

BY-CATCH OF BLUE SHARKS (*PRIONACE GLAUCA*) REPORTED BY U.S. PELAGIC LONGLINE VESSELS FROM 1987-1995

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SUMMARY

Blue sharks are not targeted by U.S. pelagic longliners and 98% of blue sharks caught by this fishery are discarded. However, blue sharks accounted for between 17% and 32% of the total catch reported by pelagic longline vessels from 1987 to 1995. The longline catch rate for blue sharks varies from approximately 1 blue shark per 1,000 hooks in the southern, near-shore regions (Caribbean, Gulf of Mexico, Atlantic South of 35°N) to 10 blue sharks per 1,000 hooks in northern and offshore regions (Atlantic North of 35°N, or offshore) to 100 blue shark per 1,000 hooks in the Grand Banks. The catch of blue sharks, measured by number of sharks caught or by blue shark proportion of total catch, increased in recent years particularly in the Grand Banks. Catch locations were mapped to analyze shifts in fishing patterns that may affect catch rates of blue sharks.

RÉSUMÉ

Le requin bleu n'est pas une espèce visée par les palangriers pélagiques américains et 98% des requins bleus capturés par cette pêcherie sont rejetés. Toutefois, les requins bleus représentaient entre 17 et 32% de la capture totale déclarée par les palangriers pélagiques entre 1987 et 1995. Le taux de capture de requins bleus à la palangre varie entre environ 1 requin bleu pour 1000 hameçons dans le Sud, dans les zones proches du littoral (Mer des Antilles, Golfe du Mexique et Atlantique, au Sud de 35° N), 10 requins bleus pour 1000 hameçons dans les zones septentrionales et au large (Atlantique, au Nord de 35° N, et large), et 100 requins bleus pour 1000 hameçons dans la région des Grands Bancs. Les captures de requins bleus, en nombre de requins capturés ou en proportion de requins bleus dans la capture totale, a augmenté récemment, en particulier dans la zone des Grands Bancs. Les zones de capture ont été étudiées pour analyser les changements de modalité de pêche pouvant influencer les taux de capture des requins bleus.

RESUMEN

Los palangreros pelágicos estadounidenses no persiguen tintoreras, y el 98% de los ejemplares capturados por esta pesquería son descartados. Sin embargo, las tintoreras representaron entre el 17% y el 32% de la captura total comunicada por los barcos palangreros pelágicos desde 1987 a 1995. La tasa de captura de palangre para la tintorera varía entre aproximadamente 1 individuo por 1000 anzuelos en el sur, cerca de las regiones reducidas (Caribe, Golfo de México, Atlántico sur de 35°N) a 10 individuos por 1000 anzuelos en las regiones norte, o alta mar) a 100 individuos por 1000 anzuelos en los grandes bancos. La captura de tintoreras, medidas en número de individuos capturados o en proporción de individuos en la captura total, se incrementó en años recientes, particularmente en Grand Banks. Se trazó un mapa de los puntos de captura para analizar los desplazamientos en los esquemas de pesca que podrían afectar a las tasas de captura de las tintoreras.

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Introduction

Although the catch of blue sharks often exceeds the catch of targeted species, there is no indication that blue sharks, *Prionace glauca*, are an intentional target of U.S. longline vessels. In fact, most blue sharks caught by longline vessels are discarded. This study was undertaken to discover where and when blue sharks are most frequently caught by U.S. longline vessels and to examine changes in blue shark catch or changes in fishing from 1987 to 1995.

Description of data sources used

Large pelagic logbook (LPL):

U.S. Atlantic, Caribbean and Gulf of Mexico fishing vessels which land swordfish have been required to provide daily records of effort and catch since October 1986. Requested data included date of set and set location in latitude and longitude for each set. From 1986 through 1991 the catch was recorded as either kept or discarded. Beginning in 1992, the live and dead discards were recorded separately and the target species were reported. Although a variety of gear types are represented, the predominant gear type (90% of vessels reporting) is longline gear. Gear type was limited to longline by selecting sets reporting at least 100 hooks. Nine full years of data (1987 to 1995) were available. 1995 data is preliminary.

NMFS Observer (NMFSO):

Three years of data were available (1992-1994) from the National Marine Fisheries Service Observer Program. Approximately 5% of the LPL longline sets were observed. These data were used to estimate average weights.

Methods

Longline sets from the LPL were grouped by season (winter: December through February, spring: March through May, summer: June through August, and fall: September through November. Maps for each season were made showing the locations of sets reporting blue sharks on more than 50% of the hooks. The indicator circles on the maps were set so that the circles were larger at locations where more blue sharks were caught.

LPL sets from the northeast distant were grouped by year and one degree areas. Areas were assigned to one of four concentration categories based on the highest percentage of blue sharks per hook of any set in that area: no blue sharks, less than 10% blue sharks per hook, 10% to 50% blue sharks per hook, more than 50% blue sharks per hook. Maps were made for each year with circles indicating the locations, concentration category, and relative quantity of blue sharks caught.

LPL records from 1992 through 1995 were grouped by target (swordfish, tuna, or shark) and the number of blue sharks caught and percentage discarded were calculated.

The percentage of dead discards, average weights and sex ratios of blue sharks were taken from NMFSO records.

Numbers of individuals reported caught in LPL were grouped into five catch categories: swordfish, tuna, other sharks, and blue sharks. Based on these sums, pie graphs were made for each year (1987-1988) in order to detect changes in the proportions of these catch categories caught over time. Similar pie graphs were made for the northeast distant area only.

For each area bar graphs were made of the number of blue sharks kept and discarded each year by LPL. The inclusion within these graphs of a line indicating the number of hooks set allowed estimates of nominal catch per unit effort.

Results and discussion

Areas used in these analyses are shown in figure 1. High concentrations of blue shark catch were observed primarily along the Atlantic coast in winter. In the spring, summer and fall the concentrated catch occurs in the north coastal regions and in the northeast distant. The highest concentrations of blue shark catch are in the northeast distant in the Summer (figure 2). While these trends are clearly affected by movements of the fishing fleet, they also follow migration patterns described by Stevens (1990) and Casey (1985).

Ninety nine percent of blue sharks reported caught in LPL from 1992 to 1995 by longline vessels targeting swordfish, tuna or both swordfish and tuna (mixed) were discarded. Vessels targeting other sharks reported discarding 57% of blue sharks kept (table 1).

Whole weights of blue sharks averaged over all areas were

consistently greater than the average weights of blue sharks in the northeast distant (table 2). Between 9% and 19% of the blue sharks caught were discarded dead (table 2). Blue sharks caught in the northeast coastal area were primarily male. In the northeast distant the male to female ratios were more variable and females were often more frequently caught than males (table 3).

Blue sharks accounted for between 17% and 32% of longline catch reported in all areas by pelagic longline vessels from 1987 to 1995. In recent years, there tend to be fewer swordfish and more blue sharks caught (figure 3).

The longline catch rate for blue sharks (approximately 1 per 1,000 hooks) and the numbers of blue sharks caught are much lower in the southern, near short regions (Caribbean, Gulf of Mexico, Atlantic south of 35°N) (figure 4), than in the northern and offshore regions (Atlantic north of 35°N, or offshore) (approximately 10 per 1,000 hooks) (figure 5).

Catch rates (approximately 100 per 1,000 hooks) and numbers of blue sharks caught in the northeast distant region are notably higher than any other region (figure 6). Catch rates of blues sharks, measured by numbers of sharks caught or by blue shark proportion of total catch, have increased in the northeast distant in recent years (figure 7). Over the same period (1987 through 1995) the numbers caught and catch rates of swordfish have decreased (figure 8). The concentration of blue shark catch in the northeast distant has increased from 1987 through 1995 (appendix 1).

The highest concentrations and numbers of blue sharks caught by U.S. longline vessels fishing in the Eastern U.S. are caught by vessels targeting swordfish in the northeast distant area. The majority 99% of blue sharks caught in this area are discarded, 9% to 19% of which are discarded dead.

References

Casey, John G. 1985. Transatlantic migrations of the blue shark; a case history of cooperative shark tagging. In: World Angling Resources and Challenges: Proceedings of the First World Angling Conference. (Ed. Stroud, Richard H.) International Game Fish Association, Fort Lauderdale, 268.

Stevens, J. D. 1990. Further results from a tagging study of pelagic sharks in the northeast Atlantic. J. Mar. Biol. Ass. U. K. 70, 707-720

Table 1. Percent of Blue Sharks caught and % discarded, by target (1992 through 1995).

target	% caught	% discarded	catch rate per 1,000 hooks
swordfish	53%	99	17
mixed	41%	99	9
tuna	5%	99	3
shark	2%	57	2

Table 2. Average weights of blue sharks in all areas and in the northeast distant. Percent of blue sharks discarded dead in all areas.

year	average whole wt (kg)		
	discarded % dead	all areas	northeast distant
1992	9%		26
1993	33%	44	39
1994	13%	50	39
1995	19%	48	35

Table 3. Sex ratios of blue sharks in the northeast coastal and northeast distant areas.

year	quarter	percent male	
		northeast coastal	northeast distant
1992	3	67%	73%
1992	4	63%	50%
1993	3	75%	na.
1993	4	80%	30%
1994	3	99%	93%
1994	4	62%	44%
1995	3	75%	44%
1995	4	100%	51%

Figure 1: Areas used in these analyses.

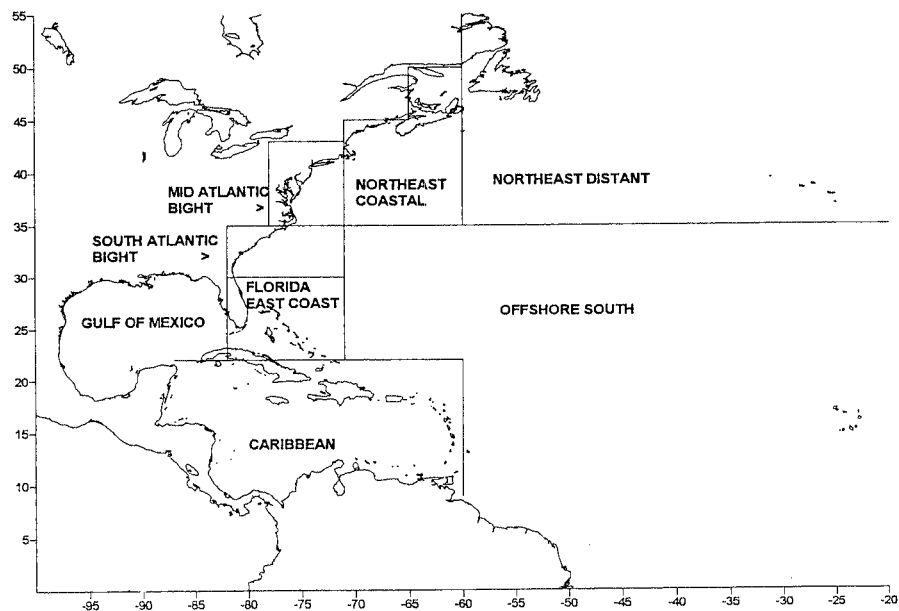
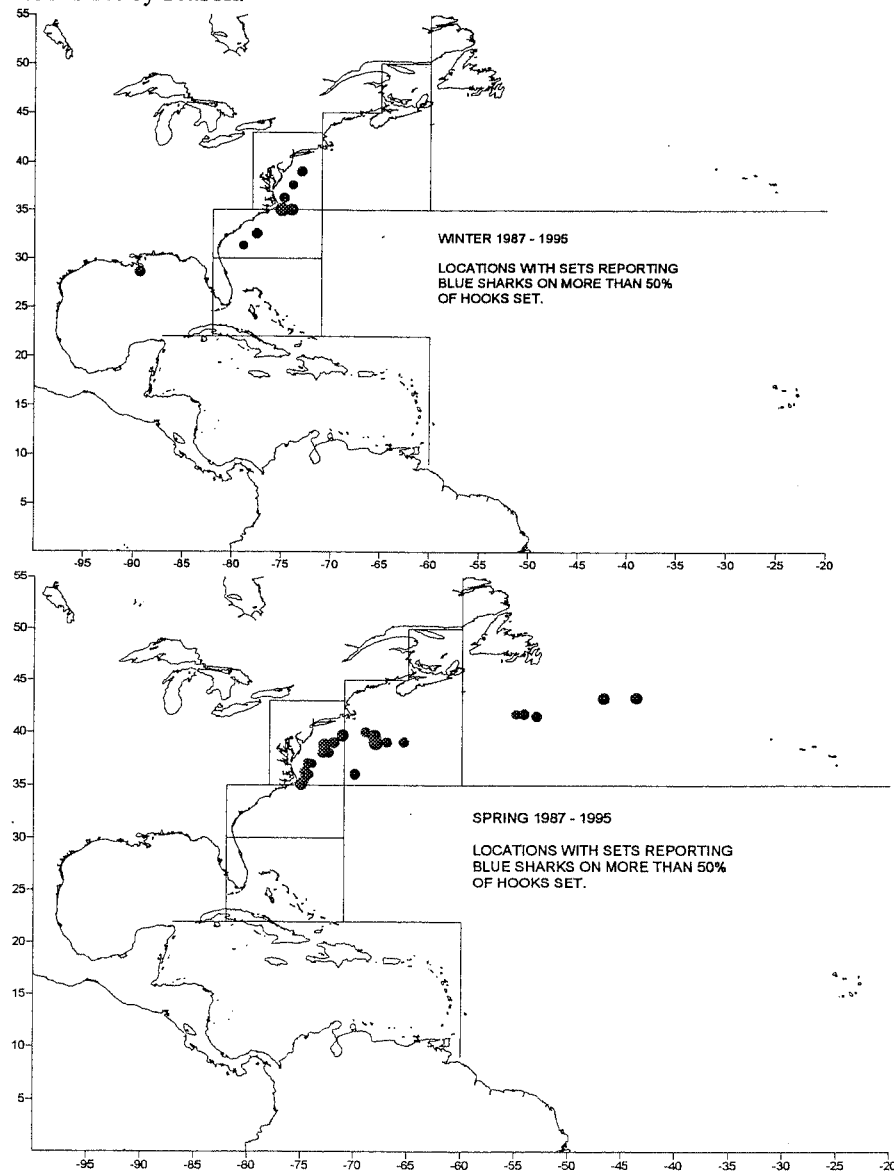


Figure 2: Locations with sets reporting blue sharks on more than 50% of hooks set by season.



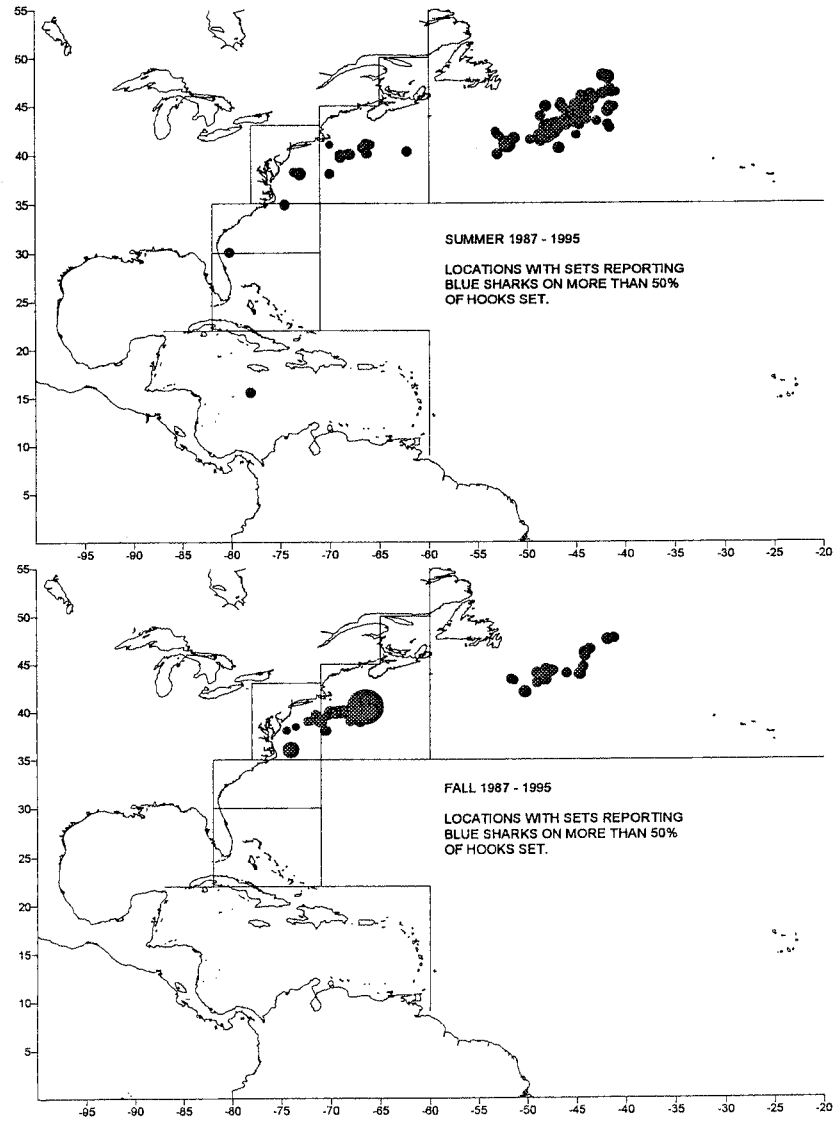


Fig. 3 U.S. PELAGIC LONGLINE CATCH ALL AREAS 1987 -1995

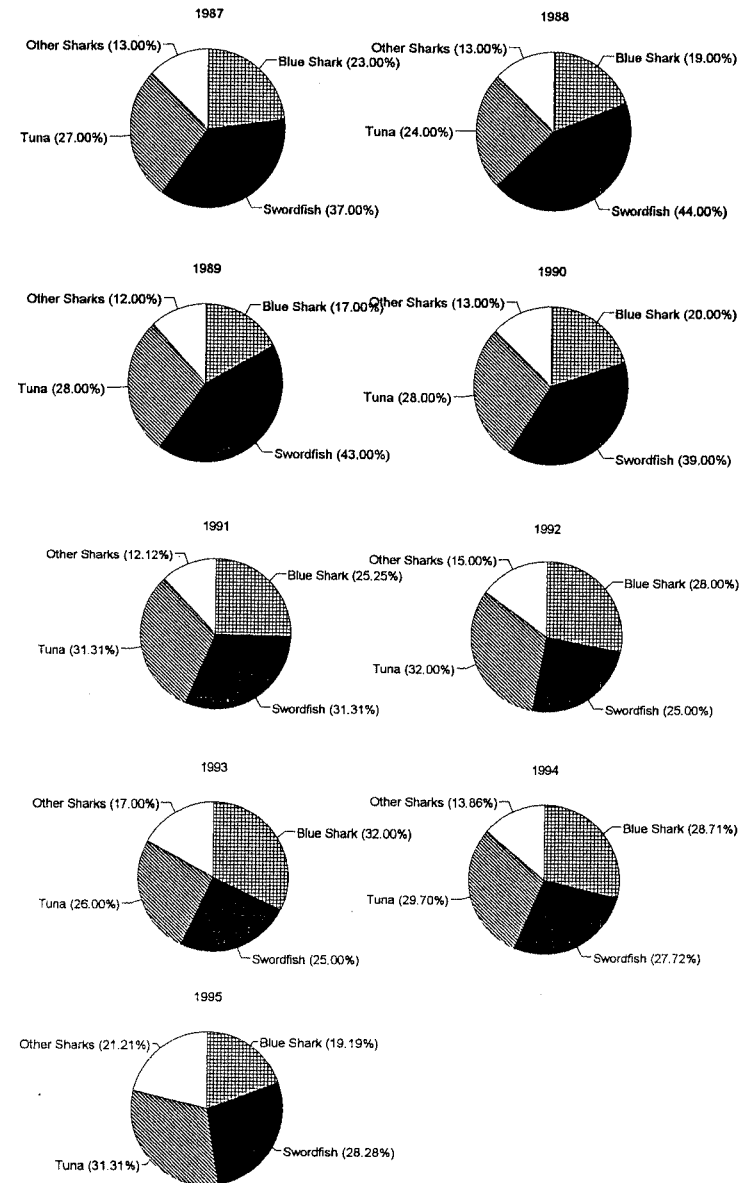


Fig. 4 Areas with Blue Shark Catches in the range of one for every 1,000 hooks

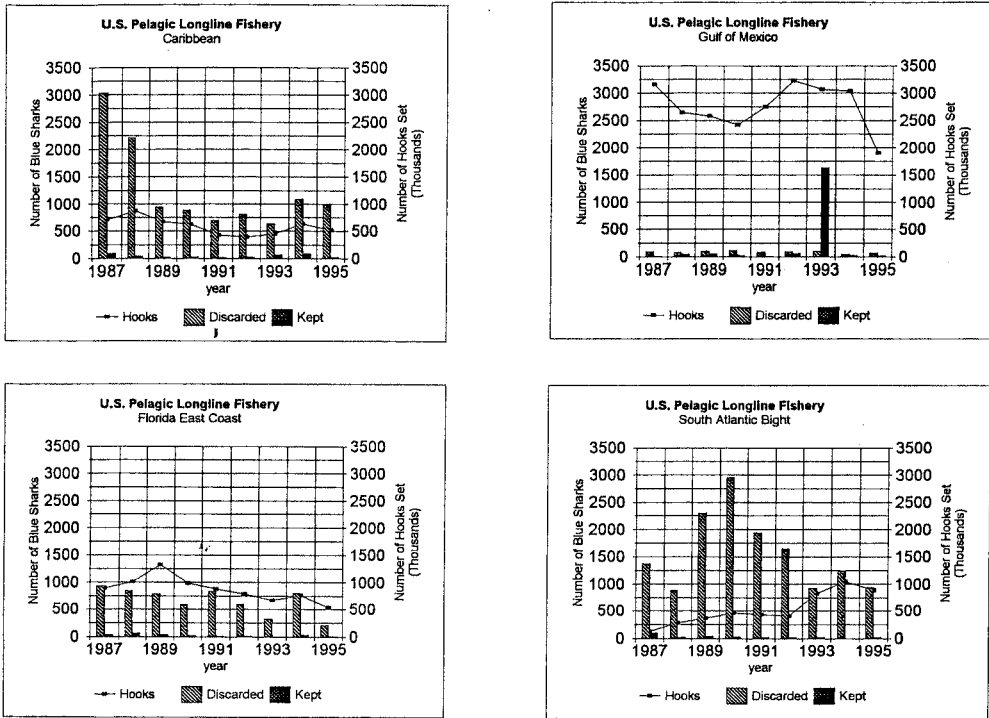


Fig. 5 Areas with Blue Shark Catches in the range of one for every 100 hooks

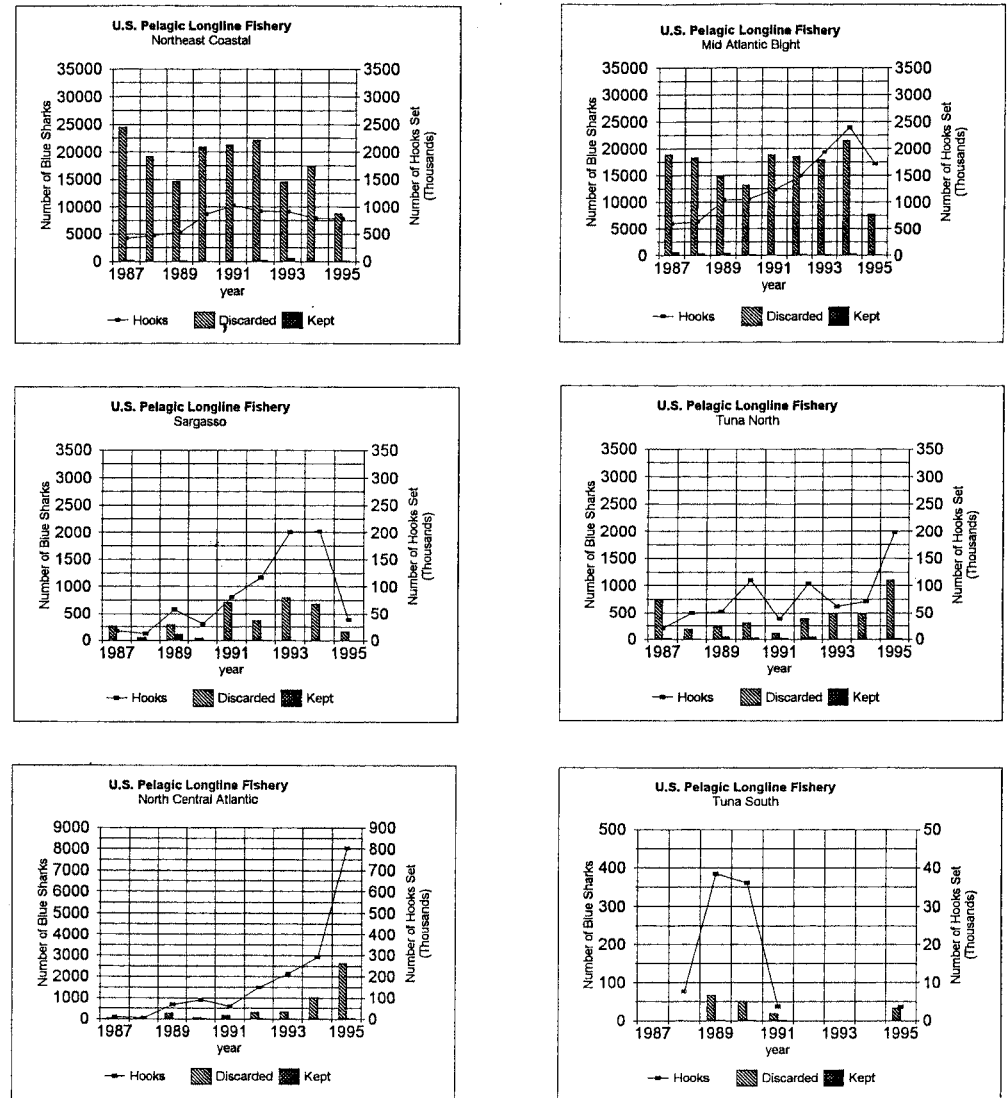


Fig. 6 Areas with Blue Shark Catches in the range of one for every 10 hooks

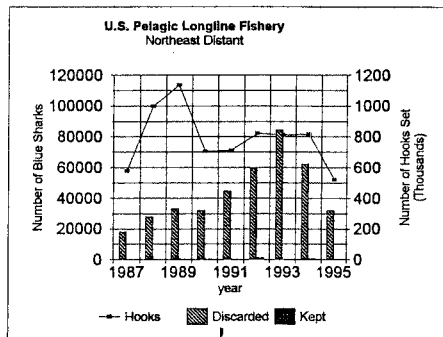


Fig. 7 U.S. PELAGIC LONGLINE CATCH NORTHEAST DISTANT ONLY 1987 -1995

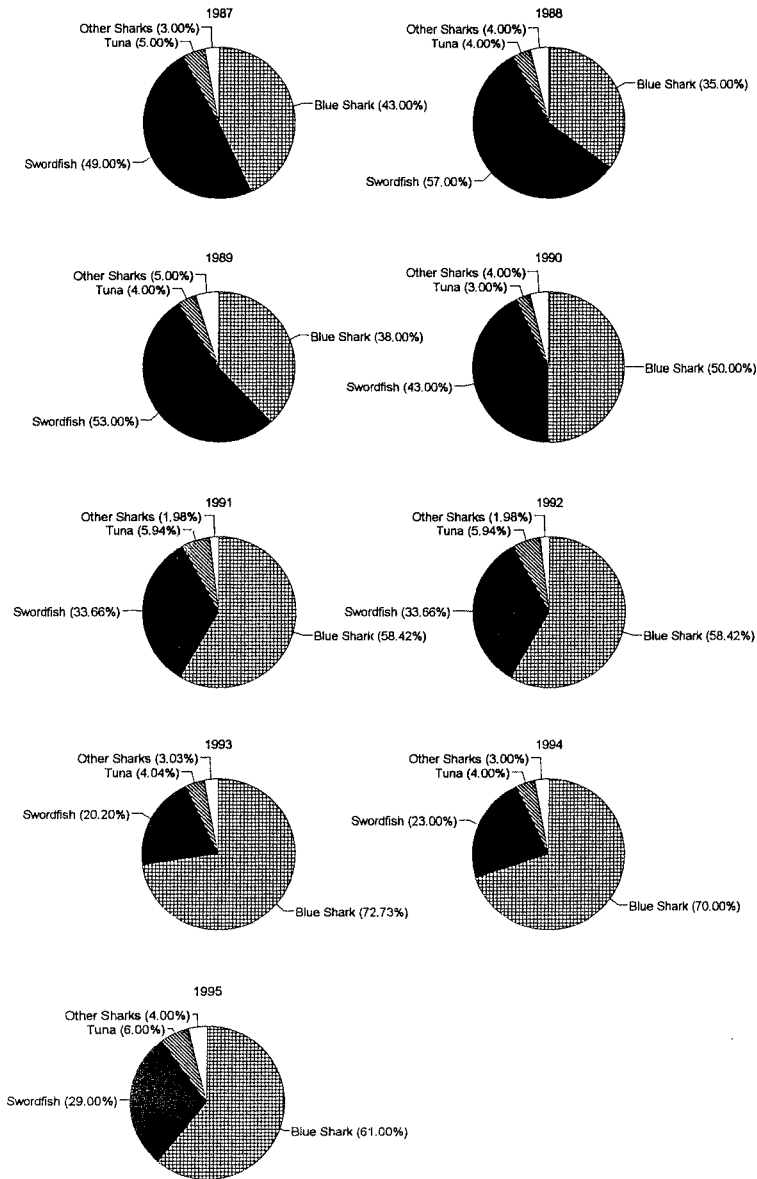
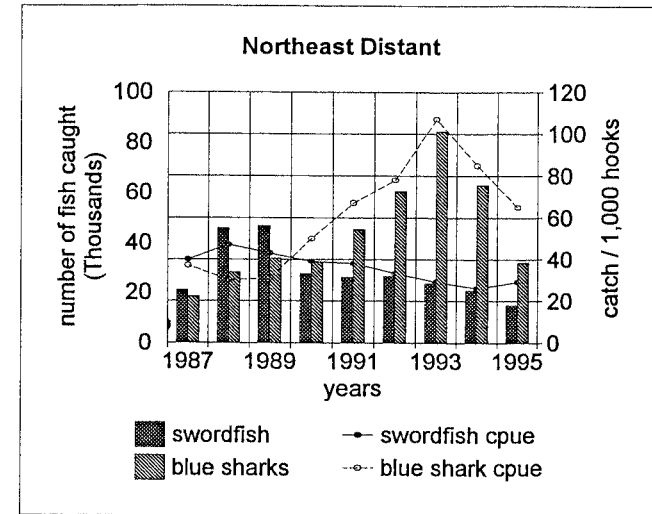


Fig. 8



Appendix 1: Locations of longline fishing in the northeast distant area by year. Larger circles indicate more blue sharks caught. Catch ranges from 0 to 4800 sharks per one degree square per year. Concentration of blue shark catch is indicated by symbols as described below.

