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

January-March 2004
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The

QUARTERLY REPORT

January-March 2004

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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COMISION INTERAMERICANA DEL ATUN TROPICAL

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. This agreement introduced such novel and effective measures as Dolphin Mortality Limits (DMLs) for individual vessels and the International Review Panel to monitor the performance and compliance of the fishing fleet. 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. In 2003 the Parties to this agreement consisted of Costa Rica, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Peru, the United States, Vanuatu, and Venezuela, and Bolivia, Colombia, and the European Union were applying it provisionally. These were "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." This agreement established Stock Mortality Limits, which are similar to DMLs except that (1) they apply to all vessels combined, rather than to individual vessels, and (2) they apply to individual stocks of dolphins, rather than to all stocks of dolphins combined. The IATTC provides the Secretariat for the International Dolphin Conservation Program (IDCP) and its various working groups and panels and coordinates the On-Board Observer Program and the Tuna Tracking and Verification System.

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 54th 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 IDCP meetings

The following IATTC and IDCP meetings were held during the first quarter of 2004. Information on these meetings can be viewed on the IATTC's web site, www.iattc.org.

Number	Meeting	Location	Dates
	IATTC meetings		
4	Working Group on Bycatch	Kobe, Japan	January 14-16
7	Permanent Working Group on Fleet Capacity	La Jolla, California, USA	February 20-21
6	Working Group on Finance	La Jolla, California, USA	February 23-24
	IDCP meetings		
15	Permanent Working Group on Tuna Tracking	La Jolla, California, USA	February 19
35	International Review Panel	La Jolla, California, USA	February 19

Other meetings

Mr. Ernesto Altamirano Nieto participated in the Derelict Fishing Gear and Related Marine Debris Seminar, organized by the Asia-Pacific Economic Cooperation organization, in Honolulu, Hawaii, on January 13-16, 2004, where he gave a talk entitled "Sightings of Discarded Fishing Gear in the Eastern Pacific Ocean." His travel expenses were paid by the Western Pacific Fishery Management Council.

Dr. Michael G. Hinton participated in the Fourth Meeting of the Interim Scientific Committee for Tuna and Tuna-like Species in the North Pacific Ocean in Honolulu, Hawaii, on January 26-February 4, 2004. During this period he participated in meetings of working groups on bluefin tuna, swordfish, marlins, and statistics, and in the plenary session. After that he attended the North Pacific Albacore Workshop Intersessional Meeting, also in Honolulu, Hawaii, on February 5-6, 2004.

Dr. Robin Allen served as chairman of the inaugural meeting of the Fishery Resources Monitoring System (FIRMS) in Rome on February 2-5, 2004. The FIRMS is a system to display information on the status and trends of the world's fisheries. The initial partners in the system are the IATTC, ICCAT (International Commission for the Conservation of Atlantic Tunas), IOTC (Indian Ocean Tuna Commission), CCSBT (Commission for the Conservation for the Southern Bluefin Tuna), ICES (International Council for the Exploration of the Sea), and the FAO Fisheries Department.

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, on February 24-26, 2004. His travel expenses were paid the by the Western Pacific Fishery Management Council.

Dr. Martín A. Hall participated in the 24th Annual Sea Turtle Symposium in San Jose, Costa Rica, on February 22-29, 2004, at which he organized a workshop entitled "Working with Fishers to Reduce Sea Turtle Bycatch."

Dr. Mark N. Maunder and Mr. Simon D. Hoyle participated in a workshop, Analysis of Multistate Capture-Recapture Data: Modeling Incomplete Individual Histories, in Mallorca, Spain, on February 29-March 5, 2004. After that they went to Montpellier, France, where they participated in an informal meeting on population modeling of black-footed albatross that took place on March 8-11, 2004. Their expenses were paid by the Pelagic Fisheries Research Program of the University of Hawaii.

Dr. Daniel Margulies participated in a meeting of the World Aquaculture Society, in Honolulu, Hawaii, on March 2-5, 2004, at which he presented a paper entitled "Sustained Spawning of Captive Yellowfin Tuna and Recent Advances in the Rearing of their Larvae and Early-Juveniles" at a special session on Advances in Offshore Aquaculture. The paper was co-authored by Mr. Vernon P. Scholey and Mss. Jeanne B. Wexler and Sharon L. Hunt.

Drs. Robin Allen, Richard B. Deriso, and Shelton J. Harley, and Mr. Kurt M. Schaefer participated in all or parts of the ICCAT Bigeye Tuna Year Symposium on March 8-9, 2004, and the Second World Meeting on Bigeye Tuna on March 10-13, 2004, both in Madrid. Dr. Deriso

was a member of the steering committee for the second meeting. The following presentations were made at the second meeting:

Harley, Shelton, Mark Maunder, and Richard B. Deriso. Assessment of bigeye tuna (*Thunnus obesus*) in the eastern Pacific Ocean.

Schaefer, Kurt M., and Daniel W. Fuller. Conventional and archival tagging of bigeye tuna (*Thunnus obesus*) in the eastern equatorial Pacific.

Schaefer, Kurt M., and Daniel W. Fuller. Preliminary results on the age, growth, and reproductive biology of bigeye tuna (*Thunnus obesus*) in the eastern Pacific Ocean.

Dr. Allen served as Chairman of the fourth meeting of the Secretariats of Tuna Agencies and Programs on March 9, 2004, and of the second meeting of Technical Advisory Committee for the FAO Project on the Management of Tuna Fishing Capacity on March 15-18, 2004. Both of these meetings took place in Madrid.

After the meetings in Madrid, Dr. Allen went to Brussels, where he participated in the third International Consultation on Multilateral Cooperation for the Conservation and Management of Swordfish in the Southeastern Pacific on March 29-30, 2004.

Dr. Martín A. Hall participated, as an expert on sea turtle conservation, in a meeting of the Western Pacific Fishery Management Council in Honolulu, Hawaii, on March 29-31, 2004. The shallow longline fishery for swordfish, which had been closed since April 2001, was reopened, with restrictions aimed at minimizing the bycatches of sea turtles.

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 length-frequency samples from 130 wells and abstracted logbook information for 247 trips of commercial fishing vessels during the first quarter of 2004.

Also during the first quarter members of the field office staffs placed IATTC observers on 155 fishing trips by vessels that participate in the AIDCP On-Board Observer Program. In addition, 133 IATTC observers completed trips during the quarter, and were debriefed by field office personnel.

Surface fleet and surface catch 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 are fishing, or are expected to fish, in the eastern Pacific Ocean (east of 150°W; EPO) during 2004 is about 203,300 cubic meters (m^3) (Table 1). The weekly average at-sea capacity for the fleet, for the weekly periods ending January 1 through March 28, was about 139,100 m^3 (range: 106,200 to 152,700 m^3). The changes of flags and vessel names and additions to and deletions from the IATTC's fleet list during that period are given in Table 2.

Catch statistics

Catch statistics for the first quarter of 2004

The estimated total retained catches of tunas in the EPO during the report period, in metric tons, were:

Species	2004	1999-2003			Weekly average, 2004
		Average	Minimum	Maximum	
Yellowfin	91,400	102,400	78,600	122,400	7,000
Skipjack	51,600	57,000	42,700	80,200	4,000
Bigeye	6,200	10,400	5,200	19,100	<500

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

Catch statistics for 2003

Estimates of the annual retained and discarded catches of the various species of tunas and other fishes by vessels fishing at least part of the year in the EPO for yellowfin, skipjack, bigeye, or bluefin during 1970-2003 are shown in Table 4. This table includes only the catches by surface gear. The retained catch data for skipjack and bluefin are essentially complete except for insignificant catches made by the longline, recreational (for skipjack), and artisanal fisheries. The catch data for yellowfin and bigeye do not include catches by longline vessels, as the data from these fisheries are received much later than those for the surface fishery. About 5 to 10 percent of the total catch of yellowfin is taken by longlines. Until recently, the great majority of the catch of bigeye had been harvested by the longline fishery.

There were no restrictions on fishing for tunas in the EPO during 1980-1997. However, there were restrictions on fishing for yellowfin in the Commission's Yellowfin Regulatory Area (CYRA) (IATTC Annual Report for 2001: Figure 1) from November 26 through December 31, 1998, from October 14 through December 31, 1999, from December 1 through 31, 2000, and from October 27 through December 31, 2001. Fishing for tunas was prohibited in the EPO from December 1 through December 31, 2002. Fishing for tunas was prohibited in a portion of the EPO from December 1 through December 31, 2003. In addition, fishing for tunas associated with fish-aggregating devices (FADs) was prohibited in the EPO from November 9 through December 31, 1999, and from September 15 through December 15, 2000. Furthermore, regulations placed on purse-seine vessels directing their effort at tunas associated with dolphins

have probably affected the way these vessels operate, especially since the late 1980s. There was a major El Niño event, which began in mid-1982 and persisted until late 1983. The catch rates in the EPO were low before and during the El Niño episode, which caused a shift of fishing effort from the eastern to the western Pacific, and the fishing effort remained relatively low during 1984-1986. During 1997-1998 another major El Niño event occurred in the EPO, but the effects of this on the vulnerability of the fish to capture were apparently less severe.

The retained catches of yellowfin, skipjack, and bigeye in the EPO during 2003, the 1988-2002 annual averages for yellowfin and skipjack, and the 1994-2002 annual average for bigeye are as follows:

Species	2003	Average	Minimum	Maximum
			1988-2002	
Yellowfin	399,256	277,729	219,261	421,443
Skipjack	259,798	126,510	63,225	265,502
			1994-2002	
Bigeye	40,720	43,794	29,375	70,287

The 2003 catch of yellowfin was the second greatest on record, exceeding the average for 1988-2002 by 44 percent. The 2003 skipjack catch was 105 percent greater than the average for 1998-2002, and slightly less than the record catch of 1999. The 2003 bigeye catch was slightly less than the average for the 1994-2002 period.

The average annual distributions of the logged retained purse-seine catches of yellowfin, skipjack, and bigeye, by set type, in the EPO during the 1988-2002 period (1994-2002 for bigeye) are shown in Figures 1a, 2a, and 3a, and the preliminary estimates for 2003 are shown in Figures 1b, 2b, and 3b. The distributions of the catches of yellowfin and skipjack during 2003 were similar to those of 1988-2002, although some differences are evident.

Bigeye are not often caught by surface gear north of about 7°N. The distribution of the catch of bigeye during 2003 was similar to those of 1994-2002, although some differences are evident. With the development of the fishery for tunas associated with floating objects since 1994, the relative importance of the inshore areas has decreased, while that of the offshore areas has increased.

While yellowfin, skipjack, and bigeye comprise most of the catches of fish made by tuna vessels in the EPO, bluefin, albacore, bonito, black skipjack, and other species contribute to the overall harvest in this area. The total retained catch of these other species in the EPO was about 4 thousand metric tons (t) in 2003, which is well below the 1988-2002 average of 8 thousand t (range: 2 to 17 thousand).

The estimated retained catch of all species in the EPO in 2003 was about 704 thousand t, which is much greater than the average of 440 thousand t for 1988-2002, and 13 percent greater than the previous record total catch of 622 thousand t, taken in 2002.

Preliminary estimates of the retained catches in the EPO, by flag, and the landings of EPO-caught fish, by country, are given in Table 5. The landings are fish unloaded during a calendar year, regardless of the year of catch. The country of landing is that in which the fish

were unloaded from the fishing vessel or, in the case of transshipments, the country which received the transshipped fish.

Preliminary estimates of the most significant (equal to or greater than 5 percent of the total) retained catches and landings, of all species combined, during 2003 were as follows:

Flag	Retained catches		Landings	
	Metric tons	Percentage	Metric tons	Percentage
Colombia	28,000	4	60,000	9
Costa Rica	-	-	38,000	6
Ecuador	194,000	28	321,000	47
Spain	33,000	5	10,000	2
Mexico	185,000	26	169,000	25
Panama	45,000	6	-	-
Venezuela	104,000	15	13,000	2

It is important to note that when final information is available the landings currently assigned to the various countries may change due to exports from storage facilities to processors in other nations.

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 4).

Data for fish caught during the fourth quarter of 1998-2003 are presented in this report. Two length-frequency histograms are presented for each species. The first shows the data by fishery (area, gear type, and set type) for the fourth quarter of 2003 and the second shows the fourth-quarter catches for the current year and the previous five years. There were 156 wells sampled during the fourth quarter of 2003. No samples were taken from the negligible catches of yellowfin and skipjack taken by pole-and-line vessels during 2003. The estimates of the size distributions of these catches were obtained by using length-frequency data of 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 4). The last fishery includes all 13 sampling areas. Of the 156 wells sampled, 125 contained yellowfin. The estimated size compositions of these fish are shown in Figure 5a. The catches of yellowfin during the fourth quarter of 2003 remained high in dolphin sets in the Northern and Inshore areas, where some of the largest fish were encountered. Significant catches were also taken in unassociated school and dolphin sets in the South. 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. Most of the yellowfin caught in unassociated sets were between 60 and 120 cm. A mode of fish between 60 and 110 cm was also present in the Inshore dolphin fishery.

Negligible amounts of yellowfin (approximately 400 metric tons (t)) were caught by pole-and-line vessels.

The estimated size compositions of the yellowfin caught by all fisheries combined during the fourth quarter of 1998-2003 are shown in Figure 5b. Although many different sizes of yellowfin were caught during 2003, the catches were dominated by fish around 120 cm in length.

There are eight fisheries for skipjack defined for stock assessments: four floating-object, two unassociated school, one dolphin, and one pole-and-line (Figure 4). The last two fisheries include all 13 sampling areas. Of the 156 wells sampled, 118 contained skipjack. The estimated size compositions of these fish are shown in Figure 6a. Catches of skipjack on floating objects were low in the Equatorial area during the first half of 2003, increased during the third quarter, and dominated the catch during the fourth quarter. A mode of fish greater than 55 cm in length was present in the floating-object and unassociated fisheries Negligible amounts of skipjack (less than 400 t) were taken by pole-and-line vessels.

The estimated size compositions of the skipjack caught by all fisheries combined during the fourth quarter of 1998-2003 are shown in Figure 6b. The larger skipjack mentioned above are evident in the size distribution for fourth quarter of 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 4). The last three fisheries include all 13 sampling areas. Of the 156 wells sampled, 49 contained bigeye. The estimated size compositions of these fish are shown in Figure 7a. The majority of the catch of bigeye was taken in floating-object sets in the Southern and Equatorial areas, and most of these fish were between 60 and 100 cm. Appreciable amounts were also caught in the Northern floating-object fishery. Negligible amounts of bigeye were caught in the Inshore floating-object fishery and in sets on unassociated schools (less than 500 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 fourth quarter of 1998-2003 are shown in Figure 7b. The average weight of bigeye increased during the fourth quarter due to larger bigeye caught in the floating-object fishery.

The estimated retained catch of bigeye less than 60 cm in length during 2003 was 12,040 t, or about 30 percent of the estimated total catch of bigeye. The corresponding amounts for 1998-2002 ranged from 3,453 to 18,458 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 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 8. The commercial catch (3,247 t) of bluefin far exceeded the recreational catch (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 2004 the observer programs of the European Union, Mexico, and Venezuela are to sample half, and that of Ecuador approximately one-third, of the trips by vessels of their respective fleets, while IATTC observers are 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 223 fishing trips aboard purse seiners covered by that program during the first quarter of 2004. Preliminary coverage data for these vessels during the quarter are shown in Table 6.

Training

There were no IATTC observer training courses during the quarter.

RESEARCH

Tuna tagging

The pole-and-line vessel *Her Grace* was chartered for the tagging of tunas in the equatorial eastern Pacific Ocean. The vessel left San Diego on March 1, 2004. As of March 31,

3,594 bigeye, 178 skipjack, and 76 yellowfin had been tagged with conventional plastic dart tags and released.

From January through July of 2003 archival tags had been implanted in small yellowfin at the Achotines Laboratory, and at the end of February 2004 there remained 10 fish from that group. In March four more small yellowfin were implanted with archival tags and added to the population, bringing the total number of archival-tagged yellowfin to 14.

Modeling of protected species

Several members of the IATTC staff are working on modeling of protected species. This project is funded by the U.S. National Oceanographic and Atmospheric Administration. The work to date has consisted of the following types of activity: (1) development of an integrated model for northeastern spotted dolphins (*Stenella attenuata*); (2) modeling of black-footed albatross (*Phoebastria nigripes*); (3) development of a general model that will apply to diverse groups of protected species; (4) methodological development; (5) other applications, including research directed at sea turtles. Nearly all of this work is being carried out cooperatively with scientists of other organizations.

Ecosystem studies

Ms. Gladis López, a graduate student at the Centro Interdisciplinario de Ciencias Marinas (CICIMAR), La Paz, Mexico, spent the period of March 8-15, 2004, at the IATTC headquarters in La Jolla, where she worked with Dr. Robert J. Olson on the zooplankton samples from the bongo net tows made on cruises of the U.S. National Marine Fisheries Service (NMFS) vessels *McArthur II* and *David Starr Jordan* in the eastern Pacific Ocean in 2003. The NMFS personnel on the cruises froze the samples from one side of each bongo tow for Dr. Olson, and preserved those from the other side in formalin for the NMFS. Ms. López measured the plankton volume in the samples, and split them into two equal parts. She took one part back to CICIMAR frozen to use in her Ph.D. dissertation on stable carbon and nitrogen isotope ratios in the copepod assemblages. Her work will also provide data for the food web project sponsored by the Pelagic Fisheries Research Program of the University of Hawaii, which is described in the IATTC Quarterly Report for April-June 2003.

Early life history studies

Yellowfin broodstock

q034 - The yellowfin broodstock in Tank 1 (1,362,000 L) at the Achotines Laboratory spawned almost daily during the quarter, except on February 22, 24, 25, and 29 and March 1, 3, and 5, when spawning halted as a result of low water temperatures. Spawning occurred as early as 5:15 p.m. and as late as 10:10 p.m. The water temperatures in the tank ranged from 24.1° to 27.7°C during the quarter. The numbers of eggs collected after each spawning event ranged from about 3,000 to 272,000.

During the quarter two 48- to 49-kg females and two 8- to 13-kg females died, all from wall strikes. At the end of March there were three size groups of fish in Tank 1: one 87-kg fish, two 52- to 67-kg fish, and 22 7- to 22-kg fish.

From January through July of 2003 archival tags had been implanted in yellowfin, and at the end of March 2004 there remained 10 fish from that group in Tank 1. On March 24, 2004, four yellowfin (7- to 9-kg) were implanted with archival tags (LOTEK model LTD 2310) and added to the Tank-1 population, bringing the total number of archival-tagged yellowfin in Tank 1 to 14.

Three yellowfin remained in Tank 2 as reserve broodstock, and capture efforts will continue during the second quarter to increase this population.

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.

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 snapper broodstock established in 1996 and held in Tank 3, which spawned during all of 2003, stopped spawning during the second week of January. During the last week of February, 15 individuals of this population died from stress caused by low dissolved oxygen levels, leaving a population of 16 snappers in this tank. The average length of the dead fish was 53.6 cm, and the average weight was 1.9 kg.

Twenty-six snappers, which were reared at the Achotines Laboratory from eggs hatched in 1998 to mature adults and are being held in Tank 4, spawned regularly during 2003. This group stopped spawning during the first week of January.

Sailfish capture trials

The facilities of the Achotines Laboratory are being used in a joint study with the Aquaculture Program of the Rosenstiel School of Marine and Atmospheric Science, University of Miami, to investigate the feasibility of capturing, transporting, and culturing live sailfish, *Istiophorus platypterus*. The Center for Sustainable Fisheries, University of Miami, is funding these studies. In support of this study, Achotines Laboratory staff members made several fishing trips during the quarter, but no sailfish were captured. Efforts to catch and transport live sailfish to the Achotines Laboratory will continue during the remainder of 2004.

Visitors at the Achotines Laboratory

On January 30, 2004, a television production crew from Amsterdam filmed yellowfin tuna broodstock and larvae for inclusion in a documentary program on tuna. It will be shown on the Dutch version of PBS's Nova series, and sold to stations in other European countries for rebroadcast.

On March 12-14, 2004, Dr. Eldredge Birmingham, Acting Deputy Director of the Smithsonian Tropical Research Institute (STRI), visited the Achotines Laboratory to survey the resources and facilities available for STRI scientists.

On March 22 and 23, 2004, Dr. César O. Romero G., Director of the Applied Marine Sciences Department of the Universidad de Oriente in Isla Margarita, Venezuela, visited the Achotines Laboratory. He was accompanied by Lic. Leonor Marín and Arq. Dumas Mercado of the Luís Hernández Brooks Company. They are visiting Panama to obtain preliminary background information for a possible tuna research program at the Universidad de Oriente.

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.

The SSTs in the ETP were near normal throughout the first quarter. There were a few small, scattered areas of cool water during January and February, and a somewhat larger area of cool water appeared off Peru during March (Figure 9). The data in Table 7, for the most part, indicate that conditions were close to normal during the first quarter, although the thermocline was unusually close to the surface at 0°-80°W in February and March. In March, however, the NOI* was well above normal, a condition that is usually associated with below-normal SSTs. Positive anomalies exceeding that have occurred in only 23 of the 675 months of the January 1948-March 2004 period. All of these occurred during the northern winter (November-March). According to the Climate Diagnostics Bulletin of the U.S. National Weather Service for March

2004, "It is likely that … neutral conditions will continue [in the tropical Pacific] for the next 3-6 months."

Tuna-dolphin research

The IATTC began giving financial support to the work of Ms. Weihua Huang, a graduate student at the Department of Statistics, University of California at Los Angeles, in February 2004. Specifically, Ms. Huang, under the supervision of her advisor, Dr. Richard A. Berk, is working with Dr. Cleridy E. Lennert-Cody of the IATTC staff to develop a computer-intensive statistical method for the classification of rare events, which will be applied to the IATTC observer data to identify anomalous observations.

GEAR PROGRAM

During the first quarter IATTC staff members participated in eight dolphin safety-gear inspection and safety-panel alignment procedures, six aboard Mexican-flag purse seiners and two aboard Panamanian-flag purse seiners.

Two AIDCP fishing captain seminars were conducted during the quarter, one by IATTC staff members in Panama, R.P., on March 18, with 12 attendees, and one by the Mexican national observer program (PNAAPD) in Mazatlan, Mexico, on March 26, with 22 attendees.

PUBLICATIONS

IATTC Bulletin

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: 96 pp.

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.

Hinke, Jefferson T., Isaac C. Kaplan, Kerim Aydin, George M Watters, Robert J. Olson, and James F. Kitchell. 2004. Visualizing the food-web effects of fishing for tunas in the Pacific Ocean. Ecology and Society, 9 (1): article 10. (This paper can be viewed on the internet at www.ecologyandsociety.org/vol9/iss1/art10.)

Loew, Ellis R., William N. McFarland, and Daniel Margulies. 2004. Developmental changes in the visual pigments of the yellowfin tuna, *Thunnus albacares*. PFRP [Pelagic Fisheries Research Program, Joint Institute for Marine and Atmospheric Research, University of Hawaii at Manoa], 9 (1): 5-7. (This is an abbreviated version

of a paper by the same name published in Marine and Freshwater Behavior and Physiology, Vol. 35, No. 4, in 2002.)

Scholey, Vernon, Daniel Margulies, Jeanne Wexler, and Sharon Hunt. 2004. Larval tuna research mimics ocean conditions in lab. Global Aqua. Advocate, 7 (1): 38.

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.

ADMINISTRATION

Mr. Roberto Uriarte, who had worked for the IATTC as an hourly employee for several years, became a permanent member of the staff on January 1, 2004.

Mr. Ryan Parker, who had been working as a temporary basis on tagging data with Messrs. Kurt M. Schaefer and Daniel W. Fuller since December 8, 2003, completed his work on January 21, 2004.

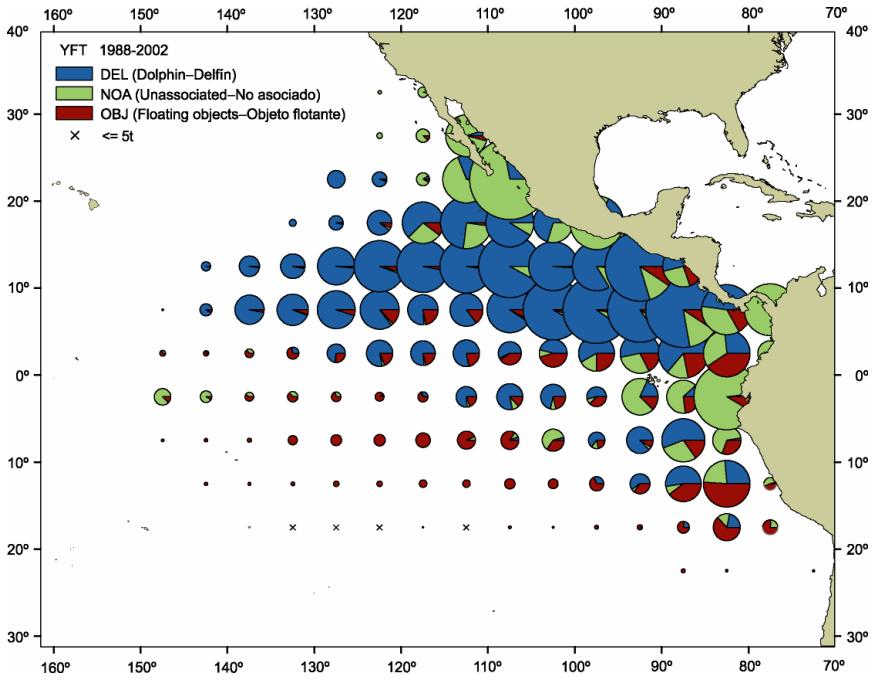

FIGURE 1a. Average annual distribution of the logged retained purse-seine catches of yellowfin in the eastern Pacific Ocean during 1988-2002.
FIGURA 1a. Distribución anual media de las capturas cerqueras retenidas registradas de aleta amarilla en el Océano Pacífico oriental durante 1988-2002.

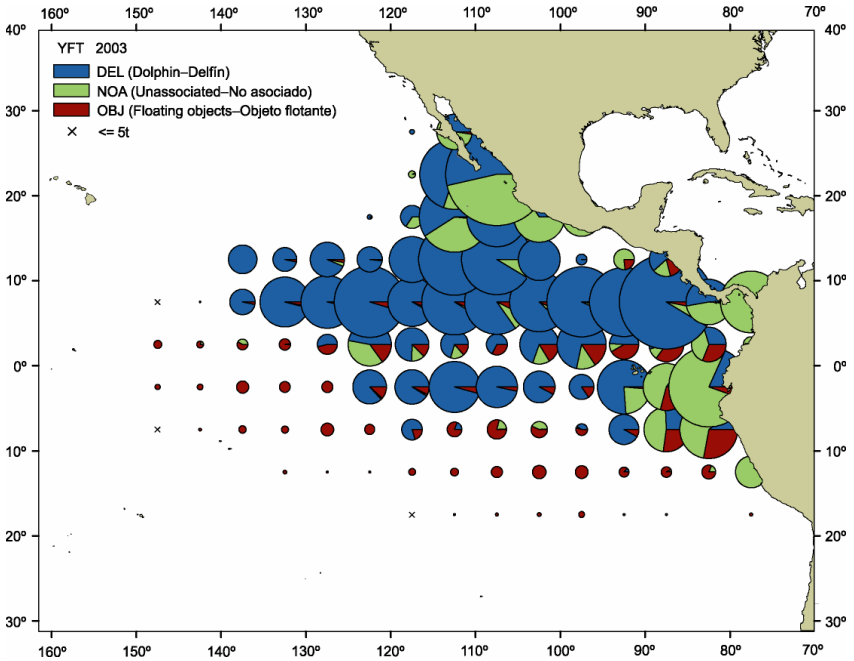

FIGURE 1b. Distribution of the logged retained purse-seine catches of yellowfin in the eastern Pacific Ocean during 2003.
FIGURA 1b. Distribución de las capturas cerqueras retenidas registradas de aleta amarilla en el Océano Pacífico oriental durante 2003.

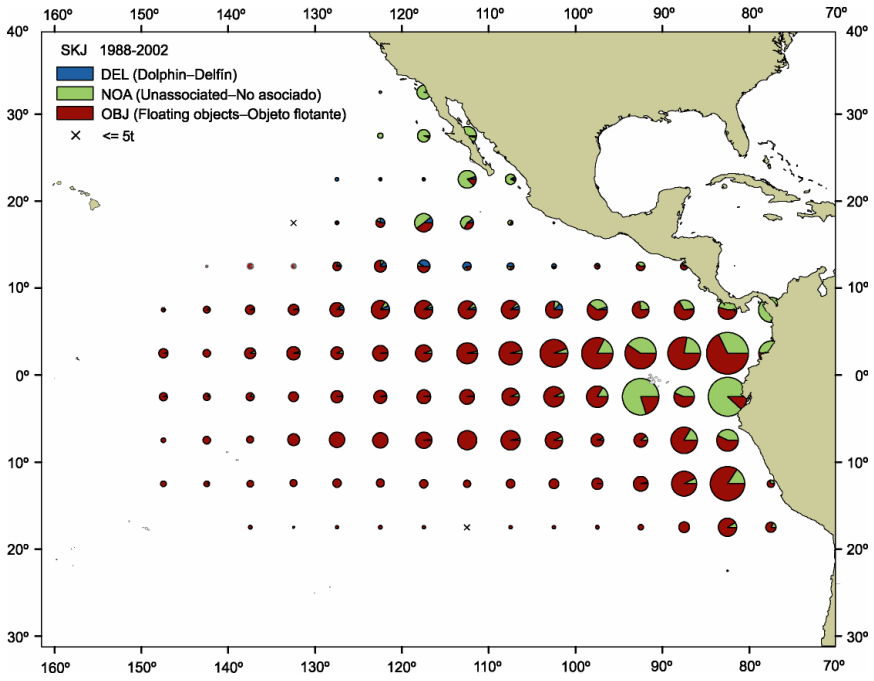

FIGURE 2a. Average annual distribution of the logged retained purse-seine catches of skipjack in the eastern Pacific Ocean during 1988-2002.
FIGURA 2a. Distribución anual media de las capturas cerqueras retenidas registradas de barrilete en el Océano Pacífico oriental durante 1988-2002.

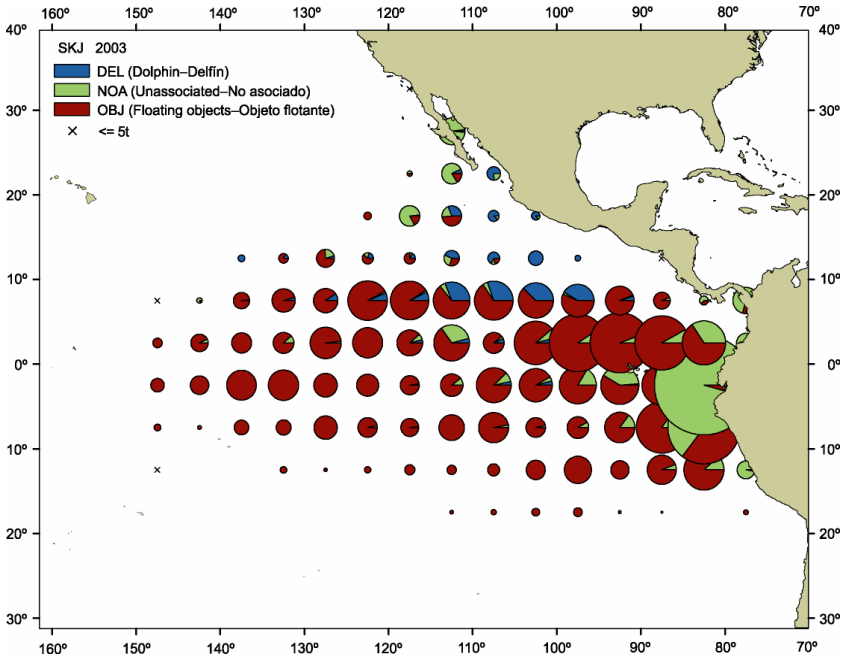

FIGURE 2b. Distribution of the logged retained purse-seine catches of skipjack in the eastern Pacific Ocean during 2003.
FIGURA 2b. Distribución de las capturas cerqueras retenidas registradas de barrilete en el Océano Pacífico oriental durante 2003.

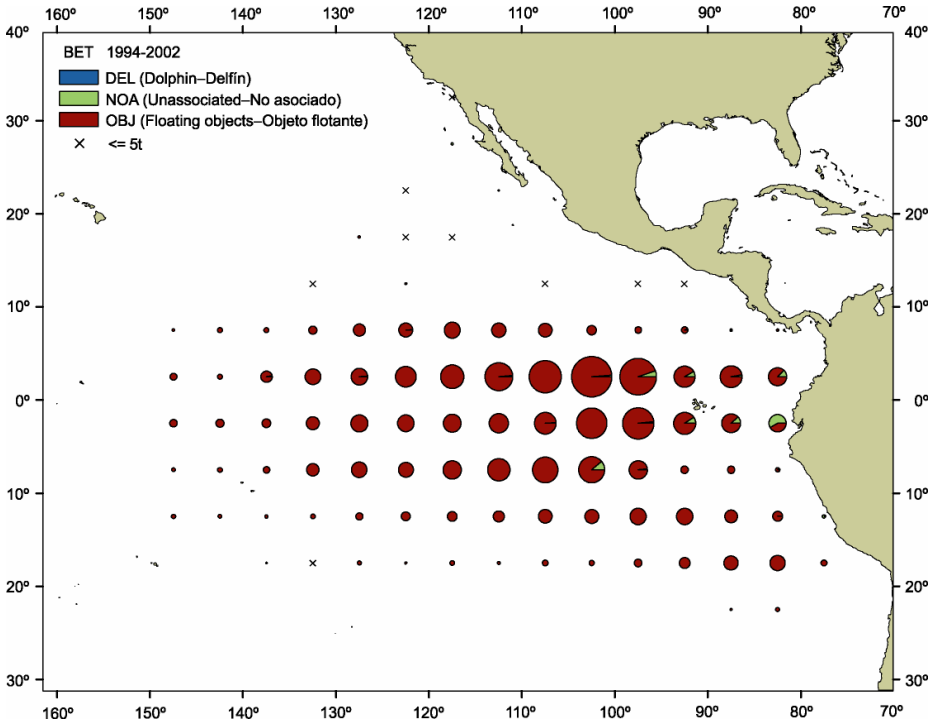

FIGURE 3a. Average annual distribution of the logged retained purse-seine catches of bigeye in the eastern Pacific Ocean during 1994-2002.
FIGURA 3a. Distribución anual promedia de las capturas cerqueras retenidas registradas de patudo en el Océano Pacífico oriental durante 1994-2002.

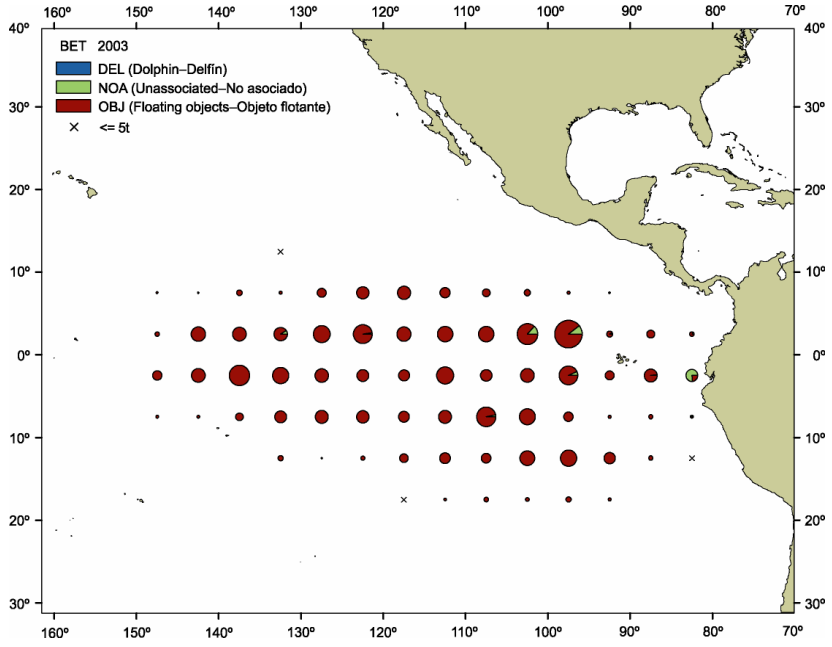

FIGURE 3b. Distribution of the logged retained purse-seine catches of bigeye in the eastern Pacific Ocean during 2003.
FIGURA 3b. Distribución de las capturas cerqueras retenidas registradas de patudo en el Océano Pacífico oriental durante 2003.

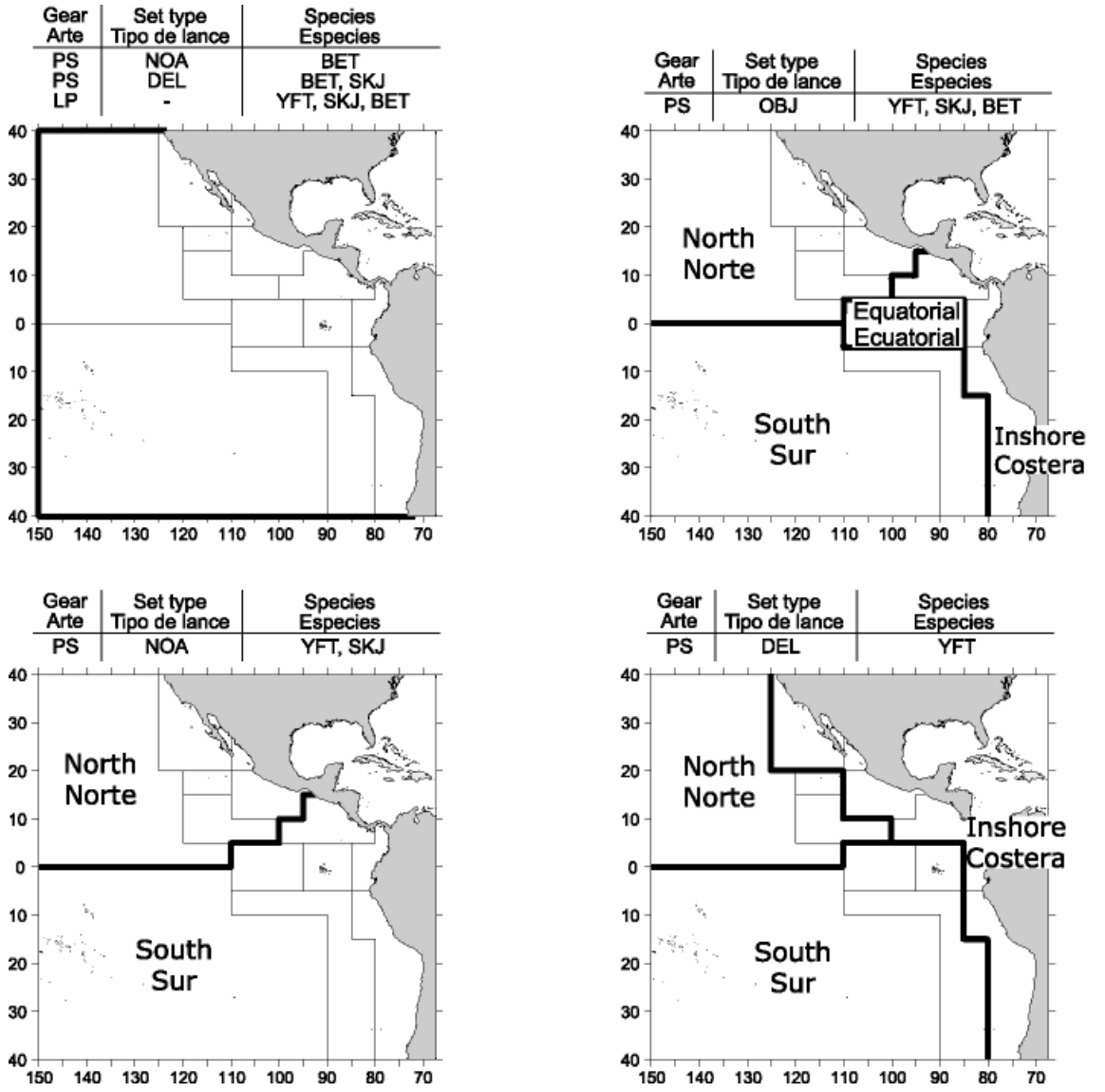

FIGURE 4. Spatial extents of the fisheries defined by the IATTC staff for stock assessment of yellowfin, skipjack, and bigeye in the EPO. The thin lines indicate the boundaries of the 13 length-frequency sampling areas, and the bold lines the boundaries of the fisheries. Gear – PS = purse seine, LP = pole and line; Set type – NOA = unassociated, DEL = dolphin, OBJ = floating object; Species – YFT = yellowfin, SKJ = skipjack, BET = bigeye.

FIGURA 4. 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. Artes – PS = cerquero, LP = caño; Tipo de arte – NOA = no asociada, DEL = delfín; OBJ = objeto flotante; Especies – YFT = aleta amarilla, SKJ = barrilete, BET = patudo.

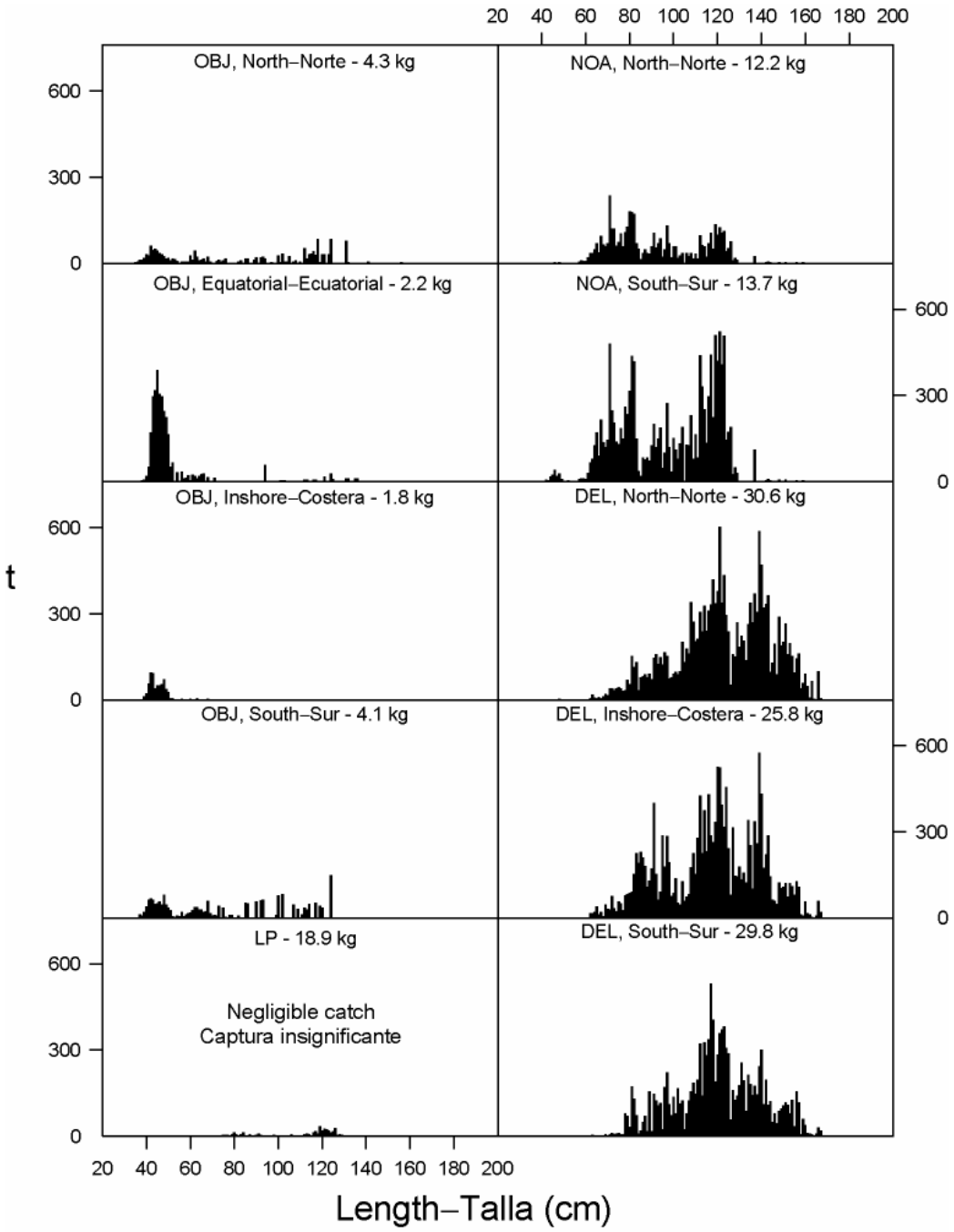

FIGURE 5a. Estimated size compositions of the yellowfin caught in each fishery of the EPO during the fourth quarter of 2003. The average weights of the fish in the samples are given at the tops of the panels. t = metric tons; OBJ = floating object; LP = pole and line; NOA = unassociated; DEL = dolphin.

FIGURA 5a. Composición por tallas estimada para el aleta amarilla capturado en cada pesquería del OPO durante el cuarto trimestre de 2003. En cada recuadro se detalla el peso promedio de los peces en las muestras. t = toneladas métricas; OBJ = objeto flotante; LP = caño; NOA = unassociated; DEL = delfín.

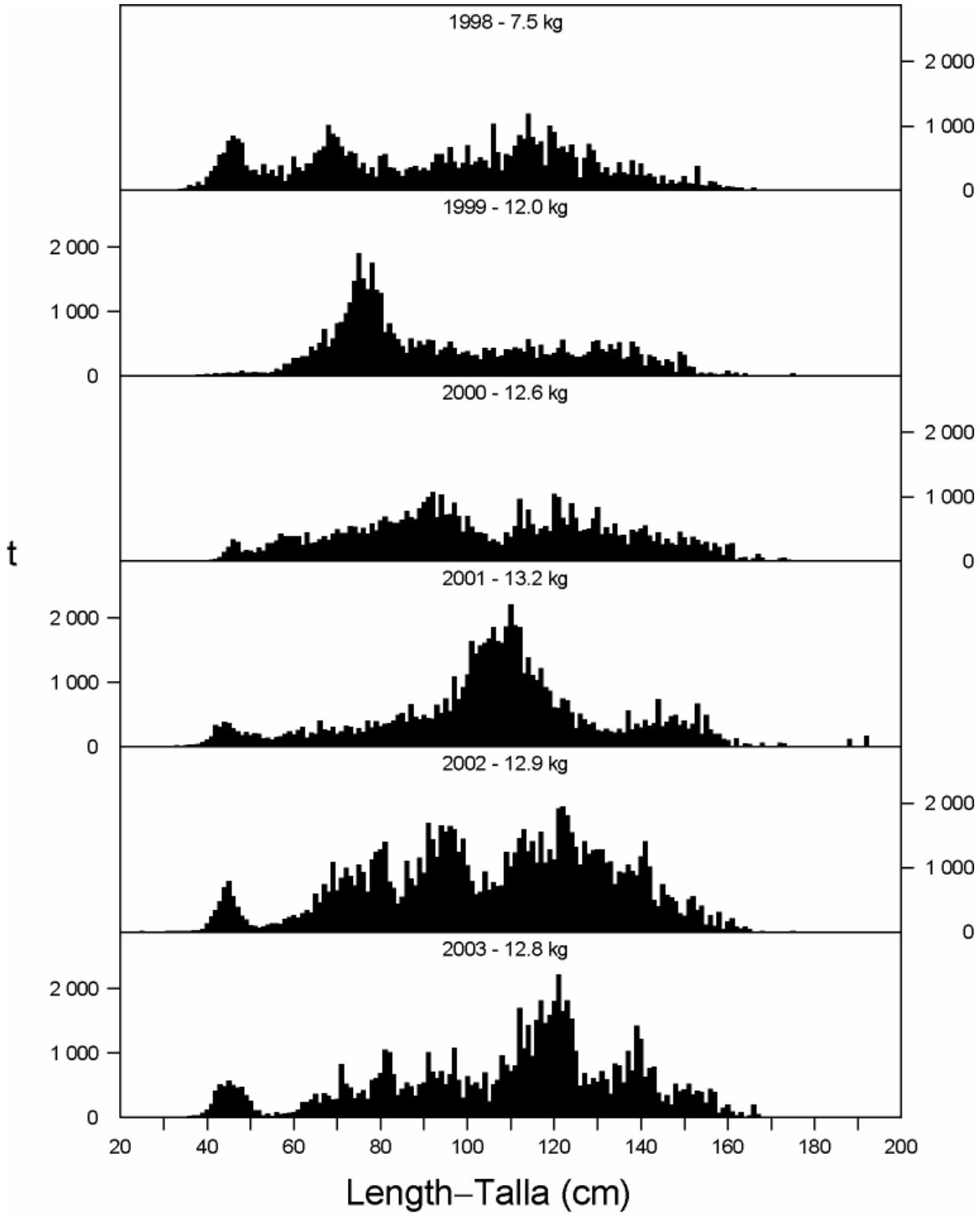

FIGURE 5b. Estimated size compositions of the yellowfin caught in the EPO during the fourth quarter of 1998-2003. The average weights of the fish in the samples are given at the tops of the panels. t = metric tons.

FIGURA 5b. Composición por tallas estimada para el aleta amarilla capturado en el OPO en el cuarto trimestre de 1998-2003. En cada recuadro se detalla el peso promedio de los peces en las muestras. t = toneladas métricas.

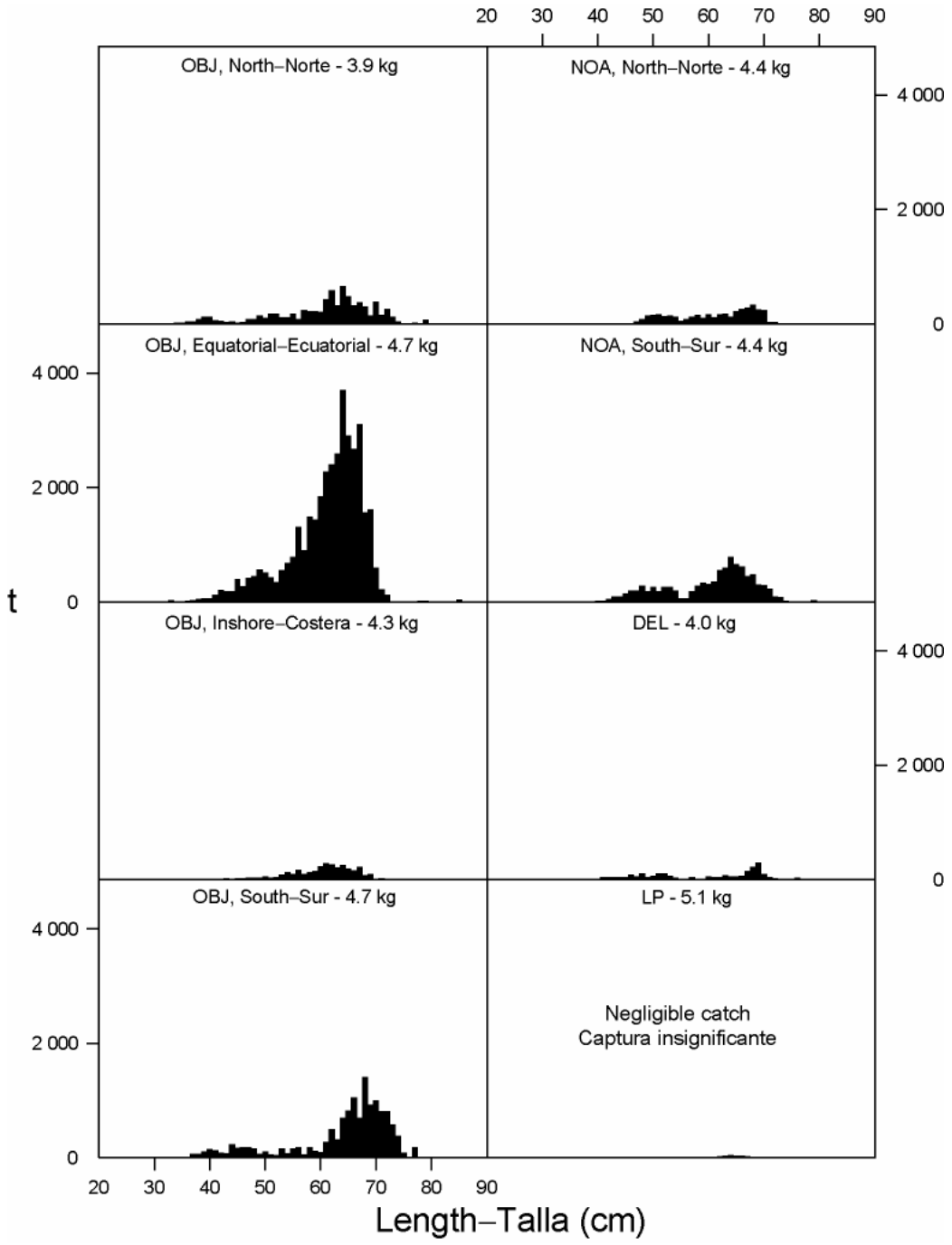

FIGURE 6a. Estimated size compositions of the skipjack caught in each fishery of the EPO during the fourth quarter of 2003. The average weights of the fish in the samples are given at the tops of the panels. t = metric tons; OBJ = floating object; LP = pole and line; NOA = unassociated; DEL = dolphin.

FIGURA 6a. Composición por tallas estimada para el barrilete capturado en cada pesquería del OPO durante el cuarto trimestre de 2003. En cada recuadro se detalla el peso promedio de los peces en las muestras. t = toneladas métricas; OBJ = objeto flotante; LP = caño; NOA = unassociated; DEL = delfín.

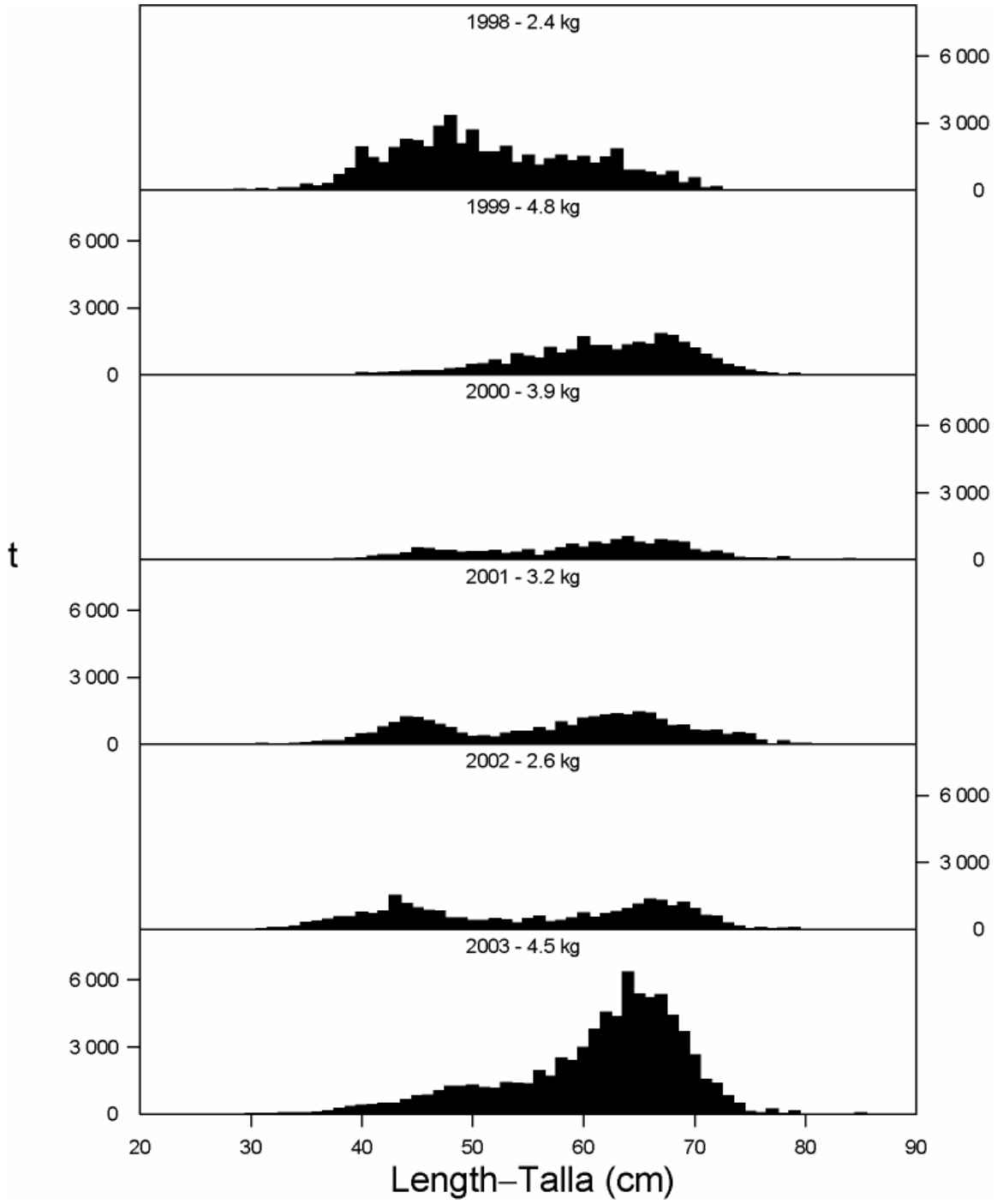

FIGURE 6b. Estimated size compositions of the skipjack caught in the EPO during the fourth quarter of 1998-2003. The average weights of the fish in the samples are given at the tops of the panels. t = metric tons.

FIGURA 6b. Composición por tallas estimada para el barrilete capturado en el OPO en el cuarto trimestre de 1998-2003. En cada recuadro se detalla el peso promedio de los peces en las muestras. t = toneladas métricas.

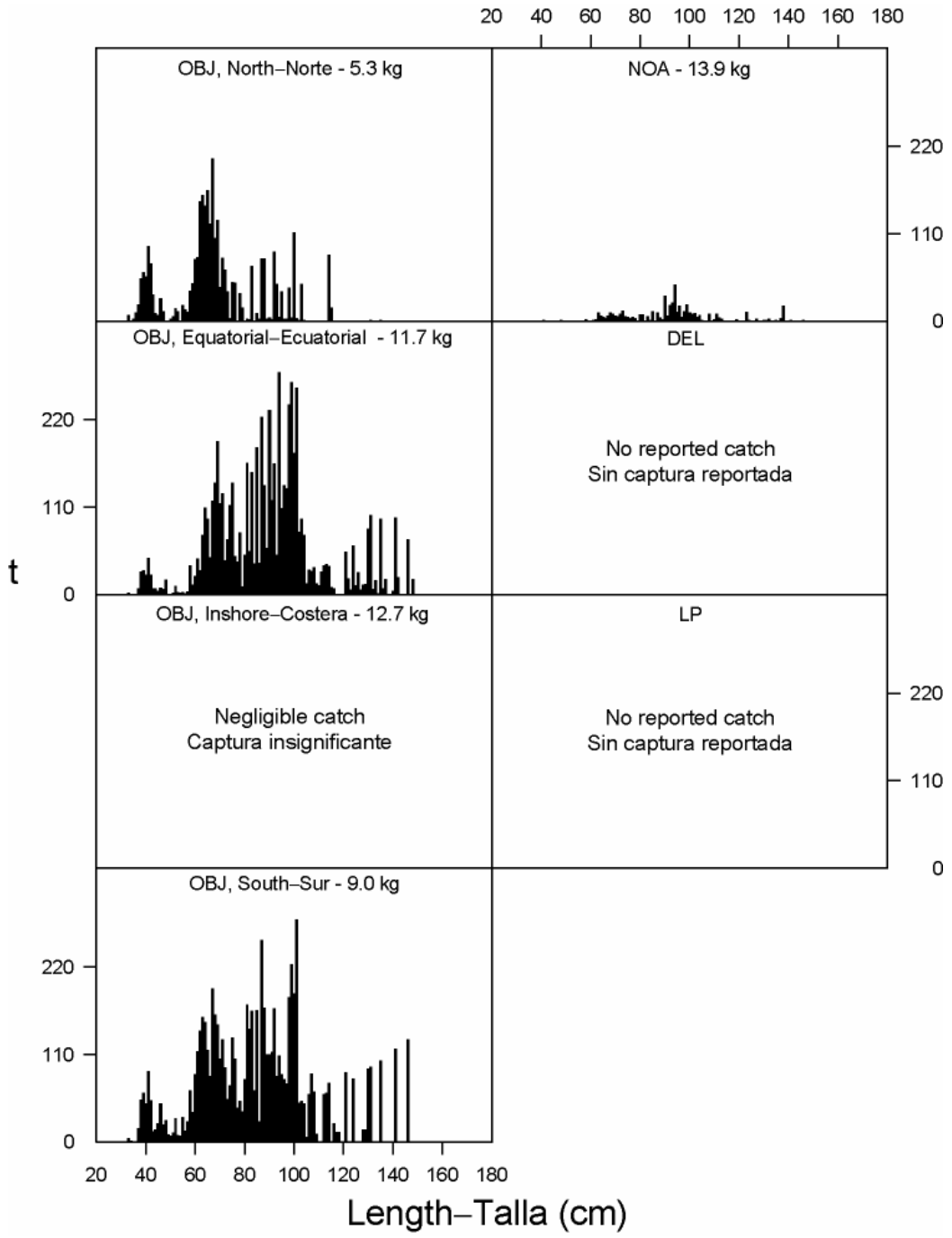

FIGURE 7a. Estimated size compositions of the bigeye caught in each fishery of the EPO during the fourth quarter of 2003. The average weights of the fish in the samples are given at the tops of the panels. t = metric tons; OBJ = floating object; LP = pole and line; NOA = unassociated; DEL = dolphin.

FIGURA 7a. Composición por tallas estimada para el patudo capturado en cada pesquería del OPO durante el cuarto trimestre de 2003. En cada recuadro se detalla el peso promedio de los peces en las muestras. t = toneladas métricas; OBJ = objeto flotante; LP = caño; NOA = unassociated; DEL = delfín.

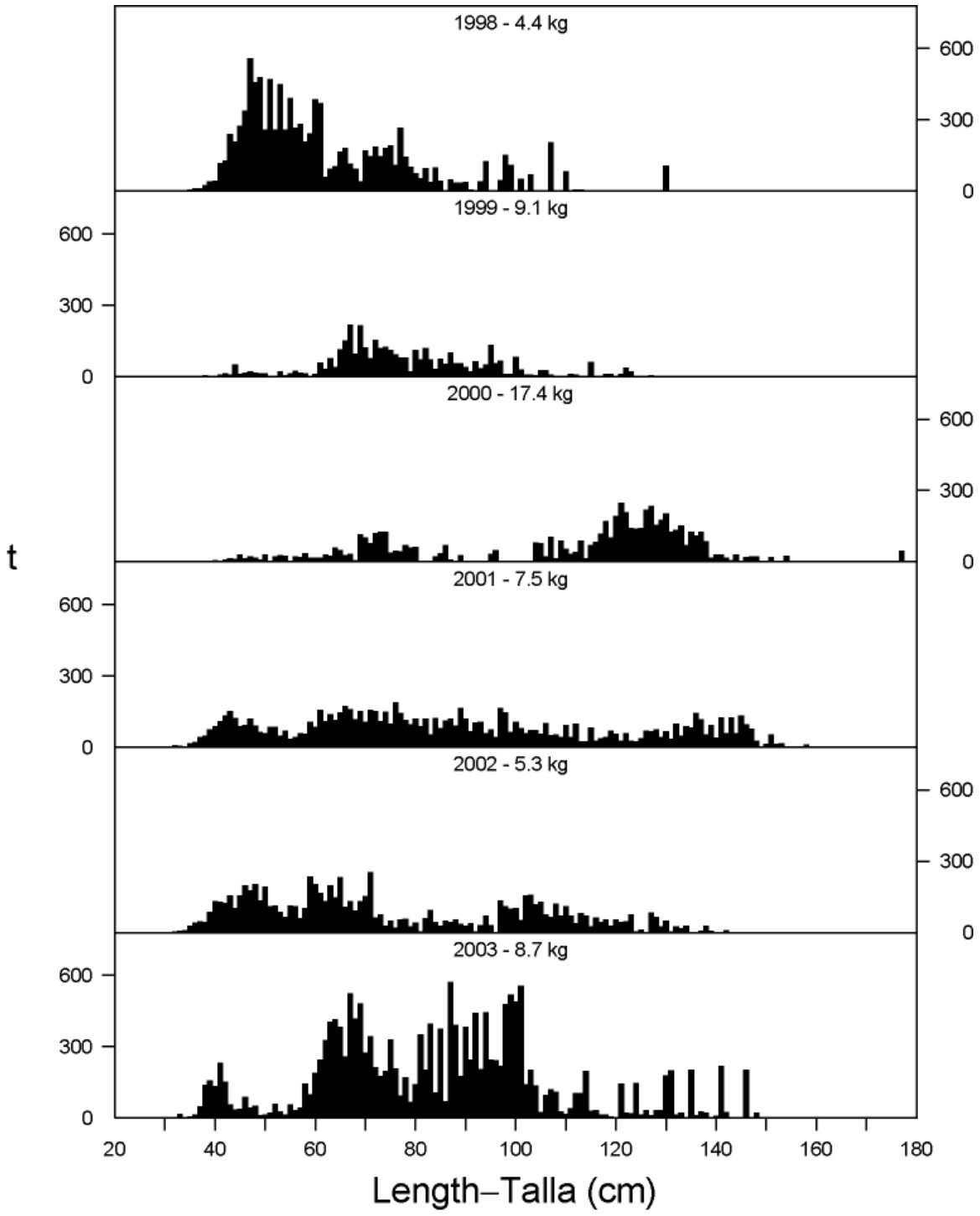

FIGURE 7b. Estimated size compositions of the bigeye caught in the EPO during the fourth quarter of 1998-2003. The average weights of the fish in the samples are given at the tops of the panels. t = metric tons.
FIGURA 7b. Composición por tallas estimada para el patudo capturado en el OPO en el cuarto trimestre de 1998-2003. En cada recuadro se detalla el peso promedio de los peces en las muestras. t = toneladas métricas.

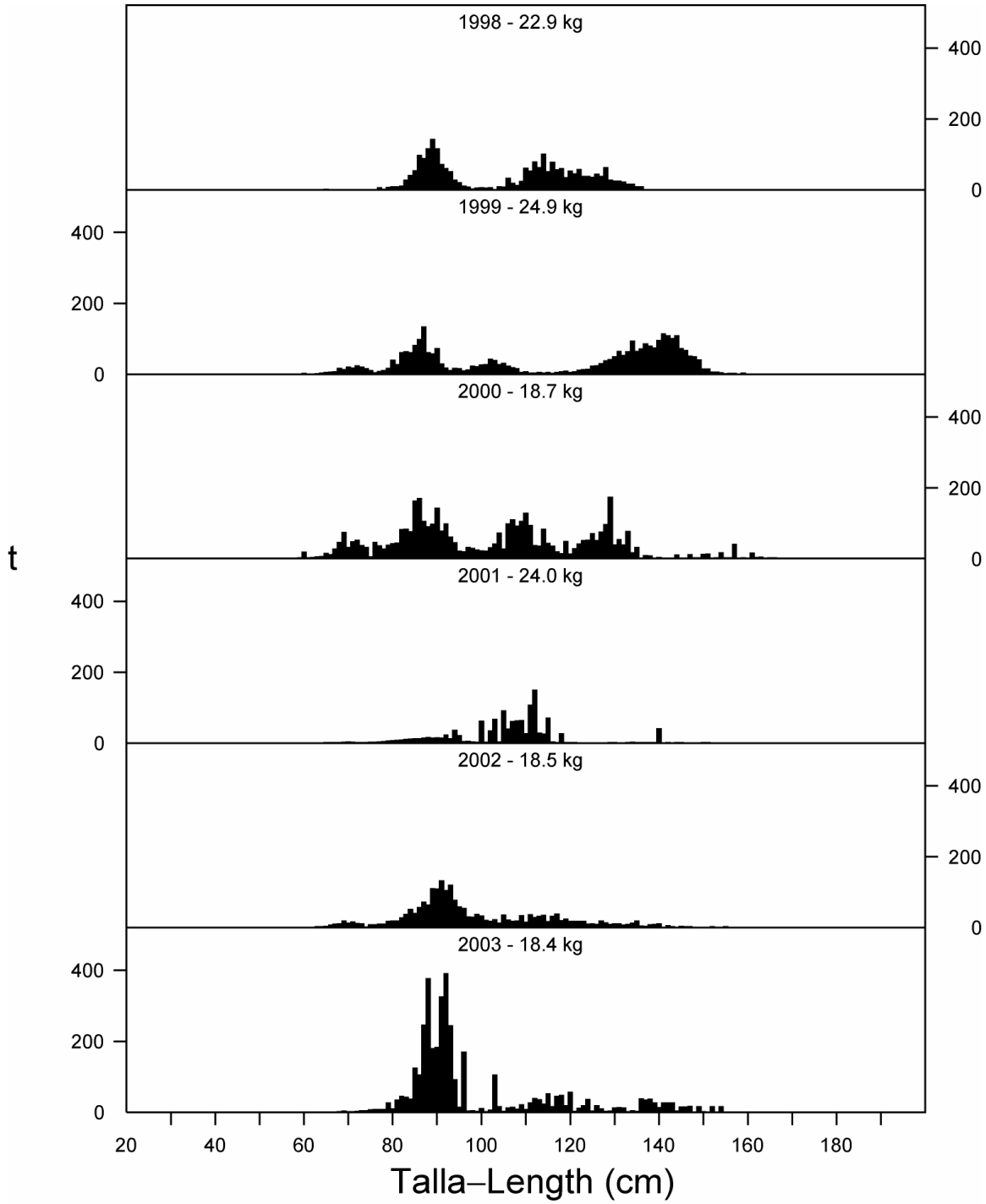

FIGURE 8. Estimated size compositions of the bluefin caught in the commercial and recreational fisheries of the EPO during 1998-2003. The average weights of the fish in the samples are given at the tops of the panels. t = metric tons.
FIGURA 8. Composición por tallas estimada para el aleta azul capturado en las pesquerías comerciales y deportivas del OPO durante 1998-2003. En cada recuadro se detalla el peso promedio de los peces en las muestras. t = toneladas métricas.

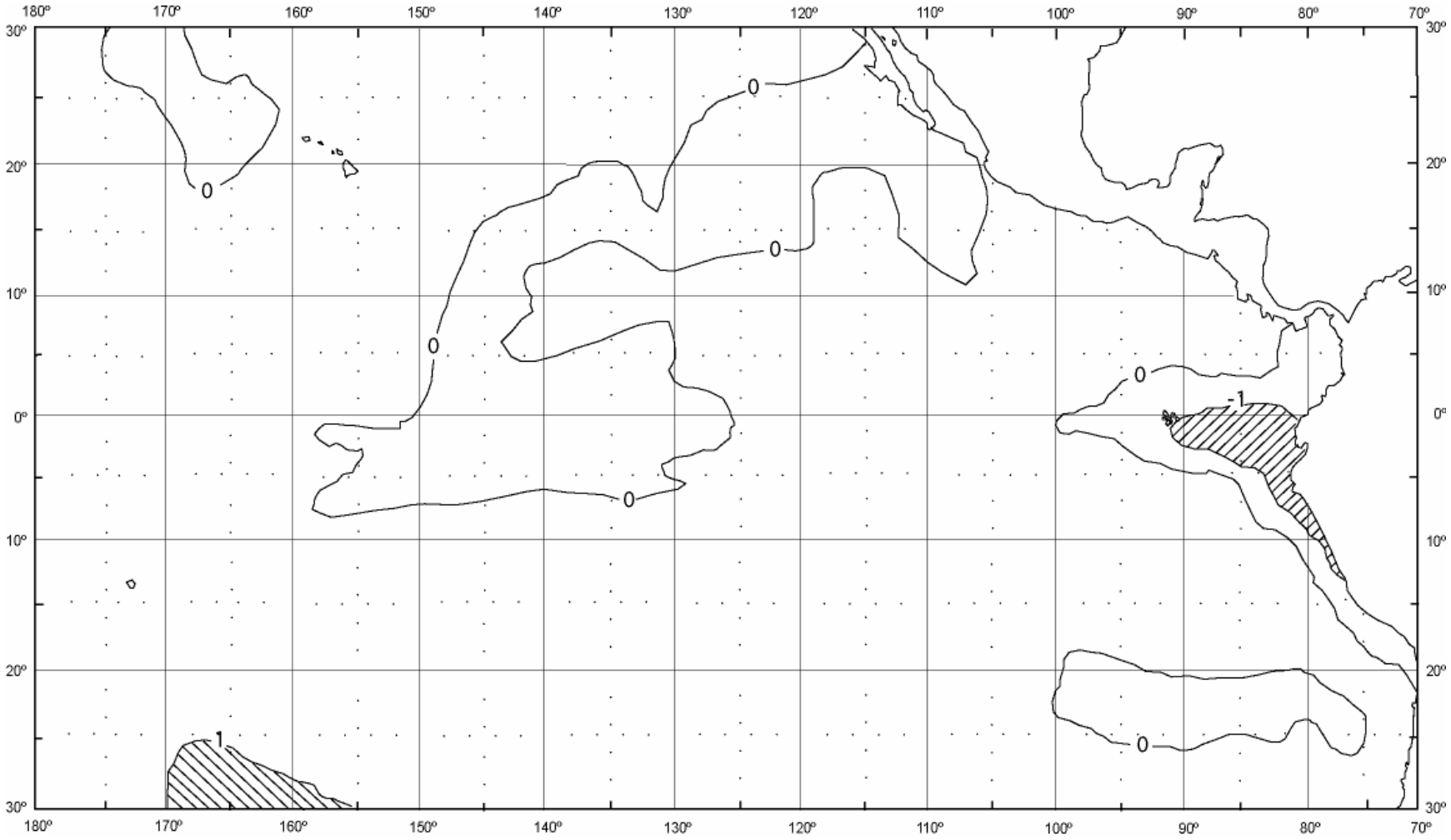

FIGURE 9. Sea-surface temperature (SST) anomalies (departures from long-term normals) for March 2004, based on data from fishing boats and other types of commercial vessels.
FIGURA 9. Anomalías (variaciones de los niveles normales a largo plazo) de la temperatura superficial del mar (TSM) en marzo de 2004, basadas en datos tomados por barcos pesqueros y otros buques comerciales.

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 2004 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 2004, 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	209
Bolivia	PS	-	-	2	-	-	6	8	7,202
Colombia	PS	-	-	-	1	1	6	8	8,318
Ecuador	PS	-	5	11	11	8	38	73	49,625
España—Spain	PS	-	-	-	-	-	4	4	8,859
Guatemala	PS	-	-	-	-	-	2	2	3,880
Honduras	PS	-	-	-	-	-	2	2	1,798
México	PS	-	-	3	7	11	39	60	52,205
	LP	-	1	3	-	-	-	4	526
Panamá	PS	-	-		1	-	16	17	21,953
Perú	PS	-	-	-	-	-	1	1	996
El Salvador	PS	-	-	-	-	-	3	3	5,377
USA—EE.UU.	PS	-	-	1	-	-	4	5	5,628
Venezuela	PS	-	-	-	-	-	24	24	31,116
Vanuatu	PS	-	-	-	-	-	5	5	5,585
All flags— Todas banderas	PS	-	5	18	20	20	150	213	
	LP	-	1	3	-	-	-	4	
	PS + LP	-	6	21	20	20	150	217	
					Capacity—Capacidad				
All flags— Todas banderas	PS	-	551	3,383	5,649	9,079	184,089	202,751	
	PL	-	101	425	-	-	-	526	
	PS + LP	-	652	3,808	5,649	9,079	184,089	203,277	

TABLE 2. Changes in the IATTC fleet list recorded during the first quarter of 2004. PS = purse seine; LP = pole-and-line. WPO = western Pacific Ocean.
TABLA 2. Cambios en la flota observada por la CIAT registrados durante el primer trimestre de 2004. PS = cerquero; LP = cañero. WPO = Océano Pacífico occidental.

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				
New entry—1er ingreso				
				Now—Ahora
Marta Lucia R.	Colombia	PS	1,600	
Re-entries—Reingresos				
				Now—Ahora
Don Quijote	Ecuador	PS	374	*Jacobita*
Bonnie	México	PS	1,278	
El Cipres	México	PS	294	*San Rafael*
La Parrula	Venezuela	PS	889	Panamá
Vessels removed from fleet—Buques retirados de la flota				
Albacora	España	PS	3,318	Inactive—Inactivo
Bold Adventuress	USA	PS	1,593	Fishing in the WPO—Pescando en el WPO
Sea Scout	USA	PS	169	Sunk—Hundido

TABLE 3. Preliminary estimates of the retained catches of tunas in the EPO from January 1 through March 28, 2004, 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 marzo 2004, 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**
Ecuador	16,921	24,217	2,527	-	8	8	-	-	43,673	29.2
España—Spain	1,114	4,191	966	-	-	-	-	-	6,271	4.2
México	27,367	4,568	-	-	-	-	218	2	32,155	21.5
Panamá	10,191	5,348	451	-	-	-	-	-	15,990	10.7
U.S.A.—EE.UU.	1,186	1,500	1,112	-	-	-	-	-	3,798	2.5
Venezuela	20,854	3,133	202	-	-	-	-	-	24,189	16.2
Vanuatú	984	2,699	604	-	-	-	-	-	4,287	2.9
Other—Otros[2]	12,805	5,907	328	-	-	-	-	-	19,040	12.7
Total	91,422	51,563	6,190	-	8	8	218	2	149,403	

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

TABLE 4. Estimated retained and discarded catches, in metric tons, by purse-seine and pole-and-line vessels of the EPO tuna fleet. "Other" includes other tunas, sharks, and miscellaneous fishes. The 2002 and 2003 data are preliminary. Discard data were first collected by observers in 1993.

TABLA 4. Estimaciones de capturas retenidas y descartadas, en toneladas métricas, de buques cerqueros y caneros de la flota atunera del OPO. "Otros" incluye otros atunes, tiburones, y peces diversos. Los datos de 2002 y 2003 son preliminares. Los observadores toman datos sobre descartes desde 1993.

Year	Yellowfin			Skipjack			Bigeye			Pacific bluefin		
	Retained	Discarded	Total	Retained	Discarded	Total	Retained	Discarded	Total	Retained	Discarded	Total
Año	Aleta amarilla			Barrilete			Patudo			Aleta azul del Pacífico		
	Retenido	Descartado	Total	Retenido	Descartado	Total	Retenido	Descartado	Total	Retenido	Descartado	Total
1970	155,642		155,642	55,973		55,973	1,332		1,332	3,966		3,966
1971	122,722		122,722	104,520		104,520	2,566		2,566	8,360		8,360
1972	177,128		177,128	33,409		33,409	2,238		2,238	13,347		13,347
1973	205,253		205,253	43,954		43,954	1,979		1,979	10,744		10,744
1974	210,364		210,364	78,803		78,803	890		890	5,617		5,617
1975	202,186		202,186	124,344		124,344	3,945		3,945	9,582		9,582
1976	236,234		236,234	126,354		126,354	10,243		10,243	10,645		10,645
1977	198,811		198,811	86,327		86,327	7,051		7,051	5,490		5,490
1978	179,923		179,923	169,858		169,858	11,532		11,532	5,402		5,402
1979	189,674		189,674	132,024		132,024	7,532		7,532	6,127		6,127
1980	159,432		159,432	130,669		130,669	15,421		15,421	2,939		2,939
1981	181,805		181,805	119,529		119,529	10,091		10,091	1,095		1,095
1982	125,184		125,184	98,551		98,551	4,366		4,366	3,156		3,156
1983	94,482		94,482	58,195		58,195	3,260		3,260	871		871
1984	145,060		145,060	60,551		60,551	5,936		5,936	907		907
1985	216,994		216,994	49,460		49,460	4,396		4,396	4,103		4,103
1986	268,314		268,314	63,553		63,553	1,939		1,939	5,091		5,091
1987	271,945		271,945	62,020		62,020	776		776	1,033		1,033
1988	288,992		288,992	85,416		85,416	1,053		1,053	1,426		1,426
1989	289,503		289,503	92,403		92,403	1,470		1,470	1,229		1,229
1990	273,370		273,370	72,580		72,580	4,711		4,711	1,576		1,576
1991	239,036		239,036	63,225		63,225	3,740		3,740	510		510
1992	239,696		239,696	83,911		83,911	5,497		5,497	2,039		2,039
1993	232,071	5,040	237,111	87,357	10,589	97,946	8,069	585	8,654	879	0	879
1994	219,261	4,614	223,875	74,534	10,314	84,848	29,375	2,305	31,680	1,062	0	1,062
1995	223,773	5,345	229,118	138,210	16,621	154,831	37,279	3,262	40,541	874	0	874
1996	250,285	6,660	256,945	112,118	24,970	137,088	51,110	5,786	56,896	8,259	0	8,259
1997	258,042	5,631	263,673	161,888	31,867	193,755	51,627	5,627	57,254	2,813	3	2,816
1998	265,782	4,718	270,500	145,115	22,856	167,971	35,154	2,853	38,007	2,239	0	2,239
1999	294,871	6,628	301,499	265,502	26,813	292,315	40,674	5,166	45,840	3,092	54	3,146
2000	272,372	6,815	279,187	210,477	26,364	236,841	70,287	5,624	75,911	4,123	0	4,123
2001	397,433	7,921	405,354	144,523	13,516	158,039	42,961	1,261	44,222	1,362	4	1,366
2002	421,443	3,956	425,399	160,394	12,793	173,187	35,677	977	36,654	2,116	6	2,122
2003	399,256	5,265	404,521	259,798	22,811	282,609	40,720	1,978	42,698	3,639	0	3,639

TABLE 4. (continued)
TABLA 4. (continuación)

Year	Albacore			Eastern Pacific bonito			Black skipjack			Other			Total		
	Retained	Discarded	Total	Retained	Discarded	Total	Retained	Discarded	Total	Retained	Discarded	Total	Retained	Discarded	Total
Año	Albacora			Bonito del Pacífico oriental			Barrilete negro			Otros			Total		
	Retenido	Descartado	Total	Retenido	Descartado	Total	Retenido	Descartado	Total	Retenido	Descartado	Total	Retenido	Descartado	Total
1970	4,476		4,476	4,738		4,738				27		27	226,155		226,155
1971	2,490		2,490	9,600		9,600	6		6	61		61	250,324		250,324
1972	4,832		4,832	8,872		8,872	601		601	367		367	240,795		240,795
1973	2,316		2,316	7,864		7,864	1,674		1,674	355		355	274,138		274,138
1974	4,783		4,783	4,436		4,436	3,742		3,742	985		985	309,620		309,620
1975	3,332		3,332	16,838		16,838	511		511	277		277	361,016		361,016
1976	3,732		3,732	4,370		4,370	1,526		1,526	1,327		1,327	394,430		394,430
1977	1,981		1,981	11,275		11,275	1,458		1,458	1,950		1,950	314,343		314,343
1978	1,745		1,745	4,837		4,837	2,170		2,170	808		808	376,273		376,273
1979	327		327	1,805		1,805	1,366		1,366	1,249		1,249	340,103		340,103
1980	601		601	6,125		6,125	3,680		3,680	1,109		1,109	319,977		319,977
1981	739		739	5,717		5,717	1,911		1,911	1,008		1,008	321,895		321,895
1982	553		553	2,121		2,121	1,338		1,338	783		783	236,052		236,052
1983	456		456	3,829		3,829	1,236		1,236	1,709		1,709	164,038		164,038
1984	5,351		5,351	3,514		3,514	666		666	987		987	222,972		222,972
1985	919		919	3,604		3,604	296		296	536		536	280,307		280,307
1986	133		133	490		490	595		595	1,140		1,140	341,256		341,256
1987	417		417	3,326		3,326	561		561	1,615		1,615	341,692		341,692
1988	288		288	9,550		9,550	1,267		1,267	1,297		1,297	389,289		389,289
1989	22		22	12,095		12,095	783		783	1,072		1,072	398,577		398,577
1990	209		209	13,856		13,856	791		791	944		944	368,038		368,038
1991	834		834	1,288		1,288	446		446	649		649	309,729		309,729
1992	255		255	978		978	104		104	763		763	333,243		333,243
1993	1	0	1	599	12	611	104	3,950	4,054	314	1,981	2,295	329,395	22,157	351,552
1994	85	0	85	8,692	145	8,837	188	805	993	419	522	941	333,616	18,705	352,321
1995	465	2	467	8,009	55	8,064	187	1,415	1,602	172	668	840	408,969	27,368	436,337
1996	83	0	83	655	1	656	704	2,417	3,121	219	1,052	1,271	423,433	40,886	464,319
1997	60	0	60	1,104	5	1,109	101	2,582	2,683	148	3,407	3,555	475,784	49,122	524,906
1998	124	0	124	1,337	5	1,342	528	1,857	2,385	168	1,233	1,401	450,446	33,522	483,968
1999	274	0	274	1,720	0	1,720	178	3,412	3,590	218	3,096	3,314	606,529	45,169	651,698
2000	157	0	157	636	0	636	293	1,885	2,178	357	1,496	1,853	558,702	42,184	600,886
2001	20	0	20	18	0	18	2,051	1,261	3,312	373	766	1,139	588,741	24,729	613,470
2002	32	0	32	0	0	0	1,462	1,939	3,401	578	1,828	2,406	621,702	21,499	643,201
2003	31	0	31	0	0	0	429	1,511	1,940	333	1,143	1,476	704,206	32,708	736,914

TABLE 5. Preliminary estimates of the retained catches and landings, in metric tons, of tunas caught by purse-seine, pole-and-line, and recreational vessels in the EPO in 2003, by species and vessel flag (upper panel) and location where processed (lower panel). Miscelaneous = other species, including other tunas, sharks, and miscellaneous fishes.

TABLA 5. Estimaciones preliminares de las capturas retenidas y descargas de atún capturado con buques cerqueros, cañeros y deportivos en el OPO en 2003, por especie y bandera del buque (panel superior) y localidad donde fue procesado (panel inferior), en toneladas métricas. Misceláneo = otras especies, incluyendo otros túnidos, tiburones, y peces diversos.

Flag	Yellowfin	Skipjack	Bigeye	Pacific bluefin	Albacore	Eastern Pacific bonito	Black skipjack	Miscel-laneous	Total	Percent of total
Bandera	**Aleta amarilla**	**Barrilete**	**Patudo**	**Aleta azul del Pacífico**	**Albacora**	**Bonito del Pacífico oriental**	**Barrilete negro**	**Misce-láneo**	**Total**	**Porcentaje de total**
Retained catches—Capturas retenidas										
Colombia	23,255	4,656	159	-	-	-	-	-	28,070	4.0
Ecuador	41,641	133,919	17,933	-	-	-	62	271	193,826	27.5
España—Spain	4,921	22,586	5,629	-	-	-	-	-	33,136	4.7
México	162,506	19,400	77	3,225	28	-	198	40	185,474	26.3
Panamá	30,930	11,309	3,022	-	-	-	2	-	45,263	6.4
USA—EE.UU.	1,196	6,746	2,254	413	-	-	165	22	10,796	1.5
Venezuela	91,551	10,697	1,335	-	-	-	-	-	103,583	14.7
Vanuatu	3,889	18,162	5,421	-	-	-	2	-	27,474	3.9
Other—Otros[1]	39,367	32,323	4,890	1	3	-	-	-	76,584	10.9
Total	399,256	259,798	40,720	3,639	31	31	429	333	704,206	
Landings—Descargas										
Colombia	50,035	8,077	1,410	-	-	-	6	-	59,528	8.8
Costa Rica	35,709	2,438	345	-	-	-	-	-	38,492	5.7
Ecuador	83,796	203,321	34,204	-	2	-	50	66	321,439	47.3
España—Spain	9,685	160	82	-	-	-	-	-	9,927	1.5
México	145,943	19,357	77	3,220	28	-	142	100	168,867	24.8
USA—EE.UU.	127	1,780	78	413	-	-	165	22	2,585	0.4
Venezuela	11,654	1,259	54	-	-	-	-	-	12,967	1.9
Other—Otros[2]	49,058	14,946	1,982	-	-	-	-	-	65,986	9.6
Total	386,007	251,338	38,232	3,633	30	-	363	188	679,791	

[1] Includes Belize, Bolivia, El Salvador, Guatemala, and Honduras. This category is used to avoid revealing the operations of individual vessels or companies.

[1] Incluye Belice, Bolivia, El Salvador, Guatemala, y Honduras. Se usa esta categoría para no revelar información sobre las actividades de buques o empresas individuales.

[2] Includes El Salvador, Guatemala, Panama, Peru, and unidentified. This category is used to avoid revealing the operations of individual vessels or companies.

[2] Incluye El Salvador, Guatemala, Panamá, Perú, y no identificados. Se usa esta categoría para no revelar información sobre las actividades de buques o empresas individuales.

TABLE 6. Preliminary data on the sampling coverage of trips by vessels with capacities greater than 363 metric tons by the IATTC program, the national programs of Ecuador, the European Union, Mexico, and Venezuela, and the Forum Fisheries Agency (FFA) program during the first quarter of 2004.

TABLA 6. Datos preliminares de la cobertura del muestreo de viajes de buques con capacidad mayor a 363 toneladas métricas por los programas de la CIAT, Ecuador, México, la Unión Europea, Venezuela, y el Forum Fisheries Agency (FFA) durante el primero trimestre de 2004.

Flag	Trips	Observed by program,				Percent observed
		IATTC	National	FFA	Total	
Bandera	Viajes	Observado por programa				Porcentaje observado
		CIAT	Nacional	FFA	Total	
Bolivia	13	13			13	100.0
Colombia	10	10			10	100.0
Ecuador	91	59	32		91	100.0
España—Spain	9	6	3		9	100.0
Guatemala	1	1			1	100.0
Honduras	5	5			5	100.0
México	69	36	33		69	100.0
Panamá	33	33			33	100.0
El Salvador	9	9			9	100.0
U.S.A.—EE.UU.	8	8			8	100.0
Venezuela	40	18	22		40	100.0
Vanuatu	9	9			9	100.0
Total	297[1]	207	90	0	297	100.0

[1] Includes 74 trips, 52 by vessels with observers from the IATTC program and 22 by vessels with observers from the national programs, that began in late 2003 and ended in 2004

[1] Incluye 74 viajes, 52 por observadores del programa de la CIAT y 22 por observadores de los programas nacionales, que iniciaron a finales de 2003 y finalizaron en 2004

TABLE 7. Oceanographic and meteorological data for the Pacific Ocean, October 2003-March 2004. The values in parentheses are anomalies.
TABLA 7. Datos oceanográficos y meteorológicos del Océano Pacífico, Octubre 2003-Marzo 2004. Los valores en paréntesis son anomalías.

Month—Mes	10	11	12	1	2	3
SST—TSM, 0°-10°S, 80°-90°W (°C)	21.0 (0.1)	21.9 (0.3)	23.0 (0.2)	24.6 (0.1)	25.8 (-0.2)	25.9 (-0.5)
SST—TSM, 5°N-5°S, 90°-150°W (°C)	24.3 (0.4)	25.4 (0.5)	25.6 (0.5)	25.9 ((0.3)	26.5 (0.1)	27.2 (0.1)
SST—TSM, 5°N-5°S, 120°-170°W (°C)	27.2 (0.6)	27.1 (0.5)	26.9 (0.4)	26.7 (0.2)	26.9 (0.2)	27.1 (-0.1)
SST—TSM, 5°N-5°S, 150W°-160°E (°C)	29.2 (0.8)	29.3 (1.0)	29.2 (0.8)	28.8 (0.7)	28.6 (0.6)	28.4 (0.3)
Thermocline depth—Profundidad de la termoclina, 0°, 80°W (m)	45	45	40	40	35	25
Thermocline depth—Profundidad de la termoclina, 0°, 110°W (m)	40	100	90	60	50	50
Thermocline depth—Profundidad de la termoclina, 0°, 150°W (m)	140	150	150	140	150	130
Thermocline depth—Profundidad de la termoclina, 0°, 180°W (m)	170	175	175	170	160	170
Sea level—Nivel del mar, La Libertad, Ecuador (cm)	233.4 (3.9)	- (-)	- (-)	- (-)	- (-)	- (-)
Sea level—Nivel del mar, Callao, Perú (cm)	103.0 (-2.6)	107.0 (0.1)	109.7 (1.1)	112.4 (0.9)	116.7 2.6	105.8 (-8.9)
SOI—IOS	-0.3	-0.4	1.1	-1.7	1.1	-0.2
SOI*—IOS*	-1.65	-2.37	5.03	0.27	-0.20	-0.15
NOI*—ION*	0.41	-0.76	-1.64	-0.55	-0.22	5.01