INTER-AMERICAN TROPICAL TUNA COMMISSION

COMISIÓN INTERAMERICANA DEL ATÚN TROPICAL

Data Report 11

BYCATCHES OF SHARKS IN THE TUNA PURSE-SEINE FISHERY OF THE EASTERN PACIFIC OCEAN REPORTED BY OBSERVERS OF THE INTER-AMERICAN TROPICAL TUNA COMMISSION, 1993-2004

by

Marlon Román-Verdesoto and Mauricio Orozco-Zöller

La Jolla, California

2005

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Additional information about the IATTC and its publications can be found on the inside back cover of this report.

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ABSTRACT

Information on bycatches of sharks collected by observers of the Inter-American Tropical Tuna Commission (IATTC) between 1993 and 2004 is presented in this data report. This report contains two sections. The first section summarizes information used by the staff of the IATTC to review and revise IATTC observers' at-sea species identifications of *Carcharhinus falciformis*, *C. limbatus*, and *C. longimanus*. The revisions were based on 1) data collected on species-specific diagnostic characteristics as part of a special sampling program conducted between March 2000, and March 2001 and 2) a review of observers' archival field notes for the 1993-2004 period. The second section summarizes the shark bycatches reported by IATTC observers between 1993 and 2004, incorporating the revisions of observers' at-sea identifications. The IATTC-observed shark bycatch data are summarized as tables with annual tallies of observed bycatches and maps of the spatial distributions of the average bycatches per set and size compositions of the bycatches.

INTRODUCTION

Purse-seining (described by Bayliff 2001: Appendix 11) is one of the principal methods used to catch tunas in the eastern Pacific Ocean (EPO) (Anonymous 2005: Table A-2). During the late 1960s, public awareness of the incidental mortality of dolphins in the purse-seine fishery for tunas prompted the enactment of the U.S. Marine Mammal Protection Act of 1972, which led to the placement of observers aboard U.S.-flag purse-seine vessels. During the 1970s non-U.S. participation in the tuna purse-seine fishery increased, and in 1976 the duties of the Inter-American Tropical Tuna Commission (IATTC) were expanded to include participation in dolphin research and in efforts to reduce the mortalities of dolphins due to purse-seine fishing. An IATTC observer program was established in 1979, with an initial goal of 30-percent coverage of large vessels (greater than 363 metric tons (t) fish-carrying capacity) of all flags. Subsequent to that, observer programs were established by governments of several of the nations that are currently major participants in the fishery. Since 1992 the observer coverage of the trips on large vessels by the combined IATTC and national observer programs has been nearly 100%.

During fishing operations for tunas in the EPO, sharks and other fishes are incidentally caught, and usually released or discarded at sea (Au 1991, Hall 1998). In 1993 IATTC observers began to collect data on the bycatches of species of animals other than mammals and commercially important tunas in order to evaluate the significance of these bycatches in this fishery. Since 1993 the IATTC has encouraged the reduction of the incidental catch of sharks and the release of live sharks (Resolution C-00-08 of 2000 and Resolution C-05-03 of 2005). The latter resolution calls for a comprehensive assessment of the principal shark species incidentally caught by this fishery. As an integral part of these efforts, the IATTC staff has been working to improve the identifications of the sharks in the data collected prior to 2005 and to increase the taxonomic

resolution of the bycatch data by developing methods for confirming observers' at-sea identifications for data collected during 2005 and in subsequent years (Román *et al*. 2005).

This report summarizes the findings of the IATTC staff in its efforts to improve the species identifications of sharks in the bycatch data collected by IATTC observers prior to 2005, and presents summaries of the observed bycatches that incorporate those findings. Specifically, the results of a review of the observers' at-sea identifications based on data collected as part of a special sampling program between 2000 and 2001 and the results of a review of archival field notes were used for this purpose. Summaries of the spatial distributions and size compositions of the IATTC-observed bycatch of sharks in the EPO tuna purse-seine fishery, which incorporate revisions to species identifications, are presented for 1993-2004 in this report.

THE IATTC OBSERVER DATABASE

Bycatches of sharks have been recorded by observers onboard large purse-seiners since 1993. In this report shark bycatch is defined as sharks that were discarded dead (partially or entirely) at sea after being removed from the net and placed on the deck of the vessel. Some of the sharks that are placed on the deck are released alive, but no data on the magnitude of this "live release" are available prior to 2005. Due to severe conditions, such as anoxia within the net, crushing within the net and the brailer, and elevated temperatures on the vessel's deck, even these sharks are not likely to survive.

There are three types of purse-seine sets: 1) sets on tunas associated with dolphins ("dolphin sets"), 2) sets on tunas associated with floating objects ("floating-object sets"), and 3) sets on unassociated schools of tunas ("unassociated sets"). Sampling coverage of the EPO purse-seine fishery by IATTC observers for non-mammal bycatch varied by set type, but was generally greater than 60% of the sets of large vessels since 1994 (IATTC 2002, IATTC 2004). The lowest sampling coverage for non-mammal bycatch occurred in 1993, with coverage of 41% for dolphin sets, 46% for floating-object sets, and 52% for unassociated sets (IATTC 2002: Table 10). Between 1993 and 2004, IATTC observers recorded the shark bycatches in 23% of all sets. Bycatches were recorded using six species groups: blacktip shark (*Carcharhinus limbatus*), oceanic whitetip shark (*C. longimanus*), silky shark (*C. falciformis*), hammerhead sharks (*Sphyrna* spp.), other sharks (*e.g*. thresher sharks and other carcharhinids), and unidentified sharks. The amount of bycatch was recorded either in number of individuals or in metric tons. Over this 12-year period the majority of sets were estimated in numbers of individuals; only 1.8%, 2.3%, and 1.4% of the dolphin, unassociated, and floating-object sets, respectively, had shark bycatches estimated in metric tons. Observers also recorded the sizes of the sharks, using three size categories: small (<90 cm total length (TL)), medium (90-150 cm TL), and large (>150 cm TL). Total length was typically estimated by the observers, as measuring the sharks would interfere with fishing operations.

The shark data were reviewed to detect recording errors; however, prior to 2005 species identification errors could not be detected during the data editing process.

SPECIES IDENTIFICATION

The IATTC staff undertook a multi-phase project to improve the shark species identifications in the IATTC database for data collected prior to 2005. This effort was initiated because historical

records indicate that the silky shark had been the shark most commonly caught by the purse-seine fishery in the EPO (Compagno 1984), and comprised 52% of the sharks caught by longline fishing gear in the equatorial Pacific Ocean south of 10ºN latitude during 1952 through 1955 (Strasburg 1958), while the percentage of blacktip shark was relatively low. Furthermore, observers' at-sea identifications indicated that a large proportion of blacktip shark bycatch occurred in areas outside the known distribution of this species, which is primarily continental and insular shelves in temperate and tropical waters (Compagno 1984). Fishermen often refer to the silky shark as "punta negra" ("blacktip"), so there was concern that observers were taking species identification cues from fishermen and misidentifying silky sharks as blacktip sharks. In addition, there was concern that the variability in the occurrence of the oceanic whitetip shark, which is the second most common shark caught by the purse-seine fishery in the EPO (Compagno 1984), was related to the misidentification or miscoding of this species, using the general category "other sharks."

The two phases of the project were: 1) a one-year study to collect species-specific diagnostic information on silky, oceanic whitetip, and blacktip sharks encountered in the fishery, and compare these characteristics to the observers' at-sea identifications (the Shark Characteristics Sampling Program), and 2) a review of observers' handwritten notes (when available) to determine if any of the records of "other sharks" could be assigned to specific species. Each of these is described below.

Shark Characteristics Sampling Program

A 1-year special sampling program was initiated in March 2000 to determine if blacktip sharks were being caught at greater than expected rates, to determine if silky, blacktip, and oceanic whitetip sharks were being misidentified and, if so, to quantify the misidentification rates, and to determine if the observers' at-sea identifications could be systematically corrected.

Design of the Shark Characteristics Form (SCF)

The SCF was designed to record species-specific diagnostic information on individual sharks. Details about the following morphological characteristics of the carcharhinid sharks believed to be commonly encountered by the purse-seine fishery were depicted on the SCF: 1) the shape of the teeth located at the symphysis of the upper jaw, 2) the location of the origin of the first dorsal fin in relation to the free rear tips of the pectoral fins, 3) the coloration of the dorsal surface of the pectoral fin, 4) the shape of the first dorsal fin, 5) the presence or absence of the interdorsal ridge, and 6) the length of the inner margin of the second dorsal fin (Figure 1). The observers were given specific choices, depicted by drawings, of the six characteristics, and were asked to 1) select the applicable drawing, or 2) to indicate that none applied, or 3) to indicate that they were unable to observe one or more of the six characteristics. These characteristics were not presented as a key, *i.e.* they were not intended to lead the observer to the correct species. Instead, the observers were instructed to independently identify the shark species as they had done previously, so that comparisons with the drawings could be made after the fact. Whenever possible, the observers took photographs of individual sharks on deck. In addition, the observers recorded the total length of each animal to the nearest centimeter.

Based on data collected on the SCF, the following rules were applied to observers' at-sea identifications to determine the misidentification rates. At-sea identifications of silky and

blacktip sharks that were consistent with all six characteristics were assumed to be correct. In addition, if not all six characteristics were consistent with the at-sea identification, but certain key diagnostic characteristics were present, the identification was also considered correct.

Three characteristics were considered key diagnostic characteristics for the silky shark (Figure 1): 1) the origin of the first dorsal fin located behind the free rear tips of the pectoral fin (Compagno 1984), 2) length of the second dorsal fin from its anterior margin to its posterior free rear tip about 2.25 times the vertical height of the fin (Castro 1983), and 3) the upper teeth erect to slightly oblique, serrated, triangular, and with a notch about half way down the tooth on each side (Last and Stevens 1994). If at least one of these three major characteristics was present, the shark was considered to be a silky shark. These diagnostic characteristics for silky sharks are, in most cases, not shared with other carcharhinid sharks that occur in the EPO.

For blacktip sharks, we considered four characteristics to be diagnostic (Figure 1): 1) the teeth at the symphysis of both jaws symmetrical and similar, with narrow and vertical, strongly serrated cusps, 2) the origin of the first dorsal fin over or slightly behind the insertion of the pectoral fin, 3) the inner margin of the second dorsal fin shorter than the fin's height, and 4) the interdorsal ridge absent (Fischer *et al*. 1995). Because *C. limbatus* typically inhabits shallow waters (Killam and Parsons 1989), and most purse-seine sets are made in oceanic habitats, it is unlikely that this species is encountered often in this fishery. We were concerned that observers were taking species identification cues from fishermens' common names, so we placed strict conditions on the positive identification of *C. limbatus* by considering the animal to be a blacktip shark only if all four characteristics were present. At-sea identifications that did not meet the criteria for either silky or blacktip sharks were classified as unidentified sharks. We placed little importance to the presence or absence of black tips on the fins, because these markings may fade with increasing age or size (Castro 1983) or after death.

For oceanic whitetip sharks, we considered two characteristics to be diagnostic: 1) the pectoral lobes rounded and tipped with white color, and 2) the first dorsal lobe rounded (Figure 1). These characteristics are not shared with other carcharhinid sharks that occur in the EPO.

Results of the Shark Characteristics Sampling Program

The data collected during the Shark Characteristics Sampling Program, for the most part, provided reasonable coverage of the spatial and temporal distributions of the sets in the IATTC observer database between March 2000 and March 2001 (Figure 2). On average, an SCF was completed for 76% of the IATTC-observed sets with shark bycatch in the more heavily-fished 2 areas (>10 sets; Figure 3). Because of the coverage of observers with SCFs overlapped at sea with that of observers without them, the sampling coverage was lowest (52%) at the beginning of the Shark Characteristics Sampling Program, between March and May 2000. The sampling coverage increased in the second quarter of the program, with 83% coverage between June and August. The greatest sampling coverage occurred between September and November 2000 (94%), and it decreased to 73% at the end of the program between December and February. The different types of sets were also well represented. During the entire Shark Characteristics Sampling Program, the coverage was 75% for dolphin sets, 72% for unassociated sets, and 76% for floating-object sets.

Taxonomic characteristics were collected for 2,830 sharks of all species during the Shark Characteristics Sampling Program. Of those animals, the observers identified 1,444 silky sharks

and 311 blacktip sharks (Table 1). Of the 1,444 silky sharks, 1,097 (76%) had all three major characteristics for silky sharks, 318 (22%) had only two of the three major characteristics, 25 (1.7%) had only one of the three major characteristics, and 4 (0.3%) had none of the three major characteristics. Of the 311 blacktip sharks identified at sea, 186 (60%) had all three major characteristics for silky sharks, 72 (23%) had only two of the three major characteristics for silky sharks, 41 (13%) had only one of the three major characteristics for silky sharks, and 12 (4%) had none of the three major characteristics for this species. Photographs of several sharks positively identified as silky and having one of the three major characteristics for silky sharks were analyzed, and all were confirmed to be silky sharks.

Silky shark misidentification rates were estimated separately for inshore and offshore areas of the EPO because blacktip sharks are thought to occur primarily in coastal areas (Castro *et al.* 1999). According to Compagno (1984), blacktip sharks commonly inhabit the continental and insular shelves, and are rarely found in waters deeper than 30 m. Given that the average shelf depth in the world oceans is 130 m (Kennett 1982), to determine a hypothetical boundary for blacktip habitat in the EPO, we estimated the average distance from the coast (continents and islands) to a depth range 130-200 m. The range of depths was necessary in order to obtain enough data points in continental shelf regions to compute a representative average distance. This average distance was found to be 14 nm. However, the data from the SCF showed that the blacktip sharks with confirmed identifications occurred up to 22.6 nm from the coast. Given the lack of information on blacktip shark distribution in the EPO, the greatest distance from the coast of these confirmed occurrences (rounded to the nearest nautical mile) was used to establish a coastal region of assumed blacktip shark habitat extending up to 23 nm from the coasts of continents and islands. This coastal region was used to adjust the shark bycatch data in the IATTC database (see revised species composition of the observed bycatch below). This region will subsequently be referred to in this report as “inshore,” and any area more than 23 nm from the coast or offshore islands will be referred as “offshore.”

All but one of the sharks caught in the offshore area and identified at sea as blacktip sharks were reclassified as silky sharks (Table 1). 42% of the sharks that were identified at sea as blacktip sharks in the inshore area (8 animals) were confirmed to be silky sharks, based on data from the SCF. Of the remaining 11 animals, 6 were reclassified as unidentified sharks, and 5 were confirmed to be blacktip sharks. Four of these were caught near the islands, and one was recorded 20.5 nm from the coast of the Gulf of Tehuantepec. All of the 31 sharks that were identified as silky sharks in the inshore area were confirmed to be silky sharks. Thus, it was concluded that sharks reported by IATTC observers as silky sharks were likely correctly identified. However, sharks reported by IATTC observers as blacktip sharks were most likely misidentified, with those in the offshore area probably being silky sharks and those in the inshore area probably a mix of silky and blacktip sharks.

For oceanic whitetip sharks, 91 individuals were identified at sea, and all of them had the two major characteristics that we considered diagnostic (Table 2). On the other hand, of the 712 sharks coded as “other sharks,” 498 (70%) had the two major characteristics for oceanic whitetip sharks. Thus, it was concluded that the observers correctly identified this species, but it was often wrongly coded under the “other sharks” category.

The corrected species identification data for the Shark Characteristics Sampling Program showed that between March 2000 and March 2001, the most common sharks in the IATTC-observed bycatch were silky sharks (63.7%) and oceanic whitetip sharks (20.8%), followed by several

shark species with rates under 4% (Table 3). Given that it was not possible to confirm the identifications of species other than the silky, blacktip, and oceanic whitetip sharks with the data collected on the SCF, the observers' at-sea identifications summarized in Table 3 are intended only to point out the potential species diversity of the shark bycatch, and should not be interpreted as verified species composition data. It should be kept in mind that the bycatches of sharks in the tuna purse-seine fishery, as in any fishery, are not necessarily proportional to the abundance of these species. For example, the catch of blue sharks in the longline fishery constituted about 41% of the entire shark catch north of 20ºN (Strasburg 1958), whereas it represented less than 1% in the EPO purse-seine shark bycatch during the Shark Characteristics Sampling Program.

Review of observers' handwritten notes

A review of all the IATTC observers' handwritten notes on the data forms they routinely complete at sea was conducted to determine if the sharks reported in the "other sharks" category could be identified to species. Observers are instructed to provide scientific or common names to the species identified on their data forms, when the species group is "other shark." Unfortunately, some observers did not always provide notes for every set, and thus revisions to species identifications were possible only for those records with scientific or common names. Over the 12-year period, 25,563 animals were coded as "other sharks." Of these, 14,156 sharks (55.4%) were reclassified as oceanic whitetip sharks, 2,078 (8.1%) were reclassified as unidentified sharks, and 917 (3.6%) were reclassified as "unidentified *Carcharhinus*." Only 1,538 "other sharks" (6%) were reclassified as silky sharks.

Revised species composition of the observed bycatch of sharks

Given the results of the Shark Characteristics Sampling Program, the coastal distribution of *Carcharhinus limbatus*, and the confusion generated from the fishermens' common name for silky sharks ("punta negra"), it is reasonable to assume that the at-sea misidentification rates of silky sharks in offshore areas were fairly consistent over the 1993-2004 period. This implies that it is reasonable to assume that all sharks reported as blacktip sharks in the offshore area were actually silky sharks. However, in the inshore area, we cannot adjust the observers' identification data with confidence for individual purse-seine sets because *C. falciformis* and *C. limbatus* both occur in inshore areas.

Although the accuracy of the observers' identifications of oceanic whitetip sharks was confirmed by the data collected on the SCF, it is difficult to use this information to revise species identifications in the observer database for 1993-2004 beyond those revisions made from the observers' handwritten notes. This is because the category "other sharks" probably contains several species whose representation in that category may not have been constant over the 1993-2004 period, and because fluctuations in the number of at-sea identifications of oceanic whitetip sharks over this period suggest that misidentification/miscoding errors for *C. longimanus* may not have been constant.

It should be noted that, even after these revisions, the "other shark" species group may still contain bycatches of *C. falciformis*, *C. limbatus*, and/or *C. longimanus* that could not be recovered because the observers' handwritten notes did not make reference to any of these species.

OBSERVED SPECIES COMPOSITION AND SPATIAL DISTRIBUTION

Tables and maps are presented to summarize the species compositions and spatial distributions of the IATTC-observed bycatches of sharks during 1993-2004, given the above revisions (no extrapolations are made to sets of unobserved trips and trips accompanied by observers from the national programs). These tables and maps are based on the assumption that all blacktip shark bycatches that occurred within the offshore area were actually bycatches of silky sharks. In what follows, the term "silky/blacktip" will be used to refer to those bycatches of sharks in the inshore area that were reported by the observer as either silky sharks or blacktip sharks.

The species compositions of the shark bycatch for each set type, and for all set types combined are shown in Table 4. The percentages shown in Table 4 for each set type were computed as the sum of sets with bycatch of a particular species group divided by the sum of all sets that had any shark bycatch (*i.e.*, columns sum to 100%). Tables 5-16 show the bycatch in terms of the original units (numbers of animals or metric tons), by year, for each type of purse-seine set, and by size category for those species groups for which the size categories (small, medium, large) were considered to be meaningful. For example, "other sharks" and "unidentified sharks" may include sharks with very different lengths, *e.g. Rhincodon typus*, *Prionace glauca*, and *Alopias pelagicus*, and size categories were not considered meaningful for these groups. In addition, the percentage of bycatch by size category is presented in Tables 17-22 for those species groups for which the size categories (small, medium, large) were considered to be meaningful. Silky/blacktip sharks in the inshore area were not included, due to small sample sizes.

Maps of the spatial distributions of bycatches and the percent size compositions of bycatches of some species groups are presented to illustrate the spatial structure in both the size and the amount of take by purse-seine set type. The average bycatches per set by 2º area are shown in Figures 4-10. Because of the small sample sizes of bycatches reported in metric tons, maps were constructed only for bycatch reported in numbers of animals. For each species group, the average bycatch per set for each 2º area was computed as the sum of all sharks of that species group divided by the number of all purse-seine sets. In addition, no annual maps were constructed for silky/blacktip sharks in the inshore area or for "other" sharks, again due to small sample sizes.

Spatial distributions of the size compositions of silky, oceanic whitetip, and hammerhead shark bycatches, pooled across years, by set type, and by 2º area, are shown in Figures 11-13. In addition, annual maps of size compositions for silky and oceanic whitetip sharks, by set type, and by 2º area, are shown in Figures 14-15. Given the misidentification rates obtained from the Shark Characteristics Sampling Program data for silky and blacktip sharks in the inshore area, and the small sample sizes, we do not show maps for silky/blacktip sharks in the inshore area. As noted above, maps of percent size compositions for "unidentified" and "other" sharks are not presented because the size intervals are not considered to be meaningful, nor annual maps for hammerhead sharks because of small sample sizes.

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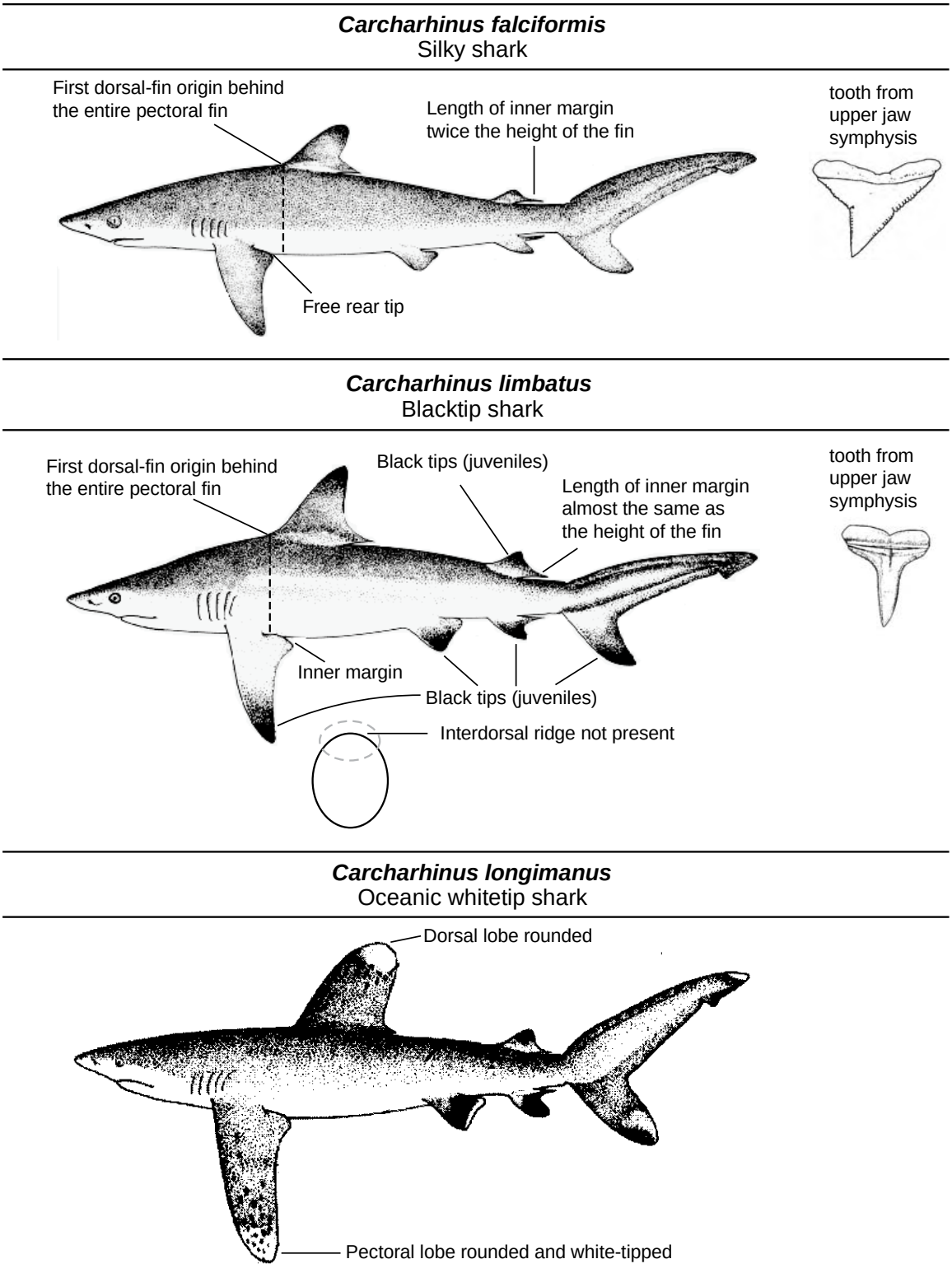


FIGURE 1. Key diagnostic characteristics of silky, oceanic whitetip, and blacktip sharks (after Compagno, 1984).

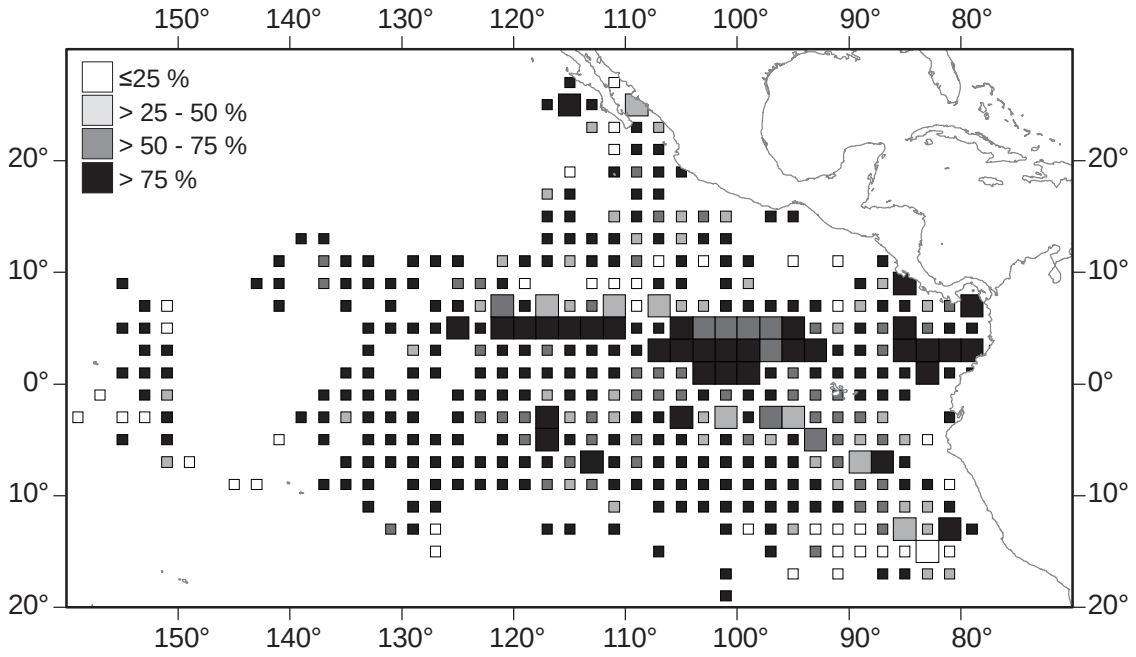


FIGURE 2. Percentages of sets with shark bycatch records in the IATTC observer database during March 2000 to March 2001 that were also sampled on the SCF, by 2º area. Large squares represent the more heavily fished area (>10 sets). Small squares indicate 10 or fewer sets.

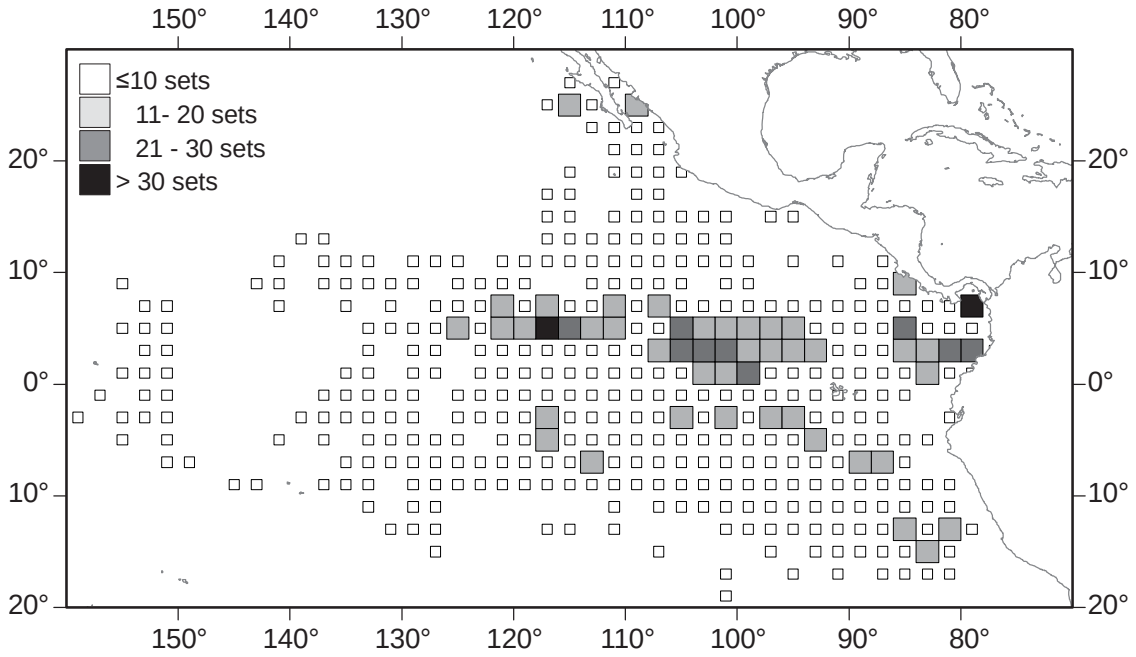


FIGURE 3. Numbers of sets with shark bycatches recorded in the IATTC observer database, by 2º area, made during the Shark Characteristics Sampling Program. Large squares represent the more heavily fished area (>10 sets). Small squares indicate 10 or fewer sets.

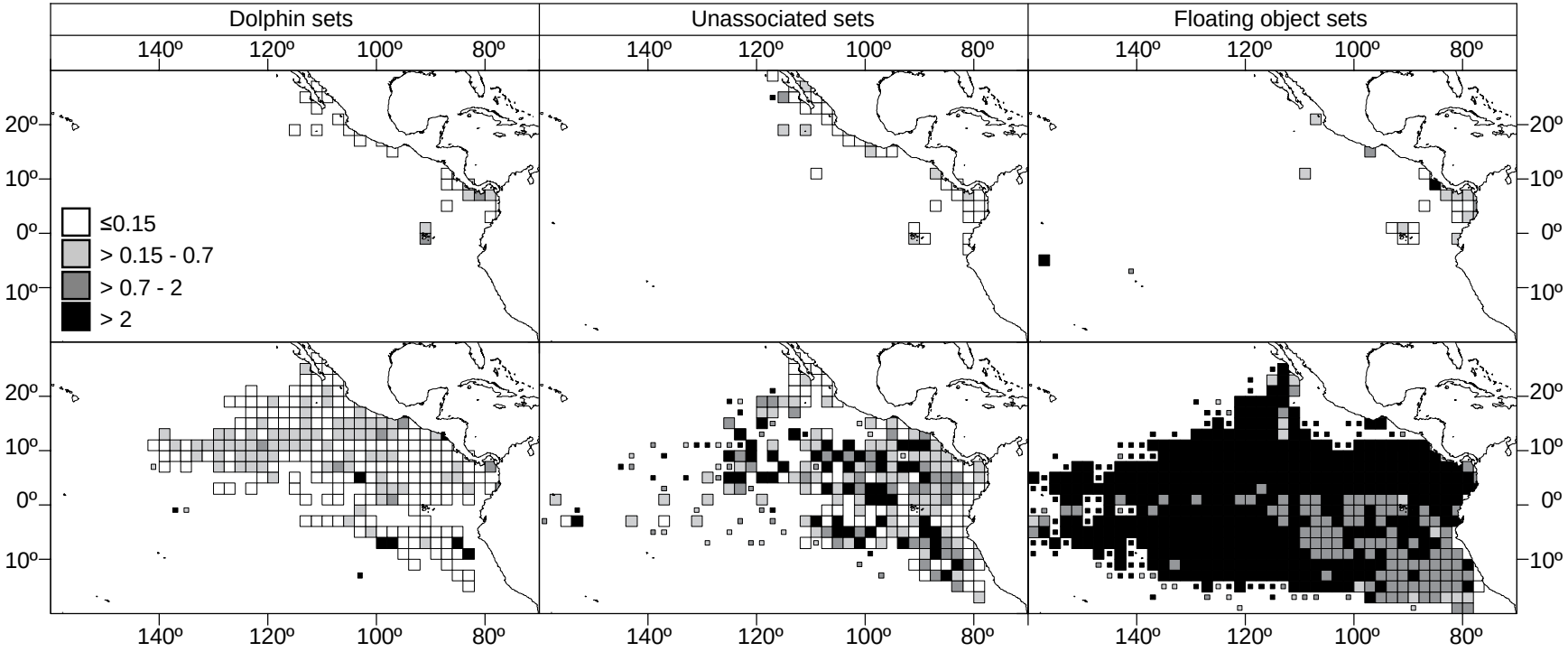


FIGURE 4. Observed bycatch per set of silky/blacktip sharks in the inshore area (top row) and silky sharks in the offshore area (bottom row), pooled across years for 1993-2004. Data are for bycatch recorded in numbers of animals only. Small squares indicate five or fewer sets per 2º area; large squares indicate more than five sets.

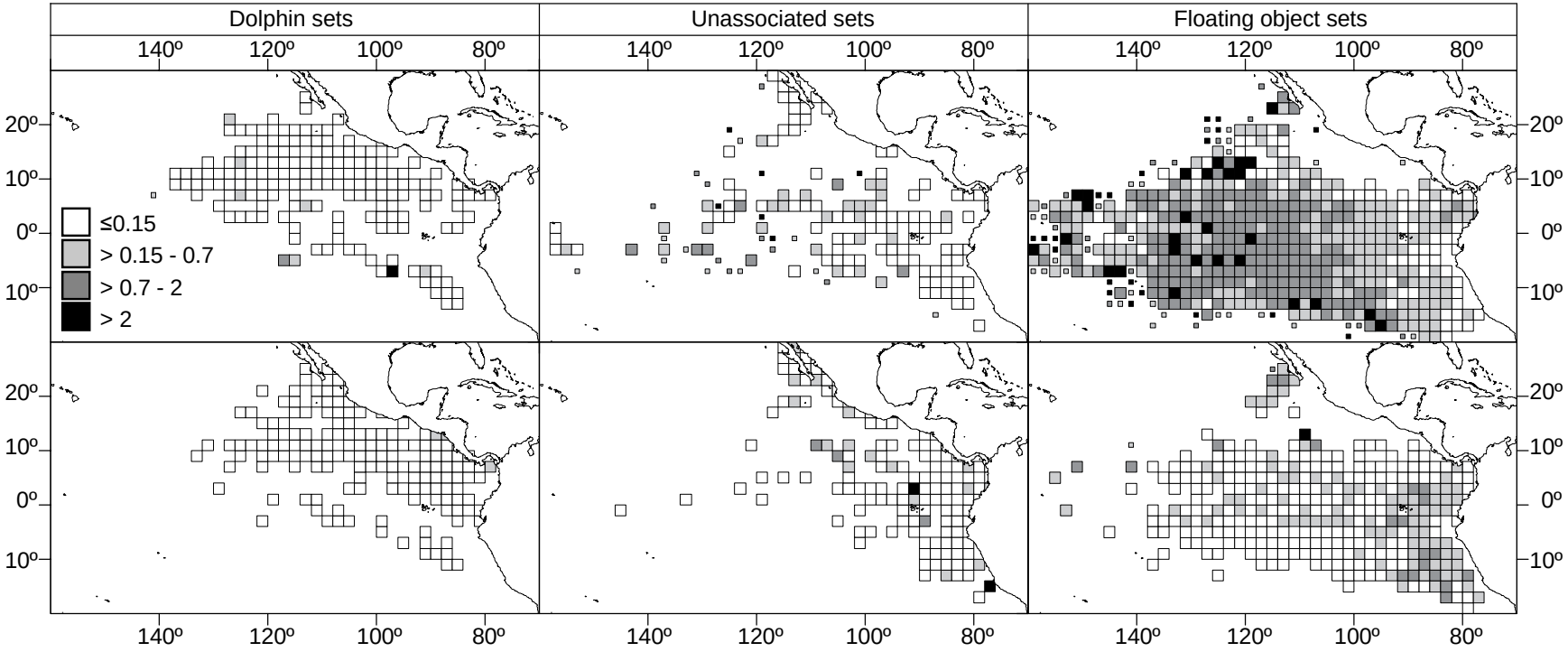


FIGURE 5. Observed bycatch per set of oceanic whitetip sharks (top row) and hammerhead sharks (bottom row), pooled across years for 1993-2004. Data are for bycatch recorded in numbers of animals only. Small squares indicate five or fewer sets per 2º area; large squares indicate more than five sets.

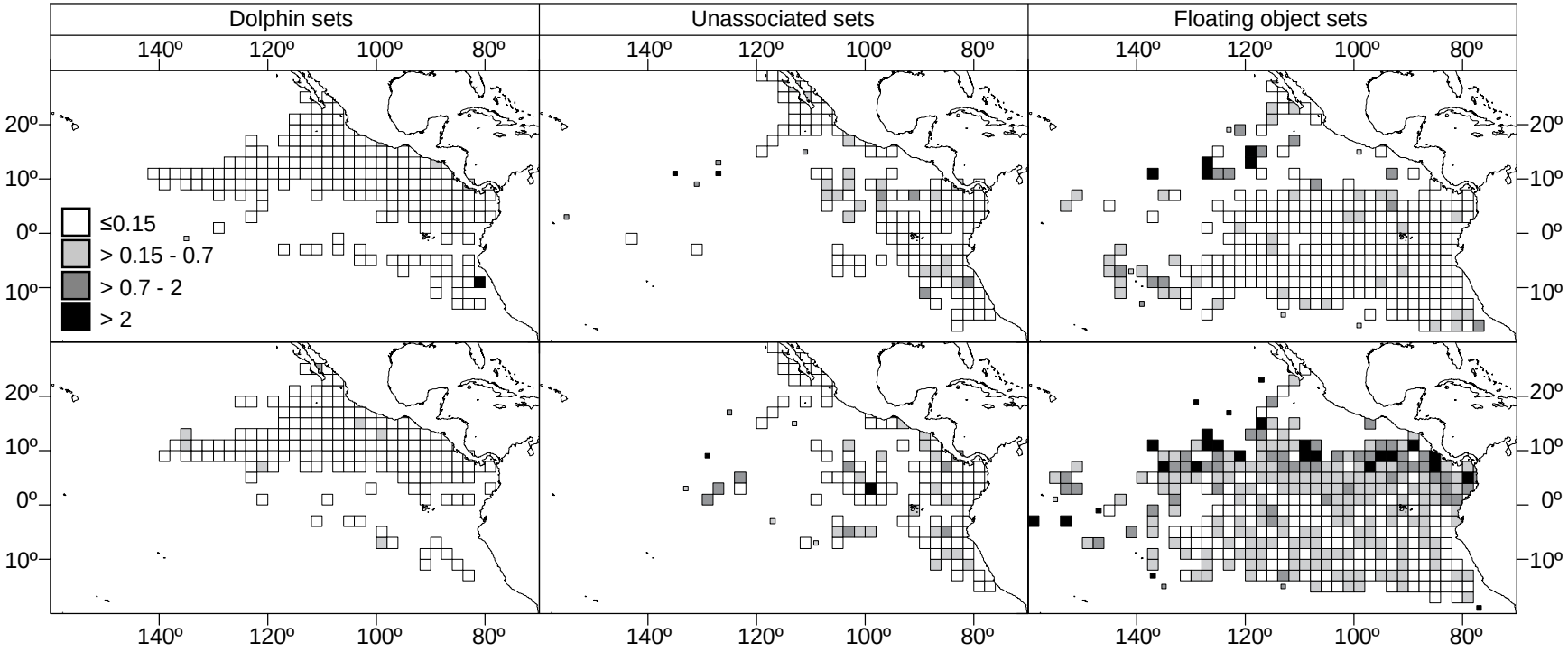


FIGURE 6. Observed bycatch per set of "other sharks" (top row) and unidentified sharks (bottom row), pooled across years for 1993-2004. Data are for bycatch recorded in numbers of animals only. Small squares indicate five or fewer sets per 2º area; large squares indicate more than five sets.

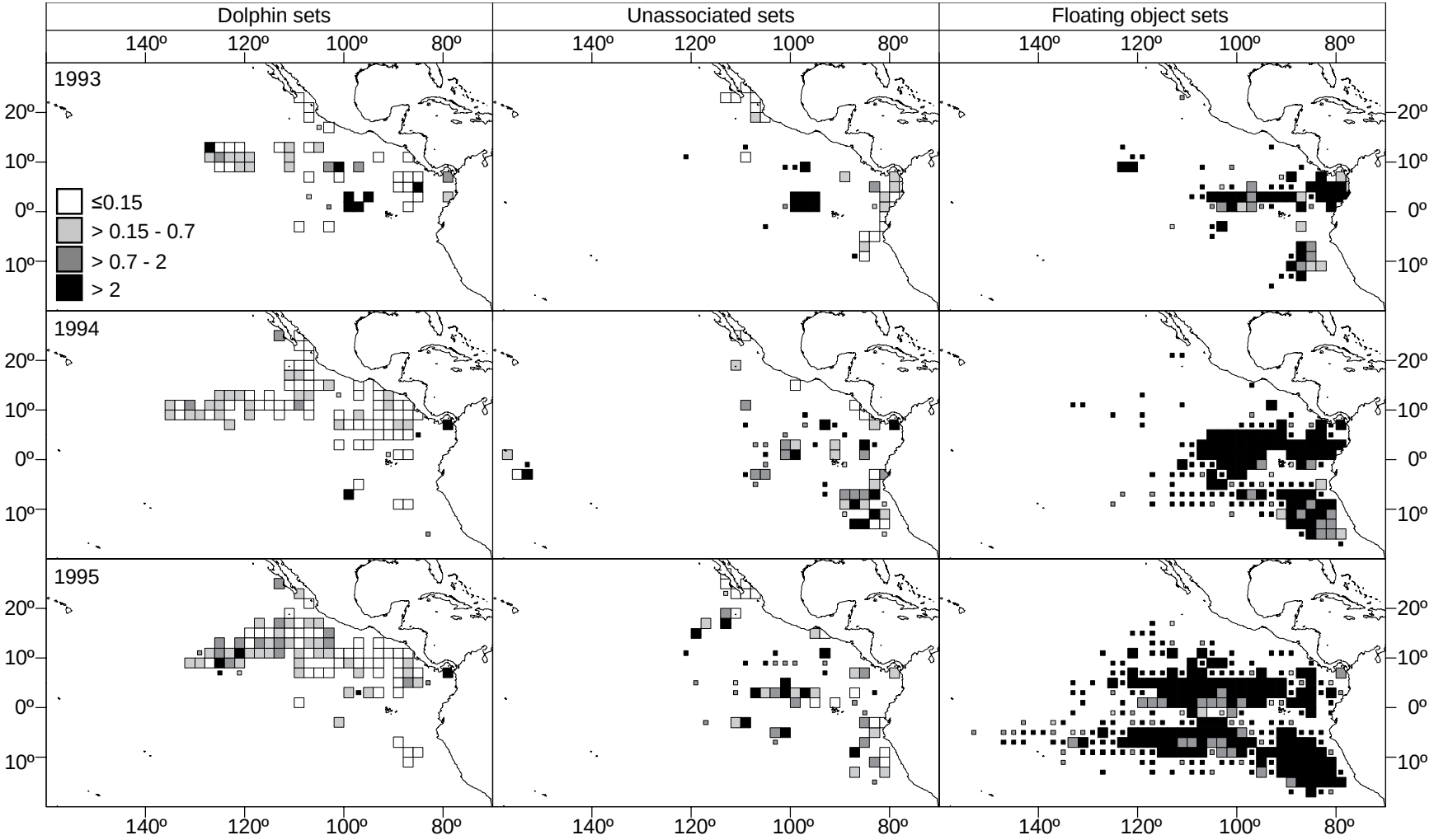


FIGURE 7. Observed bycatch per set of silky sharks in the offshore area by year for 1993-2004. Data are for bycatch recorded in numbers of animals only. Small squares indicate five or fewer sets per 2º area; large squares indicate more than five sets.

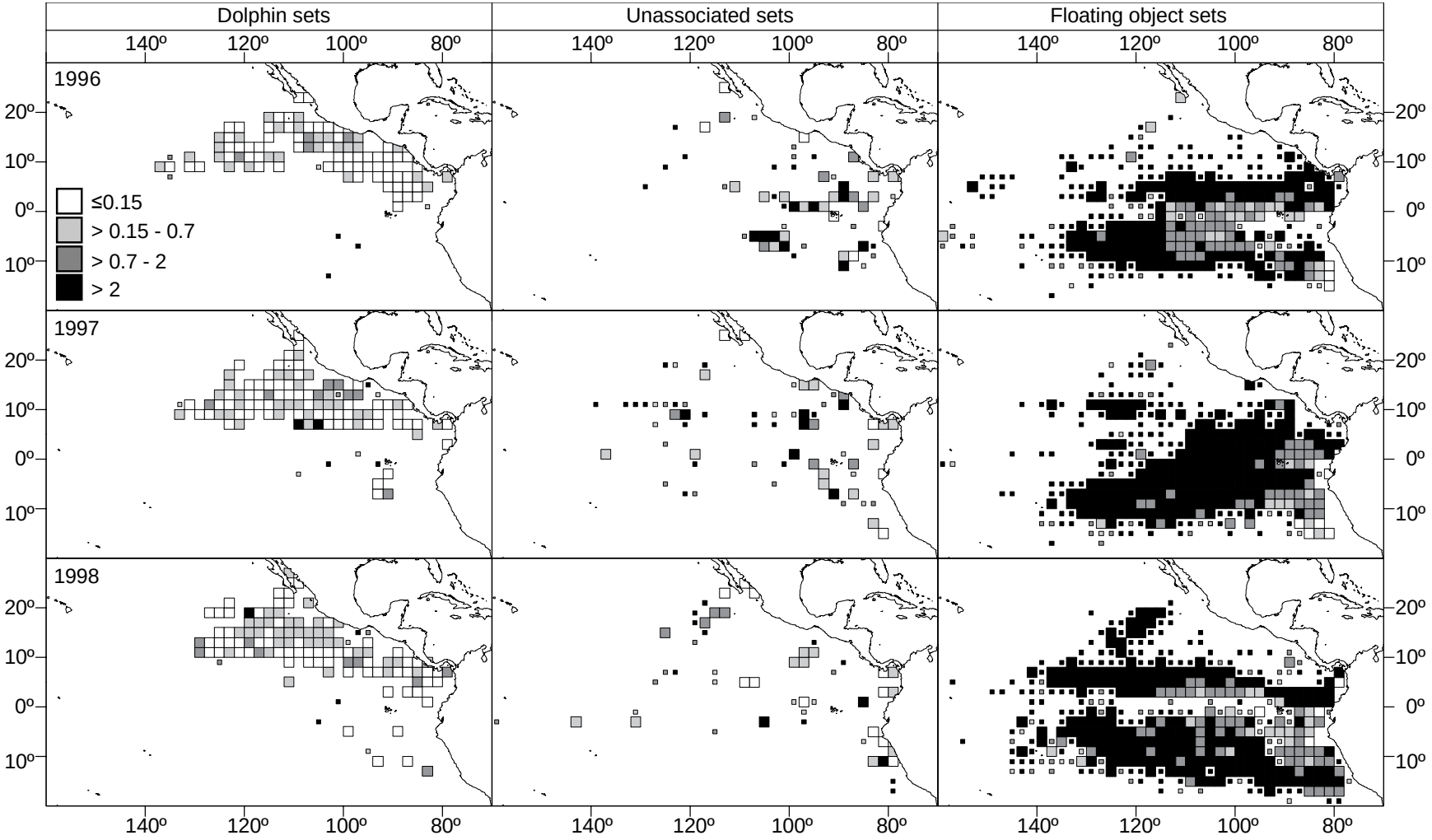


FIGURE 7. (continued)

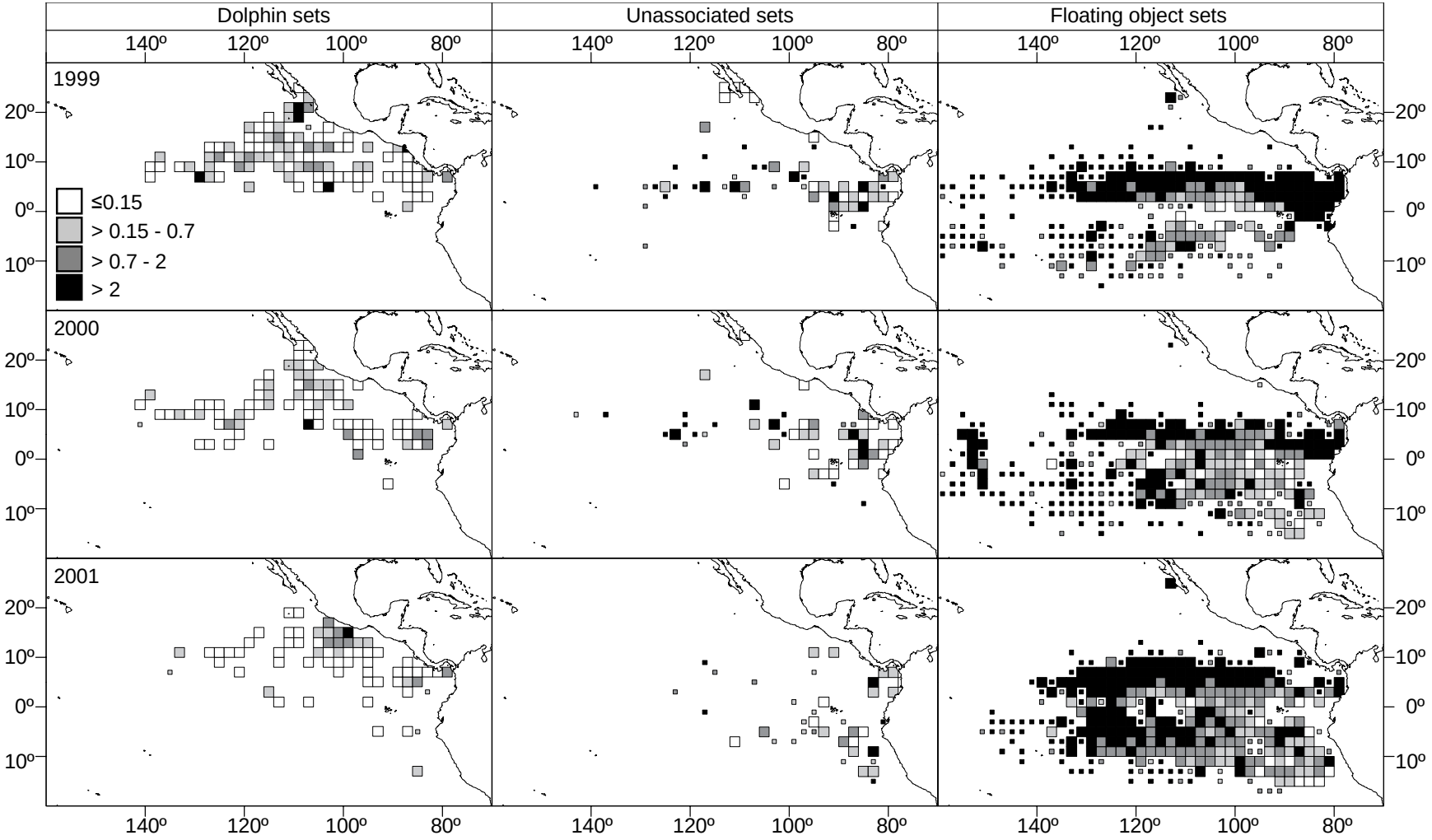


FIGURE 7. (continued)

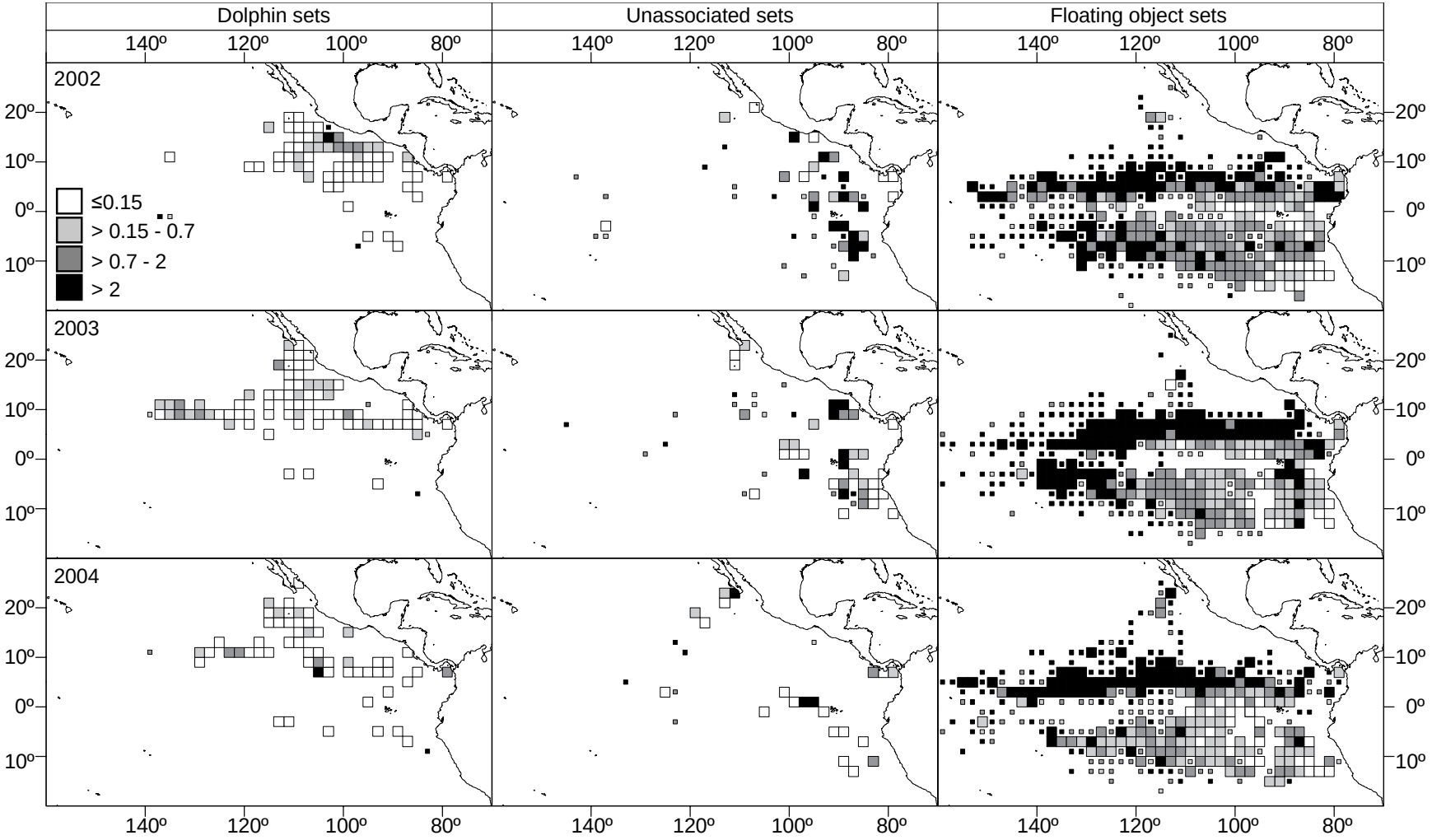


FIGURE 7. (continued)

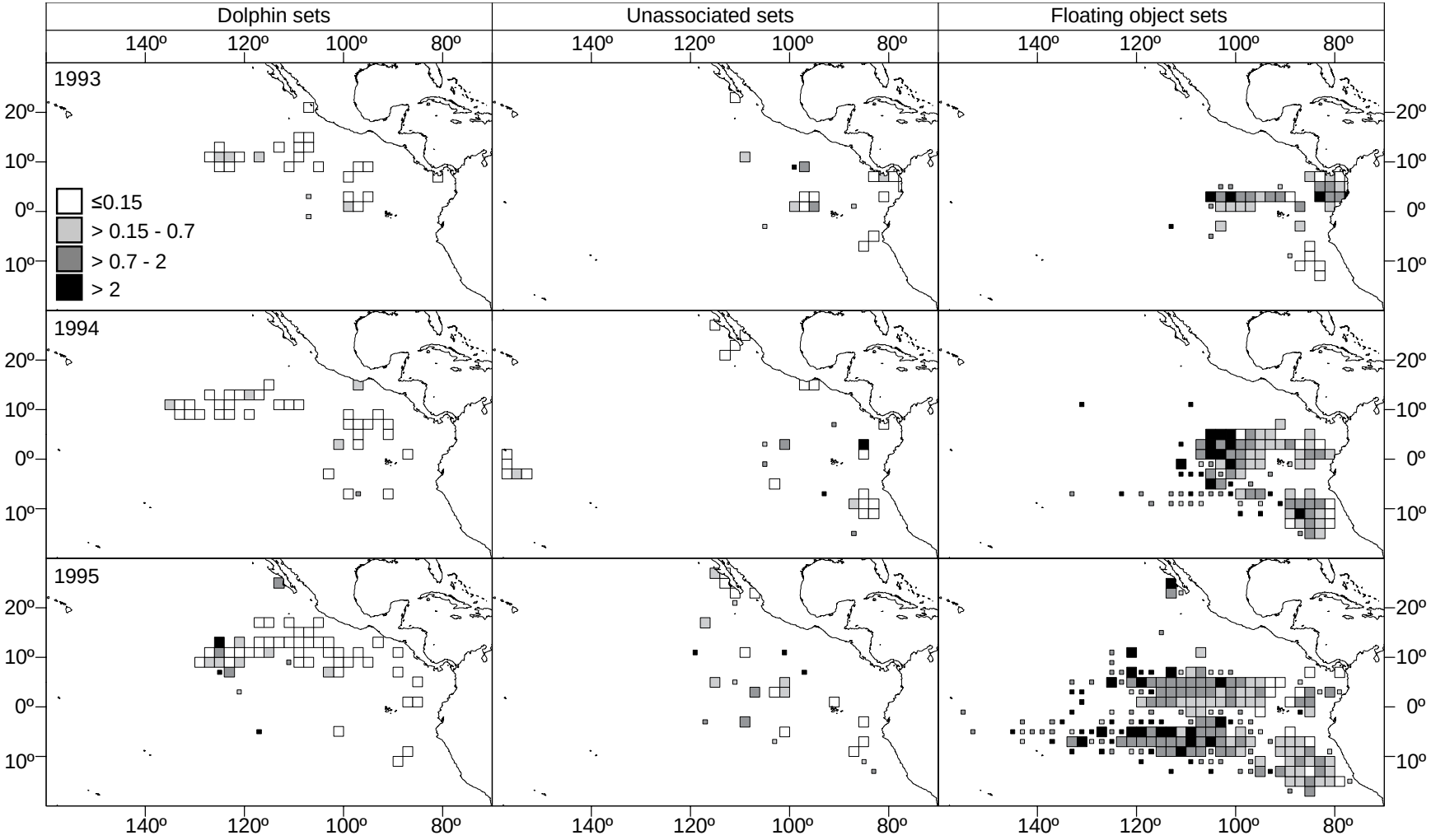
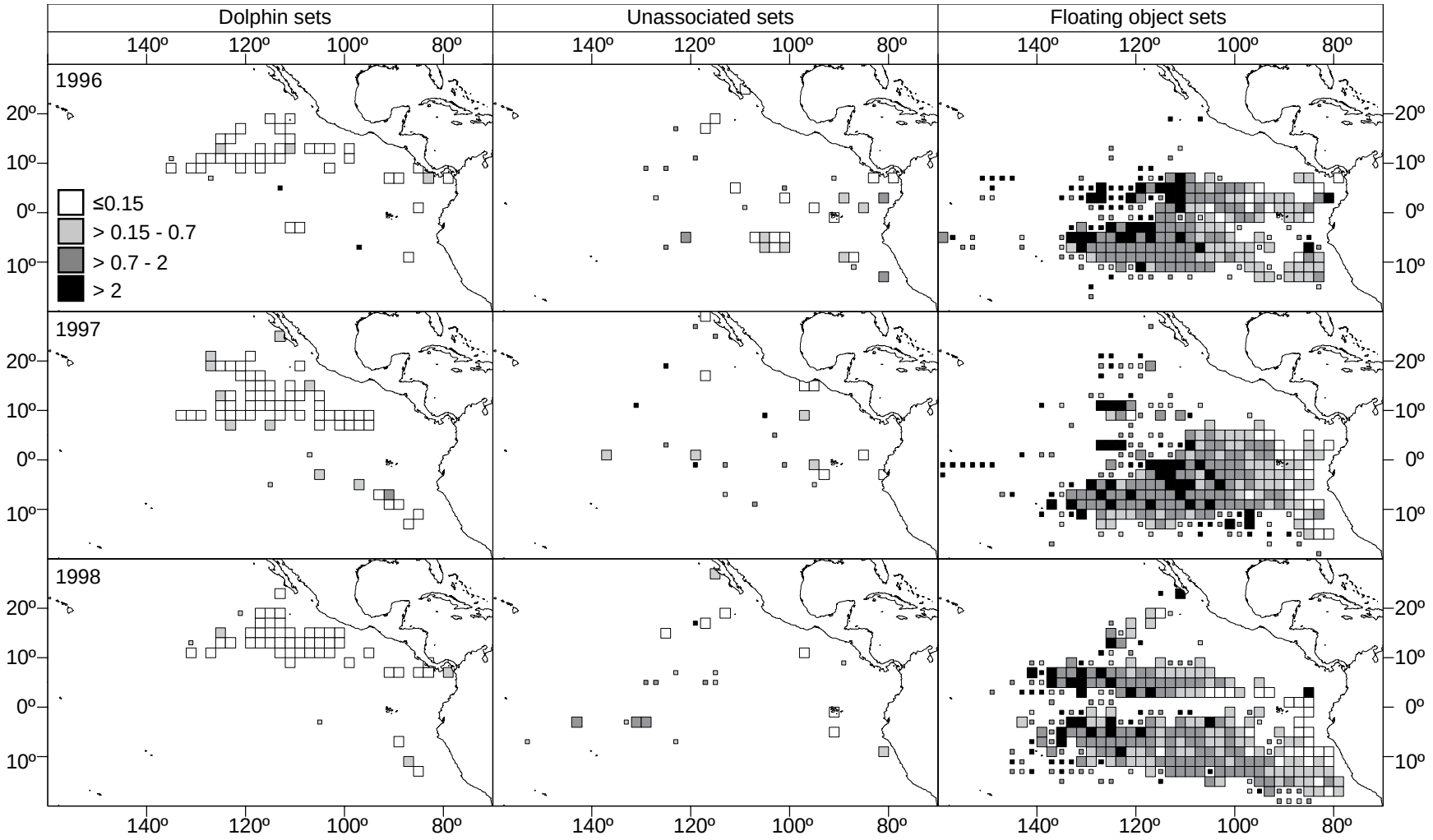


FIGURE 8. Observed bycatch per set of oceanic whitetip sharks by year for 1993-2004. Data are for bycatch recorded in numbers of animals only. Small squares indicate five or fewer sets per 2º area; large squares indicate more than five sets.



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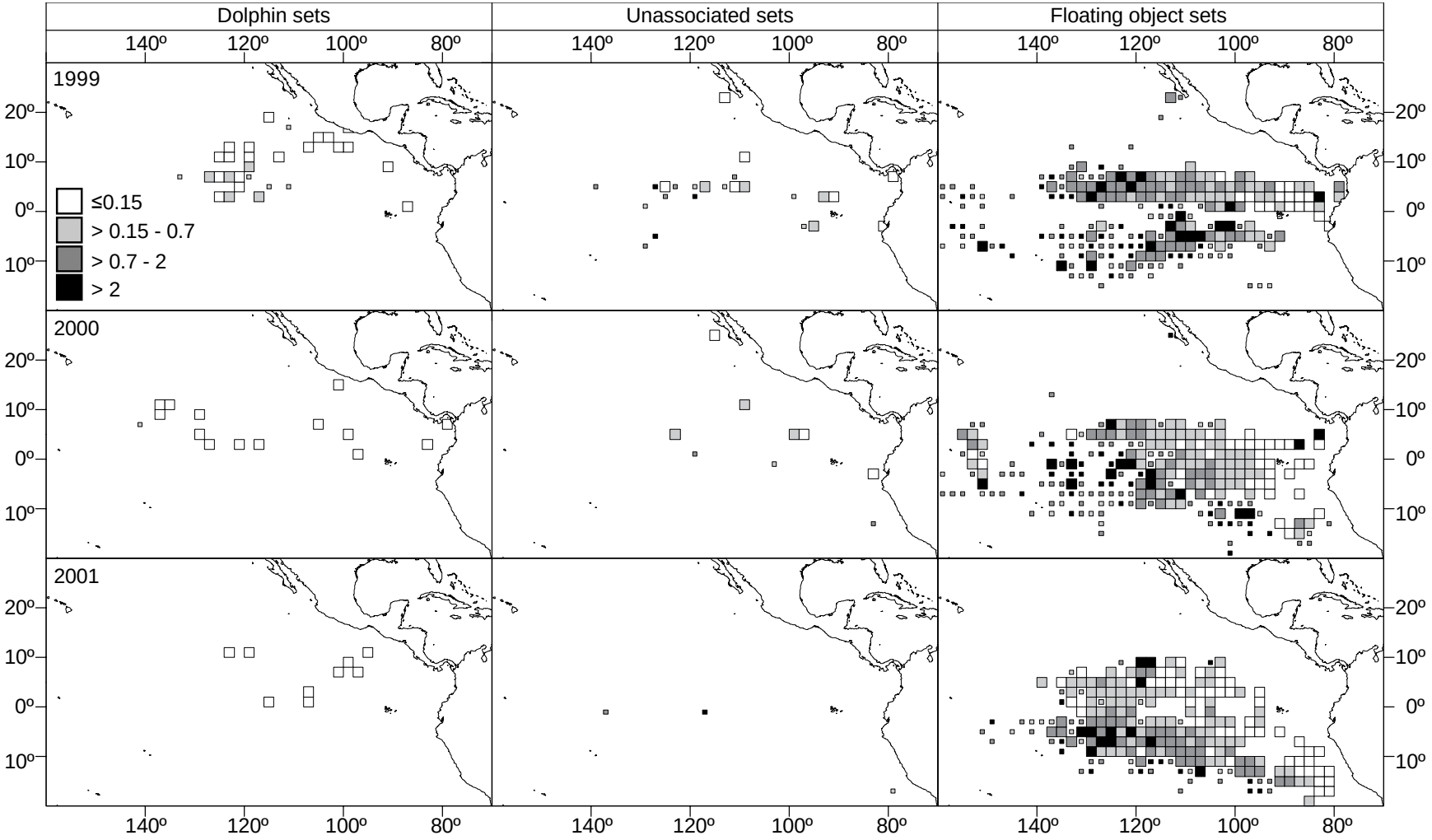

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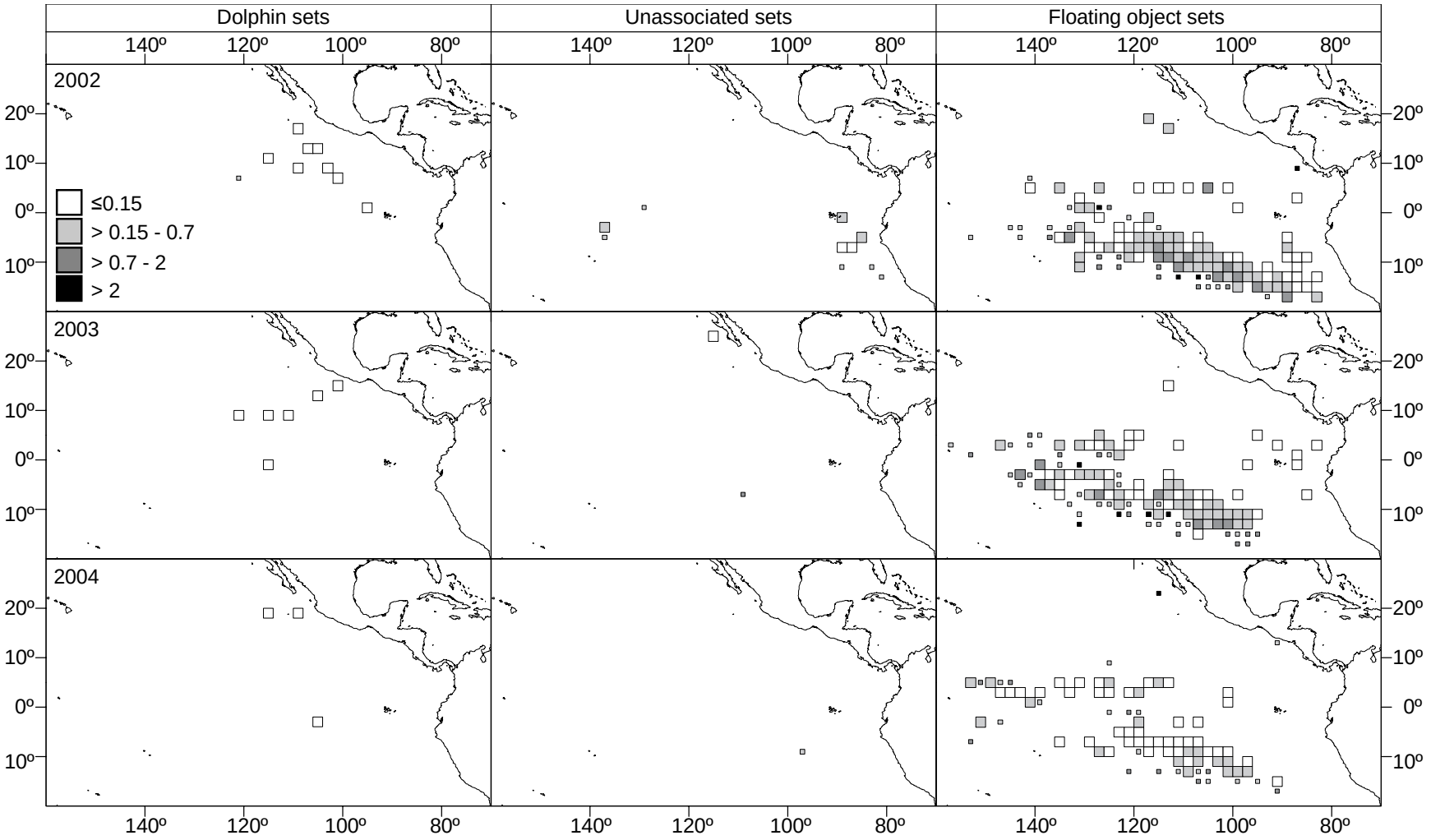

FIGURE 8. (continued)

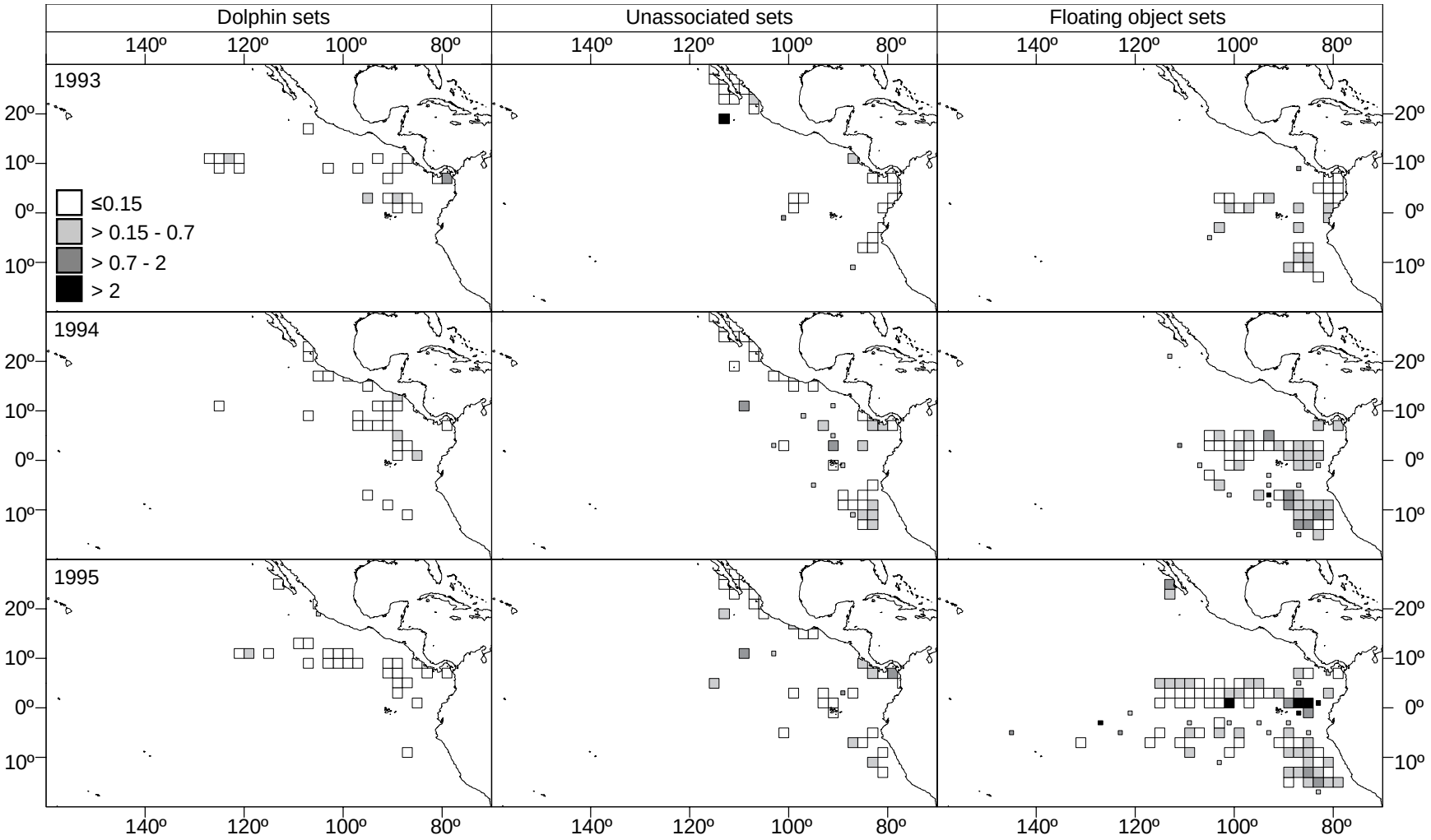

FIGURE 9. Observed bycatch per set of hammerhead sharks by year for 1993-2004. Data are for bycatch recorded in numbers of animals only. Small squares indicate five or fewer sets per 2º area; large squares indicate more than five sets.

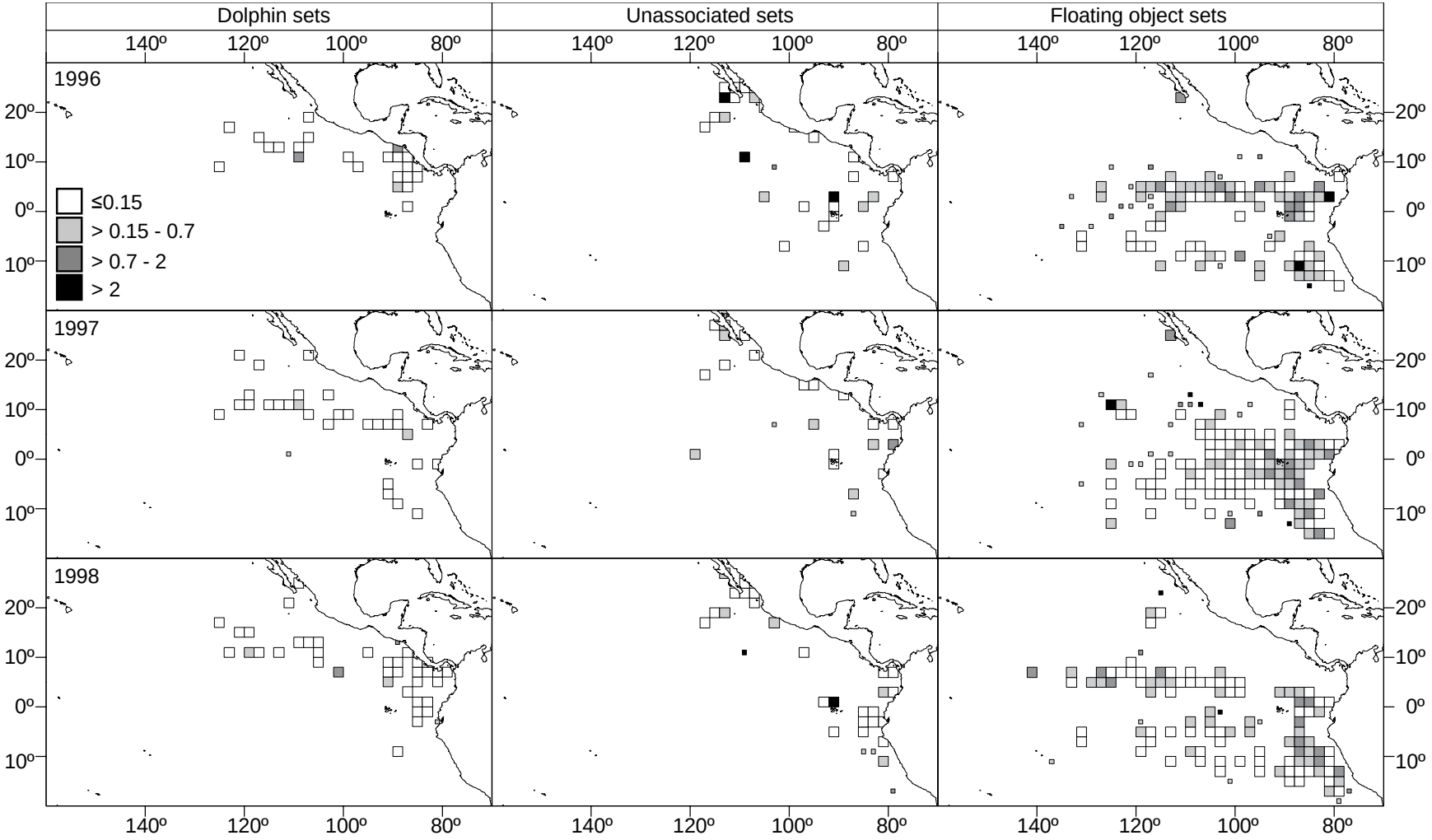

FIGURE 9. (continued)

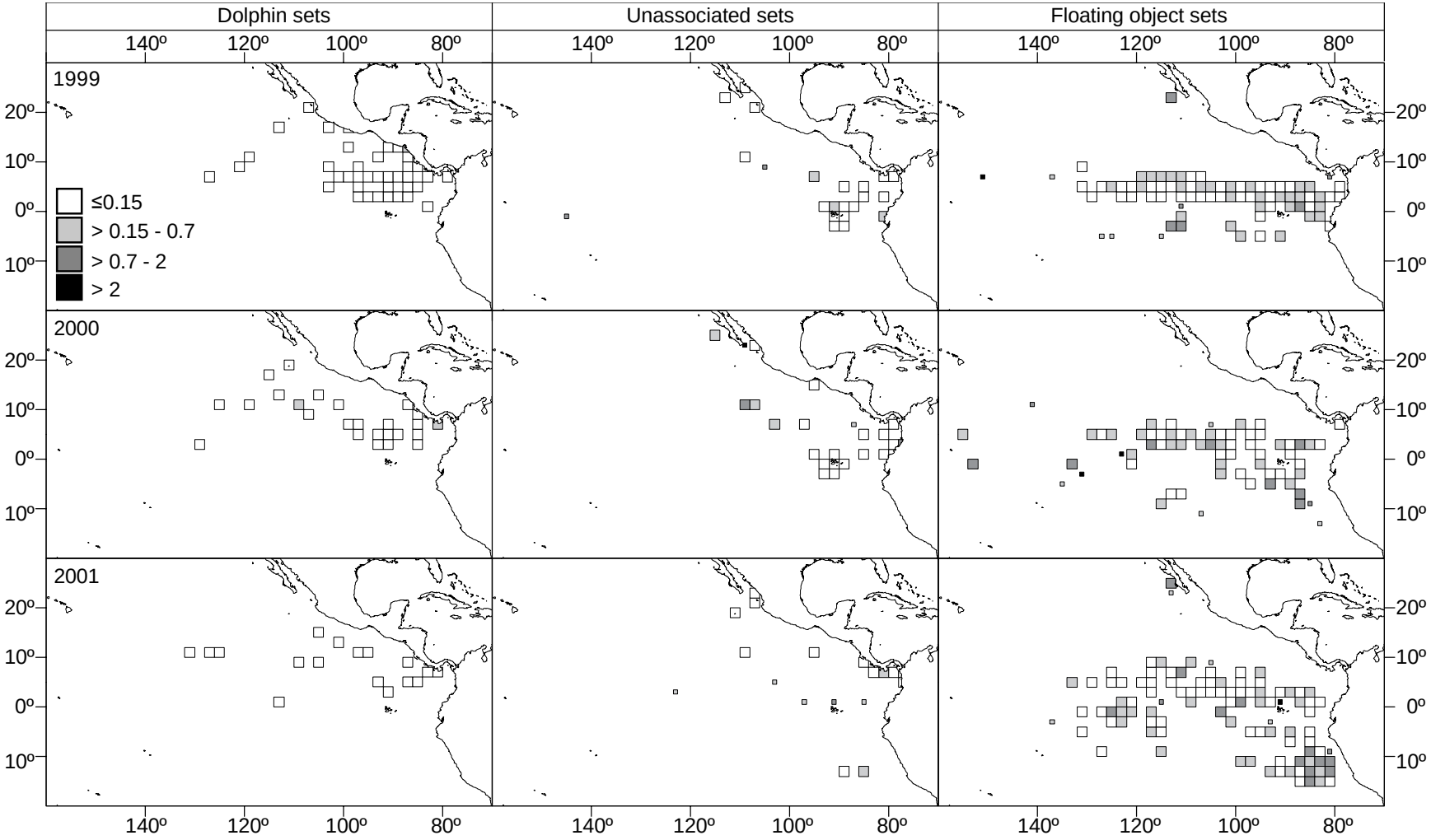

FIGURE 9. (continued)

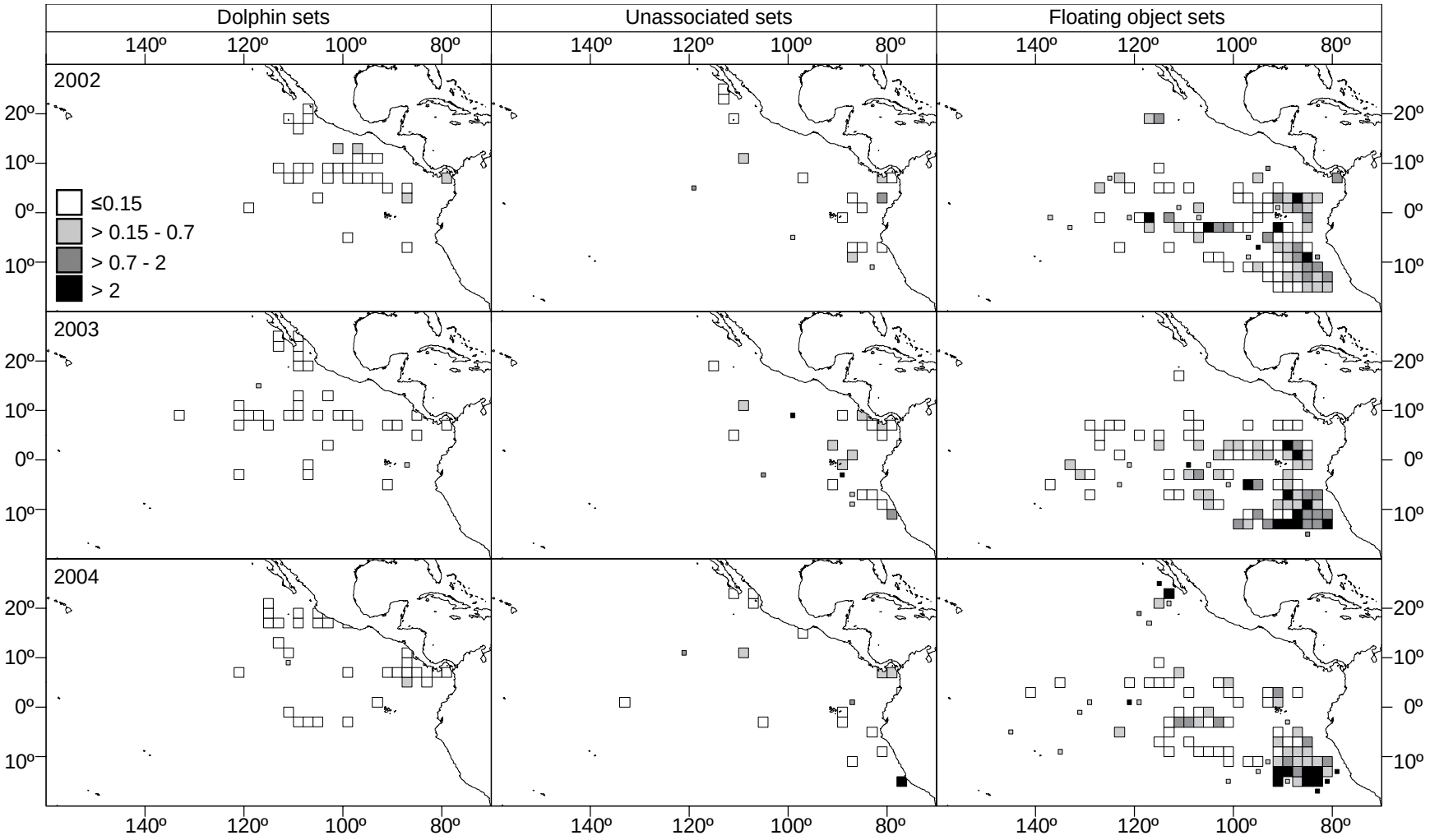

FIGURE 9. (continued)

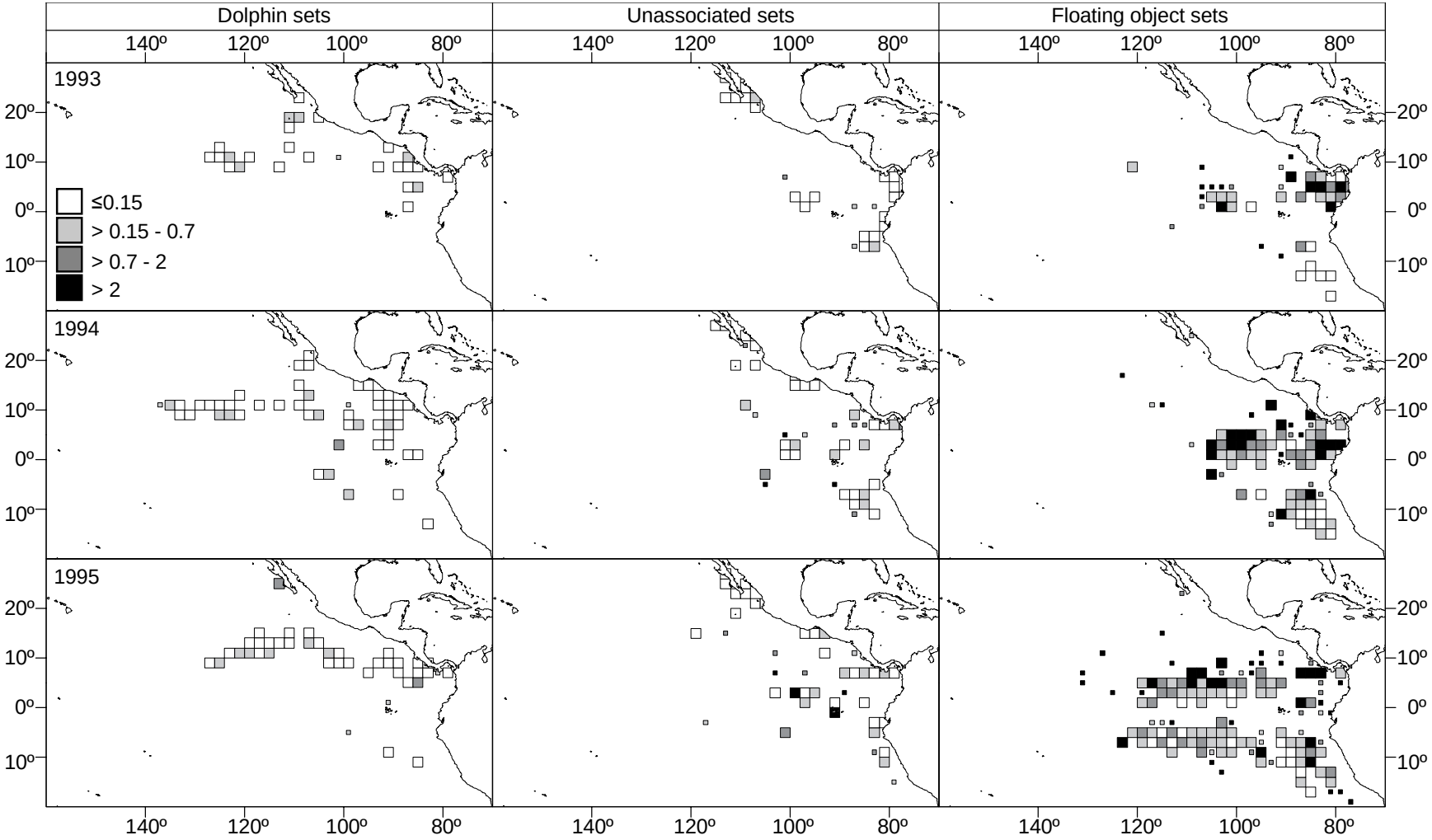

FIGURE 10. Observed bycatch per set of unidentified sharks by year for 1993-2004. Data are for bycatch recorded in numbers of animals only. Small squares indicate five or fewer sets per 2º area; large squares indicate more than five sets.

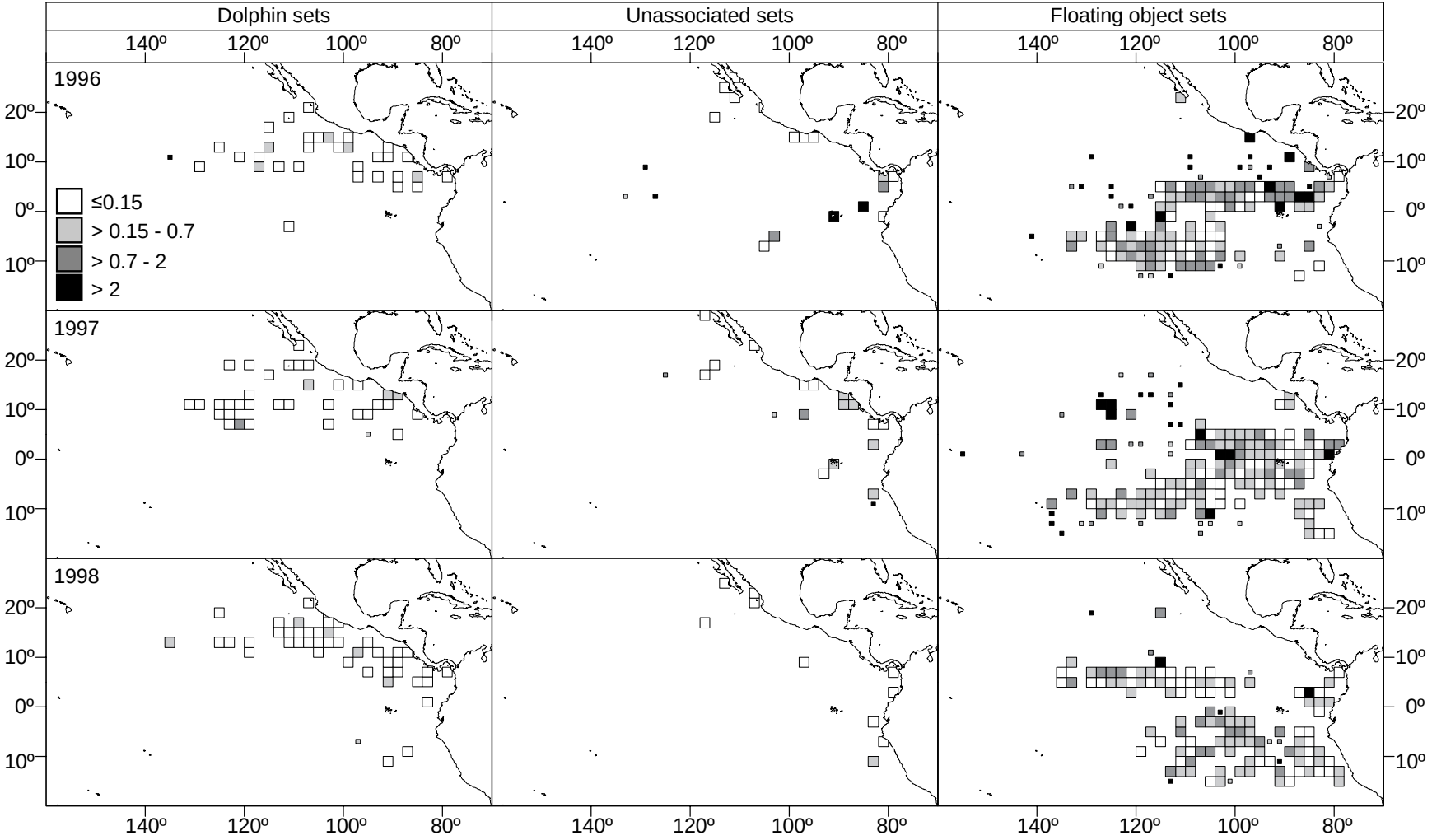

FIGURE 10. (continued)

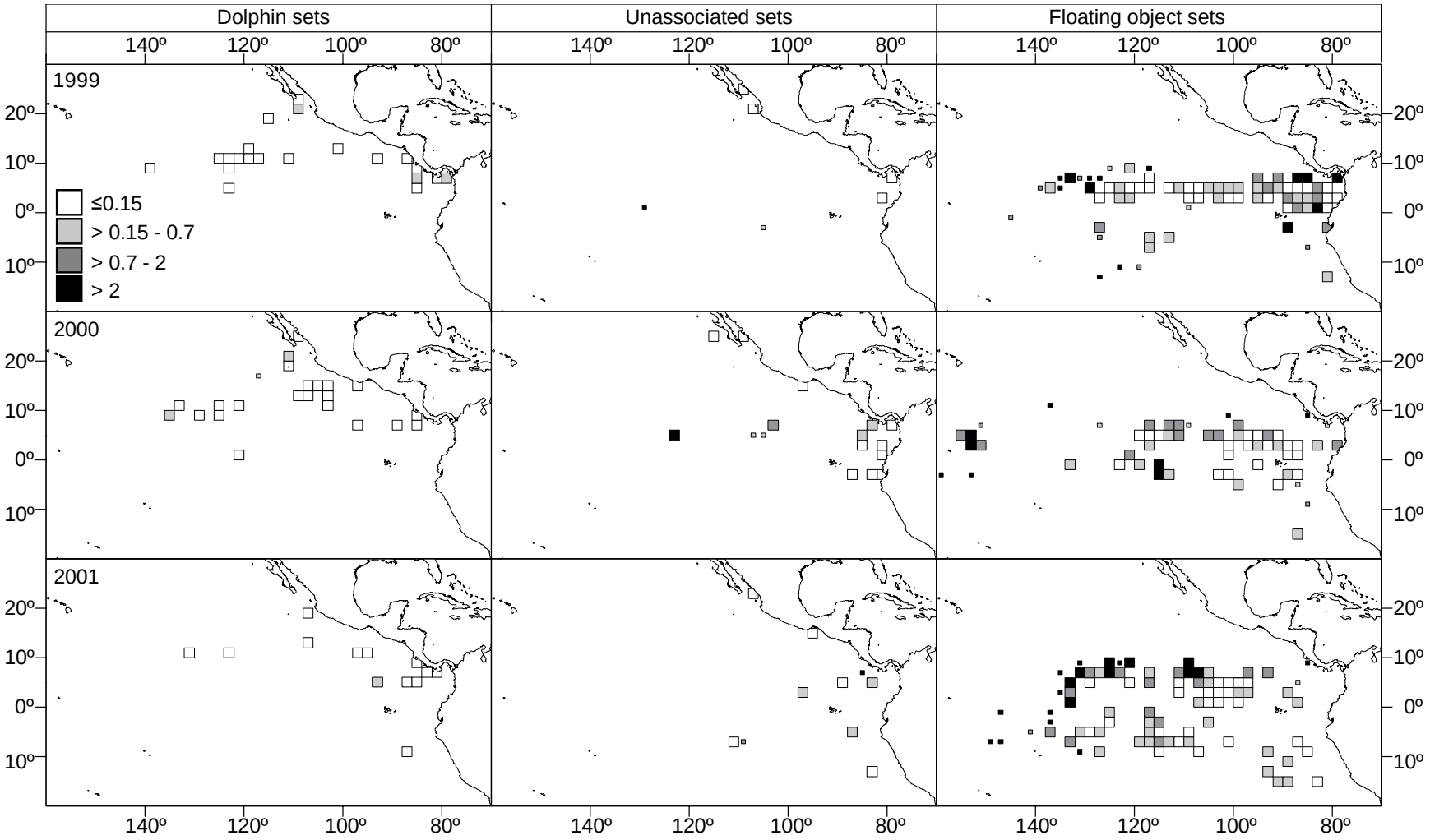

FIGURE 10. (continued)

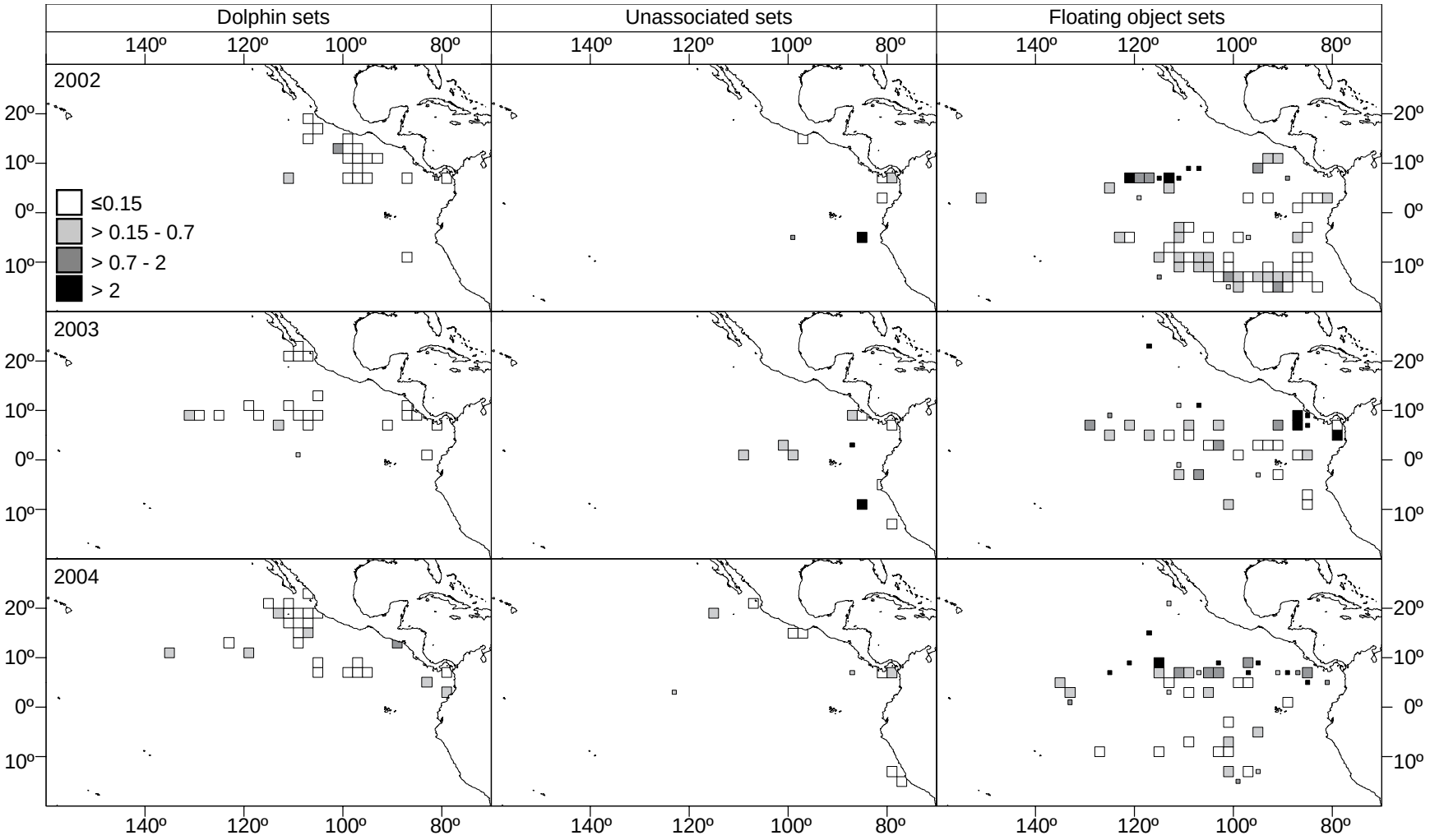

FIGURE 10. (continued)

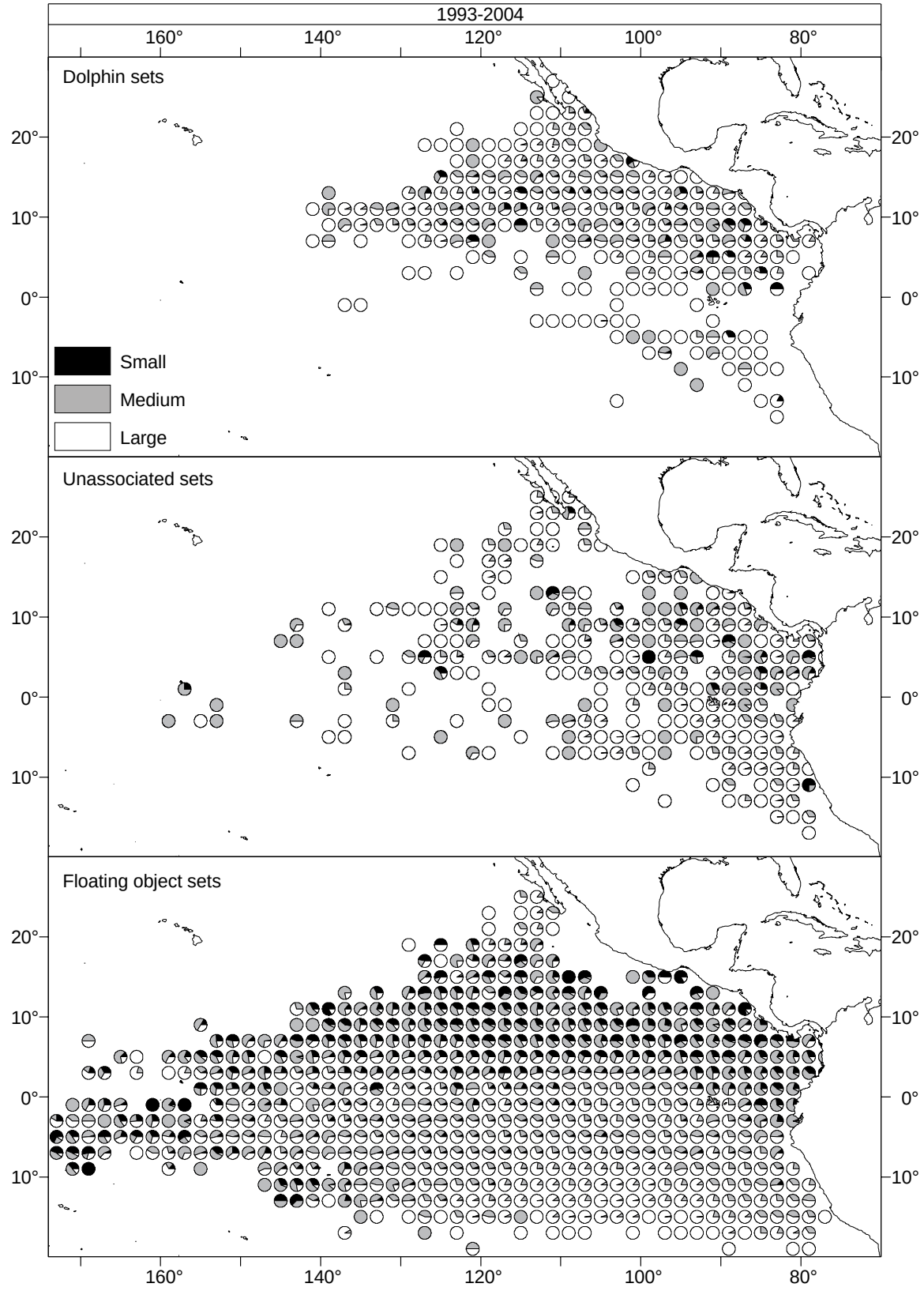

FIGURE 11. Percentage of size categories of silky sharks in the offshore area, pooled across years for 1993-2004. Data are for bycatch recorded in numbers of animals only.

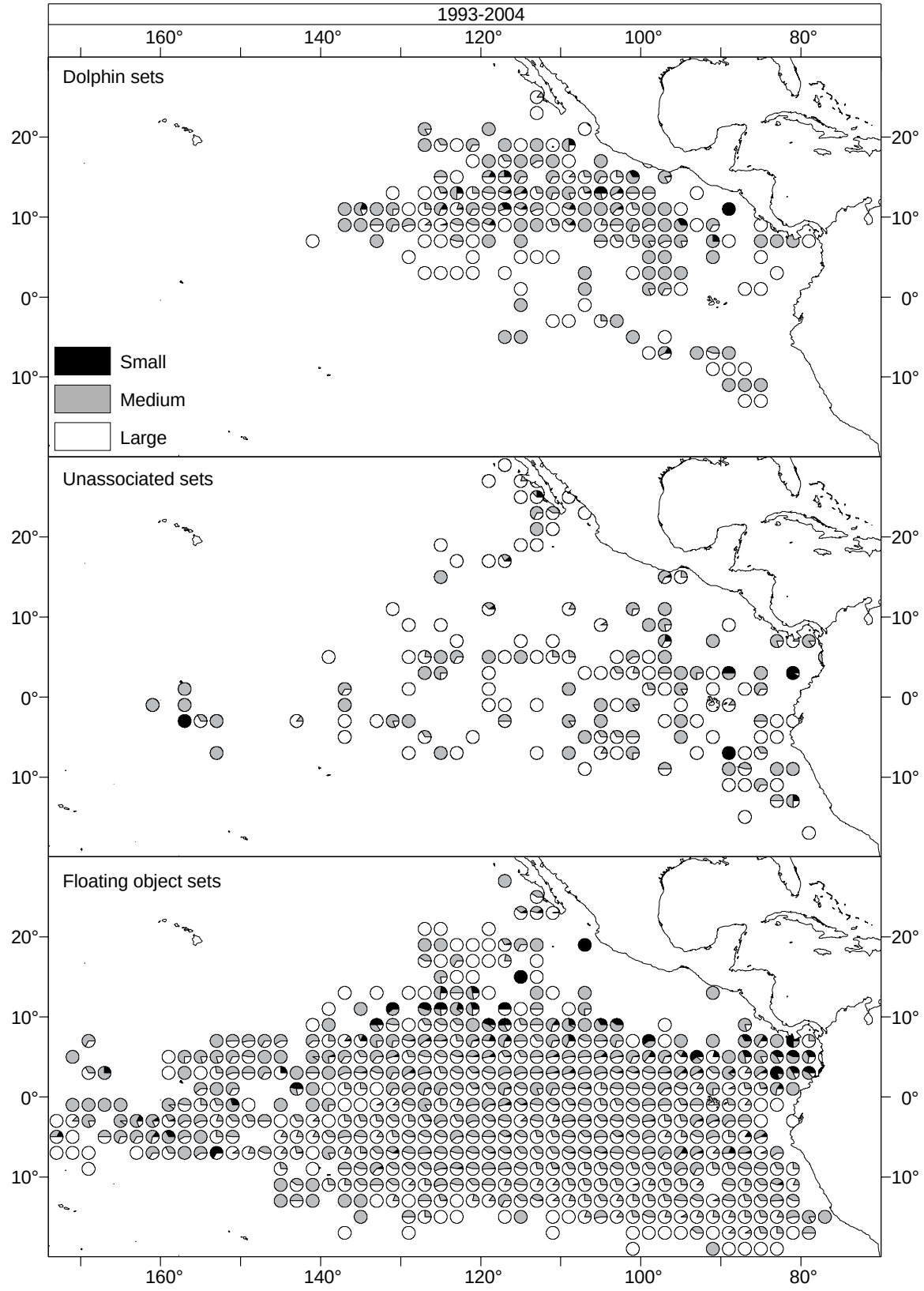

FIGURE 12. Percentage of size categories of oceanic whitetip sharks pooled across years for 1993-2004. Data are for bycatch recorded in numbers of animals only.

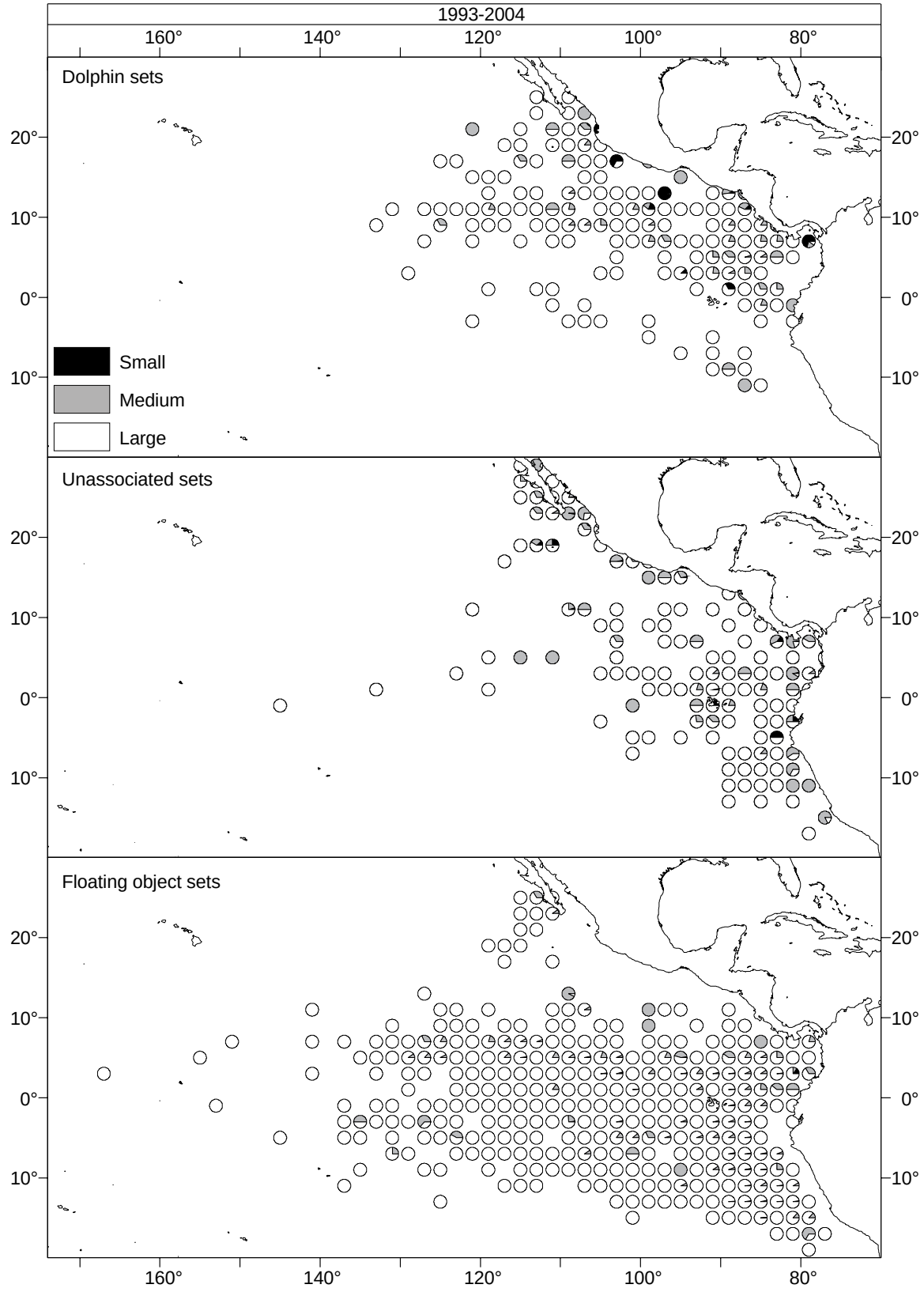

FIGURE 13. Percentage of size categories of hammerhead sharks pooled across years for 1993-2004. Data are for bycatch recorded in numbers of animals only.

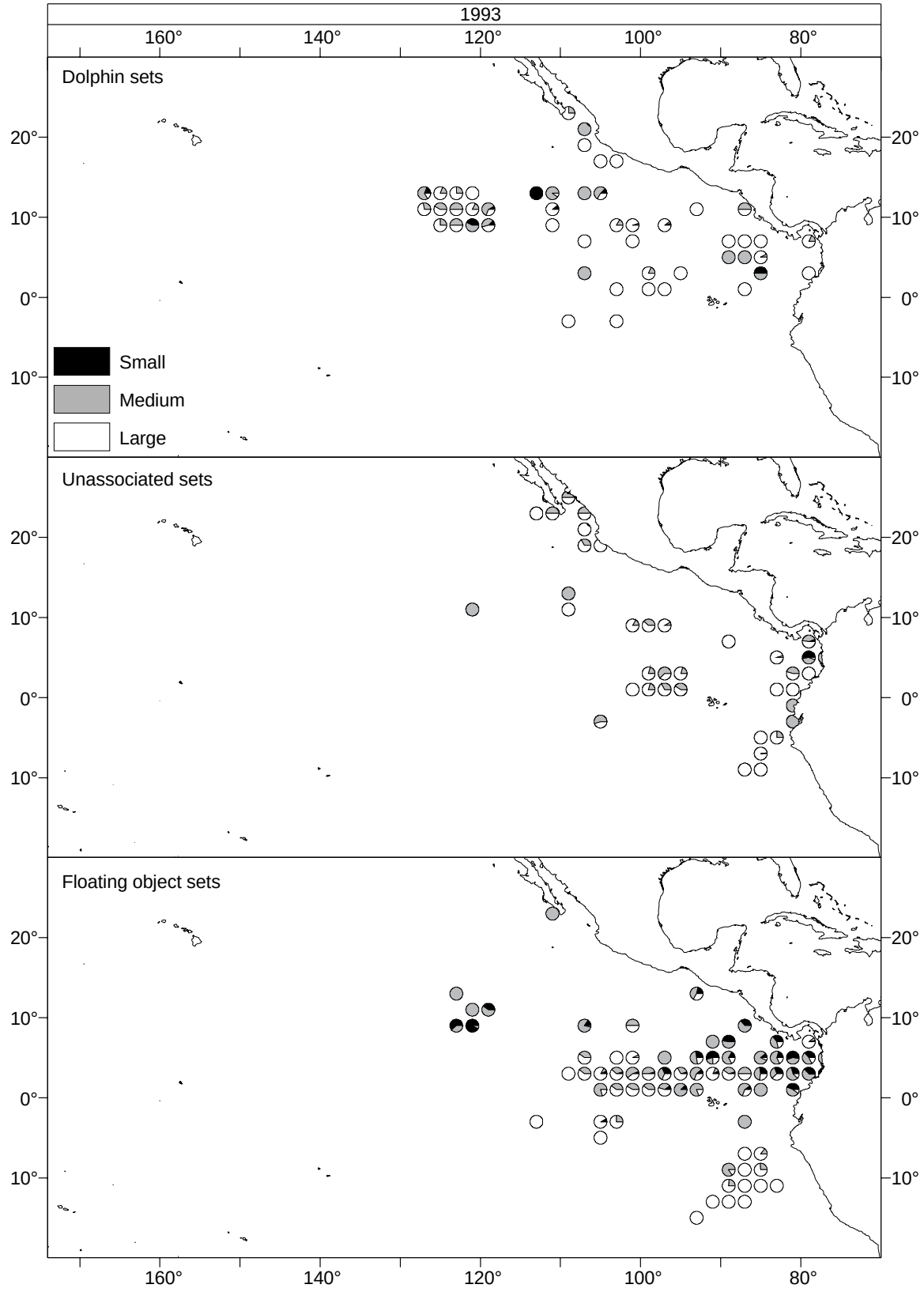

FIGURE 14. Percentage of size categories of silky sharks in the offshore area, by year for 1993-2004. Data are for bycatch recorded in numbers of animals only.

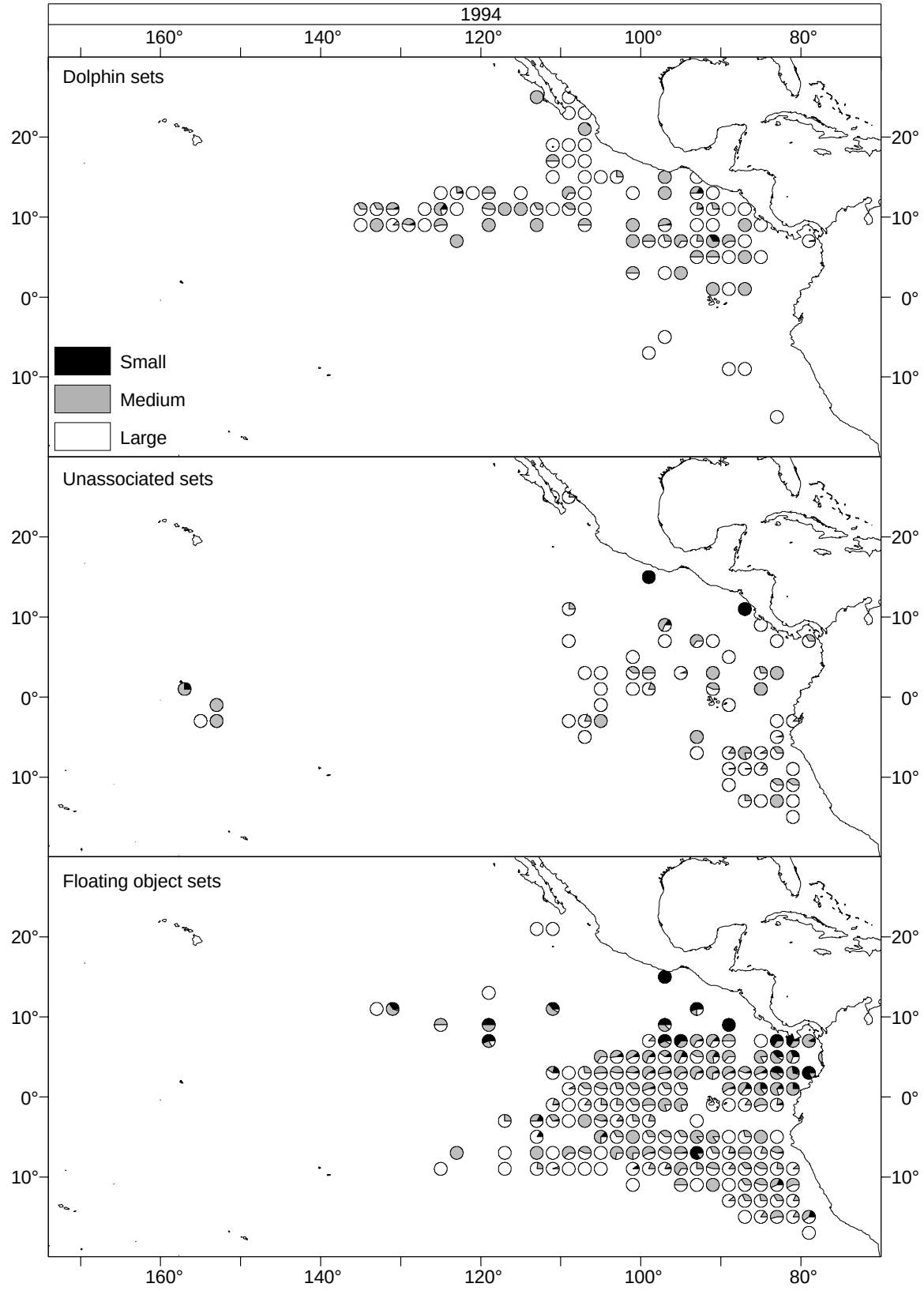

FIGURE 14. (continued)

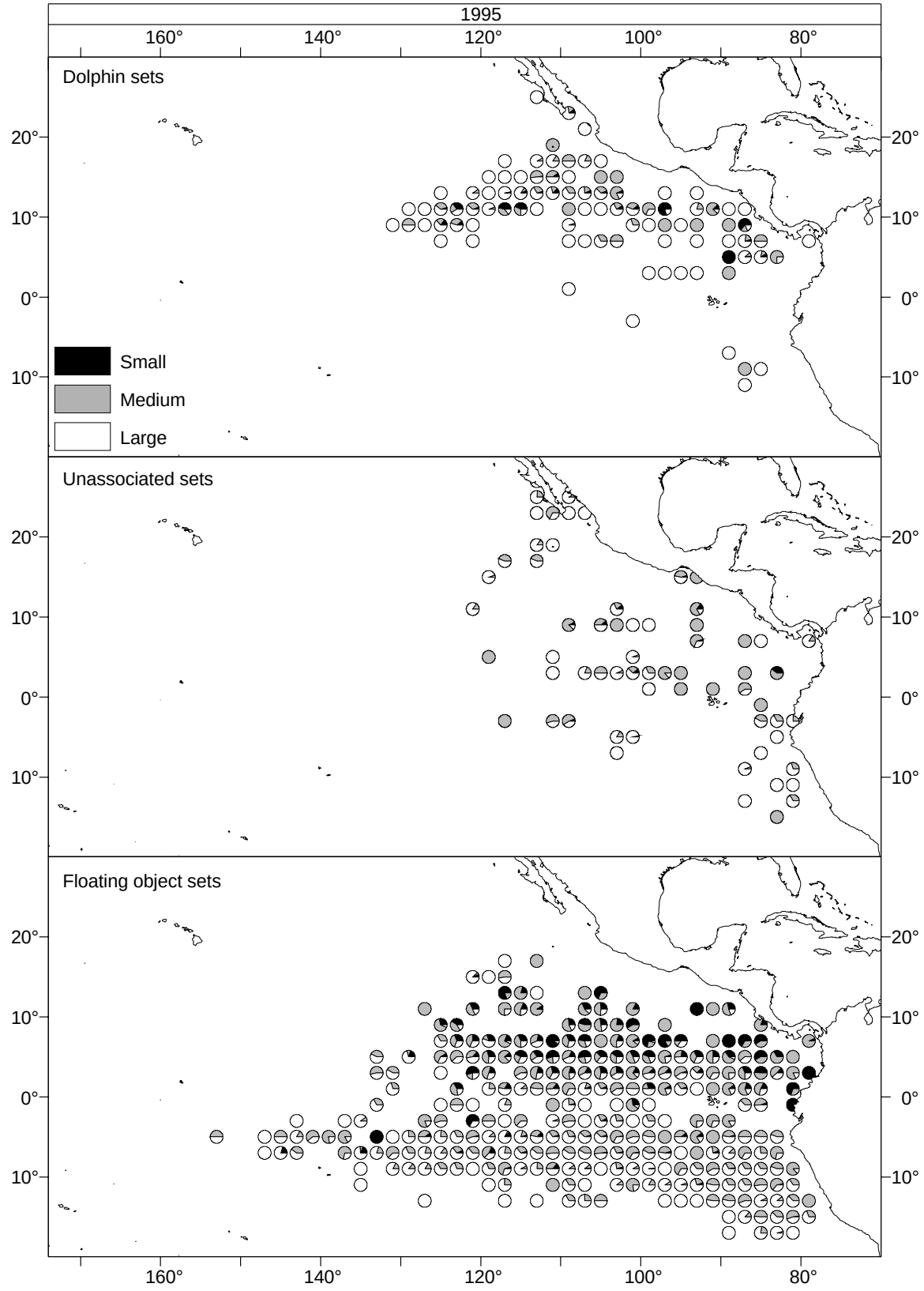

FIGURE 14. (continued)

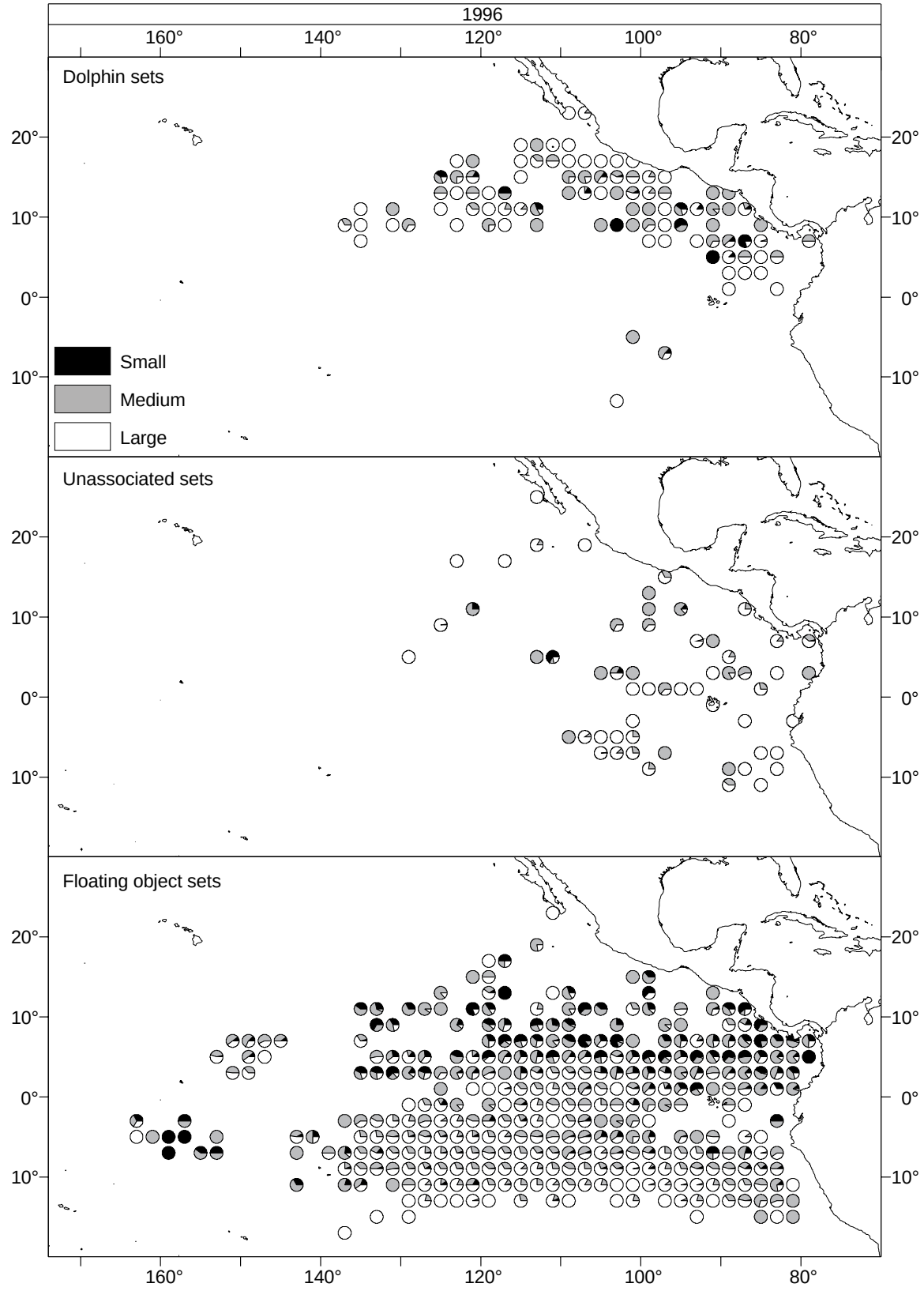

FIGURE 14. (continued)

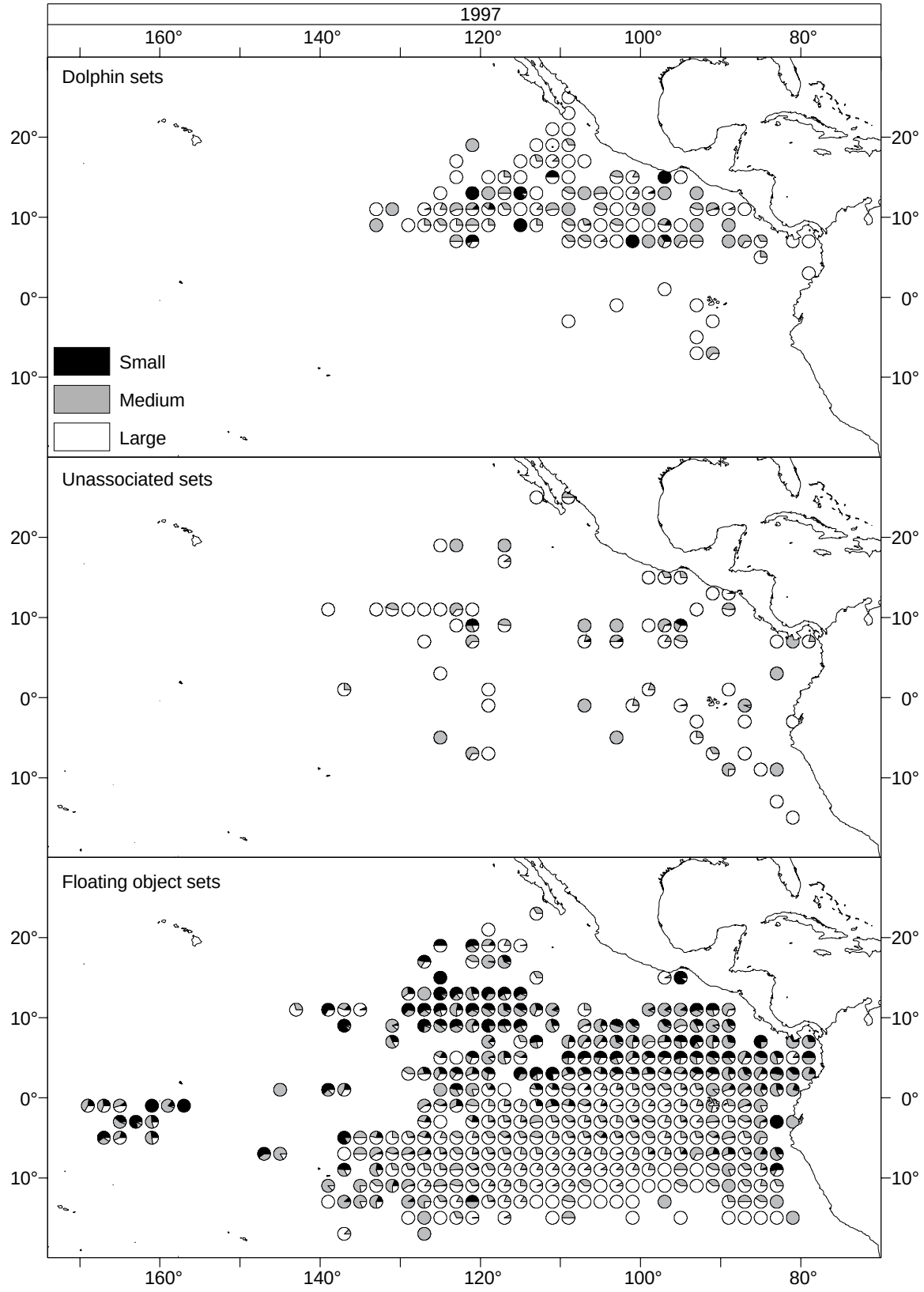

FIGURE 14. (continued)

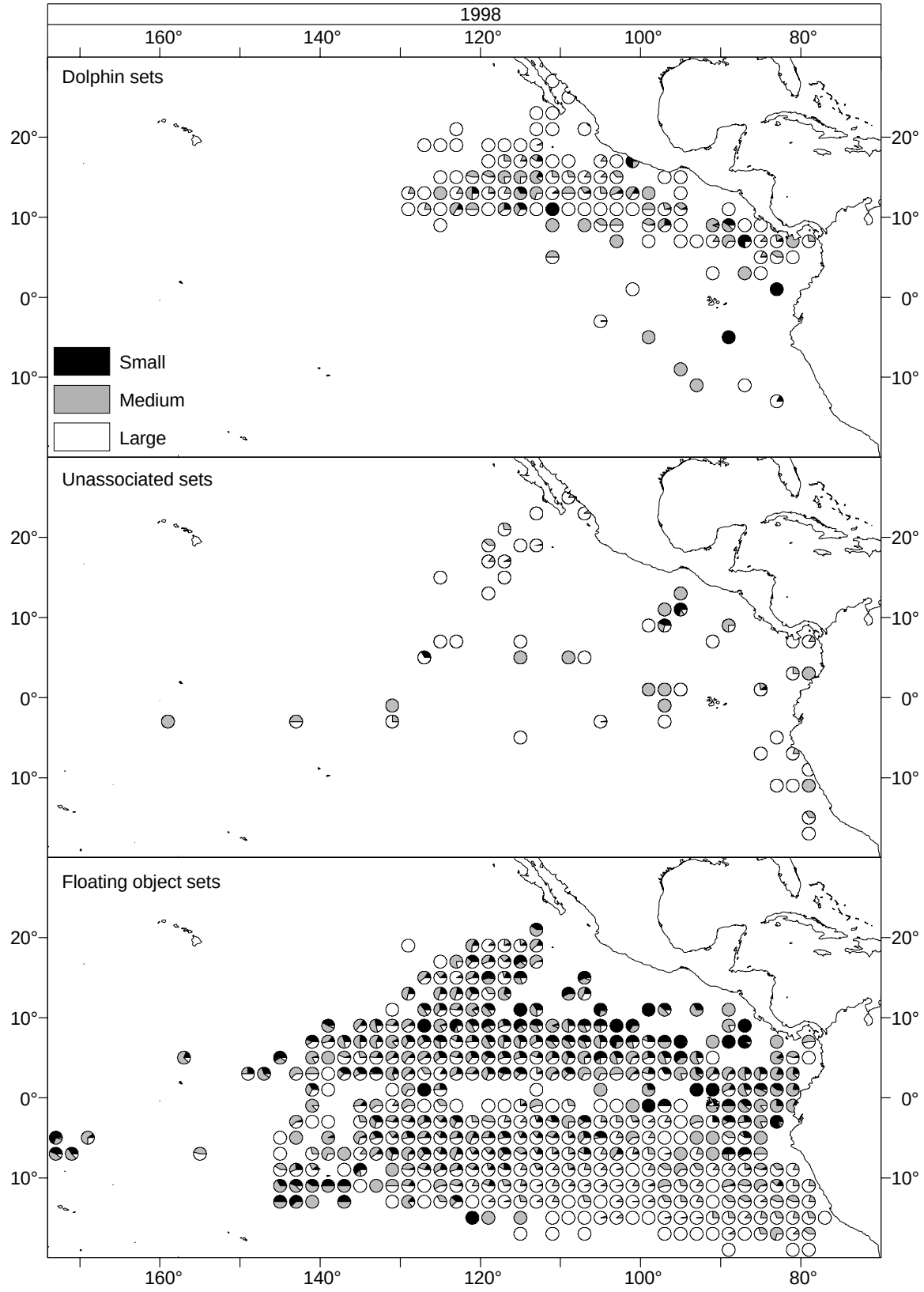

FIGURE 14. (continued)

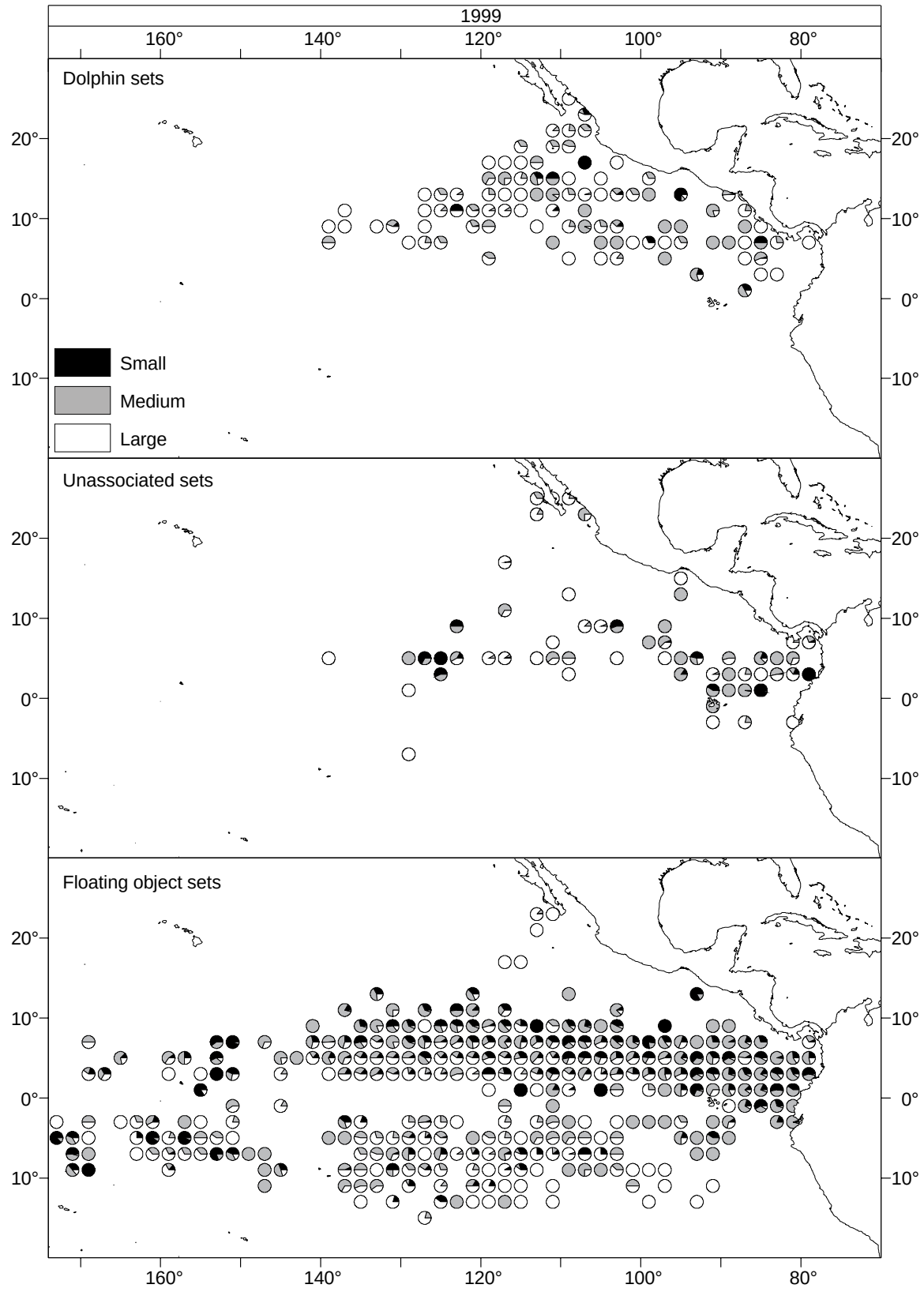

FIGURE 14. (continued)

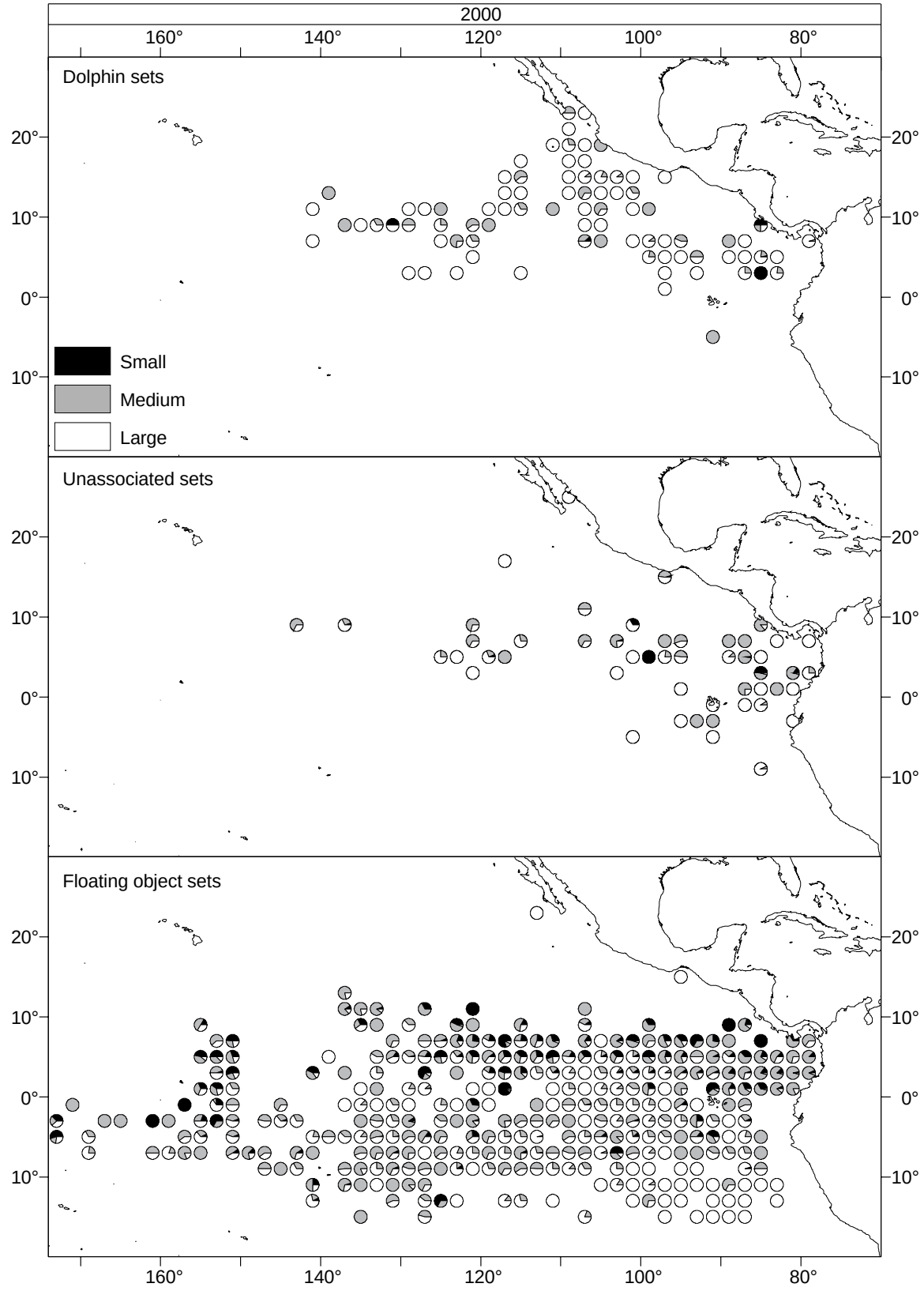

FIGURE 14. (continued)

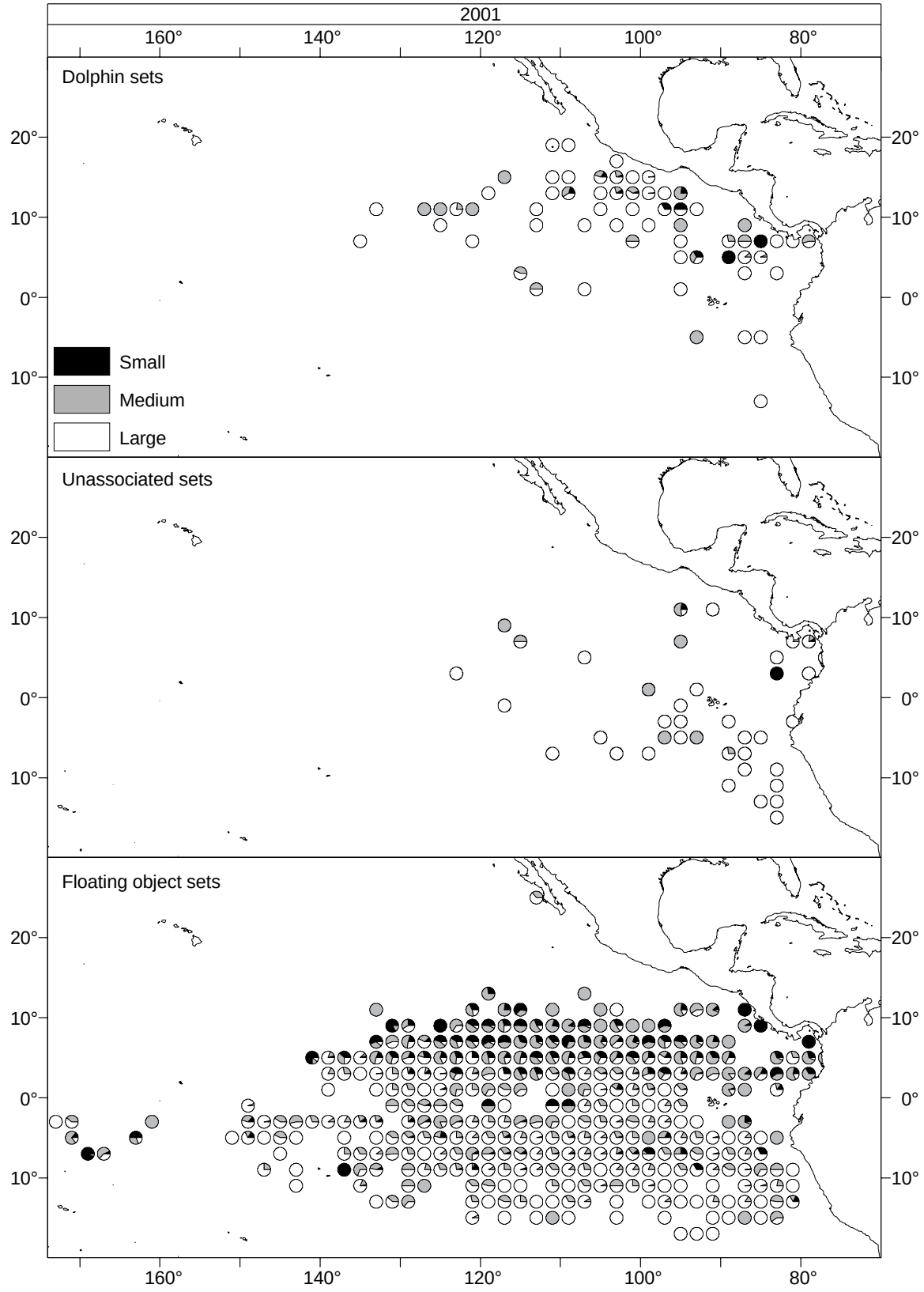

FIGURE 14. (continued)

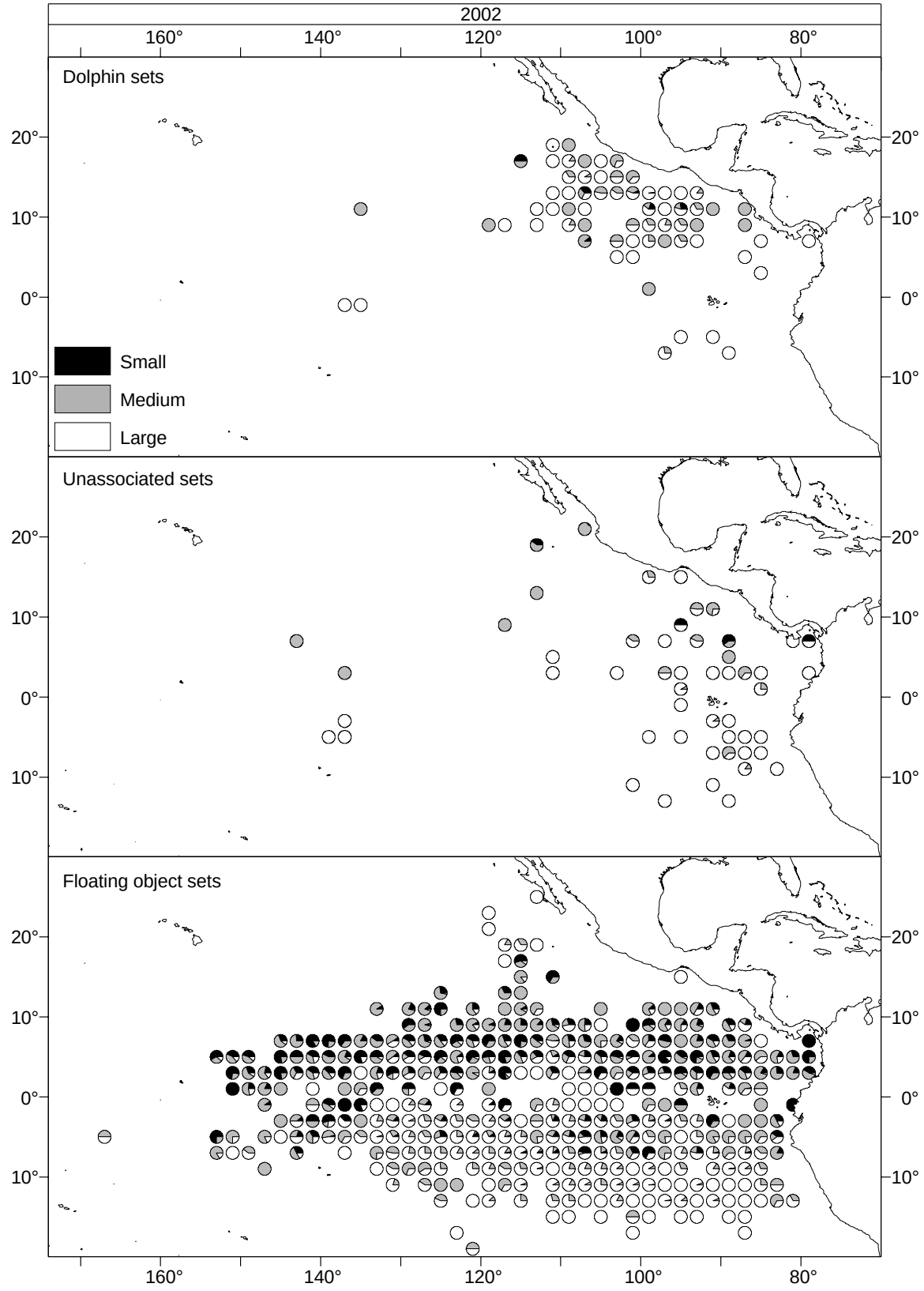

FIGURE 14. (continued)

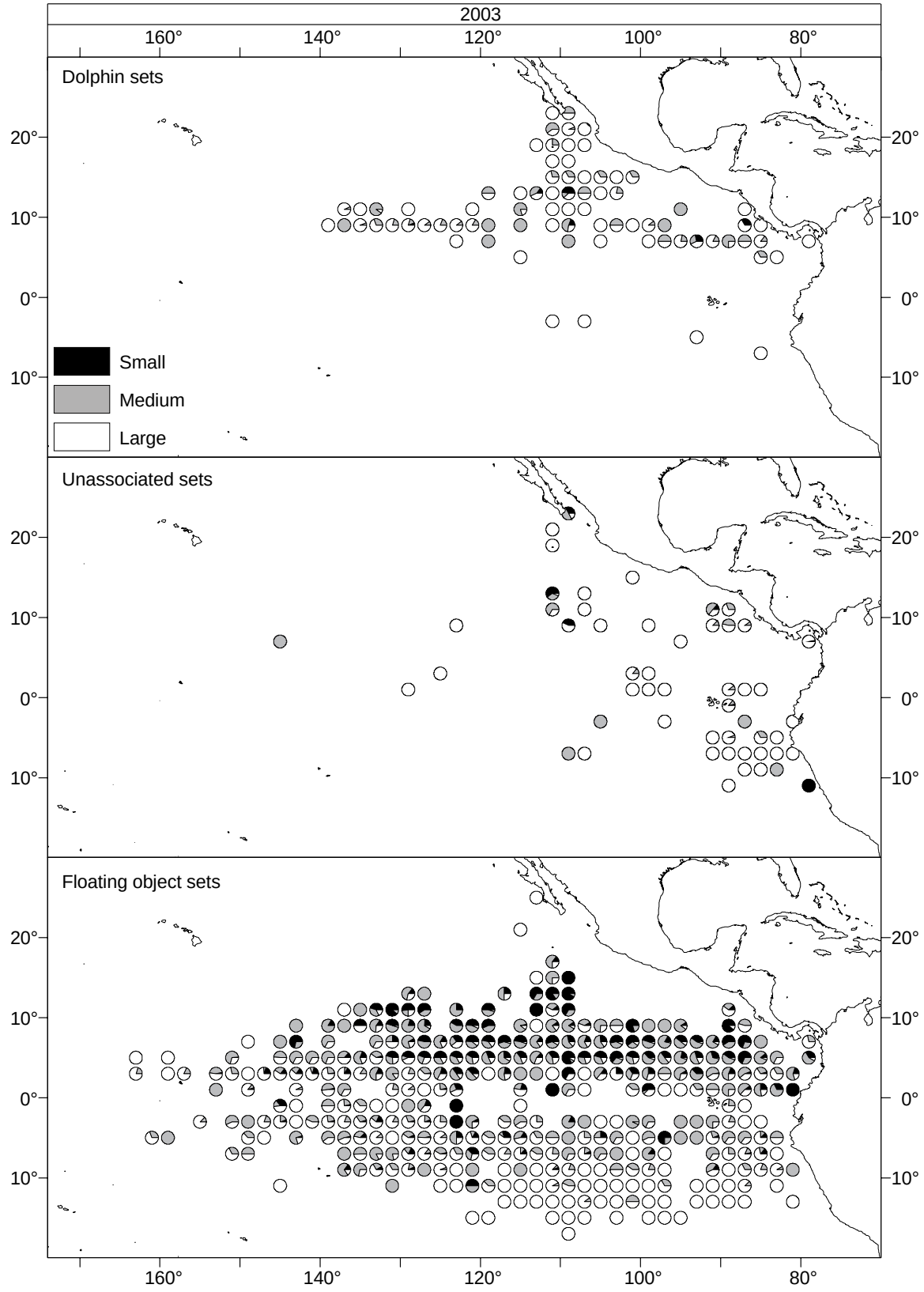

FIGURE 14. (continued)

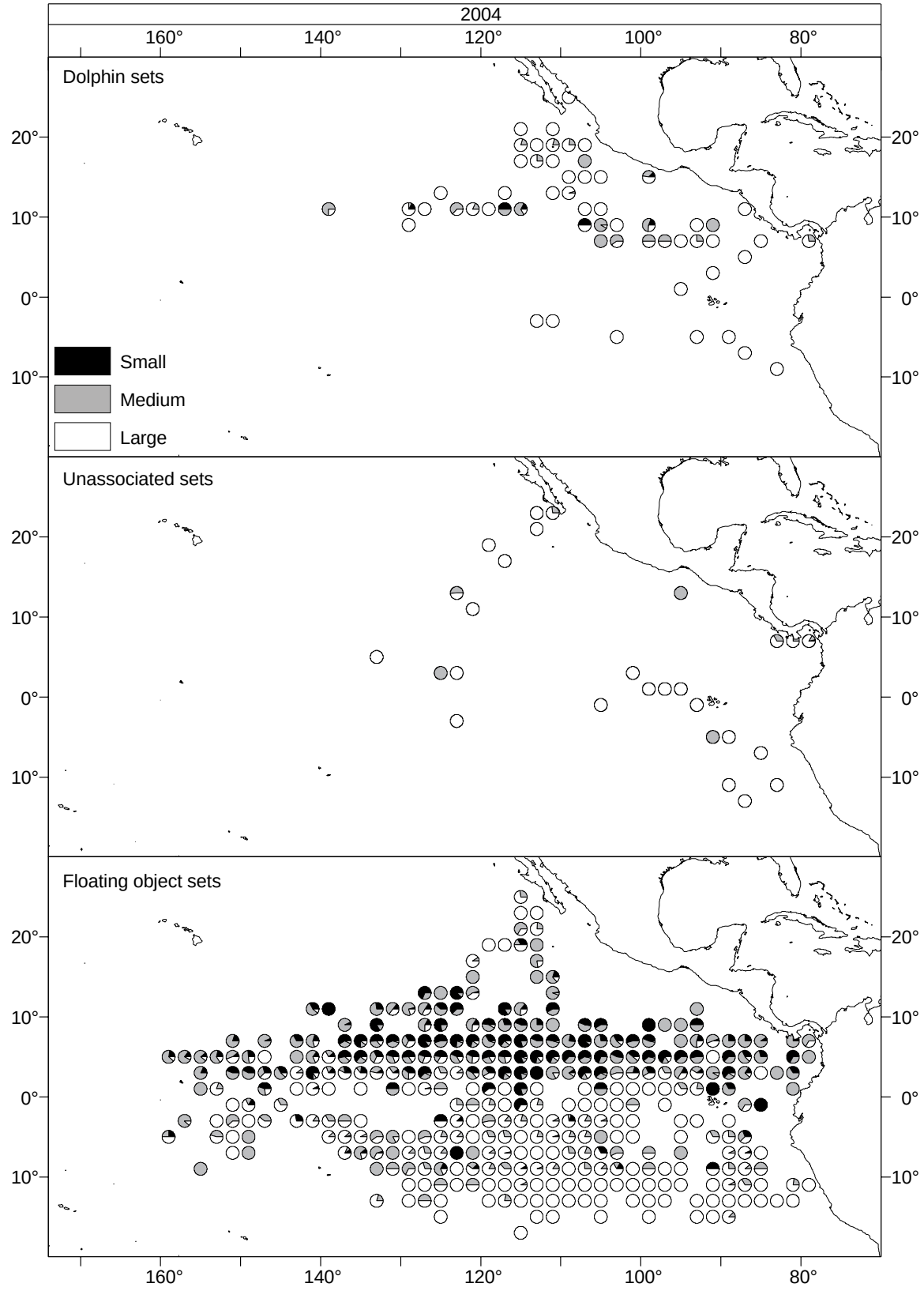

FIGURE 14. (continued)

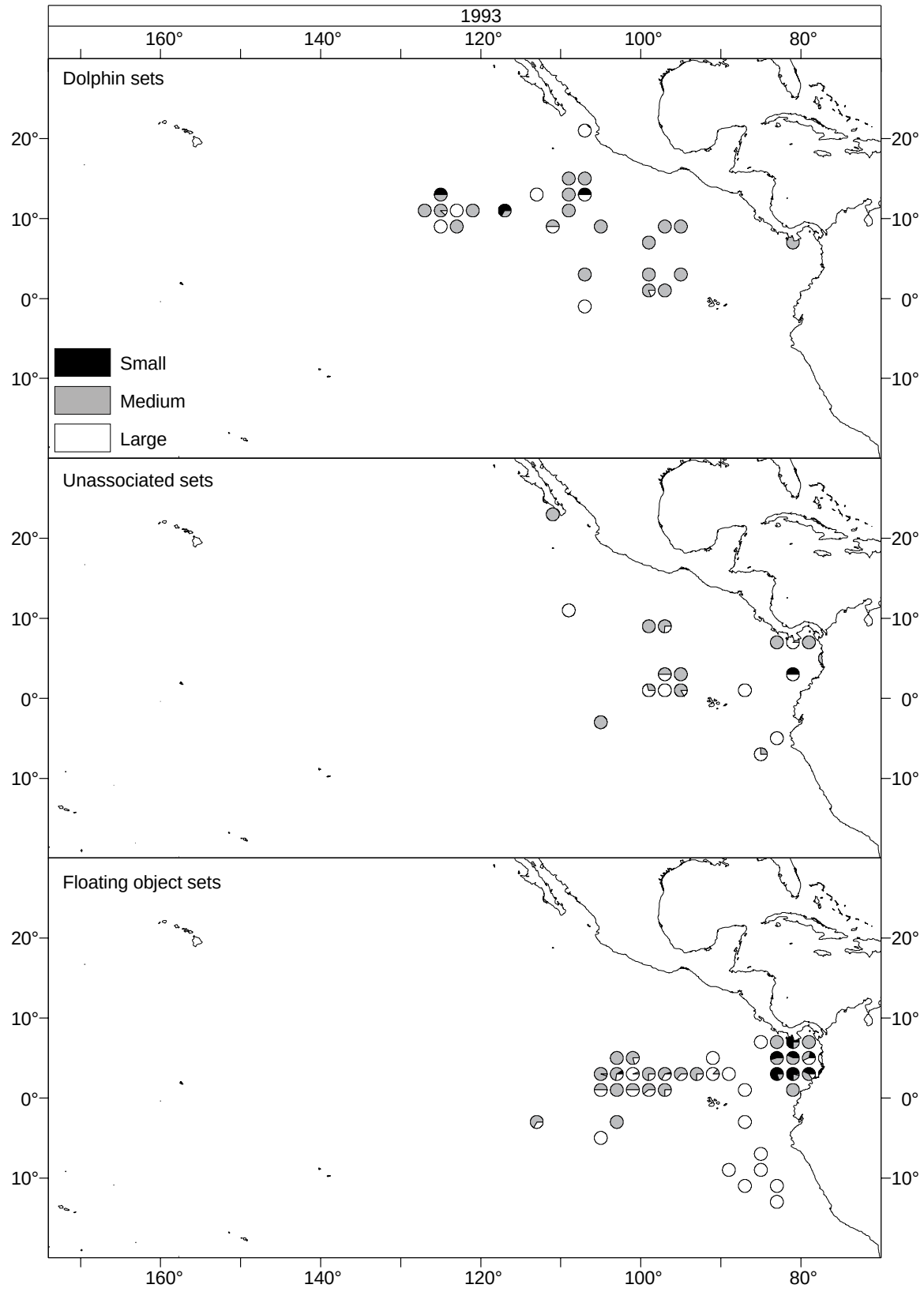

FIGURE 15. Percentage of size categories of oceanic whitetip sharks by year for 1993-2004. Data are for bycatch recorded in numbers of animals only.

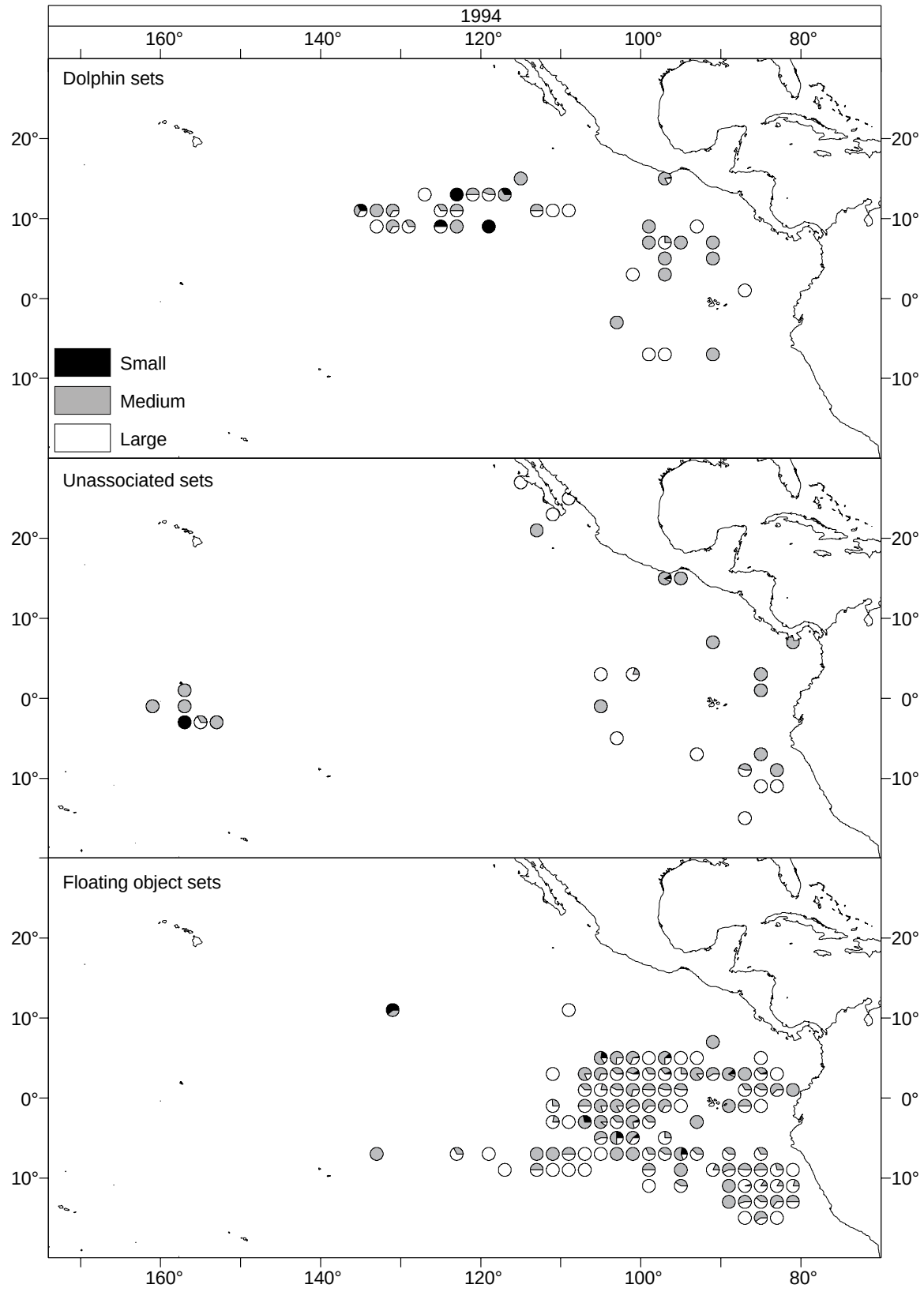

FIGURE 15. (continued)

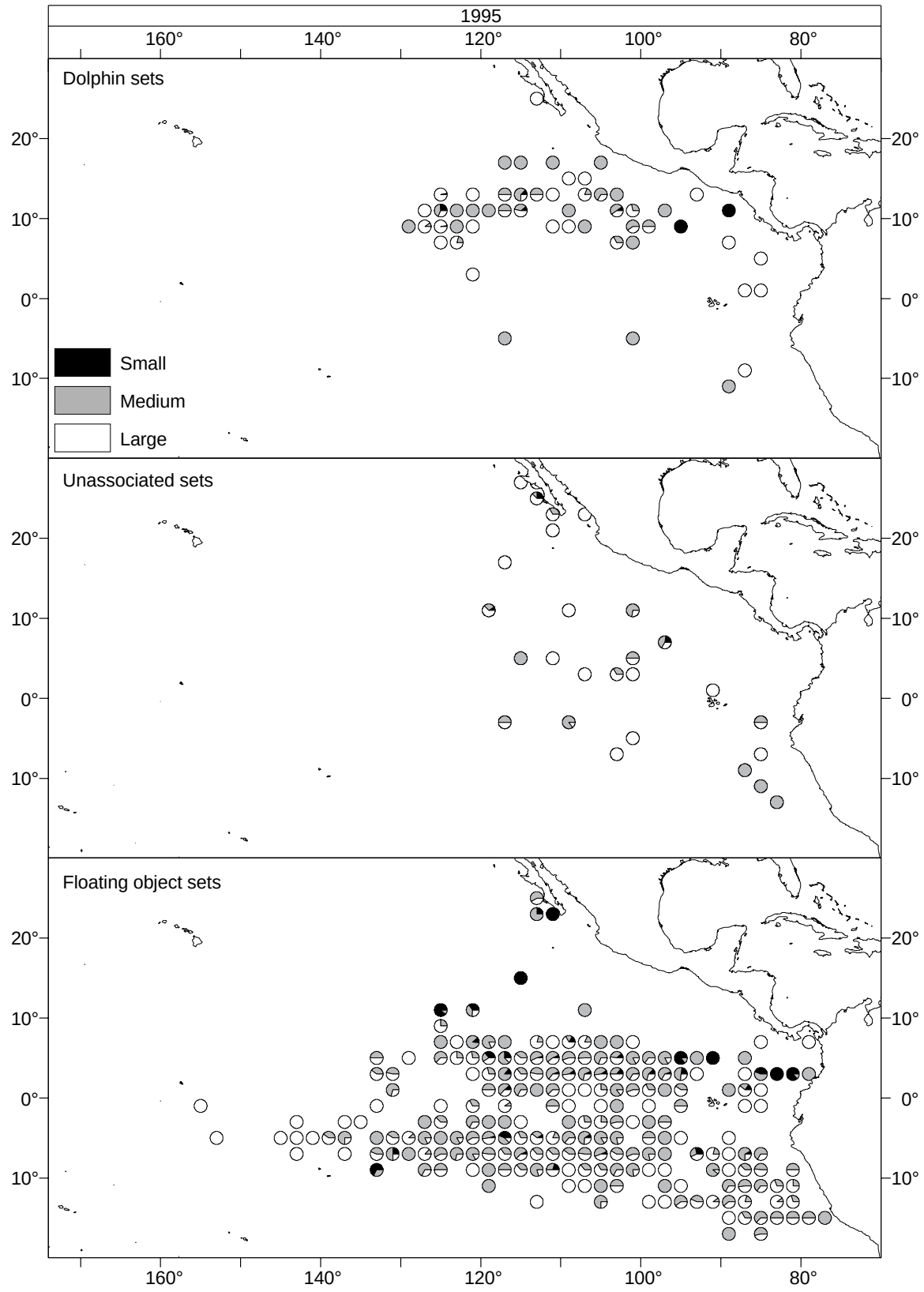

FIGURE 15. (continued)

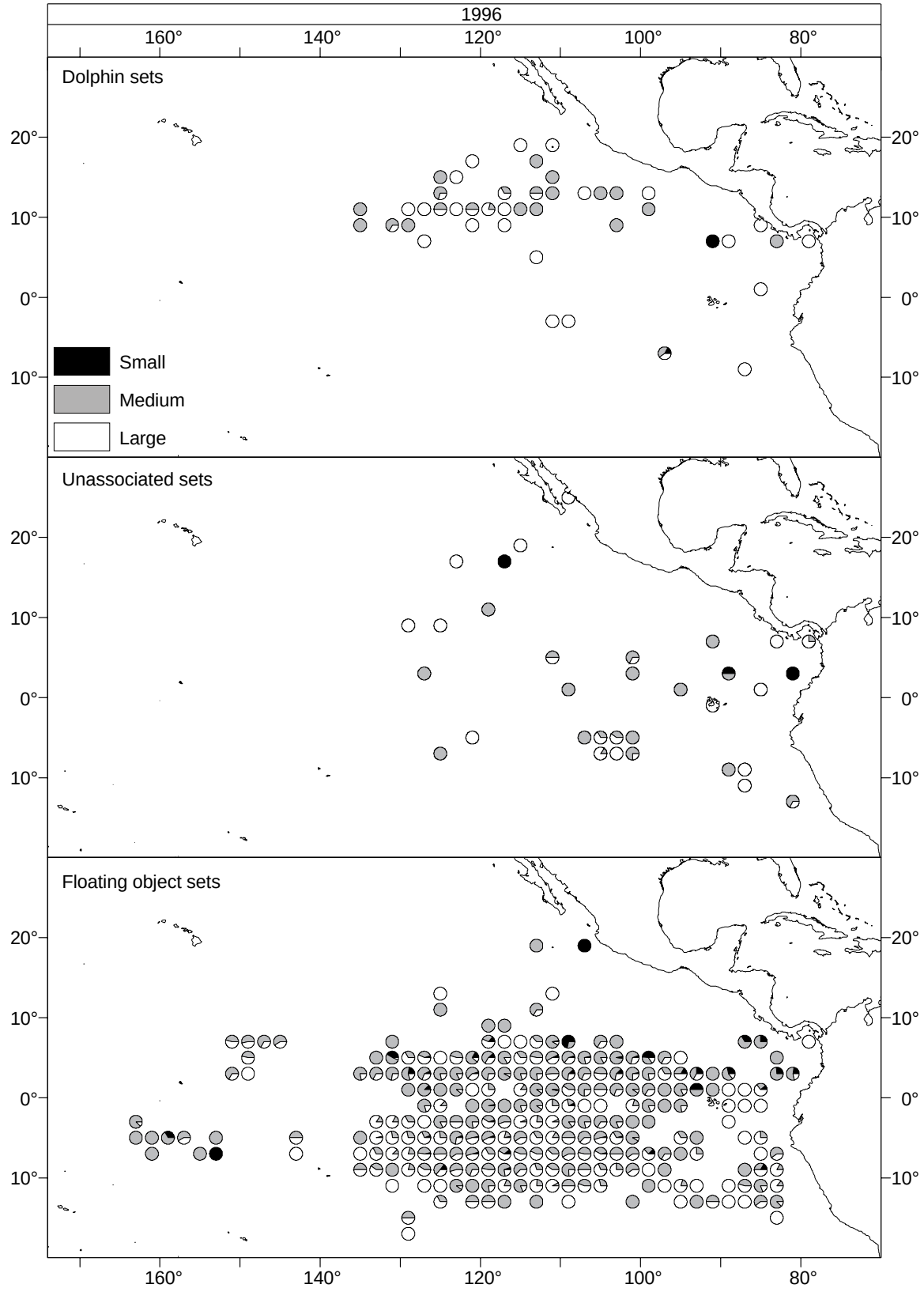

FIGURE 15. (continued)

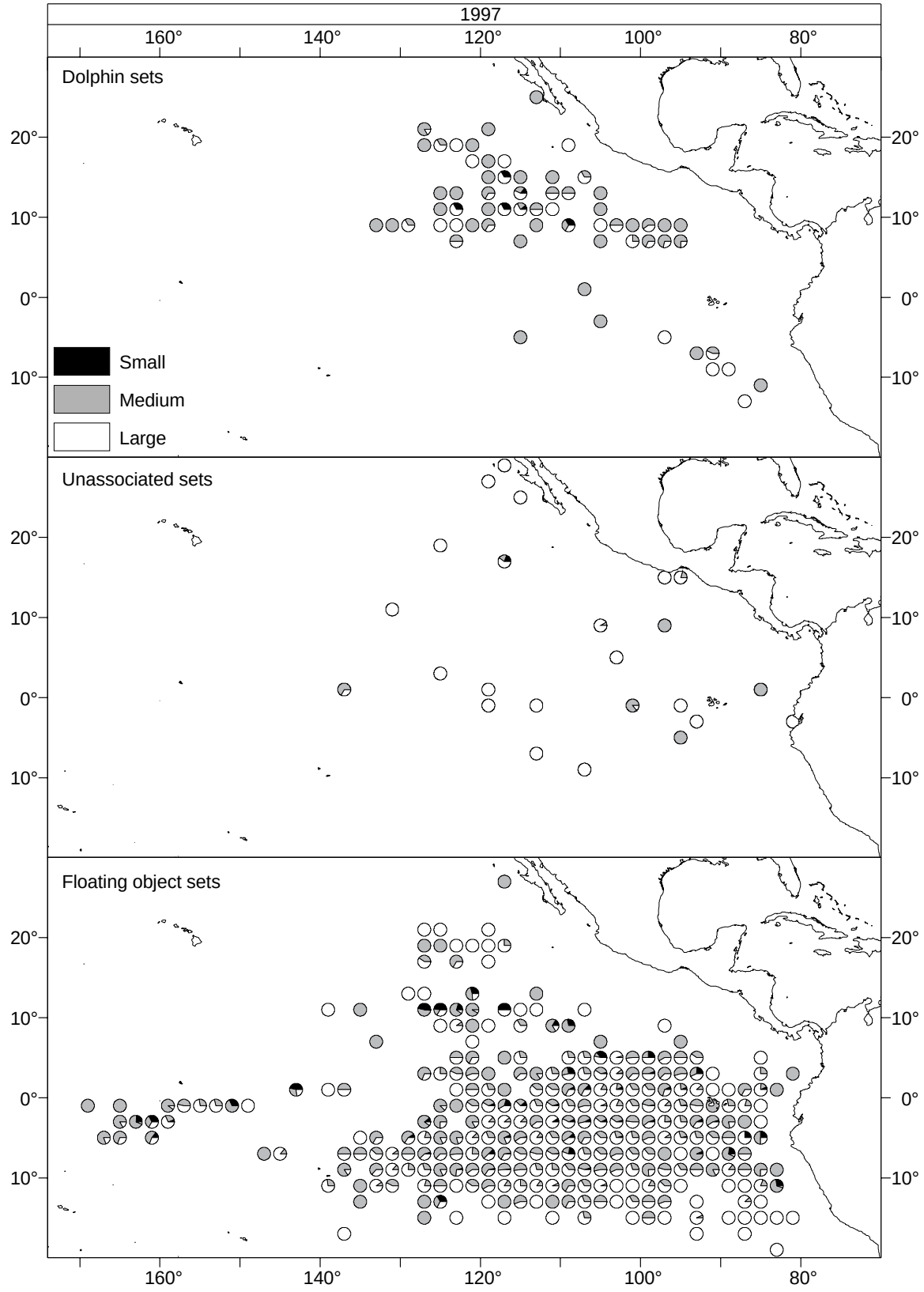

FIGURE 15. (continued)

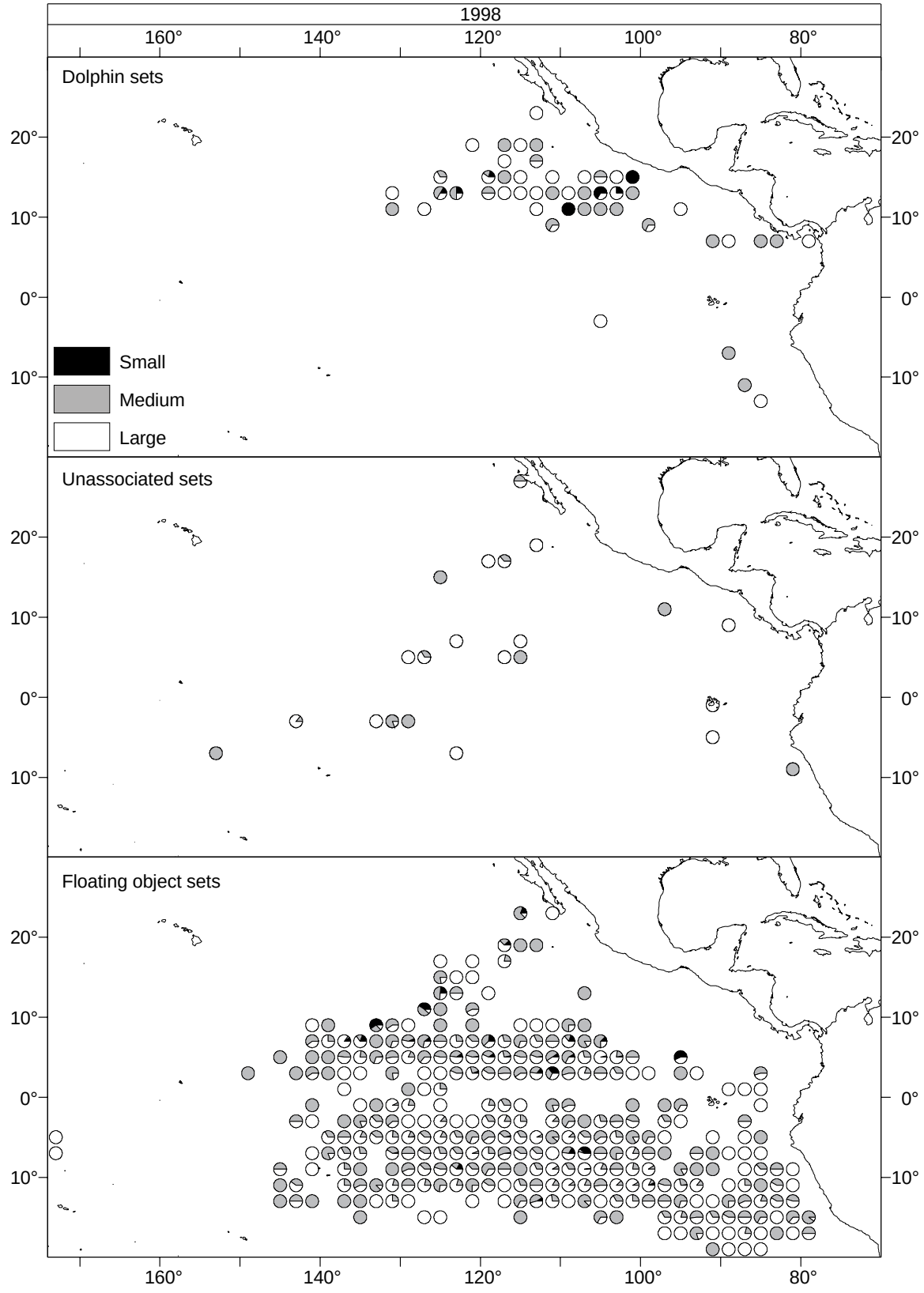

FIGURE 15. (continued)

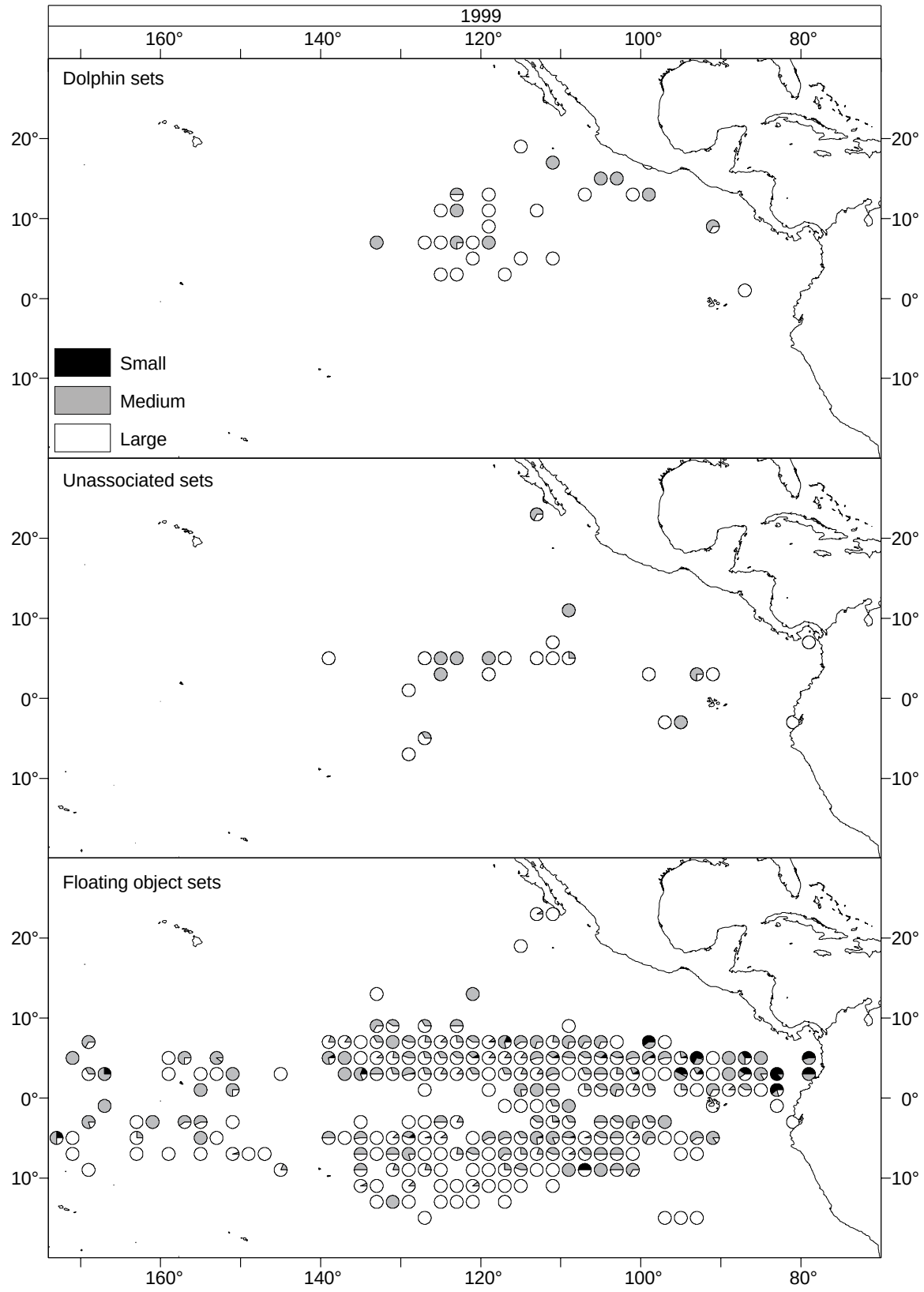

FIGURE 15. (continued)

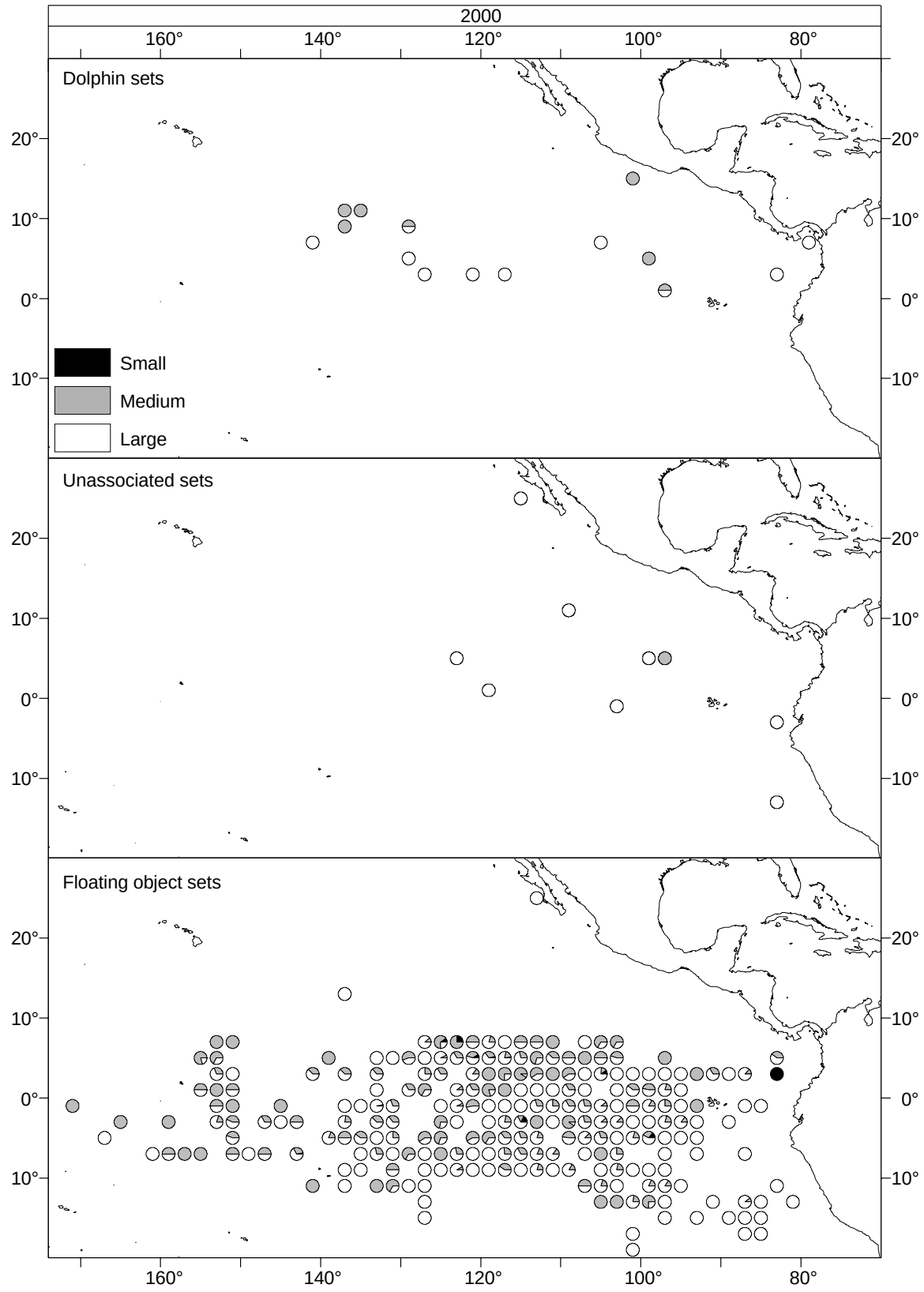

FIGURE 15. (continued)

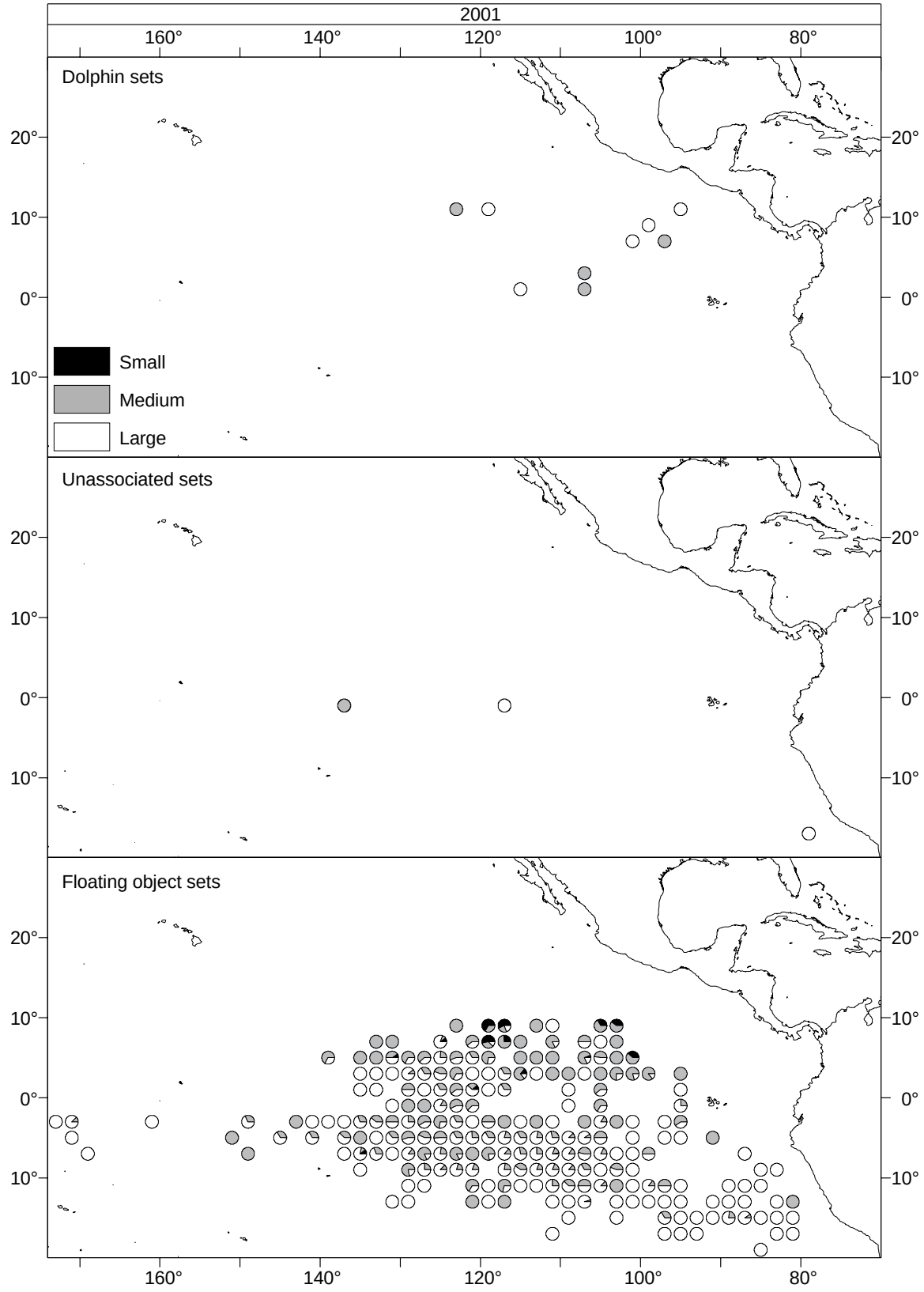

FIGURE 15. (continued)

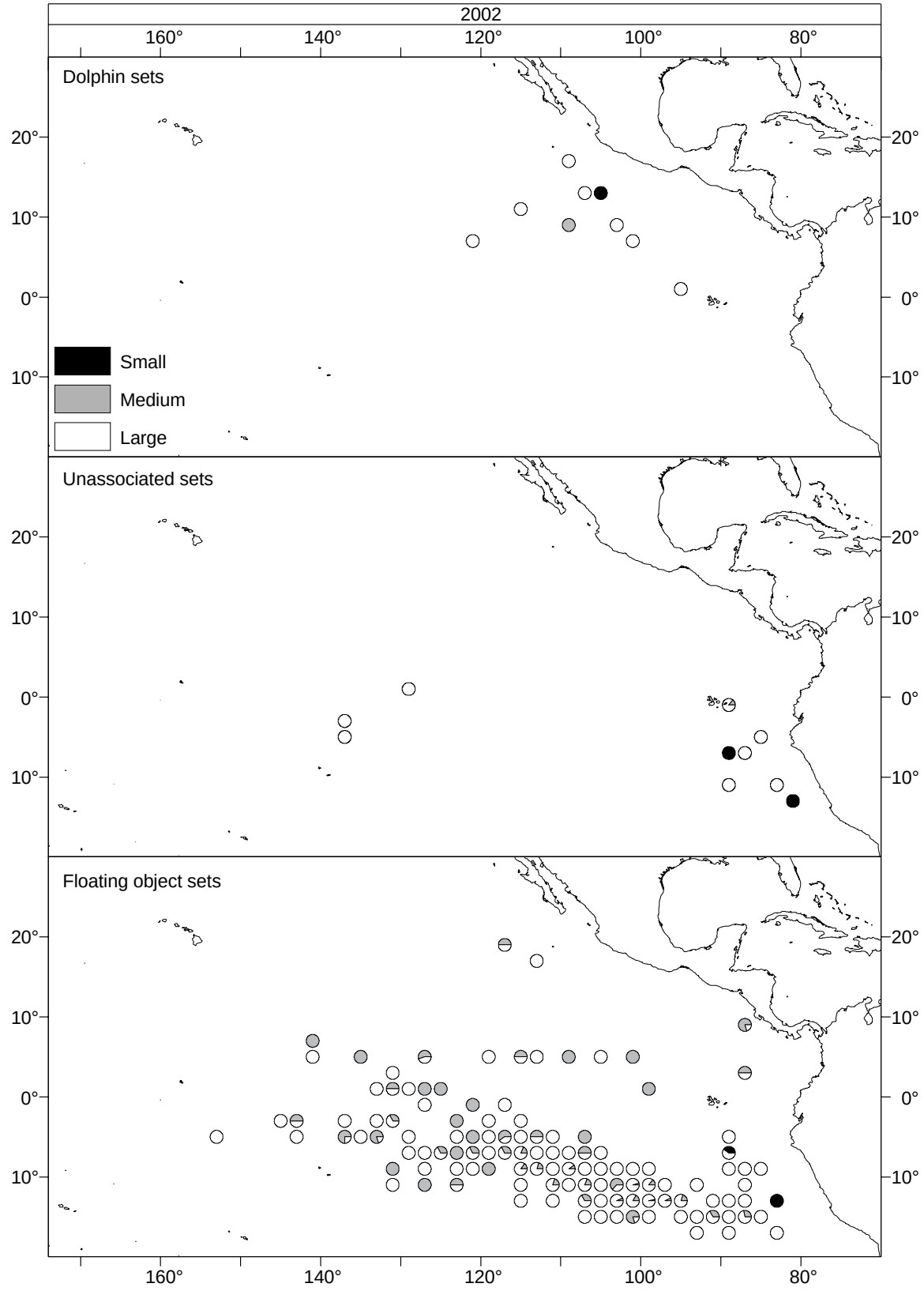

FIGURE 15. (continued)

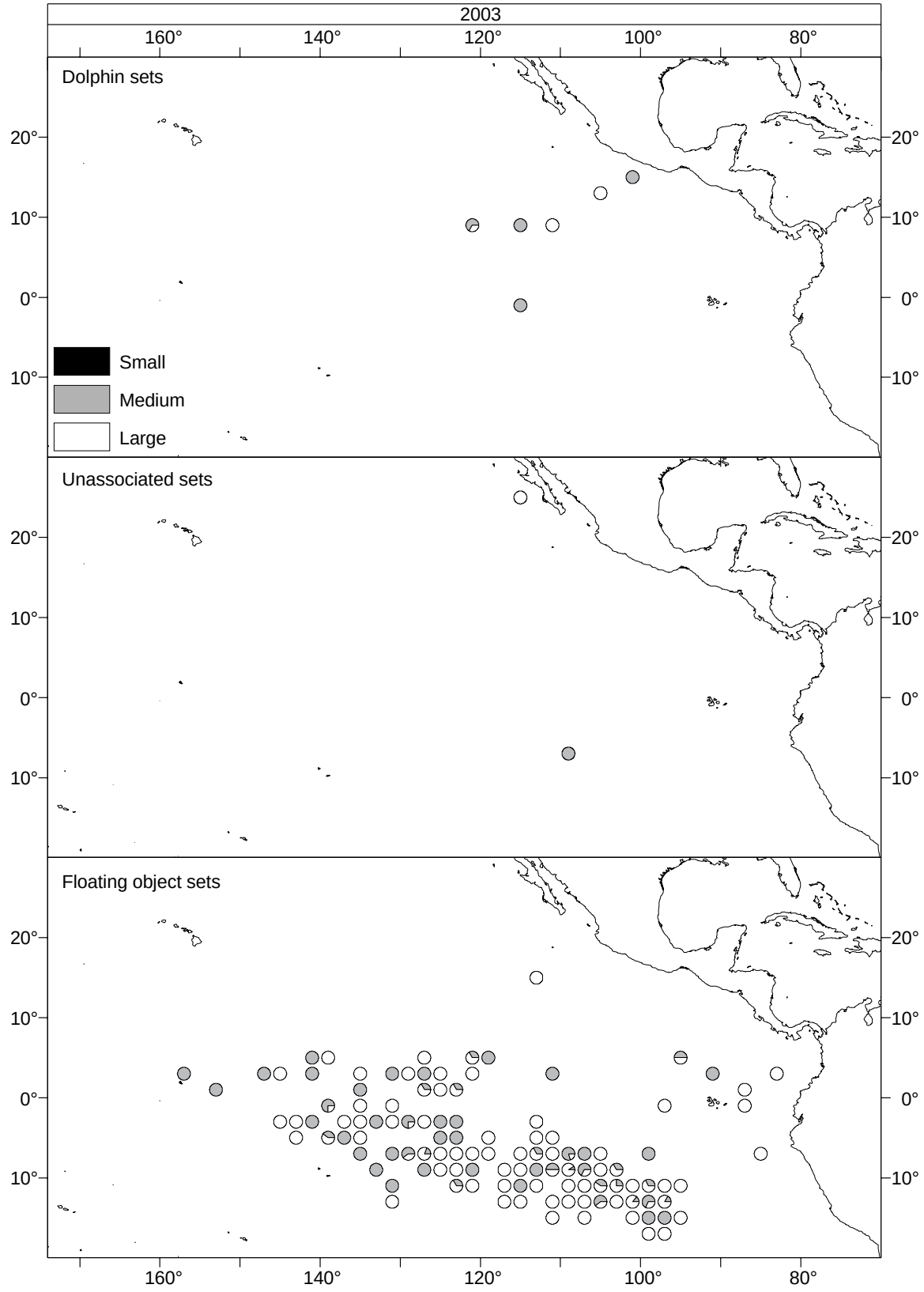

FIGURE 15. (continued)

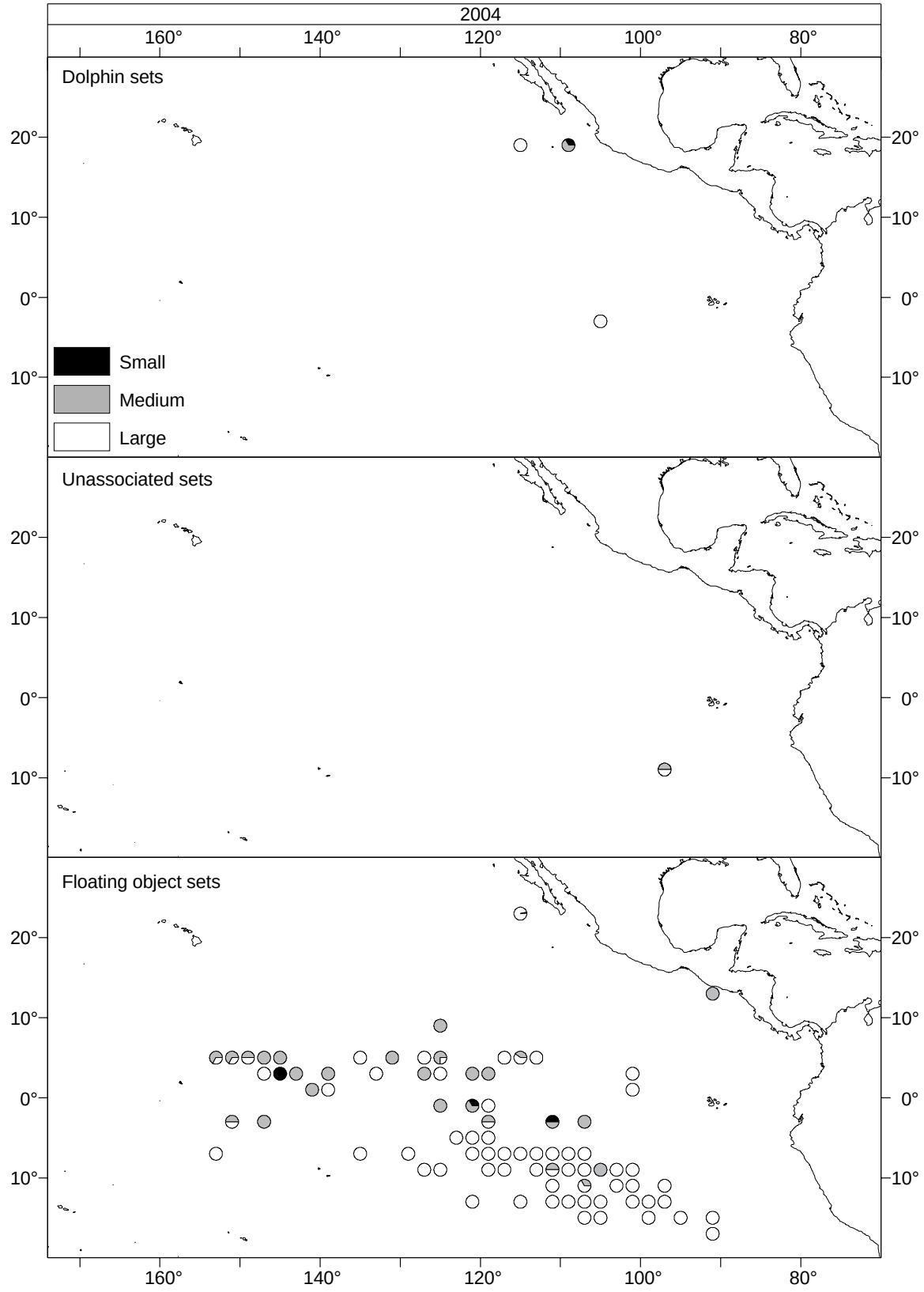

FIGURE 15. (continued)

TABLE 1. Numbers of sharks identified at sea as blacktip and silky sharks and adjusted identifications of the data, based on information collected during the one-year Shark Characteristics Sampling Program.

	Identified at sea		Adjusted identifications		
	Blacktip	Silky	Blacktip	Silky	Unidentified
Inshore	19		5	8	6
Inshore		31	0	31	0
Offshore	292		0	291	1
Offshore		1413	0	1409	4
Total	311	1444	5	1739	11

TABLE 2. Numbers of sharks identified at sea as whitetip and "other sharks" and adjusted identifications of the data, based on information collected during the one-year Shark Characteristics Sampling Program.

	Identified at sea		Adjusted identifications			
	Other shark	Whitetip	Other shark	Whitetip	Silky	Unidentified
	712		138	498	56	20
		91	0	91	0	0
Total	712	91	138	589	56	20

TABLE 3. Numbers of sharks, by species, recorded by observers at sea during the Shark Characteristics Sampling Program. The species identifications were adjusted only for *Carcharhinus falciformis*, *C. limbatus*, and *C. longimanus*. Percentages may not sum to exactly 100% because of rounding.

Species	Common name	Number	Percent
Alopias superciliosus	Bigeye thresher shark	29	1.0
A. pelagicus	Pelagic thresher shark	28	1.0
Alopias spp.	Unidentified *Alopias*	19	0.7
A. vulpinus	Thresher shark	7	0.2
Carcharhinus falciformis	Silky shark	1802	63.7
C. longimanus	Oceanic whitetip shark	589	20.8
C. brachyurus	Copper shark	1	0.1
C. galapaguensis	Galapagos shark	6	0.2
C. limbatus	Blacktip shark	5	0.2
C. leucas	Bull shark	2	0.1
C. altimus	Bignose shark	1	0.1
Nasolamia velox	Whitenose shark	2	0.1
Prionace glauca	Blue shark	17	0.6
Isurus oxyrinchus	Mako shark	28	0.9
Rhincodon typus	Whale shark	1	0.1
Sphyrna lewini	Scalloped hammerhead shark	103	3.6
S. zygaena	Smooth hammerhead shark	47	1.7
Sphyrna spp.	Unidentified *Sphyrna*	30	1.1
S. mokarran	Great hammerhead shark	9	0.3
S. media	Scoophead shark	2	0.1
Unidentified shark		102	3.6
Total		2830	

TABLE 4. Percentage of sets with observed shark bycatch, by species, by set type, and all set types combined, pooled across years for 1993-2004. Percentages may not sum to exactly 100% because of rounding.

	Percent by Set type			
Species	Dolphin	Unasso-ciated	Floating object	Total
Silky sharks "offshore"	52.5	35.1	59.4	56.0
Silky/Blacktip sharks "inshore"	2.7	9.1	0.2	1.4
Oceanic whitetip shark	10.3	5.8	24.7	21.0
Hammerhead shark	10.3	15.8	7.0	8.3
Other shark	13.0	24.6	2.7	6.3
Unidentified shark	11.3	9.5	6.0	7.0

TABLE 5. Revised observed bycatches of silky/blacktip sharks caught in the inshore area, in numbers of individuals, by size categories small (S), medium (M), and large (L). T is the total of all sizes, including those for which no size category was recorded.

	Set type											
	Dolphin				Unassociated				Floating object			
Year	S	M	L	T	S	M	L	T	S	M	L	T
1993	2	41	356	399	1	198	149	348	62	48	22	132
1994	0	23	20	43	6	52	144	212	26	26	8	60
1995	0	1	7	8	6	32	150	188	6	12	9	27
1996	0	6	40	46	1	45	172	218	34	23	24	81
1997	0	12	17	29	2	85	518	605	1	59	10	70
1998	1	4	14	19	4	10	40	54	5	10	0	15
1999	0	3	77	80	2	14	33	49	8	34	8	50
2000	2	1	53	56	10	18	261	289	0	1	1	2
2001	0	4	13	17	0	26	81	107	5	5	7	17
2002	0	1	6	7	1	0	54	55	0	5	21	26
2003	0	14	1	15	2	17	63	82	1	2	11	14
2004	0	4	311	315	1	9	80	90	5	2	0	7
Total	5	114	915	1,034	36	506	1,745	2,297	153	227	121	501

TABLE 6. Revised observed bycatches of silky sharks caught in the offshore area, in numbers of individuals, by size categories small (S), medium (M), and large (L). T is the total of all sizes, including those for which no size category was recorded.

	Set type											
	Dolphin				Unassociated				Floating object			
Year	S	M	L	T	S	M	L	T	S	M	L	T
1993	30	182	1,022	1,262	28	665	1,475	2,339	1,456	2,405	1,236	5,209
1994	12	207	582	807	6	626	1,551	2,266	1,326	5,097	5,608	12,109
1995	131	382	1,457	1,971	48	507	1,428	1,983	2,703	6,586	6,804	16,149
1996	57	353	549	959	35	336	1,636	2,008	3,140	6,787	7,300	17,274
1997	98	229	602	930	57	491	1,029	1,577	5,306	8,437	12,257	26,012
1998	102	425	1,261	1,788	17	98	880	995	4,712	7,792	10,358	22,868
1999	48	359	982	1,389	159	458	506	1,123	6,128	10,203	4,869	21,316
2000	26	172	532	730	52	376	640	1,068	1,746	6,247	3,426	11,421
2001	25	98	405	528	7	47	439	493	3,193	5,622	5,794	14,617
2002	25	231	469	725	19	202	2,115	2,336	2,472	4,540	3,331	10,343
2003	31	150	1,038	1,219	75	149	647	871	2,827	5,252	4,180	12,402
2004	13	253	341	607	3	197	919	1,119	3,414	4,011	2,647	10,240
Total	598	3,041	9,240	12,915	506	4,152	13,265	18,178	38,423	72,979	67,810	179,960

TABLE 7. Revised observed bycatches of oceanic whitetip sharks, in numbers of individuals, by size categories small (S), medium (M), and large (L). T is the total of all sizes, including those for which no size category was recorded.

	Set type											
	Dolphin				Unassociated				Floating object			
Year	S	M	L	T	S	M	L	T	S	M	L	T
1993	4	45	28	103	1	129	74	205	214	308	182	716
1994	6	54	44	104	2	74	49	125	87	1,002	1,315	2,418
1995	15	77	200	292	32	125	202	359	235	1,618	1,633	3,493
1996	15	77	82	174	12	31	46	89	200	2,498	2,104	4,835
1997	6	92	84	182	1	21	90	112	280	2,118	2,894	5,309
1998	8	34	78	120	3	38	54	95	165	1,742	2,490	4,397
1999	0	13	33	46	0	27	55	82	342	1,190	2,156	3,698
2000	0	7	13	20	0	3	24	27	18	560	1,424	2,003
2001	0	4	6	10	0	1	5	6	80	725	1,246	2,061
2002	5	1	10	16	3	5	71	79	7	116	460	583
2003	0	5	4	9	0	1	1	2	0	96	258	362
2004	1	2	2	5	0	1	1	2	3	42	133	178
Total	60	411	584	1,081	54	456	672	1,183	1,631	12,015	16,295	30,053

TABLE 8. Revised observed bycatches of hammerhead sharks, in numbers of individuals, by size categories small (S), medium (M), and large (L). T is the total of all sizes, including those for which no size category was recorded.

	Set type											
	Dolphin				Unassociated				Floating object			
Year	S	M	L	T	S	M	L	T	S	M	L	T
1993	93	8	36	154	14	124	100	238	0	14	101	116
1994	2	25	25	53	3	71	218	295	1	80	578	669
1995	1	10	47	58	14	106	154	274	1	85	562	648
1996	1	18	64	83	2	120	384	507	11	72	736	820
1997	0	5	56	61	8	47	124	180	1	107	938	1,051
1998	0	40	114	154	5	56	239	300	2	51	660	713
1999	5	18	71	94	1	16	94	111	5	79	638	722
2000	0	4	57	61	0	88	116	204	0	4	405	409
2001	0	3	24	27	1	12	27	40	0	3	642	645
2002	28	4	41	73	0	71	42	113	0	14	1,320	1,334
2003	0	2	61	63	0	86	154	240	0	27	1,568	1,595
2004	1	5	63	69	16	434	118	568	1	18	1,172	1,191
Total	131	142	659	950	64	1,231	1,770	3,070	22	554	9,320	9,913

TABLE 9. Revised observed bycatches of "other sharks" of all size categories, in numbers of individuals.

	Set types		
	Dolphin	**Unassociated**	**Floating-object**
Year	**T**	**T**	**T**
1993	72	204	24
1994	91	370	376
1995	71	313	154
1996	57	108	431
1997	38	207	682
1998	94	154	513
1999	151	127	482
2000	71	173	101
2001	55	127	210
2002	70	226	324
2003	166	328	216
2004	167	395	107
Total	1,103	2,732	3,620

TABLE 10. Revised observed bycatches of unidentified sharks of all size categories, in numbers of individuals.

	Set types		
	Dolphin	**Unassociated**	**Floating-object**
Year	**T**	**T**	**T**
1993	118	225	1,439
1994	266	257	2,530
1995	327	767	2,358
1996	199	623	2,047
1997	118	298	2,378
1998	178	41	853
1999	104	31	1,816
2000	55	69	1,087
2001	49	129	1,064
2002	97	442	713
2003	78	105	325
2004	122	116	916
Total	1,711	3,103	17,526

TABLE 11. Revised observed bycatches of silky/blacktip sharks caught in the inshore area, in metric tons, by size categories small (S), medium (M), and large (L). T is the total of all sizes, including those for which no size category was recorded.

	Dolphin				Unassociated				Floating object			
Year	**S**	**M**	**L**	**T**	**S**	**M**	**L**	**T**	**S**	**M**	**L**	**T**
1993					0.0	10.0	33.6	43.5				
1994					0.4	0.5	0.5	1.4	0.9	1.8	1.8	4.5
1995	0.0	2.7	3.6	6.4								
1996	0.0	3.2	5.0	8.2	0.0	0.0	0.9	0.9				
1997	0.0	0.9	0.0	0.9								
1998	0.0	3.6	5.4	9.1								
1999												
2000					0.0	4.5	1.7	6.2				
2001									0.0	0.7	0.0	0.7
2002												
2003												
2004	0.0	2.0	41.0	43.0								
Total	0.0	12.4	55.0	67.6	0.4	15.0	36.7	52.0	0.9	2.5	1.8	5.2

TABLE 12. Revised observed bycatches of silky sharks caught in the offshore area, in metric tons, by size categories small (S), medium (M), and large (L). T is the total of all sizes, including those for which no size category was recorded.

	Dolphin				Unassociated				Floating object			
Year	**S**	**M**	**L**	**T**	**S**	**M**	**L**	**T**	**S**	**M**	**L**	**T**
1993	0.0	2.7	10.0	12.7	0.0	21.8	52.2	73.9	6.1	36.7	10.0	60.0
1994	0.2	1.6	5.6	7.4	0.5	33.1	73.5	107.0	6.6	18.6	23.5	49.8
1995	0.5	14.6	33.9	50.8	1.5	2.7	20.1	24.3	6.7	14.7	15.1	38.0
1996	0.0	1.4	4.1	5.4	0.3	1.5	14.7	16.5	9.9	23.9	5.1	39.0
1997	0.5	0.9	15.4	16.8	2.7	22.7	73.9	99.3	11.4	63.1	27.3	107.2
1998	1.1	3.0	95.8	99.9	0.0	1.4	15.0	16.3	23.9	42.7	30.2	96.7
1999	0.0	5.6	26.4	32.1	0.9	10.0	34.5	45.4	18.9	55.7	4.3	78.9
2000	0.0	0.0	1.0	1.0	0.0	9.0	13.3	22.3	6.1	46.6	7.1	64.8
2001	2.5	8.0	3.1	13.6	0.0	3.2	23.8	27.0	1.0	12.4	4.1	17.5
2002	0.0	2.0	1.0	3.0	0.0	0.3	6.0	6.3	1.7	29.2	6.7	40.6
2003	0.0	1.0	9.3	10.3	0.0	3.0	26.5	29.5	3.4	5.6	0.3	9.3
2004					0.0	0.0	5.0	5.0	0.8	10.6	1.5	12.9
Total	4.8	40.8	205.6	253.0	5.9	108.7	358.5	472.8	96.5	359.8	135.2	614.7

TABLE 13. Revised observed bycatches of oceanic whitetip sharks, in metric tons, by size categories small (S), medium (M), and large (L). T is the total of all sizes, including those for which no size category was recorded.

	Dolphin sets				Unassociated sets				Floating-object sets			
Year	**S**	**M**	**L**	**T**	**S**	**M**	**L**	**T**	**S**	**M**	**L**	**T**
1993												
1994					0.0	0.0	0.9	0.9				
1995	0.5	0.9	1.8	3.2					0.1	21.0	2.4	26.0
1996	0.0	0.5	7.7	8.2					2.1	3.8	3.5	9.4
1997									1.6	3.0	1.5	6.1
1998	0.0	0.5	0.0	0.5					1.4	0.7	2.7	4.7
1999									0.0	1.0	2.3	3.2
2000									0.0	0.7	0.4	1.1
2001												
2002												
2003												
2004												
Total	0.5	1.9	9.5	11.9	0.0	0.0	0.9	0.9	5.2	30.2	12.8	50.5

TABLE 14. Revised observed bycatches of hammerhead sharks, in metric tons, by size categories small (S), medium (M), and large (L). T is the total of all sizes, including those for which no size category was recorded.

	Dolphin sets				Unassociated sets				Floating-object sets			
Year	**S**	**M**	**L**	**T**	**S**	**M**	**L**	**T**	**S**	**M**	**L**	**T**
1993												
1994					0.0	1.8	0.0	3.6	0.0	0.0	1.4	1.4
1995												
1996												
1997									0.0	0.0	1.8	1.8
1998					0.0	0.0	2.7	2.7	0.0	0.0	0.9	0.9
1999					0.4	1.7	0.0	2.0	0.5	1.8	0.0	2.3
2000					0.0	0.2	7.8	8.0				
2001												
2002									0.0	0.0	4.0	4.0
2003									0.0	0.0	3.0	3.0
2004					0.0	0.0	0.3	0.3				
Total	0.0	0.0	0.0	0.0	0.4	3.7	10.8	16.6	0.5	1.8	11.1	13.4

TABLE 15. Revised observed bycatches of "other sharks" of all size categories, in metric tons.

	Set types		
	Dolphin	**Unassociated**	**Floating-object**
Year	**T**	**T**	**T**
1993			
1994	0.5	0.1	
1995			
1996	7.3		
1997			
1998			
1999			
2000			
2001			
2002			1.0
2003			3.5
2004			
Total	7.8	0.1	4.5

TABLE 16. Revised observed bycatches of unidentified sharks of all size categories, in metric tons.

	Set types		
	Dolphin	**Unassociated**	**Floating-object**
Year	**T**	**T**	**T**
1993	5.4		10.9
1994		22.5	6.3
1995	10.9	0.2	1.9
1996	14.5		11.4
1997			15.4
1998			43.2
1999			12.9
2000	1.5	11.0	1.0
2001			2.4
2002			2.5
2003	0.3		
2004			1.9
Total	32.6	33.7	109.8

TABLE 17. Percentage of size categories of small (S), medium (M), and large (L) silky sharks caught in the offshore area reported in number of individuals. Percentages were obtained by sum of the three size categories. Percentages may not sum to exactly 100% because of rounding.

	Set type								
	Dolphin			Unassociated			Floating object		
Year	S	M	L	S	M	L	S	M	L
1993	2.4	14.7	82.8	1.3	30.7	68.0	28.6	47.2	24.2
1994	1.5	25.8	72.7	0.3	28.8	71.0	11.0	42.5	46.4
1995	6.6	19.4	74.0	2.4	25.6	72.0	16.8	40.9	42.3
1996	5.9	36.8	57.2	1.7	16.7	81.5	18.2	39.4	42.4
1997	10.5	24.7	64.8	3.6	31.1	65.3	20.4	32.5	47.1
1998	5.7	23.8	70.5	1.7	9.8	88.4	20.6	34.1	45.3
1999	3.5	25.8	70.7	14.2	40.8	45.1	28.9	48.1	23.0
2000	3.6	23.6	72.9	4.9	35.2	59.9	15.3	54.7	30.0
2001	4.7	18.6	76.7	1.4	9.5	89.0	21.9	38.5	39.7
2002	3.4	31.9	64.7	0.8	8.6	90.5	23.9	43.9	32.2
2003	2.5	12.3	85.2	8.6	17.1	74.3	23.1	42.8	34.1
2004	2.1	41.7	56.2	0.3	17.6	82.1	33.9	39.8	26.3

TABLE 18. Percentage of size categories of small (S), medium (M), and large (L) oceanic whitetip sharks reported in number of individuals. Percentages were obtained by sum of the three size categories. Percentages may not sum to exactly 100% because of rounding.

	Set type								
	Dolphin			Unassociated			Floating object		
Year	S	M	L	S	M	L	S	M	L
1993	5.2	58.4	36.4	0.5	63.2	36.3	30.4	43.8	25.9
1994	5.8	51.9	42.3	1.6	59.2	39.2	3.6	41.9	54.5
1995	5.1	26.4	68.5	8.9	34.8	56.3	6.7	46.4	46.8
1996	8.6	44.3	47.1	13.5	34.8	51.7	4.2	52.0	43.8
1997	3.3	50.5	46.2	0.9	18.8	80.4	5.3	40.0	54.7
1998	6.7	28.3	65.0	3.2	40.0	56.8	3.8	39.6	56.6
1999	0.0	28.3	71.7	0.0	32.9	67.1	9.3	32.3	58.5
2000	0.0	35.0	65.0	0.0	11.1	88.9	0.9	28.0	71.1
2001	0.0	40.0	60.0	0.0	16.7	83.3	3.9	35.3	60.8
2002	31.3	6.3	62.5	3.8	6.3	89.9	1.2	19.9	78.9
2003	0.0	55.6	44.4	0.0	50.0	50.0	0.0	27.1	72.9
2004	20.0	40.0	40.0	0.0	50.0	50.0	1.7	23.6	74.7

TABLE 19. Percentage of size categories of small (S), medium (M), and large (L) hammerhead sharks reported in number of individuals. Percentages were obtained by sum of the three size categories. Percentages may not sum to exactly 100% because of rounding.

	Set type								
	Dolphin			Unassociated			Floating object		
Year	S	M	L	S	M	L	S	M	L
1993	67.9	5.8	26.3	5.9	52.1	42.0	0.0	12.2	87.8
1994	3.8	48.1	48.1	1.0	24.3	74.7	0.2	12.1	87.7
1995	1.7	17.2	81.0	5.1	38.7	56.2	0.2	13.1	86.7
1996	1.2	21.7	77.1	0.4	23.7	75.9	1.3	8.8	89.9
1997	0.0	8.2	91.8	4.5	26.3	69.3	0.1	10.2	89.7
1998	0.0	26.0	74.0	1.7	18.7	79.7	0.3	7.2	92.6
1999	5.3	19.1	75.5	0.9	14.4	84.7	0.7	10.9	88.4
2000	0.0	6.6	93.4	0.0	43.1	56.9	0.0	1.0	99.0
2001	0.0	11.1	88.9	2.5	30.0	67.5	0.0	0.5	99.5
2002	38.4	5.5	56.2	0.0	62.8	37.2	0.0	1.0	99.0
2003	0.0	3.2	96.8	0.0	35.8	64.2	0.0	1.7	98.3
2004	1.4	7.2	91.3	2.8	76.4	20.8	0.1	1.5	98.4

TABLE 20. Percentage of size categories of small (S), medium (M), and large (L) silky sharks caught in the offshore area, reported in metric tons. Percentages were obtained by sum of the three size categories. Percentages may not sum to exactly 100% because of rounding.

	Set type								
	Dolphin			Unassociated			Floating object		
Year	S	M	L	S	M	L	S	M	L
1993	0.0	21.3	78.7	0.0	29.5	70.5	11.6	69.5	18.9
1994	2.7	21.6	75.7	0.5	30.9	68.6	13.6	38.2	48.3
1995	1.0	29.8	69.2	6.2	11.1	82.7	18.4	40.3	41.4
1996	0.0	25.5	74.5	1.8	9.1	89.1	25.4	61.4	13.1
1997	3.0	5.4	91.7	2.7	22.9	74.4	11.2	62.0	26.8
1998	1.1	3.0	95.9	0.0	8.5	91.5	24.7	44.1	31.2
1999	0.0	17.5	82.5	2.0	22.0	76.0	24.0	70.6	5.4
2000	0.0	0.0	100.0	0.0	40.4	59.6	10.2	77.9	11.9
2001	18.4	58.8	22.8	0.0	11.9	88.1	5.4	71.1	23.5
2002	0.0	66.7	33.3	0.0	4.8	95.2	4.5	77.7	17.8
2003	0.0	9.7	90.3	0.0	10.2	89.8	36.6	60.2	3.2
2004				0.0	0.0	100.0	6.2	82.2	11.6

TABLE 21. Percentage of size categories of small (S), medium (M), and large (L) oceanic whitetip sharks reported in metric tons. Percentages were obtained by sum of the three size categories. Percentages may not sum to exactly 100% because of rounding.

	Set type								
	Dolphin			Unassociated			Floating object		
Year	S	M	L	S	M	L	S	M	L
1993									
1994				0.0	0.0	100.0			
1995	15.6	28.1	56.3				0.4	89.4	10.2
1996	0.0	6.1	93.9				22.3	40.4	37.2
1997							26.2	49.2	24.6
1998	0.0	100.0	0.0				29.2	14.6	56.3
1999							0.0	30.3	69.7
2000							0.0	63.6	36.4
2001									
2002									
2003									
2004									

TABLE 22. Percentage of size categories of small (S), medium (M), and large (L) hammerhead sharks reported in metric tons. Percentages were obtained by sum of the three size categories. Percentages may not sum to exactly 100% because of rounding.

	Set type								
	Dolphin			Unassociated			Floating object		
Year	S	M	L	S	M	L	S	M	L
1993									
1994				0.0	100.0	0.0	0.0	0.0	100.0
1995									
1996									
1997							0.0	0.0	100.0
1998				0.0	0.0	100.0	0.0	0.0	100.0
1999				19.0	81.0	0.0	21.7	78.3	0.0
2000				0.0	2.5	97.5			
2001									
2002							0.0	0.0	100.0
2003							0.0	0.0	100.0
2004				0.0	0.0	100.0			

The IATTC's responsibilities are met with two programs, the Tuna-Billfish Program and the Tuna-Dolphin Program. The principal responsibilities of the Tuna-Billfish Program are (1) to study the biology of the tunas and related species of the eastern Pacific Ocean to estimate the effects that fishing and natural factors have on their abundance, (2) to recommend appropriate conservation measures so that the stocks of fish can be maintained at levels that will afford maximum sustainable catches, and (3) to collect information on compliance with Commission resolutions. The principal responsibilities of the Tuna-Dolphin Program are (1) to monitor the abundance of dolphins and their mortality incidental to purse-seine fishing in the eastern Pacific Ocean, (2) to study the causes of mortality of dolphins during fishing operations and promote the use of fishing techniques and equipment that minimize these mortalities, (3) to study the effects of different modes of fishing on the various fish and other animals of the pelagic ecosystem, and (4) to provide a Secretariat for the International Dolphin Conservation Program.

An important part of the work of the IATTC is the prompt publication and wide distribution of its research results. The Commission publishes its results in its Bulletin, Special Report, and Data Report series, all of which are issued on an irregular basis, and its Stock Assessment Reports, which are published annually.

The Commission also publishes Annual Reports and Quarterly Reports, which include policy actions of the Commission, information on the fishery, and reviews of the year's or quarter's work carried out by the staff. The Annual Reports also contain financial statements and a roster of the IATTC staff.

Additional information on the IATTC's publications can be found in its web site.

La CIAT cumple sus obligaciones mediante dos programas, el Programa Atún-Picudo y el Programa Atún-Delfín. Las responsabilidades principales del primero son (1) estudiar la biología de los atunes y especies afines en el Océano Pacífico oriental a fin de determinar los efectos de la pesca y los factores naturales sobre su abundancia, (2) recomendar medidas apropiadas de conservación para permitir mantener los stocks de peces a niveles que brinden las capturas máximas sostenibles, (3) reunir información sobre el cumplimiento de las resoluciones de la Comisión. Las responsabilidades principales del segundo son (1) dar seguimiento a la abundancia de los delfines y la mortalidad de los mismos incidental a la pesca con red de cerco en el Océano Pacífico oriental, (2) estudiar las causas de la mortalidad de delfines durante las operaciones de pesca y fomentar el uso de técnicas y aparejo de pesca que reduzcan dicha mortalidad al mínimo, (3) estudiar los efectos de distintas mortalidades de pesca sobre los varios peces y otros animales del ecosistema pelágico, (4) proporcionar la Secretaría para el Programa Internacional para la Conservación de los Delfines.

La pronta publicación y amplia distribución de los resultados de investigación forman un aspecto importante de las labores de la Comisión, la cual publica los resultados en su serie de Boletines, Informes Especiales, e Informes de Datos, publicados a intervalos irregulares, y sus Informes de Evaluación de Stocks, publicados anualmente.

La Comisión publica también Informes Anuales e Informes Trimestrales; éstos incluyen información sobre las labores de la Comisión, la pesquería, y las investigaciones realizadas en el año o trimestre correspondiente. Los Informes Anuales incluyen también un resumen financiero y una lista del personal de la CIAT.

En el sitio de internet de la CIAT se presenta información adicional sobre estas publicaciones.

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