

**DISTRIBUTION OF JUVENILE SWORDFISH (*Xiphias gladius*)
CAUGHT BY PELAGIC LONGLINE
IN THE ATLANTIC OCEAN**

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SUMMARY

Maps were created showing the numbers of undersized swordfish and proportions of undersized swordfish in the total swordfish catch by area and quarter from U.S., Canadian, Venezuelan, South African, and Japanese pelagic longline fleets operating in the Atlantic. These maps were used to identify times and areas where closures would be most likely to reduce the mortality of undersized swordfish.

RÉSUMÉ

Des cartes ont été élaborées pour illustrer le nombre d'espérons sous-taille et les proportions d'espérons sous-taille dans le total des captures d'espéron réalisées par zone et par trimestre par les flottilles palangrières pélagiques des Etats-Unis, du Canada, du Venezuela, d'Afrique du Sud et du Japon qui opèrent dans l'Atlantique. Ces cartes ont été utilisées pour identifier les époques et les zones où les fermetures auraient plus de chance de réduire la mortalité de l'espéron sous-taille.

RESUMEN

Se crearon mapas que muestran el número de peces espada de talla inferior a la regulada y las proporciones de peces espada de talla inferior a la regulada en el total de las capturas de pez espada por zona y trimestre para las flotas de palangre pelágico de Estados Unidos, Canadá, Venezuela, Sudáfrica y Japón que operan en el Atlántico. Estos mapas se utilizaron para identificar las temporadas y zonas en que las vedas tienen más posibilidades de reducir la mortalidad de peces espada de talla inferior a la regulada.

KEYWORDS

Juveniles, long lining, By catch, Size limit regulations

1. INTRODUCTION

The SCRS was asked to analyze and identify times and areas for possible closure in the Atlantic that would contribute to the protection of undersized north and south Atlantic swordfish. A small working group was formed to assemble an Atlantic -wide data base consisting of catch (numbers of fish) and effort

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records by 5° squares and quarter with effort in hooks and numbers of swordfish separated in undersized (< 125 cm) and larger than undersized (\geq 125 cm). Data for this purpose were received from U.S., Canadian, Venezuelan, South African, and Japanese pelagic longline fleets operating in the Atlantic

2. METHODS

Since the catch by the Spanish longline fleet is very important in the Atlantic swordfish fishery and the Spanish swordfish catch data were not submitted to the group, catch at size data, for year 1998 from the U.S. and Spain were used to make plots showing 5° squares where swordfish < 125 cm made up 25% to 50% and > 50% of the total swordfish catch in an area and quarter (figure 1). Those data were also used to plot the twenty 5° squares with the largest numbers of swordfish < 125 cm reported caught and the highest CPUEs for swordfish < 125 cm by area and quarter (figure 2).

Five degree squares where swordfish < 125 cm made up > 50% of the total swordfish catch were ranked by the proportion of small fish reported caught; the 5° squares with the largest numbers of swordfish < 125 cm were ranked by the number of small fish reported caught; and 5° squares with the highest CPUEs were ranked by CPUE. These ranks were combined to create a relative score for each 5° square and area (table 1).

Observer data for years 1997, 1998, and 1999 submitted to the small swordfish working group by the U.S., Canada, Venezuela, South Africa, and Japan were used to make plots showing 5° squares where swordfish < 125 cm made up 25% to 50% and > 50% of the total swordfish catch in an area and quarter (figure 3).

Data submitted to the small swordfish working group by the U.S., Canada, Venezuela, South Africa, and Japan were used to make plots of total reported swordfish catch and effort (hooks) in 1997 (figure 4), 1998 (figure 5), and 1999 (figure 6).

3. RESULTS AND DISCUSSION

Because catch by size by 5° square across the total fleets harvesting Atlantic swordfish were not available, the maps in this document show only partial views of the concentration areas of small fish catch. Until such time that these data are available Atlantic-wide from the dominant portions of the catch, inference will need to be drawn using only a partial view of the Atlantic-wide catch. In the case of the U.S., time/area closures were established using US catch effort data and these areas are within a number of the five degree squares in the Western Atlantic that are identified in Table 1.

Table 1. Five degree squares defined by latitude and longitude are ranked based on a combination of proportion of swordfish < 125 cm caught, number of swordfish < 125 cm caught, and CPUE of swordfish < 125 cm. The lowest numbers indicate the highest combination of proportion, number, and CPUE of small swordfish in the five degree square and quarter.

Latitude	Longitude	Quarter	Quarter	Quarter	Quarter
		1	2	3	4
23.0	-97.0			5	
28.0	-92.0	18	7	13	7
23.0	-87.0			33	25
28.0	-87.0	20	2	28	17
23.0	-82.0	8	16		13
28.0	-82.0	3		2	1
33.0	-82.0		34		
18.0	-77.0		33		
23.0	-77.0	23		3	21
28.0	-77.0	2	21	1	6
33.0	-77.0	1	1	7	3
38.0	-77.0		24		
13.0	-72.0		13		
23.0	-72.0	33	38		14
33.0	-72.0	7	42	15	
38.0	-72.0	4	35	6	12
43.0	-72.0			12	
13.0	-67.0		6		
18.0	-67.0	25	27	26	20
38.0	-67.0			10	11
43.0	-67.0			9	
13.0	-62.0		3		
18.0	-62.0		4		
38.0	-62.0			19	
8.0	-57.0		23		
18.0	-57.0		18		
13.0	-52.0		15		
23.0	-52.0	27			
43.0	-52.0			24	27
7.0	-47.0		12		
37.5	-47.0		14		
42.5	-47.0		41	36	28
7.0	-42.0		36		
32.5	-42.0	24			
37.5	-42.0		20	35	
42.5	-42.0		28	22	
47.0	-42.0			16	

12.5	-37.0	21	37		
32.5	-37.0	28		23	
37.5	-37.0		22	30	24
42.5	-37.0		30	32	
17.5	-32.0	26			
22.5	-32.0		29		
32.5	-32.0	22		11	
42.5	-32.0			37	
17.5	-27.0	11			29
32.5	-27.0			4	
7.5	-22.0		39		
12.5	-22.0	30			
17.5	-22.0	17			
22.5	-22.0				22
27.5	-22.0				26
42.5	-22.0	32	40	38	
7.5	-17.0		32		
12.5	-17.0	31			
17.5	-17.0		19	29	
22.5	-17.0	6	8	20	16
27.5	-17.0	13	9	17	23
37.5	-17.0	15	26	21	19
42.5	-17.0	29	5	31	10
7.5	-12.0		11	14	
27.5	-12.0	10	31		5
32.5	-12.0	16		34	9
37.5	-12.0	9	25	18	15
42.5	-12.0	14	17	25	8
32.5	-7.5	12		8	2
37.5	-7.5	5		27	4
42.5	-7.5	19			18
44.5	-5.5		10		

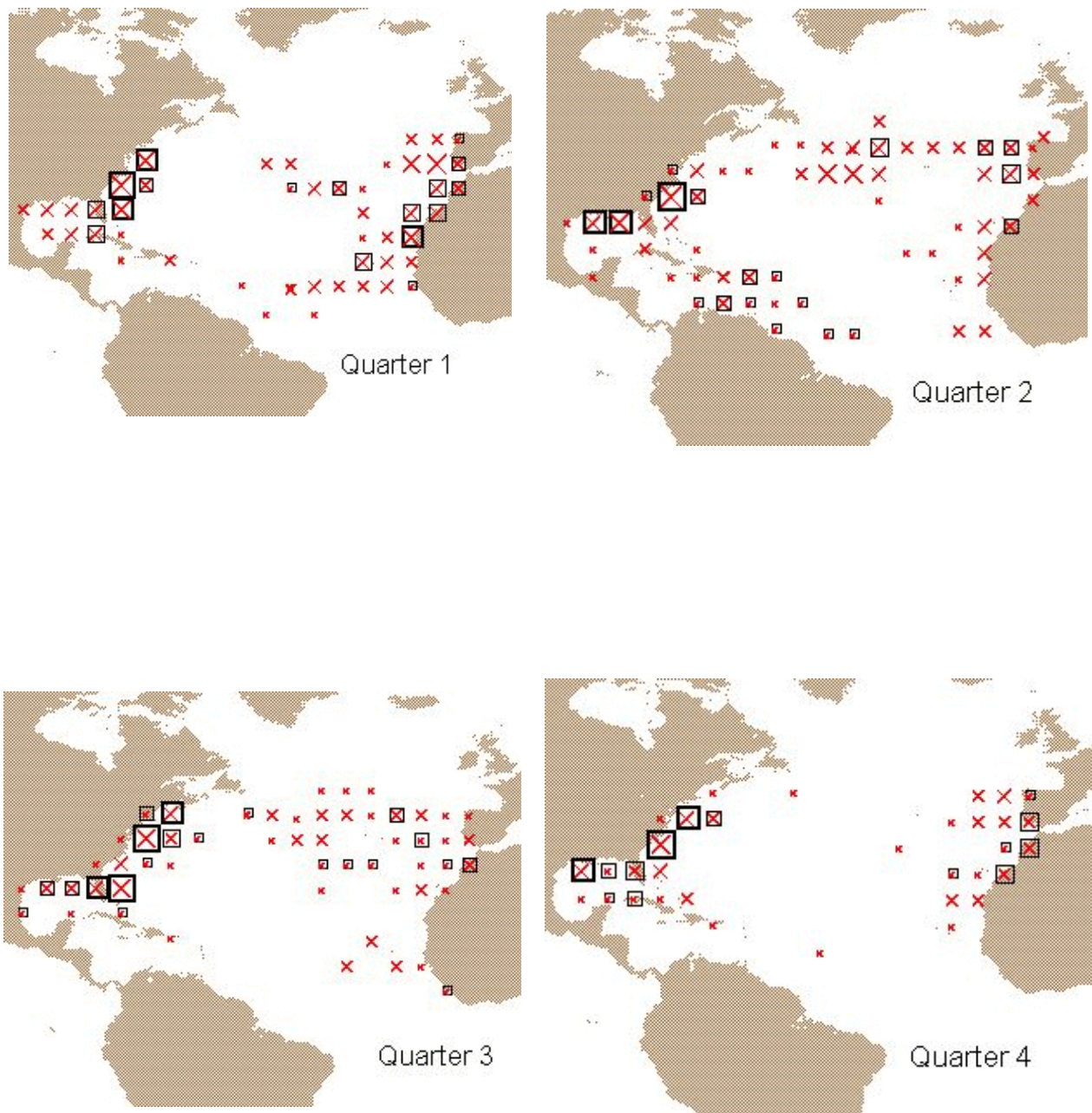


Figure 1. Locations (5° squares) where swordfish < 125 cm LJFL made up more than 25% (x) and more than 50% (box) of the total number of swordfish caught in the U.S. and Spanish longline fisheries in 1998. Symbols are proportional to number of small swordfish caught.

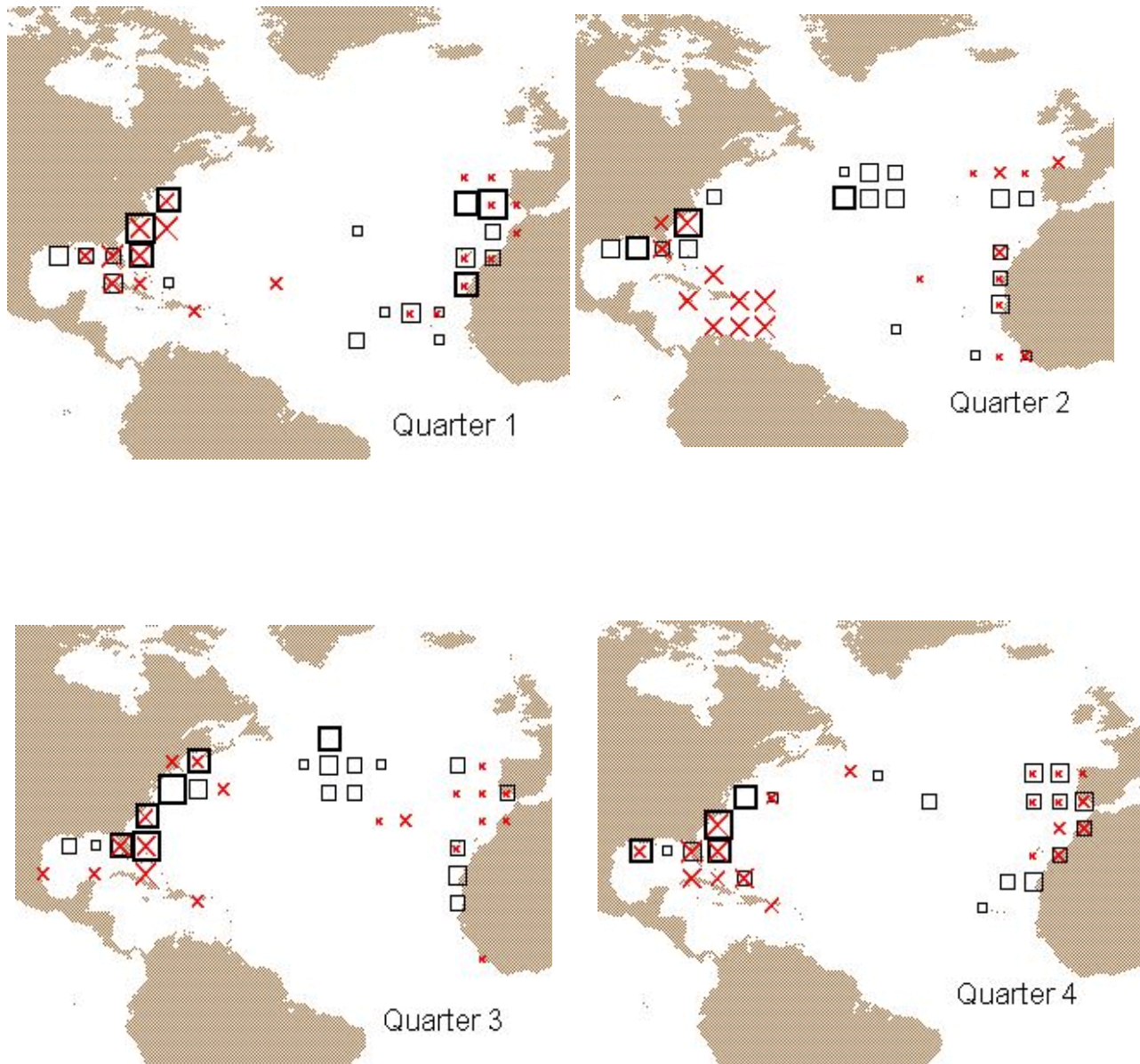


Figure 2. Top 20 locations (5° squares) by CPUE (x) of swordfish < 125 cm LJFL and by number (box) of swordfish < 125 cm LJFL caught in the U.S. and Spanish longline fisheries in 1998. Symbols are in proportion to CPUE and number of small swordfish caught respectively.

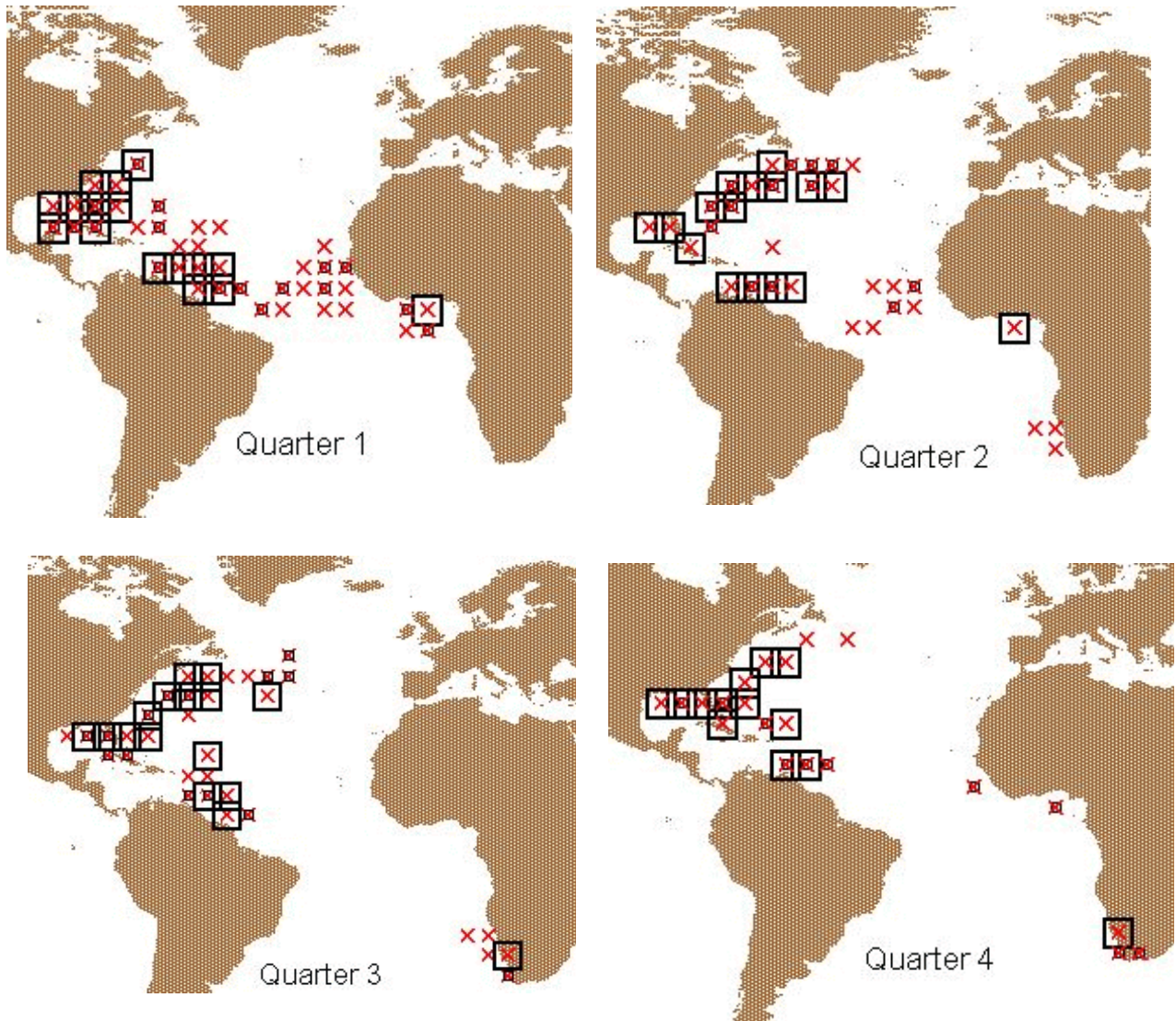


Figure 3. Locations (x) of observed catch in the U.S, Japanese, Canadian, South African, and Venezuelan fisheries in 1997, 1998, and 1999. Large squares indicate locations where swordfish < 125 cm LJFL fish accounted for more than 50% of the number of swordfish caught in the year, area, and quarter. Small squares indicate locations where swordfish < 125 cm LJFL accounted for between 25% and 50% of the number of swordfish caught in the year, area, and quarter..

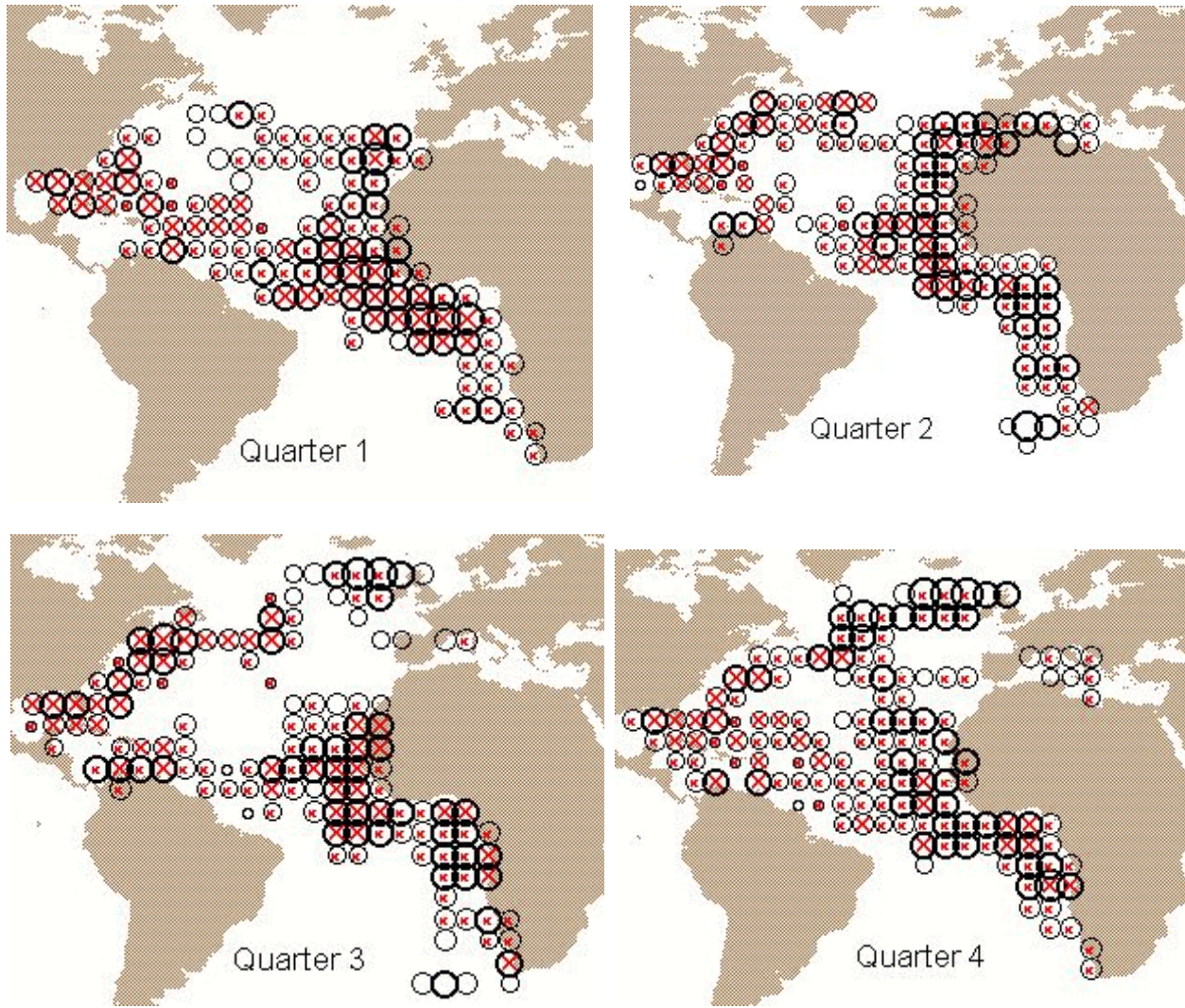


Figure 4. Locations of U.S., Japanese, Canadian, and Venezuelan fishing swordfish catch (N) and longline fishing effort (S) in hooks in 1997. Symbols are in proportion to catch **and** effort.

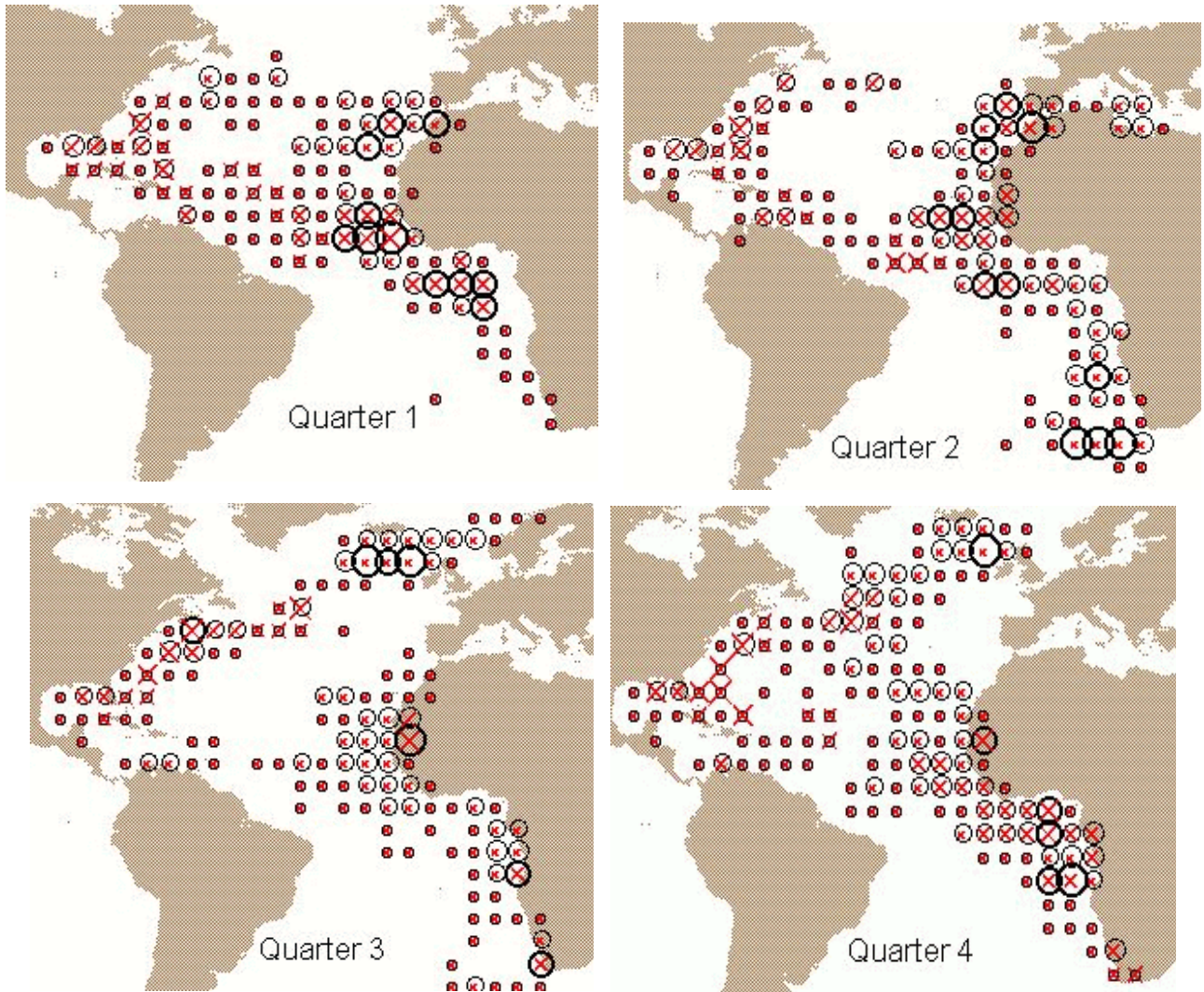


Figure 5. Locations of U.S., Japanese, Canadian, South African, and Venezuelan fishing swordfish catch (x) and longline fishing effort (o) in hooks in 1998. Symbols are in proportion to catch and effort.

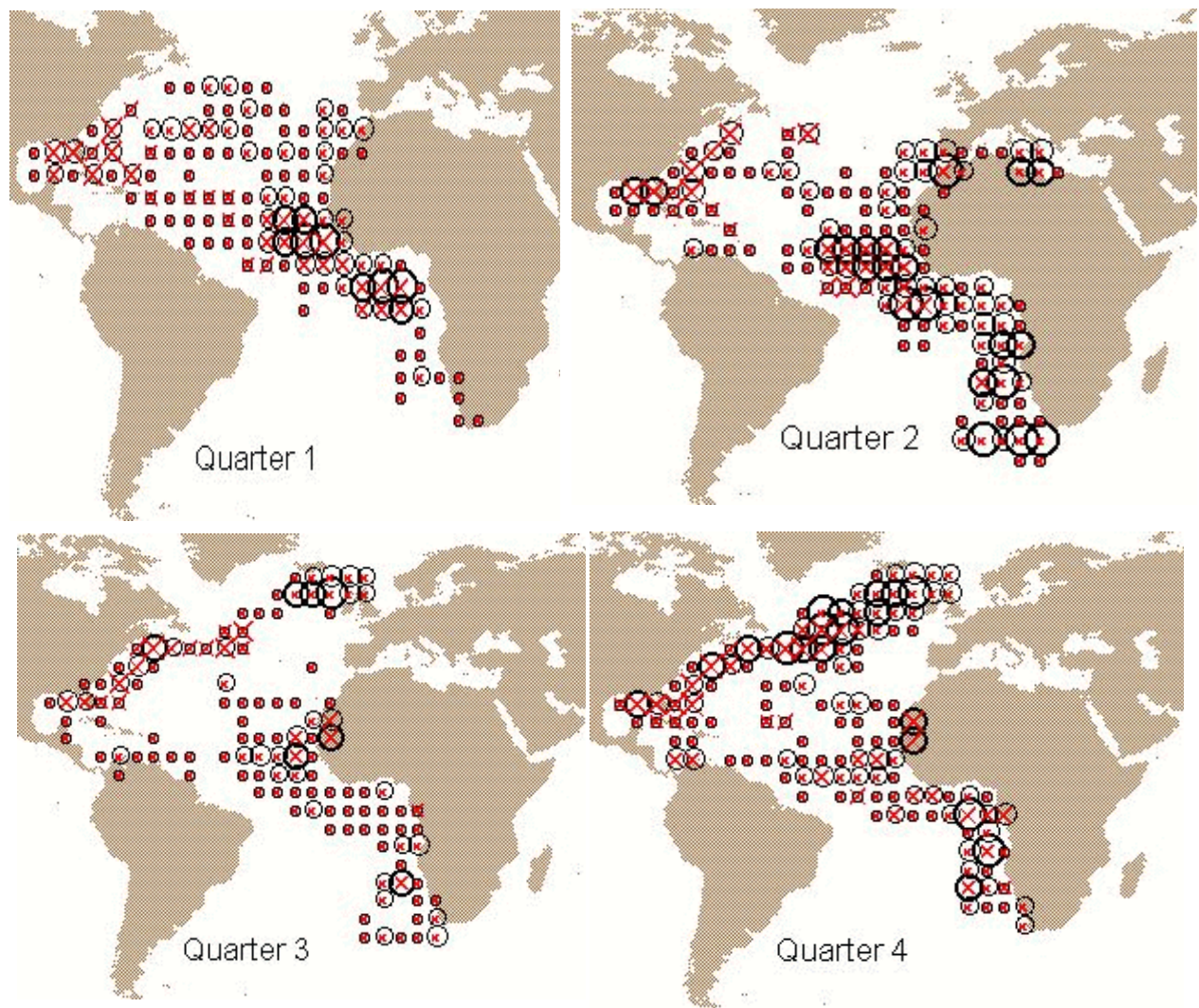


Figure 6. Locations of U.S., Japanese, Canadian, South African, and Venezuelan fishing swordfish catch (x) and longline fishing effort (o) in hooks in 1999. Symbols are in proportion to catch and effort