INTER-AMERICAN TROPICAL TUNA COMMMISSION
COMISIÓN INTERAMERICANA DEL ATÚN TROPICAL
QUARTERLY REPORT—INFORME TRIMESTRAL

April-June 2004
Abril-Junio 2004

COMMISSIONERS—COMISIONADOS

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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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de la

COMISIÓN INTERAMERICANA DEL ATÚN 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 2004 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 (both described later in this report).

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 appointed 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

The background documents and the minutes or chairman's reports of most of the IATTC and IDCP meetings described below are, or soon will be, available at the IATTC's web site, www.iattc.org.

IATTC and AIDCP meetings

The fifth meeting of the IATTC Working Group on Stock Assessment was held in La Jolla, California, USA, on May 11-13, 2004.

The following meetings of the IATTC and the AIDCP and their working groups were held in Lima, Peru, in June 2004:

Inter-American Tropical Tuna Commission		
Meeting		**Dates**
5	Permanent Working Group on Compliance	June 11, 2004
72	Inter-American Tropical Tuna Commission	June 14-18, 2004

The following resolutions were adopted at the 72nd meeting of the IATTC:

- Resolution on the Amendment to the Terms of Reference of the Joint Working Group on Fishing by Non-Parties – C-04-01;
- Resolution on Criteria for Attaining the Status of Cooperating Non-Party or Fishing Entity in IATTC – C-04-02;
- Resolution on a System of Notification of Sighting and Identification of Vessels [that may be fishing contrary to the conservation and management measures of the IATTC] Operating in the Convention Area – C-04-03;
- Resolution to Establish a List of Vessels Presumed to Have Carried Out Illegal, Unreported and Unregulated Fishing Activities in the Eastern Pacific Ocean – C-04-04;
- Consolidated Resolution on Bycatch – C-04-05;
- Resolution on the Establishment of a Vessel Monitoring System (VMS) – C-04-06;
- Resolution on a Three-Year Program to Mitigate the Impact of Tuna Fishing on Sea Turtles – C-04-07;
- Resolution on Financing [of the IATTC] – C-04-08;
- Resolution for a Multi-Annual Program on the Conservation of Tuna in the Eastern Pacific Ocean for 2004, 2005 and 2006 – C-04-09;
- Resolution on Catch Reporting – C-04-10.

Agreement on the International Dolphin Conservation Program		
Meeting		**Dates**
16	Permanent Working Group on Tuna Tracking	June 7, 2004
2	Working Group to Promote and Publicize the AIDCP Dolphin Safe Tuna Certification System	June 7, 2004
36	International Review Panel	June 8, 2004
11	Parties to the AIDCP	June 9, 2004
1	Scientific Advisory Board	June 12, 2004

The following resolutions were adopted at the 11th meeting of the Parties to the AIDCP:

- Procedures for Invalid Dolphin Safe Certificates – A-04-01;
- Resolution Regarding Captains with Two or More Night Set Infractions A-04-02;
- Resolution Regarding Dolphin Safety Gear Inspections – A-04-03;
- Resolution Regarding Modification of the *Procedures for Maintaining the AIDCP List of Qualified Captains* – A-04-04.

IATTC and AIDCP		
Meeting		**Date**
3	Joint Working Group on Fishing by non-Parties	June 10, 2004

Other meetings

Mr. Brian S. Hallman participated in the sixth session of the Preparatory Conference for the Establishment of the Western and Central Pacific Fisheries Commission in Bali, Indonesia, on April 19-23, 2004. The convention establishing the Commission will enter into force on June 19, 2004, and the first meeting of the Commission will take place in December 2004.

A poster coauthored by J. Cristóbal Román-Reyes; Felipe Galván-Magaña, and Robert J. Olson was presented at the 4th International Conference on Applications of Stable Isotope Techniques to Ecological Studies, in Wellington, New Zealand, on April 19-23, 2004. The poster was entitled "Stable Isotope Analysis of Yellowfin Tuna, Spotted, and Spinner Dolphins in Polyspecific Aggregations in the Eastern Tropical Pacific Ocean."

Dr. Robin Allen and Ms. Nora Roa-Wade participated in a meeting of the International Fisheries Commissions Pension Society in Washington, D.C., on April 28-30, 2004.

Dr. Mark N. Maunder participated in the Fourth World Fisheries Congress in Vancouver, B.C., Canada, on May 2-6, 2004, where he presented a paper, "Problems with interpreting catch-per-unit-of-effort data to assess the status of individual stocks and communities: is integrated stock assessment, ecosystem modeling, management strategy evaluation, or adaptive management the solution?" by Mark N. Maunder, John R. Sibert, Alain Fonteneau, John Hampton, Pierre Kleiber, and Shelton J. Harley.

Many members of the IATTC staff attended all or parts of the 55th Tuna Conference in Lake Arrowhead, California, on May 24-27, 2004. Dr. William H. Bayliff and Ms. Jenny M. Suter were moderators of sessions on Operations and Data and on Fisheries Oceanography, respectively, and talks were given by Drs. Shelton J. Harley, Mark N. Maunder, and Peter A. Nelson, Messrs. Simon D. Hoyle and Vernon P. Scholey, and Ms. Jenny M. Suter. In addition, research in which Drs. Martín A. Hall, Shelton J. Harley, Daniel Margulies, Mark N. Maunder, and Robert J. Olson, Messrs. Simon D. Hoyle and Patrick K. Tomlinson, and Mss. Sharon L. Hunt, Jenny M. Suter, and Jeanne B. Wexler had participated was presented by other speakers.

Dr. Robert J. Olson organized and chaired a workshop on research applications of stable isotopes in pelagic ecosystems, in La Paz, Mexico, on May 31-June 1, 2004. The meeting was sponsored by the Pelagic Fisheries Research Program, University of Hawaii, by a Global Ocean Ecosystem Dynamics (GLOBEC) multinational program called Oceanic Fisheries and Climate Change Project (OFCCP), and by a GLOBEC regional program called Climate Impacts on Oceanic Top Predators (CLIOTOP). The participants discussed stable carbon and nitrogen isotope analyses for the Pacific, Atlantic, and Indian Oceans.

Drs. Cleridy E. Lennert-Cody and Mark N. Maunder participated in a meeting of the Statistics for Natural Resources section of the International Chinese Statistical Association (ICSA) 2004 Applied Statistics Symposium, held on June 6-9, 2004, in San Diego, California. Dr. Lennert-Cody chaired a session entitled "Statistics for Natural Resources," and gave a presentation entitled "Using random forests to identify misreporting in fisheries data." Dr. Maunder gave an invited presentation entitled "Computationally-intensive Methods in Natural Resource Management, and Software for Parameter Estimation." He also participated in a one-day course, "Resampling Methods: a Guide for Practitioners," which immediately preceded the symposium.

Dr. Robin Allen spent the period of June 24-July 1, 2004, in Rome, where he participated in FAO technical consultations on illegal, unreported, and unregulated fishing, fleet capacity, and subsidies.

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 164 wells and abstracted logbook information for 340 trips of commercial fishing vessels during the second quarter of 2004.

Also during the second quarter members of the field office staffs placed IATTC observers on 146 fishing trips by vessels that participate in the AIDCP On-Board Observer Program. In addition, 143 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 for purse-seine and pole-and-line vessels 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 purse-seine and pole-and-line vessels that are fishing, or are expected to fish, in the eastern Pacific Ocean (east of 150°W; EPO) during 2004 is about 203,500 cubic meters (m^3) (Table 1). The weekly average at-sea capacity for the fleet, for the weekly periods ending March 29 through June 27, was about 141,400 m^3 (range: 128,900 to 151,600 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 and catch-per-unit-of-effort statistics for the purse-seine and pole-and-line fisheries

Catch statistics

The estimated total retained catches of tunas in the EPO during the January 1-June 27, 2004, period, in metric tons, were:

Species	2004	1999-2003			Weekly average, 2004
		Average	Minimum	Maximum	
Yellowfin	175,000	197,000	150,000	229,000	7,000
Skipjack	97,000	116,000	78,000	152,000	4,000
Bigeye	15,000	24,000	12,000	41,000	<1,000

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 quarter of 2004 and the corresponding periods of 1999-2003, in metric tons, were:

Species	Region	2004	1999-2003		
			Average	Minimum	Maximum
Yellowfin	N of 5°N	12.8	20.2	14.3	30.7
	S of 5°N	9.0	7.9	4.9	14.7
Skipjack	N of 5°N	1.8	2.4	0.5	4.9
	S of 5°N	7.9	12.4	8.0	18.7
Bigeye	EPO	1.5	2.9	1.7	5.6

Catch statistics for the longline fishery

The catches of bigeye by longline gear in the EPO during the first and second quarters of 2004 are shown in Table 7. Equivalent data are not available for the other species of tunas, or for billfishes.

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 first quarter of 1999-2004 are presented in this report. Two length-frequency histograms are presented for each species. For yellowfin, skipjack, and bigeye, the first shows the data by fishery (area, gear type, and set type) for the first quarter of 2004. The second shows the first-quarter catches for the current year and the previous five years. There were 140 wells sampled during the first quarter of 2004.

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 140 wells sampled, 120 contained yellowfin. The estimated size compositions of these fish are shown in Figure 2a. The majority of the catches of yellowfin during the first quarter of 2004 were made in the Southern unassociated fishery and the Inshore and Southern dolphin fisheries. Small amounts of yellowfin were taken in floating-object sets, but some of the estimated catches do not show well in the graphs. A very distinct mode of fish between 80 and 100 cm was present in the Southern unassociated fishery. Yellowfin in this size range were also encountered in some of the other fisheries, but are less evident in the graphs.

The estimated size compositions of the yellowfin caught by all fisheries combined during the first quarter of 1999-2004 are shown in Figure 2b. The size ranges of the fish are generally consistent over time (40-160 cm), but the size distributions differ among quarters and among years. The average weight of yellowfin caught during the first quarter of 2004, 13.5 kg, reflects the large amount of fish of about that size caught in the Southern unassociated 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 140 wells sampled, 119 contained skipjack. The estimated size compositions of these fish are shown in Figure 3a. The greatest catches of skipjack were taken in the Southern floating-object and Southern unassociated fisheries. The average weights of the fish caught in these two fisheries were nearly equal; however, the size distribution of the fish from the unassociated fishery was unimodal (around 52 cm), while that of the floating-object fishery was bimodal (with modes at about 48 and 65 cm). No catches of skipjack were recorded for pole-and-line vessels during the first quarter of 2004.

The estimated size compositions of the skipjack caught by all fisheries combined during the first quarter of 1999-2004 are shown in Figure 3b. The mode occurred at about 50 cm, but the distribution was heavily skewed to the right.

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 140 wells sampled, only 19 contained bigeye. The estimated size compositions of these fish are shown in Figure 4a. The majority of the catch of bigeye was taken by floating-object sets in the Southern area, with a distinct mode of smaller fish between 40 and 60 cm, and another mode between 65 and 80 cm. Small amounts of bigeye were caught in the floating-object fisheries in the Northern and Equatorial regions. Negligible amounts of bigeye (less than 100 mt) were taken in the Inshore floating-object fishery. 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 first quarter of 1999-2004 are shown in Figure 4b. Two modes, one of smaller (40-55 cm) and one of medium (70-80 cm) bigeye, are evident in the graph for the first quarter of 2004, but not many larger bigeye (>100 cm) were taken during that time, making the size distribution look unusual. It in unclear whether this is an artifact of sampling, since only 19 samples of bigeye were taken, or whether almost no large bigeye were caught during the first quarter of 2004.

The estimated retained catch of bigeye less than 60 cm in length during the first quarter of 2004 was 1,866 metric tons (t), or about 29 percent of the estimated total catch of bigeye. The corresponding amounts for the first quarters of 1999-2003 ranged from 501 to 3,585 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 146 fishing trips aboard purse seiners covered by that program during the second quarter of 2004. Preliminary coverage data for these vessels during the quarter are shown in Table 8.

Training

There were no IATTC observer training courses during the quarter.

RESEARCH

Tagging

Bigeye tuna tagging project

A bigeye tuna tagging project is being conducted in the equatorial eastern Pacific Ocean (EPO). in order to obtain estimates of movement, growth, mortality, and gear interaction parameters for incorporation into stock assessments for this species. The IATTC conducted a tagging cruise in the EPO from March 1 to May 28, 2004, on the chartered pole-and-line vessel *Her Grace*. The primary objective of this cruise was to tag and release, using conventional plastic dart tags, large numbers of small bigeye (<100 cm) in the area of the EPO where purse-seine vessels catch bigeye associated with fish-aggregating devices (FADs). The secondary objective was to implant archival tags into the peritoneal cavities of bigeye and skipjack tunas.

Bigeye tuna were tagged, and released in significant numbers in association with NOAA Tropical Atmosphere-Ocean (TAO) buoys and in association with the vessel at approximately 0° and 2°S on the 95°W meridian. The numbers of tag releases, by species and tag types, were as follows:

Species	Tag type	
	Conventional	Archival
Bigeye	7,089	58
Yellowfin	306	-
Skipjack	878	33
Total	8,273	91

The length frequencies of these fish are shown in Figure 5.

Archival tags, with light sensors for geolocation estimation, were implanted into the peritoneal cavities of 58 bigeye, ranging in length from 54 to 123 cm. Recoveries of bigeye with archival tags provide information on the actual movement paths of individuals during their time at liberty and important behavioral data, including habitat utilization.

Some small archival tags, without light sensors, but with depth and temperature sensors, were implanted into the peritoneal cavities of 33 skipjack, ranging in length from 57 to 71 cm. One of those archival tags was recovered from a skipjack, at liberty for 25 days, and the data were successfully downloaded from the tag.

The memory allocation of the archival tag had been set to collect data at 30-second intervals for 10 days. The behavior was quite different from what was expected. The first 2 days of depth data are indicative of "associative" behavior with the TAO buoy at which the fish was tagged and released, and the following 8 days of data are indicative of "non-associative" behavior with a floating object. During the time that the fish exhibited "non-associative" behavior it remained near the surface at night, but throughout the day it made numerous "bounce dives" to depths in excess of 250 m (Figure 6). The daytime depths are similar to those of bigeye tuna in the same general area. The difference in behavior among these species is related to their thermal physiology. Skipjack need to make regular upward excursions into warmer waters to maintain body temperatures within a comfortable zone, whereas bigeye are able to remain longer at those depths because of their thermal regulatory capabilities.

It has become apparent from the data for this skipjack and data for tagged yellowfin released and recaptured well offshore in the EPO (IATTC Quarterly Report for July-September 2003), that these species are not restricted to the mixed layer habitat and that they feed within the deep-scattering layer, both at night and during the day, as do bigeye tuna.

Yellowfin tuna tagging project

The IATTC conducted yellowfin tuna-tagging cruises aboard the long-range sportfishing vessel *Royal Star* in October 2002 and 2003 in collaboration with the Tagging of Pacific Pelagics (TOPP) program, which is being conducted within the framework of the Census of Marine Life (COML). TOPP is a program using electronic tagging technology to study the movements of large open-ocean animals, and the oceanographic factors influencing their behavior.

The numbers of releases and returns, as of the end of June 2004, are as follows:

Tag type	Released	Returned	Percent returned
	2002		
Conventional	254	49	19.3
Archival	25	12	48.0
PAT	2	2	100
	2003		
Conventional	100	8	8.0
Archival	43	16	37.2

The time at liberty for the fish with archival tags has ranged from 9 to 560 days. Five of the fish released in 2002 had been at liberty for more than 10 months.

Preliminary analyses of the location estimates from the archival tag data show seasonal movements to the south and then to the north, correlated with shifts in the sea-surface temperatures off Baja California, Mexico. In addition, evaluations of the archival tag depth data illustrate previously-undocumented "bounce-diving" behavior throughout the day to depths of about 250 m, following movements offshore away from coastal topographical features.

The yellowfin at liberty for 560 days, the greatest time thus far, was 91 cm long at the time of release at 25°44'N-113°08'W and a reported 124 cm long at the time of recapture by a purse-seine vessel during a set on dolphin-associated fish at 8°16'N-119°50'W. This fish exhibited two seasonal migrations from the region where it was originally tagged and released off Baja California, Mexico. The first consisted of a movement from outside Magdalena Bay to an area just north of the Revillagigedo Islands and then a return to the area off southern Baja California. The second consisted of movement southward, slightly west of the Revillagigedo Islands and continuing in a southerly direction to where it was recaptured, approximately 640 nautical miles west-southwest of Clipperton Island.

Bluefin tagging

Two bluefin tagged and released in the EPO were recaptured in the WPO in June 2004. The data are as follows:

Tag number	Release			Recapture		
	Location	**Date**	**Length**	**Location**	**Date**	**Weight**
------G2015	31°13'N-117°55'W	August 22, 2000	90 cm	38°30'N-158°40'E	June 3, 2004	68 kg (gilled and gutted)
G4894-G4895	29°30'N-116°58'W	August 12, 2002	148 cm	38°30'N-158°40'E	June 3, 2004	89 kg (gilled and gutted)

Surprisingly, the two fish, released in different years, were recaptured by the same vessel on the same date.

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, except on April 3, 13-15, and 17-19, when spawning halted due to lower water temperatures. Spawning occurred between 3:00 p.m. and 8:20 p.m. The water temperatures in the tank ranged from 23.5° to 28.9°C during the quarter. The numbers of eggs collected after each spawning event ranged from about 1,000 to 1,085,000.

Two fish, one a 32-kg male and the other a 14-kg female, died during the quarter from wall strikes. At the end of June there were three size groups of fish in Tank 1: 1 95-kg fish, 2 59- to 74-kg fish, and 22 11- to 28-kg fish.

From January through July of 2003 archival tags had been implanted in yellowfin (IATTC Quarterly Report for January-March 2003), and at the end of June 2004 there remained 9 fish from that group in Tank 1. On March 24 four yellowfin (7- to 9-kg) and on April 29 two yellowfin (8- and 11-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 15.

Three yellowfin captured during May and June were placed into Tank 2 as reserve broodstock, bringing the total number of yellowfin in that tank to four. Capture efforts will continue during the third quarter to increase this population for use in sorting-grid trials.

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 the quarter 150,000 yolk sac larvae were stocked in a 10,000-L tank. The larvae and juveniles were raised to 45 days after hatching, to a size of approximately 4 to 6 cm standard length. The juveniles were maintained on a diet of yellowfin larvae and minced bigscale anchovy (*Anchovia macrolepidota*). After 35 days after hatching, approximately 200 juveniles remained in the tank. High mortality, which may have been due to a dietary deficiency during the early juvenile phase, occurred at 40 days after hatching. Various dietary supplements will be explored during the next quarter in order to attempt to enhance the survival during the early juvenile stage of development.

Experiments with yellowfin larvae

Several experiments were conducted during the quarter to determine the minimum survivable water temperature and dissolved oxygen requirements for first-feeding yellowfin larvae. These experiments were designed to determine the physical limitations to the distribution of yellowfin larvae in the ocean. The results from the temperature experiments indicate that first-feeding larvae are not capable of surviving at water temperatures of 20ºC or less after the first day of feeding; but that they are capable of surviving at 21ºC for up to 3 days after first feeding. The results from the dissolved oxygen experiments indicate that yellowfin larvae are able to survive at dissolved oxygen levels of more than 2.20 mg/L (more than 33.0 percent of oxygen saturation) during the first 8 hours of feeding. During the third quarter, experiments will be conducted to determine the maximum survivable water temperature of first-feeding yellowfin larvae.

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 second week of June 16 snappers of the broodstock established in 1996 and held in Tank 3 resumed spawning. The broodstock had not spawned since early January of 2004.

Twenty-six snappers, which were raised at the Achotines Laboratory from eggs hatched in 1998 to mature adult and are being held in Tank 4, spawned regularly during 2003, but have not spawned since early January of 2004.

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*. This study is funded by the University of Miami.

In support of the study, members of the staff of the Achotines Laboratory made several fishing trips during the quarter. During June one sailfish was transported alive to the laboratory and placed in Tank 6 (170,000-L capacity), where it remained alive for nearly 2 hours. Although the fish did not survive, it apparently responded well to injections of a dextrose solution. Following the injections the fish displayed more movement and activity than had the previous sailfish that had not received dextrose. The dextrose injections are being tried as a way to elevate the blood sugar levels, as the previous fish that had died were found to have very low blood sugar levels, which may have been a major factor in their deaths. The most recent sailfish, a female, had a total length of 2.4 m and weighed 35.6 kg. Efforts to catch and transport live sailfish to the Achotines Laboratory will continue during the remainder of 2004.

Visitors at the Achotines Laboratory

Dr. Robert Stallard of the U.S. Geological Survey, presently based at the Smithsonian Tropical Research Institute, spent the period of April 9-11, 2004, at the Achotines Laboratory while examining the local geology.

Various members of the staff of the Proyecto de Reforestación con Especies Nativas spent the period of April 12-18, 2004, at the Achotines Laboratory while preparing plots of land adjacent to the Laboratory for planting of seedling trees.

Dr. Alexandra Amat, who is performing post-doctoral research at the Smithsonian Tropical Research Institute field laboratory in Bocas del Toro, Panama, visited the Achotines Laboratory on June 14-15, 2004, to discuss the feasibility of maintaining live coral in captivity at the Laboratory. Dr. Amat is working on the response of reef growth and calcification to elevated carbon dioxide and temperatures.

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 tropical eastern Pacific Ocean (EPO). 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 tropical EPO were near normal throughout the second quarter. There was a small area of cool water along the equator west of the Galapagos Islands during April, which spread to coastal waters off Peru during May. In June it persisted off Peru, but had disappeared from the area west of the Galapagos Islands (Figure 7). In addition, an area of cool water appeared north of the Hawaiian Islands in May, and increased in size to the west in June. Also an area of warm water appeared in the Gulf of California in May, and extended to off central

Mexico in June. Finally, there were scattered areas of warm water offshore, the most persistent located south of 15°S between 150°W and 180°. The data in Table 9, for the most part, indicate that conditions were close to normal during the second quarter, although the thermocline was unusually close to the surface at 0°-180° in June. According to the Climate Diagnostics Bulletin of the U.S. National Weather Service for June 2004, "ENSO [El Niño-Southern Oscillation] - neutral conditions are expected to continue for the next 3 months."

Dolphins

Preliminary estimates of the mortality of dolphins due to fishing

The preliminary estimate of the incidental mortality of dolphins in the fishery in 2003 is 1,502 animals (Table 10), a slight decrease relative to the 1,514 mortalities recorded in 2002. The mortalities for 1979-2003, by species and stock, are shown in Table 11a, and the standard errors of these estimates are shown in Table 11b. The mortalities of the principal stocks of dolphins affected by the fishery show declines in the last decade (Figure 8) similar to that for the mortalities of all dolphins combined (Figure 9). Estimates of the abundances of the various stocks of dolphins for 1986-1990 and the relative mortalities (mortality/abundance) are also shown in Table 10. The stocks with the highest levels of relative mortality were northeastern spotted dolphins and eastern spinner dolphins (0.04 and 0.05 percent, respectively).

The number of sets on dolphin-associated schools of tuna made by Class-6 vessels increased by 11 percent, from 12,433 in 2002 to 13,841 in 2003, and this type of set accounted for 57 percent of the total number of sets made in 2003, compared to 58 percent in 2002. The average mortality per set decreased from 0.12 dolphins in 2002 to 0.11 dolphins in 2003. The estimated spatial distribution of the average mortalities per set during 2003 is shown in Figure 10. Typically, patches of relatively high mortalities per set were found throughout the fishing area, but in 2003 the areas with higher mortality rates were centered around 10ºN and east of 110ºW. The trends in the numbers of sets on dolphin-associated fish, mortality per set, and total mortality in recent years are shown in Figure 9.

The catches of dolphin-associated yellowfin decreased by 8 percent in 2003, as compared to 2002. The percentage of the catch of yellowfin taken in sets on dolphins decreased from 71 percent of the total catch in 2002 to 68 percent of the catch in 2003, and the average catch of yellowfin per set on dolphins decreased from 24 to 21 t. The mortality of dolphins per metric ton of yellowfin caught increased from 0.0051 in 2002 to 0.0055 in 2003.

Causes of the mortality of dolphins

The above figures are based on data from trips covered by observers from all components of the On-Board Observer Program. The comparisons in the next paragraph are based on the IATTC data bases for 1986-2003 only.

The decrease in the mortality per set is the result of actions by the fishermen to better manage the factors that bring about incidental mortalities of dolphins. Indicative of this effort is the number of sets in which no mortalities occurred, which has risen from 38 percent in 1986 to 94 percent in 2003, and the average number of animals left in the net after backdown, which has decreased from 6.0 in 1986 to less than 0.1 in 2003 (Table 12). The factors under the control of the fishermen that are likely to affect the mortality of dolphins per set include the occurrence of malfunctions, especially those that lead to net canopies and net collapses, and the time it takes to complete the backdown maneuver (Table 12). The percentage of sets with major mechanical malfunctions has decreased from an average of approximately 11 percent during the late 1980s to less than 7 percent during 1997-2003; in the same period the percentage of sets with net collapses decreased from about 30 percent to less than 5 percent, on average, and that of net canopies from about 20 percent to less than 5 percent, on average. Although the chance of dolphin mortality increases with the duration of the backdown maneuver, the average backdown time has changed little since 1986. Also, the mortality of dolphins per set increases with the number of animals in the encircled herd, in part because the backdown maneuver takes longer to complete when larger herds are encircled. The fishermen can reduce the mortalities per set by encircling schools of fish associated with fewer dolphins.

GEAR PROGRAM

During the second quarter IATTC staff members participated in three dolphin safety-gear inspection and safety-panel alignment procedures, all aboard Mexican-flag purse seiners.

One AIDCP fishing captain seminar was conducted during the quarter by the U.S. National Marine Fisheries Service staff in Long Beach, California, on April 14, 2004. One fisherman and two IATTC staff members attended the seminar.

PUBLICATIONS

Copies of the IATTC Annual Report for 2002 and IATTC Stock Assessment Report 4 were received in May. The Annual Report was mailed out in June, with a compact disk that contains files that are identical, except for the pagination, to the four sections IATTC Stock Assessment Report 4. IATTC Stock Assessment Report 4 can be viewed on the IATTC's web site, www.iattc.org.

ADMINISTRATION

Dr. Shelton J. Harley resigned his position with the IATTC on June 30, 2004, to accept employment with the Ministry of Fisheries of New Zealand. Dr. Harley began work with the IATTC in April 2002, shortly before obtaining his Ph.D. degree from Dalhousie University in Canada. During his short stay with the IATTC he accomplished an impressive amount of work. He was the junior author of the section on stock assessment of bigeye in IATTC Stock Assessment Report 3, the senior author of the bigeye section and junior author of the yellowfin section in Stock Assessment Report 4, and the senior author of the bigeye section and junior author of the yellowfin and skipjack sections in Stock Assessment Report 5. (Stock Assessment Report 5 will be published in early 2005.) In addition, he is co-author, with Dr. Mark N. Maunder and several scientists of other organizations, of an important manuscript on abundance of top-level predators that has been submitted to the journal Nature. Dr. Harley will be working on international fisheries issues, mostly those related to tuna, in New Zealand. Everyone wishes him well in his new position.

Mr. Simon D. Hoyle became a member of the IATTC's permanent staff on June 1, 2004, replacing Dr. Harley. Mr. Hoyle, who has an M.S. degree from Auckland University in New Zealand, has been a visiting scientist at the IATTC since July 2003. During his period as a visiting scientist he worked with Dr. Mark N. Maunder on a general model for protected species, particularly spotted dolphins and black-footed albatrosses. This work was funded by the Pelagic Fisheries Research Program of the University of Hawaii. A paper describing their work will be published in the journal Animal Biodiversity and Conservation.

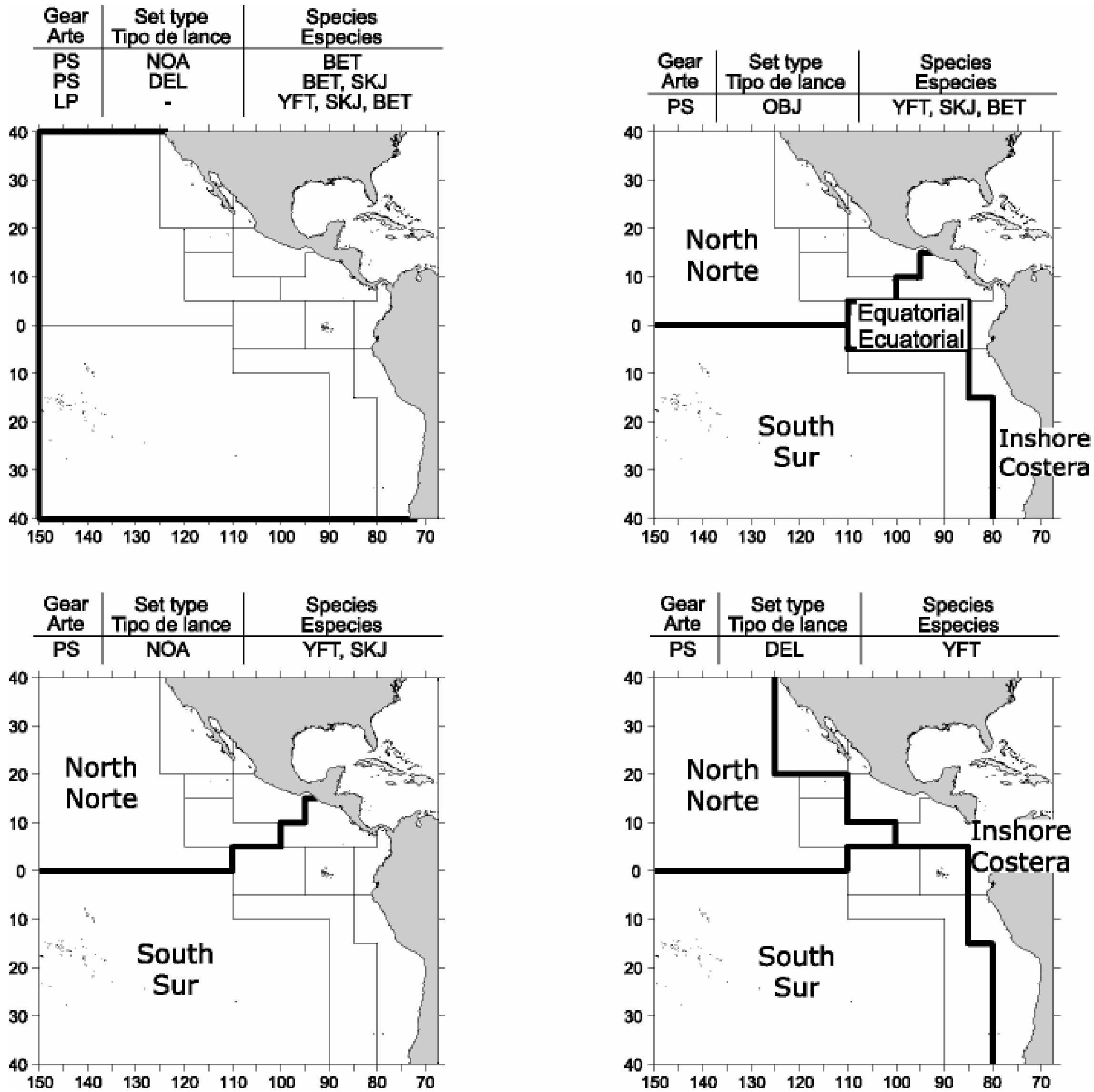

FIGURE 1. Spatial extents of the fisheries defined by the IATTC staff for stock assessment of yellowfin, skipjack, and bigeye in the EPO. The thin lines indicate the boundaries of the 13 length-frequency sampling areas, and the bold lines the boundaries of the fisheries. Gear: PS = purse seine, LP = pole and line; Set type: NOA = unassociated, DEL = dolphin, OBJ = floating object; Species: YFT = yellowfin, SKJ = skipjack, BET = bigeye.

FIGURA 1. Extensión espacial de las pesquerías definidas por el personal de la CIAT para la evaluación de las poblaciones 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 = red de cerco, LP = caña; Tipo de lance: NOA = no asociado, DEL = delfín; OBJ = objeto flotante; Especies: YFT = aleta amarilla, SKJ = barrilete, BET = patudo.

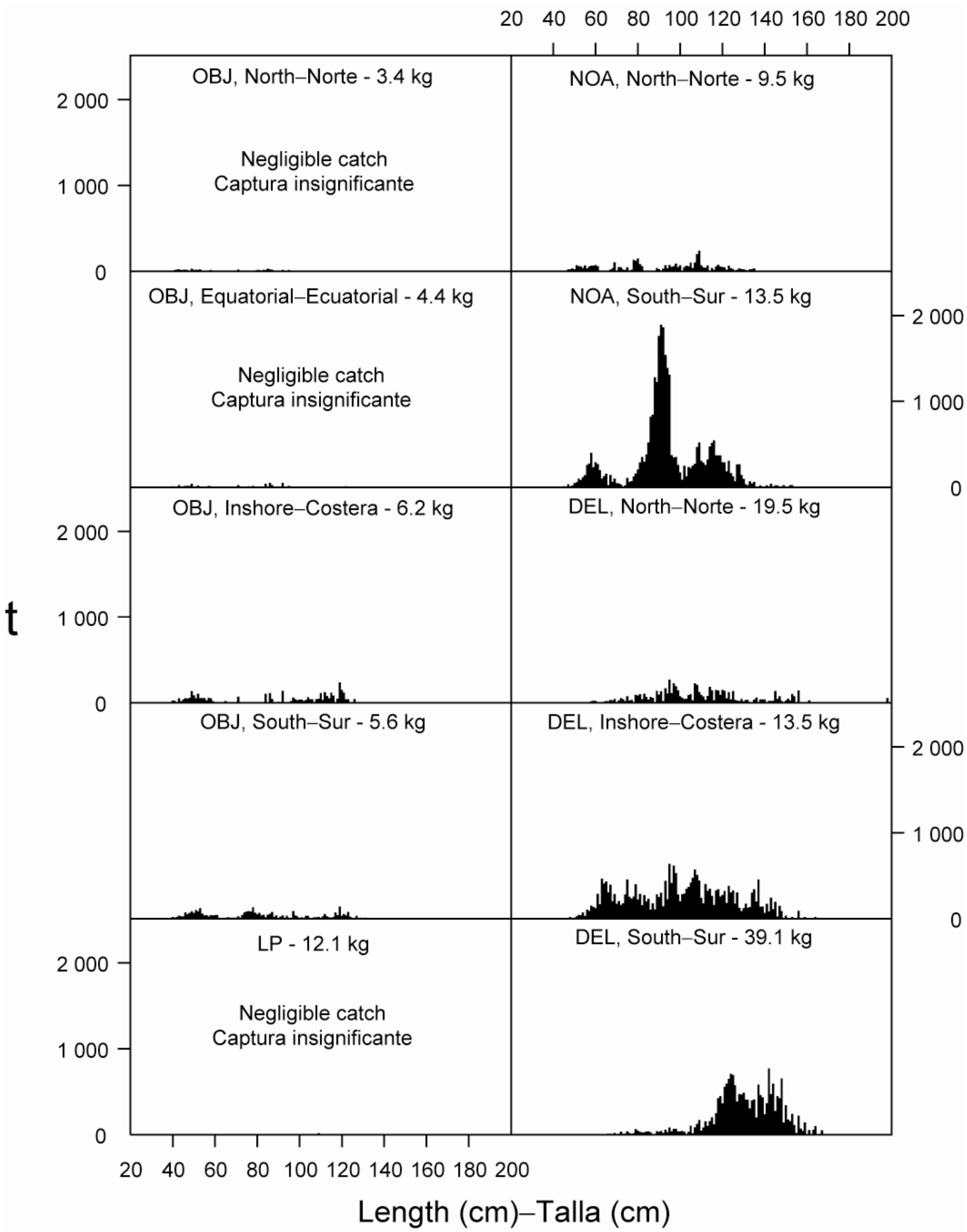

FIGURE 2a. Estimated size compositions of the yellowfin caught in each fishery of the EPO during the second quarter of 2004. The average weights of the fish in the samples are given at the tops of the panels. t = metric tons; OBJ = floating object; LP = pole and line; NOA = unassociated; DEL = dolphin.

FIGURA 2a. Composición por tallas estimada del aleta amarilla capturado en cada pesquería del OPO durante el segundo trimestre de 2004. En cada recuadro se detalla el peso promedio de los peces en las muestras. t = toneladas métricas; OBJ = objeto flotante; LP = caña; NOA = no asociado; DEL = delfín.

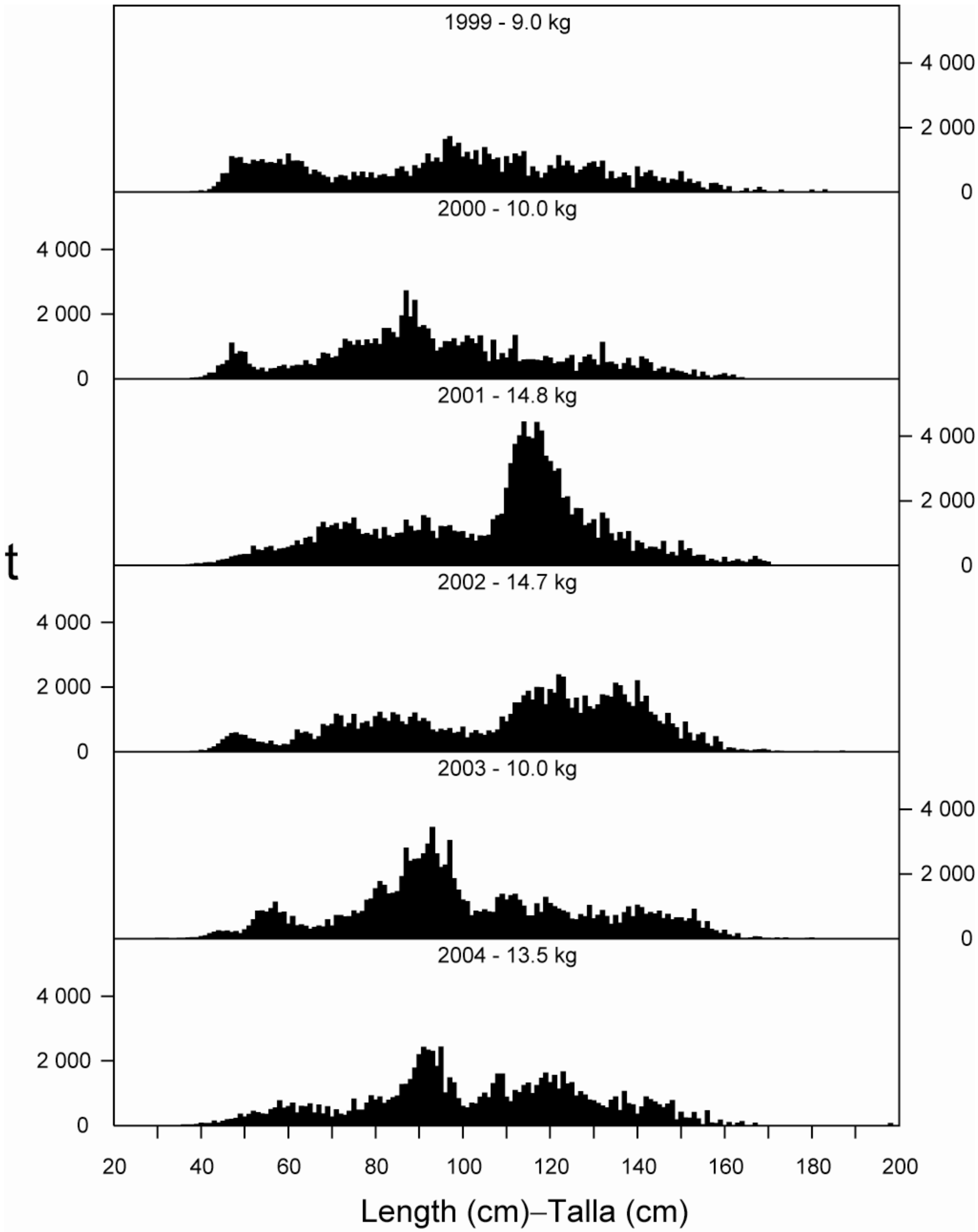

FIGURE 2b. Estimated size compositions of the yellowfin caught in the EPO during the second quarter of 1999-2004. The average weights of the fish in the samples are given at the tops of the panels. t = metric tons.

FIGURA 2b. Composición por tallas estimada del aleta amarilla capturado en el OPO en el segundo trimestre durante 1999-2004. En cada recuadro se detalla el peso promedio de los peces en las muestras. t = toneladas métricas.

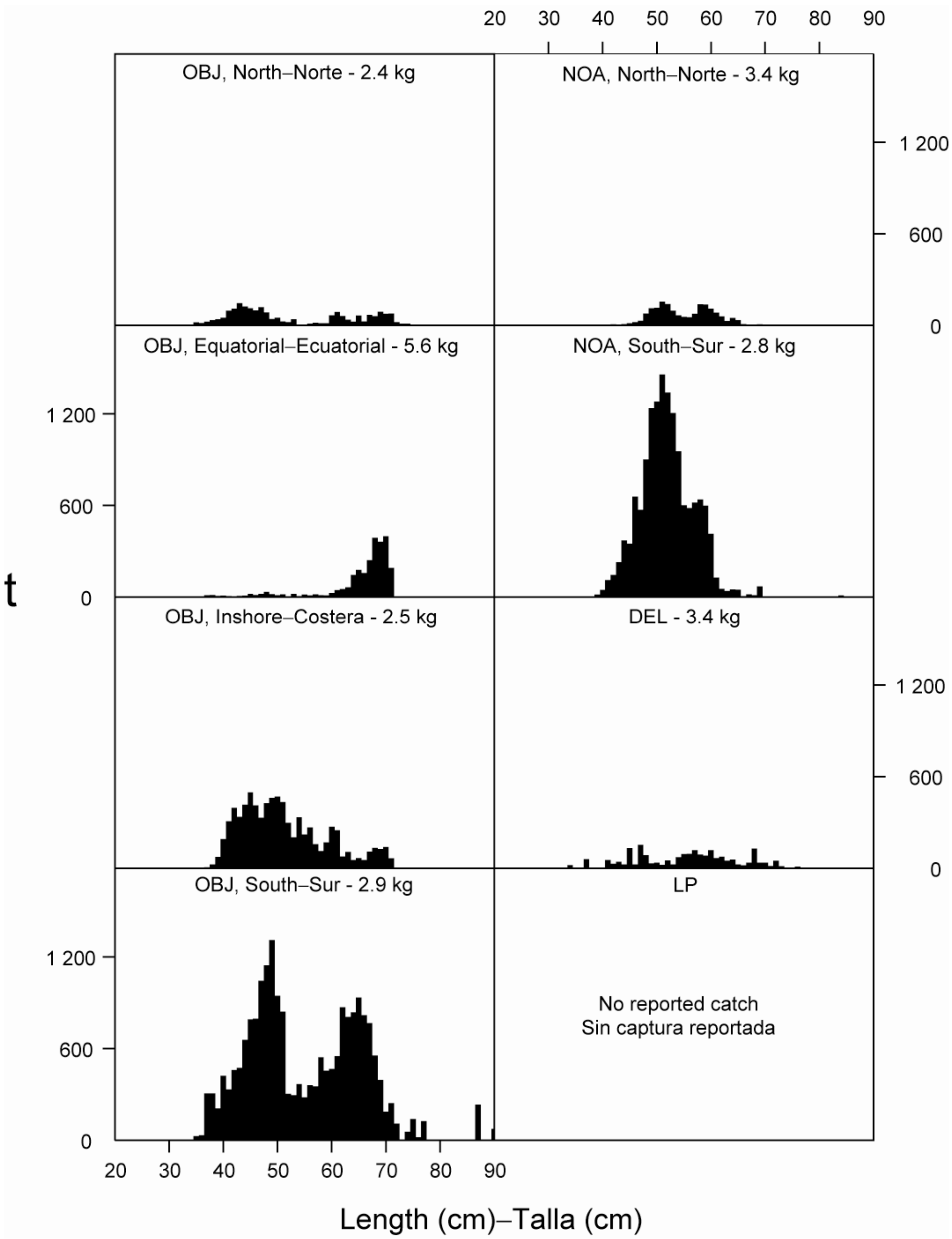

FIGURE 3a. Estimated size compositions of the skipjack caught in each fishery of the EPO during the second quarter of 2004. The average weights of the fish in the samples are given at the tops of the panels. t = metric tons; OBJ = floating object; LP = pole and line; NOA = unassociated; DEL = dolphin.

FIGURA 3a. Composición por tallas estimada del barrilete capturado en cada pesquería del OPO durante el segundo trimestre de 2004. En cada recuadro se detalla el peso promedio de los peces en las muestras. t = toneladas métricas; OBJ = objeto flotante; LP = caña; NOA = no asociado; DEL = delfín.

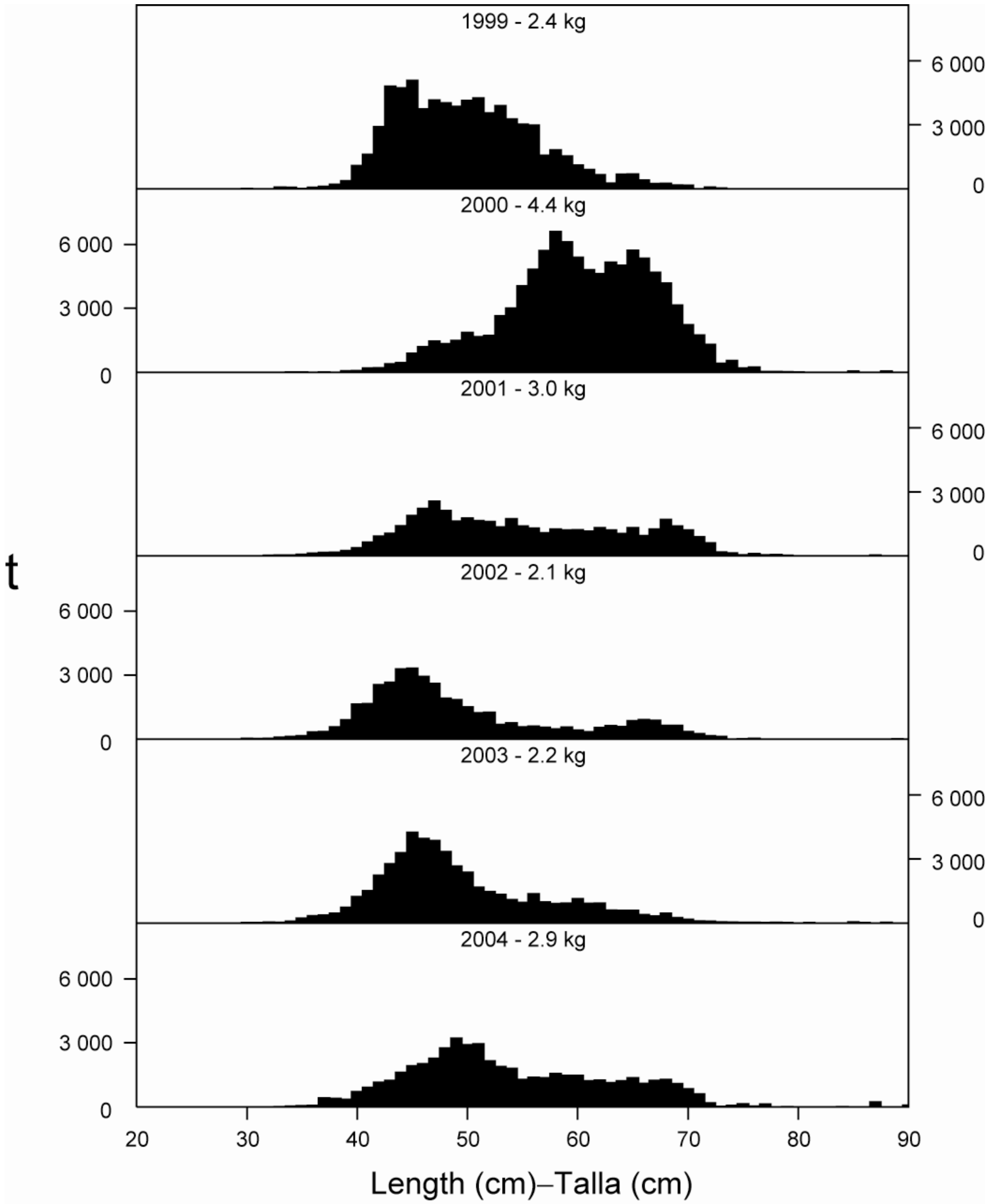

FIGURE 3b. Estimated size compositions of the skipjack caught in the EPO during the second quarter of 1999-2004. The average weights of the fish in the samples are given at the tops of the panels. t = metric tons.

FIGURA 3b. Composición por tallas estimada del barrilete capturado en el OPO en el segundo trimestre durante 1999-2004. En cada recuadro se detalla el peso promedio de los peces en las muestras. t = toneladas métricas.

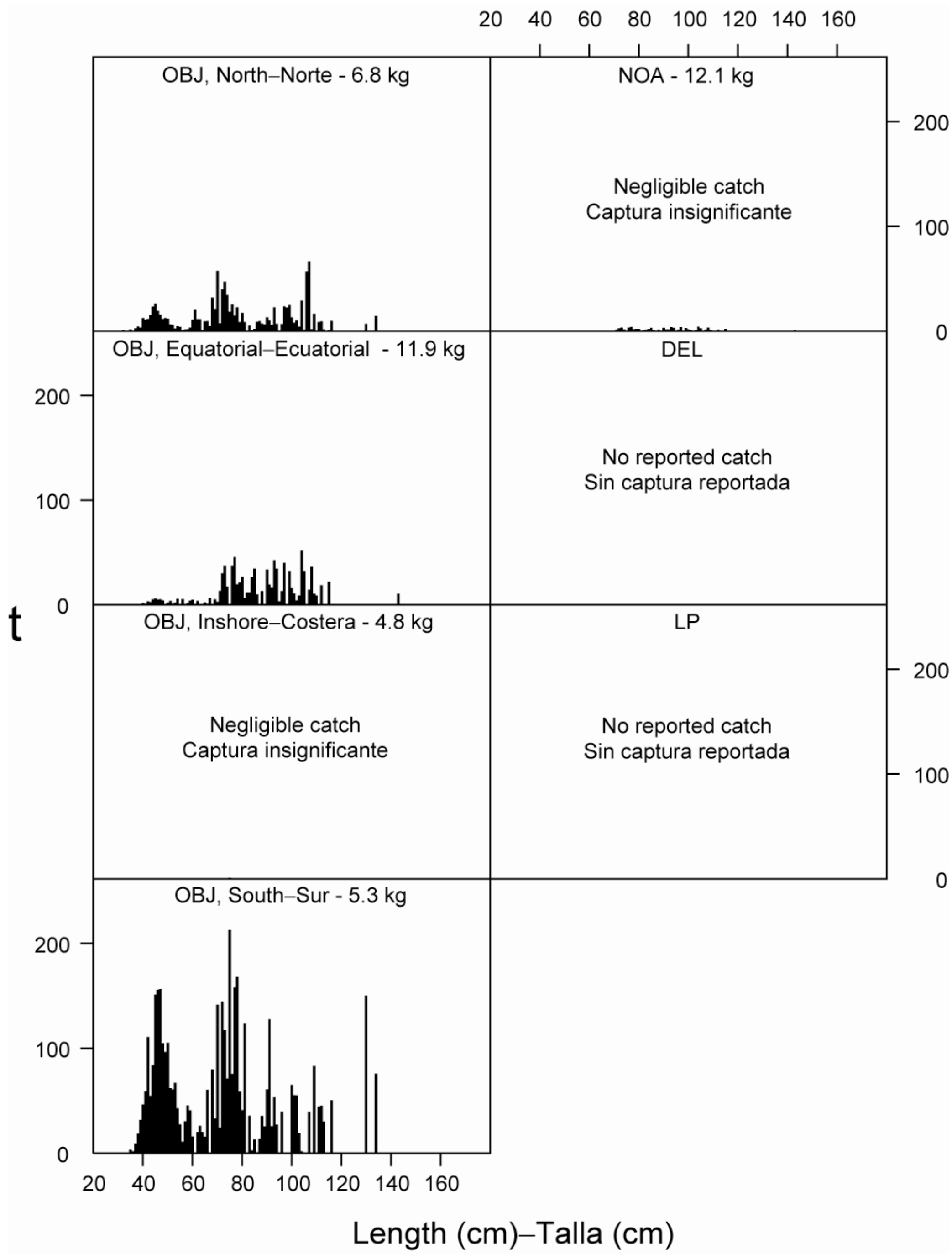

FIGURE 4a. Estimated size compositions of the bigeye caught in each fishery of the EPO during the second quarter of 2004. The average weights of the fish in the samples are given at the tops of the panels. t = metric tons; OBJ = floating object; LP = pole and line; NOA = unassociated; DEL = dolphin.

FIGURA 4a. Composición por tallas estimada del patudo capturado en cada pesquería del OPO durante el segundo trimestre de 2004. En cada recuadro se detalla el peso promedio de los peces en las muestras. t = toneladas métricas; OBJ = objeto flotante; LP = caña; NOA = no asociado; DEL = delfín.

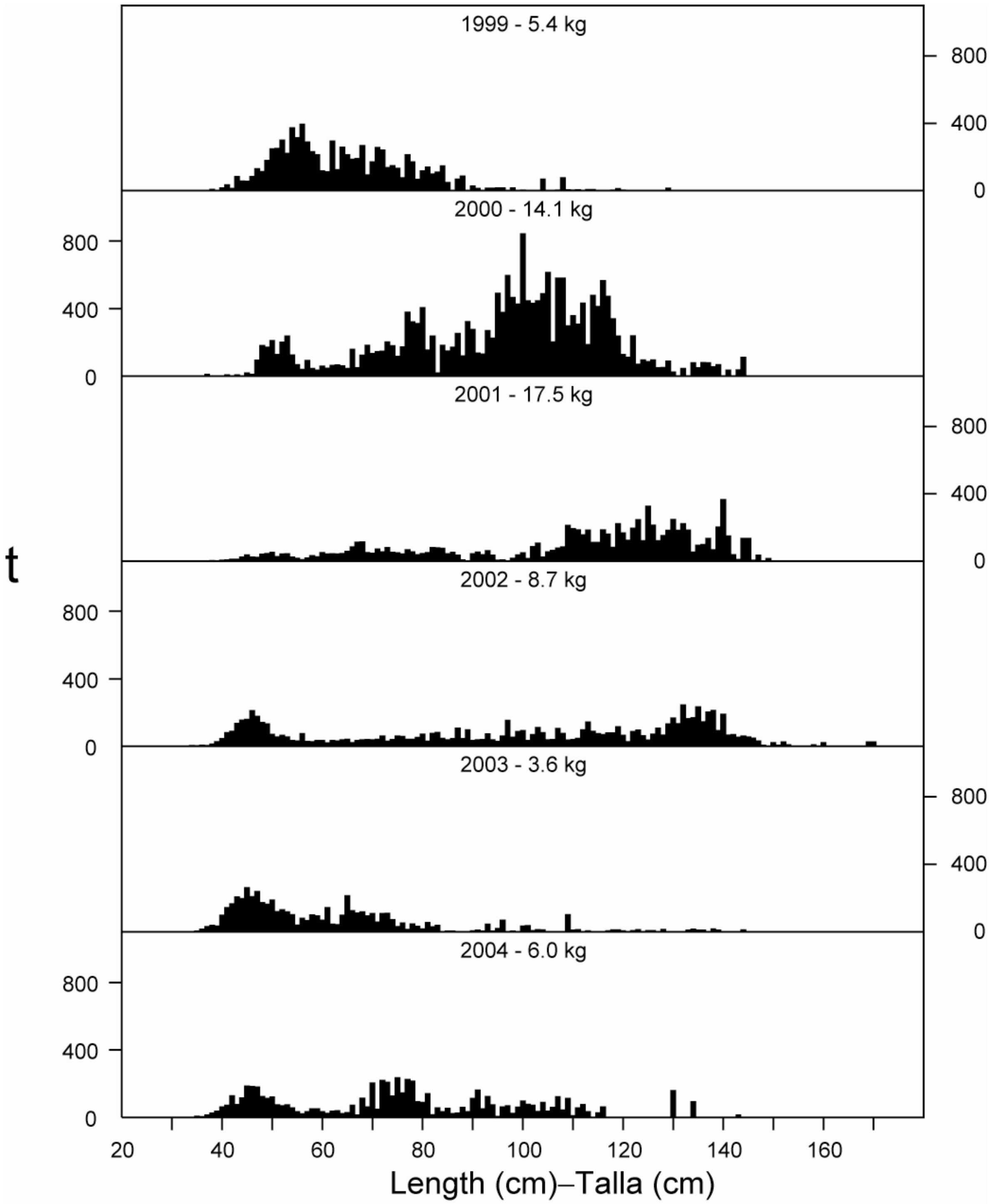

FIGURE 4b. Estimated size compositions of the bigeye caught in the EPO during the second quarter of 1999-2004. The average weights of the fish in the samples are given at the tops of the panels. t = metric tons.
FIGURA 4b. Composición por tallas estimada del patudo capturado en el OPO en el segundo trimestre durante 1999-2004. En cada recuadro se detalla el peso promedio de los peces en las muestras. t = toneladas métricas.

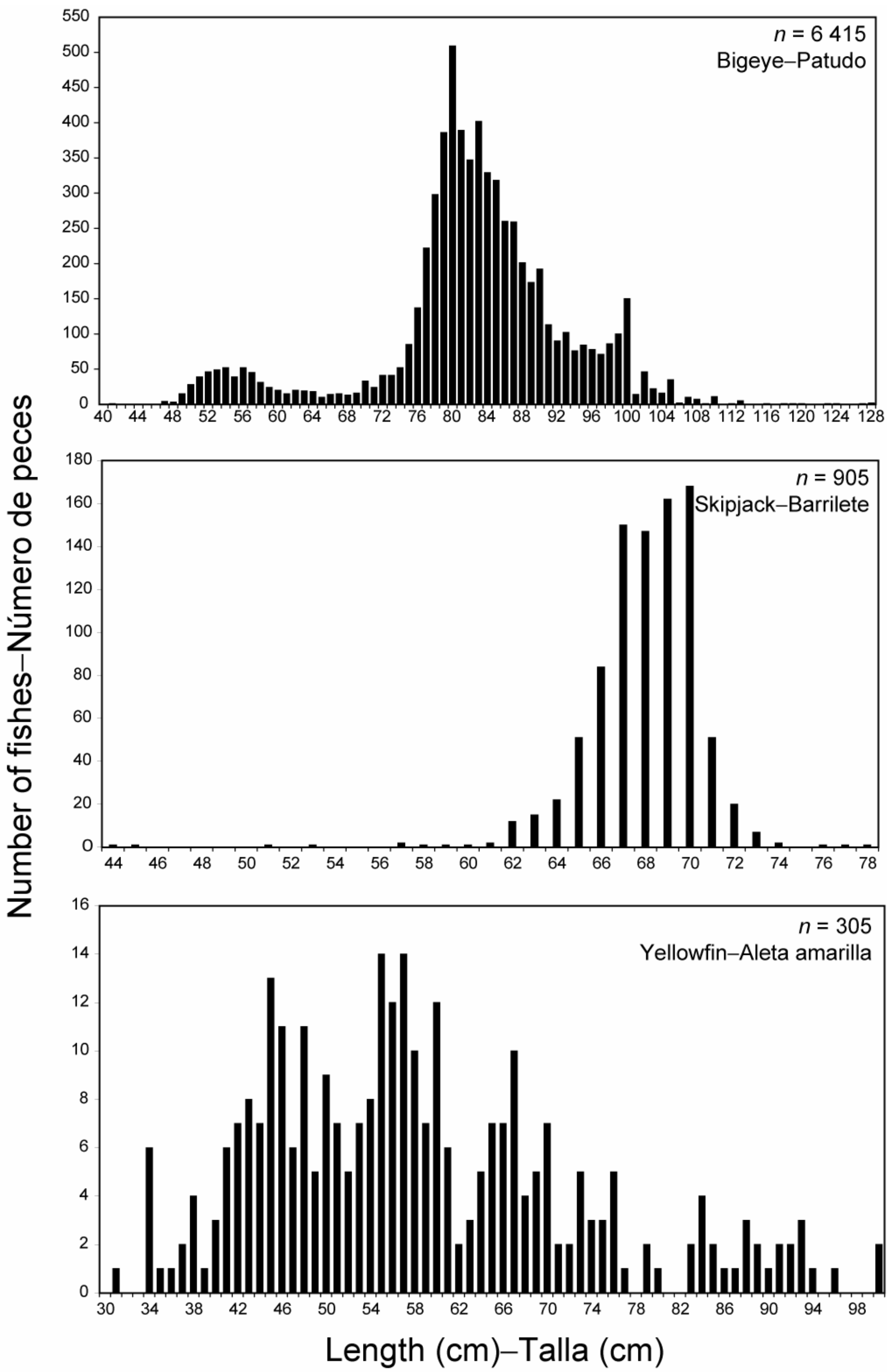

FIGURE 5. Length frequencies of tagged tunas released in the eastern Pacific Ocean during March-May 2004.

FIGURA 5 Frecuencias de talla de atunes marcados liberados en el Océano Pacífico oriental durante marzo-mayo de 2004.

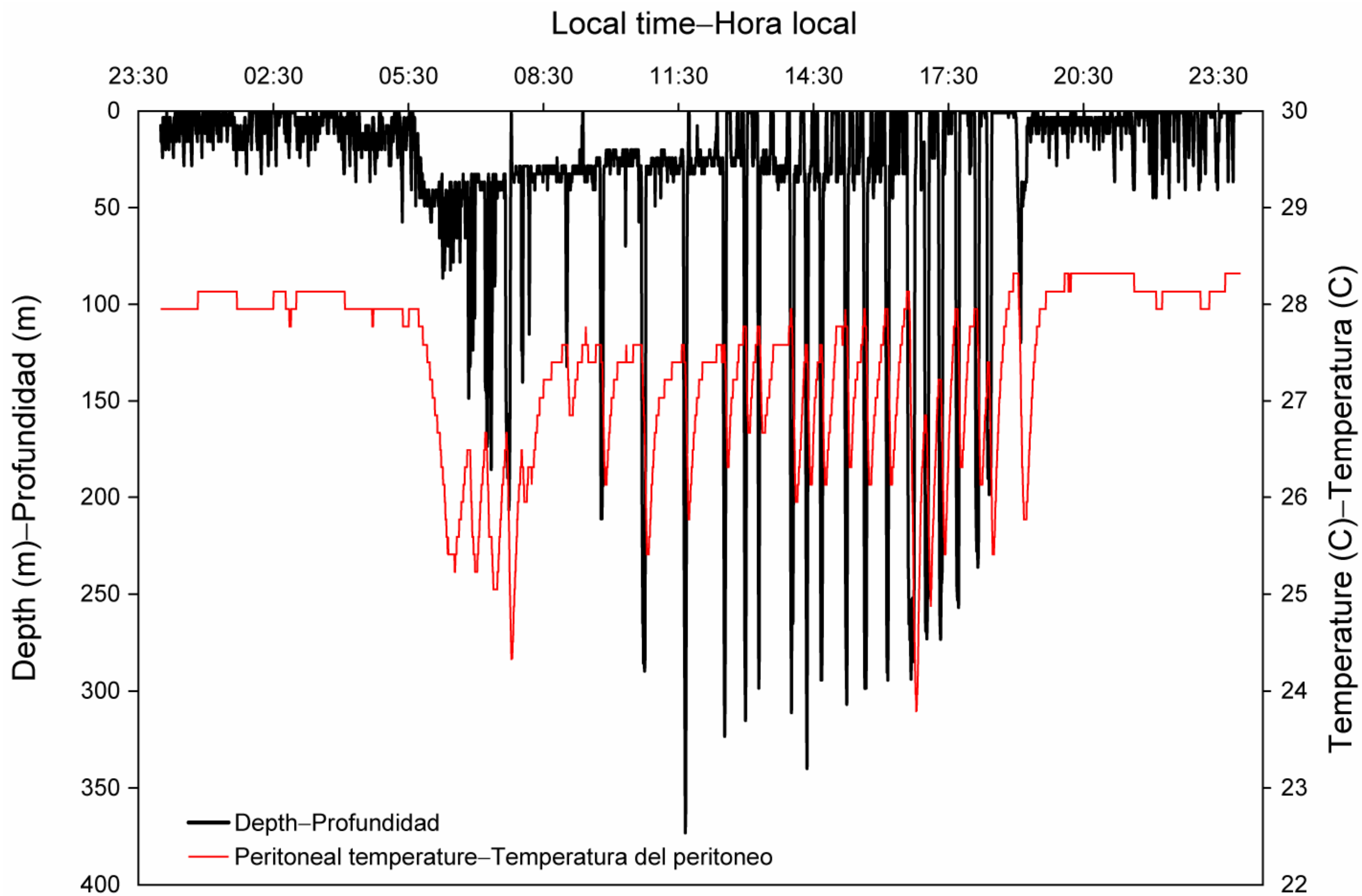

FIGURE 6. Depth and body temperature records for a 67-cm skipjack tuna with an archival tag exhibiting non-associative behavior on April 14, 2004.

FIGURA 6. Registros de profundidad y temperatura del cuerpo de un barrilete de 67 cm con una marca archivadora mostrando comportamiento no asociativo, 14 de abril de 2004.

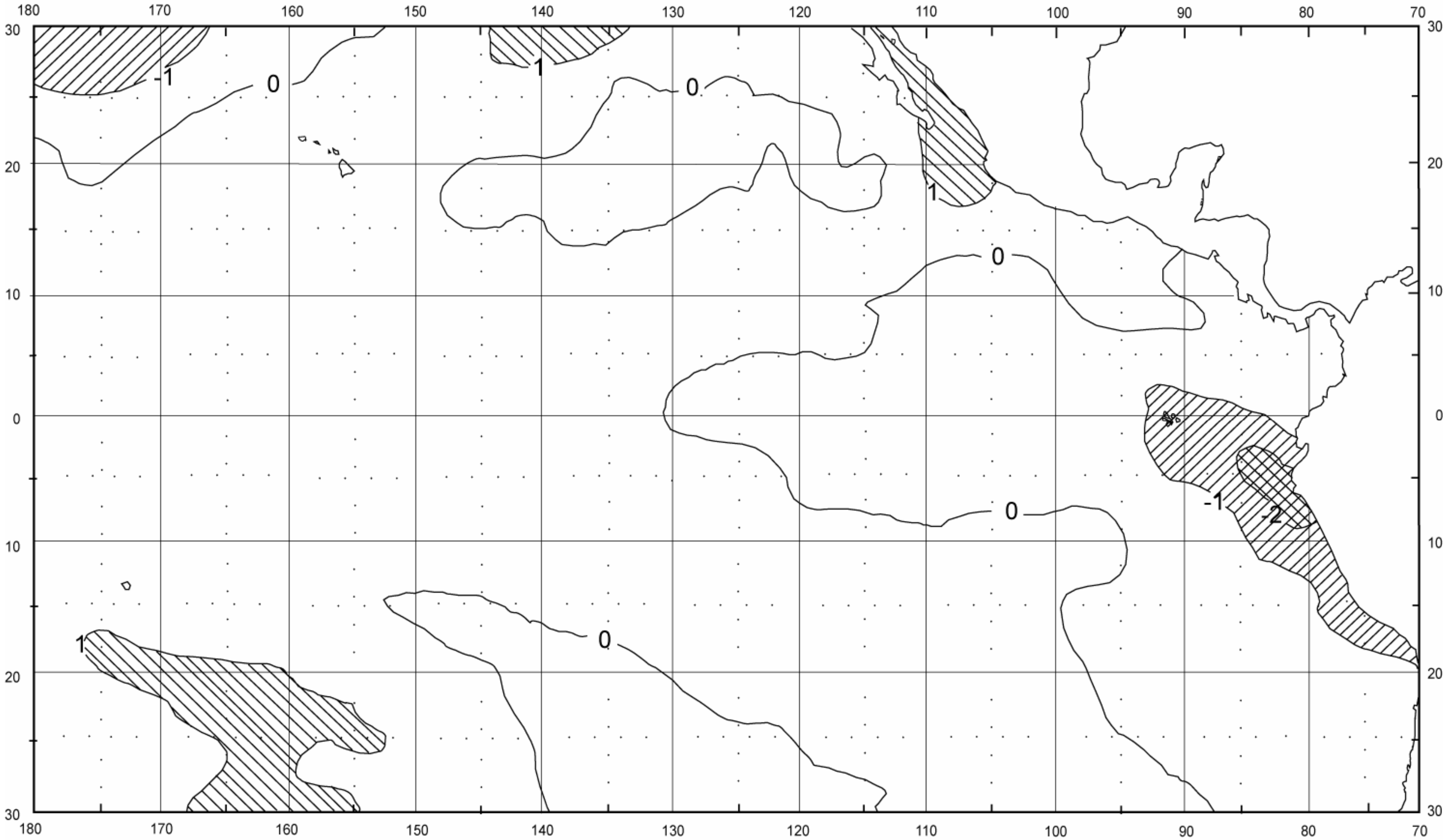

FIGURE 7. Sea-surface temperature (SST) anomalies (departures from long-term normals) for June 2004, based on data from fishing boats and other types of commercial vessels.
FIGURA 7. Anomalías (variaciones de los niveles normales a largo plazo) de la temperatura superficial del mar (TSM) en junio de 2004, basadas en datos tomados por barcos pesqueros y otros buques comerciales.

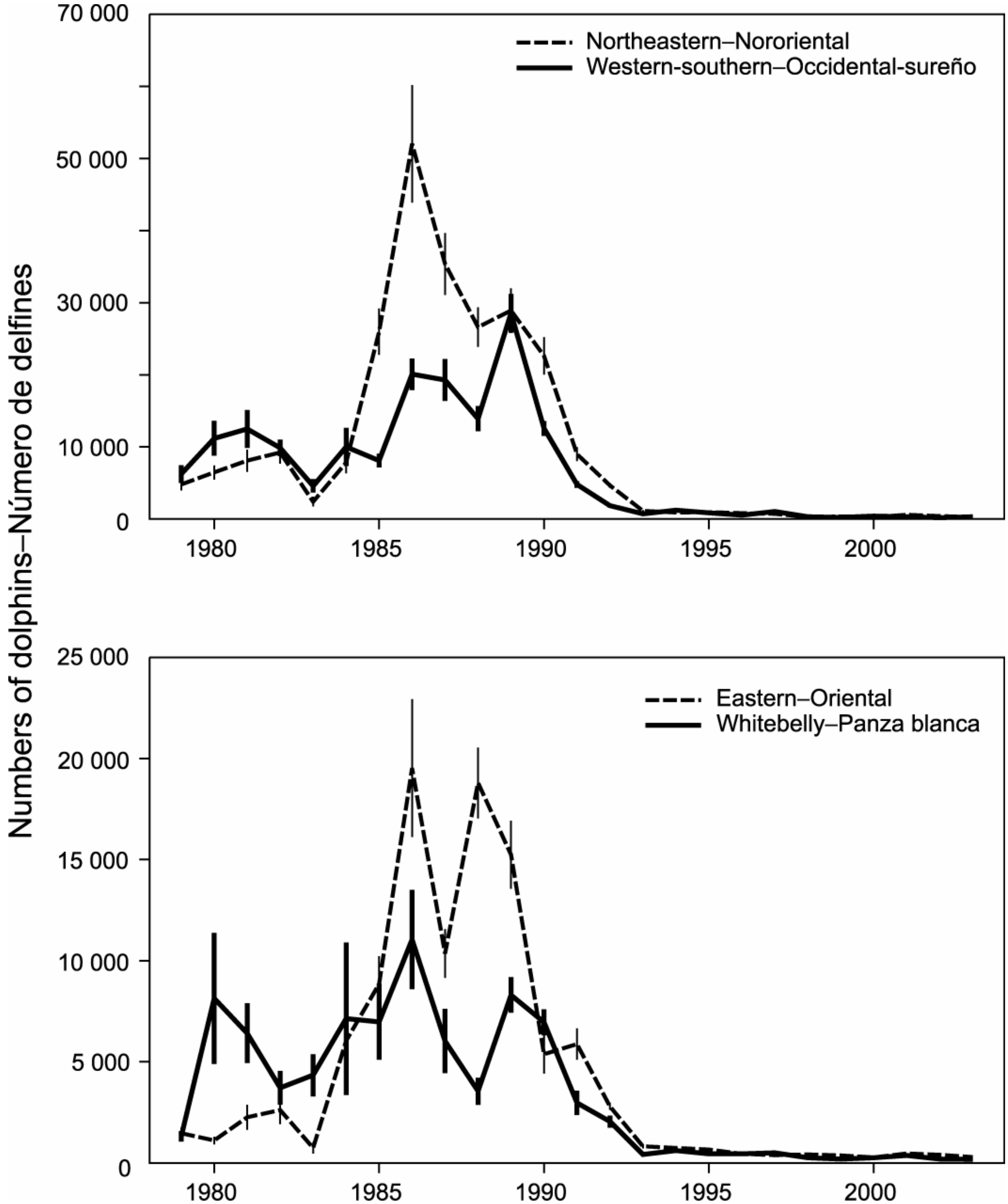

FIGURE 8. Estimated numbers of mortalities for the stocks of spotted (upper panel) and spinner (lower panel) dolphins in the EPO. Each vertical line represents one positive and one negative standard error.

FIGURA 8. Número estimado de mortalidades para la poblaciones 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.

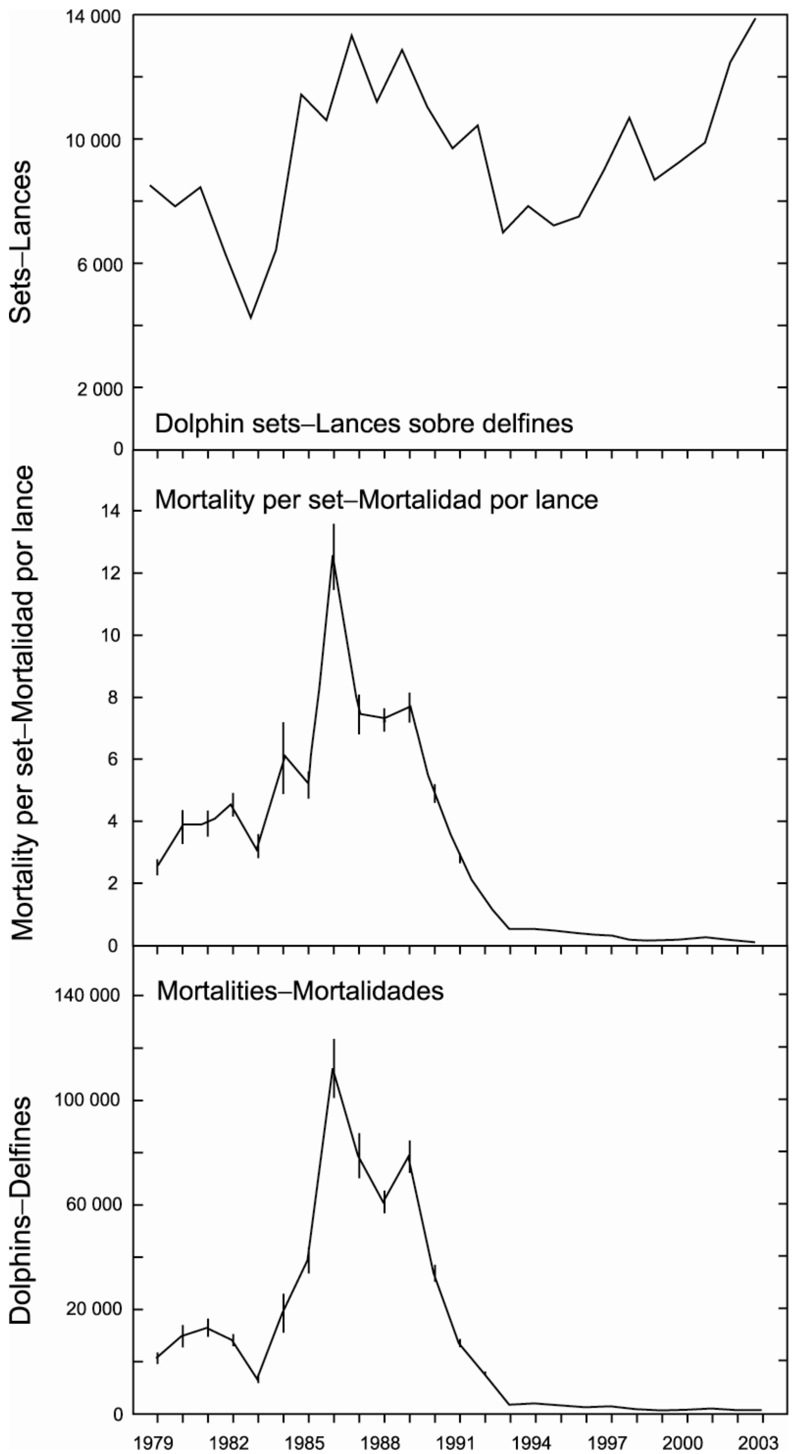

FIGURE 9. Estimated numbers of sets on tunas associated with dolphins, dolphin mortalities per set, and total mortalities of dolphins due to fishing in the EPO. Each vertical line represents one positive and one negative standard error.
FIGURA 9. Número estimado de lances sobre atunes asociados con delfines, mortalidad 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.

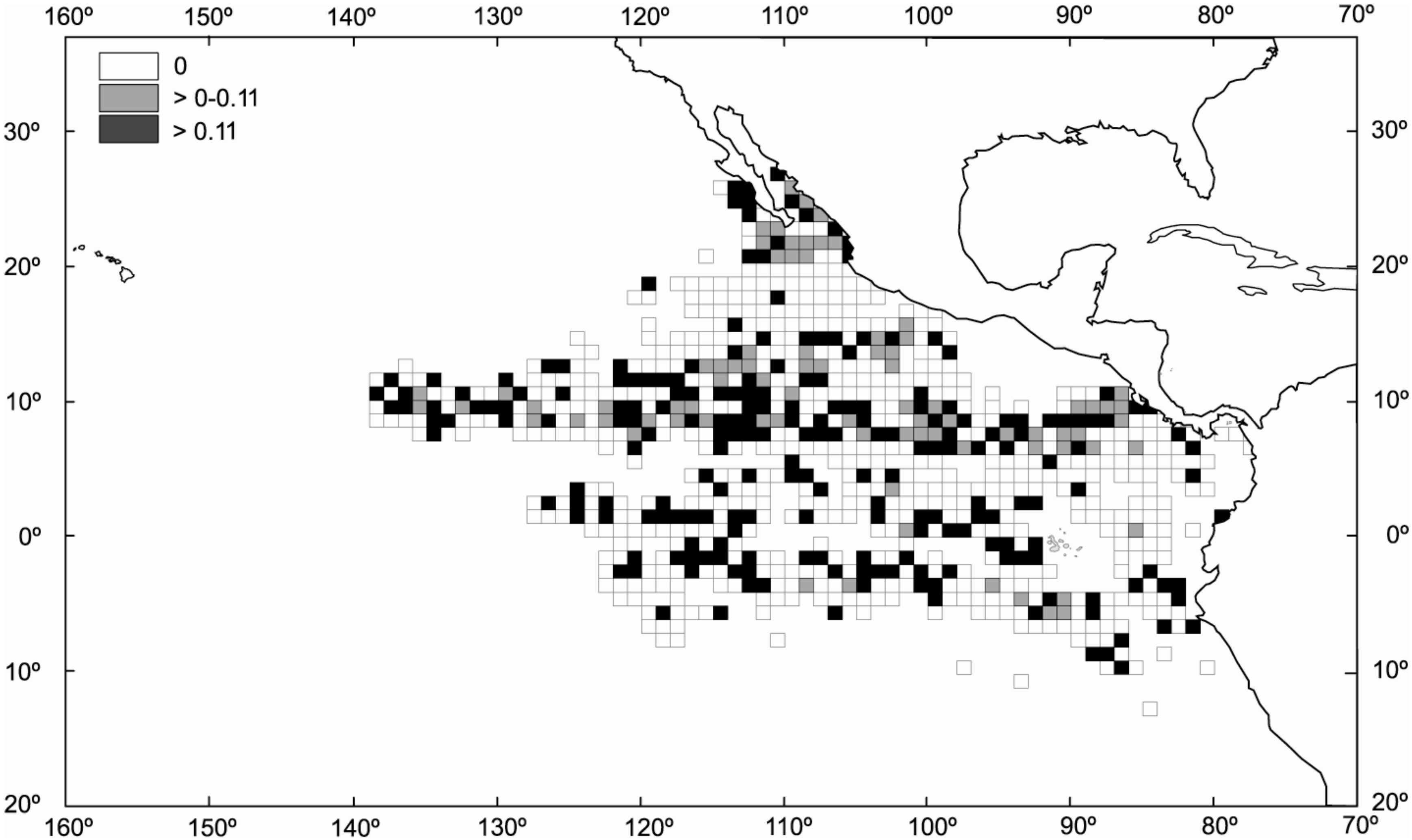

FIGURE 10. Spatial distributions of the average mortalities per set for all dolphins combined during 2003.
FIGURA 10. Distribuciones espaciales de la mortalidad media por lance de todos los delfines combinados durante 2003.

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 cañeros 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	Gear	Size class—Clase de arqueo							Capacity
	Arte	1	2	3	4	5	6	Total	Capacidad
					Number—Número				
Bolivia	PS	-	-	2	1	-	6	9	7,424
Colombia	PS	-	-	-	1	1	6	8	8,318
Ecuador	PS	-	5	11	12	9	39	76	50,800
España—Spain	PS	-	-	-	-	-	4	4	8,859
Guatemala	PS	-	-	-	-	-	1	1	1,940
Honduras	PS	-	-	-	-	-	2	2	1,798
México	PS	-	-	3	7	11	39	60	52,205
	LP	-	1	3	-	-	-	4	526
Panamá	PS	-	-	-	1	-	18	19	24,510
Perú	PS	-	-	-	-	-	1	1	996
El Salvador	PS	-	-	-	-	-	3	3	5,377
USA—EE.UU.	PS	-	-	1	-	-	5	6	6,903
Venezuela	PS	-	-	-	-	-	24	24	31,116
Vanuatu	PS	-	-	-	-	-	5	5	5,585
Unknown—Desconocida	PS	-	-	1	-	-	-	1	209
All flags—Todas banderas	PS	-	5	18	22	21	150	216	
	LP	-	1	3	-	-	-	4	
	PS + LP	-	6	21	22	21	150	220	
					Capacity—Capacidad				
All flags—Todas banderas	PS	-	551	3,383	6,119	9,328	183,599	-	202,980
	PL	-	101	425	-	-	-	-	526
	PS + LP	-	652	3,808	6,119	9,328	183,599	-	203,506

TABLE 2. Changes in the IATTC fleet list recorded during the second quarter of 2004. PS = purse seine; LP = pole-and-line.
TABLA 2. Cambios en la flota observada por la CIAT registrados durante el segundo trimestre de 2004. 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	
Mar Cantabrica	Bolivia	PS	222		
Chasca	Ecuador	PS	249		
San Antonio V	Ecuador	PS	248	*Gloria C*	
Legacy	USA	PS	1,275		
Changes of name or flag—Cambios de nombre o pabellon					
				Now—Ahora	
Milena	Perú	PS	996	*Milena A.*	Panamá
Caribbean Star No. 31	Belize	PS	209		Unknown—Desconocida
Cape Ferrat	Vanuatu	PS	1,561		Panamá
Carmen D	Vanuatu	PS	503		Ecuador
Vessels removed from fleet—Buques retirados de la flota					
Rocio Del Pilar	Ecuador	PS	191	Sunk—Hundido	
Sant Yago Dos	Guatemala	PS	1,940		

TABLE 3. Preliminary estimates of the retained catches of tunas in the EPO from January 1 through June 27, 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 27 de junio 2004, por especie y bandera del buque, en toneladas métricas**.**

Flag	Yellowfin	Skipjack	Bigeye	Pacific bluefin	Eastern Pacific bonito	Albacore	Black skipjack	Other[1]	Total	Percentage of total
Bandera	**Aleta amarilla**	**Barrilete**	**Patudo**	**Aleta azul del Pacífico**	**Bonito del Pacífico oriental**	**Albacora**	**Barrilete negro**	**Otras[1]**	**Total**	**Porcentaje del total**
Ecuador	30,700	45,717	5,575	-	8	-	25	-	82,025	28.4
España—Spain	2,313	7,108	2,602	-	-	-	-	-	12,023	4.2
México	53,728	12,152	-	2,052	-	-	418	2	68,352	23.7
Panamá	22,384	10,460	2,969	-	-	-	-	-	35,813	12.4
USA–EE.UU.	1,841	2,417	1,341	-	-	-	-	-	5,599	1.9
Venezuela	36,563	5,639	203	-	-	-	-	-	42,405	14.7
Vanuatu	1,282	4,358	1,507	-	-	-	-	-	7,147	2.5
Other—Otros[2]	25,933	8,662	708	-	-	-	-	-	35,303	12.2
Total	174,744	96,513	14,906	2,052	8	-	443	2	288,668	

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, and Honduras; this category is used to avoid revealing the operations of individual vessels or companies.
2 Incluye Bolivia, Colombia, El Salvador, Guatemala, y Honduras; 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-March 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 al 30 de marzo, basado en información de los cuadernos de bitácora de buques pesqueros.

Area	Fishery statistic Estadística de pesca	Year-Año					
		1999	**2000**	**2001**	**2002**	**2003**	**2004[2]**
Purse seine—Red de cerco							
North of 5°N	Catch—Captura	37,800	26,600	22,800	30,300	36,900	13,100
Al norte de 5°N	CPDF—CPDP	14.4	14.3	18.9	30.7	22.9	12.8
South of 5°N	Catch—Captura	11,700	25,200	34,800	15,600	13,600	22,000
Al sur de 5°N	CPDF—CPDP	4.9	7.2	14.7	6.5	6.1	9.0
Total	Catch—Captura	49,500	51,800	57,600	45,900	50,500	35,100
	CPDF—CPDP	12.2	10.9	16.3	22.5	18.4	10.4
Annual total Total anual	Catch—Captura	169,700	157,400	148,700	149,000	150,800	

[1] Class-6 purse-seiners 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 solamente. Se redondean los valores de captura al 100 más cercano, y los de CPDP al 0.1 más cercano.

[2] Preliminary

[2] 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-March 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 al 30 de marzo, basado en información de los cuadernos de bitácora de buques pesqueros.

Area	**Fishery statistic Estadística de pesca**	**Year-Año**					
		1999	**2000**	**2001**	**2002**	**2003**	**2004[2]**
	Purse seine—Red de cerco						
North of 5°N	Catch—Captura	6,500	9,000	3,200	500	2,700	1,800
Al norte de 5°N	CPDF—CPDP	2.5	4.9	2.6	0.5	1.7	1.8
South of 5°N	Catch—Captura	44,700	55,700	19,100	22,300	22,500	19,300
Al sur de 5°N	CPDF—CPDP	18.7	16.0	8.0	9.3	10.1	7.9
Total	Catch—Captura	51,200	64,700	22,300	22,800	25,200	21,100
	CPDF—CPDP	16.6	14.4	7.3	9.1	9.2	7.4
Annual total Total anual	Catch—Captura	185,100	129,100	71,200	67,700	97,600	

1 Class-6 purse seiners 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 solamente. Se redondean los valores de captura al 100 más cercano, y los de CPDP al 0.1 más cercano.

2 Preliminary

2 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-March 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 al 30 de marzo, basado en información de los cuadernos de bitácora de buques cerqueros.

Fishery statistic—Estadística de pesca	Year—Año					
	1999	2000	2001	2002	2003	2004[2]
Catch—Captura	8,600	21,400	6,900	4,600	4,100	3,800
CPDF—CPDP	2.3	5.6	2.8	1.9	1.7	1.5
Total annual catch—Captura total anual	43,200	64,800	31,500	21,000	20,400	

[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
[2] Preliminar

TABLE 7. Catches of bigeye tuna in the eastern Pacific Ocean during 2004 by longline vessels.
TABLA 7. Captures de atún patudo en el Océano Pacífico oriental durante 2004 por buques palangreros.

Flag	Month			First quarter	Month			Second quarter	Total to date
	1	2	3		4	5	6		
Bandera	Mes			Primer trimestre	Mes			Segundo trimestre	Total al fecha
	1	2	3		4	5	6		
China	201	278	22	501	0	63	0	63	564
European Union—Unión Europea	1	3	-	4	-	-	-	-	4
Japan—Japón	2,124	1,796	1,776	5,696	1,377	1,358	1,308	4,043	8,431
Republic of Korea—República de Corea	981	820	1,001	2,802	1,295	941	806	3,042	5,038
Chinese Taipei—Taipei Chino	1,178	887	845	2,910	834	818	373	2,025	4,562
Vanuatu	111	93	146	350	81	-	-	81	431
Total	4,596	3,877	3,790	12,263	3,587	3,180	2,487	9,254	19,030

TABLE 8. 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 second quarter of 2004. The numbers in parentheses indicate cumulative totals for the year.

TABLA 8. Datos preliminares de la cobertura de viajes de buques de más de 363 toneladas métricasde capacidad de acarreo por los programas de observadores de la CIAT, Ecuador, México, la Unión Europea, Venezuela, y el Forum Fisheries Agency (FFA) durante el segundo trimestre de 2004. 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			
Bolivia	6	(19)	6	(19)					6	(19)	100.0	(100.0)
Colombia	8	(18)	8	(18)					8	(18)	100.0	(100.0)
Ecuador	55	(146)	37	(96)	18	(50)			55	(146)	100.0	(100.0)
España—Spain	4	(13)	1	(7)	3	(6)			4	(13)	100.0	(100.0)
Guatemala	0	(1)	0	(1)					0	(1)	-	(100.0)
Honduras	3	(8)	3	(8)					3	(8)	100.0	(100.0)
México	64	(133)	36	(72)	28	(61)			64	(133)	100.0	(100.0)
Panamá	28	(61)	28	(61)					28	(61)	100.0	(100.0)
El Salvador	4	(13)	4	(13)					4	(13)	100.0	(100.0)
U.S.A.—EE.UU.	5	(13)	4	(12)			1	(1)	5	(13)	100.0	(100.0)
Venezuela	27	(67)	14	(32)	13	(35)			27	(67)	100.0	(100.0)
Vanuatu	5	(14)	5	(14)					5	(14)	100.0	(100.0)
Total	209	(506)[1]	146	(353)	62	(152)	1	(1)	209	(506)[1]	100.0	(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 del CIAT y 22 por observadores de los programas nacionales) iniciados a fines de 2003 y completados en 2004

TABLE 9. Oceanographic and meteorological data for the Pacific Ocean, January-June 2004. The values in parentheses are anomalies.
TABLA 9. Datos oceanográficos y meteorológicos del Océano Pacífico, enero-junio 2004. Los valores en paréntesis son anomalías.

Month—Mes	**1**	**2**	**3**	**4**	**5**	**6**
SST—TSM, 0°-10°S, 80°-90°W (°C)	24.6 (0.1)	25.8 (-0.2)	25.9 (-0.5)	25.3 (-0.2)	23.1 (-1.3)	21.6 (-1.4)
SST—TSM, 5°N-5°S, 90°-150°W (°C)	25.9 ((0.3)	26.5 (0.1)	27.2 (0.1)	27.4 (0.0)	26.7 (-0.3)	26.3 (-0.1)
SST—TSM, 5°N-5°S, 120°-170°W (°C)	26.7 (0.2)	26.9 (0.2)	27.1 (-0.1)	27.8 (0.2)	28.1 (0.3)	27.8 (0.3)
SST—TSM, 5°N-5°S, 150W°-160°E (°C)	28.8 (0.7)	28.6 (0.6)	28.4 (0.3)	28.8 (0.3)	29.2 (0.5))	29.2 (0.5)
Thermocline depth—Profundidad de la termoclina, 0°, 80°W (m)	40	35	25	25	40	40
Thermocline depth—Profundidad de la termoclina, 0°, 110°W (m)	60	50	50	25	40	60
Thermocline depth—Profundidad de la termoclina, 0°, 150°W (m)	140	150	130	125	130	120
Thermocline depth—Profundidad de la termoclina, 0°, 180°W (m)	170	160	170	170	170	130
Sea level—Nivel del mar, Callao, Perú (cm)	112.4 (0.9)	116.7 2.6	105.8 (-8.9)	113.9 (-0.6)	110.0 (-3.5)	107.2 (-4.8)
SOI—IOS	-1.7	1.1	-0.2	-1.3	0.9	-1.3
SOI*—IOS*	0.27	-0.20	-0.15	1.67	1.99	1.57
NOI*—ION*	-0.55	-0.22	5.01	0.08	1.53	0.55

TABLE 10. Estimates of mortalities of dolphins in 2003, population abundance pooled for 1986-1990 (from Report of the International Whaling Commission, 43: 477-493), and relative mortality (with approximate 95% confidence intervals), by stock.

TABLA 10. Estimaciones de la mortalidad incidental de delfines en 2003, la abundancia de poblaciones agrupadas para 1986-1990 (del Informe de la Comisión Ballenera Internacional, 43: 477-493), y la mortalidad relativa (con intervalos de confianza de 95% aproximados), por población.

Species and stock	**Incidental mortality**	**Population abundance**	**Relative mortality (percent)**
Especie y población	**Mortalidad incidental**	**Abundancia de la población**	**Mortalidad relativa (porcentaje)**
Offshore spotted dolphin—Delfín manchado de altamar			
Northeastern—Nororiental	282	730,900	0.04 (0.030, 0.050)
Western-southern—Occidental y sureño	334	1,298,400	0.03 (0.020, 0.036)
Spinner dolphin—Delfín tornillo			
Eastern—Oriental	289	631,800	0.05 (0.028, 0.069)
Whitebelly—Panza blanca	171	1,019,300	0.02 (0.010, 0.022)
Common dolphin—Delfín común			
Northern—Norteño	133	476,300	0.03 (0.016, 0.060)
Central	140	406,100	0.03 (0.018, 0.068)
Southern—Sureño	99	2,210,900	<0.01 (0.003, 0.007)
Other dolphins—Otros delfines[1]	54	2,802,300	<0.01 (0.001, 0.002)
Total	1,502	9,576,000	0.02 (0.014, 0.018)

[1] "Other dolphins" includes the following species and stocks, whose observed mortalities were as follows: striped dolphins (*Stenella coeruleoalba*), 11; bottlenose dolphins (*Tursiops truncatus*), 4; shortfin pilot whale (*Globicephala macrorhynchus*), 2; coastal spotted dolphins, 15; and unidentified dolphins, 22.

[1] "Otros delfines" incluye las siguientes especies y poblaciones, con las mortalidades observadas correspondientes: delfín listado (*Stenella coeruleoalba*), 11; tonina (*Tursiops truncatus*), 4; ballena piloto (*Globicephala macrorhynchus*), 2; delfín manchado costero, 15; y delfines no identificados, 22.

TABLE 11a. Annual estimates of dolphin mortality, by species and stock. The estimates for 1979-1992 are based on a mortality-per-set ratio. The sums of the estimated mortalities for the northeastern and western-southern stocks of offshore spotted dolphins do not necessarily equal those for the previous stocks of northern and southern offshore spotted dolphins because the estimates for the two stock groups are based on different areal strata, and the mortalities per set and the total numbers of sets vary spatially.

TABLA 11a. Estimaciones anuales de la mortalidad de delfines, por especie y población. Las estimaciones de 1979-1992 se basan en una razón de mortalidad por lance. Las sumas de las mortalidades estimadas para las poblaciones nororiental y occidental y sureño del delfín manchado de altamar no equivalen necesariamente a las sumas de aquéllas para las antiguas poblaciones de delfín manchado de altamar norteño y sureño porque las estimaciones para los dos grupos de poblaciones se basan en estratos espaciales diferentes, y las mortalidades por lance y el número total de lances varían espacialmente.

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	295	435	275	262	54	223	10	82	1,636
2001	591	309	469	372	94	203	46	44	2,128
2002	439	206	405	186	69	155	4	49	1,513
2003	290	341	289	171	133	140	99	39	1,502

[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 11b. Standard errors of annual estimates of dolphin species and stock mortality for 1979-1994. There are no standard errors for 1995-2000 because the coverage was at or nearly at 100 percent during those years. Standard errors for 2001-2003 are not yet available.
TABLA 11b. Errores estándar de las estimaciones anuales de la mortalidad de delfines por especie y población en 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 2001-2003.

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

TABLE 12. Percentages of sets with no dolphin mortalities, with major gear malfunctions, with net collapses, with net canopies, average times of backdown (in minutes), and average number of live dolphins left in the net at the end of backdown.
TABLA 12. Porcentajes de lances sin mortalidad de delfines, con averías mayores, con colapso de la red, con abultamiento de la red, duración media del retroceso (en minutos), y número medio de delfines en la red después del retroceso.

Year	Sets with zero mortality (percent)	Sets with major malfunctions (percent)	Sets with net collapse (percent)	Sets with net canopy (percent)	Average duration of backdown (minutes)	Average number of live dolphins left in net after backdown
Año	**Lances sin mortalidad (porcentaje)**	**Lances con averías mayores (porcentaje)**	**Lances con colapso de la red (porcentaje)**	**Lances con abultamiento de la red (porcentaje)**	**Duración media del retroceso (minutos)**	**Número medio de delfines en la red después del retroceso**
1986	38.1	9.5	29.0	22.2	15.3	6.0
1987	46.1	10.9	32.9	18.9	14.6	4.4
1988	45.1	11.6	31.6	22.7	14.3	5.5
1989	44.9	10.3	29.7	18.3	15.1	5.0
1990	54.2	9.8	30.1	16.7	14.3	2.4
1991	61.9	10.6	25.2	13.2	14.2	1.6
1992	73.4	8.9	22.0	7.3	13.0	1.3
1993	84.3	9.4	12.9	5.7	13.2	0.7
1994	83.4	8.2	10.9	6.5	15.1	0.3
1995	85.0	7.7	10.3	6.0	14.0	0.4
1996	87.6	7.1	7.3	4.9	13.6	0.2
1997	87.7	6.6	6.1	4.6	14.3	0.2
1998	90.3	6.3	4.9	3.7	13.2	0.2
1999	91.0	6.6	5.9	4.6	14.0	0.1
2000	90.8	5.6	4.3	5.0	14.9	0.2
2001	91.6	6.5	3.9	4.6	15.6	0.1
2002	93.6	6.0	3.1	3.3	15.0	0.1
2003	93.9	5.2	3.5	3.7	14.5	<0.1