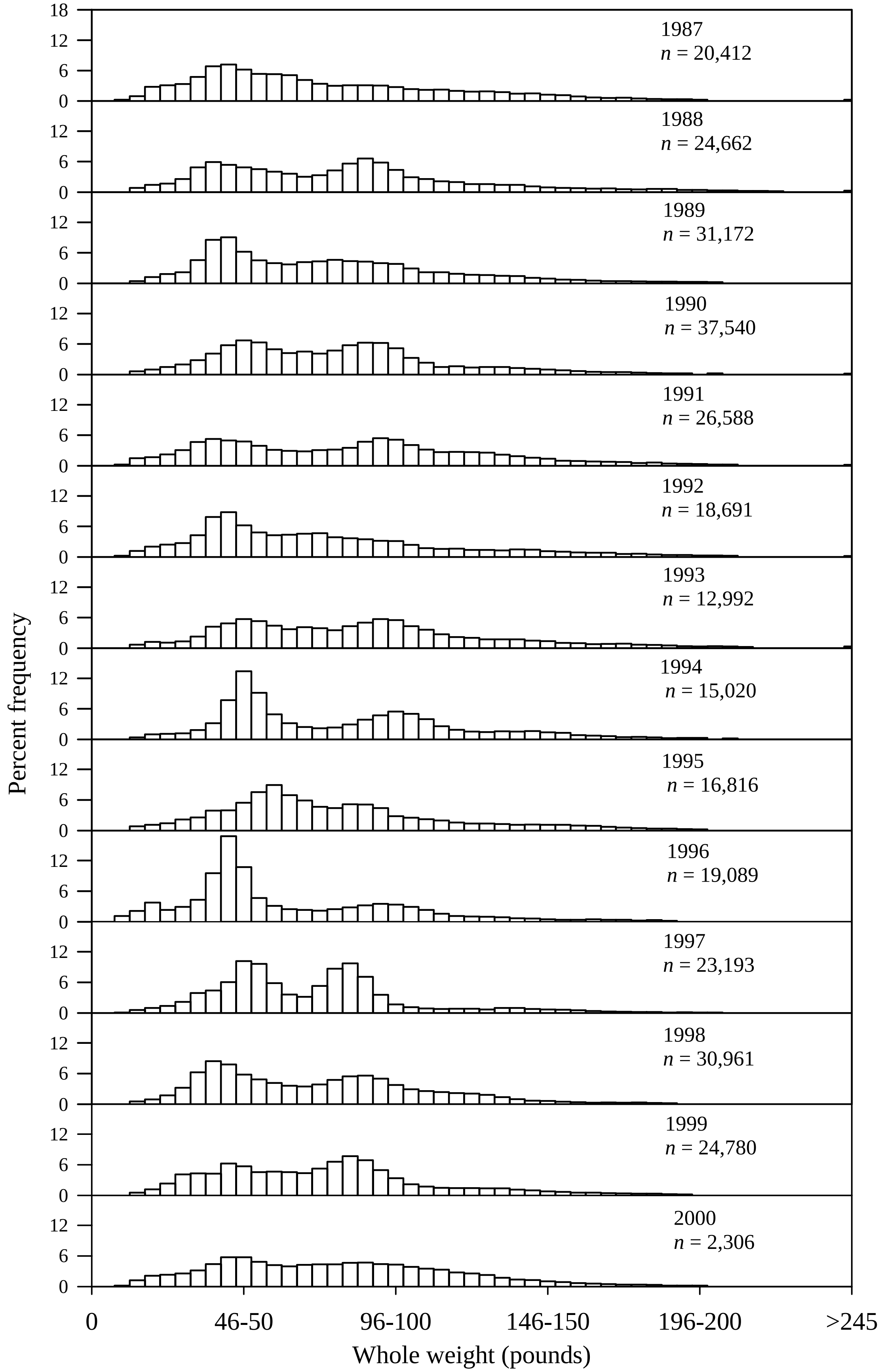

Figure 23.--Bigeye tuna weight-frequency histograms, 1987-2000.

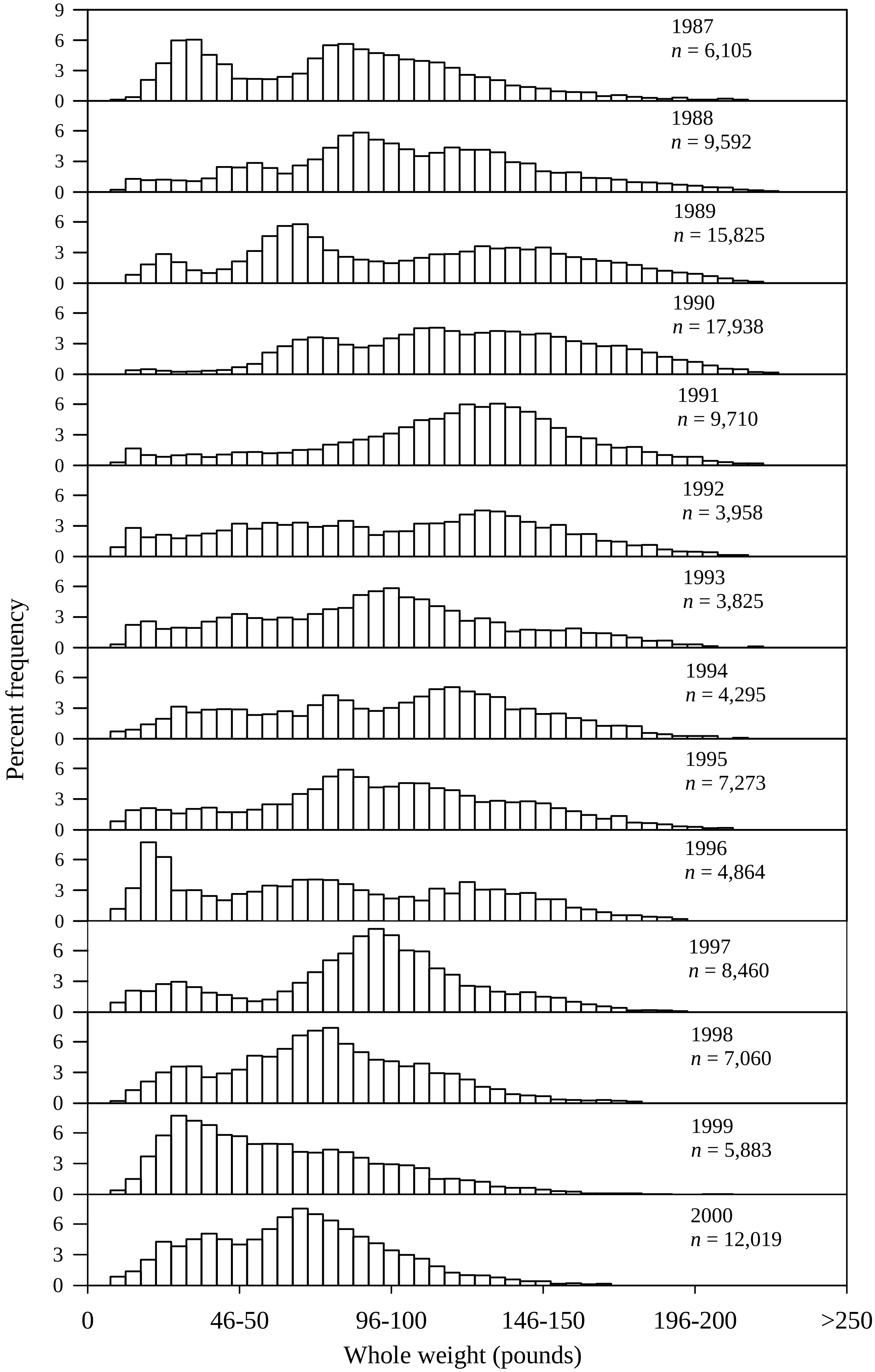

Figure 24.--Yellowfin tuna weight-frequency histograms, 1987-2000.

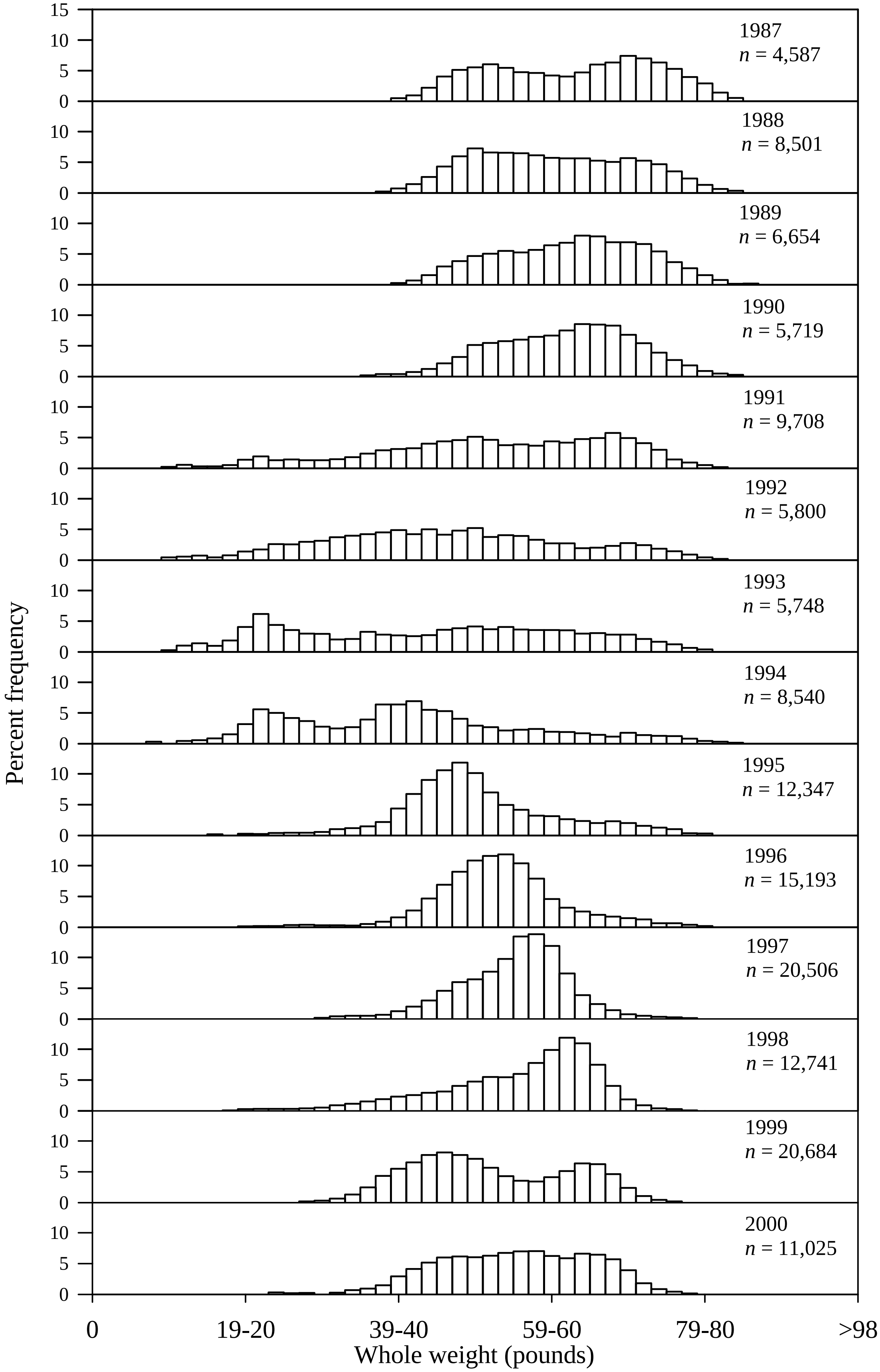

Figure 25.--Albacore weight-frequency histograms, 1987-2000.