INTER-AMERICAN TROPICAL TUNA COMMMISSION
COMISION INTERAMERICANA DEL ATUN TROPICAL
QUARTERLY REPORT—INFORME TRIMESTRAL

October-December 2003
Octubre-Diciembre 2003

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The

QUARTERLY REPORT

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of the

INTER-AMERICAN TROPICAL TUNA COMMISSION

is an informal account, published in English and Spanish, of the current status of the tuna fisheries in the eastern Pacific Ocean in relation to the interests of the Commission, and of the research and the associated activities of the Commission's scientific staff. The research results presented should be regarded, in most instances, as preliminary and in the nature of progress reports.

El

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es un relato informal, publicado en inglés y español, de la situación actual de la pesca atunera en el Océano Pacífico oriental con relación a los intereses de la Comisión, y de la investigación científica y demás actividades del personal científico de la Comisión. Gran parte de los resultados de investigación presentados en este informe son preliminares y deben ser considerados como informes del avance de la investigación.

Editor—Redactor:
William H. Bayliff

INTRODUCTION

The Inter-American Tropical Tuna Commission (IATTC) operates under the authority and direction of a convention originally entered into by Costa Rica and the United States. The convention, which came into force in 1950, is open to adherence by other governments whose nationals fish for tropical tunas and tuna-like species in the eastern Pacific Ocean (EPO). Under this provision Panama adhered in 1953, Ecuador in 1961, Mexico in 1964, Canada in 1968, Japan in 1970, France and Nicaragua in 1973, Vanuatu in 1990, Venezuela in 1992, El Salvador in 1997, Guatemala in 2000, Peru in 2002, and Spain in 2003. Canada withdrew from the IATTC in 1984.

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 specified in the IATTC's convention were (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 and (2) to recommend appropriate conservation measures so that the stocks of fish could be maintained at levels that would afford maximum sustainable catches. It was subsequently given the responsibility for collecting information on compliance with Commission resolutions.

The IATTC's responsibilities were broadened in 1976 to address the problems arising from the incidental mortality in purse seines of dolphins that associate with yellowfin tuna in the EPO. The Commission agreed that it "should strive to maintain a high level of tuna production and also to maintain [dolphin] stocks at or above levels that assure their survival in perpetuity, with every reasonable effort being made to avoid needless or careless killing of [dolphins]" (IATTC, 33rd meeting, minutes: page 9). The principal responsibilities of the IATTC's Tuna-Dolphin Program are (1) to monitor the abundance of dolphins and their mortality incidental to purse-seine fishing in the EPO, (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, described below.

On June 17, 1992, the Agreement for the Conservation of Dolphins ("the 1992 La Jolla Agreement"), which created the International Dolphin Conservation Program (IDCP), was adopted. The main objective of the Agreement was to reduce the mortality of dolphins in the purse-seine fishery without harming the tuna resources of the region and the fisheries that depend on them. On May 21, 1998, the Agreement on the International Dolphin Conservation Program (AIDCP), which built on and formalized the provisions of the 1992 La Jolla Agreement, was signed, and it entered into force on February 15, 1999. The Parties to this agreement, which in 2003 consisted of Bolivia, Colombia, Costa Rica, Ecuador, El Salvador, the European Union, Guatemala, Honduras, Mexico, Nicaragua, Panama, Peru, the United States, Vanuatu, and Venezuela, would be "committed to ensure the sustainability of tuna stocks in the eastern Pacific Ocean and to progressively reduce the incidental mortalities of dolphins in the tuna fishery of the eastern Pacific Ocean to levels approaching zero; to avoid, reduce and minimize the incidental

catch and the discard of juvenile tuna and the incidental catch of non-target species, taking into consideration the interrelationship among species in the ecosystem."

At its 70th meeting, on June 24-27, 2003, the Commission adopted the Resolution on the Adoption of the Convention for the Strengthening of the Inter-American Tropical Tuna Commission Established by the 1949 Convention between the United States of America and the Republic of Costa Rica ("the Antigua Convention"). This convention will replace the original one 15 months after it has been ratified by seven signatories that are Parties to the 1949 Convention.

To carry out its responsibilities, the IATTC conducts a wide variety of investigations at sea, in ports where tunas are landed, and in its laboratories. The research is carried out by a permanent, internationally-recruited research and support staff selected by the Director, who is directly responsible to the Commission.

The scientific program is now in its 53rd year. The results of the IATTC staff's research are published in the IATTC's Bulletin and Stock Assessment Report series in English and Spanish, its two official languages, in its Special Report and Data Report series, and in books, outside scientific journals, and trade journals. Summaries of each year's activities are reported upon in the IATTC's Annual Reports and Fishery Status Reports, also in the two languages.

MEETINGS

IATTC and AIDCP meetings

The following meetings took place in Del Mar, California, USA, during October 2003. The minutes or reports of these meetings are on the IATTC's web site, www.iattc.org.

Date	Meeting
Oct. 6-7	71st meeting of the IATTC
Oct. 8	14th meeting of the Permanent Working Group on Tuna Tracking
Oct. 8-9	34th meeting of the International Review Panel
Oct. 11	10th meeting of the Parties to the AIDCP

A Resolution on Conservation of Tuna in the Eastern Pacific Ocean was adopted at the 71st meeting of the IATTC. This resolution established a closure of the purse-seine fishery for tunas in part of the EPO in December 2003, and a closure of that fishery in the entire EPO from August 1 through September 11, 2004, and catch limits for the longline fleets.

A Workshop on Reference Points for Tunas and Billfishes was held in La Jolla, California, USA, on October 27-29, 2003. Dr. Mark N. Maunder was the principal organizer of this workshop. The other participants included Drs. Robin Allen, Richard B. Deriso, Shelton J. Harley, and Michael G. Hinton, Messrs. Simon D. Hoyle and Patrick K. Tomlinson, and Ms. Jenny M. Suter of the IATTC, and representatives of the Instituto Español de Oceanografía, the International Commission for the Conservation of Atlantic Tunas, the Secretariat for the Pacific Community, National Taiwan University, and the U.S. National Marine Fisheries Service (Honolulu, La Jolla, and Miami).

Other meetings

Mr. Brian S. Hallman participated in the Fifth Session of the Preparatory Conference for the Establishment of the Commission for the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific in Rarotonga, Cook Islands, on September 29-October 3, 2003. As a result of developments at this meeting, Japan indicated that it was prepared to join the new Commission, which is likely to be established during 2004.

Dr. Mark N. Maunder and Mr. Simon D. Hoyle participated in EURING Technical Meeting 2003: the Quantitative Study of Marked Individuals in Ecology, Evolution, and Conservation Biology in Radolfzell am Bodensee, Germany, on October 6-11, 2003. (EURING is an acronym for European Union for Bird Ringing.) They presented a talk entitled "A Bayesian Integrated Population Dynamics Model to Analyze Data for the Spotted Dolphin (*Stenella attenuata*) in the Northeastern Pacific Ocean" and a poster entitled "AD Model Builder: a Tool for Fitting Custom-Built Highly-Parameterized Nonlinear Models."

Dr. Richard B. Deriso participated in a meeting of the Scientific and Statistical Committee of the Western Pacific Fishery Management Council of the United States in Honolulu, Hawaii, USA, on October 14-16, 2003. His travel expenses were paid by the Council.

Dr. Martín A. Hall participated in a meeting of the Scientific Advisory Council of Seafood Watch at the Monterey Bay Aquarium, Monterey, California, USA. on October 15-17. His travel expenses were paid by Seafood Watch.

Dr. Robert J. Olson participated in the planning meeting of a new GLOBEC (Global Ocean Ecosystem Dynamics) project, CLIOTOP (Climate Impacts on Oceanic Top Predators), in Sète, France, on November 4-7, 2003. The general objective of CLIOTOP is to organize a large-scale worldwide comparative effort aimed at identifying and elucidating the key processes involved in ecosystem functioning and, in particular, determining the impact of climate variability at various scales on the structure and function of open-ocean pelagic ecosystems and their top predator species (CLIOTOP Science Plan).

Dr. Richard B. Deriso participated in a meeting of the Ocean Studies Board of the National Research Council in Washington, D.C., USA, on November 5-7, 2003. His travel expenses were paid by the National Research Council.

Drs. Martín A. Hall, Shelton J. Harley, Mark N. Maunder, and Robert J. Olson and Mr. Simon D. Hoyle, participated in a conference entitled "Marine Biodiversity: Using the Past to Inform the Future," held at the Scripps Institution of Oceanography, La Jolla, California, USA, on November 14-17, 2003. Dr. Maunder gave a presentation entitled "Is the rapid worldwide depletion of 'pelagic' predatory fish communities real?" The presentation was based on a manuscript by himself and Drs. John R. Sibert, Alain Fonteneau, John Hampton, Pierre M. Kleiber, and Shelton J. Harley, which was written in response to a letter published in Nature, Vol. 423, No. 6937, pages 280-283, by Ransom A. Myers and Boris Worm.

Dr. Robin Allen attended the 18th regular meeting of the International Commission for the Conservation of Atlantic Tunas in Dublin, Ireland, on November 17-24, 2003.

Dr. Shelton J. Harley participated in the VI Foro Nacional sobre el Atún, held in Mazatlan, Mexico, on December 3-5, 2003. He presented a talk entitled "Stock Assessment of Tunas in the Eastern Pacific Ocean," based on work done by Dr. Mark N. Maunder and himself.

Dr. Robert J. Olson participated in a meeting of the principal investigators of a food-web study in Honolulu, Hawaii, USA, on December 11-13, 2003. The three-year project, which is funded by a grant from the Pelagic Fisheries Research Program of the University of Hawaii, involves research on the trophic structure (including plankton, forage organisms, and upper-level predators) in the pelagic equatorial eastern, central, and western Pacific Ocean, using stable carbon and nitrogen isotopes and diet analysis. The principal investigators are Dr. Valerie Allain, Secretariat of the Pacific Community, Dr. Felipe Galván-Mangaña, Centro Interdisciplinario de Ciencias Marinas, Instituto Politécnico Nacional (México), Dr. Olson, IATTC, and Dr. Brian N. Popp, University of Hawaii. Dr. Brian Fry of Louisana State University, an internationally-recognized expert in the application of stable isotope techniques to ecological studies, also participated in the meeting. Dr. Olson's travel expenses were paid by project.

Dr. Michael D. Scott participated in the First International Workshop on the Biology of *Kogia*, which took place in Greensboro, North Carolina, USA, on December 13, 2003. He presented a paper on the release and tracking of a rehabilitated pygmy sperm whale.

Dr. Cleridy E. Lennert-Cody and Dr. Scott participated in the 15th Biennial Conference on the Biology of Marine Mammals, also in Greensboro, on December 15-19, 2003. Dr. Lennert-Cody gave a talk based on a paper prepared by herself and Dr. Michael D. Scott entitled "Evasion of purse-seine encirclement by spotted dolphins: influences of learning and fishing pressure." Dr. Scott was co-author, with Ann Pabst, William McLellan, Erin Meagher, Andrew Westgate, and Karin Forney, of a paper entitled "Measuring temperature and heat flux from dolphins in the eastern tropical Pacific: is thermal stress associated with chase and capture in the tuna purse-seine fishery?" that was presented at the meeting. In addition, he served on the Scientific Program Committee for the Conference.

DATA COLLECTION

The IATTC has field offices at Las Playas and Manta, Ecuador; Ensenada and Mazatlan, Mexico; Panama, Republic of Panama; Mayaguez, Puerto Rico, USA; and Cumaná, Venezuela.

Personnel at these offices collected 196 length-frequency samples and abstracted logbook information for 229 trips of commercial fishing vessels during the fourth quarter of 2003.

Also during the fourth quarter members of the field office staffs placed IATTC observers on 134 fishing trips by vessels that participate in the AIDCP On-Board Observer Program. In addition, 146 IATTC observers completed trips during the quarter, and were debriefed by field office personnel.

Surface fleet and surface catch and catch-per-unit-of-effort statistics

Statistical data are continuously being collected by personnel at the IATTC's field stations and processed at its headquarters in La Jolla. As a result, estimates of fisheries statistics with varying degrees of accuracy and precision are available, the most accurate and precise being those made after all available information has been entered into the data base, processed, and verified. The estimates for the current quarter are the most preliminary, while those made six

months to a year after monitoring of the fishery are much more accurate and precise. While it may require a year or more to obtain some final information, much of the catch information is processed and available within two to three months of the return of a vessel from a fishing trip.

Fleet statistics

The estimated total carrying capacity of the vessels that fished in the eastern Pacific Ocean (east of 150°W; EPO) during 2003 is about 203,900 cubic meters (m^3) (Table 1). The weekly average at-sea capacity for the fleet, for the weekly periods ending October 5 through December 28, was about 135,300 m^3 (range: 97,300 to 153,000 m^3). The changes of flags and vessel names and additions to and deletions from the IATTC's fleet list during the fourth quarter of 2003 are given in Table 2.

Catch and catch-per-unit-of-effort statistics

Catch statistics

The estimated total retained catches of tunas in the EPO during January 1-December 28, 2003, and the corresponding periods of 1998-2002, in metric tons, were:

Species	2003	1998-2002			Weekly average, 2003
		Average	Minimum	Maximum	
Yellowfin	394,800	327,400	266,000	413,900	7,600
Skipjack	248,900	180,300	131,200	263,400	4,800
Bigeye	37,600	44,600	31,600	70,100	700

Summaries of the preliminary estimated retained catches, by flag of vessel, are shown in Table 3.

Catch-per-unit-of-effort statistics based on vessel logbook abstracts

The logbook data used in the analyses have been obtained with the cooperation of vessel owners and captains. The catch and effort measures used by the IATTC staff are based on fishing trips landing predominantly yellowfin, skipjack, bigeye, and bluefin tuna. The great majority of the purse-seine catches of yellowfin, skipjack, and bigeye are made by Class-6 vessels (vessels with well volumes greater than 425 m^3), and only data for Class-6 purse seiners are included herein for comparisons among years. There are now far fewer pole-and-line vessels than in previous years, so the data for these vessels are combined without regard to size classes. There are no adjustments included for other factors, such as type of set or vessel operating costs and market prices, which might identify whether a vessel was directing its effort toward a specific species.

Preliminary estimates of the catches per unit of effort (CPUEs), expressed as catches per day's fishing by purse seiners, of yellowfin (Table 4), skipjack (Table 5), and bigeye (Table 6) in the EPO during the first three quarters of 2003 and the corresponding periods of 1998-2002, in metric tons, were:

Species	Region	2003	1998-2002		
			Average	Minimum	Maximum
Yellowfin	N of 5°N	24.5	19.1	13.7	28.6
	S of 5°N	5.3	6.7	5.0	9.1
Skipjack	N of 5°N	3.3	2.5	1.5	3.9
	S of 5°N	12.3	10.7	5.5	21.4
Bigeye	EPO	2.4	2.8	1.3	4.8

Preliminary estimates of the CPUEs, by pole-and-line vessels, of yellowfin (Table 4) and skipjack (Table 5) in the EPO during the first three quarters of 2003 and the corresponding periods of 1998-2002, in metric tons, were:

Species	Region	2003	1998-2002		
			Average	Minimum	Maximum
Yellowfin	EPO	0.9	2.2	1.5	3.4
Skipjack	EPO	3.2	1.0	0.2	2.0

Size compositions of the surface catches of tunas

The methods for sampling the catches of tunas are described in the IATTC Annual Report for 2000. Briefly, the fish in a well of a purse seiner or pole-and-line vessel are selected for sampling only if all the fish in the well were caught during the same calendar month, in the same type of set (floating-object, unassociated school, or dolphin), and in the same sampling area. These data are then categorized by fishery (Figure 1).

Data for fish caught during the third quarter of 1998-2003 are presented in this report. Two length-frequency histograms are presented for yellowfin, skipjack, and bigeye . The first shows the data by fishery (area, gear type, and set type) for the third quarter of 2003 and the second shows the third-quarter catches for the current year and the previous five years. There were 116 wells sampled during the third quarter of 2003. No samples were taken from the negligible catches of yellowfin and skipjack taken by pole-and-line vessels during the third quarter. The estimates of the size distributions of these catches were obtained by using length-frequency data from fish caught in unassociated schools by purse seiners.

There are ten surface fisheries for yellowfin defined for stock assessments: four floating-object, two unassociated school, three dolphin, and one pole-and-line (Figure 1). The last fishery includes all 13 sampling areas. Of the 245 wells sampled, 159 contained yellowfin. The estimated size compositions of these fish during the third quarter of 2003 are shown in Figure 2a. The catches of yellowfin remained high in dolphin sets in the Northern and Inshore areas, where some of the largest fish were encountered. The largest fish, on average, were caught in the dolphin fishery of the South. A distinct mode between 40 and 60 cm was present in all of the floating-object fisheries. A mode of fish between 60 and 110 cm was also present in the Inshore dolphin fishery.

The estimated size compositions of the yellowfin caught by all fisheries combined during the third quarter of 1998-2003 are shown in Figure 2b. Four modes of fish were evident. The

average weight remained low due to the increase of catches of smaller fish in floating-object sets and in the Inshore dolphin fishery.

There are eight fisheries for skipjack defined for stock assessments: four floating-object, two unassociated school, one dolphin, and one pole-and-line (Figure 1). The last two fisheries include all 13 sampling areas. Of the 245 wells sampled, 133 contained skipjack. The estimated size compositions of these fish during the third quarter of 2003 are shown in Figure 3a. More than half of the skipjack catches were taken from the floating object fisheries in the Northern and Equatorial areas. A mode of fish more than 55 cm long was present in the floating-object fisheries, especially that of the Equatorial area. Negligible amounts of skipjack (less than 300 metric tons (t)) were taken by pole-and-line vessels.

The estimated size compositions of the skipjack caught by all fisheries combined during the third quarter of 1998-2003 are shown in Figure 3b. The larger skipjack mentioned above are evident in the size distribution for 2003.

There are seven surface fisheries for bigeye defined for stock assessments: four floating-object, one unassociated school, one dolphin, and one pole-and-line (Figure 1). The last three fisheries include all 13 sampling areas. Of the 245 wells sampled, 56 contained bigeye. The estimated size compositions of these fish during the third quarter of 2003 are shown in Figure 4a. The majority of the catch of bigeye was taken in floating-object sets in the Northern and Southern areas, and most of these fish were between 50 and 100 cm, with a large mode of fish between 50 and 60 cm. Appreciable amounts were also caught in the Equatorial floating-object fishery. Negligible amounts of bigeye were caught in the Inshore floating-object fishery and in sets on unassociated schools (less than 400 t each). There were no recorded catches of bigeye in dolphin sets or by pole-and-line vessels.

The estimated size compositions of the bigeye caught by all fisheries combined during the third quarter of 1998-2003 are shown in Figure 4b. The average weight of bigeye remained low, as only small amounts of large bigeye were caught.

The estimated retained catch of bigeye less than 60 cm in length during the first three quarters of 2003 was 10,582 t, or about 45 percent of the estimated total catch of bigeye by purse seiners. The corresponding amounts for the first three quarters of 1998-2002 ranged from 3,147 to 12,489 t.

Pacific bluefin are caught by surface gear by both commercial and sport-fishing vessels off California and Baja California from about 23°N to 35°N, with most of the catch being taken during May through October. During 2003 bluefin were caught between 25°N and 31°N from January through November. The majority of the catch of bluefin by commercial and recreational vessels was taken during July to September. In the past, commercial and recreational catches have been reported separately. In 2003, however, 64 samples were taken from recreational vessels and only 7 from commercial vessels (from the total of 872 samples of commercial catches for 2003), making it infeasible to estimate the catches and size compositions separately. Therefore, the commercial and recreational catches of bluefin were combined for the 1998-2003 period. The estimated size compositions are shown in Figure 5. The 2003 commercial catch (3,247 t) of bluefin far exceeded the recreational catch of that species (391 t).

Observer program

Coverage

The Agreement on the International Dolphin Conservation Program (AIDCP) requires 100-percent coverage by observers on trips by purse seiners with carrying capacities greater than 363 metric tons that fish for tunas in the eastern Pacific Ocean (EPO). This mandate is carried out by the AIDCP On-Board Observer Program, made up of the IATTC's international observer program and the observer programs of Ecuador, the European Union, Mexico, and Venezuela. The observers are biologists trained to collect a variety of data on the mortalities of dolphins associated with the fishery, sightings of dolphin herds, catches of tunas and bycatches of fish and other animals, oceanographic and meteorological data, and other information used by the IATTC staff to assess the conditions of the various stocks of dolphins, study the causes of dolphin mortality, and assess the effect of the fishery on tunas and other components of the ecosystem. The observers also collect data relevant to compliance with the provisions of the AIDCP, and data required for the tuna-tracking system established under the AIDCP, which tracks the "dolphin-safe" status of tuna caught in each set from the time it is captured until it is unloaded (and, after that, until it is canned and labeled).

In 2003 the observer programs of the European Union, Mexico, and Venezuela were to sample half, and that of Ecuador approximately one-third, of the trips by vessels of their respective fleets, while IATTC observers were to sample the remainder of those trips. Except as described in the next paragraph, the IATTC is to cover all trips by vessels registered in other nations that are required to carry observers.

At the fifth meeting of the Parties to the AIDCP in June 2001, observers from the international observer program of the South Pacific Forum Fisheries Agency (FFA) were approved to collect pertinent information for the On-Board Observer Program, pursuant to Annex II (9) of the AIDCP in cases for which the Director determines that the use of an observer from the AIDCP On-Board Observer Program is not practical.

Observers from the On-Board Observer Program departed on 192 fishing trips aboard purse seiners covered by that program during the fourth quarter of 2003. Preliminary coverage data for these vessels during the quarter are shown in Table 7.

Training

Dr. Martín A. Hall and Messrs. David A. Bratten and Ernesto Altamirano Nieto met with Messrs. Karl Staisch of the Forum Fisheries Agency (FFA), Honiara, Solomon Islands, Peter Sharples of the Secretariat of the Pacific Community, Noumea, New Caledonia, and Gordon Yamasaki of the U.S. National Marine Fisheries Service, American Samoa, in La Jolla on October 24, 2003, to discuss future training of FFA observers who may accompany U.S. vessels based in the western Pacific Ocean fishing inside the AIDCP Agreement Area.

IATTC staff members conducted an observer training course in Mazatlan, Mexico, from November 24 to December 11, 2003, for 10 trainees.

RESEARCH

Bluefin tagging

Bluefin tuna were tagged with conventional tags in the eastern Pacific Ocean (EPO) during 1953-1980 by the IATTC and various other organizations and in the western Pacific Ocean (WPO) during 1979-1988 by the IATTC and the National Research Institute of Far Seas Fisheries (NRIFSF) of Japan. The results of these experiments are discussed in IATTC Bulletin, Vol. 20, No. 1.

Employees of the Monterey Bay Aquarium have placed conventional IATTC tags on bluefin caught in the EPO by the chartered recreational fishing vessel *Shogun* during each year of the 1999-2003 period (and also tags of the U.S. National Marine Fisheries Service during 1999 and 2003). Information on the releases and recaptures of the fish with IATTC tags, by year of release and by area and year of recapture, is given in Table 8.

The NRIFSF and various other organizations in Japan have continued to tag bluefin with conventional tags in the WPO after 1988. Information on the years of release and recapture for the fish recaptured in the EPO is given in Table 9.

Nearly all of the commercial catch of bluefin in the EPO is now transferred at sea to pens, which are then towed to sheltered locations in northern Mexico. The fish are held and fattened in the pens for several months, and then removed for sale at higher prices. This practice also takes place in Japan, but to a lesser extent (and also in other parts of the world for Atlantic bluefin and southern bluefin) (Farwell, Charles J., 2001, Tunas in captivity, *In* Block, Barbara A., and E. Donald Stevens (editors), Tuna: Physiology, Ecology, and Evolution, Academic Press, San Diego: 391-412). This practice has some important effects on the results obtainable from tagging programs conducted with conventional tags.

In nearly every case, the fish in the pens in northern Mexico are all removed for sale during the period from late November through early March. When a tagged fish is found while the fish are being removed from a pen, information on that fish is furnished to the IATTC staff. The fish in a pen are usually caught by one or two boats, but sometimes in several sets made over a period of several weeks, so it not always possible to tell where and when they were caught..

The principal types of information obtainable from tagging with conventional tags are movements, growth, and attrition.

Movements

Logbook information is available from the boats, so ranges of possible locations and dates of recapture can be ascertained. This information is not of great importance in the EPO, however, as the range of the fishery is so restricted.

Growth

The tagged fish are measured and weighed on a digital platform scale when they are removed from the pens, and in most cases that information is made available to IATTC staff

members. Nevertheless, the data should probably not be used for growth studies because the rates of growth in the pens are not necessarily the same as the rates of growth in the wild. (Exceptions might be made for fish that were at liberty for long periods and confined for only short periods in the pens.)

Attrition

Attrition includes natural mortality, fishing mortality, and emigration. Adjustments should be made to compensate for shedding of the tags. The fact that most of the fish caught in the EPO are confined in pens would introduce severe complications into any attempt to estimate attrition in that area because the survival rate of the fish in the pens is likely to be different from that of fish in the wild. Also, the shedding rate may be greater for the fish confined in the pens because the fish are handled more than once and because the tags may be shed due to abrasion against the sides of the pens. In addition, some fish that are confined in the pens might have otherwise commenced to emigrate to the WPO.

In spite of the above, it not suggested that the tagging of bluefin with conventional tags in the EPO be suspended. The cost of this program is negligible, and useful data are still obtained on movements and growth for the fish that are recaptured in the EPO by the recreational fishery, and particularly for those that are recaptured in the WPO.

Electronic tags

These tags produce useful information on movements and behavior that is not obtainable from conventional tags. When a fish with an archival tag is found in a pen, the date and the approximate location of recapture can be ascertained from the information on the tag. When this information is compared with logbook information from the vessels a more precise location of recapture can be established.

Bluefin are being tagged with archival and pop-up tags in the EPO as part of the Tagging of Pacific Pelagics program of the Census of Marine Life by personnel of the Hopkins Marine Station of Stanford University and the Monterey Bay Aquarium.

Bluefin are also being tagged with archival tags in the WPO by the NRIFSF. Information on the four bluefin with archival tags that were released in the WPO and recaptured in the EPO is given in Table 9. The fourth fish was released at approximately 35°00'N-139°30'E on November 17, 2001, at which time it was 46 cm long. It was recaptured at 30°42'N-117°20'W on August 15, 2003. It was found in a pen on January 1, 2004, at which time it was 91 cm long.

Early life history studies

Yellowfin broodstock

The yellowfin broodstock in Tank 1 (1,362,000 L) at the Achotines Laboratory spawned daily during the quarter. Spawning occurred between 9:20 and 10:25 p.m. The water

temperatures in the tank ranged from 27.7° to 28.6°C. The numbers of eggs collected after each spawning event ranged from about 47,000 to 563,000.

On November 19 two fish (5 and 14-kg) were added to the broodstock population in Tank 1. During the quarter four fish died in Tank 1 from striking the tank wall, including one 55-kg male and three 8- to 13-kg archival-tagged fish (two males and one fish of unknown sex). At the end of the quarter there were 19 fish in three size groups in Tank 1, including 3 75- to 90-kg fish, 2 48-kg fish, and 14 7- to 17-kg fish. Ten archival-tagged fish remain in Tank 1.

Fifteen yellowfin are being held in Tank 2 as reserve broodstock.

Rearing of yellowfin eggs, larvae, and juveniles

During the quarter the following parameters were recorded for most spawning events: times of spawning, egg diameter, duration of egg stage, hatching rate, lengths of hatched larvae, and duration of yolk-sac stage. The weights of the eggs, yolk-sac larvae, and first-feeding larvae, and the lengths and selected morphometrics of these, were measured periodically.

During 2001 and 2002 several experiments were conducted to compare the effects of probiotics (beneficial bacteria) on the survival of yellowfin larvae. The results of those experiments were inconclusive, so similar trials were conducted again during the third quarter of 2003. Two 7-day feeding trials were conducted to compare the survival of yellowfin larvae reared with probiotics *versus* those reared without probiotics (control). The results of these trials were mixed. In the first trial the average survival of the larvae treated with probiotics was four times that of the control fish, but the results were highly variable and not statistically significant. In the second trial, the average survival was slightly higher in the control group. One additional probiotic trial is planned for the first quarter of 2004.

Studies of snappers

The work on snappers (*Lutjanus guttatus*) is carried out by the Dirección General de Recursos Marinos y Costeros de Panamá.

During the quarter the 29 fish of the snapper broodstock established in 1996 continued to spawn intermittently. The larvae that hatched from fertilized eggs of this broodstock in August 2002 were reared to the juvenile stage. In early February 2003 about 3,000 of these juveniles were transferred to four floating pens in an estuarine mangrove area about 12 km from the Achotines Laboratory for growth studies. This project was funded by a grant from Proyectos de Pobreza Rural of the Autoridad Nacional del Ambiente de Panamá. In May about half of these succumbed to an apparent bacterial infection. The project was ended in November; at that time the remaining juveniles averaged 30 cm in total length and 400 g in weight.

Twenty-five snappers that had been reared from eggs to mature adults in two 12,000-L tanks remained in Tank 4 during the quarter. These fish had hatched in October 1998 from eggs obtained from the original snapper broodstock, which that was established in 1996, and continue to spawn sporadically.

Sailfish capture trials

Four dedicated sailfish capture trips were attempted during the quarter, but no sailfish were caught.

Visitors to the Achotines Laboratory

On October 13, 2003, Mr. Fernando Pascal, Director of the Smithsonian Institution Office of Facilities Engineering and Operations (OFEO-SI) visited the Achotines Laboratory. He was accompanied by Ms. Sheryl Kolasinski, Director of the Office for Project Management, OFEO-SI, and Mr. Derek Ross, Assistant Director for Construction Management, OFEO-SI. The Smithsonian Institution is upgrading the seawater systems at several of its laboratories in the Republic of Panama, and this visit was made primarily to inspect the seawater system at the Achotines Laboratory.

Media exposure

The Achotines Laboratory was featured in an episode of "Offshore Adventures" that was shown on ESPN2 during the last week of October.

Oceanography and meteorology

Easterly surface winds blow almost constantly over northern South America, which causes upwelling of cool, nutrient-rich subsurface water along the equator east of 160ºW, in the coastal regions off South America, and in offshore areas off Mexico and Central America. El Niño events are characterized by weaker-than-normal easterly surface winds, which cause above-normal sea-surface temperatures (SSTs) and sea levels and deeper-than-normal thermoclines over much of the eastern tropical Pacific (ETP). In addition, the Southern Oscillation Indices (SOIs) are negative during El Niño episodes. (The SOI is the difference between the anomalies of sea-level atmospheric pressure at Tahiti, French Polynesia, and Darwin, Australia. It is a measure of the strength of the easterly surface winds, especially in the tropical Pacific in the Southern Hemisphere.) Anti-El Niño events, which are the opposite of El Niño events, are characterized by stronger-than-normal easterly surface winds, below-normal SSTs and sea levels, shallower-than-normal thermoclines, and positive SOIs. Two new indices, the NOI* (Progress Ocean., 53 (2-4): 115-139) and the SOI*, have recently been devised. The NOI* is the difference between the anomalies of sea-level atmospheric pressure at the North Pacific High (35°N-130°W) and Darwin, Australia, and the SOI* is the difference between the anomalies of sea-level atmospheric pressure at the South Pacific High (30°S-95°W) and Darwin. Ordinarily, the NOI* and SOI* values are both negative during El Niño events and positive during anti-El Niño events.

Very strong El Niño events occurred in 1982-1983 and 1997-1998, which has led some scientists to suspect that these were related to changes resulting from human activity, such as global warming. However, recent studies of fossil coral oxygen isotopic records at Palmyra Island, located at about 6°N-162°W, indicate that during the last 1,100 years there have been periods in which there have been relatively strong and weak and relatively frequent and infrequent El Niño events (Nature, 424: 271-276), so it is not necessarily likely that there will be more strong El Niño episodes in the near future.

Each of the four El Niño events during the 1969-1983 period was followed by greater-than-average recruitment of yellowfin in the eastern Pacific Ocean two years later (Japan. Soc. Fish. Ocean., Bull., 53 (1): 77-80).

The SSTs in the ETP were near normal throughout the fourth quarter. The small area of cool water that was present off Peru in September (IATTC Quarterly Report for July-September 2003: Figure 7) was absent during the fourth quarter. There were a few small, scattered areas of warm water along the Equator during the quarter, and a small area of cool water appeared off southern Mexico during December (Figure 6). The data in Table 10, for the most part, indicate that conditions were close to normal during the fourth quarter, although the SSTs were all slightly above normal. In December however, the SOI* was well above normal, a condition that is usually associated with below-normal SSTs. Positive anomalies exceeding that have occurred in only nine months (July 1948, May 1954. September 1954, February 1955, July-August 1955, May 1956, August 1971, and September 1988) since January 1948. All but one of these occurred during an anti-El Niño event (IATTC Annual Report for 2001: Figure 16). According to the Climate Diagnostics Bulletin of the U.S. National Weather Service for December 2003, "It is likely that slightly warmer-than-average conditions will persist in the equatorial Pacific into the Northern Hemisphere [until the] early spring [of] 2004."

Estimates of the mortality of dolphins due to fishing

The preliminary estimate of the incidental mortality of dolphins in the fishery in 2002, based on data from trips covered by observers from the On-Board Observer Program and the South Pacific Forum Fisheries Agency (FFA), is 1,513 animals (Table 11), a 29-percent decrease relative to the 2,128 mortalities estimated for 2001. The estimated mortalities for 1979-2002, by species and stock, are shown in Table 12a, and the standard errors of these estimates are shown in Table 12b. The estimates for 1979-1992 are based on mortality-per-set ratios. The estimates for 1993-1994 are based on the sums of the IATTC species and stock tallies and the total dolphin mortalities recorded by the Mexican observer program, prorated to species and stock. The estimates for 1995-2002 represent the sums of the observed species and stock tallies recorded by the observers of the On-Board Observer Program and the FFA. The estimates for 2001-2002, however, have been adjusted upward to compensate for the lack of observers on a few trips of large (Class-6) vessels that should have had observers aboard. The mortalities of the principal species and stocks affected by the fishery show declines in the last decade (Figure 7) similar to that for the mortalities of all dolphins combined (Figure 8). Estimates of the abundances of the various stocks of dolphins for 1986-1990 and the relative mortalities (mortality/abundance) are also shown in Table 11. The stocks with the highest levels of relative mortality were northeastern spotted dolphins and eastern spinner dolphins (0.06 percent each).

The number of sets on schools of tuna associated with dolphins made by Class-6 vessels increased by 26 percent, from 9,847 in 2001 to 12,433 in 2002, and this type of set accounted for 57.5 percent of the total number of sets made in 2002, compared to 52.9 percent in 2001. The average mortality per set decreased from 0.22 dolphins in 2001 to 0.12 dolphins in 2002. The spatial distribution of the average mortalities per set during 2002 is shown in Figure 9. Typically, patches of relatively high mortalities per set occur throughout the fishing area, but in 2002 the higher-mortality areas were concentrated around 10ºN east of 115ºW. The trends in the numbers of sets on dolphin-associated fish, mortality per set, and total mortality in recent years are shown in Figure 8.

The catches of dolphin-associated yellowfin were 28 percent greater in 2002 than in 2001. The proportion of the catch of yellowfin taken in sets on dolphins increased from 68.1

percent of the total catch by Class-6 vessels in 2001 to 79.2 percent of that catch in 2002, and the average catch of yellowfin per set on dolphins increased from 24.9 to 25.2 metric tons. The mortality of dolphins per metric ton of yellowfin caught decreased from 0.009 in 2001 to 0.005 in 2002.

GEAR PROGRAM

During the fourth quarter IATTC staff members participated in four dolphin safety-gear inspection and safety-panel alignment procedures, three aboard Mexican-flag purse seiners and one aboard a Vanuatu-flag purse seiner.

There were no AIDCP seminars for fishermen conducted during the fourth quarter.

PUBLICATIONS

IATTC Bulletins (These Bulletins, and also the two that preceded it, can be viewed on the IATTC's website, www.iattc.org.)

Olson, Robert J., and George W. Watters. 2003. A model of the pelagic ecosystem in the eastern tropical Pacific Ocean. Inter-Amer. Trop. Tuna Comm., Bull., 22 (3): 133-218.

Okamoto, Hiroaki, and William H. Bayliff. 2003. A review of the Japanese longline fishery for tunas and billfishes in the eastern Pacific Ocean, 1993-1997. Inter-Amer. Trop. Tuna Comm., Bull., 22 (4): 219-431.

Maunder, Mark N., and George M. Watters. 2003. A-SCALA: an age-structured statistical catch-at-length analysis for assessing tuna stocks in the eastern Pacific Ocean. Vol. 22, No. 5: 433-582.

IATTC Fishery Status Report

No. 1 (This report can be viewed on the IATTC's web site, www.iattc.org.)

Outside journals

Harley, S. J., and M. N. Maunder. 2003. Stock assessment of tunas in the eastern Pacific Ocean [abstract]. El Vigía [órgano informativo del Programa Nacional de Aprovechamiento de Atún y Protección de Delfines, México], 8 (19): 12.

Hinton, Michael G. 2003. Status of swordfish stocks in the eastern Pacific Ocean estimated using data from Japanese tuna longline fisheries. Mar. Fresh. Res., 54 (4): 393-399.

Kleiber, Pierre, Michael G. Hinton, and Yuji Uozumi. 2003. Stock assessment of blue marlin (*Makaira nigricans*) in the Pacific using MULTIFAN-CL. Mar. Fresh. Res., 54 (4): 349-360.

Lennert-Cody, Cleridy E., and Michael D. Scott. 2003. Evasion of purse-seine encirclement by spotted dolphins: influences of learning and fishing pressure [abstract]. 15th Biennial Conference on the Biology of Marine Mammals, Proc.: 94.

Maunder, Mark N. 2003. Paradigm shifts in fisheries stock assessment: from integrated analysis to Bayesian analysis and back again. Natural Resource Modeling, 16(4): 465-475.

Pabst, D. Ann, William A. McClellan, Erin M. Meagher, Andrew J. Westgate, Michael D. Scott, and Karin A. Forney. 2003. Measuring temperature and heat flux from dolphins in the eastern tropical Pacific: is thermal stress associated with the chase and capture in the tuna purse-seine fishery? [abstract]. 15th Biennial Conference on the Biology of Marine Mammals, Proc.: 125.

Schaefer, K. M. 2003. Estimation of the maturity and fecundity of tunas. Fisken og havet [Institute of Marine Research, Bergen, Norway], 12: 117-124.

Takagi, Motohiro, Seinen Chow, Tetsuro Okamura, Vernon P. Scholey, Akio Nakazawa, Daniel Margulies, Jeanne B. Wexler, and Nobuhiko Taniguchi. 2003. Mendelian inheritance and variation of four microsatellite DNA markers in the yellowfin tuna *Thunnus albacares*. Fish. Sci., 69 (6): 1306-1308.

Watters, George M., Robert J. Olson, Robert C. Francis, Paul C. Fiedler, Jeffrey J. Polovina, Stephen B. Reilly, Kerim Y. Aydin, Christofer H. Boggs, Timothy E. Essington, Carl J. Walters, and James F. Kitchell. 2003. Physical forcing and the dynamics of the pelagic ecosystem in the eastern tropical Pacific: simulations with ENSO-scale and global-warming climate drivers. Canad. Jour. Fish. Aquatic Sci., 60 (9**):** 1161-1175.

ADMINISTRATION

Dr. Peter A. Nelson, a graduate of Northern Arizona University, has been pursuing post-doctoral studies, sponsored jointly by the IATTC and the Center for Marine Biodiversity and Conservation, since March 20, 2003. He is working with Dr. Martín A. Hall on bycatches, particularly small bigeye, taken in association with floating objects. His ultimate goal is to find ways to reduce the bycatches.

Mr. Ryan Parker, a graduate of Pomona College, was hired as a temporary employee on December 8, 2003, to assist Messrs. Kurt M. Schaefer and Daniel W. Fuller in processing tag returns for the IATTC bigeye tagging project.

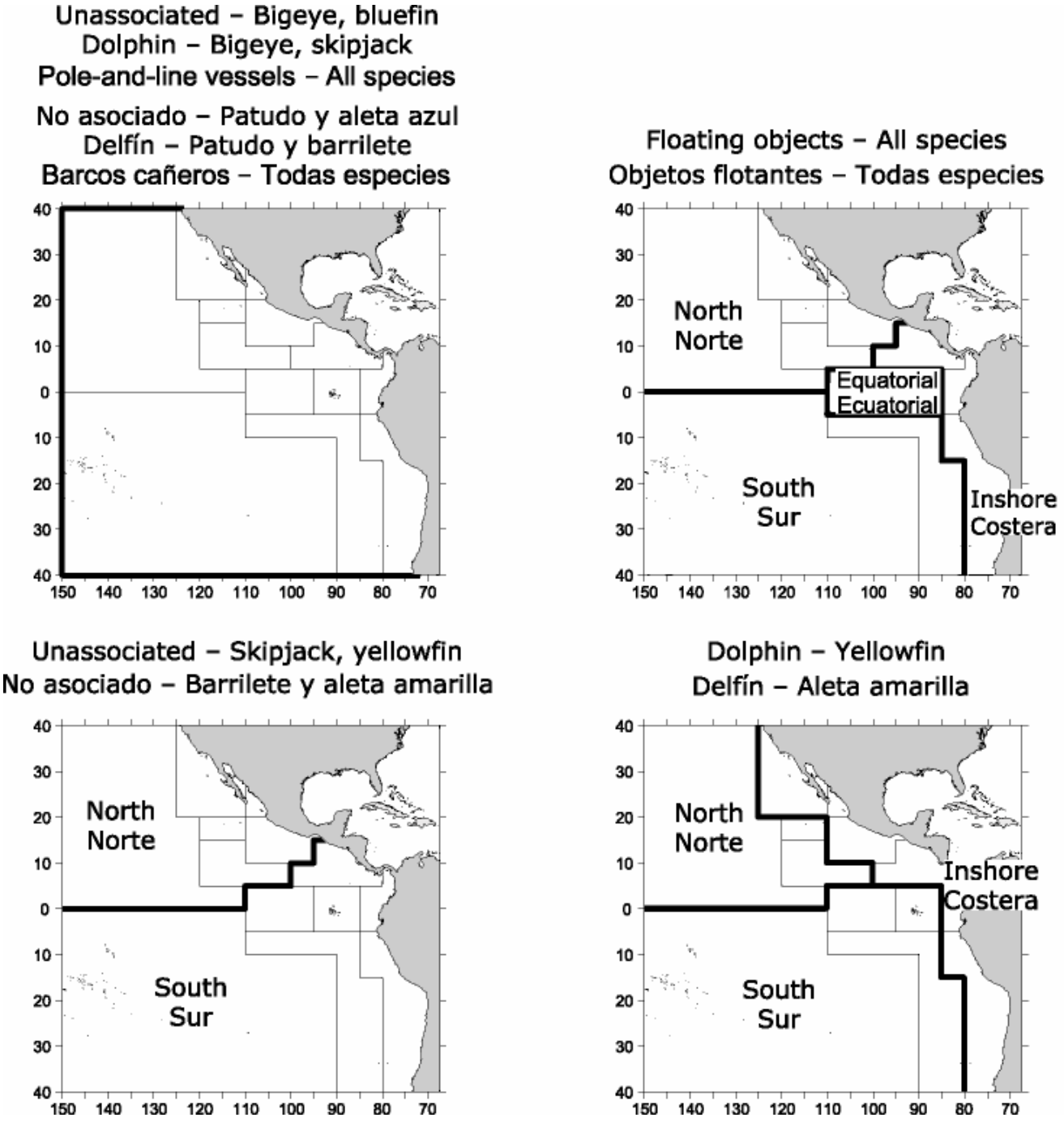

FIGURE 1. Spatial extents of the fisheries defined by the IATTC staff for stock assessment of yellowfin, skipjack, bigeye, and bluefin in the EPO. The thin lines indicate the boundaries of the 13 length-frequency sampling areas, and the bold lines the boundaries of the fisheries.
FIGURA 1. Extensión especial de las pesquerías definidas por el personal de la CIAT para la evaluación de los stocks de atún aleta amarilla, barrilete, patudo, y aleta azul en el OPO. Las líneas delgadas indican los límites de las 13 zonas de muestreo de frecuencia de tallas, y las líneas gruesas los límites de las pesquerías.

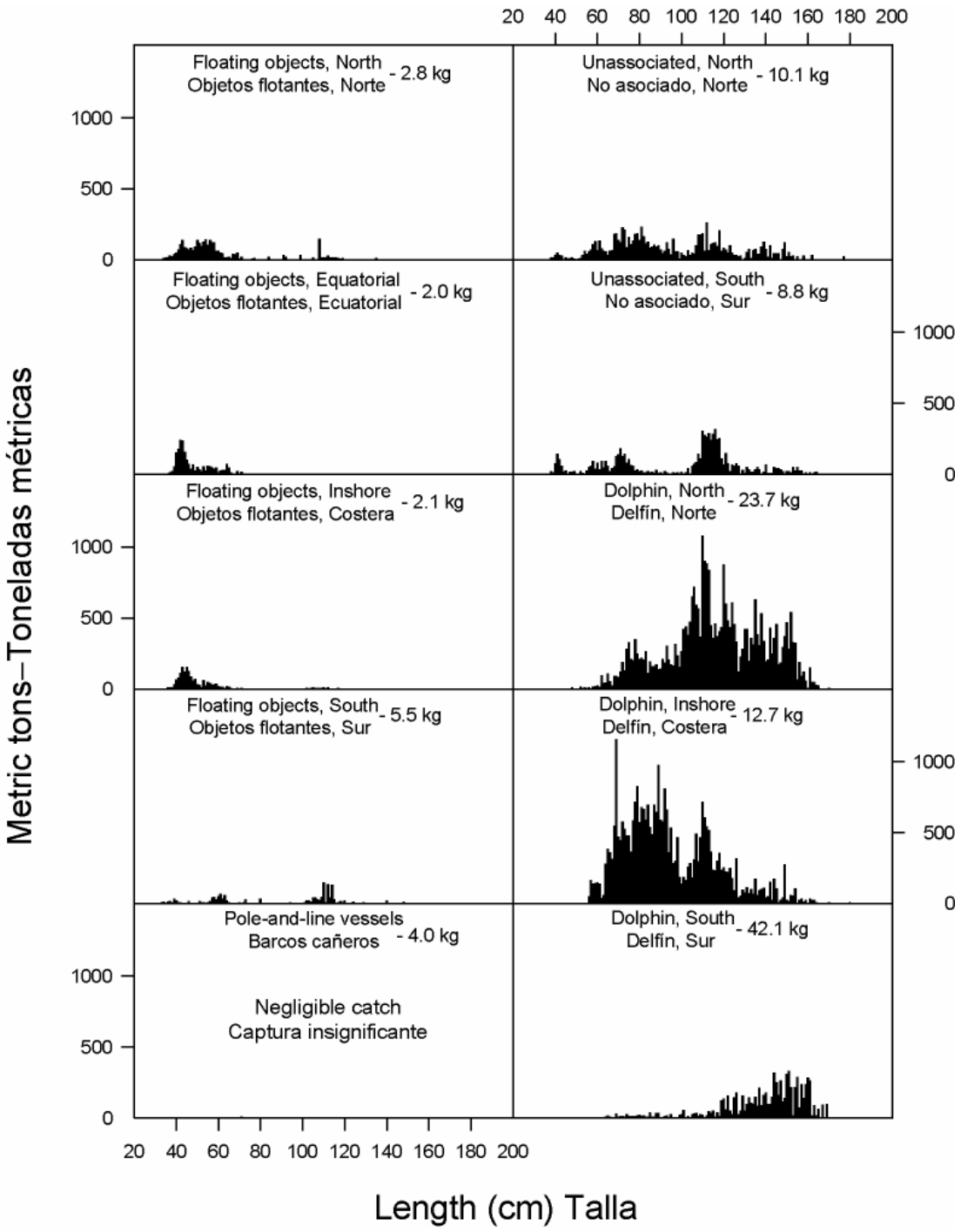

FIGURE 2a. Estimated size compositions of the yellowfin caught in each fishery of the EPO during the third quarter of 2003. The average weights of the fish in the samples are given at the tops of the panels.

FIGURA 2a. Composición por tallas estimada para el aleta amarilla capturado en cada pesquería del OPO durante el tercero trimestre de 2003. En cada recuadro se detalla el peso promedio de los peces en las muestras.

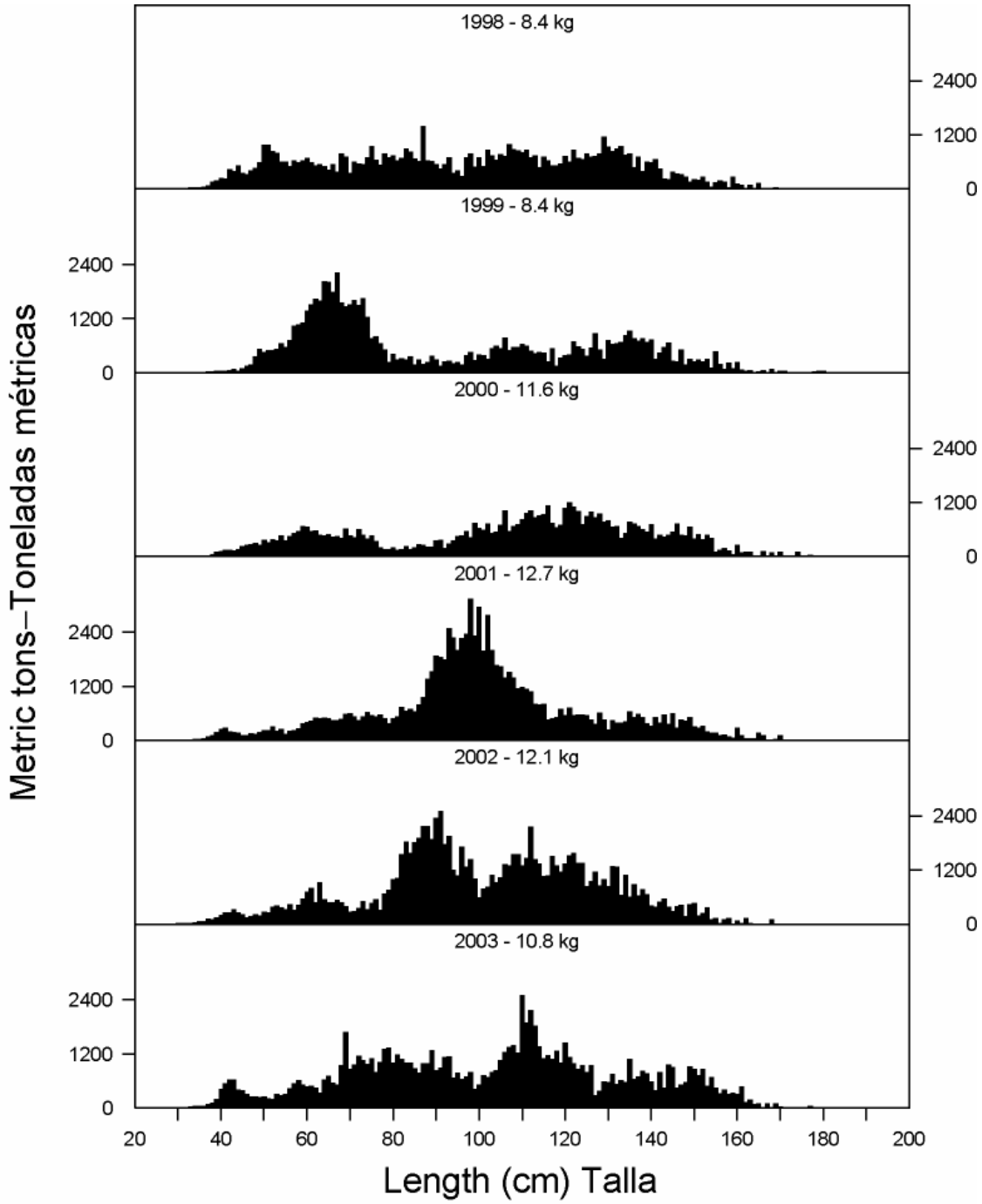

FIGURE 2b. Estimated size compositions of the yellowfin caught in the EPO during the third quarter of 1998-2003. The average weights of the fish in the samples are given at the tops of the panels.

FIGURA 2b. Composición por tallas estimada para el aleta amarilla capturado en el OPO en el tercero trimestre de 1998-2003. En cada recuadro se detalla el peso promedio de los peces en las muestras.

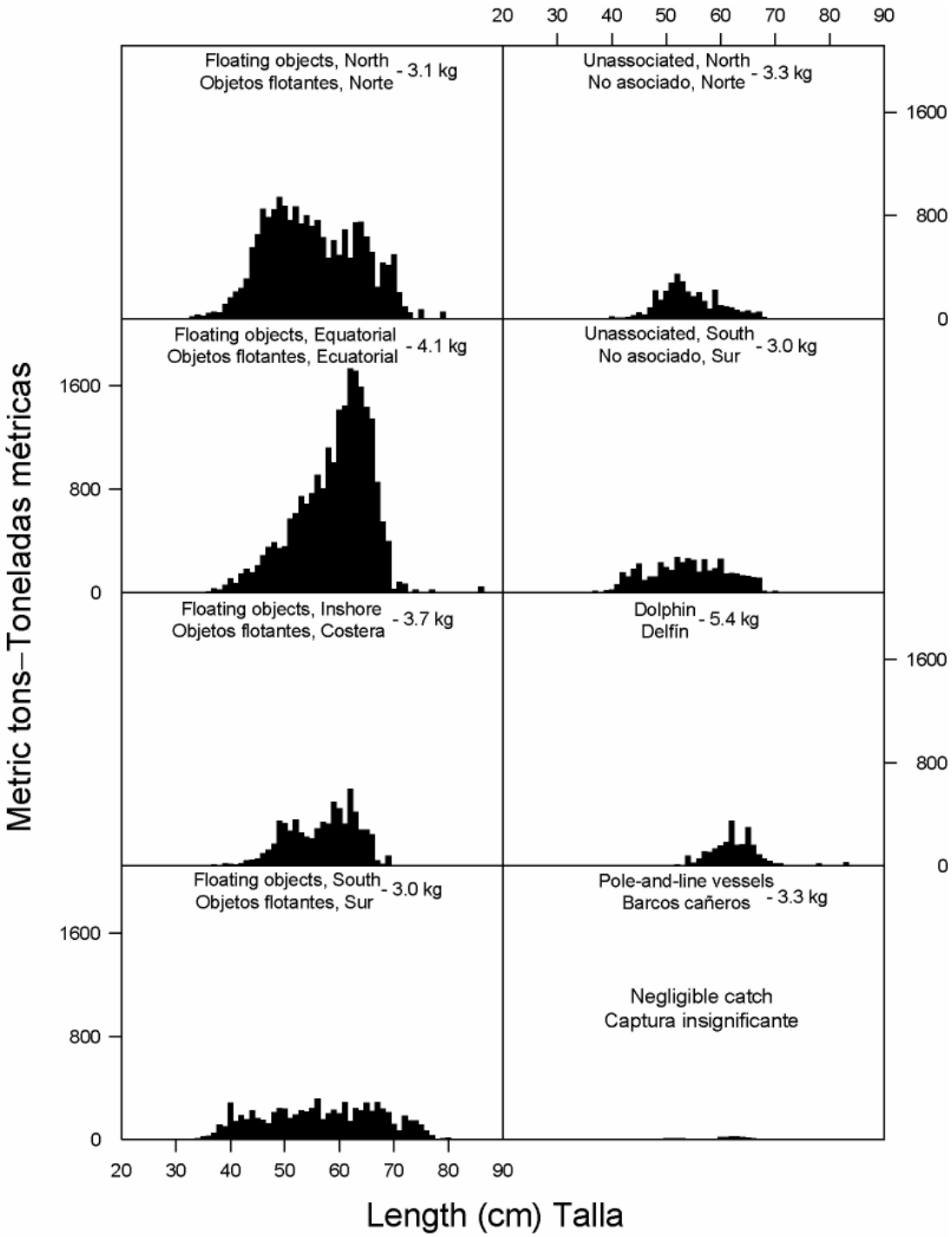

FIGURE 3a. Estimated size compositions of the skipjack caught in each fishery of the EPO during the third quarter of 2003. The average weights of the fish in the samples are given at the tops of the panels.

FIGURA 3a. Composición por tallas estimada para el barrilete capturado en cada pesquería del OPO durante el tercero trimestre de 2003. En cada recuadro se detalla el peso promedio de los peces en las muestras.

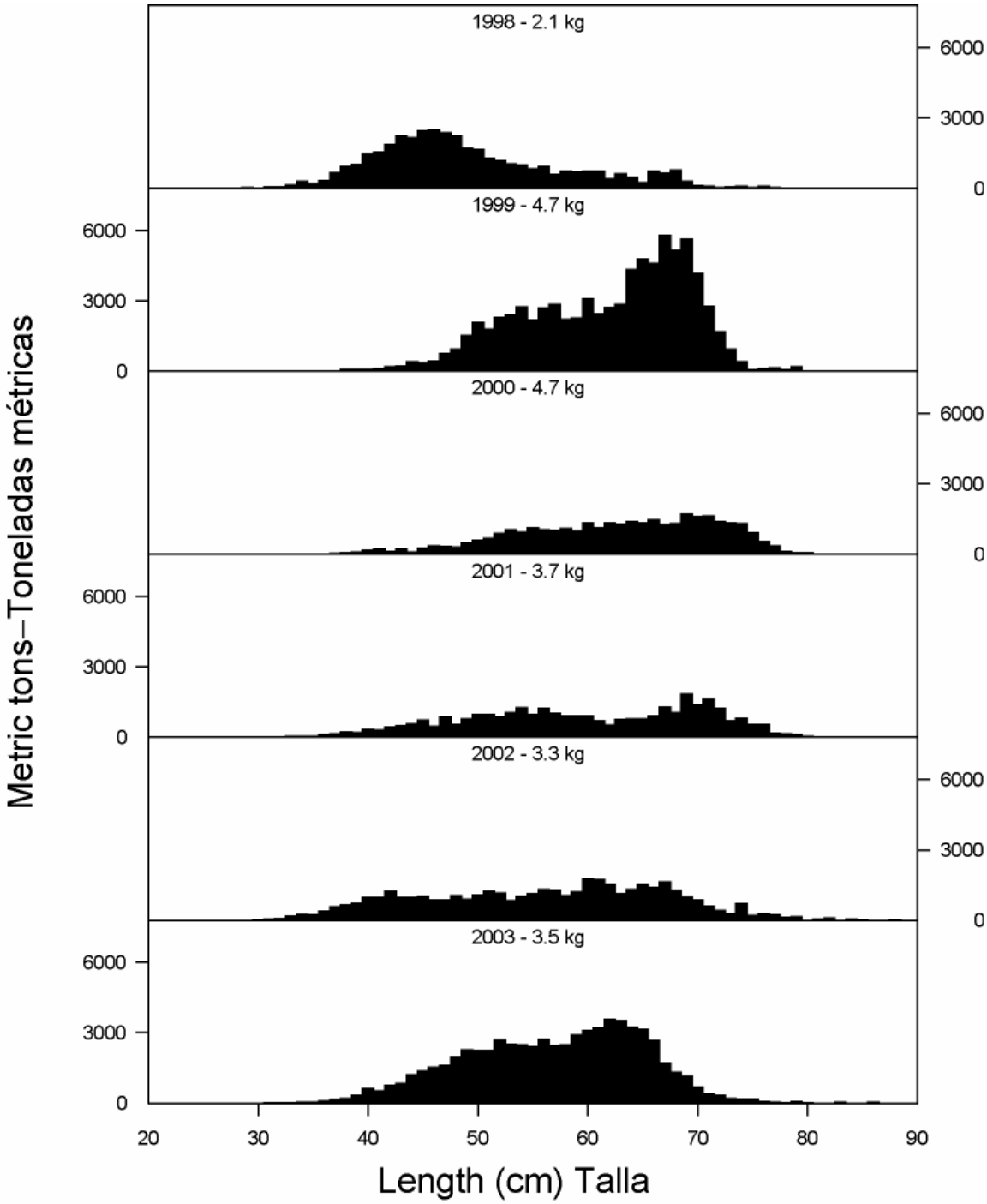

FIGURE 3b. Estimated size compositions of the skipjack caught in the EPO during the third quarter of 1998-2003. The average weights of the fish in the samples are given at the tops of the panels.

FIGURA 3b. Composición por tallas estimada para el barrilete capturado en el OPO en el tercero trimestre de 1998-2003. En cada recuadro se detalla el peso promedio de los peces en las muestras.

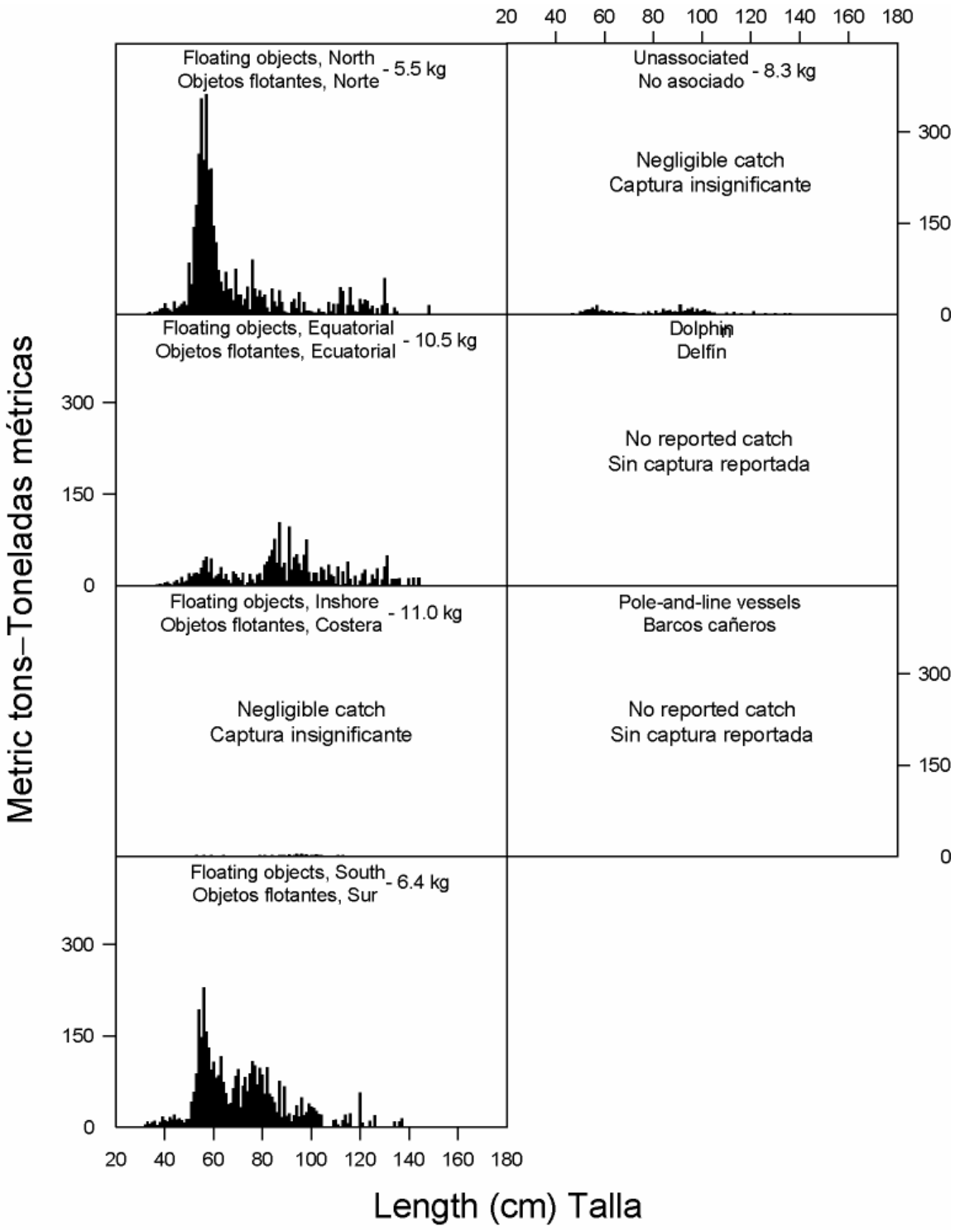

FIGURE 4a. Estimated size compositions of the bigeye caught in each fishery of the EPO during the third quarter of 2003. The average weights of the fish in the samples are given at the tops of the panels.

FIGURA 4a. Composición por tallas estimada para el patudo capturado en cada pesquería del OPO durante el tercero trimestre de 2003. En cada recuadro se detalla el peso promedio de los peces en las muestras.

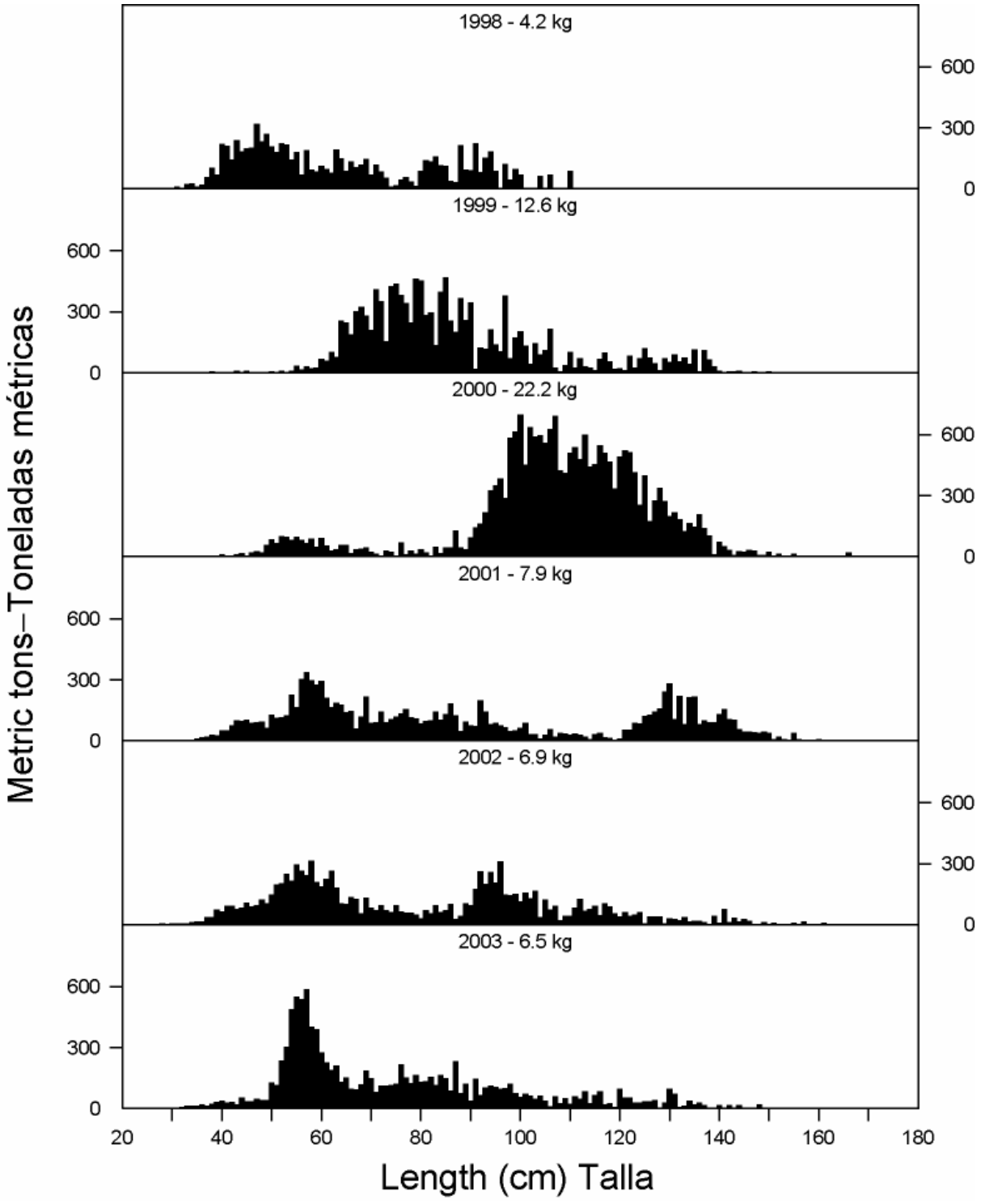

FIGURE 4b. Estimated size compositions of the bigeye caught in the EPO during the third quarter of 1998-2003. The average weights of the fish in the samples are given at the tops of the panels.

FIGURA 4b. Composición por tallas estimada para el patudo capturado en el OPO en el tercero trimestre de 1998-2003. En cada recuadro se detalla el peso promedio de los peces en las muestras.

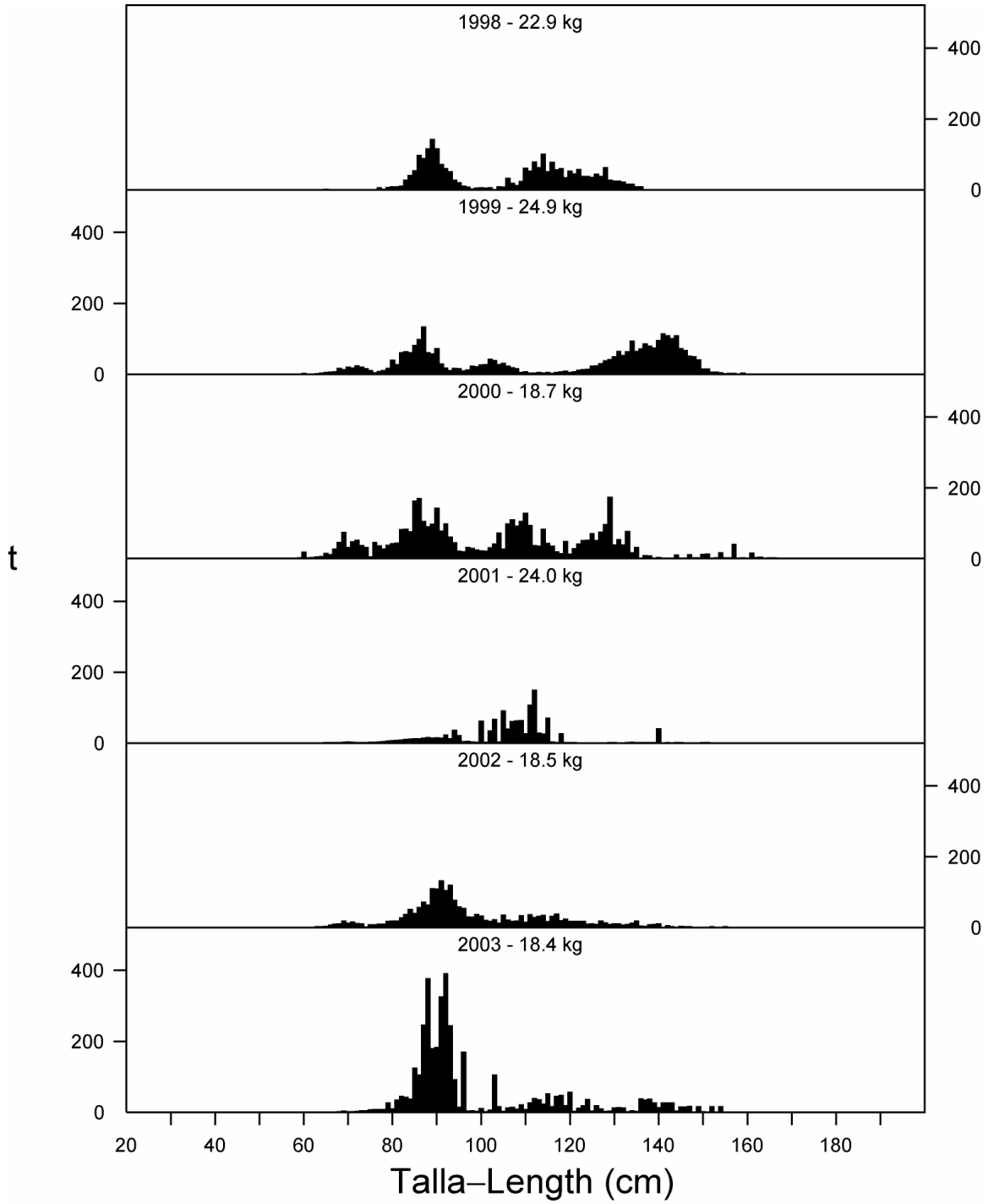

FIGURE 5. Estimated catches of Pacific bluefin by purse-seine and recreational gear in the EPO during 1998-2003. The values at the tops on the panels are average weights. t = metric tons.

FIGURA 5. Captura estimada de aleta azul del Pacífico por buques cerqueros y deportivos en el OPO durante 1998-2003. El valor en cada recuadro reprsenta el peso promedio. t = toneladas métricas.

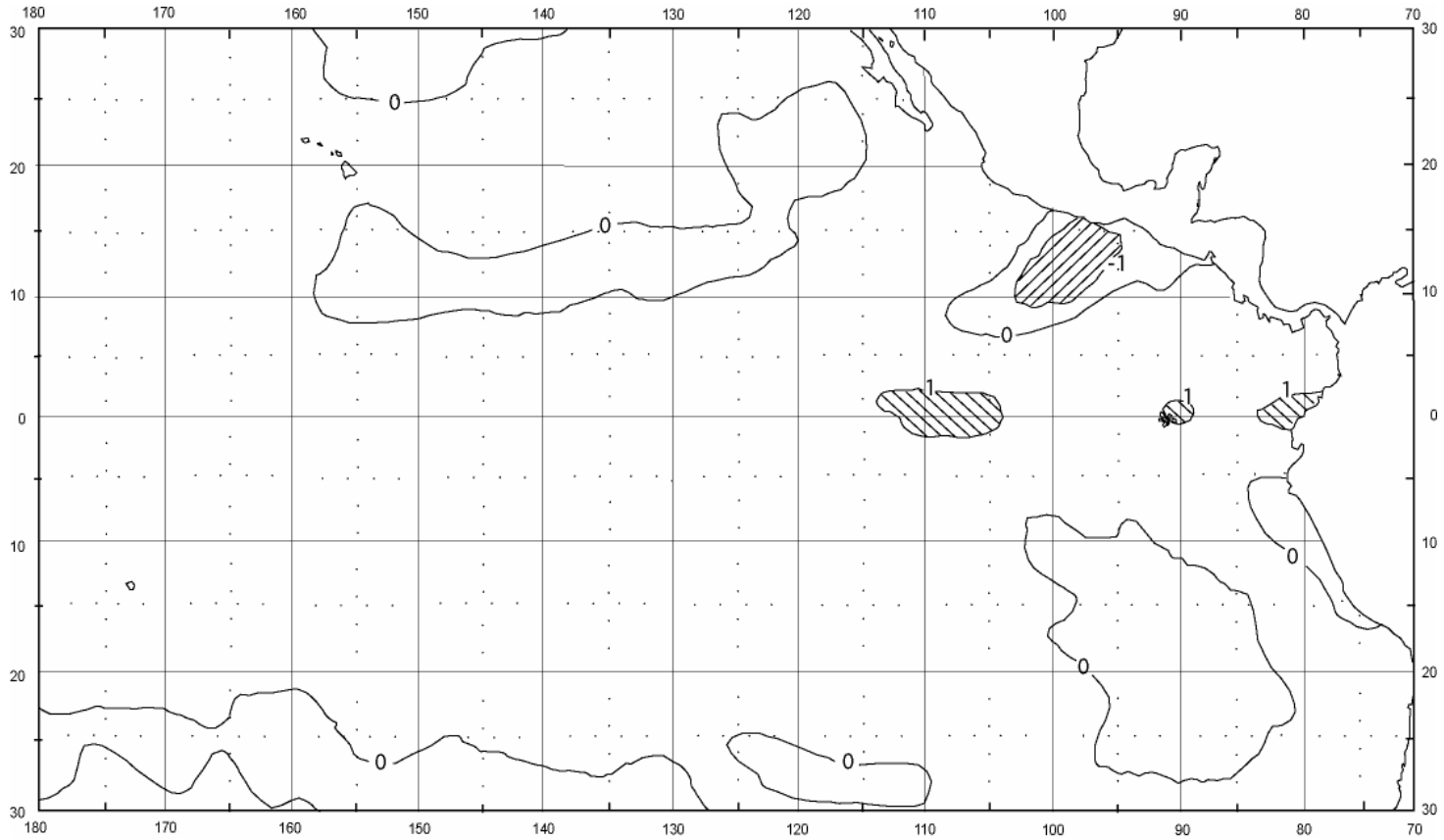

FIGURE 6. Sea-surface temperature (SST) anomalies (departures from long-term normals) for December 2003, based on data from fishing boats and other types of commercial vessels.
FIGURA 6. Anomalías (variaciones de los niveles normales a largo plazo) de la temperatura superficial del mar (TSM) en diciembre de 2003, basadas en datos tomados por barcos pesqueros y otros buques comerciales.

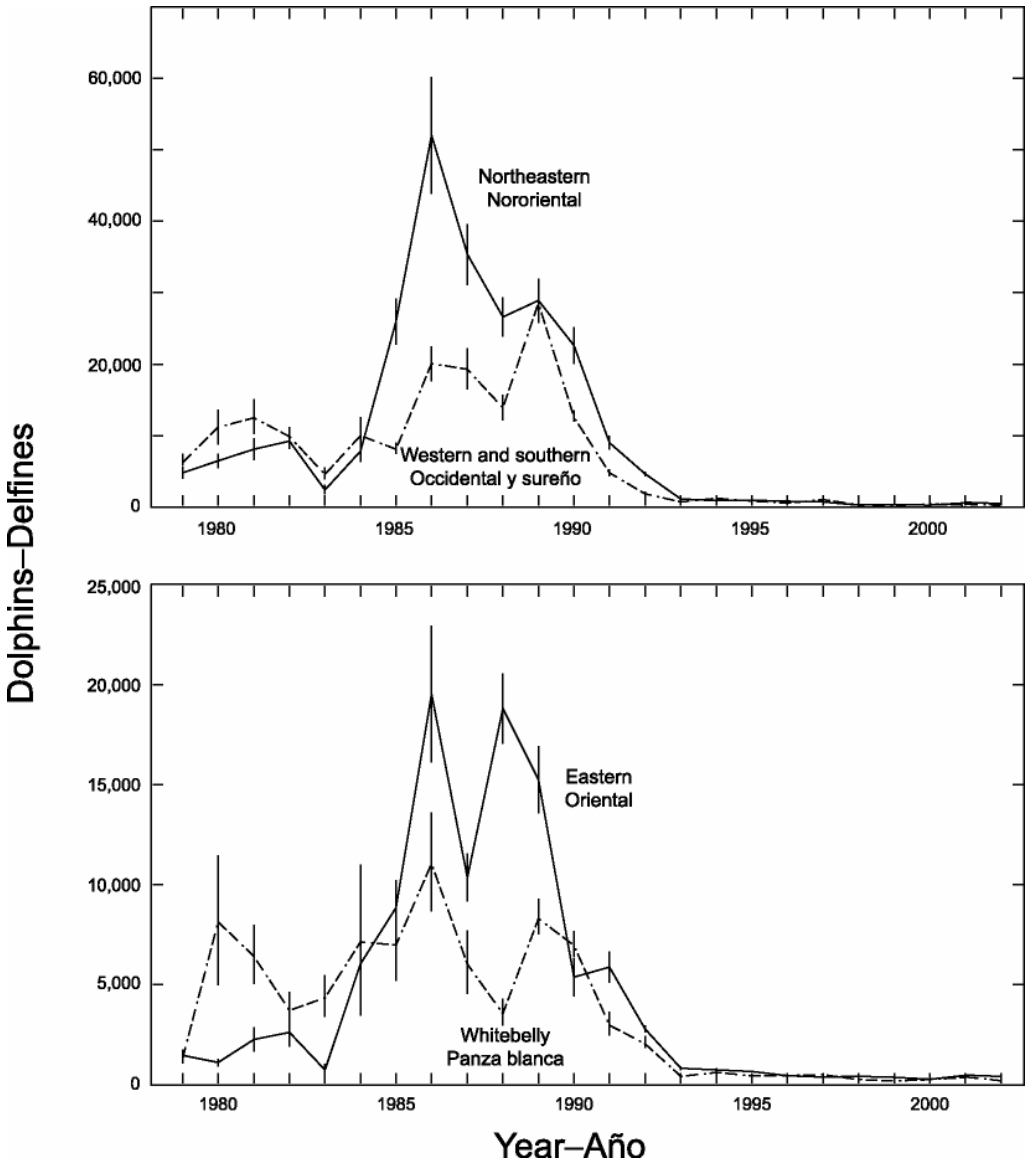

FIGURE 7. Estimated numbers of mortalities for the stocks of spotted (upper panel) and spinner (lower panel) dolphins in the EPO. Each vertical line represents one positive and one negative standard error.

FIGURA 7. Número estimado de mortalidades para los stocks de delfines manchado (panel superior) y tornillo (panel inferior) en el OPO. Cada línea vertical representa un error estándar positivo y un error estándar negativo.

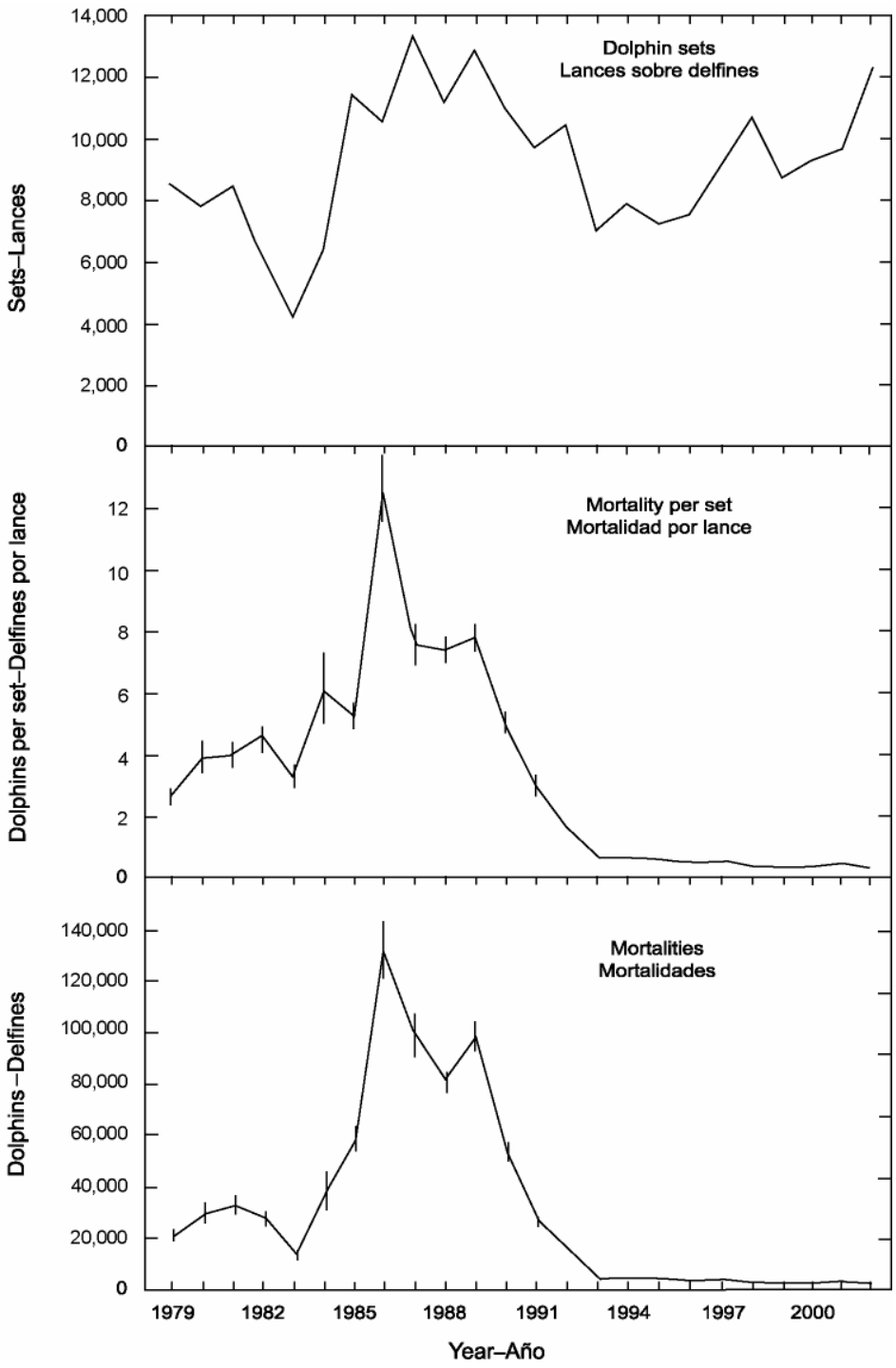

FIGURE 8. Estimated numbers of sets on tunas associated with dolphins, dolphin mortalities per set, and total mortalities of dolphins due to fishing in the EPO. Each vertical line represents one positive and one negative standard error.
FIGURA 8. Número estimado de lances sobre atunes asociados con delfines, mortalidades de delfines por lance, y mortalidad total de delfines causada por la pesca en el OPO. Cada línea vertical representa un error estándar positivo y un error estándar negativo.

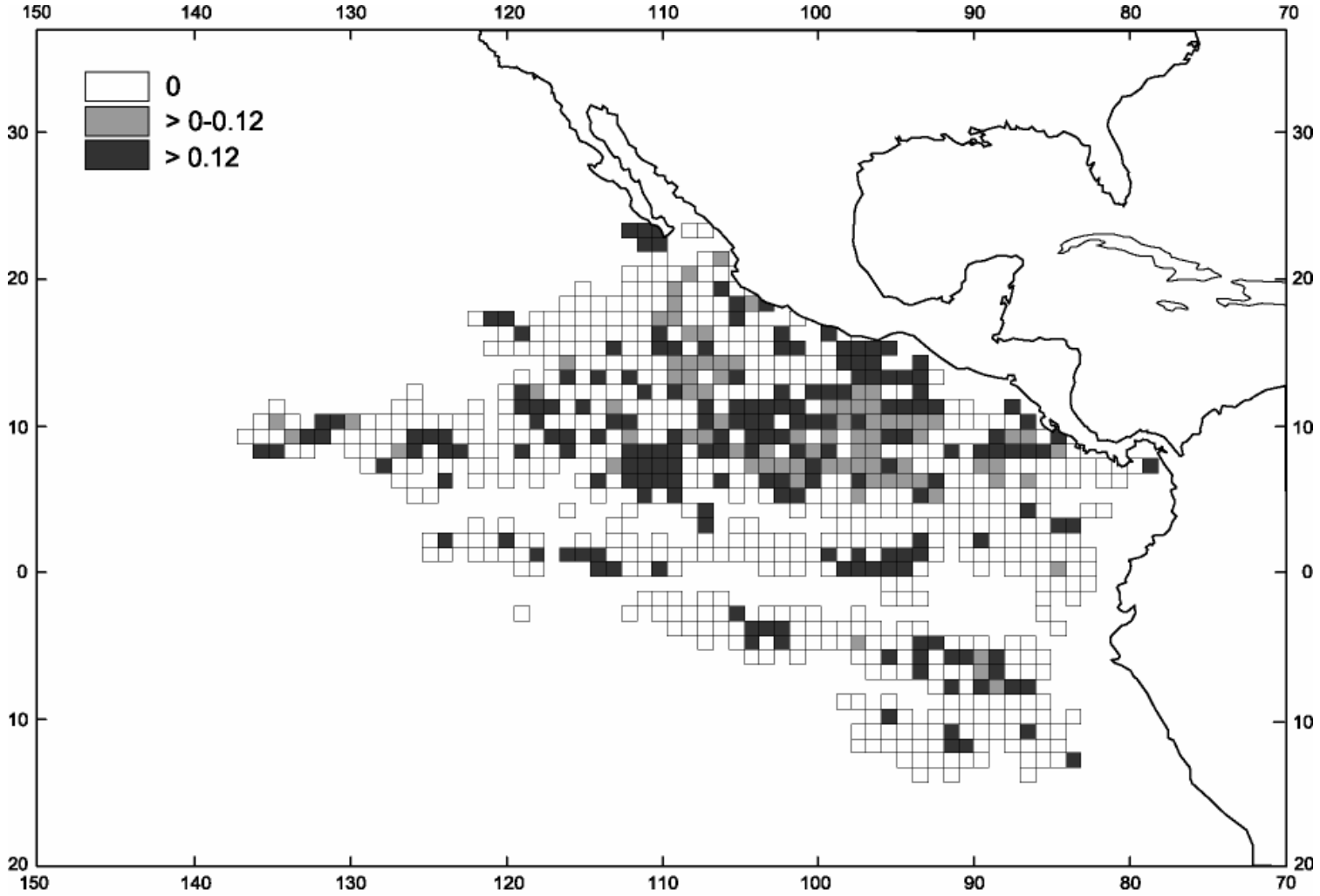

FIGURE 9. Spatial distributions of the average mortalities per set for all dolphins combined during 2002.
FIGURA 9. Distribuciones de las mortalidades medias por lance para todos los delfines combinados durante 2002.

TABLE 1. Preliminary estimates of the numbers and carrying capacities, in cubic meters, of purse seiners and pole-and-line vessels operating in the EPO in 2003 by flag, gear, and size class. Each vessel is included in the totals for each flag under which it fished during the year, but is included only once in the fleet total. Therefore the totals for the fleet may not equal the sums of the individual flag entries. PS = purse seine; LP = pole-and-line.

TABLA 1. Estimaciones preliminares del número de buques cerqueros y de cañero que pescan en el OPO en 2003, y de la capacidad de acarreo de los mismos, en metros cúbicos, por bandera, arte de pesca, y clase de arqueo. Se incluye cada buque en los totales de cada bandera bajo la cual pescó durante el año, pero solamente una vez en el total de la flota; por consiguiente, los totales de las flotas no son siempre iguales a las sumas de las banderas individuales. PS = cerquero; LP = cañero.

Flag Bandera	Gear Arte	Size class—Clase de arqueo							Capacity Capacidad
		1	2	3	4	5	6	Total	
					Number—Número				
Belize—Belice	PS	-	-	1	-	-	1	2	695
Bolivia	PS	-	-	2	-	-	7	9	7,688
Colombia	PS	-	-	1	1	2	5	9	7,259
Ecuador	PS	-	5	11	11	7	38	72	49,251
España—Spain	PS	-	-	-	-	-	5	5	12,177
Guatemala	PS	-	-	-	-	-	4	4	7,640
Honduras	PS	-	-	-	-	-	2	2	1,798
México	PS	-	-	3	6	11	38	58	50,633
	LP	-	1	3	-	-	-	4	526
Panamá	PS	-	-	-	1	-	15	16	21,064
Perú	PS	-	-	-	-	-	2	2	2,018
El Salvador	PS	-	-	-	-	-	3	3	5,377
USA—EE.UU.	PS	-	-	2	-	-	6	8	8,665
Venezuela	PS	-	-	-	-	-	25	25	32,699
Vanuatu	PS	-	-	-	-	-	6	6	7,467
All flags— Todas banderas	PS	-	5	19	19	19	149	211	
	LP	-	1	3	-	-	-	4	
	PS + LP	-	6	22	19	19	149	215	
					Capacity—Capacidad				
All flags— Todas banderas	PS	-	551	3,552	5,355	8,705	185,233	203,396	
	LP	-	101	425	-	-	-	526	
	PS + LP	-	652	3,977	5,355	8,705	185,233	203,922	

TABLE 2. Changes in the IATTC fleet list recorded during the fourth quarter of 2003. PS = purse seine; LP = pole-and-line.
TABLA 2. Cambios en la flota observada por la CIAT registrados durante el cuarto trimestre de 2003. PS = cerquero; LP = cañero.

Vessel name	Flag	Gear	Capacity (m^3)	Remarks	
Nombre del buque	**Bandera**	**Arte**	**Capacidad (m^3)**	**Comentarios**	
Vessels added to the fleet—Buques añadidos a la flota					
Re-entries—Reingresos					
				Now—Ahora	
Atun I	México	PS	807		
Cape Hatteras	USA	PS	1,805		
Molly N	USA	LP	101	México	
Changes of name or flag—Cambios de nombre o pabellon					
				Now—Ahora	
Atun IV	Ecuador	PS	809		*Rossana L*
Albacora Catorce	Guatemala	PS	1,880	Panamá	
Albacora Doce	Guatemala	PS	1,880	Panamá	
Danielle D	Perú	PS	1,022	Panamá	
South Seas	USA	PS	1,275	Panamá	*Lautaro*
Ugavi Dos	Vanuatu	PS	1,882	Ecuador	
Vessels removed from the fleet – Buques retirados de la flota					
Toño I	México	PS	166	Sunk—Hundido	
Sea Scout	USA	PS	169	Sunk—Hundido	
Mar Cantabrico	Bolivia	PS	222		
Chasca	Ecuador	PS	249		
Don Santiago	Ecuador	PS	1,881		
Emperador	Ecuador	PS	82		
Jacobita	Ecuador	PS	374		
Romeo	Ecuador	PS	125		
San Antonio V	Ecuador	PS	248		
Delfin V	México	LP	160		
Delfin X	México	LP	160		
Lupe Del Mar	México	PS	1,298		
Oscar I	México	PS	135		
Geminis	Panamá	PS	255		
La Parrula	Panamá	PS	889		
Capt Vincent Gann	USA	PS	1,593		

TABLE 3. Preliminary estimates of the retained catches of tunas in the EPO from January 1 through December 28, 2003, by species and vessel flag, in metric tons.
TABLA 3. Estimaciones preliminares de las capturas retenidas de atunes en el OPO del 1 de enero al 28 de diciembre 2003, por especie y bandera del buque, en toneladas métricas**.**

Flag	Yellowfin	Skipjack	Bigeye	Pacific bluefin	Albacore	Eastern Pacific bonito	Black skipjack	Other[1]	Total	Percentage of total
Bandera	**Aleta amarilla**	**Barrilete**	**Patudo**	**Aleta azul del Pacífico**	**Albacora**	**Bonito del Pacífico oriental**	**Barrilete negro**	**Otras[1]**	**Total**	**Porcentaje del total**
Colombia	22,779	4,805	172	-	-	-	-	-	27,756	4.0
Ecuador	40,298	125,186	16,381	-	-	-	61	51	181,977	26.6
España—Spain	4,876	22,283	5,565	-	-	-	-	-	32,724	4.8
México	162,993	18,607	65	3,225	29	-	199	40	185,158	27.0
Panamá	30,087	11,339	2,880	-	-	-	2	-	44,308	6.5
USA—EE.UU.	1,074	6,262	1,939	22	-	-	165	22	9,484	1.4
Venezuela	89,909	11,115	1,202	-	-	-	-	-	102,226	14.9
Vanuatu	4,422	17,466	4,726	-	-	-	2	-	26,616	3.9
Other—Otros[2]	38,335	31,827	4,704	-	2	-	-	-	74,868	10.9
Total	394,773	248,890	37,634	3,247	31	-	429	113	685,117	

[1] Includes other tunas, mackerel, sharks, and miscellaneous fishes
[1] Incluye otros túnidos, caballas, tiburones, y peces diversos
[2] Includes Belize, Bolivia, El Salvador, Guatemala, Honduras, and Peru; this category is used to avoid revealing the operations of individual vessels or companies.
[2] Incluye Belice, Bolivia, El Salvador, Guatemala, Honduras, y Perú; se usa esta categoría para no revelar información sobre faenas de buques o empresas individuales

TABLE 4. Logged catches and catches per day's fishing[1] (CPDF) of yellowfin in the EPO, in metric tons, during the period of January 1-September 30, based on fishing vessel logbook information.

TABLA 4. Captura registrada y captura por día de pesca[1] CPDP) de aleta amarilla en el OPO, en toneladas métricas, durante el período de 1 de enero-30 de septiembre, basado en información de los cuadernos de bitácora de buques pesqueros.

Area	Fishery statistic Estadística de pesca	Year-Año					
		1998	1999	2000	2001	2002	2003[2]
Purse seine—Red de cerco							
North of 5°N	Catch—Captura	117,800	130,700	96,100	123,900	144,600	120,900
Al norte de 5°N	CPDF—CPDP	14.1	15.1	13.7	23.9	28.6	24.5
South of 5°N	Catch—Captura	37,400	33,700	60,800	62,700	34,900	25,400
Al sur de 5°N	CPDF—CPDP	5.0	6.6	7.8	9.1	5.2	5.3
Total	Catch—Captura	155,200	164,400	157,000	186,600	179,500	146,300
	CPDF—CPDP	11.9	13.4	11.4	18.9	24.1	21.1
Annual total Total anual	Catch—Captura	191,900	194,600	195,400	221,700	215,000	
Pole and line—Cañero							
Total	Catch—Captura	2,400	1,100	1,500	2,400	400	100
	CPDF—CPDP	2.2	1.5	2.2	3.4	1.5	0.9
Annual total	Catch—Captura	2,400	1,500	2,200	3,300	800	

[1] Purse-seiners, Class-6 only. The catch values are rounded to the nearest 100, and the CPDF values to the nearest 0.1.

[1] Cerqueros de las Clase 6. Se redondean los valores de captura al 100 más cercano, y los de CPDP al 0.1 más cercano.

[2] preliminary—preliminar

TABLE 5. Logged catches and catches per day's fishing[1] (CPDF) of skipjack in the EPO, in metric tons, during the period of January 1-September 30, based on fishing vessel logbook information.

TABLA 5. Captura registrada y captura por día de pesca[1] (CPDP) de barrilete en el OPO, en toneladas métricas, durante el período de 1 de enero-30 de septiembre, basado en información de los cuadernos de bitácora de buques pesqueros.

Area	Fishery statistic Estadística de pesca	Year-Año					
		1998	1999	2000	2001	2002	2003[2]
Purse seine—Red de cerco							
North of 5°N Al norte de 5°N	Catch—Captura CPDF—CPDP	22,100 2.6	34,000 3.9	19,500 2.8	10,000 1.9	7,700 1.5	16,300 3.3
South of 5°N Al sur de 5°N	Catch—Captura CPDF—CPDP	41,500 5.5	109,200 21.4	91,900 11.7	47,700 6.9	52,100 7.8	58,600 12.3
Total	Catch—Captura CPDF—CPDP	63,600 4.5	143,100 17.3	111,400 10.2	57,600 6.0	59,800 7.0	75,000 10.3
Annual total Total anual	Catch—Captura	96,500	161,400	121,200	76,000	70,700	
Pole and line—Cañero							
Total	Catch—Captura CPDF—CPDP	800 0.8	1,400 2.0	100 0.2	100 0.2	500 1.9	200 3.2
Annual total	Catch—Captura	900	1,700	100	300	500	

[1] Purse-seiners, Class-6 only. The catch values are rounded to the nearest 100, and the CPDF values to the nearest 0.1.

[1] Cerqueros de las Clase 6. Se redondean los valores de captura al 100 más cercano, y los de CPDP al 0.1 más cercano.

[2] preliminary—preliminar

TABLE 6. Logged catches and catches per day's fishing[1] (CPDF) of bigeye in the EPO, in metric tons, during the period of January 1-September 30, based on purse-seine vessel logbook information.

TABLA 6. Captura registrada y captura por día de pesca[1] (CPDP) de patudo en el OPO, en toneladas métricas, durante el período de 1 de enero-30 de septiembre, basado en información de los cuadernos de bitácora de buques cerqueros.

Fishery statistic—Estadística de pesca	Year—Año					
	1998	1999	2000	2001	2002	2003[2]
Catch—Captura	13,200	20,200	40,600	21,000	17,400	12,800
CPDF—CPDP	1.3	2.9	4.8	2.9	2.3	2.4
Total annual catch—Captura total anual	18,800	22,200	44,400	29,400	20,700	

[1] Class-6 vessels only. The catch values are rounded to the nearest 100, and the CPDF values to the nearest 0.1.

[1] Buques de las Clase 6 solamente. Se redondean los valores de captura al 100 más cercano, y los de CPDF al 0.1 más cercano.

[2] preliminary—preliminar

TABLE 7. Preliminary data on the sampling coverage of trips by vessels with capacities greater than 363 metric tons by the observer programs of the IATTC, Ecuador, the European Union, Mexico, Venezuela, and the Forum Fisheries Agency (FFA) during the fourth quarter of 2003. The numbers in parentheses indicate cumulative totals for the year.

TABLA 7. Datos preliminares de la cobertura de muestreo de viajes de buques con capacidad más que 363 toneladas métricas por los programas de observadores de la CIAT, Ecuador, México, el Unión Europea, Venezuela, y el Forum Fisheries Agency (FFA) durante el cuarto trimestre de 2003. Los números en paréntesis indican totales acumulados para el año.

Flag	Trips		Observed by program								Percent observed	
			IATTC		National		FFA		Total			
Bandera	Viajes		Observado por programa								Porcentaje observado	
			CIAT		Nacional		FFA		Total			
Belize	0	(4)	0	(0)					0	(0)	-	(0.0)
Bolivia	8	(36)	8	(34)					8	(34)	100.0	(94.4)
Colombia	6	(26)	6	(26)					6	(26)	100.0	(100.0)
Ecuador	65	(264)	42	(178)	23	(86)			65	(264)	100.0	(100.0)
España—Spain	4	(28)	3	(17)	1	(11)			4	(28)	100.0	(100.0)
Guatemala	2	(17)	2	(17)					2	(17)	100.0	(100.0)
Honduras	3	(15)	3	(15)					3	(15)	100.0	(100.0)
México	43	(237)	19	(120)	24	(117)			43	(237)	100.0	(100.0)
Panamá	16	(62)	16	(61)	-	(1)[2]			16	(62)	100.0	(100.0)
Perú	1	(8)	1	(8)					1	(8)	100.0	(100.0)
El Salvador	5	(21)	5	(21)					5	(21)	100.0	(100.0)
USA—EE.UU.	5	(17)	5	(16)			0	(1)	5	(17)	100.0	(100.0)
Venezuela	24	(133)	9	(64)	15	(69)			24	(133)	100.0	(100.0)
Vanuatu	10	(39)	10	(39)					10	(39)	100.0	(100.0)
Total	192	(907)[1]	129	(616)	63	(284)	0	(1)	192	(901)[1]	100.0	(99.2)

[1] Includes 32 trips (24 by vessels with observers from the IATTC program, 7 by vessels with observers from the national programs, and 1 by an observer from the FFA program) that began in late 2002 and ended in 2003

[1] Incluye 32 viajes (24 por observadores del programa del CIAT, 7 por observadores de los programas nacionales, y 1 por un observador del programa FFA) iniciados a fines de 2002 y completados en 2003

[2] Sampled by the Venezuelan national program. It was not known at the time that the vessel had changed flag from Venezuela to Panama just prior to the trip departure.

[2] Muestreado por el programa nacional venezolano. No se supo en ese momento que el buque había cambiado de pabellón de Venezuela a Panamá justo antes de comenzar el viaje.

TABLE 8. Releases of bluefin tuna with IATTC tags from the recreational fishing vessel *Shogun*, and recaptures of these fish in the eastern and western Pacific Ocean.
TABLA 8. Liberaciones de atún aleta azul con marcas del CIAT del buque deportivo *Shogun*, y recapturas de estos peces en el Océano Pacífico oriental y el Océano Pacífico occidental.

Cruise	Year released	Number released	Recaptured in the eastern Pacific Ocean						Recaptured in the western Pacific Ocean					
Crucero	Año de liberación	Número liberado	Recapturado in el Océano Pacífico oriental						Recapturado en el Océano Pacífico occidental					
			1999	2000	2001	2002	2003	Total	1999	2000	2001	2002	2003	Total
1102	1999	57	4	4	0	0	0	8	0	4	0	2	2	8
1104	2000	9	-	0	0	0	0	0	-	0	0	0	0	0
1105	2001	85	-	-	5	2	2	9	-	-	0	1	0	1
1108	2002	68	-	-	-	0	2	2	-	-	-	0	0	0
1112	2003	57	-	-	-	-	0	0	-	-	-	-	0	0

TABLE 9. Recaptures in the eastern Pacific Ocean of tagged bluefin tuna released in the western Pacific Ocean.
TABLA 9. Recapturas en el Océano Pacífico oriental de atunes aleta azul con marcas liberados en el Océano Pacífico occidental.

Year of release	Year of recapture—Año de recaptura											
Año de liberación	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	?	Total
1994	0	1	1	0	0	0	0	0	0	0	0	2
1995	-	0	2	0	0	0	0	0	0	0	0	2
1996	-	-	0	1	4[1]	0	0	0	0	0	0	5
1997	-	-	-	0	3	1	0	0	0	0	0	4
1998	-	-	-	-	0	0	2[2]	0	0	0	0	2
1999	-	-	-	-	-	0	1	0	0	1	0	2
2000	-	-	-	-	-	-	0	0	0	0	0	0
2001	-	-	-	-	-	-	-	0	1[3]	3[4]	1	5
2002	-	-	-	-	-	-	-	-	0	0	0	0
2003	-	-	-	-	-	-	-	-	-	0	0	0
?	0	0	0	2	1	0	0	0	0	0	0	3
Total	0	1	3	3	8	1	3	0	1	4	1	25

[1] includes 1 fish with an archival tag (IATTC Annual Report for 1998: 40)—incluye 1 pez con una marca archivadora (Informe Anual de CIAT de 1998: 246)
[2] includes 1 fish with an archival tag (IATTC Annual Report for 2000: 25)—incluye 1 pez con una marca archivadora (Informe Anual de CIAT de 2000: 139)
[3] includes 1 fish with an archival tag (IATTC Quarterly Report for January-March 2003: 9)—incluye 1 pez con una marca archivadora (Informe Trimestral de CIAT de Enero-Marzo 2003: 9)
[4] includes 1 fish with an archival tag (this report)—incluye 1 pez con una marca archivadora (este informe)

TABLE 10. Oceanographic and meteorological data for the Pacific Ocean, July-December 2003. The values in parentheses are anomalies.
TABLA 10. Datos oceanográficos y meteorológicos del Océano Pacífico, Julio-Diciembre 2003. Los valores en paréntesis son anomalías.

Month—Mes	7	8	9	10	11	12
SST—TSM, 0°-10°S, 80°-90°W (°C)	20.8 (-1.1)	20.1 (-0.7)	20.0 (-0.5)	21.0 (0.1)	21.9 (0.3)	23.0 (0.2)
SST—TSM, 5°N-5°S, 90°-150°W (°C)	25.8 (0.2)	25.0 (0.1)	25.0 (0.1)	24.3 (0.4)	25.4 (0.5)	25.6 (0.5)
SST—TSM, 5°N-5°S, 120°-170°W (°C)	27.4 (0.4)	26.9 (0.2)	27.0 (0.3)	27.2 (0.6)	27.1 (0.5)	26.9 (0.4)
SST—TSM, 5°N-5°S, 150W°-160°E (°C)	29.1 (0.5)	29.1 (0.6)	29.0 (0.5)	29.2 (0.8)	29.3 (1.0)	29.2 (0.8)
Thermocline depth—Profundidad de la termoclina, 0°, 80°W (m)	40	40	50	45	45	40
Thermocline depth—Profundidad de la termoclina, 0°, 110°W (m)	50	70	70	40	100	90
Thermocline depth—Profundidad de la termoclina, 0°, 150°W (m)	140	140	130	140	150	150
Thermocline depth—Profundidad de la termoclina, 0°, 180°W (m)	170	170	170	170	175	175
Sea level—Nivel del mar, La Libertad, Ecuador (cm)	237.5 (7.2)	235.2 (7.6)	231.4 (3.5)	233.4 (3.9)	- (-)	- (-)
Sea level—Nivel del mar, Callao, Perú (cm)	113.6 (3.5)	106.9 (-0.7)	109.9 (3.9)	103.0 (-2.6)	107.0 (0.1)	109.7 (1.1)
SOI—IOS	0.2	-0.3	-0.1	-0.3	-0.4	1.1
SOI*—IOS*	2.36	-1.22	-2.42	-1.65	-2.37	5.03
NOI*—ION*	0.29	0.09	-1.55	0.41	-0.76	-1.64

TABLE 11. Stock mortality limits for 2002, preliminary estimates of the incidental mortalities of dolphins in 2002, estimates of population abundance pooled for 1986-1990 (from Report of the International Whaling Commission, 43: 477-493), and estimates of relative mortality (with approximate 95-percent confidence intervals), by stock.
TABLA 11. Límites de mortalidad por población para 2002, estimaciones preliminares de las mortalidades incidentales de delfines en 2002, estimaciones de abundancia de poblaciones agrupadas para 1986-1990 (del Informe de la Comisión Ballenera Internacional, 43: 477-493), y estimaciones de mortalidad relativa (con intervalos de confianza de 95% aproximados), por población.

Species and stock	Stock mortality limit	Incidental mortality	Population abundance	Relative mortality (percent)
Especie y población	**Límite de mortalidad por población**	**Mortalidad incidental**	**Abundancia de la población**	**Mortalidad relativa (porcentaje)**
Offshore spotted dolphin—Delfín manchado de altamar				
Northeastern—Nororiental	648	439	730,900	0.06 (0.046, 0.076)
Western-southern—Occidental y sureño	1,145	206	1,298,400	0.02 (0.012, 0.022)
Spinner dolphin—Delfín tornillo				
Eastern—Oriental	518	405	631,800	0.06 (0.040, 0.097)
Whitebelly—Panza blanca	871	186	1,019,300	0.02 (0.011, 0.024)
Common dolphin—Delfín común				
Northern—Norteño	562	69	476,300	0.01 (0.008, 0.031)
Central	207	155	406,100	0.04 (0.020, 0.075)
Southern—Sureño	1,845	4	2,210,900	<0.01 (0.001, 0.003)
Other dolphins—Otros delfines[1]		49	2,802,300	<0.01 (0.001, 0.002)
Total		1,513	9,576,000	0.02 (0.014, 0.018)

[1] "Other dolphins" includes the following species and stocks, whose observed mortalities were as follows: Central American spinner dolphins (*Stenella longirostris centroamericana*), 3; striped dolphins (*S. coeruleoalba*), 2; bottlenose dolphins (*Tursiops truncatus*), 10; rough-toothed dolphin (*Steno bredanensis*), 5; short-finned pilot whale (*Globicephala macrorhynchus*), 1; unidentified dolphins, 28.

[1] "Otros delfines" incluye las siguientes especies y poblaciones, con las mortalidades observadas correspondientes: delfín tornillo centroamericana (*Stenella longirostris centroamericana*), 3; delfín listado (S. *coeruleoalba*), 2; tonina (*Tursiops truncatus*), 10; delfín de dientes rugosos (*Steno bredanensis*), 5; ballena piloto (*Globicephala macrorhynchus*), 1; delfines no identificados, 28.

TABLE 12a. Annual estimates of dolphin mortality, by species and stock. The data for 2002 are preliminary. The data are further explained in the text.
TABLA 12a. Estimaciones anuales de la mortalidad de delfines, por especie y población. Los datos de 2002 son preliminares. En el texto se explican los datos en detalle.

Year	Offshore spotted[1]		Spinner		Common			Others	Total
	North-eastern	Western-southern	Eastern	White belly	Northern	Central	Southern		
Año	Manchado de altamar[1]		Tornillo		Común			Otros	Total
	Nor-oriental	Occidental y sureño	Oriental	Panza blanca	Norteño	Central	Sureño		
1979	4,828	6,254	1,460	1,312	4,161	2,342	94	880	21,331
1980	6,468	11,200	1,108	8,132	1,060	963	188	633	29,752
1981	8,096	12,512	2,261	6,412	2,629	372	348	367	32,997
1982	9,254	9,869	2,606	3,716	989	487	28	1,347	28,296
1983	2,430	4,587	745	4,337	845	191	0	353	13,488
1984	7,836	10,018	6,033	7,132	0	7,403	6	156	38,584
1985	25,975	8,089	8,853	6,979	0	6,839	304	1,777	58,816
1986	52,035	20,074	19,526	11,042	13,289	10,884	134	5,185	132,169
1987	35,366	19,298	10,358	6,026	8,216	9,659	6,759	3,200	98,882
1988	26,625	13,916	18,793	3,545	4,829	7,128	4,219	2,074	81,129
1989	28,898	28,530	15,245	8,302	1,066	12,711	576	3,123	98,451
1990	22,616	12,578	5,378	6,952	704	4,053	272	1,321	53,874
1991	9,005	4,821	5,879	2,974	161	3,182	115	990	27,127
1992	4,657	1,874	2,794	2,044	1,773	1,815	64	518	15,539
1993	1,139	757	821	412	81	230	0	161	3,601
1994	935	1,226	743	619	101	151	0	321	4,096
1995	952	859	654	445	9	192	0	163	3,274
1996	818	545	450	447	77	51	30	129	2,547
1997	721	1,044	391	498	9	114	58	170	3,005
1998	298	341	422	249	261	172	33	101	1,877
1999	358	253	363	192	85	34	1	62	1,348
2000	303	428	272	262	56	222	9	84	1,636
2001	591	309	469	372	94	203	46	44	2,128
2002	439	206	405	186	69	155	4	49	1,513

[1] The estimates for offshore spotted dolphins include mortalities of coastal spotted dolphins.
[1] Las estimaciones de delfines manchados de altamar incluyen mortalidades de delfines manchados costeros.

TABLE 12b. Standard errors of annual estimates of dolphin species and stock mortalities for 1979-1994. There are no standard errors for 1995-2000 because the coverage was at or nearly at 100 percentduring those years. The standard errors for 2001 and 2002 are not yet available.

TABLA 12b. Errores estándar de las estimaciones anuales de la mortalidad de delfines por especie y población para 1979-1994. No hay errores estándar para 1995-2000 porque la cobertura fue de 100%, o casi, en esos años. No se dispone todavía de errores estándar para 2001 y 2002.

Year	Offshore spotted		Spinner		Common			Other
	North-eastern	Western-southern	Eastern	Whitebelly	Northern	Central	Southern	
Año	Manchado de altamar		Tornillo		Común			Otros
	Nor-oriental	Occidental y sureño	Oriental	Panza blanca	Norteño	Central	Sureño	
1979	817	1,229	276	255	1,432	560	115	204
1980	962	2,430	187	3,239	438	567	140	217
1981	1,508	2,629	616	1,477	645	167	230	76
1982	1,529	1,146	692	831	495	168	16	512
1983	659	928	284	1,043	349	87	-	171
1984	1,493	2,614	2,421	3,773	-	5,093	3	72
1985	3,210	951	1,362	1,882	-	2,776	247	570
1986	8,134	2,187	3,404	2,454	5,107	3,062	111	1,722
1987	4,272	2,899	1,199	1,589	4,954	2,507	3,323	1,140
1988	2,744	1,741	1,749	668	1,020	1,224	1,354	399
1989	3,108	2,675	1,674	883	325	4,168	295	430
1990	2,575	1,015	949	640	192	1,223	95	405
1991	956	454	771	598	57	442	30	182
1992	321	288	168	297	329	157	8	95
1993	89	52	98	33	27	-	-	29
1994	69	55	84	41	35	8	-	20