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

July-September 2003
Julio-Septiembre 2003

COMMISSIONERS—COMISIONADOS

COSTA RICA
Ligia Castro
George Heigold
Asdrubal Vásquez

ECUADOR
Lucía Fernández de De Genna
Luis Torres Navarrete

EL SALVADOR
Manuel Calvo Benivides
Mario González Recinos
Jorge López Mendoza
José Emilio Suadi Hasbun

ESPAÑA—SPAIN
Carlos Domínguez Díaz
Ignacio Escobar Guerrero

FRANCE—FRANCIA
Didier Ortolland
Daniel Silvestre
Sven-Erik Sjöden
Xavier Vant

GUATEMALA
Fraterno Díaz Monge
Pablo Girón Muñoz

JAPAN—JAPÓN
Katsuma Hanafusa
Yoshiaki Ito
Yamato Ueda

MÉXICO
María Teresa Bandala Medina
Guillermo Compeán Jiménez
Michel Dreyfus León
Jerónimo Ramos Sáenz-Pardo

NICARAGUA
Miguel Angel Marenco Urcuyo
Sergio Martínez Casco

PANAMÁ
Arnulfo Franco Rodríguez

PERÚ
Leoncio Alvarez
Gladys Cárdenas
Alberto Hart

USA—EE.UU.
Scott Burns
Robert Fletcher
Rodney McInnis
Patrick Rose

VANUATU
Anthony N. Tillett
Edward E. Weissman

VENEZUELA
Daniel Novoa Raffalli
Nancy Tablante

DIRECTOR

Robin Allen

HEADQUARTERS AND MAIN LABORATORY—OFICINA Y LABORATORIO PRINCIPAL
8604 La Jolla Shores Drive
La Jolla, California 92037-1508, USA
www.iattc.org

The

QUARTERLY REPORT

July-September 2003

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

INFORME TRIMESTRAL

Julio-Septiembre 2003

de la

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, and Peru in 2002. Canada withdrew from the IATTC in 1984.

The IATTC's responsibilities are met with two programs, the Tuna-Billfish Program and the Tuna-Dolphin Program.

The principal responsibilities of the Tuna-Billfish Program specified in the IATTC's convention were (1) to study the biology of the tunas and related species of the eastern Pacific Ocean to estimate the effects that fishing and natural factors have on their abundance and (2) to recommend appropriate conservation measures so that the stocks of fish could be maintained at levels that would afford maximum sustainable catches. It was subsequently given the responsibility for collecting information on compliance with Commission resolutions.

The IATTC's responsibilities were broadened in 1976 to address the problems arising from the incidental mortality in purse seines of dolphins that associate with yellowfin tuna in the EPO. The Commission agreed that it "should strive to maintain a high level of tuna production and also to maintain [dolphin] stocks at or above levels that assure their survival in perpetuity, with every reasonable effort being made to avoid needless or careless killing of [dolphins]" (IATTC, 33rd meeting, minutes: page 9). The principal responsibilities of the IATTC's Tuna-Dolphin Program are (1) to monitor the abundance of dolphins and their mortality incidental to purse-seine fishing in the EPO, (2) to study the causes of mortality of dolphins during fishing operations and promote the use of fishing techniques and equipment that minimize these mortalities, (3) to study the effects of different modes of fishing on the various fish and other animals of the pelagic ecosystem, and (4) to provide a secretariat for the International Dolphin Conservation Program, described below.

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

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

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

MEETINGS

Dr. Michael G. Hinton participated in an *ad hoc* meeting of representatives of regional fisheries bodies and FAO on the establishment of the FAO Fisheries Resources Monitoring System (FIRMS) in Rome on June 30-July 1, 2003. FIRMS provides the organizational structure underlying the FAO Fisheries Global Information System (FIGIS), and provides the mechanism by which regional fisheries bodies, such as the IATTC, structure a working relationship to transmit information to the FIGIS reporting system.

Dr. Martín A. Hall and Messrs. Mauricio X. Orozco Z. and Nickolas W. Vogel attended the Environmental Systems Research Institute (ESRI) International Users Conference as invited guests of ESRI in San Diego, California, USA, on July 7-10, 2003. ESRI employees demonstrated the varied uses of ESRI's ArcGIS mapping software through posters and presentations, and offered instructional sessions on all aspects of the ArcGIS software.

Drs. Michael G. Hinton and Mark N. Maunder spent the period of July 9-16, 2003, in Mooloolaba, Queensland, Australia, where they participated in the 16th meeting of the Standing Committee on Tuna and Billfish of the Oceanic Fisheries Programme of the Secretariat for the Pacific Community.

Drs. Michael G. Hinton, Cleridy E. Lennert, and Mark N. Maunder, and Ms. Jenny M. Suter, participated in a course entitled “Multivariate Adaptive Regression Splines: an Alternative to Neural Nets” at the Southwest Fisheries Science Center in La Jolla, California, USA, on August 13, 2003. The course was organized by Drs. Lennert and Nancy C. H. Lo of the U.S. National Marine Fisheries Service.

Dr. Martín A. Hall participated in a meeting of the Marine Stewardship Council in London on August 28-29, 2003. His expenses were paid by that organization.

At the invitation of the Subsecretaria de Recursos Pesqueros del Ecuador (SRPE), Dr. Hall coordinated a series of workshops on reducing the incidental mortality of sea turtles, which took place from September 20 to October 1, 2003. Ing. Luis Torres and Ms. Alexa Avendano from the SRPE organized the workshops. In addition to Dr. Hall, Drs. John Mitchell and Yonat Swimmer, and Mr. Charlie Bergmann, all of the U.S. National Oceanic and Atmospheric Administration, and Biol. Maria J. Barragan of the Fundación Jatun Sacha del Ecuador participated in all the workshops. The workshops took place at nine locations along the Ecuadorian coast. A total of about 800 people, most of whom were fishermen, attended the

workshops. In addition to purse-seine fishermen, crew members of longline and shrimp vessels were in attendance. The conservation concerns about sea turtles were explained, and the characteristics of the species present in those waters and their geographic distributions were discussed. The technical sections of the workshops covered different subjects, in accordance with the gear involved. In the technical section of the workshop in which longline fishermen participated, recent experiments with different types and sizes of hooks, and the use of dipnets, dehookers, and line cutters to release the turtles, were discussed.

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 215 length-frequency samples and abstracted logbook information for 386 trips of commercial fishing vessels during the third quarter of 2003. In addition, personnel in La Jolla obtained 26 length-frequency samples of bluefin from recreational fishing vessels.

Also during the third quarter members of the field office staffs placed IATTC observers on 153 fishing trips by vessels that participate in the AIDCP On-Board Observer Program. In addition, 151 IATTC observers completed trips during the quarter, and were debriefed by field office personnel.

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

Statistical data are continuously being collected by personnel at the IATTC's field stations and processed at its headquarters in La Jolla. As a result, estimates of fisheries statistics with varying degrees of accuracy and precision are available, the most accurate and precise being those made after all available information has been entered into the data base, processed, and verified. The estimates for the current quarter are the most preliminary, while those made six months to a year after monitoring of the fishery are much more accurate and precise. While it may require a year or more to obtain some final information, much of the catch information is processed and available within two to three months of the return of a vessel from a fishing trip.

Fleet statistics

The estimated total carrying capacity of the vessels that are fishing, or are expected to fish, in the eastern Pacific Ocean (east of 150°W; EPO) during 2003 is about 208,600 cubic meters (m^3) (Table 1). The weekly average at-sea capacity for the fleet, for the weekly periods ending June 30 through September 28, was about 134,800 m^3 (range: 125,700 to 149,600 m^3). Data on the tuna fleet of the EPO are given in Table 2. The changes of flags and vessel names and additions to and deletions from the IATTC's fleet list during the third quarter of 2003 are given in Table 3.

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

Catch statistics

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

Species	2003	1998-2002			Weekly average, 2003
		Average	Minimum	Maximum	
Yellowfin	325,000	260,000	208,000	321,000	8,000
Skipjack	180,200	149,000	88,000	220,000	5,000
Bigeye	23,100	36,000	22,000	62,000	<1,000

Summaries of the preliminary estimated retained catches, by flag of vessel, are shown in Table 4.

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 day's fishing (CPDFs), by purse seiners, of yellowfin (Table 5), skipjack (Table 6), and bigeye (Table 7) in the EPO during the first two quarters of 2003 and the corresponding periods of 1998-2002, in metric tons, were:

Species	Region	2003	1998-2002		
			Average	Minimum	Maximum
Yellowfin	N of 5° N	26.1	20.0	14.6	30.5
	S of 5° N	6.9	7.8	3.8	12.3
Skipjack	N of 5° N	1.9	2.1	0.9	3.7
	S of 5° N	14.4	11.6	5.8	22.7
Bigeye	EPO	1.6	2.8	1.4	4.9

There was almost no effort by pole-and-line vessels, and there were virtually no catches of yellowfin, skipjack, or bigeye by these vessels, during the first and second quarters of 2003.

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 second 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 second quarter of 2003 and the second shows the second-quarter catches for the current year and the previous five years. There were 242 wells sampled during the second quarter of 2003. No samples were taken from pole-and-line vessels during the second quarter.

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 242 wells sampled, 193 contained yellowfin. The estimated size compositions of these fish are shown in Figure 2a. The catches of yellowfin during the second quarter of 2003 remained high in dolphin sets in the North and Inshore areas, where some of the largest fish were encountered. The largest fish, on average, were caught in the dolphin fishery of the South. A significant proportion of the catch was taken in floating-object sets in the Inshore area. Two distinct modes, one between 40 and 60 cm and the other between 80 and 120 cm, were present in all of the floating-object fisheries. The majority of the yellowfin caught in unassociated sets were between 60 and 80 cm. A mode of larger fish between 120 and 160 cm was present in all of the dolphin fisheries.

The estimated size compositions of the yellowfin caught by all fisheries combined during the second quarter of 1998-2003 are shown in Figure 2b. The average weight of yellowfin caught during the second quarter of 2003, 9.3 kg, was the lowest since 1999, due to the large numbers of small fish caught in both of those years.

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 242 wells sampled, 131 contained skipjack. The estimated size compositions of these fish are shown in Figure 3a. The greatest catches of skipjack during the first quarter were taken in the Inshore floating-object fishery and the unassociated fishery in the South. During the second quarter large amounts of skipjack were caught in three of the four floating-object fisheries, the exception being that of the Equatorial area. The distinct modes of fish between about 30 and 50 cm that were present in the major fishing areas during 2002 persisted in most of the floating-object fisheries and in the unassociated fisheries during the second quarter of 2003, but had shifted about 10 cm to the right as the fish had grown. Negligible amounts of skipjack (less than 200 metric tons (t)) were taken in unassociated sets in the North area.

The estimated size compositions of the skipjack caught by all fisheries combined during the second quarter of 1998-2003 are shown in Figure 3b. The mode of fish between 40 and 65 cm described above is clear in the graphs for the second quarters of 2002 and 2003.

There are seven surface fisheries for bigeye defined for stock assessments: four floating-object, one unassociated school, one dolphin, and one pole-and-line (Figure 1). The last three fisheries include all 13 sampling areas. Of the 242 wells sampled, 41 contained bigeye. The

estimated size compositions of these fish are shown in Figure 4a. The majority of the catch of bigeye was taken in floating-object sets in the South, and most of these fish were between 40 and 90 cm. Appreciable amounts were also caught in the North and Equatorial floating-object fisheries. Negligible amounts of bigeye were caught in the Inshore floating-object fisheries and in sets on unassociated schools (less than 100 t each). There were no recorded catches of bigeye in dolphin sets.

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

The estimated retained catch of bigeye less than 60 cm in length during the first half of 2003 was 3,234 t, or about 26 percent of the estimated total catch of bigeye. The corresponding amounts for the first halves of 1998-2002 ranged from 1,990 to 8,441 t.

Observer program

Coverage

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

In 2003 the observer programs of the European Union, Mexico, and Venezuela 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 224 fishing trips aboard purse seiners covered by that program during the third quarter of 2003. Preliminary coverage

data for these vessels during the quarter are shown in Table 8.

Training

There were no IATTC observer training courses held during the third quarter of 2003.

RESEARCH

Tuna tagging

Bigeye tuna tagging project

The IATTC has conducted three bigeye tuna tagging cruises in the EPO during March to May of 2000, 2002, and 2003, utilizing a chartered live-bait pole-and-line tuna fishing vessel. The primary objective has been to tag and release, using conventional plastic dart tags, large numbers of smaller bigeye tuna (<100 cm) in the area where purse-seine vessels catch bigeye associated with fish-aggregating devices (FADs). The second objective has been to implant archival (electronic data storage) tags in the peritoneal cavities of bigeye tunas. The third objective has been to investigate the fine-scale simultaneous behavior of bigeye and skipjack tunas associated with floating objects, through sonic tracking, coupled with echosounder and sonar imaging.

Some results of the bigeye tuna tagging project from the tagging cruise of 2000 are available in the IATTC Annual Report for 2001 and Fishery Bulletin of the U.S. National Marine Fisheries Service, Vol. 100, No. 4, pages 765-788, and some results for the tagging cruise of 2002 are available in the IATTC Quarterly Report for October-December 2002.

The numbers of tag releases and returns, by species and tag type, for the tagging cruises of 2002 and 2003, are shown in Table 9.

The already high percentages of returns of conventional and archival tags from the bigeye and yellowfin released in 2003 are attributable to recaptures by purse-seine vessels of 1,311 bigeye and 139 yellowfin with conventional tags, and 28 bigeye and 3 yellowfin with archival tags, associated with the Tropical Atmosphere-Ocean (TAO) buoys moored at 2°S-95°W and 2°N-95°W after about two and four weeks at liberty, respectively. In addition, in 2003 10 bigeye with archival tags were recovered by the tagging vessel at the 2°S-95ºW TAO buoy; the tags were redeployed in other bigeye after downloading the data.

The first draft of a manuscript describing the horizontal and vertical movements of bigeye and skipjack tunas within large multi-species aggregations associated with moored buoys or a drifting vessel, based on data from ultrasonic telemetry and archival tags, along with sonar imaging, has been completed. This research, conducted during the 2002 and 2003 tagging cruises, consisted of four experiments in which pairs of skipjack and/or bigeye with implanted acoustic or archival tags were monitored concurrently.

Yellowfin tuna tagging project

The IATTC conducted a yellowfin tuna-tagging cruise in October 2002 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. Further information regarding this cruise is available in the IATTC Quarterly Report for October-December 2002.

The numbers of releases, and the numbers and percentages of returns as of the end of September 2003, are as follows:

Tag type	Released		Returned	
	Location	Number	Number	Percent
Conventional	NW of Magdalena Bay	245	43	17.6
Conventional	Alijos Rocks	9	5	55.6
Archival	NW of Magdalena Bay	25	11	44.0
Pop-up archival transmitting (PAT)	Alijos Rocks	2	2	100.0

One fish with conventional tags was recaptured at Guadalupe Island, 341 miles north of its release location, after 341 days at liberty. Another fish with conventional tags was recaptured in association with common dolphins just 19 miles from the release location, after 329 days at liberty.

The time at liberty for the fish with archival tags has ranged from 9 to 302 days. Four of these were at liberty for about 10 months.

The movement path for a fish released with an archival tag that was at liberty for 287 days is shown in Figure 5. It remained within the general area of release west of Magdalena Bay for about two months before moving in a southerly direction when the sea-surface temperatures (SSTs) fell below 20°C, apparently to remain within its preferred thermal habitat. Its vertical movements for about one week after release are shown in Figure 6a. The fish remained primarily within the mixed layer ($\geq$20°C) above 50 m, and exhibited diel oscillatory behavior, with slightly shallower depths at night than during the day. Once the fish moved away from the influence of bathymetric features, such as banks and seamounts, its behavior changed dramatically, as shown in Figure 6b. It began to demonstrate continuous diving behavior from the bottom of the mixed layer (50 to 60 m) to about 200 to 250 m, from dawn until dusk, for several months, apparently as part of its foraging strategy. Previous observations from short-term ultrasonic telemetry studies have indicated that yellowfin remained primarily within the mixed layer, aside from occasional forays below the thermocline. The behavior shown in Figure 6b is similar to that from the depth records one week prior to recapture of this fish in association with spotted dolphins, and thus may be indicative of the behavior of yellowfin when associated with dolphins. With the northward seasonal shift in the 20°C isotherm in June of 2003 the fish began to move northward from its most southern location near the Revillagigedo Islands. It was recaptured 176 miles south-southeast of the release location on July 27, 2003.

Bluefin tuna tagging

On July 24-28, 2003, 57 bluefin were tagged with IATTC conventional tags by personnel of the Monterey Bay Aquarium (MBA) aboard the sport-fishing vessel *Shogun*, which had been chartered by the MBA for various purposes. The tagging took place at or near 29°15'N-117°30'W. Fifty-six of the fish were between 76 and 98 in length, and the other was 148 cm long.

One bluefin tagged with IATTC conventional tags by personnel of the Monterey Bay Aquarium at 28°17'N-116°47'W on July 9, 1999, was recaptured by a Japanese longline vessel at 33°54'N-142°44'E on April 27, 2003.

Two bluefin tagged off Japan by personnel of the Kochi Prefectural Fisheries Experimental Station have recently been recaptured in the EPO. Both were released off Nakatosa, Kochi Prefecture, in July 2001. One was recaptured by a sport fisherman off Baja California on July 29, 2003. The other was found on a fish in a holding pen in northern Mexico. The precise location and date of recapture are not known, but examination of logbook data for vessels that delivered fish to the pens before the tagged fish was found will enable the staff to establish a range of locations and dates of recapture of the fish.

Early life history studies

Yellowfin broodstock

The yellowfin broodstock in Tank 1 (1,362,000 L) at the Achotines Laboratory spawned nearly daily during the quarter. Short interruptions in spawning occurred during August 20-24 and September 20-24. Spawning occurred as early as 8:30 p.m. and as late as 10:30 p.m. The water temperatures in the tank ranged from 27.4° to 28.6°C. The numbers of eggs collected after each spawning event ranged from about 14,000 to 1,153,000.

In late July 18 archival-tagged yellowfin (5-8 kg) were transferred from Tank 2 to Tank 1 to supplement the broodstock population. During the quarter five fish died in Tank 1 from striking the tank wall, including one 49-kg female, one 48-kg male, and three 4- to 10-kg archival-tagged males. At the end of the quarter there were 21 fish in three size groups in Tank 1, including three 98- to 105-kg fish, three 40- to 60-kg fish, and 15 7- to 11-kg fish.

Efforts to capture live yellowfin to rebuild the reserve group of yellowfin in Tank 2 were conducted. By the end of the quarter four 2- to 7-kg yellowfin had been captured and transported to the Laboratory. Capture efforts will continue during the fourth quarter.

Rearing of yellowfin eggs, larvae, and juveniles

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

During 2001 and 2002 several experiments were conducted to compare the effects of probiotics (beneficial bacteria) on the survival of yellowfin larvae. The results of those experiments were inconclusive, so similar trials were conducted again during the third quarter of

2003. Two 7-day feeding trials were conducted to compare the survival of yellowfin larvae reared with probiotics *versus* those reared without probiotics (control). The results of these trials were mixed. In the first trial the average survival of the larvae treated with probiotics was four times that of the control fish, but the results were highly variable and not statistically significant. In the second trial, the average survival was slightly higher in the control group. One additional probiotic trial is planned for the fourth quarter of 2003.

Several groups of yellowfin larvae were reared beyond juvenile metamorphosis. The longest time that a fish was reared during the quarter was 8 weeks after hatching.

Workshop on rearing pelagics

The University of Miami Center for Sustainable Fisheries (CSF) and the IATTC held a workshop entitled "Physiology and Aquaculture of Pelagics, with Emphasis on Reproduction and Early Developmental Stages of Yellowfin Tuna," which took place from July 21 to August 2, 2003. The organizers and primary instructors were Dr. Daniel Benetti (CSF), Dr. Daniel Margulies (IATTC), and Mr. Vernon P. Scholey (IATTC). The participants were Dr. Harry Ako of the University of Hawaii, Mr. Mark Drawbridge and Ms. Paula Sylvia of Hubbs Sea World Research Institute, San Diego, California, and Dr. William Hawkins of the Gulf Coast Research Laboratory, Ocean Springs, Mississippi. The workshop included lectures and daily laboratory presentations on methods for spawning and rearing tropical pelagic species, with special emphasis on rearing of yellowfin tuna. A fee for the participants covered the expenses of putting on the workshop. Mr. Amado Cano of the Dirección General de Recursos Marinos de Panamá and several members of the Achotines Laboratory staff also participated in portions of the workshop.

Studies of snappers

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

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

Twenty-nine snappers, averaging 1.7 kg, that had been reared at the Achotines Laboratory from eggs to mature adults, were maintained in Tank 4 during the quarter. These fish had hatched in October 1998 from eggs obtained from the original snapper broodstock that was established in 1996.

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 (CSF), University of Miami, is

funding these studies. In support of this study, considerable effort to capture sailfish for holding at the Achotines Laboratory took place in July. Two sport-fishing boats, the 9-m *Jenny Lee*, owned by Robert Novey, and the 13-m *Picaflor*, owned by John and Justin Richardson, were used in those efforts. The other participants included Tim Choate, a billfishing expert, Dr. Daniel Benetti of the CSF, Patrick Rice, a graduate student at the CSF, and several IATTC scientists. During July six sailfish, ranging in weight from 24 to 50 kg, were captured and returned alive to the Achotines Laboratory, utilizing several different transport techniques. Unfortunately, none of the fish recovered from the stress of capture and transfer, and all of them died within 2 hours after being placed in the holding tank. Efforts will continue during the fourth quarter to capture and transport smaller sailfish (<25 kg) to the Achotines Laboratory.

Visitors at the Achotines Laboratory

Mr. Matt Hardy of Aqua-Terra Farms, Maui, Hawaii, visited the Achotines Laboratory from July 6 to 10, 2003. During his stay he studied the techniques and equipment used for yellowfin egg and larval production to determine the feasibility of using such techniques for tuna production on a commercial scale.

Administrative personnel from Smithsonian Tropical Research Institute made a familiarization trip to the Achotines Laboratory on August 14-15, 2003. During their stay Ms. Maria de los Angeles Leone, Ms. Inez Campbell, Ms. Giselle Didier, Mr. José Ramón Perurena, and Ms. Xenia Saavedra were given a tour of the Achotines Laboratory and an explanation of the facilities available to visiting scientists.

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. Each of the four El Niño events during the 1969-1983 period was followed by greater-than-average recruitment of yellowfin in the eastern Pacific Ocean two years later (Japan. Soc. Fish. Ocean., Bull., 53 (1): 77-80), and IATTC staff members are currently studying data for more recent years to see if this relationship has persisted and to see if it applies to skipjack and/or bigeye.

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. The NOI* and SOI* values are both negative during El Niño events and positive during anti-El Niño events.

The band of cool water that extended westward from the coast of South America along the equator during the second quarter of 2003 was virtually absent during the third quarter. All that remained of it in September was a small area of cool water off Peru. A few small, scattered areas of warm water appeared off North America and far offshore south of the Equator during that month (Figure 7). The data in Table 10, for the most part, indicate that conditions were close to normal during the third quarter of 2003, although the SSTs were somewhat below normal along the coast of South America between the equator and 10°S. According to the Climate Diagnostics Bulletin of the U.S. National Weather Service for September 2003, "a majority of the statistical and coupled-model forecasts indicate near-average … conditions in the tropical Pacific … through the [northern hemisphere] winter [of] 2003-2004 … However, over the past few months there has been a trend in the suite of forecasts toward somewhat warmer conditions, consistent with observations. Thus, it is likely that slightly warmer-than-average conditions will persist through the Northern Hemisphere winter of 2003-2004."

GEAR PROGRAM

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

One AIDCP seminar for fishermen was conducted by staff members of the Venezuelan national observer program in Caracas, Venezuela, on August 8, 2003. Five fishermen participated in the seminar.

PUBLICATION

Hall, Martín A., Marcela Campa, and Martha Gómez. 2003. Solving the tuna-dolphin problem in the eastern Pacific purse-seine fishery. *In* Borgese, Elizabeth Mann, Aldo Chircop, and Moira McConnell (editors), Ocean Yearbook 17, University of Chicago Press: 60-92.

INTER-AGENCY COOPERATION

Drs. Richard B. Deriso and Mark N. Maunder of the IATTC and Dr. George Sugihara of Scripps Institution of Oceanography (SIO) began teaching a course on ecological modeling at SIO on September 25, 2003. This course describes the development and application of ecological models, with a focus on fitting models to data, population dynamics, and providing results that are useful for management.

ADMINISTRATION

Mr. Simon D. Hoyle, a graduate of the University of Auckland, joined the IATTC staff on July 28, 2003, for a two-year period. He is working with Dr. Mark N. Maunder on modeling protected species, including dolphins and albatross.

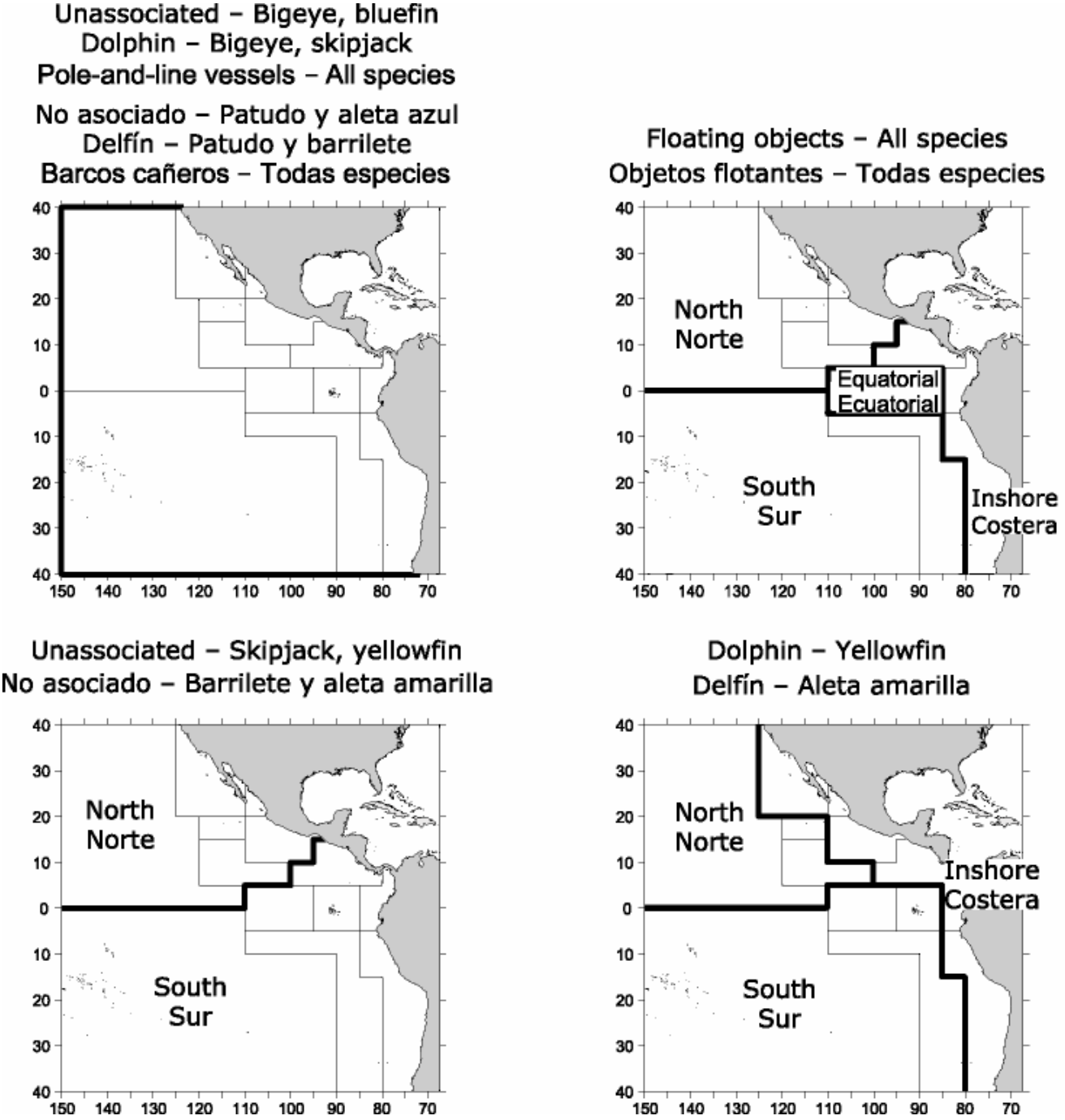

FIGURE 1. Spatial extents of the fisheries defined by the IATTC staff for stock assessment of yellowfin, skipjack, and bigeye in the EPO. The thin lines indicate the boundaries of the 13 length-frequency sampling areas, and the bold lines the boundaries of the fisheries.
FIGURA 1. Extensión especial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

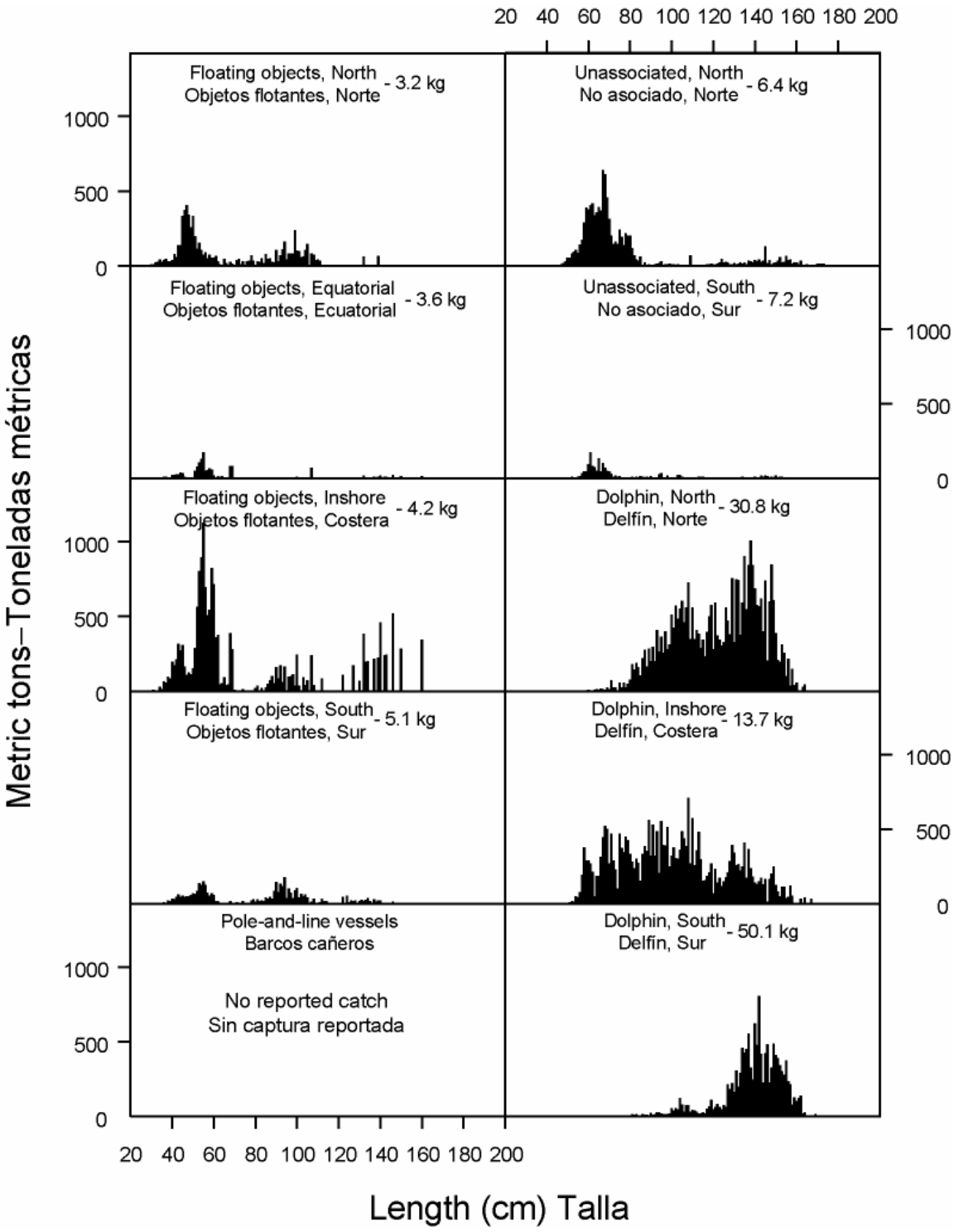

FIGURE 2a. Estimated size compositions of the yellowfin caught in each fishery of the EPO during the second quarter of 2003. The average weights of the fish in the samples are given at the tops of the panels.

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

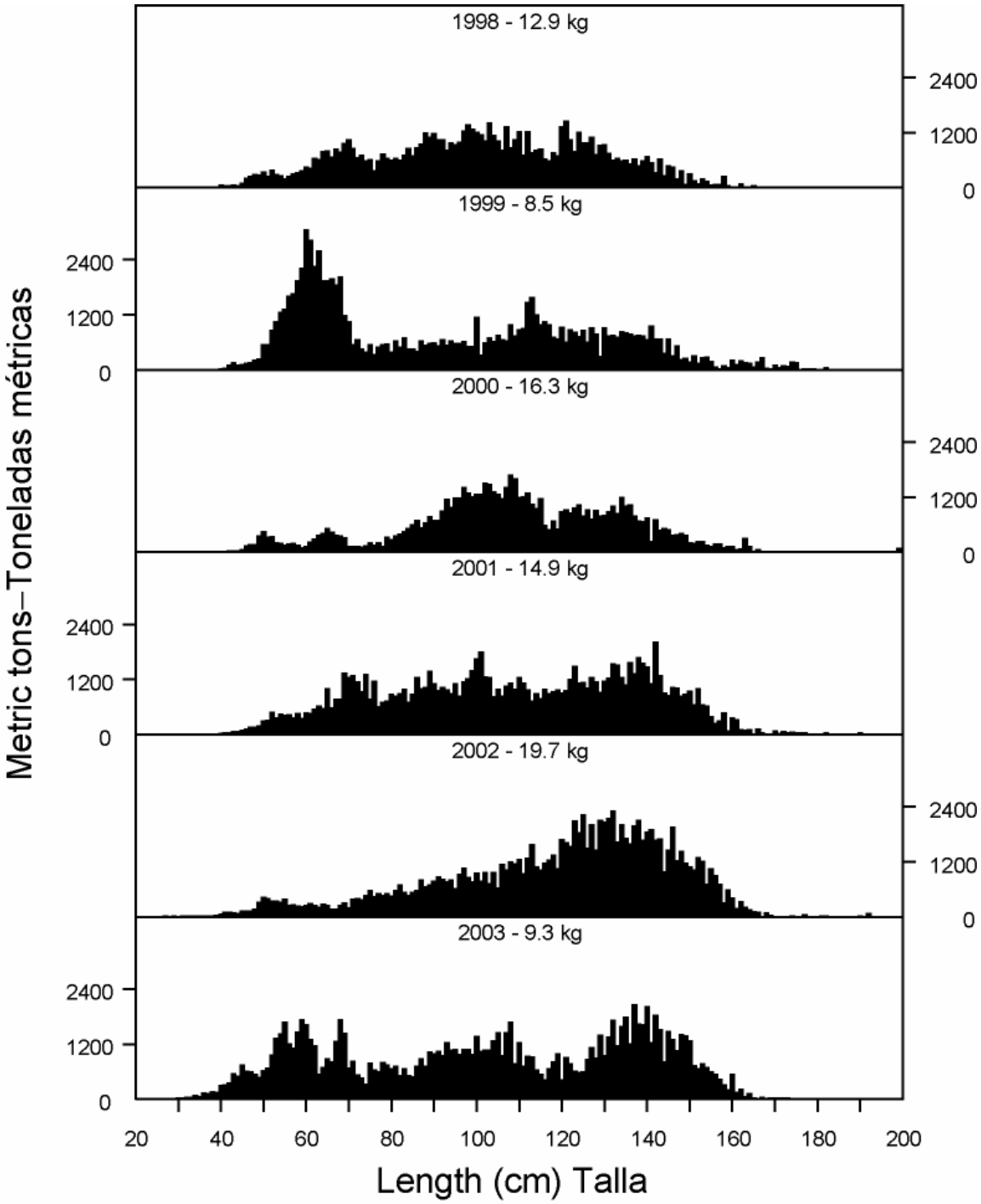

FIGURE 2b. Estimated size compositions of the yellowfin caught in the EPO during the second quarter of 1998-2003. The average weights of the fish in the samples are given at the tops of the panels.

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

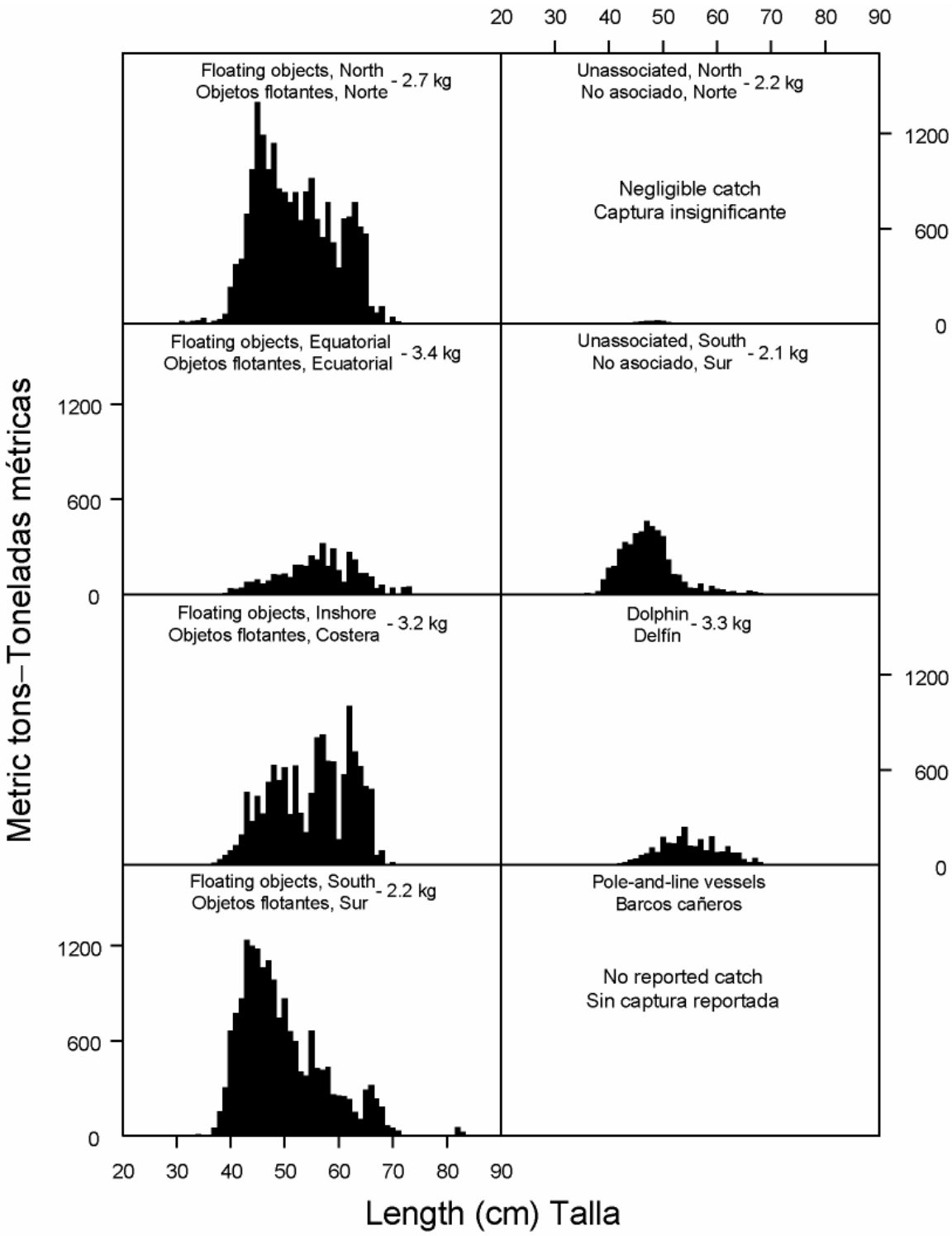

FIGURE 3a. Estimated size compositions of the skipjack caught in each fishery of the EPO during the second quarter of 2003. The average weights of the fish in the samples are given at the tops of the panels.

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

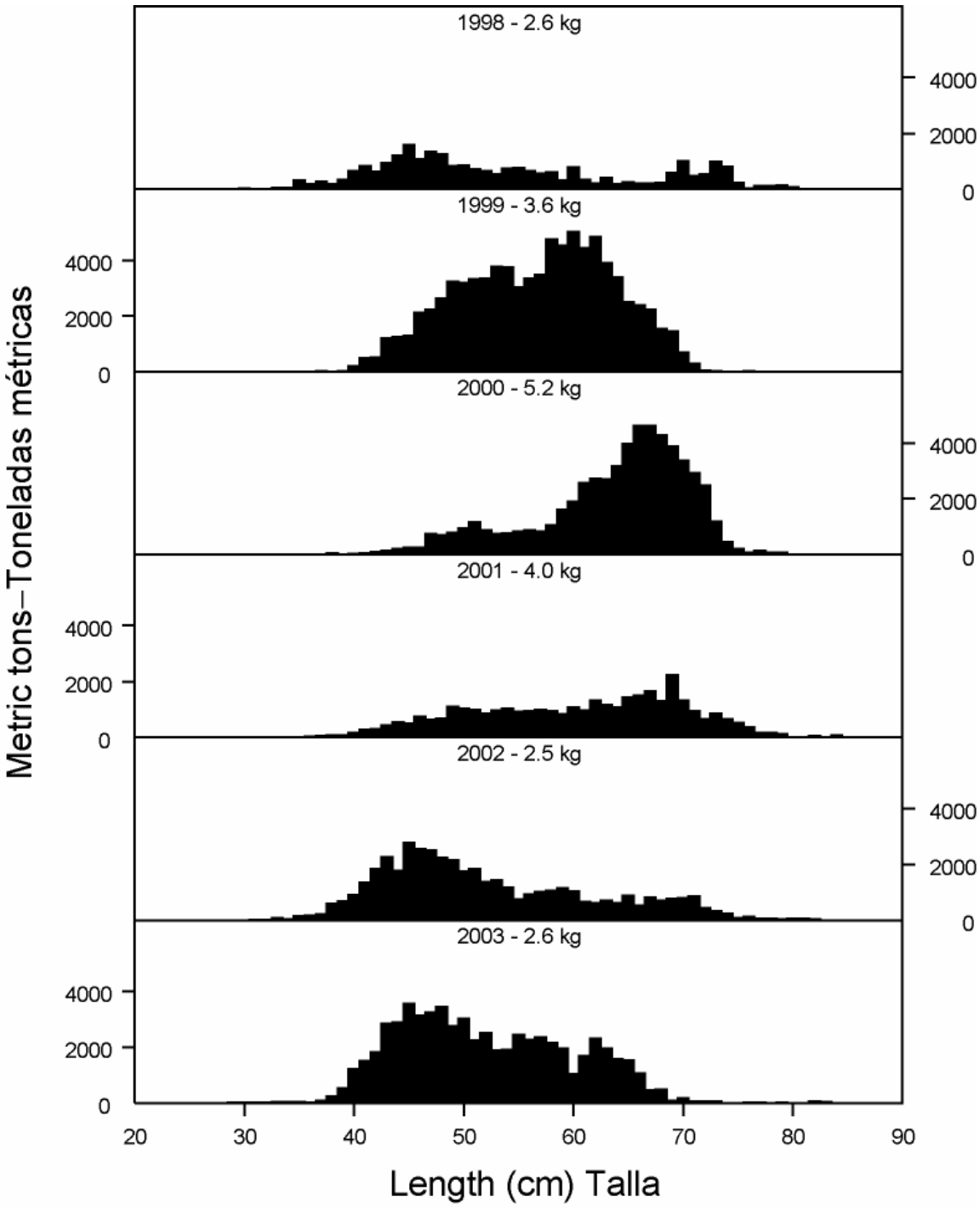

FIGURE 3b. Estimated size compositions of the skipjack caught in the EPO during the second quarter of 1998-2003. The average weights of the fish in the samples are given at the tops of the panels.

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

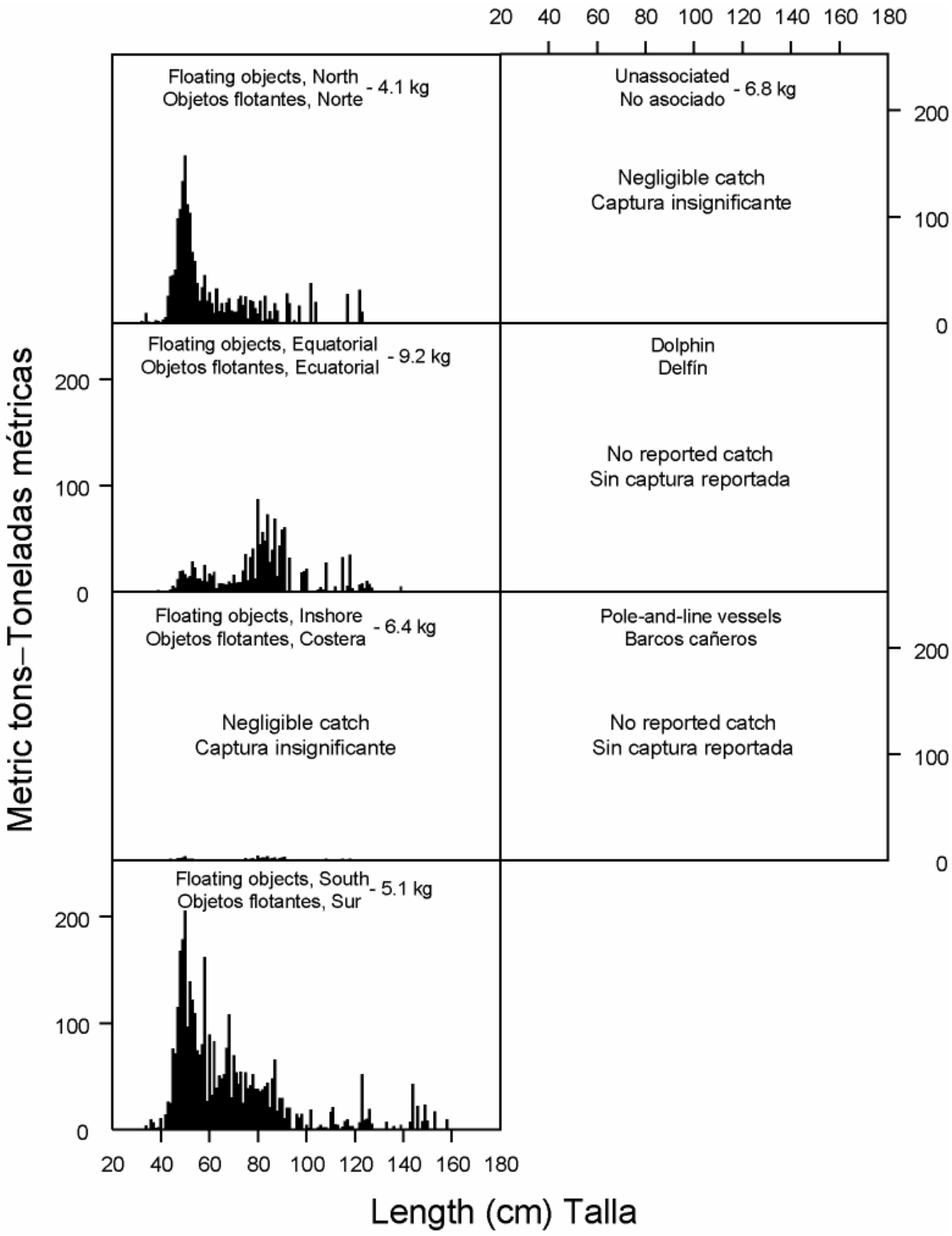

FIGURE 4a. Estimated size compositions of the bigeye caught in each fishery of the EPO during the second quarter of 2003. The average weights of the fish in the samples are given at the tops of the panels.

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

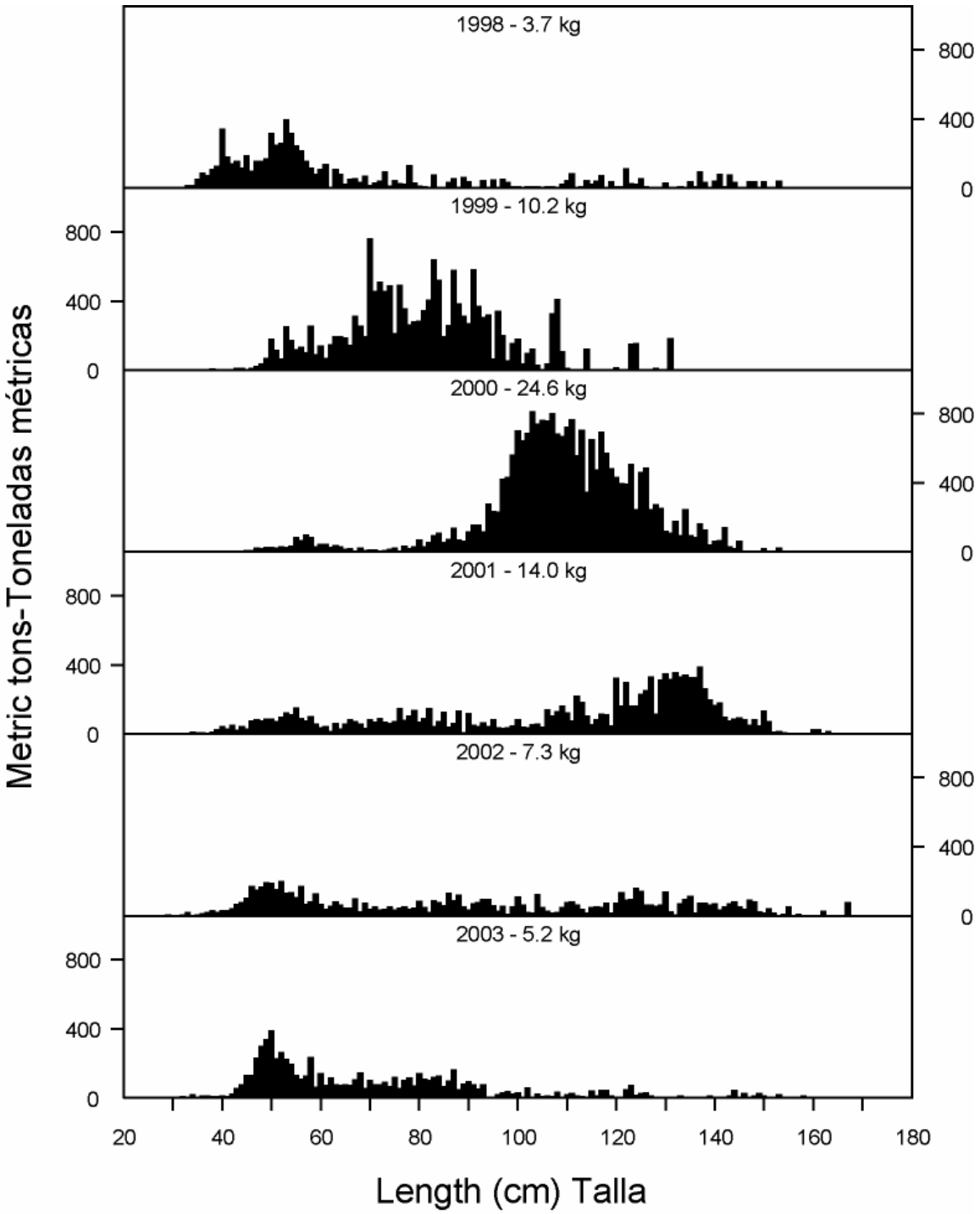

FIGURE 4b. Estimated size compositions of the bigeye caught in the EPO during the second quarter of 1998-2003. The average weights of the fish in the samples are given at the tops of the panels.

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

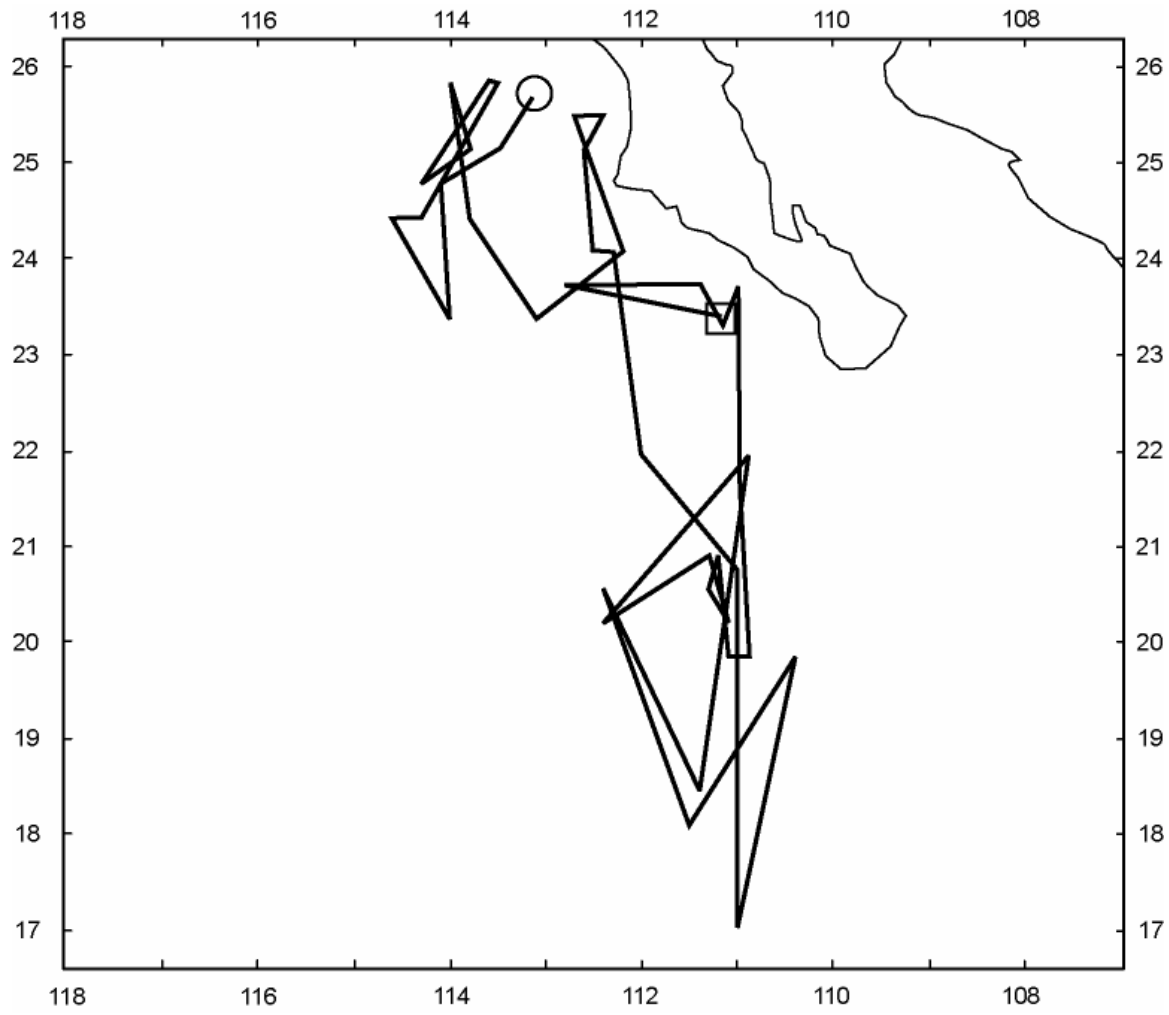

FIGURE 5. The movement path of a yellowfin at liberty for 287 days, derived from filtered geolocation estimates from an archival tag. The lengths of this fish were 94 cm at release and 125 cm at recapture. The locations of release and recapture are indicated by a circle and a square, respectively.

FIGURA 5. Ruta de desplazamiento de un aleta amarilla en libertad 287 días, derivada de estimaciones filtradas de ubicación geográfica de una marca archivadora. El pez midió 94 cm al ser liberado y 125 cm al ser recapturado. El círculo y el cuadro indican los puntos de liberación y recaptura, respectivamente.

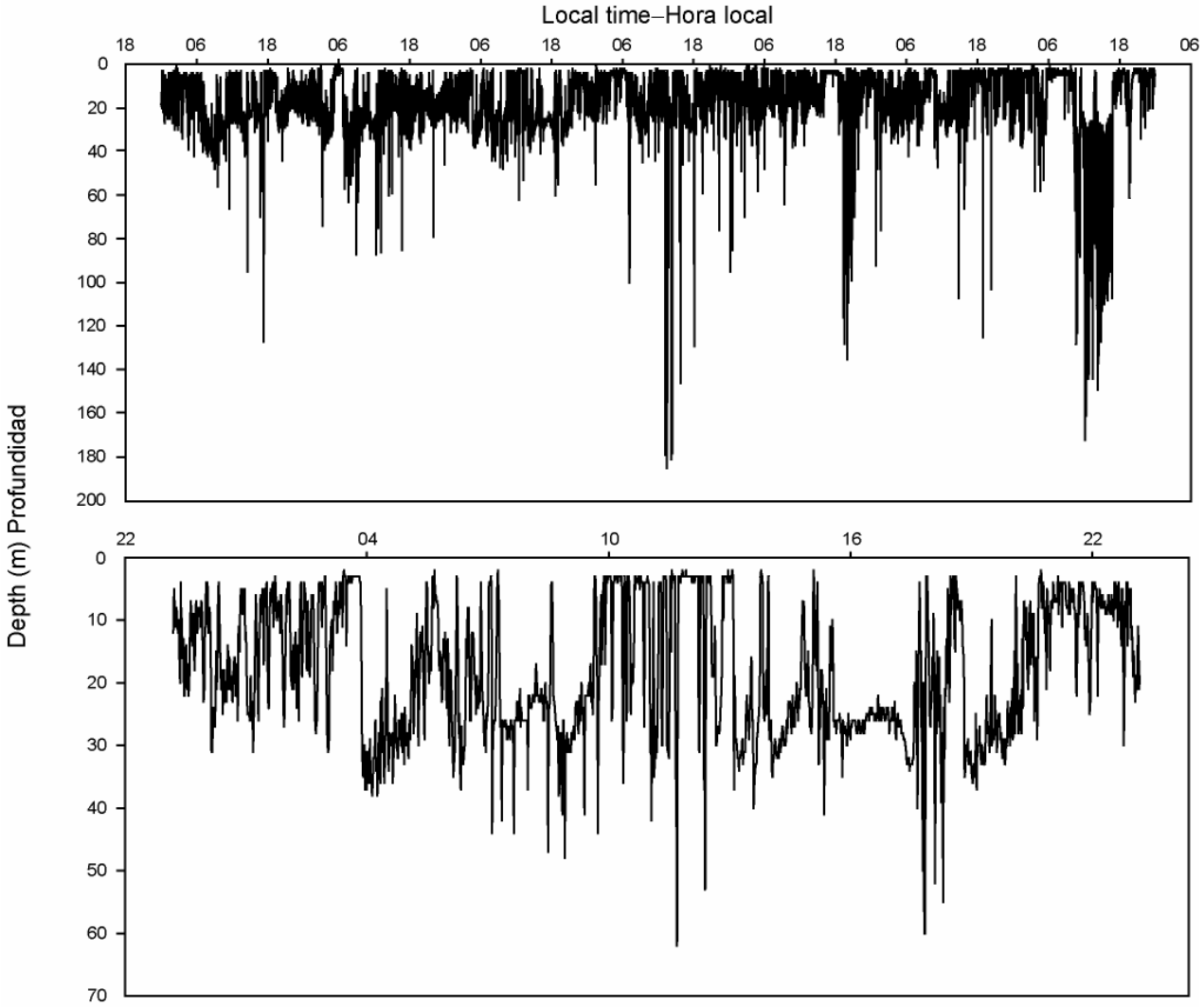

FIGURE 6a. Depth records for the yellowfin in Figure 5. The approximate location was 25°N-113°W. (upper panel) October 18-24, 2002. (lower panel) October 20, 2002.
FIGURA 6a. Registros de profundidad del aleta amarilla en la Figura 5. La posición aproximada fue 25°N-113°O. (panel superior) 18-24 de octubre de 2002. (panel inferior) 20 de octubre de 2002.

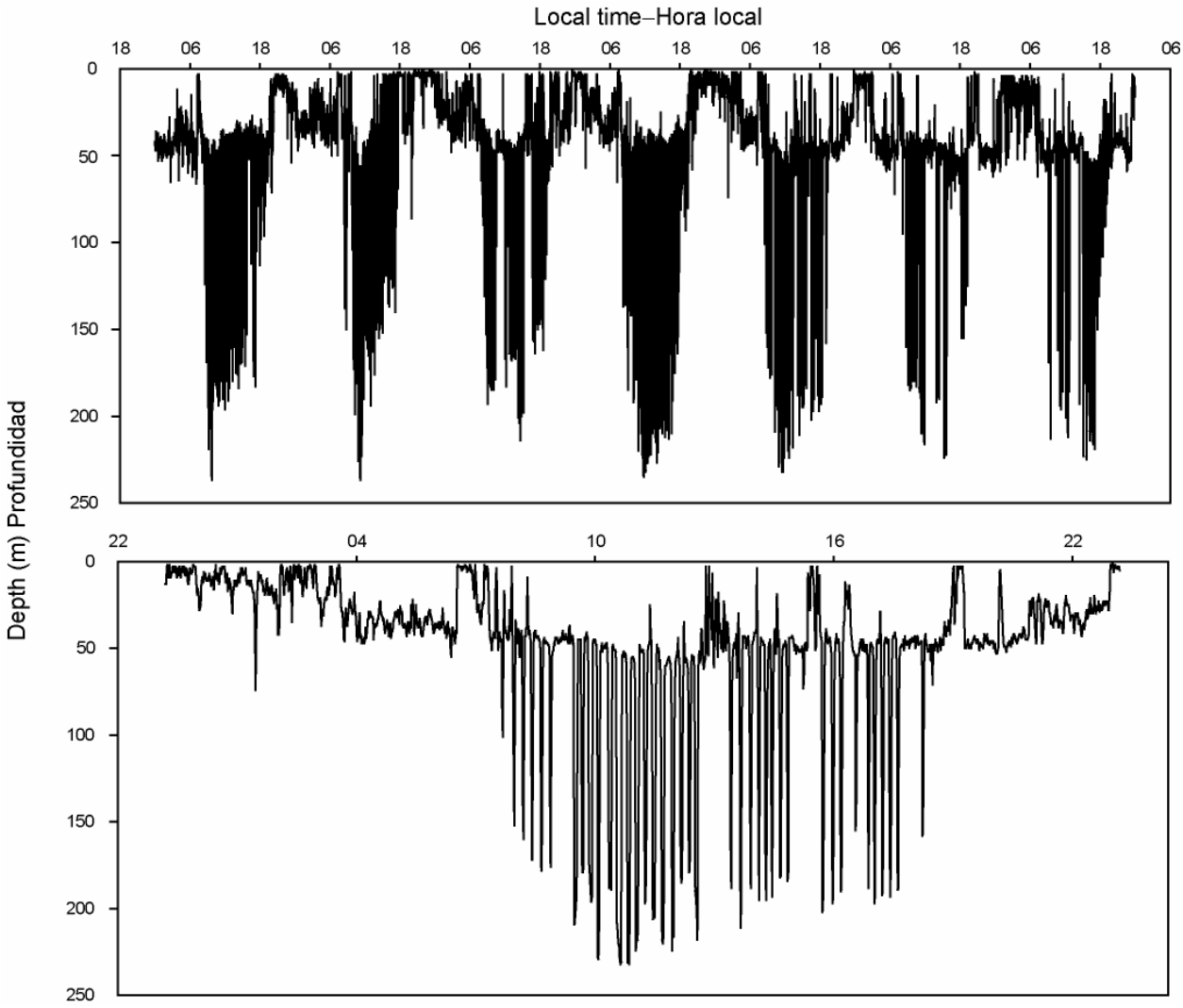

FIGURE 6b. Depth records for the yellowfin in Figure 5. The approximate location was 20°N-112°W. (upper panel) February 19-25, 2003. (lower panel) February 23, 2003.
FIGURA 6b. Registros de profundidad del aleta amarilla en la Figura 5. La posición aproximada fue 20°N-112°O. (panel superior) (19-25 de febrero de 2003. (panel inferior) 23 de febrero de 2003.

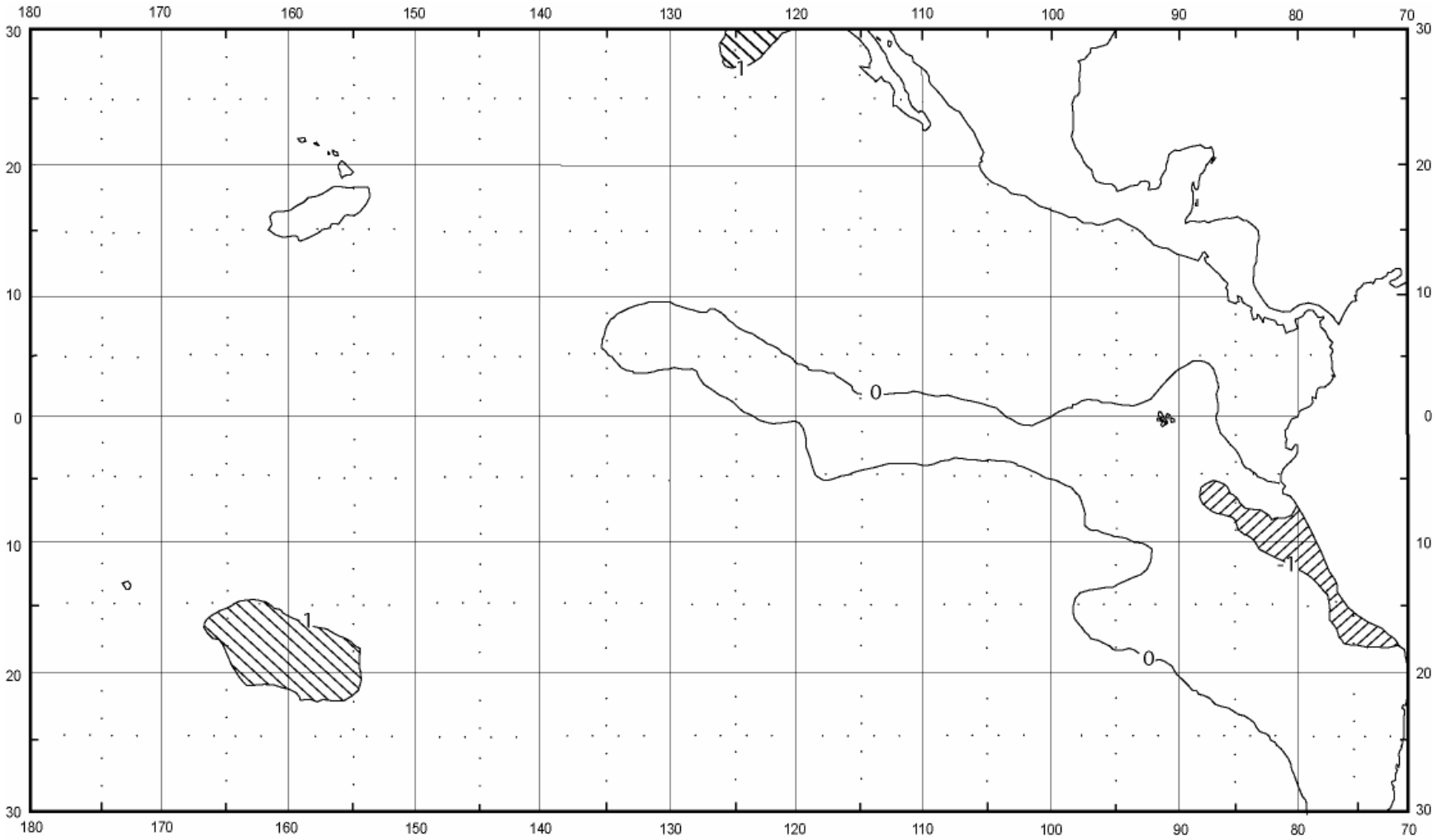

FIGURE 7. Sea-surface temperature (SST) anomalies (departures from long-term normals) for September 2003, based on data from fishing boats and other types of commercial vessels.
FIGURA 7. Anomalías (variaciones de los niveles normales a largo plazo) de la temperatura superficial del mar (TSM) en septiembre de 2003, 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 2003 by flag, gear, and size class. Each vessel is included in the totals for each flag under which it fished during the year, but is included only once in the fleet total. Therefore the totals for the fleet may not equal the sums of the individual flag entries. PS = purse seine; LP = pole-and-line.

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

Flag Bandera	Gear Arte	Size class—Clase de arqueo							Capacity Capacidad
		1	2	3	4	5	6	Total	
					Number—Número				
Belize—Belice	PS	-	-	1	-	-	1	2	695
Bolivia	PS	-	-	2	1	-	7	10	7,910
Colombia	PS	-	-	1	1	2	5	9	7,259
Ecuador	PS	-	7	11	12	9	38	77	50.328
España—Spain	PS	-	-	-	-	-	5	5	12,177
Guatemala	PS	-	-	-	-	-	4	4	7,640
Honduras	PS	-	-	-	-	-	2	2	1,798
México	PS	-	-	5	6	11	38	60	50,983
	LP	-	-	5	-	-	-	5	745
Panamá	PS	-	-		2	-	12	14	16,151
Perú	PS	-	-	-	-	-	2	2	2,018
El Salvador	PS	-	-	-	-	-	3	3	5,377
USA—EE.UU.	PS	-	-	2	-	-	6	8	8,485
Venezuela	PS	-	-	-	-	-	25	25	32,699
Vanuatu	PS	-	-	-	-	-	6	6	7,467
All flags— Todas banderas	PS	-	7	21	22	21	151	222	
	LP	-	-	5	-	-	-	5	
	PS + LP	-	7	26	22	21	151	227	
					Capacity—Capacidad				
All flags— Todas banderas	PS	-	758	3,853	6,136	8,830	188,314	207,891	
	LP	-	-	745	-	-	-	745	
	PS + LP	-	758	4,598	6,136	8,830	188,314	208,636	

TABLE 2. Eastern Pacific Ocean surface fleet, by flag, vessel name, gear type (PS = purse seine; LP = pole-and-line), and cubic meters of fish-carrying capacity, as of September 28, 2003.
TABLA 2. La flota atunera de superficie del Océano Pacífico oriental, por bandera, nombre del barco, tipo de arte (PS = cerquero; LP = cañero), y metros cúbicos de capacidad de acarreo de pescado, hasta el 28 de septiembre de 2003.

Flag and vessel name	Gear type	Capacity	Flag and vessel name	Gear type	Capacity
Bandera y nombre de buque	**Tipe de arte**	**Capacidad**	**Bandera y nombre de buque**	**Tipe de arte**	**Capacidad**
Belize—Belice			**Ecuador (cont.)**		
Caribbean Star No. 31	PS	209	*Fiorella L*	PS	390
			Gabriela A	PS	323
Bolivia			*Gloria A*	PS	543
Amanda S	PS	1268	*Ile Aux Moines*	PS	750
Blue Tuna	PS	1012	*Indico*	PS	267
Cabo De Hornos	PS	680	*Ingalapagos*	PS	285
Don Alvaro	PS	180	*Intrepido*	PS	85
Don Luis	PS	180	*Isabel Victoria V*	PS	307
Gold Coast	PS	1194	*José Antonio*	PS	142
Mar Cantabrico	PS	222	*Joselito*	PS	91
Nazca	PS	1414	*Julia D*	PS	2759
Sea Gem	PS	1274	*Killa*	PS	412
			Lizi	PS	1038
Colombia			*Ljbuica M.*	PS	275
American Eagle	PS	1275	*Lucia T*	PS	738
El Dorado	PS	382	*Lucy*	PS	245
El Rey	PS	1168	*Malula*	PS	849
Enterprise	PS	1272	*Manuel Ignacio F*	PS	644
Grenadier	PS	1176	*Maria*	PS	168
Patricia Lynn	PS	270	*Maria Del Carmen*	PS	320
Sandra C	PS	1175	*Maria Isabel*	PS	276
			Mariajosé	PS	1013
Ecuador			*Mariella*	PS	1041
Alize	PS	688	*Medjugorje*	PS	843
Amalis	PS	217	*Milagros A*	PS	1550
Atun IV	PS	809	*Miry Ann D*	PS	497
Aurora	PS	490	*Monte Cristi*	PS	1232
Balbina	PS	217	*North Queen*	PS	257
Betty C	PS	1010	*Patricia*	PS	962
Betty Elizabeth	PS	290	*Ramoncho*	PS	96
Cap. Berny B.	PS	1285	*Roberto A*	PS	323
Cesar V	PS	335	*Roberto M*	PS	1161
Charo	PS	2023	*Rocio*	PS	1366
Chasca	PS	249	*Rocio Del Pilar*	PS	191
Diana Maria	PS	154	*Rodolfo X*	PS	662
Dominador	PS	162	*Romeo*	PS	125
Don Antonio	PS	197	*Rosa F*	PS	662
Don Bartolo	PS	495	*San Andres*	PS	1862
Don Mario	PS	552	*San Antonio V*	PS	248
Don Quijote	PS	374	*San Mateo*	PS	1033
Don Santiago	PS	1881	*Saturno*	PS	106
Doña Luz	PS	786	*Southern Queen*	PS	137
Doña Roge	PS	592	*Sun Ranger*	PS	1033
Doña Tula	PS	603	*Tarqui*	PS	459
Drennec	PS	1140	*Ugavi*	PS	1695
Eillen Marie	PS	350	*Via Simoun*	PS	1324
Elizabeth Cinco	PS	1265	*Victor Andres*	PS	115
Elizabeth F	PS	738	*Western Pacific I*	PS	274
Emperador	PS	82	*Yelisava*	PS	855
Fernandito	PS	147	*Yolanda L*	PS	1168

TABLE 2. (continued)
TABLA 2. (continuación)

Flag and vessel name	Gear type	Capacity	Flag and vessel name	Gear type	Capacity
Bandera y nombre de buque	**Tipe de arte**	**Capacidad**	**Bandera y nombre de buque**	**Tipe de arte**	**Capacidad**
España—Spain			**México (cont.)**		
Albacora	PS	3318	*José Gerardo*	PS	351
Albacora Quince	PS	1900	*Juan Pablo I*	PS	300
Albacora Uno	PS	2800	*Juan Pablo II*	PS	250
Aurora B.	PS	2079	*Judith I*	PS	809
Rosita C	PS	2080	*Lupe Del Mar*	PS	1298
			Manolo	PS	300
Guatemala			*Maranatha*	LP	125
Albacora Catorce	PS	1880	*Maria Antonieta*	PS	1118
Albacora Doce	PS	1880	*María Beatriz*	PS	829
Sant Yago Dos	PS	1940	*Maria Del Mar*	PS	1242
Sant Yago Uno	PS	1940	*Maria Fernanda*	PS	1232
			Maria Gabriela	LP	112
Honduras			*María Luisa*	PS	1168
Eastern Pacific	PS	628	*Maria Rosana*	PS	1142
Esthercho	PS	1170	*Maria Veronica*	PS	1232
			Mazatun	PS	1482
México			*Mazcu I*	PS	240
Aguila Descalza	PS	410	*Mazpesca*	PS	410
Ana Maria	LP	188	*Monica*	PS	1311
Ariete	PS	490	*Nair*	PS	1346
Arkos I Chiapas	PS	1348	*Nair II*	PS	1275
Arkos II Chiapas	PS	1348	*Nair III*	PS	240
Atilano Castano	PS	1297	*Oscar I*	PS	135
Atun VI	PS	809	*San José*	PS	220
Atun VIII	PS	751	*San Miguel*	PS	294
Azteca 1	PS	1202	*Tamara*	PS	410
Azteca 10	PS	1627	*Theresa Janene*	PS	1275
Azteca 11	PS	410	*Tizoc*	PS	180
Azteca 12	PS	410	*Tlaloc*	PS	810
Azteca 2	PS	1274	*Tono I*	PS	166
Azteca 3	PS	1524	*Tutankamon*	PS	784
Azteca 4	PS	1278			
Azteca 5	PS	1282	**Panamá**		
Azteca 6	PS	1283	*Capt. Joe Jorge*	PS	1229
Azteca 7	PS	1383	*Cervantes*	PS	775
Azteca 8	PS	1157	*Contadora I*	PS	914
Azteca 9	PS	733	*Don Italo*	PS	486
Buenaventura I	PS	1005	*Geminis*	PS	255
Buenaventura II	PS	1005	*Julie L*	PS	2056
Cabo San Lucas	PS	1478	*La Parrula*	PS	889
Camila	PS	410	*Lucile F*	PS	1583
Cartadedeces	PS	807	*Mary Lynn*	PS	285
Chac Mool	PS	1190	*Panama Tuna*	PS	3300
Delfin V	LP	160	*Raffaello*	PS	1104
Delfin X	LP	160	*Sea King*	PS	1487
Donna Cristina	PS	1282	*Sofia Lynn*	PS	586
Edgar Ivan	PS	316	*Tiuna*	PS	1202
Ensenada	PS	381			
Estado 29	PS	725	**Perú**		
Excalibur	PS	160	*Danielle. D*	PS	1022
Guaymas	PS	359	*Milena*	PS	996

TABLE 2. (continued)
TABLA 2. (continuación)

Flag and vessel name	Gear type	Capacity	Flag and vessel name	Gear type	Capacity
Bandera y nombre de buque	**Tipe de arte**	**Capacidad**	**Bandera y nombre de buque**	**Tipe de arte**	**Capacidad**
El Salvador			**Venezuela (cont.)**		
Montelucia	PS	2550	*Don Abel*	PS	1226
Monteneme	PS	908	*Falcon*	PS	1137
Monterocio	PS	1919	*Jane*	PS	1242
			Judibana	PS	1231
USA—EE.UU.			*La Foca*	PS	1287
Atlantis	PS	1275	*Los Roques*	PS	1262
Bold Adventuress	PS	1593	*Maria Del Mar A*	PS	1784
Cape Elizabeth	PS	1805	*Marinero*	PS	1244
Capt Vincent Gann	PS	1593	*Napoleon*	PS	1250
Connie Jean	*PS*	605	*Orinoco II*	PS	1581
Donna B	PS	170	*Sea Royal*	PS	1488
Sea Scout	PS	169	*Taurus I*	PS	1191
South Seas	PS	1275	*Taurus Tuna*	PS	1175
			Templario	PS	1268
Venezuela			*Ventuari*	PS	1542
Amazonas	PS	1115			
Calypso	PS	1168	**Vanuatu**		
Canaima	PS	1094	*Cape Ferrat*	PS	1561
Carirubana	PS	1137	*Carmen D*	PS	503
Carmela	PS	1241	*Chiara*	PS	803
Caroni II	PS	1438	*Esmeralda C.*	PS	1358
Cayude	PS	1274	*Mirelur*	PS	1360
Conquista	PS	1168	*Ugavi Dos*	PS	1882
Cuyuni	PS	1573			

TABLE 3. Changes in the IATTC fleet list recorded during the third quarter of 2003. PS = purse seine; LP = pole-and-line.
TABLA 3. Cambios en la flota observada por la CIAT registrados durante el tercero trimestre de 2003. PS = cerquero; LP = cañero.

Vessel name	**Flag**	**Gear**	**Capacity (m^3)**	**Remarks**	
Nombre del buque	**Bandera**	**Arte**	**Capacidad (m^3)**	**Comentarios**	
Vessels added to the fleet—Buques añadidos a la flota					
Re-entries—Reingresos					
				Now—Ahora	
Chorotega	Perú	PS	2759	Ecuador	*Julia D*
Cape Elizabeth	USA	PS	1805	Vanuatu	
Cape Ferrat	Vanuatu	PS	1561		
Calafia	México	PS	220		*San José*
Vizcaino	México	PS	294		*San Miguel*
Sea King	Panamá	PS	1487		
Changes of name or flag—Cambios de nombre o pabellon					
				Now—Ahora	
Genesis I	Panamá	PS	586		*Sofia Lynn*

TABLE 4. Preliminary estimates of the retained catches of tunas in the EPO from January 1 through September 28, 2003, by species and vessel flag, in metric tons.
TABLA 4. Estimaciones preliminares de las capturas retenidas de atunes en el OPO del 1 de enero al 28 de septiembre 2003, por especie y bandera del buque, en toneladas métricas**.**

Flag	Yellowfin	Skipjack	Bigeye	Pacific bluefin	Albacore	Eastern Pacific bonito	Black skipjack	Other[1]	Total	Percentage of total
Bandera	**Aleta amarilla**	**Barrilete**	**Patudo**	**Aleta azul del Pacífico**	**Albacora**	**Bonito del Pacífico oriental**	**Barrilete negro**	**Otras[1]**	**Total**	**Porcentaje del total**
Colombia	17,550	3,171	68	-	-	-	-	-	20,789	3.9
Ecuador	29,924	90,850	10,193	-	-	-	10	23	131,000	24.6
España—Spain	4,173	19,043	3,978	-	-	-	-	-	27,194	5.1
México	137,894	11,216	36	3,206	-	24	199	40	152,615	28.7
Panamá	23,875	7,295	1,539	-	-	-	2	-	32,711	6.1
Venezuela	76,420	6,998	231	-	-	-	-	-	83,649	15.7
Vanuatú	3,293	12,837	2,619	-	-	-	2	-	18,751	3.5
Other—Otros[2]	31,892	28,804	4,419	22	-	2	173	22	65,334	12.3
Total	325,021	180,214	23,083	3,228	-	26	386	85	532,043	

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

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

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

Area	Fishery statistic Estadística de pesca	Year-Año					
		1998	1999	2000	2001	2002	2003[2]
Purse seine—Red de cerco							
North of 5°N	Catch—Captura	83,000	94,300	63,400	80,200	90,900	60,200
Al norte de 5°N	CPDF—CPDP	16.0	15.5	14.6	23.5	30.5	26.1
South of 5°N	Catch—Captura	21,000	23,100	51,000	58,700	31,500	11,900
Al sur de 5°N	CPDF—CPDP	3.8	6.7	9.4	12.3	6.6	6.9
Total	Catch—Captura	104,000	117,400	114,400	138,900	122,400	72,100
	CPDF—CPDP	13.6	13.8	12.3	18.8	24.4	22.9
Annual total Total anual	Catch—Captura	191,900	194,600	195,400	221,600	214,800	

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

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

[2] preliminary—preliminar

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

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

Area	Fishery statistic Estadística de pesca	Year-Año					
		1998	1999	2000	2001	2002	2003[2]
Purse seine—Red de cerco							
North of 5°N	Catch—Captura	4,700	16,000	15,900	7,300	3,400	4,300
Al norte de 5°N	CPDF—CPDP	0.9	2.6	3.7	2.2	1.1	1.9
South of 5°N	Catch—Captura	32,000	77,700	77,600	34,000	38,300	25,100
Al sur de 5°N	CPDF—CPDP	5.8	22.7	14.2	7.1	8.1	14.4
Total	Catch—Captura	36,700	93,700	93,500	41,300	41,700	29,400
	CPDF—CPDP	5.1	19.3	12.4	6.2	7.5	12.6
Annual total Total anual	Catch—Captura	96,500	161,400	121,200	76,000	69,600	

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

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

[2] preliminary—preliminar

TABLE 7. Logged catches and catches per day's fishing[1] (CPDF) of bigeye in the EPO, in metric tons, during the period of January 1-June 30, based on purse-seine vessel logbook information.

TABLA 7. Captura registrada y captura por día de pesca[1] (CPDP) de patudo en el OPO, en toneladas métricas, durante el período de 1 de enero-30 de June, basado en información de los cuadernos de bitácora de buques cerqueros.

Fishery statistic—Estadística de pesca	Year—Año					
	1998	1999	2000	2001	2002	2003[2]
Catch—Captura	8,400	13,300	27,700	14,200	10,500	3,100
CPDF—CPDP	1.4	2.7	4.9	2.9	2.0	1.6
Total annual catch—Captura total anual	18,800	22,200	44,400	29,400	20,600	

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

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

[2] preliminary—preliminar

TABLE 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 third quarter of 2003. The numbers in parentheses indicate cumulative totals for the year.

TABLA 8. Datos preliminares de la cobertura de muestreo de viajes de buques con capacidad más que 363 toneladas métricas por los programas de observadores de la CIAT, Ecuador, México, el Unión Europea, Venezuela, y el Forum Fisheries Agency (FFA) durante el tercero trimestre de 2003. Los números en paréntesis indican totales acumulados para el año.

Flag	Trips		Observed by program								Percent observed	
			IATTC		National		FFA		Total			
Bandera	Viajes		Observado por programa								Porcentaje observado	
			CIAT		Nacional		FFA		Total			
Belize	0	(4)	0	(0)					0	(0)	-	(0.0)
Bolivia	6	(28)	6	(26)					6	(26)	100.0	(92.9)
Colombia	5	(20)	5	(20)					5	(20)	100.0	(100.0)
Ecuador	64	(198)	42	(135)	22	(63)			64	(198)	100.0	(100.0)
España—Spain	8	(24)	5	(14)	3	(10)			8	(24)	100.0	(100.0)
Guatemala	5	(16)	5	(16)					5	(16)	100.0	(100.0)
Honduras	4	(12)	4	(12)					4	(12)	100.0	(100.0)
México	62	(192)	32	(99)	30	(93)			62	(192)	100.0	(100.0)
Panamá	14	(45)	14	(44)	-	(1)[2]			14	(45)	100.0	(100.0)
Perú	2	(7)	2	(7)					2	(7)	100.0	(100.0)
El Salvador	4	(16)	4	(16)					4	(16)	100.0	(100.0)
U.S.A.—EE.UU.	6	(12)	6	(11)			0	(1)	6	(12)	100.0	(100.0)
Venezuela	35	(109)	19	(55)	16	(54)			35	(109)	100.0	(100.0)
Vanuatu	9	(29)	9	(29)					9	(29)	100.0	(100.0)
Total	224	(712)[1]	153	(484)	71	(221)	0	(1)	224	(706)[1]	100.0	(99.2)

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

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

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

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

TABLE 9. Releases and returns of tagged tunas for the experiments initiated in March-May 2002 and March-May 2003.
TABLA 9. Liberaciones y retornos de atunes marcados para los experimentos iniciados en Marzo-Mayo de 2002 y Marzo-Mayo de 2003.

2002

Species	Tag type	Releases	Returns	
			Number	Percent
Especie	**Tipo de marca**	**Liberaciones**	**Retornos**	
			Número	**Porcentaje**
Bigeye—Patudo	Conventional—Convencional	1418	548	38.6
Bigeye—Patudo	Archival—Archivadora	26	7	26.9
Skipjack—Barrilete	Conventional—Convencional	257	32	12.5
Skipjack—Barrilete	Archival—Archivadora	36	1	2.7
Yellowfin—Aleta amarilla	Conventional—Convencional	195	30	15.4

2003

Species	Tag type	Releases	Returns	
			Number	Percent
Especie	**Tipo de marca**	**Liberaciones**	**Retornos**	
			Número	**Porcentaje**
Bigeye—Patudo	Conventional—Convencional	8605	2437	28.3
Bigeye—Patudo	Archival—Archivadora	90	45	50.0
Skipjack—Barrilete	Conventional—Convencional	138	15	10.9
Skipjack—Barrilete	Archival—Archivadora	10	0	0.0
Yellowfin—Aleta amarilla	Conventional—Convencional	863	221	25.6
Yellowfin—Aleta amarilla	Archival—Archivadora	8	3	37.5

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

Month—Mes	4	5	6	7	8	9
SST—TSM, 0°-10°S, 80°-90°W (°C)	24.4 (-1.0)	22.5 (-1.8)	21.6 (-1.4)	20.8 (-1.1)	20.1 (-0.7)	20.0 (-0.5)
SST—TSM, 5°N-5°S, 90°-150°W (°C)	27.2 (-0.3)	26.1 (-0.9)	25.8 (-0.6)	25.8 (0.2)	25.0 (0.1)	25.0 (0.1)
SST—TSM, 5°N-5°S, 120°-170°W (°C)	27.8 (0.1)	27.4 (-0.4)	27.5 (0.0)	27.4 (0.4)	26.9 (0.2)	27.0 (0.3)
SST—TSM, 5°N-5°S, 150W°-160°E (°C)	29.0 (0.6)	28.9 (0.3)	29.1 (0.4)	29.1 (0.5)	29.1 (0.6)	29.0 (0.5)
Thermocline depth—Profundidad de la termoclina, 0°, 80°W (m)	20	30	40	40	40	50
Thermocline depth—Profundidad de la termoclina, 0°, 110°W (m)	40	30	25	50	70	70
Thermocline depth—Profundidad de la termoclina, 0°, 150°W (m)	110	120	140	140	140	130
Thermocline depth—Profundidad de la termoclina, 0°, 180°W (m)	150	160	170	170	170	170
Sea level—Nivel del mar, La Libertad, Ecuador (cm)	223.0 (-7.8)	231.9 (-0.4)	228.1 (-4.8)	237.5 (7.2)	235.2 (7.6)	231.4 (3.5)
Sea level—Nivel del mar, Callao, Perú (cm)	103.1 (-11.4)	106.7 (-6.8)	103.3 (-8.7)	113.6 (3.5)	106.9 (-0.7)	109.9 (3.9)
SOI—IOS	-0.4	-0.6	-1.1	0.2	-0.3	-0.1
SOI*—IOS*	0.16	1.21	-6.29	2.36	-1.22	-2.42
NOI*—ION*	-2.63	-0.76	-2.72	0.29	0.09	-1.55