INTER-AMERICAN TROPICAL TUNA COMMMISSION
COMISIÓN INTERAMERICANA DEL ATÚN TROPICAL

QUARTERLY REPORT—INFORME TRIMESTRAL

October-December 2008—Octubre-Diciembre 2008

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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

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

Editor—Redactor:
William H. Bayliff

INTRODUCTION

The Inter-American Tropical Tuna Commission (IATTC) operates under the authority and direction of a convention originally entered into by Costa Rica and the United States. The convention, which came into force in 1950, is open to adherence by other governments whose nationals fish for tropical tunas and tuna-like species in the eastern Pacific Ocean (EPO). Under this provision Panama adhered in 1953, Ecuador in 1961, Mexico in 1964, Canada in 1968, Japan in 1970, France and Nicaragua in 1973, Vanuatu in 1990, Venezuela in 1992, El Salvador in 1997, Guatemala in 2000, Peru in 2002, Spain in 2003, the Republic of Korea in 2005, and Colombia in 2007. 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 17 June 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 21 May 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 15 February 1999. In 2007 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 24-27 June 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 1949 convention 15 months after it has been ratified or acceded to by seven Parties that were Parties to the 1949 Convention on the date that the Antigua Convention was open for signature. It has been ratified or acceded to by Mexico on 14 January 2005, El Salvador on 10 March 2005, the Republic of Korea on 13 December 2005, the European Union on 7 June 2006, Nicaragua on 13 December 2006, Belize on 12 June 2007, Panama on 10 July 2007, France on 20 July 2007, and Japan on 11 July 2008. Of these, El Salvador, France, Japan, Mexico, Nicaragua, and Panama were Parties to the 1949 Convention on the date that the Antigua Convention was open for signature.

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 58th year. The results of the IATTC staff's research are published in the IATTC's Bulletin and Stock Assessment Report series in English and Spanish, its two official languages, in its Special Report and Data Report series, and in books, outside scientific journals, and trade journals. Summaries of each year's activities are reported upon in the IATTC's Annual Reports and Fishery Status Reports, also in the two languages.

MEETINGS

IATTC and IDCP meetings

The following meetings of the IATTC and IDCP and their working groups were held in La Jolla, California, USA, during November 2008:

No.	International Dolphin Conservation Program	Date
12	Working Group to Promote and Publicize the Dolphin Safe Tuna Certification System	3 November
46	International Review Panel	3 November
6	Scientific Advisory Board	3 November
20	Meeting of the Parties [to the AIDCP]	4 November
	Inter-American Tropical Tuna Commission	
10	Permanent Working Group on Fleet Capacity	5 November
79	IATTC	6-7 November

Other meetings

Mr. Vernon P. Scholey was an invited keynote speaker at the Fourth Colombian Aquaculture Congress, which took place in Medellin, Colombia, on 1-3 October 2008. His presentation, "Resumen de Investigaciones del Atún en la CIAT, Laboratorio Achotines" was co-authored by Dr. Daniel Margulies and Mss. Jeanne B. Wexler and Maria C. Santiago. An abstract of the presentation was published in "Revista Colombiana de Ciencias Pecuarias."

Dr. Richard B. Deriso participated in a meeting of the Scientific and Statistical Committee of the Western Pacific Fishery Management Council of the United States in Honolulu, Hawaii, on 8-10 October 2008. His travel expenses were paid by the Western Pacific Fishery Management Council.

Dr. Guillermo Compeán was an invited speaker at the XV Congreso Nacional de Oceanografía and the II Reunión Internacional de Ciencias Marinas, which took place in Veracruz, Mexico, on 13-18 October 2008. His presentation was entitled "Estado de las Poblaciones de Atún en el Pacífico Oriental."

A tutorial on the application to tunas of the general stock assessment program, *Stock Synthesis*, convened by Dr. Mark N. Maunder, was held in La Jolla, California, USA, on 13 October 2008. Scientists from the Instituto Español de Oceanografía, the Subsecretaría de Recursos Pesqueros of Ecuador, the International Pacific Halibut Commission, the Secretariat of the Pacific Community, the U.S. National Marine Fisheries Service (La Jolla, California, and Seattle, Washington), the University of British Columbia (Canada), and the Universities of Massachusetts and Washington (USA) participated in the meeting. In addition to Dr. Maunder, Dr. Alexandre Aires-da-Silva participated in the meeting. Dr. Maunder gave four talks, and Dr. Alexandre Aires-da-Silva gave one.

A Workshop on Spatial Analysis for Stock Assessment, also convened by Dr. Mark N. Maunder, was held in La Jolla, California, USA, on 14-17 October 2008. Scientists and observers from the California Lobster and Trap Fishermen's Association, the Columbia River Inter-Tribal Fish Commission, the Instituto Español de Oceanografía, the Instituto de Fomento Pesquero of Chile, the Instituto Nacional de Pesca of Mexico, the International Pacific Halibut Commission, the Ministerio de Ambiente, Vivienda y Desarrollo Territorial of Colombia, the Secretariat of the Pacific Community, the Subsecretaría de Recursos Pesqueros of Ecuador, the U.S. National Marine Fisheries Service (La Jolla, California, and Seattle, Washington), National Taiwan Ocean University, the University of British Columbia, the University of Hawaii at

Manoa, the University of Massachusetts, and the University of Washington, and Myriax Software Pty., Ltd., participated in the meeting. In addition to Dr. Maunder, Drs. Guillermo Compeán, Richard B. Deriso, Martín A. Hall, Alexandre Aires-da-Silva, William H. Bayliff, Michael G. Hinton, Cleridy E. Lennert-Cody, and Mihoko Minami, and Messrs. Daniel W. Fuller, Alejandro Pérez, Kurt M. Schaefer, and Patrick K. Tomlinson of the IATTC staff participated in all or parts of the workshop. Talks were given by Drs. Compeán, Maunder, Aires-da-Silva, Lennert-Cody, and Minami, and Mr. Schaefer, and work in which Messrs. Fuller and Nickolas W. Vogel had participated was presented by other scientists.

Dr. Daniel Margulies was an invited keynote speaker at a satellite symposium of the World Fisheries Congress entitled "Current Status and Future Development of Tuna Aquaculture," held in Yokohama, Japan, on 25-27 October 2008. His presentation, "Reproductive Biology and Spawning of Captive Yellowfin Tuna and Recent Advances in the Rearing of their Larvae and Juveniles," was co-authored by Mr. Vernon P. Scholey and Mss. Jeanne B. Wexler and Maria C. Santiago. During the trip, Dr. Margulies also met with faculty members of Kinki University, Higashi-Osaka City, Japan, to discuss plans for a proposed joint project to study the early life histories of bluefin and yellowfin tuna. Dr Margulies' travel expenses were paid in part by the Japan Fisheries Research Agency.

Dr. Michael G. Hinton participated in a special session of the Billfish Working Group of the International Scientific Committee (ISC) for Tuna and Tuna-like Species in the North Pacific Ocean in Honolulu, Hawaii, USA, in November 2008. The special session selected one of several hypothesized stock structures for swordfish to be used in the upcoming ISC stock assessment of that species. Work was also presented on possible stock structure hypotheses to be used in a collaborative IATTC-ISC assessment of striped marlin planned for 2009.

Dr. Robert J. Olson participated in the PFRP Principal Investigators Workshop at the University of Hawaii at Manoa, USA, on 18-19 November 2008. PFRP is the Pelagic Fisheries Research Program of the University of Hawaii, which is supported by the U.S. National Oceanic and Atmospheric Administration. The theme for the Workshop was tuna forage and inserting synoptic estimates of mid-trophic-level biomass into Integrated Ocean Observing Systems. After the workshop, Dr. Olson worked with Dr. Jock Young, Commonwealth Scientific and Industrial Research Organisation, Australia, and Dr. Valerie Allain, Secretariat of the Pacific Community, New Caledonia, on a Pacific-wide analysis of diet data of upper-trophic-level predators. Dr. Olson's travel expenses were paid by the PFRP under a research grant.

Dr. Michael D. Scott served as chairman of the annual meeting of the Pacific Scientific Review Group held in Maui, Hawaii, USA, on 19-21 November 2008. This group advises the U.S. National Marine Fisheries Service on its marine mammal research and management programs in the Pacific Ocean.

Dr. Daniel Margulies and Mr. Vernon P. Scholey participated in a graduate lecture program at the Nara Campus of Kinki University, Nara Prefecture, Japan, on 25-27 November 2008, where they made presentations summarizing the IATTC's research project on yellowfin tuna at the Achotines Laboratory. The lecture program, part of the Japanese government's Global Center of Excellence (GCOE) Program, was attended by Kinki University faculty members and graduate students. Before and after the lecture program Dr. Margulies and Mr.

Scholey visited the Kinki University Oshima Experimental Station in Kushimoto, Wakayama Prefecture, and the Japan Fisheries Agency National Research Institute of Aquaculture in Ise, Mie Prefecture. They also met with Kinki University faculty members to discuss the development of a memorandum of understanding and research schedule for a joint studies project between Kinki University and the IATTC's Early Life History Group. Their travel expenses were paid by Kinki University.

Dr. Mark N. Maunder was an invited participant at the Managing Data-Poor Fisheries Workshop, sponsored by Sea Grant (the U.S. National Oceanic and Atmospheric Administration's primary university-based program in support of coastal resource use and conservation) and the California Department of Fish and Game, which took place in Berkeley, California, USA, on 1-4 December 2008. His manuscript, "A Depletion Estimator for Within-Season Management of Yellowfin Tuna," was included in the workshop materials to promote discussion. His expenses were paid by the conference organizers.

Dr. Alexandre Aires-da-Silva was an invited participant at the Taller Interregional para la Ordenación y Conservación de Tiburones, which took place in Mazatlan, Mexico, on 3-5 December 2008.

Mr. Brian S. Hallman represented the IATTC at the fifth annual meeting of the Western and Central Pacific Fisheries Commission (WCPFC), held in Busan, Korea, on 8-12 December 2008. The WCPFC adopted conservation measures for yellowfin and bigeye tuna, and granted cooperating status to Belize, Ecuador (provisionally), El Salvador, and Mexico.

Dr. Michael G. Hinton, an *ex-officio* member of the U.S. Argo Scientific Advisory Panel, participated in a meeting of that panel at Woods Hole Oceanographic Institution, Woods Hole, Massachusetts, USA, in December 2008.

Dr. Alexandre Aires-da-Silva participated in a workshop of the Pacific Bluefin Tuna Working Group of the Interim Scientific Committee for Tuna and Tuna-like Species in the North Pacific Ocean in Ishigaki, Japan, on 10-17 December 2008. IATTC staff members were co-authors of the following papers that were presented at the workshop:

Piner, K., H. Lee, and A. Aires-da-Silva. 2008. The Estimate of Unfished Bluefin Spawning Stock Biomass: the Result of Density-Dependent Processes?

Piner, K., H. Lee, M. Maunder, and A. Aires-da-Silva. 2008. Simulation of the Estimation of *M* as a Model Mis-Specification Diagnostic.

Aires-da-Silva, A., M. Maunder, R. Deriso, K. Piner, and H. Lee. 2008. An Evaluation of the Natural Mortality Schedule Assumed in the PBF 2008 Stock Assessment and Proposed Changes for Adult Natural Mortality.

DATA COLLECTION

The IATTC has field offices at Las Playas and Manta, Ecuador; Manzanillo and Mazatlan, Mexico; Panama, Republic of Panama; and Cumaná, Venezuela.

Personnel at these offices abstracted logbook information from 263 trips of commercial fishing vessels and collected 330 length-frequency samples from 201 wells during the fourth quarter of 2008.

Also during the fourth quarter members of the field office staffs placed IATTC observers on 89 fishing trips by vessels that participate in the AIDCP On-Board Observer Program. In addition, 115 IATTC observers completed trips during the quarter, and were debriefed by field office personnel.

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

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

Fleet statistics

The estimated total carrying capacity of the vessels that fished in the eastern Pacific Ocean (east of 150°W; EPO) during 2008 is about 225,100 cubic meters (m^3) (Table 1). The changes to the IATTC's fleet list during the fourth quarter of 2008 are given in Table 2. The weekly average at-sea capacity for the fleet, for the weekly periods ending 29 September through 31 December, was about 128,560 m^3 (range: 77,000 to 173,900 m^3). The EPO was closed to purse-seine fishing for tunas for various periods during 2008, which explains the low capacity-at-sea averages.

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

Catch statistics

The estimated total retained catches of tunas in the EPO during 1 January-31 December 2008, and the corresponding periods of 2003-2007, in metric tons (t), were:

Species	2008	2003-2007			Weekly average, 2008
		Average	Minimum	Maximum	
Yellowfin	193,700	261,100	178,400	394,800	3,700
Skipjack	297,500	238,100	194,600	284,800	5,700
Bigeye	60,000	50,000	38,600	59,900	1,200

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 vessels with carrying capacities greater than 363 t, and only data for such 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 carrying capacity. There are no adjustments included for other factors, such as type of set or vessel operating costs and market prices, which might identify whether a vessel was directing its effort toward a specific species.

Preliminary estimates of the catches per unit of effort (CPUEs), expressed as catches per day's fishing by purse seiners, of yellowfin (Table 4), skipjack (Table 5), and bigeye (Table 6) in the EPO during the first three quarters of 2008 and the corresponding periods of 2003-2007, in metric tons, were:

Species	**Region**	**2008**	**2003-2007**		
			Average	**Minimum**	**Maximum**
Yellowfin	N of 5°N	10.4	12.0	8.5	20.6
	S of 5°N	3.1	4.0	2.1	6.2
Skipjack	N of 5°N	3.5	3.3	2.4	4.5
	S of 5°N	12.3	8.4	5.9	10.4
Bigeye	EPO	2.9	2.0	1.7	2.2

Preliminary estimates of the CPUEs, by pole-and-line vessels, of yellowfin (Table 4) and skipjack (Table 5) in the EPO during the first three quarters of 2008 and the corresponding periods of 2003-2007, in metric tons, were:

Species	**Region**	**2008**	**2003-2007**		
			Average	**Minimum**	**Maximum**
Yellowfin	EPO	2.3	2.3	0.7	3.1
Skipjack	EPO	0.8	1.4	0.5	2.5

Catch statistics for the longline fishery

Preliminary estimates of the catches of bigeye by longline gear in the EPO during 2008 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

Length-frequency samples are the basic source of data used for estimating the size and age compositions of the various species of fish in the landings. This information is necessary to obtain age-structured estimates of the population for various purposes, including the integrated modeling that the staff has employed during the last several years. The results of such studies have been described in several IATTC Bulletins, in its Annual Reports for 1954-2002, in its Fishery Status Reports 1-6 (covering the years 2002-2007), and in its Stock Assessment Reports.

Length-frequency samples of yellowfin, skipjack, bigeye, Pacific bluefin, and, occasionally, black skipjack from the catches of purse-seine, pole-and-line, and recreational vessels in the EPO are collected by IATTC personnel at ports of landing in Ecuador, Mexico, Panama, the USA, and Venezuela. The catches of yellowfin and skipjack were first sampled in 1954, bluefin in 1973, and bigeye in 1975. Sampling has continued to the present.

The methods for sampling the catches of tunas are described in the IATTC Annual Report for 2000 and in IATTC Stock Assessment Report 4. Briefly, the fish in a well of a purse-seine or pole-and-line vessel are selected for sampling only if all the fish in the well were caught during the same calendar month, in the same type of set (floating-object, unassociated school, or dolphin), and in the same sampling area. These data are then categorized by fishery (Figure 1).

Data for fish caught during the third quarter of each year of the 2003-2008 period are presented in this report. Two sets of length-frequency histograms are presented for yellowfin, skipjack, and bigeye; the first shows the data by strata (gear type, set type, and area) for the third quarter of 2008, and the second shows data for the combined strata for the third quarter of each year of the 2003-2008 period. Only one set of histograms is presented for bluefin, as bluefin are caught in only one area in only one type of purse-seine set. Samples from 245 wells were taken during the third quarter of 2008.

There are ten surface fisheries for yellowfin defined for stock assessments: four associated with floating objects, two unassociated school, three associated with dolphins, and one pole-and-line (Figure 1). The last fishery includes all 13 sampling areas. Of the 245 wells sampled that contained fish caught during the third quarter of 2008, 148 contained yellowfin. The estimated size compositions of these fish are shown in Figure 2a. The majority of the yellowfin catch during the third quarter was taken by sets on unassociated schools in the Northern area and on schools associated with dolphins in the Northern and Inshore areas. Lesser amounts of yellowfin were taken in floating-object sets in four areas and in unassociated and dolphin sets in the Southern area.

The estimated size compositions of the yellowfin caught by all fisheries combined during the third quarter of 2003-2008 are shown in Figure 2b. The average weight of the yellowfin caught during the third quarter of 2008 was greater than that of 2007, but less than those of 2003-2005.

There are eight fisheries for skipjack defined for stock assessments: four associated with floating objects, two unassociated school, one associated with dolphins, and one pole-and-line (Figure 1). The last two fisheries include all 13 sampling areas. Of the 245 wells sampled that contained fish caught during the third quarter of 2008, 163 contained skipjack. The estimated size compositions of these fish are shown in Figure 3a. Large amounts of skipjack were caught in the Northern, Equatorial, and Southern floating-object fisheries and the Southern unassociated fishery. Lesser amounts of skipjack were taken in the Inshore floating-object and Northern unassociated fisheries., and small amounts were also taken in schools associated with dolphins.

The estimated size compositions of the skipjack caught by all fisheries combined during the third quarter of 2003-2008 are shown in Figure 3b. The average weight of the skipjack caught during the third quarter of 2008 was greater than those of 2006-2007, but less than those of 2003-2004.

There are seven surface fisheries for bigeye defined for stock assessments: four associated with floating objects, one unassociated school, one associated with dolphins, and one pole-and-line (Figure 1). The last three fisheries include all 13 sampling areas. Of the 245 wells sampled that contained fish caught during the third quarter of 2008, 64 contained bigeye. The estimated size compositions of these fish are shown in Figure 4a. The majority of the catch was taken in floating-object sets in the Northern, Equatorial and Southern areas, with lesser amounts being taken in the Inshore floating-object and unassociated fisheries

The estimated size compositions of the bigeye caught by all fisheries combined during the third quarter of 2003-2008 are shown in Figure 4b. The average weight of bigeye caught during the third quarter of 2008 was greater than those of any of the previous five years.

The estimated retained catch of bigeye less than 60 cm in length during the first three quarters of 2008 was 10,245 metric tons (t). or about 16 percent of the estimated total catch of bigeye by purse seiners during those three quarters. The corresponding amounts for the first three quarters of 2003-2007 ranged from 12,350 to 29,700 t, or 27 to 48 percent.

Pacific bluefin are caught by purse-seine and recreational gear off California and Baja California from about 23°N to 35°N, with most of the catch being taken during May through October. During 2008 bluefin were caught between 26°N and 32°N from May through September. The majority of the catches of bluefin by both commercial and recreational vessels were taken during May, June, and July. In the past commercial and recreational catches have been reported separately. The inability to collect sufficient numbers of samples during 2004 through 2008, however, has made it infeasible to estimate the catches and size compositions separately. Therefore, the commercial and recreational catches of bluefin were combined for each year of the 2003-2008 period. The estimated size compositions are shown in Figure 5. The average weight of the fish caught during 2008 was considerably less than those of the previous five years.

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 Colombia, Ecuador, the European Union, Mexico, Nicaragua, Panama, 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 2008 the observer programs of Colombia, the European Union, Mexico, Nicaragua, Panama, 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 143 fishing trips aboard purse seiners covered by that program during the fourth quarter of 2008. 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

Tuna tagging

Two IATTC staff members spent the period of 10-20 December 2008, aboard the long-range sport-fishing vessel *Royal Star* on a regularly-scheduled fishing trip to Baja California, Mexico. During the trip they tagged yellowfin tuna, as part of the Tagging of Pacific Pelagics (TOPP) program, which is one of several programs supported by the Census of Marine Life (COML). Forty-three archival tags (Lotek LTD 2310s) were implanted in the peritoneal cavities of yellowfin tuna ranging in length from 65 to 94 cm (mean = 74.2 cm). Thirty yellowfin were captured and released near the 13-Fathom Bank (25°43'N-113°08'W) and 13 near Punta Tosca (24°12'N-111 30'W). All of these fish were associated with common dolphins.

Early life history studies

Yellowfin broodstock

The yellowfin broodstock in Tank 1 (1,362,000 L) at the Achotines Laboratory spawned daily during the quarter. Spawning occurred between 10:00 p.m. and 11:05 p.m. The numbers of eggs collected after each spawning event ranged from about 1,000 to 840,000. The water temperatures in the tank ranged from 26.8° to 28.7°C during the quarter. Eleven 9- to 13-kg yellowfin and four 7- to 11-kg yellowfin were transferred to Tank 1 in October and December, respectively. During the quarter one 70-kg female and two males (10 and 13 kg) died from striking the tank wall, and one 6-kg female died of starvation. At the end of December there were 6 45- to 60-kg and 12 7- to 18-kg yellowfin tuna in Tank 1

From January 2003 through July 2005 archival tags had been implanted in yellowfin tuna (IATTC Quarterly Reports for January-March 2003, April-June 2004, October-December 2004, and July-September 2005), and during the fourth quarter the last of these fish (a 70-kg female stocked in 2003) died after 5.8 years in captivity. In late January 2007 10 yellowfin (4 to 10 kg) held in the 170,000-L reserve broodstock tank (Tank 2) were implanted with prototype archival tags and transferred to Tank 1. Another 15 reserve broodstock yellowfin that had been held in Tank 2 were transferred to Tank 1 during October and December 2008; five of the October-stocked fish and one of the December-stocked fish were implanted with archival tags before they were moved to Tank 1. At the end of December, three of the January 2007 group, four of the October 2008 group, and one of the December 2008 group, all bearing archival tags, remained in Tank 1.

Tank 2 held two yellowfin at the end of the 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.

Experiments with yellowfin larvae

During the quarter the data from an experiment conducted earlier in the year that was designed to examine the effect of different stocking densities on growth of yellowfin larvae between 8 and 15 days after hatching (IATTC Quarterly Report for April-June 2008) were analyzed. Although there was a fourfold difference in larval density (treatments done in triplicate), there were no significant differences in either the final mean sizes or the growth rates. These results are different from those of an experiment conducted in 2001 (IATTC Quarterly Report for April-June 2001), which examined the effect of a twofold difference in densities on the growth of larvae within a similar age range (9 to 15 days after hatching). In that experiment the growth rates were significantly more rapid and the final mean sizes at age were greater for the larvae stocked at the lower density than for those stocked at the higher density. The food levels were lower, and the tank volumes greater, in the 2001 experiment than in the 2008 experiment, which may explain, at least in part, the differences in the results of the two experiments.

The results from other density experiments conducted on yellowfin larvae between the ages of 3 and 24 days after hatching have indicated that, at high food levels, density-dependent growth is present in all larval stages, but appears to diminish after 9 days after hatching. During the first-feeding stages (3 to 9 days after hatching), larvae maintained at higher stocking densities grow significantly more slowly than do those maintained at lesser densities, regardless of the food levels. Two- and four-fold increases in larval densities during first-feeding stages resulted in growth deficits of 20 to 44 percent in weight and 22 to 76 percent in length. Equivalent increases in fish densities during the late-larval and early-juvenile stages resulted in growth deficits ranging from about 5 to 18 percent in weight.

Density effects on growth appear to be stage-specific, and may be influenced by available food conditions or tank volumes in larvae older than 8 days after hatching. Further experiments will be conducted in 2009 to examine the effects of food level, tank volume, and stocking density on the growth of such larvae.

Studies of snappers

The work on spotted rose snappers (*Lutjanus guttatus*) is carried out by the Autoridad de los Recursos Acuáticos de Panamá (ARAP).

During the second quarter two existing populations of mature snappers, totaling 30 fish, were combined in Tank 3 (85,000 L). During the third quarter, 10 of the fish died, and the survivors spawned only twice during the quarter. During the fourth quarter 5 more of the fish died, and the remaining 15 fish did not spawn during the quarter.

A new population of 43 mature snappers was stocked in Tank 4 (85,000 L) during the third quarter, and 10 of these individuals died during the fourth quarter. These fish have not yet spawned, and at the end of the fourth quarter 30 individuals remained in Tank 4.

Oceanography and meteorology

Easterly surface winds blow almost constantly over northern South America, which cause 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 additional 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.

Throughout the fourth quarter of 2007 there was an area of cool water that extended westward along the equator to about 180° and southward along the coast of South America to about 30°S (IATTC Quarterly Report for October-December 2007: Figure 6). Also, a small area of cool water appeared off Baja California in October, and persisted throughout the fourth quarter of 2007. There were some areas of warm water west of 170°W and south of 15°S during October and November, but these had disappeared by December. An area of warm water that had existed north and northwest of the Hawaiian Islands during the fourth quarter of 2007 persisted throughout the first and second quarters of 2008, but disappeared after that. Another area of warm water appeared south of 20°S between about 90° and 140°W in January 2008, and moved westward during the subsequent months. An area of warm water appeared off South America south of 20°S in February, increased in size in March (IATTC Quarterly Report for January-March 2008: Figure 8), and then decreased in size and eventually disappeared by June (IATTC Quarterly Report for April-June 2008: Figure 8). Meanwhile, the area of cool water that had extended along the equator from the coast of South America to as far west as 180° during most of 2007 began to dissipate. However, the small area of cool water that was noted off Baja California in December 2007 expanded westward in January 2008, connecting with the area of cool water along the equator, and that connection persisted in February and March (IATTC Quarterly Report for January-March 2008: Figure 8). This area of cool water gradually dissipated during the second quarter of 2008, and was confined to waters north of 5°N by June (IATTC Quarterly Report for April-June 2008: Figure 8). The small area of warm water that had appeared along the equator east of 100°W in March (IATTC Quarterly Report for January-March 2008: Figure 8) persisted throughout the second and third quarters. It extended as far west as about 150°W in July, but had retreated to about 115°W by September (IATTC Quarterly Report for July-September 2008: Figure 5). The SSTs were near normal throughout the fourth quarter of 2008, with only a few scattered areas, mostly small, of warm or cool water (Figure 6). It can be seen in Table 9, however, that all of the SST values for the fourth quarter were below normal, that the SOI* and NOI* indices were well above normal during the fourth quarter, and that the thermocline became very shallow in the equatorial eastern Pacific Ocean in December, all of which are indicative of anti-El Niño conditions. (However, the SOI index was only moderately above normal, and the chart from which Figure ocean1 was taken and the equivalent charts for October and November 2008 indicate near-normal conditions.) According to the Climate Diagnostics Bulletin of the U.S. National Weather Service for December 2008, "… [anti-El Niño] conditions are likely to continue into the Northern Hemisphere Spring [of] 2009."

GEAR PROJECT

During the fourth quarter the IATTC staff did not participate in any dolphin safety-gear inspections or safety-panel alignment procedures aboard purse seiners.

COLLECTION OF AT-SEA AND SUPPLEMENTAL RETAINED CATCH DATA FOR SMALL PURSE SEINERS

The U.S. National Oceanic and Atmospheric Administration has awarded the IATTC a contract to place observers, on a voluntary basis, on sufficient numbers of trips of "Class-5" purse seiners (vessels with carrying capacities of 273-363 metric tons) based in ports on the Pacific Coast of Latin America to obtain data on "catch, bycatch, interaction with protected species, and gear" for 1,000 days at sea per year and to "sample 100 percent of the in-port unloadings of Class 4-5 purse seine vessels [vessels with well capacities of 182-363 metric tons]." If that is not possible, observers can be placed on sufficient numbers of trips of Class-3 and/or -4 vessels (vessels with well capacities of 92-272 metric tons) to bring the total numbers of days at sea observed to 1,000.

No observers were placed on vessels during the fourth quarter of 2008. The numbers of trips completed, numbers of samples taken, and numbers of fish sampled were as follows:

Month	Trips completed	Samples taken	Fish sampled		
			Yellowfin	Skipjack	Bigeye
October	**17**	**16**	**6,055**	**700**	**150**
November	**16**	**14**	**4,993**	**657**	**50**
December	**20**	**14**	**3.302**	**900**	**-**
Total	**53**	**44**	**14,350**	**2257**	**200**

INTERAGENCY COOPERATION

Dr. Guillermo Compeán gave a talk on the legal aspects of fishing in international waters and the role of the IATTC in management of the fishery at the School of Law, University of San Diego, San Diego, California, USA, on 7 October 2008.

Dr. Shane Griffiths, a research scientist with the Commonwealth Scientific and Industrial Research Organisation (CSIRO) of Cleveland, Queensland, Australia, spent the period of 29 September-16 December 2008, at the IATTC headquarters in La Jolla, California, USA, where he worked with Dr. Robert J. Olson and Ms. Leanne M. Duffy of the IATTC staff and Drs. Jessica V. Redfern and George M. Watters of the U.S. National Marine Fisheries Service, La Jolla, on aspects of trophic ecology and food-web models.

Mr. Nickolas W. Vogel spent the period of 19-21 November 2008, in Ensenada, Mexico, where he worked with members of the staff of the Mexican national observer program to assist them in adopting a data-processing system similar to that used by the IATTC staff.

The Mexican observer program was established in 1992, and its staff developed a specialized data base and computer programs for data processing. The IATTC had previously developed its own specialized data base, programs, and data-processing routines, which after that were adopted by the national observer programs of Colombia, Ecuador, the European Union, Nicaragua, Panama, and Venezuela. Beginning in 2009, the Mexican observer program will begin using the same data base structures and data entry and editing routines used by the IATTC and the other national observer programs. This will greatly facilitate the exchange of data sets between the IATTC and the Mexican observer program.

Dr. Mark N. Maunder taught three classes in Dr. George Sugihara's course, "Quantitative Theory of Populations and Communities," at Scripps Institution of Oceanography, La Jolla, California, USA, during November 2008. The classes were "Fisheries Stock Assessment," "Fisheries Management," and "In-Season Estimators for Yellowfin Tuna in the Eastern Pacific Ocean."

Dr. Chin-Hwa Sun, Professor, Institute of Applied Economics, National Taiwan Ocean University, Chinese Taipei, has been a Visiting Professor at the Department of Economics, University of California at San Diego, USA, since February 2008. In late November 2008 she began collaborative studies with Dr. Dale Squires, U.S. National Marine Fisheries Service, La Jolla, California, USA, and Drs. James Joseph, Robin Allen, Mark N. Maunder, and Alexandre Aires-da-Silva on designing a management decision rule for bigeye tuna to ensure the recovery of the biomass by incorporating market response information. Specifically, she has been working on:

1. Impact of the tuna longline and purse-seine fisheries on bigeye tuna in the eastern Pacific Ocean;
2. Cost-benefit analysis of the vessel buyback program of the tuna purse-seine fisheries in the eastern Pacific Ocean.

She will remain in La Jolla till the end of 2009.

PUBLICATIONS

IATTC

IATTC. 2008. Annual Report for 2006: 113 pp.

IATTC. 2008. Tunas and billfishes in the eastern Pacific Ocean in 2007. Inter-Amer. Trop. Tuna Comm., Fish. Status Rep., 6: 140 pp.

Matsumoto, Takayuki, and William H. Bayliff. 2008. A review of the Japanese longline fishery for tunas and billfishes in the eastern Pacific Ocean¸ 1998-2003. Inter-Amer. Trop. Tuna Comm., Bull., 24 (1): 1-187.

Other publications

Maunder, M. N., H. J. Skaug, D. A. Fournier, and S. D. Hoyle. 2008. Comparison of estimators for mark-recapture models: random effects, hierarchical Bayes, and AD Model Builder. *In* Thomson, David L., Evan G. Cooch, and Michael J. Conroy (editors), Modeling Demographic Processes in Marked Populations Series: Environmental and Ecological Statistics, Vol. 3: 917-948.

Scholey, Vernon, Daniel Margulies, Jeanne Wexler, and Maria Santiago. 2008. Resumen de investigaciones del atún en la Comisión Interamericana del Atún Tropical, Laboratorio Achotines—Summary of tuna investigations in the Inter-American Tropical Tuna Commission, Laboratory Achotines. Revista Colombiana de Ciencias Pecuarias, 21 (3): 469-470.

Wells, Randall S., Jason B. Allen, Suzanne Hofmann, Kim Bassos-Hull, Deborah A. Fauquier, N´Elio B. Barros, Ruth E. Delynn, Gretchen Sutton, Victoria Socha, and Michael D. Scott. 2008. Consequences of injuries on survival and reproduction of common bottlenose dolphins (*Tursiops truncatus*) along the west coast of Florida. Mar. Mammal Sci., 24 (4): 774-794.

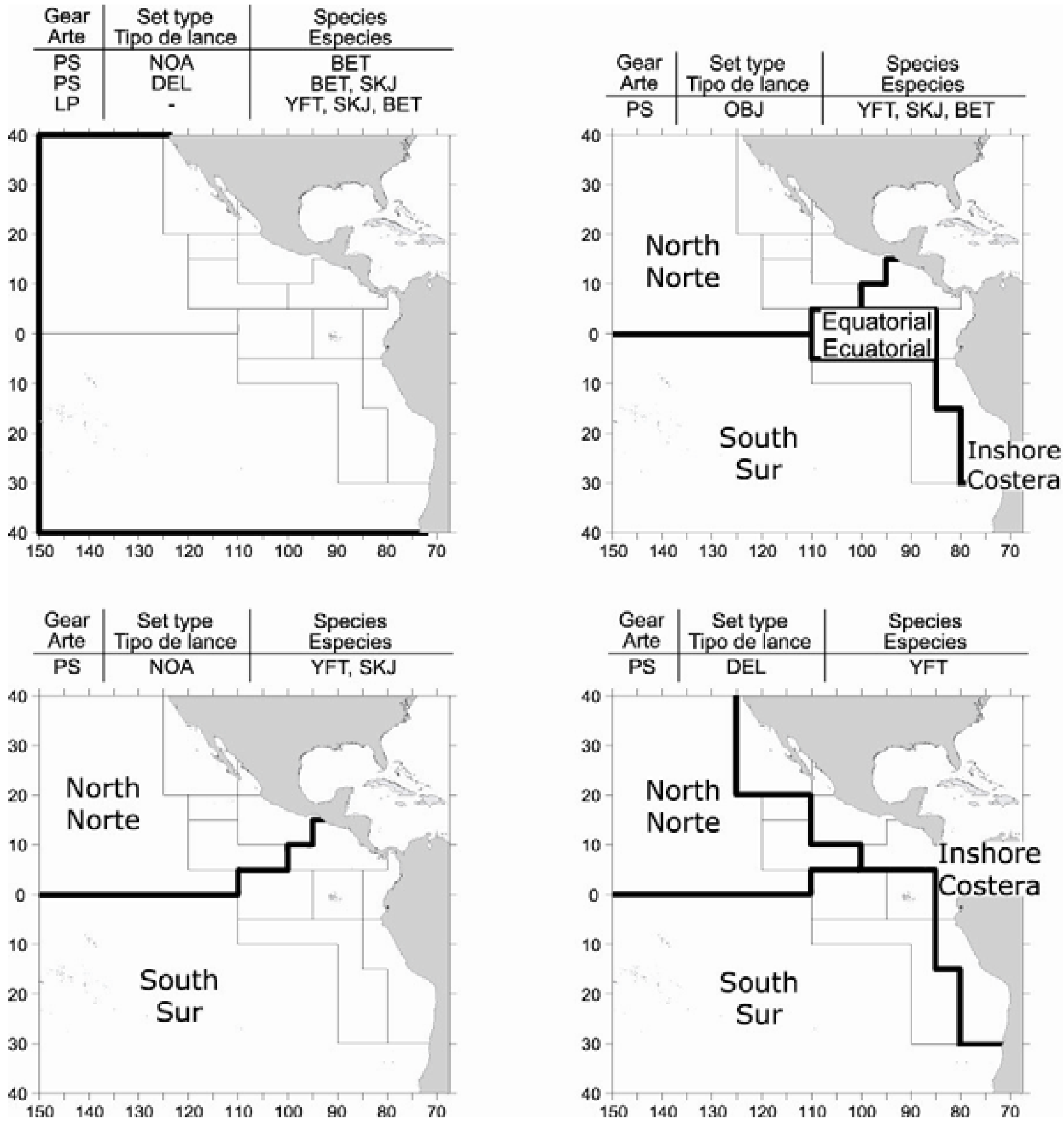

FIGURE 1. Spatial extents of the fisheries defined by the IATTC staff for stock assessment of yellowfin, skipjack, and bigeye in the EPO. The thin lines indicate the boundaries of the 13 length-frequency sampling areas, and the bold lines the boundaries of the fisheries. Gear: PS = purse seine, LP = 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, 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. Artes: PS = red de cerco, LP = caña; Tipo de lance: NOA = peces no asociados, DEL = delfín; OBJ = objeto flotante; Especies: YFT = aleta amarilla, SKJ = barrilete, BET = patudo.

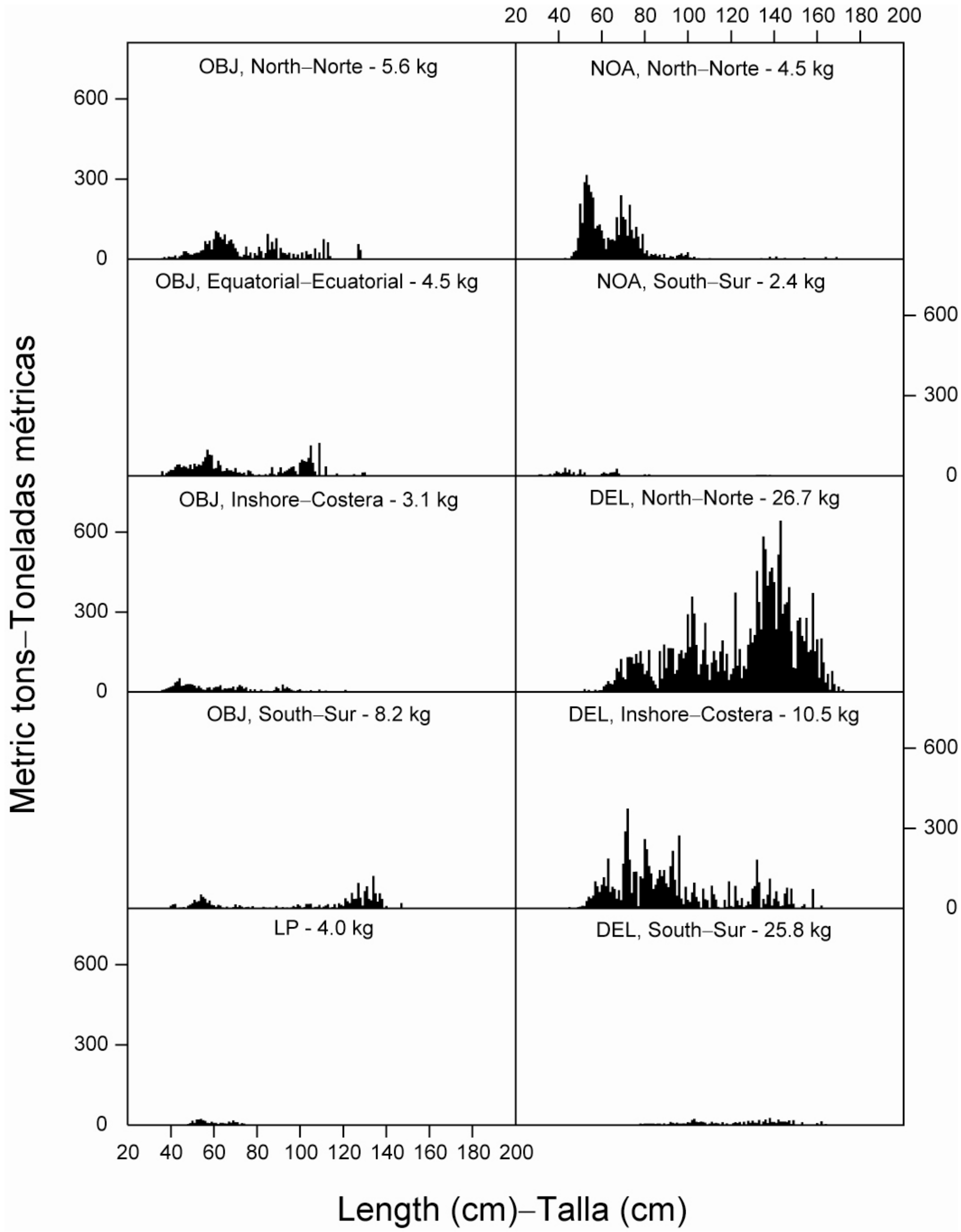

FIGURE 2a. Estimated size compositions of the yellowfin caught in each fishery of the EPO during the third quarter of 2008. The average weights of the fish in the samples are given at the tops of the panels. OBJ = floating object; LP = pole and line; NOA = unassociated; DEL = dolphin.

FIGURA 2a. Composición por tallas estimada para el aleta amarilla capturado en cada pesquería del OPO durante el tercer trimestre de 2008. En cada recuadro se detalla el peso promedio de los peces en las muestras. OBJ = objeto flotante; LP = caña; NOA = peces no asociados; DEL = delfín.

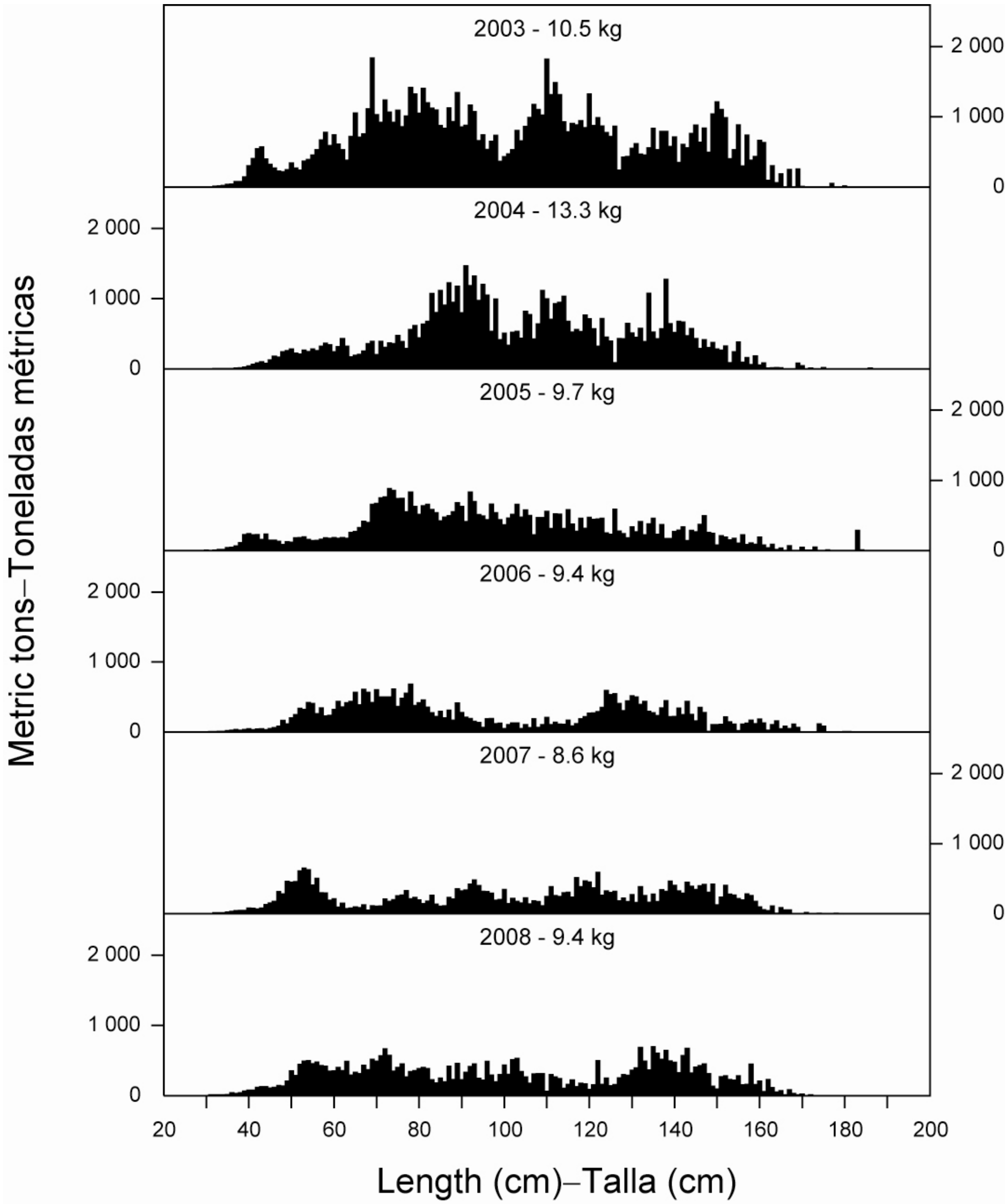

FIGURE 2b. Estimated size compositions of the yellowfin caught in the EPO during the third quarter of 2003-2008. The average weights of the fish in the samples are given at the tops of the panels.

FIGURA 2b. Composición por tallas estimada para el aleta amarilla capturado en el OPO en el tercer trimestre de 2003-2008. En cada recuadro se detalla el peso promedio de los peces en las muestras.

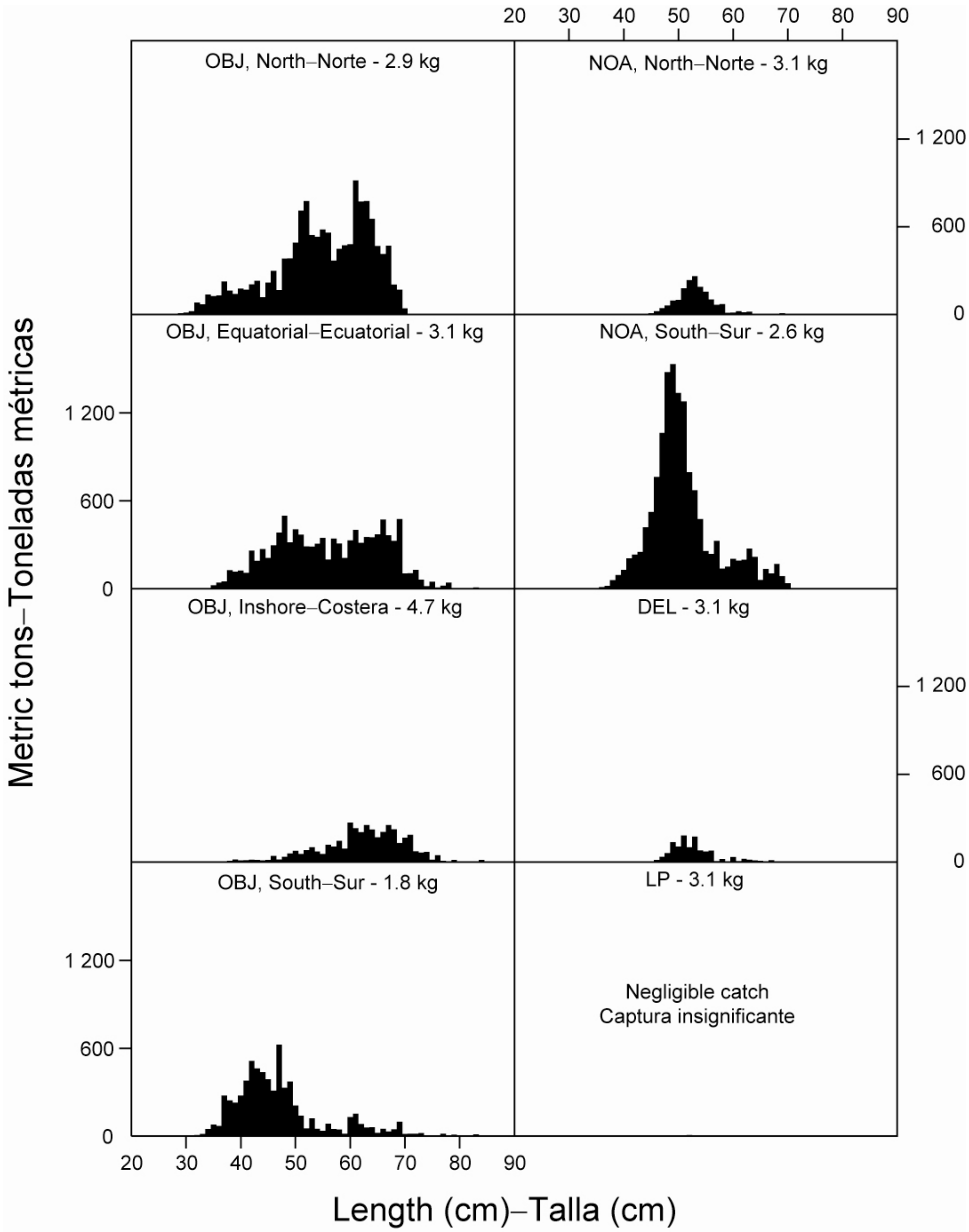

FIGURE 3a. Estimated size compositions of the skipjack caught in each fishery of the EPO during the third quarter of 2008. The average weights of the fish in the samples are given at the tops of the panels. OBJ = floating object; LP = pole and line; NOA = unassociated; DEL = dolphin.

FIGURA 3a. Composición por tallas estimada para el barrilete capturado en cada pesquería del OPO durante el tercer trimestre de 2008. En cada recuadro se detalla el peso promedio de los peces en las muestras. OBJ = objeto flotante; LP = caña; NOA = peces no asociados; DEL = delfín.

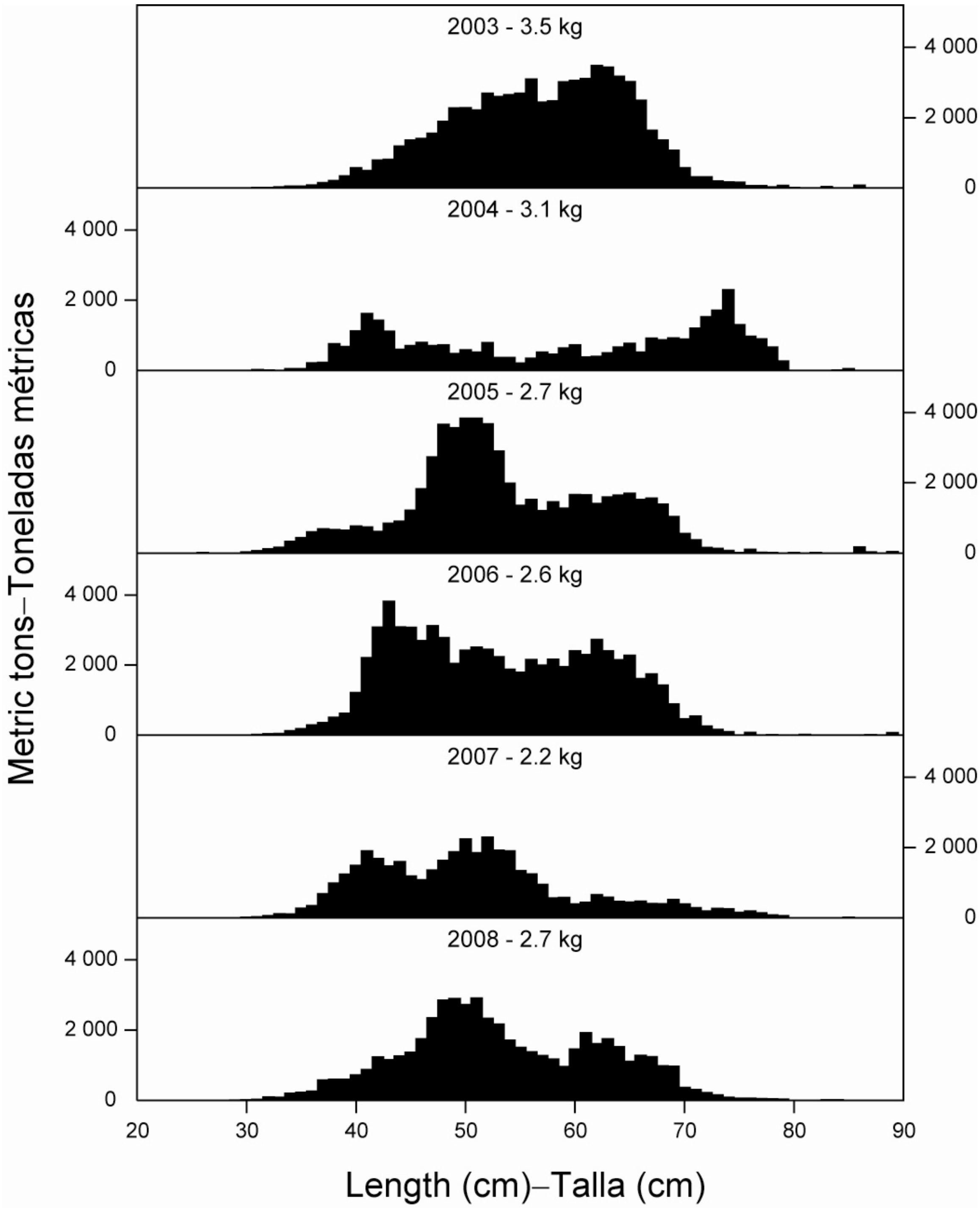

FIGURE 3b. Estimated size compositions of the skipjack caught in the EPO during the third quarter of 2003-2008. The average weights of the fish in the samples are given at the tops of the panels.

FIGURA 3b. Composición por tallas estimada para el barrilete capturado en el OPO en el tercer trimestre de 2003-2008. En cada recuadro se detalla el peso promedio de los peces en las muestras.

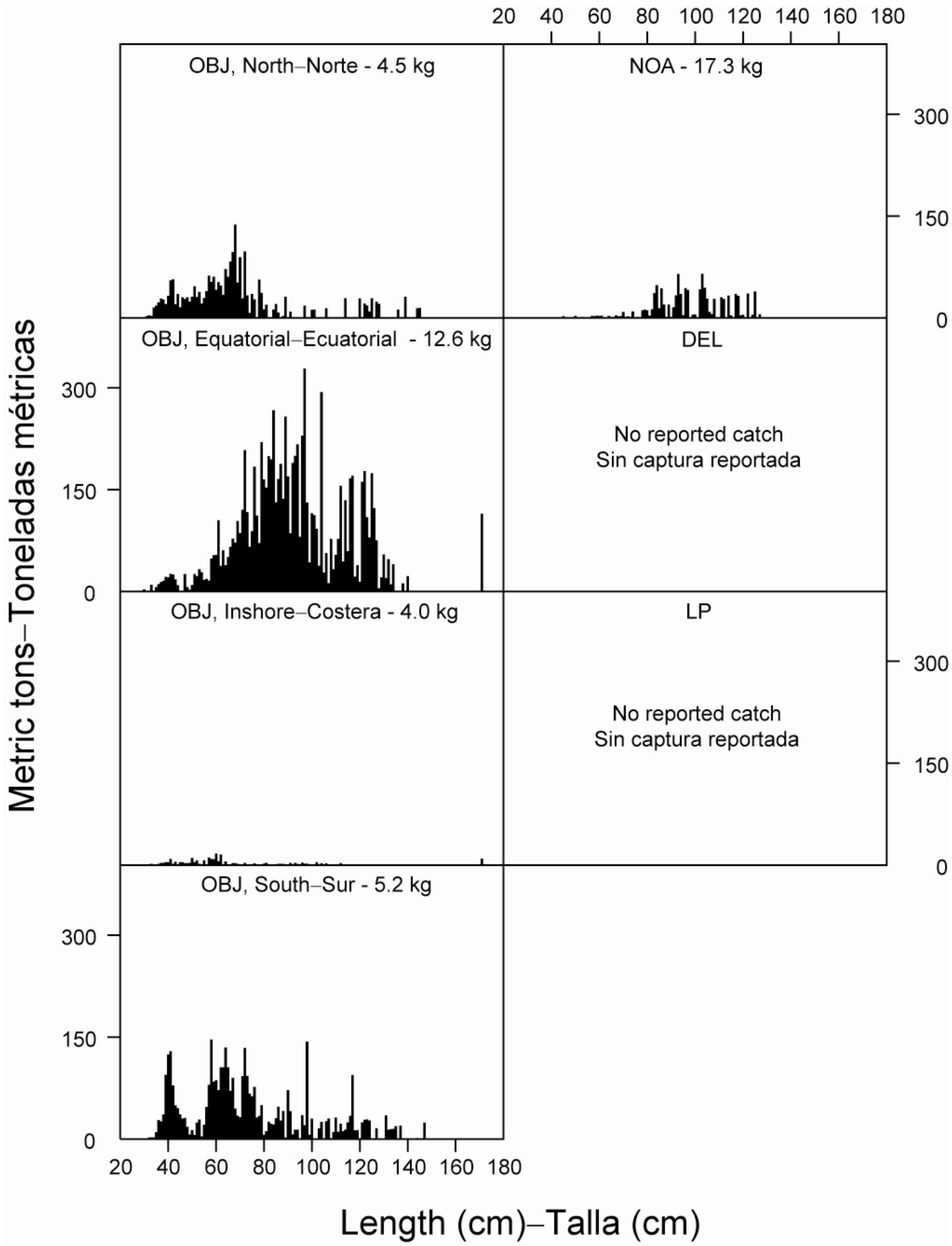

FIGURE 4a. Estimated size compositions of the bigeye caught in each fishery of the EPO during the third quarter of 2008. The average weights of the fish in the samples are given at the tops of the panels. OBJ = floating object; LP = pole and line; NOA = unassociated; DEL = dolphin.

FIGURA 4a. Composición por tallas estimada para el patudo capturado en cada pesquería del OPO durante el tercer trimestre de 2008. En cada recuadro se detalla el peso promedio de los peces en las muestras. OBJ = objeto flotante; LP = caña; NOA = peces no asociados; DEL = delfín.

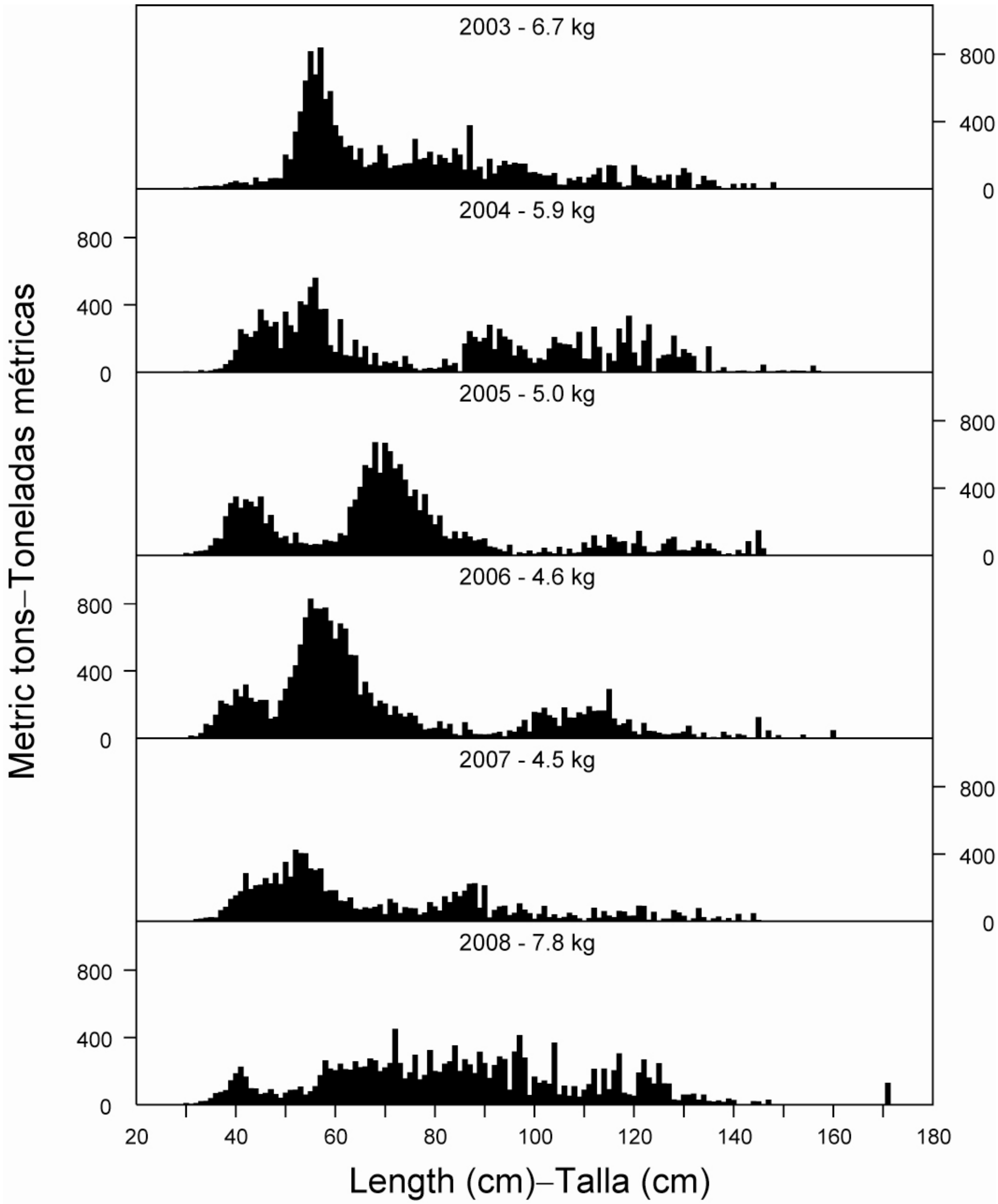

FIGURE 4b. Estimated size compositions of the bigeye caught in the EPO during the third quarter of 2003-2008. The average weights of the fish in the samples are given at the tops of the panels.

FIGURA 4b. Composición por tallas estimada para el patudo capturado en el OPO en el tercer trimestre de 2003-2008. En cada recuadro se detalla el peso promedio de los peces en las muestras.

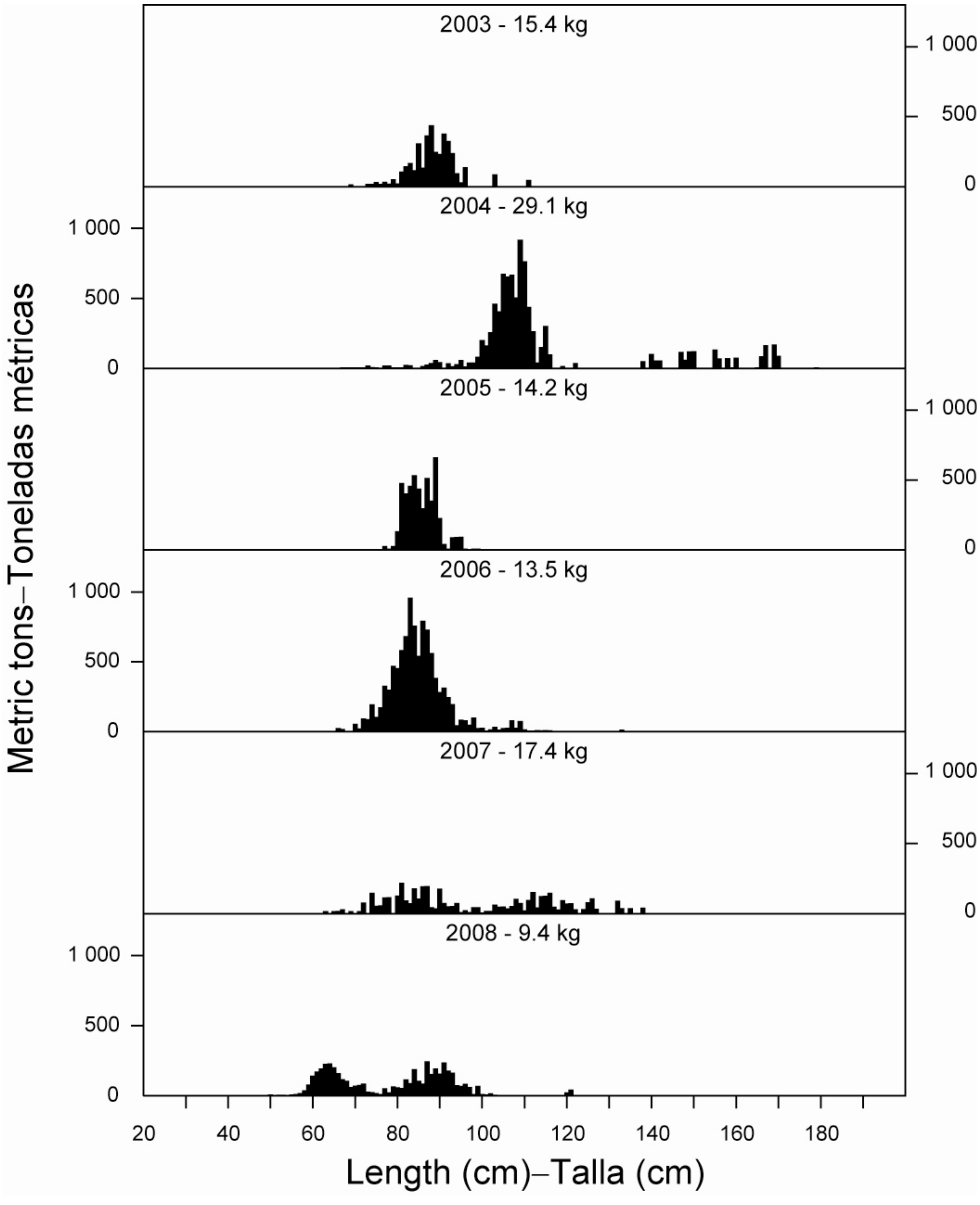

FIGURE 5. Estimated catches of Pacific bluefin by purse-seine and recreational gear in the EPO during 2003-2008. The values at the tops of the panels are the average weights.
FIGURE 5. Captura estimada de aleta azul del Pacífico con arte de cerco y deportiva en el OPO durante 2003-2008. El valor en cada recuadro representa el peso promedio.

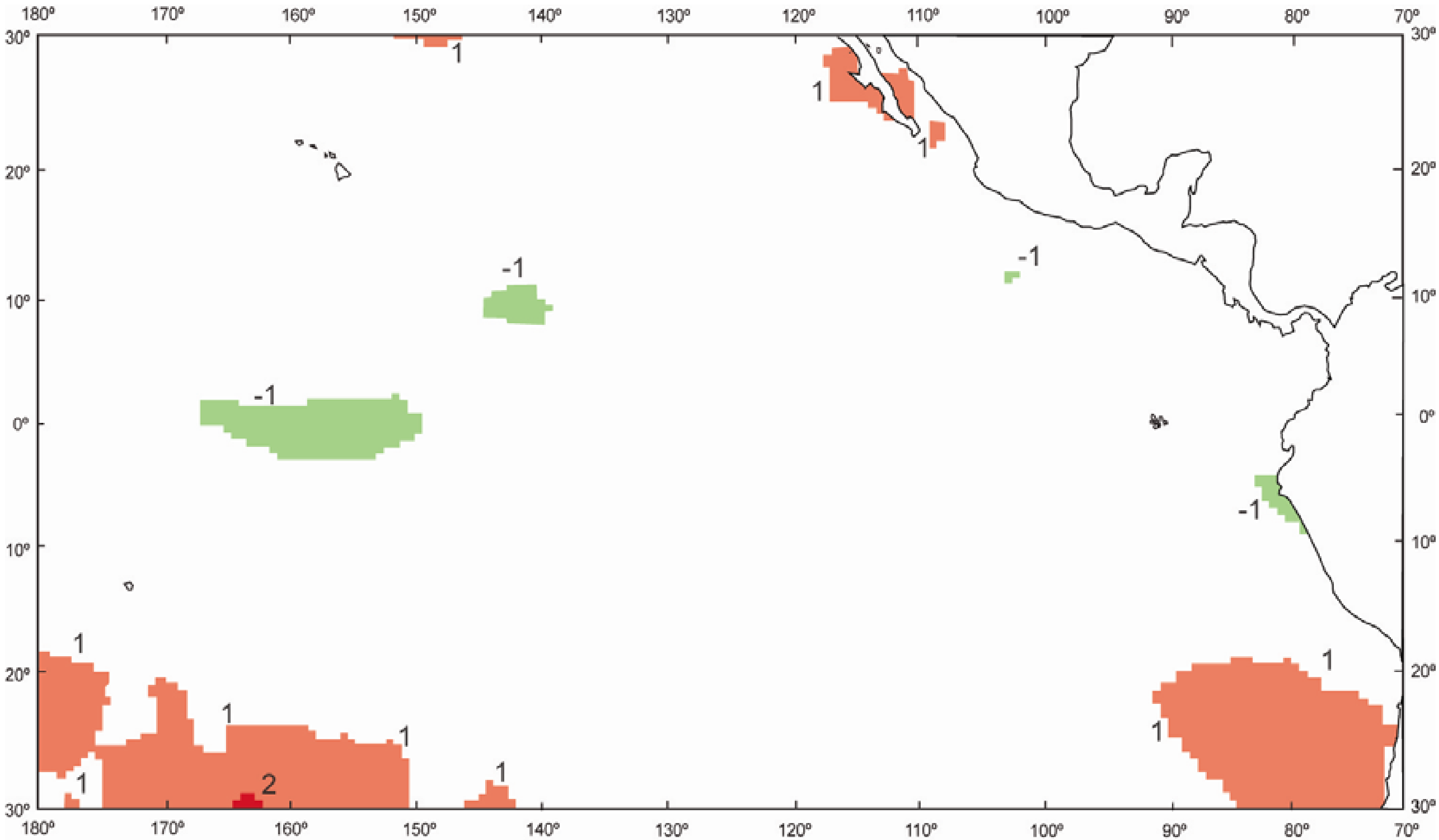

FIGURE 6. Sea-surface temperature (SST) anomalies (departures from long-term normals) for December 2008, based on data from fishing boats and other types of commercial vessels.
FIGURA 6. Anomalías (variaciones de los niveles normales a largo plazo) de la temperatura superficial del mar (TSM) en diciembre de 2008, basadas en datos tomados por barcos pesqueros y otros buques comerciales.

TABLE 1. Preliminary estimates of the numbers and capacities, in cubic meters, of purse seiners and pole-and-line vessels operating in the EPO in 2008 by flag, gear, and well volume. 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 2008, y de la capacidad de acarreo de los mismos, en metros cúbicos, por bandera, arte de pesca, y volumen de bodega. 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	Well volume–Volumen de bodega 1-900	 901-1700	 >1700	 Total	Capacity Capacidad
			Number—Número			
Colombia	PS	5	10	-	15	15,110
Ecuador	PS	60	15	9	84	60,519
España—Spain	PS	-	-	4	4	10,116
Guatemala	PS	-	2	-	2	3,056
Honduras	PS	1	1	-	2	1,559
México	PS	19	32	1	52	53,413
	LP	4	-	-	4	380
Nicaragua	PS	-	5	-	5	6,023
Panamá	PS	4	18	5	27	36,711
Perú	PS	1	-	-	1	542
El Salvador	PS	-	1	3	4	7,415
USA—EE.UU.	PS	1	-	-	1	170
Venezuela	PS	-	18	2	20	28,309
Vanuatu	PS	1	2	-	3	3,609
All flags—	PS	91	103	24	218	
Todas banderas	LP	4	-	-	4	
	PS + LP	95	103	24	222	
			Capacity—Capacidad			
All flags—	PS	40,591	132,234	51,896	224,721	
Todas banderas	LP	380	-	-	380	
	PS + LP	40,971	132,234	51,896	225,101	

TABLE 2. Changes in the IATTC fleet list recorded during the fourth quarter of 2008. PS = purse seine; LP = pole-and-line, WPO = western Pacific Ocean.
TABLA 2. Cambios en la flota observada por la CIAT registrados durante el cuarto trimestre de 2008. PS = cerquero; LP = cañero; WPO = Océano Pacífico occidental.

Vessel name	Flag	Gear	Capacity (m^3)	Remarks
Nombre del buque	**Bandera**	**Arte**	**Capacidad (m^3)**	**Comentarios**
Vessels added to the fleet—Buques añadidos a la flota				
New entries—1^er ingresos				
Albatún Tres	España—Spain	PS	3,161	
Re-entries—Reingresos				
San Miguel	México	PS	294	
Changes of name or flag—Cambios de nombre o pabellon				
				Now—Ahora
Jacobita	Ecuador	PS	374	*Anais*
Vessels removed from fleet—Buques retirados de la flota				
Mar Cantabrico	Bolivia	PS	222	
Lady Jannette	Honduras	PS	141	
Atun VIII	México	PS	806	
Manolo	México	PS	300	
Monica	México	PS	1,154	
San Gabriel	México	PS	294	
San José	México	PS	220	
San Antonio	Panamá	PS	255	
Cape San Lucas	USA—EE.UU.	PS	1,311	Fishing in the WPO—Pescando en el WPO
Caribe Tuna	Venezuela	PS	1,260	
Falcon	Venezuela	PS	1,060	
Caribbean Star No. 31	Unknown—Desconocida	PS	209	

TABLE 3. Preliminary estimates of the retained catches of tunas in the EPO from 1 January through 31 December 2008, 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 31 de diciembre 2008, por especie y bandera del buque, en toneladas métricas**.**

Flag	**Yellowfin**	**Skipjack**	**Bigeye**	**Pacific bluefin**	**Bonitos (*Sarda* spp.)**	**Albacore**	**Black skipjack**	**Other[1]**	**Total**	**Percentage of total**
Bandera	**Aleta amarilla**	**Barrilete**	**Patudo**	**Aleta azul del Pacífico**	**Bonitos (*Sarda* spp.)**	**Albacora**	**Barrilete negro**	**Otras[1]**	**Total**	**Porcentaje del total**
Ecuador	21,796	141,506	35,820	-	23	-	69	594	199,808	35.3
México	80,962	25,576	1,044	4,413	6,955	9	3,336	116	122,411	21.6
Nicaragua	6,421	6,159	562	-	-	-	3	18	13,163	2.3
Panamá	30,157	42,871	8,018	-	66	-	47	94	81,253	14.3
Venezuela	22,987	26,955	2,101	-	9	-	55	24	52,131	9.2
Other—Otros[2]	31,359	54,392	12,407	-	5	-	2	30	98,195	17.3
Total	193,682	297,459	59,952	4,413	7,058	9	3,512	876	566,961	

[1] Includes other tunas, sharks, and miscellaneous fishes
[1] Incluye otros túnidos, tiburones, y peces diversos
[2] Includes Colombia, El Salvador, Guatemala, Honduras, Peru, Spain, and Vanuatu; this category is used to avoid revealing information about the operations of individual vessels or companies.
[2] Incluye Colombia, El Salvador, España, Guatemala, Honduras, Perú, y Vanuatú; 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 1 January-30 September, based on fishing vessel logbook information. Because the catches in this table include only data that meet the requirements for calculation of the CPDFs, they are less than the total catches for the first three quarters of 2003-2008.

TABLA 4. Captura registrada y captura por día de pesca[1] CPDP) de aleta amarilla en el OPO, en toneladas métricas, durante el período de 1 de enero-30 de septiembre, basado en información de los cuadernos de bitácora de buques pesqueros. Ya que las capturas en esta tabla incluyen solamente los datos que satisfacen los requisitos para el cálculo de la CPDP, son menos que las capturas totales de los primeros tres trimestres de 2003-2008.

Area	Fishery statistic	Year-Año					
	Estadística de pesca	2003	2004	2005	2006	2007	2008[2]
Purse seine—Red de cerco							
North of 5°N	Catch—Captura	186,600	102,800	91,200	68,500	66,500	58,900
Al norte de 5°N	CPDF—CPDP	20.6	11.0	11.4	8.5	8.5	10.4
South of 5°N	Catch—Captura	40,100	65,100	39,700	20,400	18,600	19,300
Al sur de 5°N	CPDF—CPDP	4.6	6.2	4.7	2.1	2.5	3.1
Total	Catch—Captura	226,700	167,900	130,900	88,900	85,100	78,200
	CPDF—CPDP	17.8	9.1	9.4	7.1	7.1	8.6
Annual total Total anual	Catch—Captura	275,000	193,200	162,000	106,400	104,600	
Pole and line—Cañero							
Total	Catch—Captura	100	900	800	300	700	300
	CPDF—CPDP	0.7	3.1	2.5	2.4	2.8	2.3
Annual total Total anual	Catch—Captura	500	1,800	800	500	800	

1 Purse-seiners with carrying capacities greater than 363 metric tons only; all pole-and-line vessels. The catch values are rounded to the nearest 100, and the CPDF values to the nearest 0.1.

1 Cerqueros con capacidad de acarreo más de 363 toneladas métricas únicamente; todos buques cañeros. Se redondean los valores de captura al 100 más cercano, y los de CPDP al 0.1 más cercano.

2 Preliminary

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TABLE 5. Logged catches and catches per day's fishing[1] (CPDF) of skipjack in the EPO, in metric tons, during the period of 1 January-30 September, based on fishing vessel logbook information. Because the catches in this table include only data that meet the requirements for calculation of the CPDFs, they are less than the total catches for the first three quarters of 2003-2008.

TABLA 5. Captura registrada y captura por día de pesca[1] (CPDP) de barrilete en el OPO, en toneladas métricas, durante el período de 1 de enero-30 de septiembre, basado en información de los cuadernos de bitácora de buques pesqueros. Ya que las capturas en esta tabla incluyen solamente los datos que satisfacen los requisitos para el cálculo de la CPDP, son menos que las capturas totales de los primeros tres trimestres de 2003-2008.

Area	**Fishery statistic**	**Year-Año**					
	Estadística de pesca	**2003**	**2004**	**2005**	**2006**	**2007**	**2008[2]**
	Purse seine—Red de cerco						
North of 5°N	Catch—Captura	29,000	22,100	35,700	27,700	23,000	20,000
Al norte de 5°N	CPDF—CPDP	3.2	2.4	4.5	3.5	2.9	3.5
South of 5°N	Catch—Captura	84,400	73,200	87,400	88,500	44,100	75,700
Al sur de 5°N	CPDF—CPDP	9.7	7.0	10.4	9.0	5.9	12.3
Total	Catch—Captura	113,400	95,300	123,100	116,200	67,100	95,700
	CPDF—CPDP	8.1	5.9	8.7	7.6	4.9	10.5
Annual total Total anual	Catch—Captura	155,000	132,500	148,600	146,700	85,800	
	Pole and line—Cañero						
Total	Catch—Captura	200	500	300	100	100	100
	CPDF—CPDP	2.5	1.7	1.5	0.6	0.5	0.8
Annual total Total anual	Catch—Captura	500	500	400	300	200	

[1] Purse-seiners with carrying capacities greater than 363 metric tons only; all pole-and-line vessels. The catch values are rounded to the nearest 100, and the CPDF values to the nearest 0.1.

[1] Cerqueros con capacidad de acarreo más de 363 toneladas métricas únicamente; todos buques cañeros. 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 1 January-30 September, based on purse-seine vessel logbook information. Because the catches in this table include only data that meet the requirements for calculation of the CPDFs, they are less than the total catches for the first three quarters of 2003-2008.

TABLA 6. Captura registrada y captura por día de pesca[1] (CPDP) de patudo en el OPO, en toneladas métricas, durante el período de 1 de enero-30 de septiembre, basado en información de los cuadernos de bitácora de buques cerqueros. Ya que las capturas en esta tabla incluyen solamente los datos que satisfacen los requisitos para el cálculo de la CPDP, son menos que las capturas totales de los primeros tres trimestres de 2003-2008.

Fishery statistic—Estadística de pesca	**Year—Año**					
	2003	**2004**	**2005**	**2006**	**2007**	**2008[2]**
Catch—Captura	21,100	28,000	18,000	26,900	16,000	19,500
CPDF—CPDP	2.0	2.2	1.7	2.2	1.8	2.9
Total annual catch—Captura total anual	33,100	43,100	28,500	34,100	23,700	

1 Vessels with carrying capacities greater than 363 metric tons only. The catch values are rounded to the nearest 100, and the CPDF values to the nearest 0.1.

1 Buques con capacidad de acarreo más de 363 toneladas métricas únicamente. 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 2008 by longline vessels.
TABLA 7. Captures de atún patudo en el Océano Pacífico oriental durante 2008 por buques palangreros.

Flag	Quarter				Month			Fourth quarter	Total
	1	2	3	1-3	10	11	12		
Bandera	**Trimestre**				**Mes**			**Cuarto trimestre**	**Total**
	1	**2**	**3**	**1-3**	**10**	**11**	**12**		
China	271	120	494	885	-	-	1		885
Japan—Japón	3,729	2,352	3,238	9,319	820	970	829	2,619	11,938
Republic of Korea—República de Corea	783	913	1,202	2,898	331	359	562	1,252	4,150
Chinese Taipei—Taipei Chino	697	454	497	1,648	78	114	-	192	1,840
United States—EE.UU.	0	0	0	0	0	0	0	0	0
Vanuatu	228	82	32	342	4	-	-	4	346
Total	5,708	3,921	5,463	15,092	1,233	1,443	1,391	4,067	19,159

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, Colombia, Ecuador, the European Union, Mexico, Nicaragua, Panama, and Venezuela during the fourth quarter of 2008. 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, Colombia, Ecuador, México, Nicaragua, Panamá, la Unión Europea, y Venezuela durante el cuarto trimestre de 2008. Los números en paréntesis indican totales acumulados para el año.

Flag	Trips		Observed by program						Percent observed	
			IATTC		National		Total			
Bandera	Viajes		Observado por programa						Porcentaje observado	
			CIAT		Nacional		Total			
Colombia	13	(50)	6	(24)	7	(26)	13	(50)	100.0	(100.0)
Ecuador	54	(282)	39	(191)	15	(91)	54	(282)	100.0	(100.0)
España—Spain	5	(19)	2	(9)	3	(10)	5	(19)	100.0	(100.0)
Guatemala	2	(10)	2	(10)			2	(10)	100.0	(100.0)
Honduras	2	(15)	2	(15)			2	(15)	100.0	(100.0)
México	19	(190)	8	(95)	11	(95)	19	(190)	100.0	(100.0)
Nicaragua	5	(19)	3	(10)	2	(9)	5	(19)	100.0	(100.0)
Panamá	23	(117)	11	(58)	12	(59)	23	(117)	100.0	(100.0)
Peru	1	(7)	1	(7)			1	(7)	100.0	(100.0)
El Salvador	6	(28)	6	(28)			6	(28)	100.0	(100.0)
U.S.A.—EE.UU.	0	(1)	0	(1)			0	(1)	-	(100.0)
Venezuela	10	(72)	6	(40)	4	(32)	10	(72)	100.0	(100.0)
Vanuatu	3	(18)	3	(18)			3	(18)	100.0	(100.0)
Total	143	(828)[1]	89	(506)	54	(322)	143	(828)	100.0	(100.0)

[1] Includes 52 trips (36 by vessels with observers from the IATTC program and 16 by vessels with observers from the national programs) that began in late 2007 and ended in 2008

[1] Incluye 52 viajes (36 por observadores del programa del CIAT y 16 por observadores de los programas nacionales) iniciados a fines de 2007 y completados en 2008

TABLE 9. Oceanographic and meteorological data for the Pacific Ocean, January-December 2008. The values in parentheses are anomalies. SST = sea-surface temperature; SOI = Southern Oscillation Index; SOI* and NOI* are defined in the text.
TABLA 9. Datos oceanográficos y meteorológicos del Océano Pacífico, enero-diciembre 2008. Los valores en paréntesis son anomalías. TSM = temperatura superficie del mar; IOS = Índice de Oscilación del Sur; IOS* y ION* están definidas en el texto.

Month—Mes	**1**	**2**	**3**	**4**	**5**	**6**
SST—TSM (°C)						
Area 1 (0°-10°S, 80°-90°W)	23.8 (-0.7)	26.3 (0.2)	27.3 (0.8)	25.9 (0.4)	24.4 (0.1)	23.7 (0.6)
Area 2 (5°N-5°S, 90°-150°W	24.1 (-1.5)	25.0 (-1.4)	26.5 (-0.6)	27.2 (-0.2)	27.1 (0.0)	26.6 (0.2)
Area 3 (5°N-5°S, 120°-170°W)	24.7 (-1.8)	24.8 (-1.9)	26.0 (-1.1)	26.8 (-0.9)	27.2 (-0.6)	27.2 (-0.3)
Area 4 (5°N-5°S, 150W°-160°E)	26.6 (-1.5)	26.4 (-1.6)	26.8 (-1.3)	27.4 (-1.0)	27.9 (-0.8)	28.1 (-0.6)
Thermocline depth—Profundidad de la termoclina, 0°, 80°W (m)	30	25	20	15	80	70
Thermocline depth—Profundidad de la termoclina, 0°, 110°W (m)	40	30	20	40	80	70
Thermocline depth—Profundidad de la termoclina, 0°, 150°W (m)	140	145	140	140	140	145
Thermocline depth—Profundidad de la termoclina, 0°, 180°W (m)	190	190	200	200	200	180
Sea level—Nivel del mar, Callao, Perú (cm)	105.6 (-5.9)	103.7 (-10.2)	115.4 (0.7)	112.4 (-2.1)	115.7 (2.2)	113.6 (1.6)
SOI—IOS	1.9	2.7	1.1	0.6	-0.3	0.3
SOI*—IOS*	0.85	0.89	0.71	0.21	-4.85	3.56
NOI*—ION*	1.34	5.69	8.12	4.41	0.57	1.47

Month—Mes	**7**	**8**	**9**	**10**	**11**	**12**
SST—TSM (°C)						
Area 1 (0°-10°S, 80°-90°W)	22.7 (0.8)	21.9 (1.1)	21.2 (0.7)	20.8 (-0.2)	21.5 (-0.2)	22.4 (-0.4)
Area 2 (5°N-5°S, 90°-150°W	26.1 (0.6)	25.7 (0.7)	25.1 (0.3)	24.8 (-0.1)	24.8 (-0.2)	24.6 (-0.5)
Area 3 (5°N-5°S, 120°-170°W)	27.2 (0.1)	26.9 (0.2)	26.5 (-0.2)	26.3 (-0.3)	26.3 (-0.2)	25.7 (-0.7)
Area 4 (5°N-5°S, 150W°-160°E)	28.3 (-0.3)	28.2 (-0.3)	28.1 (-0.4)	28.3 (-0.1)	28.1 (-0.3)	27.7 (-0.6)
Thermocline depth—Profundidad de la termoclina, 0°, 80°W (m)	35	45	30	45	35	20
Thermocline depth—Profundidad de la termoclina, 0°, 110°W (m)	50	60	45	45	35	20
Thermocline depth—Profundidad de la termoclina, 0°, 150°W (m)	170	125	125	120	140	125
Thermocline depth—Profundidad de la termoclina, 0°, 180°W (m)	170	170	170	170	165	180
Sea level—Nivel del mar, Callao, Perú (cm)	119.3 (9.2)	106.0 (-1.6)	107.2 (1.2)	104.7 (-1.0)	101.8 (-5.1)	97.8 (-10.8)
SOI—IOS	0.2	0.8	1.5	1.3	1.5	1.5
SOI*—IOS*	-3.87	-0.75	0.72	4.73	2.60	3.97
NOI*—ION*	-1.58	-1.44	-0.10	2.20	2.52	4.22