INTER-AMERICAN TROPICAL TUNA COMMISSION
COMISIÓN INTERAMERICANA DEL ATÚN TROPICAL

WORKING GROUP TO REVIEW STOCK ASSESSMENTS

7TH MEETING

LA JOLLA, CALIFORNIA (USA)
15-19 MAY 2006

DOCUMENT SAR-7-10

DISTRIBUTION AND VULNERABILITY TO BYCATCH OF SEABIRDS

1. INTRODUCTION

At the 73rd meeting of the IATTC, Resolution C-05-01 was adopted to encourage reporting of seabird mortalities in longline and other tuna fisheries. This document follows up on that issue by providing data from the purse-seine fishery on the distribution of seabird species, and compares their distributions with that of the pelagic longline fishery in the eastern Pacific Ocean (EPO).

2. SEABIRD BYCATCH IN TUNA FISHERIES

Seabird mortalities are not recorded by IATTC observers during purse-seine sets because it is an exceedingly rare event. Seabirds can comprise significant bycatches in other fisheries, however, particularly those using longline and gillnets (see, for example, Melvin and Parrish, 2001; Brothers *et al*., 1999). Albatrosses, shearwaters, and petrels that forage by diving are most vulnerable to entanglement in these fisheries (Brothers *et al*., 1999). Albatrosses, because they feed by scavenging, are at particular risk from longline fisheries. Gales (1998) has stated that "the best available evidence indicates that longline fishing is the most serious threat facing albatrosses today." Even artisanal longline fisheries can provide substantial bycatch risks for albatrosses (Anderson *et al*., 2003), although reports from observers placed aboard artisanal longliners in the EPO by regional sea-turtle programs have not confirmed any albatross mortalities and indicate that seabird mortalities were rare. These small coastal boats tend to use setting techniques that result in rapid line sinkage close to the hull, which limits the exposure of the bait to seabirds.

3. SEABIRD DISTRIBUTION IN THE EPO

Au and Pitman (1986; 1988) identified several species that are frequently associated with dolphins and/or tuna in the EPO. Multi-species flocks of boobies (*Sula* spp.), wedge-tailed shearwaters (*Puffinus pacificus*), jaegers (*Stercorarius* spp.), and frigatebirds (*Fregata* spp.) are often found in association with spotted and spinner dolphins and yellowfin tuna in the core area of the purse-seine fishery, north of 5°N and east of 120°W. Further to the west, the more-coastal boobies and jaegers are largely replaced by sooty terns (*Sterna fuscata*) and Juan Fernandez or white-necked petrels (*Pterodoma externa*). The associations between tunas and sooty terns and frigate birds are particularly close, because the seabirds feed on prey that are chased to the surface by yellowfin tuna (Ashmole and Ashmole, 1967; Au and Pitman, 1986; 1988).

The list of seabird species recorded by IATTC observers during 1997-2004 is presented in Table 1. These sightings were made in association with purse-seine sets during 1997-2004, and thus are affected by the distribution and type of purse-seine sets. Most seabird sightings (59%) were made in association with dolphin sets; 24% were in association with sets on floating objects and 17% were in association with school sets. Distribution plots are presented for boobies (Figure 1), shearwaters and petrels (Figure 2), frigatebirds and jaegers (Figure 3), terns (Figure 4), and albatrosses (Figure 5).

4. COMPARISON OF SEABIRD DISTRIBUTION WITH LONGLINE SETS

Brothers *et al*. (1999) noted that little is known about seabird bycatch in longline fisheries along the

Pacific coast of South America, but that longline bycatches have been recorded for albatrosses, including the Galápagos Islands-nesting waved albatross (*Phoebastria irrorata*), a black petrel (*Procellaria parkisoni*), and a blue-footed booby (*Sula nebouxii*).

Figure 6 presents the distribution of longline effort in the EPO from 1997-2004 IATTC data. The area of most concern for the potential bycatch of seabirds is between the Galápagos Islands and the mainland of South America, where the distribution of the longline fishery overlaps the distribution of the waved albatross (Figure 7). The waved albatross is the only exclusively tropical albatross, nesting only in the Galápagos Islands and feeding mainly in the waters of Peru and Ecuador (Anderson, *et al.* 1983). The FAO has determined the conservation status of the species to be vulnerable, based on the potential for mortality by longline fisheries (Brothers *et al*., 1999). In 1998, Ecuador established the 133,000-km^2 Galápagos Marine Reserve around the Islands, within which industrial, but not artesanal, longlining was prohibited.

REFERENCES CITED

Anderson, D.J., K.P. Huyvaert, D.R. Wood, C.L. Gillikin, B.J. Frost, H. Mouritsen. 2003. At-sea distribution of waved albatrosses and the Galapágos Marine Reserve. Biol. Cons. 110:367-373.

Ashmole, N.P., and M.J. Ashmole. 1967. Comparative feeding ecology of sea birds of a tropical oceanic island. Yale University, Peabody Museum of Natural History Bulletin 24: 1-131.

Au, D.W., and R.L. Pitman. 1988. Seabird relationships with tropical tunas and dolphins. Pages174-209 in Seabirds and Other Marine Vertebrates: Competition, Predation, and Other Interactions, J. Burger, ed. Columbia University Press. New York, New York. 339 pp.

Au, D.W.K., and R.L. Pitman. 1986. Seabird interactions with dolphins and tuna in the eastern tropical Pacific. The Condor 88:304-317.

Gales, R. 1998. Albatross populations: Status and threats. Pages 20-45 in Albatross Biology and Conservation, G. Robertson and R. Gales, eds. Surrey Beatty and Sons, Chipping Norton.

Melvin, E.F., and J.K. Parrish (eds.). 2001. Seabird Bycatch: Trends, Roadblocks, and Solutions. University of Alaska Sea Grant. Fairbanks, Alaska. 204 pp.

Pitman, R.L. 1986. Atlas of seabird distribution and relative abundance in the eastern tropical Pacific. Southwest Fisheries Center Admin. Rep. LJ-86-02C. 107 pp.

TABLE 1. List of seabirds recorded by IATTC observers associated with purse-seine sets during 1997-2004.

Common name		Scientific name	No. sightings
English	**Spanish**		
Unidentified booby	Bobo no identificado	*Sula* spp.	8,053
Red-footed booby	Bobo de patas rojas	*S. sula*	4,416
Masked booby	Bobo enmascarado/blanco	*S. dactylatra*	24,058
Brown booby	Bobo café/prieto	*S. leucogaster*	25,201
Unidentified shearwater	Pardela no identificada	*Puffinus* spp.	8,786
Wedge-tailed shearwater	Pardela de cola de gajo	*P. pacificus*	2,217
Small shearwater (Manx, Audubon)	Pardela pequeña (Manx, Audubon)	*P. puffinus*/ *P. lherminieri*	6,178
Petrels or shearwaters	Pardelas o petreles	Procellariiformes	10,872
Tern (black with white)	Golondrina blanca con negro	*Sterna* spp.	6,186
Tern (all white)	Golondrina blanca	*Sterna* spp	2,383
Frigatebird	Fregata	*Fregata* spp.	37,971
Albatross	Albatros	Diomedeidae	78
Sea gull	Gaviota	*Larus* spp.	249
Pelican	Pelicano	*Pelecanus* spp.	56
Heron	Garza	Ardeidae	84
Petrel	Petreles	Procellariiformes	3,114
Jaeger	Estercorarios	*Stercorarius* spp.	1,030
Tropicbird	Rabijunco	*Phaethon* spp.	273
Unidentified bird	Pájaro no identificado		4,053
Other bird	Otro pájaro		89

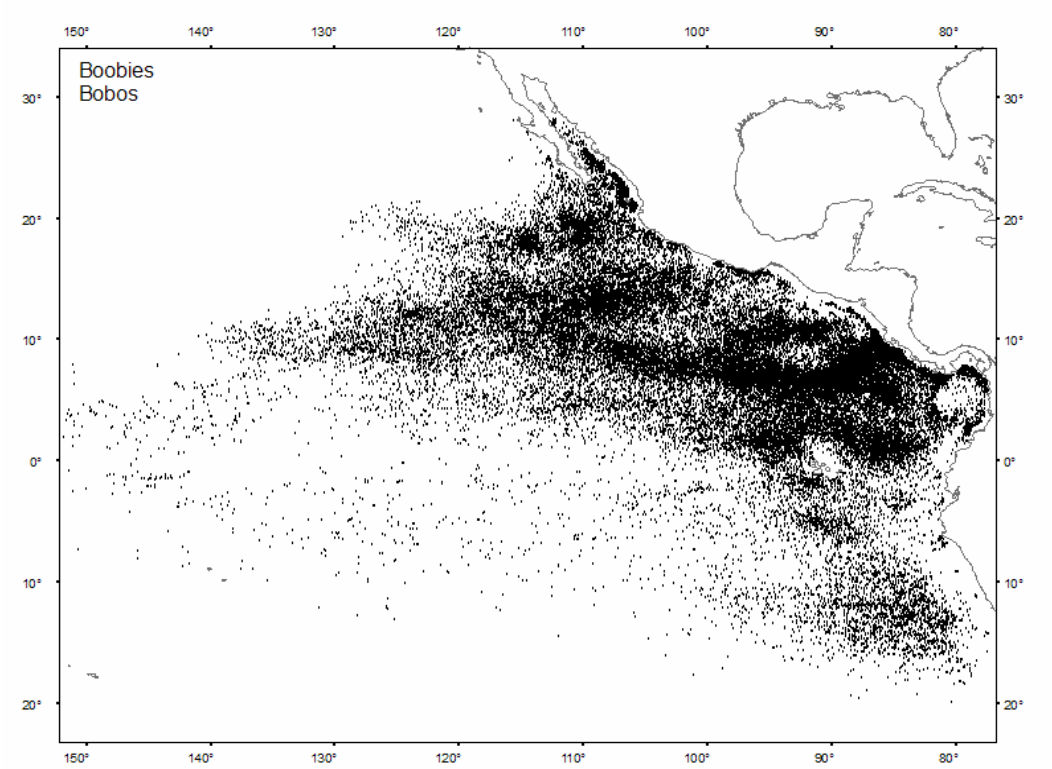

FIGURE 1. Boobies (red-footed, masked, brown, and unidentified species), sighted in association with purse-seine sets, 1997-2004.

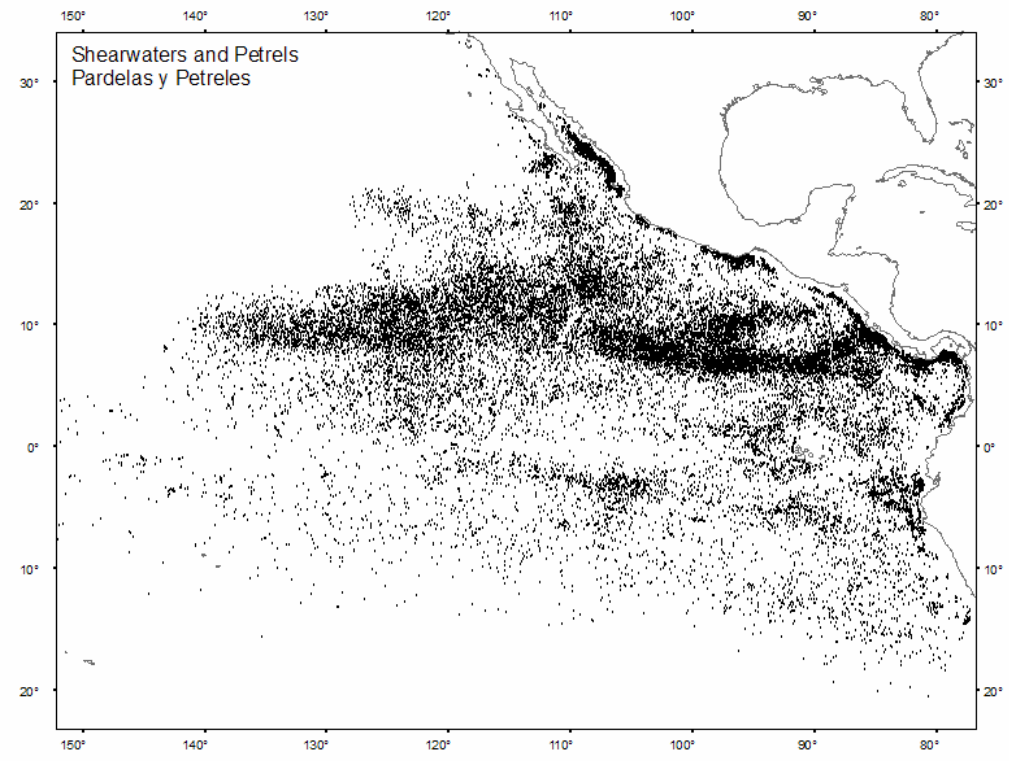

FIGURE 2. Shearwaters and petrels sighted in association with purse-seine sets, 1997-2004.

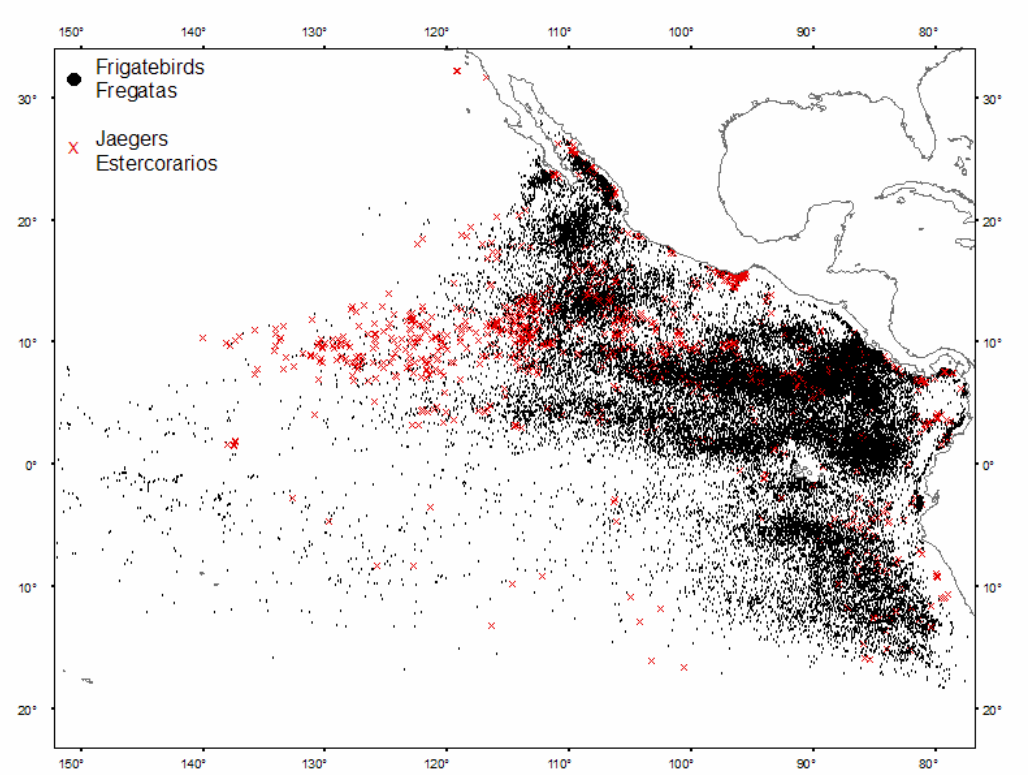

FIGURE 3. Frigatebirds (the magnificent frigatebird, *Fregata magnificens*, and the great frigatebird, *F. minor*) and jaegers sighted in association with purse-seine sets, 1997-2004.

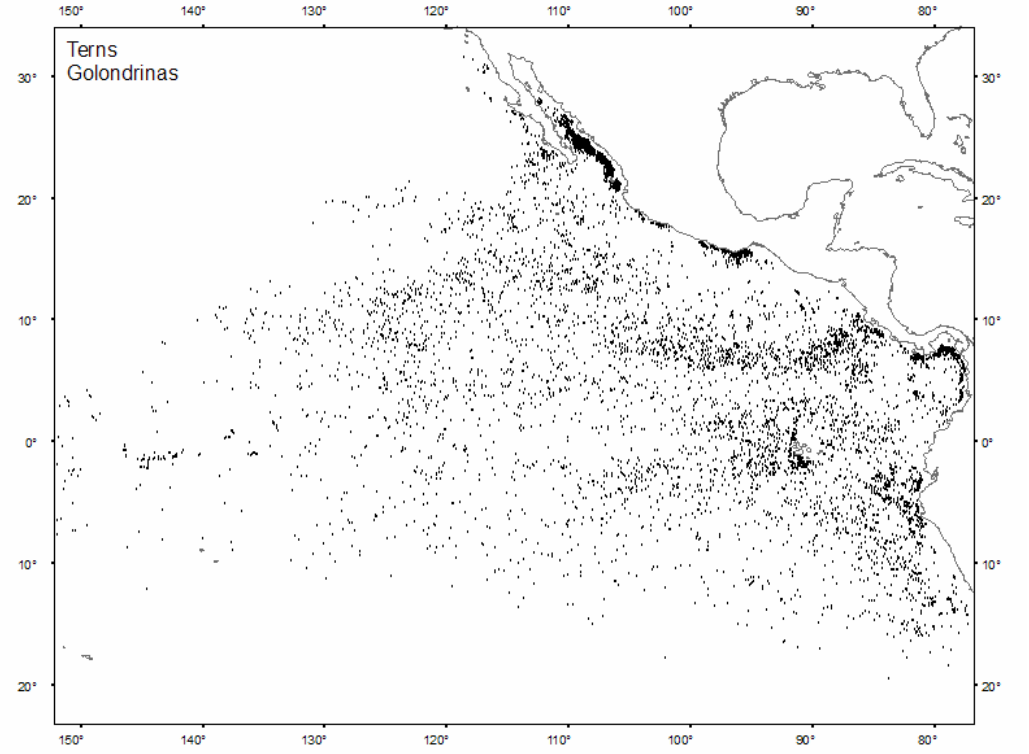

FIGURE 4. Terns sighted in association with purse-seine sets, 1997-2004. Pelagic sightings are most likely that of the sooty tern, *Sterna fuscata*.

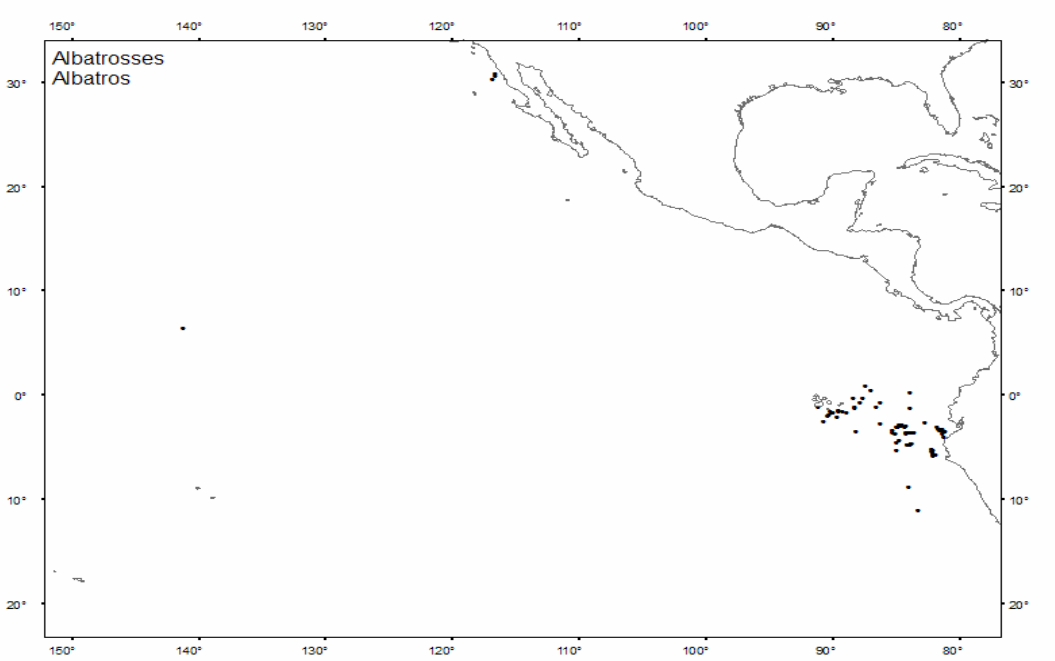

FIGURE 5. Albatrosses sighted in association with purse-seine sets, 1997-2004. Most of the sightings are likely to be that of the waved albatross, *Phoebastria irrorata*, which nests in the Galapagos Islands. Distribution plots published by Harrison (1983) and sightings data published by Pitman (1986) indicate that the Laysan and black-footed albatrosses (*Diomedea immutabilis* and *D. nigripes*) are found off the coast of Baja California and several Southern Hemisphere species can be found as far north as the coasts of Ecuador and Peru.

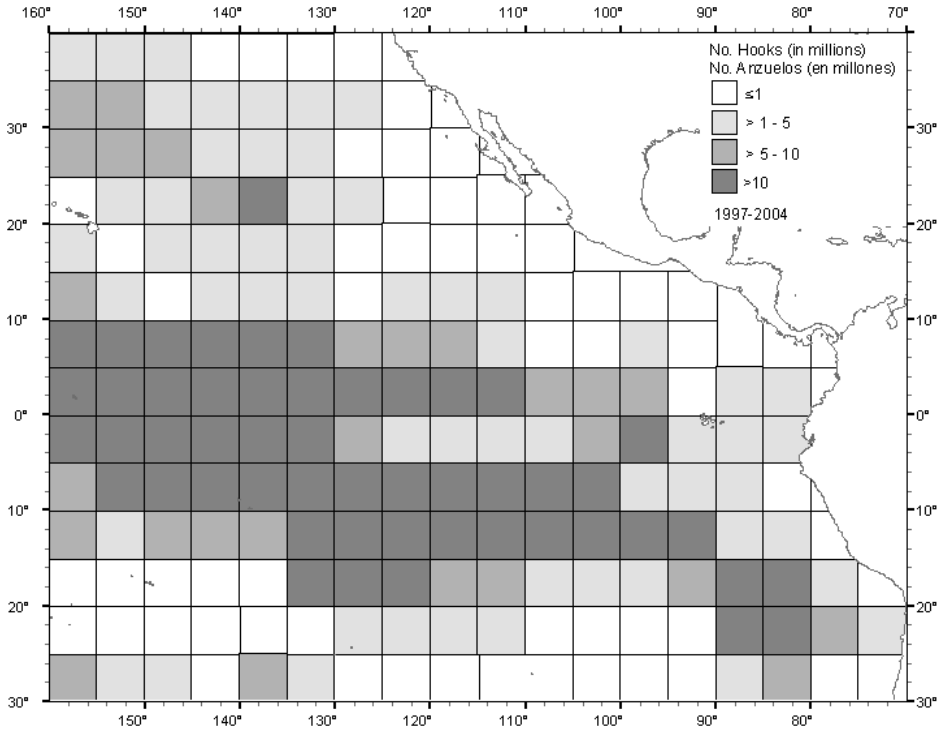

FIGURE 6. Distribution of longline effort in the EPO during 1997-2004, measured by the number of hooks set per 5° square.

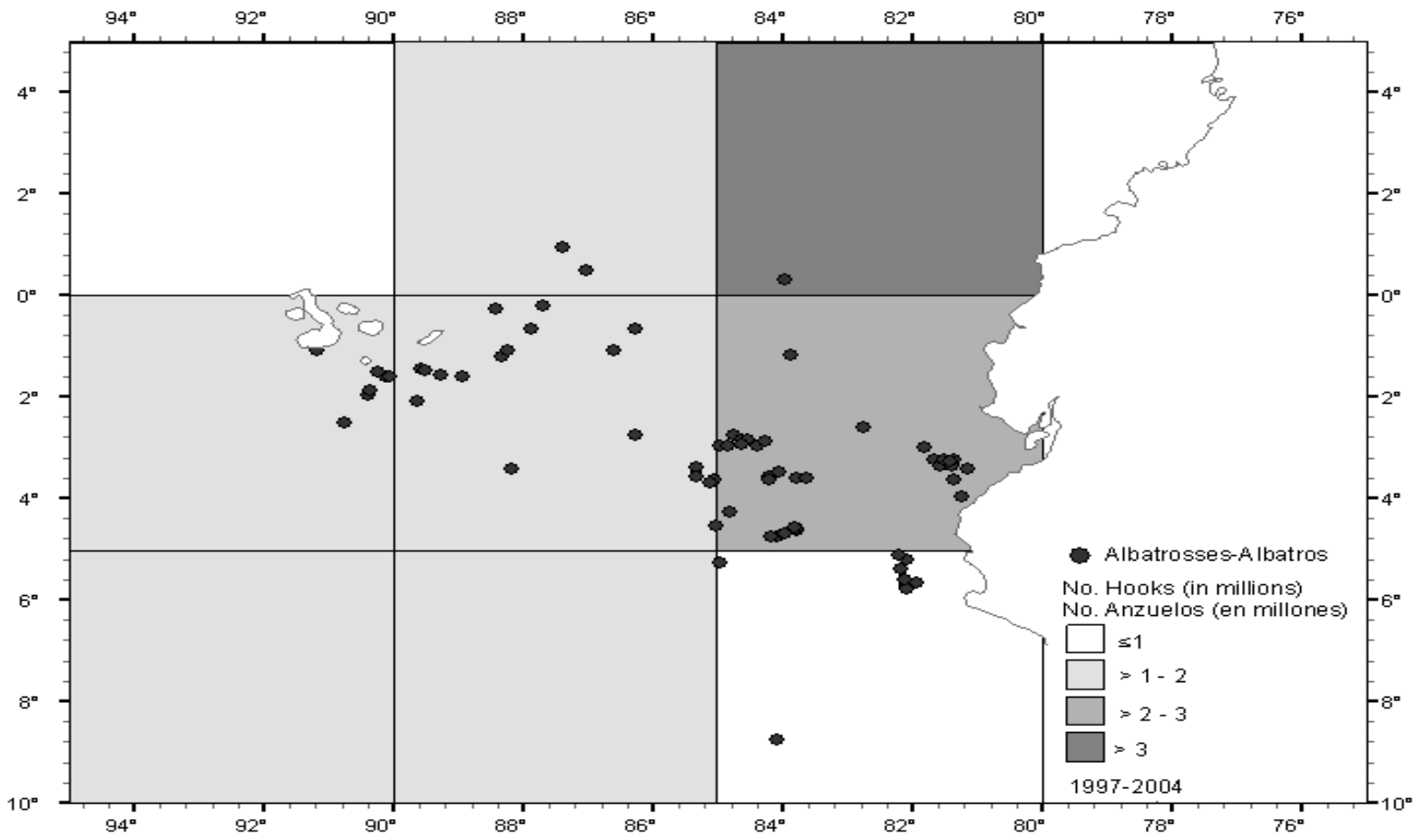

FIGURE 7. Comparison of longline effort (number of hooks set per 5° square) and albatross distribution (sightings in association with purse-seine sets), 1997-2004. The waved albatross, *Phoebastria irrorata*, nests in the Galapagos Islands and is known to forage in the waters between the islands and the mainland (Anderson, *et al.* 1983). Note that the effort strata differs from that of the previous plot.