

OBSERVED SHARK BYCATCH FROM THE VENEZUELAN TUNA AND SWORDFISH FISHERY FROM 1994 THROUGH 2000

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SUMMARY

Shark bycatch information is recorded from the Venezuelan Pelagic Longline Observer Program from 1994 to 2000. 21 shark species are caught by the Venezuelan longline fleet targeting tuna and swordfish as reported by scientific observers. Blue shark and blacktip shark represent 54.3% of the total shark catch in numbers, followed by smalltail shark, great hammerhead shark and the shortfin mako, which altogether they represent 23%. Blue shark catch at size data suggests a seasonal change in size in males and females. In contrast to the catch at size of blacktip shark that do not show distinct variations during the season. Seasonal distribution of blue shark is widely dispersed throughout the fishing grounds, in contrast to the blacktip shark in which the seasonal distribution is mostly concentrated in the Caribbean Sea. Overall catch at size and seasonal distribution is presented for each of remaining common species (i.e., smalltail shark, great hammerhead shark and the shortfin mako).

RÉSUMÉ

L'information sur la prise accessoire de requins est compilée d'après le Programme vénézuélien d'observateurs à bord de palangriers pélagiques pour les années 1994 à 2000. Selon les observateurs scientifiques, les palangriers vénézuéliens qui visent les thons et l'espadon capturent 21 espèces de requins. Le requin peau bleue et le requin bordé constituent 54,3% de la prise numérique totale de requins, suivis du requin ti-queue, du grand requin-marteau et du requin-taupe bleu, qui représentent en tout 33%. Les données de prise par taille du requin peau bleue suggèrent l'existence d'un changement saisonnier de la taille chez les mâles et les femelles, contrairement à la prise par taille du requin bordé qui ne montre pas de variations distinctives pendant la saison. La distribution saisonnière du requin peau bleue est amplement dispersée sur l'ensemble des lieux de pêche, contrairement à celle du requin bordé dont la distribution saisonnière se concentre surtout dans la mer des Caraïbes. Le présent document donne la prise globale par taille et la distribution saisonnière de chacune des autres espèces courantes (c'est-à-dire, le requin ti-queue, le grand requin-marteau et le requin-taupe bleu.)

RESUMEN

La información sobre captura fortuita de tiburones desde 1994 a 2000 se recopila a través del El Programa de Observadores de Palangre Pelágico de Venezuela. Según comunicaron los observadores científicos, la flota de palangre venezolana dirigida a los túnidos y pez espada captura 21 especies de tiburones. El tiburón azul y el tiburón macuira responden del 54,3% de las capturas totales de tiburones en número, seguidos por el tiburón poroso, la cornuda gigante y el marrajo dientuso, que juntos representan el 23% de las capturas. Los datos de captura por clases de talla del tiburón azul sugieren un cambio estacional de talla en hembras y machos, a diferencia de las capturas por clases de talla del tiburón macuira que no presenta variaciones estacionales. La distribución estacional del tiburón azul presenta una fuerte dispersión en los caladeros, en contraste con el tiburón macuira cuya distribución estacional se centra sobre todo en el mar Caribe. Se presentan también las capturas globales por clases de talla y la distribución para cada una de las especies comunes restantes (es decir, tiburón poroso, cornuda gigante y marrajo dientuso).

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KEYWORDS

Shark bycatch, Observer Program, Venezuelan longline fishery

1. INTRODUCTION

In 1994 the Venezuelan Pelagic Longline Observer Program (VPLOP), sponsored by ICCAT's Enhanced Billfish Research Program, started to gather information on the shark species caught by the tuna and swordfish fishery. Preliminary information on shark species composition was presented by Arocha & Marcano (2001) where an outline of the monitoring system conducted by the VPLOP was detailed. The present document details the shark species composition, describes the seasonal catch at size and the seasonal distribution of the most common shark species caught by the Venezuelan longline fleet in the Caribbean Sea and the western central Atlantic from 1994 to 2000.

2. METHODS

The information on shark species collected for the VPLOP come from scientific observers on board vessels targeting tuna and swordfish, a detailed description of the fleet characteristics and fishing areas were presented by Arocha *et al.* (2001). Length measurement of the different shark species was based on the distance between the tip of the snout and the fork of the tail (FL) in centimeters. Size groups were separated into 10 cm length classes. The seasonal spatial distribution of the most important shark species was based on the geographical position of the begin haul set. Due to the uneven sample size between years, seasonal catch at size was grouped into quarters starting in January for all years combined. Species identification were performed by scientific observers with the help of several field guides (Casey, 1964; FAO, 1984; Castro, 1993). Spanish common names are based on Venezuelan common names used by fishermen, recognized and accepted in the Venezuelan shark literature (Cervigón and Alcalá, 1999).

3. RESULTS

A total of 21 shark species have been caught as part of the tuna and swordfish catch during the period of 1994-2000 (Table 1). The most common species is the blue shark, which represents 30.6% of the total catch in numbers, followed by the blacktip shark which represents 23.7%. These two species are followed by 3 species that represent 23% of the total catch, namely, smalltail shark (8.4%), great hammerhead shark (7.9%) and the shortfin mako (6.7%). The rest of the catch in numbers is represented by 17 species that account for 22.7%, of which the most significant in that group are the two hammerhead shark species. Average size, as well as minimum and maximum sizes, of all shark species caught by the longline fishery are presented in table 2.

Blue shark seasonal catch at size appear to vary between quarters (Fig. 1). Males show two distinct groups throughout the year, one group that is centered between 125-150 cm FL which is present in the first, third and fourth quarter, and another group between 175-225 cm FL which is most conspicuous in the first two quarters. Females show a similar trend, although most evident in the last two quarters of the year. It is only during the second quarter that both sexes show similar size in the catch.

Blacktip shark seasonal catch at size do not vary considerably between quarters (Fig. 2). Most of the catch is centered around 125-150 cm FL in both sexes. Occasional larger specimens (>200 cm FL) of both sexes appear in the catch.

Catch at size for shortfin mako, great hammerhead shark and smalltail shark are presented in figure 3. Catch at size for shortfin mako is centered between 125 and 225 cm FL for both sexes. Great hammerhead shark catch is centered around 125 cm FL for both sexes. In both species, males are more common in the catches. Catch at size in smalltail shark covers a broad range of sizes, but most of the

catch is centered around specimens between 80-150 cm FL. However, there maybe problems with the identification of this species as the literature suggest than they do not exceed 150 cm FL (FAO, 1984).

Seasonal distribution of all major shark species caught reflect the seasonal movements of the longline fleet. Blue shark appear to be evenly distributed in the Caribbean Sea and off the northern area of the Guyanas during the first quarter of the year (Fig. 4), as the season progresses the catches tend to be more frequent in the Caribbean Sea, as seen in the second and third quarter. Finally, in the last quarter all blue shark is caught only in the Caribbean Sea in small numbers. Blacktip shark is mostly caught in the Caribbean Sea (Fig. 5), insignificant catches are present off the northern area of the Guyanas during the first, second and fourth quarter. During the quarter (second) of highest incidence of blacktip shark in the catches, the total catch is concentrated only in the Caribbean Sea and close to the oceanic island chain off Venezuela.

Overall spatial distribution for shortfin mako, great hammerhead shark and smalltail shark are presented in figure 6. Shortfin mako has a broad distribution throughout the fishing grounds, it can be found off the oceanic island chain of Venezuela and around Isla Ave, as well as off the Guyanas. In contrast, the great hammerhead shark is mostly concentrated around the Venezuelan oceanic islands and close to sharp drop off the shelf. The smalltail shark is mainly dispersed off the oceanic island chain of Venezuela, with few catches off the Guyanas.

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Table 1. Shark species caught by the Venezuelan longline fleet as observed by the Venezuela Pelagic Longline Observer Program from 1994 to 2000.

Species	Nombre común	Common name	Numbers	Percentage
<i>Alopias superciliosus</i>	Tiburón zorro ojón	Big eye thresher	41	2.2
<i>Alopias vulpinus</i>	Tiburón zorro	Common thresher	31	1.6
<i>Carcharhinus falciformis</i>	Tiburón bobo	Silky shark	31	1.6
<i>Carcharhinus leucas</i>	Tiburón sarda	Bull shark	48	2.5
<i>Carcharhinus limbatus</i>	Tiburón macuira	Blacktip shark	450	23.7
<i>Carcharhinus longimanus</i>	Tiburón avioneto	Oceanic whitetip shark	28	1.5
<i>Carcharhinus obscurus</i>	Tiburón arenero	Dusky shark	9	0.5
<i>Carcharhinus perezii</i>	Tiburón piedrero	Caribbean reef shark	47	2.5
<i>Carcharhinus plumbeus</i>	Tiburón trozo	Sandbar shark	3	0.2
<i>Carcharhinus porosus</i>	Cazón poroso	Smalltail shark	160	8.4
<i>Galeocerdo cuvier</i>	Tintorera	Tiger shark	1	0.1
<i>Hexanchus griseus</i>	Tiburón vaca	Sixgill shark	4	0.2
<i>Isurus oxyrinchus</i>	Tiburón carite	Shortfin mako	127	6.7
<i>Mustelus canis</i>	Viuda virma	Smooth dogfish	2	0.1
<i>Mustelus norrisi</i>	Viuda virma blanca	Narrowfin smoothhound	3	0.2
<i>Negaprion brevirostris</i>	Tiburón cuchivano	Lemmon shark	5	0.3
<i>Prionace glauca</i>	Tiburón azul	Blue shark	579	30.6
<i>Rhizoprionodon porosus</i>	Cazón playón	Caribbean sharpnose shark	11	0.6
<i>Sphyrna lewini</i>	Cornua	Scalloped hammerhead	77	4.1
<i>Sphyrna mokarran</i>	Cornua aletona	Great hammerhead	149	7.9
<i>Sphyrna zygaena</i>	Cornuda cruz	Smooth hammerhead	88	4.6
<i>Squalus cubensis</i>	Cazón de puyas	Cuban dogfish	1	0.1

Table 2. Descriptive statistics of the shark species caught by the Venezuelan longline fleet as observed by the Venezuela Pelagic Longline Observer Program from 1994 to 2000.

Species	mean	s.e.	Min. size cm	Max. size cm	Total number
<i>Alopias superciliosus</i>	150.7	4.847	93	227	41
<i>Alopias vulpinus</i>	143.7	6.409	86	225	31
<i>Carcharhinus falciformis</i>	116.3	1.607	93	142	31
<i>Carcharhinus leucas</i>	179.9	5.694	76	250	48
<i>Carcharhinus limbatus</i>	130.7	1.206	67	275	450
<i>Carcharhinus longimanus</i>	125.0	6.974	78	250	28
<i>Carcharhinus obscurus</i>	184.4	9.324	159	241	9
<i>Carcharhinus perezii</i>	117.9	2.755	96	190	47
<i>Carcharhinus plumbeus</i>	136.3	15.191	108	160	3
<i>Carcharhinus porosus</i>	129.1	3.651	62	280	160
<i>Galeocerdo cuvier</i>	180	-	-	-	1
<i>Hexanchus griseus</i>	106.3	4.714	97	119	4
<i>Isurus oxyrinchus</i>	168.5	3.038	80	265	125
<i>Mustelus canis</i>	132;136	-	-	-	2
<i>Mustelus norrisi</i>	90.0	11.547	70	110	3
<i>Negaprion brevirostris</i>	183.6	22.999	100	200	5
<i>Prionace glauca</i>	185.8	1.833	67	320	578
<i>Rhizoprionodon porosus</i>	144.2	9.565	112	217	11
<i>Sphyrna lewini</i>	126.3	3.277	83	200	77
<i>Sphyrna mokarran</i>	134.4	2.529	102	330	149
<i>Sphyrna zygaena</i>	148.6	4.030	92	292	88
<i>Squalus cubensis</i>	49.0	-	-	-	1

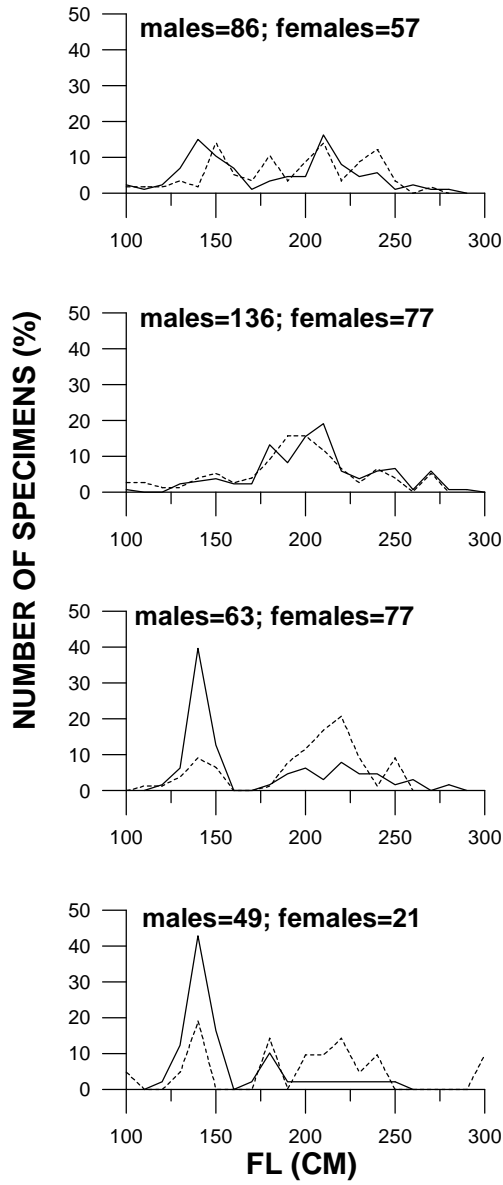


Figure 1. Blue shark catch at size by quarter (first on top) from the Venezuelan longline fleet. Males(solid line), females (dotted line).

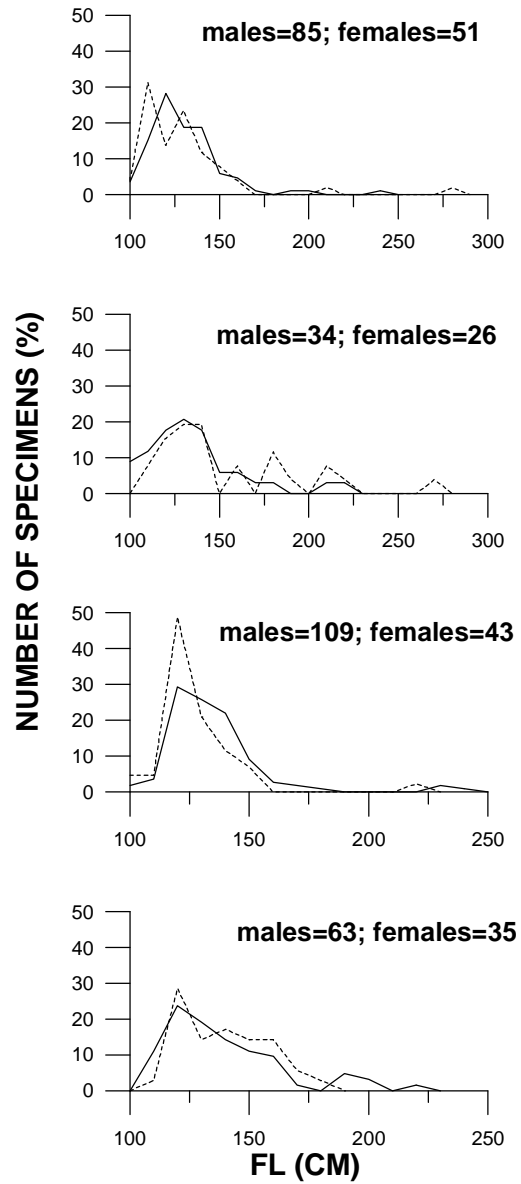


Figure 2. Blacktip shark catch at size by quarter (first on top) from the Venezuelan longline fleet. Males(solid line), females (dotted line).

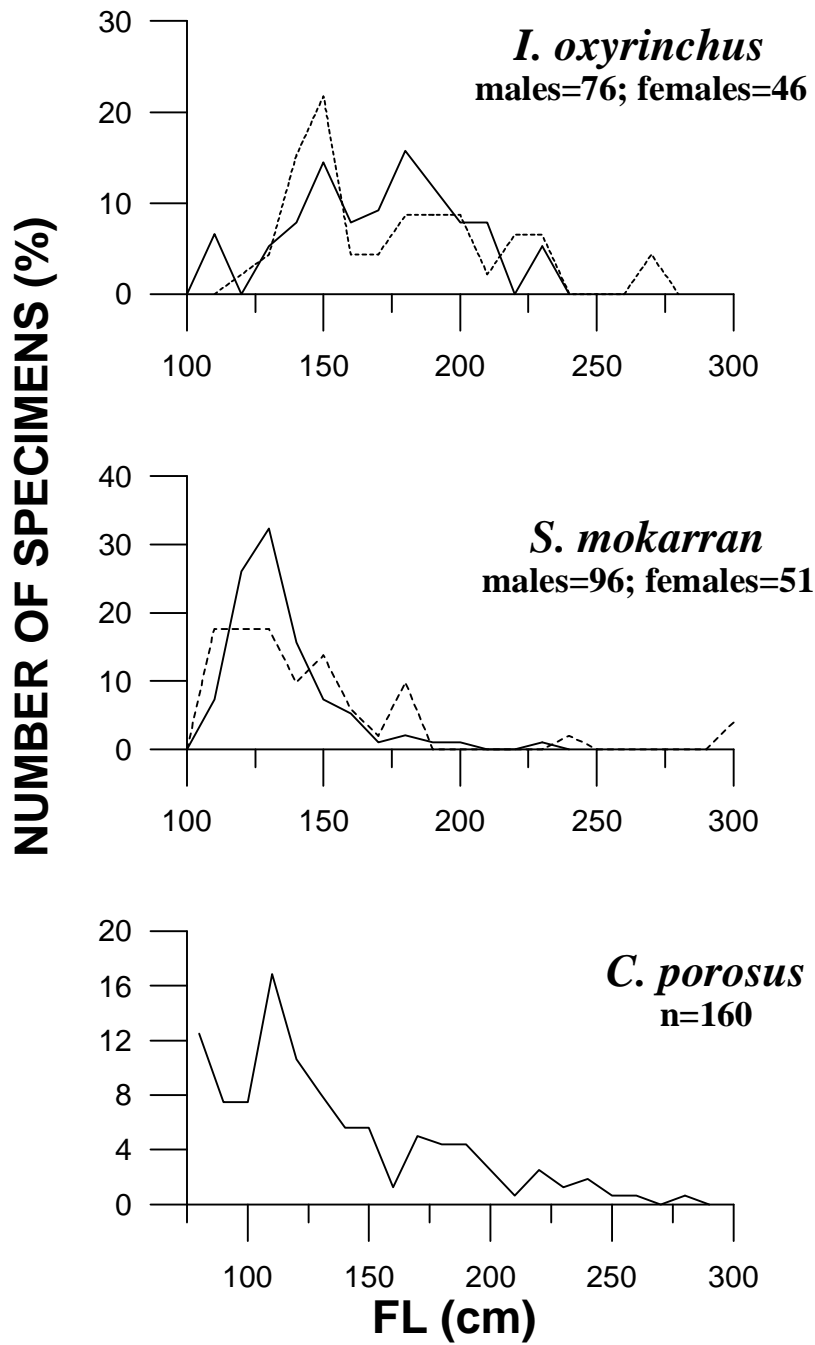


Figure 3. Overall catch at size from the second most common group of shark species caught by the Venezuelan longline fleet. Males(solid line), females (dotted line).

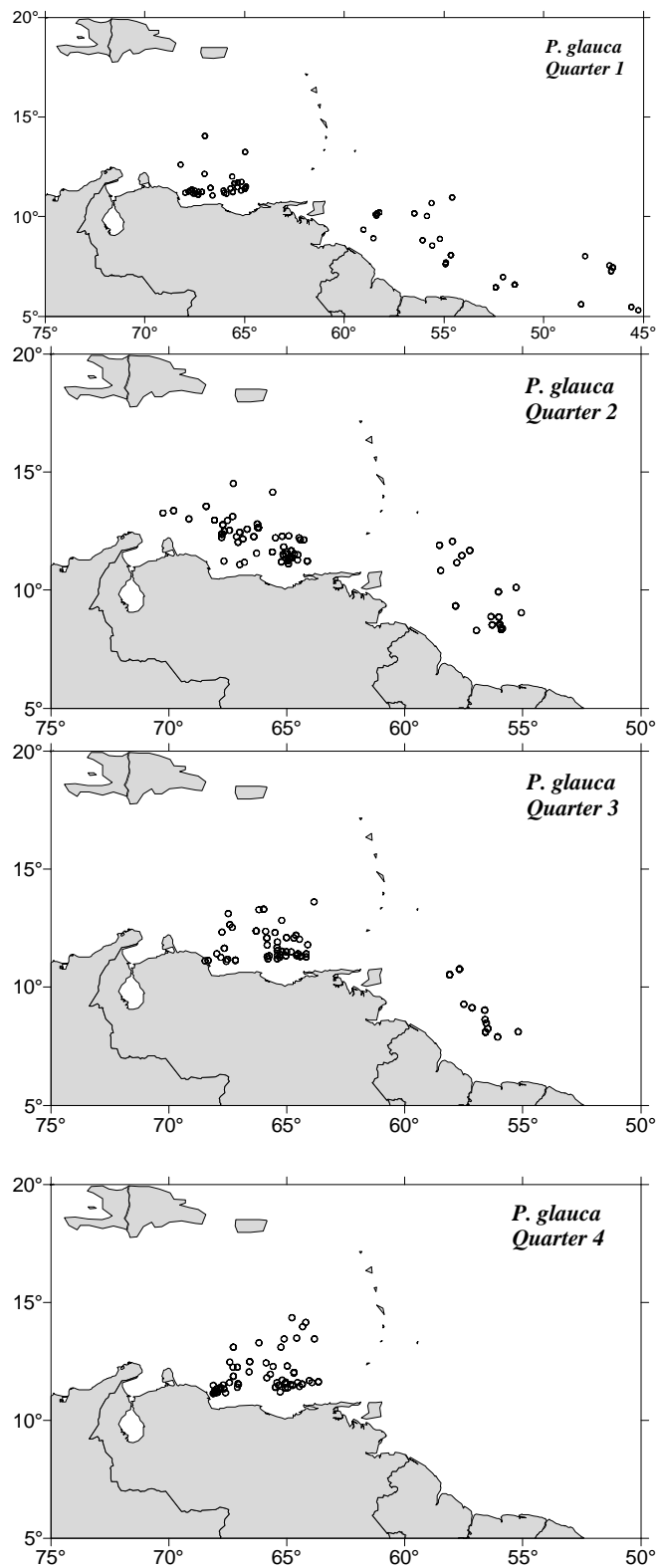


Figure 4. Seasonal spatial distribution of blue shark caught by the Venezuelan longline fleet.

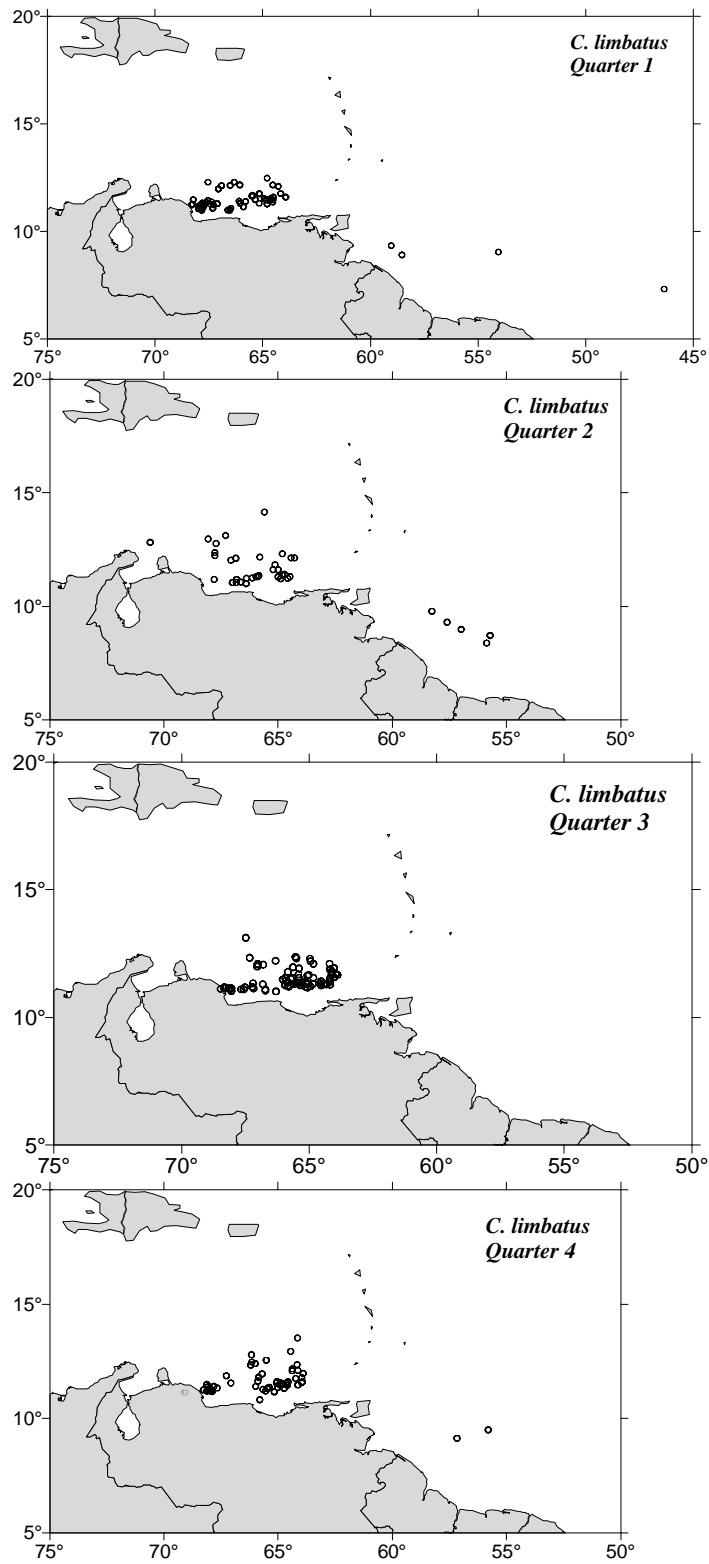


Figure 5. Seasonal spatial distribution of blacktip shark caught by the Venezuelan longline fleet.

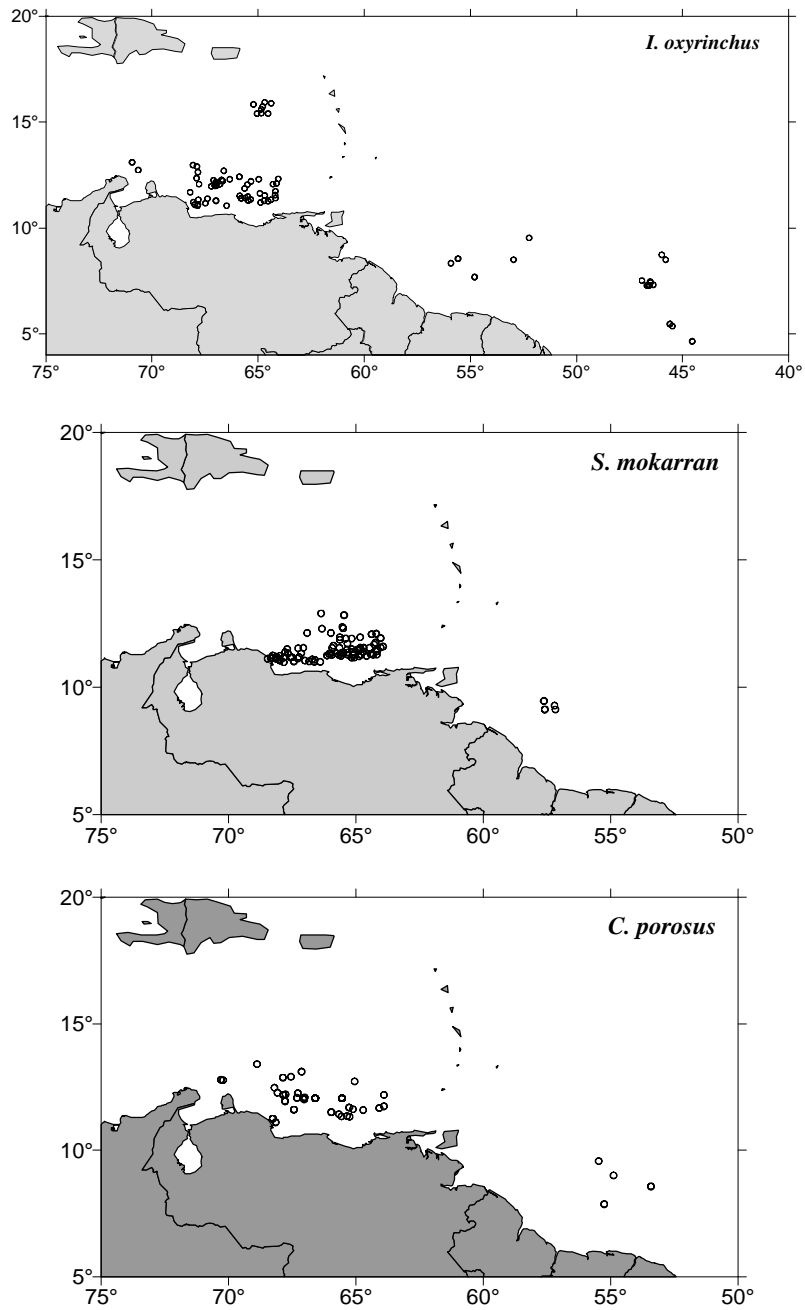


Figure 6. Overall spatial distribution from the second most common group of shark species caught by the Venezuelan longline fleet.