INTER-AMERICAN TROPICAL TUNA COMMMISSION
COMISIÓN INTERAMERICANA DEL ATÚN TROPICAL

QUARTERLY REPORT—INFORME TRIMESTRAL

July-September 2013—Julio-Septiembre 2013

The Quarterly Report of the Inter-American Tropical Tuna Commission is an informal account 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 de la Comisión Interamericana del Atún Tropical es un relato informal 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.

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INTRODUCTION

The Inter-American Tropical Tuna Commission (IATTC) operated from 1950 to 2010 under the authority and direction of a Convention signed by representatives of the governments of Costa Rica and the United States of America on 31 May 1949. The Convention was open to the adherence by other governments whose nationals participated in the fisheries for tropical tunas and tuna-like species in the eastern Pacific Ocean (EPO). The original convention was replaced by the "Antigua Convention" on 27 August 2010, 15 months after it had been ratified or acceded to by seven Parties that were Parties to the original Convention on the date that the Antigua Convention was open for signature. On that date, Belize, Canada, China, Chinese Taipei, and the European Union became members of the Commission, and Spain ceased to be a member. Spanish interests were henceforth handled by the European Union. Kiribati joined the IATTC in June 2011. There were 21 members of the IATTC at the end of the third quarter of 2013.

The Antigua Convention states that the "Scientific Staff shall operate under the supervision of the Director," that it will "conduct scientific research … approved by the Commission," and "provide the Commission, through the Director, with scientific advice and recommendations in support of the formulation of conservation and management measures and other relevant matters." It states that "the objective of this Convention is to ensure the long-term conservation and sustainable use of the "tunas and tuna-like species and other species of fish taken by vessels fishing for tunas and tuna-like species," but it also states that the Commission is to "adopt, as necessary, conservation and management measures and recommendations for species belonging to the same ecosystem and that are affected by fishing for, or dependent on or associated with, the fish stocks covered by this Convention, with a view to maintaining or restoring populations of such species above levels at which their reproduction may become seriously threatened."

The scientific program is now in its 63rd 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

Drs. Mark N. Maunder, Alexandre Aires-da-Silva, and Carolina Minte Vera participated in the World Conference on Stock Assessment Methods in Boston, Massachusetts, USA, on 17-19 July 2013, and the associated workshop on 15-16 July 2013. Dr. Maunder gave the keynote presentation, "Challenges for Fisheries Stock Assessment: Illustrated with Absolute Abundance Estimation," at the session entitled "Key Challenges for Single Species Assessments." Dr. Maunder's expenses were paid by the organizers of the conference and the International Seafood Sustainability Foundation.

Dr. Richard B. Deriso was a member of a five-person panel that reviewed the work of the Southwest Fisheries Science Center on 29 July-1 August 2013. The meeting was chaired by a staff member of the U.S. Bureau of Ocean Energy Management, Pacific Region, and the other three panel members are staff members of the U.S. National Oceanic and Atmospheric Administration.

Dr. Carolina Minte Vera participated in a workshop, "Enhancing Stewardship in Small-Scale Fisheries (SSF) through Ecosystem Approaches and Other Means," jointly sponsored and organized by two divisions of the Too Big to Ignore (TBTI) Network, the Latin America and the Caribbean Region and Working Group 4, in Curitiba, Brazil, on 6-9 August 2013.

Mr. Kurt M. Schaefer participated at the Ninth Scientific Committee meeting of the Western and Central Pacific Fisheries Commission (WCPFC) in Pohnpei, Federated States of Micronesia, on 6-14 August 2013, at which he gave a presentation consisting of an overview of the EPO tuna fisheries through 2012, along with summaries of the current stock assessments by IATTC staff members for yellowfin, skipjack, and bigeye. Most of the documents presented at the meeting can be seen at the following web site: http://www.wcpfc.int/meetings/9th-regular-session-scientific-committee.

In addition, while at the WCPFC Scientific Committee meeting, Mr. Schaefer participated in the Sixth Steering Committee meeting for the Pacific Tuna Tagging Programme, at which he presented an overview of recent tagging experiments in the EPO by the IATTC.

Drs. Martín A. Hall and Jefferson Murua of AZTI Tecnalia, Sukurrieta, Spain, conducted workshops for purse-seine vessel captains in Lima, Peru, on 5 August 2013, Manta, Ecuador, on 8 August 2013, and Panama, R.P., on 14-15 August 2013. The focus of the workshops was reduction of bycatches of sets on tunas associated with floating objects. The workshops were sponsored by the International Seafood Sustainability Foundation (ISSF), which had previously sponsored bycatch reduction workshops in American Samoa, France, Ghana, Indonesia, Mauritius, Micronesia, the Marshall Islands, the Philippines, the Seychelles, and Spain. Dr. Hall's expenses were paid by the ISSF.

Dr. Mark N. Maunder participated, as an invited expert, in the Workshop on Stock Assessment of Peruvian Small Pelagics on 2-6 September 2013, in Callao, Peru, at which he gave a presentation entitled "The Current Status of Fisheries Stock Assessment." His travel expenses were paid by the Instituto del Mar del Perú.

Dr. Guillermo A. Compeán participated in the first day of a meeting celebrating the 40th anniversary of the founding of the Centro de Investigación Científica y de Educación Superior de Ensenada (CICESE) in Ensenada, Mexico, on September 17-18, 2013.

Dr. Guillermo A. Compeán participated in a meeting celebrating the 80th anniversary of the founding of the Universidad Autónoma de Nuevo León in Monterrey, Mexico, on September 18-19, 2013, where he gave a presentation entitled Analisis de Sustentabilidad: un Enfoque Ecosistémico para Asegurar un Futuro en el Manejo de Pesquerías.

RESEARCH

DATA COLLECTION AND DATABASE PROGRAM

There are two major fisheries for tunas in the eastern Pacific Ocean (EPO; the region east of 150ºW, south of 50ºN, and north of 50°S), the commercial surface fishery and the longline fishery. The catches by the commercial surface fishery are taken almost entirely by purse-seine and pole-and-line vessels based in ports of Western Hemisphere nations. The longline catches are taken almost entirely by vessels registered and based in Far Eastern nations. The staff of the IATTC collects data on the catches by purse-seine and pole-and-line vessels and samples the catches of these vessels at unloading facilities in Las Playas and Manta, Ecuador; Manzanillo and Mazatlan, Mexico; Panama, Republic of Panama; and Cumaná, Venezuela, where it has field offices, and also, to a lesser extent, at other ports. The governments of the nations in which the catches of the longliners that fish in the EPO are registered compile the catch and size data for those vessels and make the data, in aggregated form, available to the IATTC staff. The rest of this section deals almost entirely with the surface fisheries.

Compilation of data on the amounts of catch, and on species and length composition of the catch for the surface fisheries is complicated. Observers accompany all trips of Class-6 purse seiners (vessels with fish-carrying capacities greater than 363 metric tons) that fish in the EPO, and the data that they collect include the locations and dates of each set, the type of each set (dolphin, floating object, or unassociated), the approximate total weights of each species caught in each set, and the wells in which the fish caught in each set are stored. Similar data are obtained from the logbooks of smaller purse seiners and of pole-and-line vessels, although these data may be less accurate or less precise than those collected by the observers. Then, when a vessel unloads its catch, the weight of the contents of each well is made available to the IATTC staff. These "reported catch statistics"—catch statistics obtained from every possible source, including observer records, fishing vessel logbooks, unloading records, and data compiled by governmental agencies—are compiled to provide an estimate of the total amount of tropical tunas (yellowfin, bigeye, and skipjack combined) caught annually by the surface fisheries. In addition, sample data on the species and length composition of the catch are also obtained when a vessel unloads. The methods for collection of these sample data are described in the IATTC Annual Report for 2000 and in IATTC Stock Assessment Reports 2, 4, 10, 11, 12, and 13. Briefly, the fish in a well of a purse-seine or pole-and-line vessel are selected for sampling only if all of the fish in the well were caught in the same sampling area, during the same calendar month, and by the same type of gear (pole-and-line, or in the same type of set of a Class 1-5 or a Class-6 vessel). These data are then categorized by fishery (Figure 1).

The sample data on species and length composition of the catch are eventually combined with the reported catch statistics to make the "final" estimates of the catches by species and length- and weight-frequency distributions by species that appear in the IATTC's Stock Assessment Reports, Fishery Status Reports, and papers in outside journals, but this does not take place until two or more months after the end of the calendar year. (If additional information is acquired after the "final" estimates are calculated, that information is used to recalculate the estimates.) Most of the catch statistics that appear in the rest of this report are preliminary, as the calculations cannot be performed until after the end of the year.

IATTC personnel stationed at its field offices collected 269 length-frequency samples from 171 wells and abstracted logbook information for 268 trips of commercial fishing vessels during the third quarter of 2013.

Reported fisheries statistics

The information reported herein are for the eastern Pacific Ocean (EPO: the region east of 150ºW, south of 50ºN, and north of 50°S), unless noted otherwise. The catches are reported in metric tons (t), the vessel capacities in cubic meters (m^3), and effort in days fishing. Estimates of fisheries statistics with varying degrees of accuracy and precision are available. The most accurate and precise are those made after all available information has been entered into the data base, processed, and verified. 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. Thus the estimates for the current week are the most preliminary, while those made a year later are much more accurate and precise. The statistics are developed using data from many sources, including reports of landings, fishing vessel logbooks, scientific observers, and governmental agencies.

Fleet statistics for the purse-seine and pole-and-line fisheries

The IATTC Regional Vessel Register (http://www.iattc.org/VesselListsENG.htm) lists all vessels, other than artisanal and recreational fishing vessels, authorized to fish for tunas in the EPO. The estimated total carrying capacity of the purse-seine and pole-and-line vessels that have or are expected to fish in the EPO during 2013 is about 216,537 m^3 (Table 1). The average weekly at-sea capacity for the fleet, for the weeks ending 30 June through 29 September, was about 133,600 m^3 (range: 113,200 to 166,400 m^3).

Catch and catch-per-unit-of-effort statistics for the purse-seine and pole-and-line fisheries

Catch statistics

The estimated total retained catches, in metric tons, of tropical tunas from the EPO during the period of January-September 2013, and the equivalent statistics for 2008-2012, were:

Species	2013	2008-2012			Weekly average, 2013
		Average	Minimum	Maximum	
Yellowfin	180,800	176,200	154,100	187,200	4,600
Skipjack	222,300	185,900	118,500	234,600	5,700
Bigeye	39,900	41,100	35,900	48,000	1,000

Summaries of the estimated retained catches, by species and by flag of vessel, are shown in Table 2.

Catch-per-unit-of-effort statistics for purse-seine vessels

The catch-per-unit-of-effort (CPUE) statistics in this report do not incorporate adjustments for factors, such as type of set, vessel operating costs, or market prices, which might identify whether a vessel was directing its effort toward a specific species.

The measures of CPUE used in these analyses are based on data from 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 fish-carrying capacities greater than 363 metric tons, and only data for these vessels are included in these analyses. There are now far fewer pole-and-line vessels than in previous years, so the data for these vessels are combined without regard to their fish-carrying capacities.

The estimated nominal catches of yellowfin, skipjack, and bigeye per day of fishing, in metric tons, by purse-seine (PS) and pole-and-line (LP) gear in the EPO during the second quarter of 2013 and comparative statistics for 2008-2012 were:

Region	Species	Gear	2013	2008-2012		
				Average	Minimum	Maximum
N of 5°N	yellowfin	PS	16.1	13.7	12.0	14.9
S of 5°N			2.3	3.4	2.7	4.1
N of 5°N	skipjack	PS	2.4	1.7	0.7	3.5
S of 5°N			10.2	10.1	8.0	12.7
EPO	bigeye	PS	1.5	2.5	2.2	3.4
EPO	yellowfin	LP	0.0	3.1	0.5	8.2
EPO	skipjack	LP	0.0	2.0	0.3	4.5

Catch statistics for the longline fishery

IATTC Resolution C-09-01 requires nations whose annual catches of bigeye by longline gear in the EPO exceed 500 metric tons to report their catches at monthly intervals. The catches reported for January-September 2013 are shown in Table 3.

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. 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.

Data for fish caught during the second quarters of 2008-2013 are presented in this report. Two sets of length-frequency histograms are presented for each species; the first shows the data

by stratum (gear type, set type, and area) for the second quarter of 2013, and the second shows data for the combined strata for the second quarter of each year of the 2008-2013 period. Samples from 235 wells were taken during the second quarter of 2013.

There are ten surface fisheries for yellowfin defined for stock assessments, four associated with floating objects, two with unassociated schools, three associated with dolphins, and one pole-and-line (Figure 1). The last fishery includes all 13 sampling areas. Of the 235 wells sampled that contained fish caught during the second quarter of 2013, 173 contained yellowfin. The estimated size compositions of these fish are shown in Figure 2a. The majority of the yellowfin catch during the second quarter was taken by sets on dolphins in the Northern and Inshore areas, with a lesser amount in the Southern area. Small amounts of yellowfin were taken in floating-object sets in the Northern, Equatorial, Inshore, and Southern areas, and in sets on unassociated schools in the Northern and Southern areas. Sets on unassociated schools in the Southern area produced the greatest average size of yellowfin, 35.3 kg.

The estimated size compositions of the yellowfin caught by all fisheries combined during the second quarters of 2008-2013 are shown in Figure 2b. The average weight of the yellowfin caught during the second quarter of 2013 (10.1 kg) was less than the 2012 average of 17.2 kg, but about the same as those of 2010-2011.

There are eight fisheries for skipjack defined for stock assessments, four associated with floating objects, two with unassociated schools, one associated with dolphins, and one pole-and-line (Figure 1). The last two fisheries include all 13 sampling areas. Of the 235 wells sampled that contained fish caught during the second quarter of 2013, 136 contained skipjack. The estimated size compositions of these fish are shown in Figure 3a. Large amounts of skipjack in the 40- to 70-cm range were caught in all four of the floating-object fisheries and in the Southern unassociated fishery. The estimated size compositions of the skipjack caught by all fisheries combined during the second quarters of 2008-2013 are shown in Figure 3b. The average weight for the second quarter of 2013 (2.7 kg) was greater than that of skipjack caught during the second quarter of previous five years, which ranged from 1.8 to 2.3 kg.

There are seven surface fisheries for bigeye defined for stock assessments, four associated with floating objects, one with unassociated schools, one associated with dolphins, and one pole-and-line (Figure 1). The last three fisheries include all 13 sampling areas. Of the 235 wells sampled that contained fish caught during the second quarter of 2013, 43 contained bigeye. The estimated size compositions of these fish are shown in Figure 4a. Almost all of the second-quarter bigeye catch was taken in floating-object sets, primarily in the Northern, Equatorial, and Southern areas. The average weight of the fish caught in the Northern floating-object fishery was considerably less than those caught in any of the other fisheries.

The estimated size compositions of the bigeye caught by all fisheries combined during the second quarters of 2008-2013 are shown in Figure 4b. The average weight of bigeye caught during the second quarter of 2013 (6.7 kg) was less than those of 2011 and 2012, but greater than those of 2009 and 2010.

The estimated retained purse-seine catch of bigeye less than 60 cm in length during the first two quarters of 2013 was 5,525 metric tons (t), or about 28 percent of the estimated total

retained purse-seine catch of bigeye during that period. The corresponding amounts for the first two quarters of 2008-2012 ranged from 4,259 to 7,587 t, or 20 to 33 percent.

BIOLOGY AND ECOSYSTEM PROGRAM

Early life history studies

Yellowfin broodstock

Although courtship behavior and pre-spawning activities of the yellowfin broodstock were observed on many occasions, there was no spawning in Tank 1 during the quarter. The temperatures in the tank ranged from 27.6° to 28.4°C. The sustained cessation in spawning during the quarter was likely related to a low number of older broodstock fish in the tank and the presence of newly stocked younger fish. Fishing effort for new broodstock fish during the quarter resulted in the addition of 13 6- to10-kg yellowfin. At the end of the quarter there were one 39-kg yellowfin, two 27-kg yellowfin, and nine 9- to 16-kg yellowfin in Tank 1.

An additional 14 yellowfin (<6 kg) were stocked in the reserve Tank 2 (170,000 L), and at the end of the quarter there were five fish in the tank.

Comparative studies of yellowfin and Pacific bluefin larvae

A joint Kinki University (KU)-IATTC-ARAP [Autoridad de los Recursos Acuáticos de Panamá] 5-year research project is being supported in Panama by the Japan International Cooperation Agency (JICA) (see Quarterly Report for January-March 2011). This project, which is being conducted through the Science and Technology Research Partnership for Sustainable Development (SATREPS) Program, involves comparative studies of the early life histories of Pacific bluefin and yellowfin.

As part of the SATREPS project, numerous KU professors, graduate students, and post-doctoral researchers visited the Achotines Laboratory from mid-April through mid-July. The KU scientists worked with ARAP biologists and IATTC Achotines staff members to continue SATREPS research investigations of the genetics, nutrition, and early life history of yellowfin. Although there was no yellowfin spawning during their visits, the KU scientists continued to analyze genetic samples of yellowfin collected previously, continued analysis of weaning diets to be used in future rearing trials with yellowfin juveniles, and conducted comparative trials of enrichment media used to nutritionally enhance the zooplankton prey of yellowfin larvae.

As part of the SATREPS project, scientists of the IATTC's early life history (ELH) group spent the month of July at the Oshima Experimental Station, Kinki University (KU), Wakayama Prefecture, Japan. They conducted joint experiments with KU staff members and ARAP scientists examining the growth and survival of Pacific bluefin tuna larvae that were fed low to moderate food levels (mean daily target food levels between 170 and 500 rotifers/L) over the first 10 days of feeding, and they also examined the growth and survival potential in response to delayed feeding of optimal food levels during the first week of feeding. Similar comparative growth studies have been conducted on yellowfin larvae at the Achotines Laboratory (Quarterly Reports for April-June 2011 and October-December 2012). During July the ELH group also examined starvation rates in Pacific bluefin larvae at water temperatures of 24°C, 26°C, 27°C,

and 29.5°C. Similar starvation trials will be conducted on yellowfin larvae during 2014. The growth and survival data of the experiments conducted at the Oshima Laboratory will be analyzed during the next quarter.

Workshop on the physiology and aquaculture of pelagics

The IATTC and the University of Miami (Miami, Florida, USA) held their eleventh workshop, "Physiology and Aquaculture of Pelagics, with Emphasis on Reproduction and Early Developmental Stages of Yellowfin Tuna," from 10 to 18 July 2013. The organizers were Dr. Daniel Margulies and Mr. Vernon P. Scholey of the IATTC staff and Dr. Daniel Benetti, Director of the Aquaculture Program of the Rosenstiel School of Marine and Atmospheric Science (RSMAS), University of Miami. Mr. Scholey and Dr. Benetti served as instructors. The participants included six of Dr. Benetti's graduate students and Dr. Luke Gardner of Stanford University. A fee for the participants covered the expenses of putting on the workshop. As part of the workshop, dorado (most likely *Coryphaena hippurus*) were cultured from the larval stage through the first week of feeding. Before and after their stay at the Achotines Laboratory the workshop group spent several days at the Ocean Blue cobia (*Rachycentron canadum*) culture laboratories and ocean cages on the Caribbean coast of Panama.

Culture of dorado

In combination with yellowfin tuna capture efforts, a spawning population of dorado, was established at the Achotines Laboratory by opportunistically capturing and transporting wild dorado from local fishing grounds directly to tank T5 in the broodstock tank building. At the end of July there were 16 dorado, ranging from about 50 to70 cm total length, being held. During July the dorado spawned daily. The primary reason for establishing this group is to supply dorado yolk-sac larvae as food for late-larval and early-juvenile yellowfin tuna being cultured for experimental purposes.

Studies of snappers

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

During 1996-2009, the ARAP staff had conducted full life cycle research on spotted rose snappers (*Lutjanus guttatus*) in captivity. Efforts to rebuild the broodstock population of this species had been unsuccessful in recent years. During the second quarter, a major fishing effort was undertaken, and more than100 spotted rose snappers were collected in local waters. At the end of the third quarter a large group of fish continued to be held in the broodstock snapper tank.

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.

In December 2012 a small area of warm water formed off Mexico and a short tongue of cool water formed along the Equator off Ecuador (IATTC Quarterly Report for October-December 2012: Figure 6). There were spots of cool water along the Equator during January-February 2013 and offshore off Mexico and far offshore south 20°S during January-March 2013 (IATTC Quarterly Report for January-March 2013: Figure 8). During April 2013 the SSTs were mostly normal except for a narrow band of cool water close to the coast of Peru and some warm water far offshore south of about 15°S. During May and June the area of cool water expanded westward along the equator to slightly west of 120°W. During July, August, and September this band retreated eastward. However a large spot of cool water appeared at about 20°S-125° to 140°W in September (Figure 5). The SSTs were mostly above normal during October and November 2012 and mostly below normal from December 2012 through September 2013 (Table 4). The value of 8.00 for the NOI* for February 2013 is particularly noteworthy, as it has been exceeded only four times (8.68 in January 1989, 8.10 in December 1998, 8.06 in January 2007, and 8.12 in March 2008) during the period since 1948 for which records exist. According to the Climate Diagnostics Bulletin of the U.S. National Weather Service for September 2013, "… the consensus forecast is for [El Niño-Southern Oscillation-neutral conditions] to continue into the Northern Hemisphere spring 2014."

BYCATCH PROGRAM AND INTERNATIONAL DOLPHIN CONSERVATION PROGRAM

Observer program

Coverage

The Agreement on the International Dolphin Conservation Program (AIDCP) requires 100-percent coverage by observers on trips by Class-6 purse seiners (vessels with fish-carrying capacities greater than 363 metric tons) that fish for tunas in the eastern Pacific Ocean (EPO). This mandate is carried out by the IDCP 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, Venezuela and the Regional Observer Program (ROP) under the umbrella of the WCPFC, based on a Memorandum of Cooperations (MOC) signed by representatives of the IATTC and the WCPFC.

In addition, Resolution C-12-08 of the IATTC indicates that "Any vessel [regardless of size class] with one or more of its wells sealed to reduce its well volume recorded on the Regional Vessel Register shall be required to carry an observer from the International Dolphin Conservation Program (IDCP) on board." Furthermore, Resolution C-12-01 allows Class-4 purse-seine vessels (vessels with fish-carrying capacities of 182 to 272 metric tons) to make a single fishing trip of up to 30 days duration during the specified closure periods, provided that that vessel carries an observer of the IDCP On-Board Observer Program.

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 2013 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 IDCP 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 IDCP On-Board Observer Program is not practical. In 2011, the IATTC and the WCPFC agreed on the MOC described above. As part of the implementation of the MOC, representatives of the two organizations put together a series of procedures for the observers of the ROP to follow under the umbrella of the WCPFC for tuna purse seiners, while observing fishing activity in the IATTC convention area. Under that MOC, two Parties to both regional fisheries management organizations, and to the AIDCP, requested that cross-endorsed observers be allowed to be deployed on 13 trips of vessels planning to operate in both areas during the third quarter of 2013. These requests were granted.

Observers from the IDCP On-Board Observer Program departed on 183 fishing trips aboard purse seiners covered by that program during the third quarter of 2013. Preliminary coverage data for these vessels during the quarter are shown in Table 5. Nine of these trips were made on Class-4 purse seiners (182 to 272 metric tons of fish-carrying capacity). Only Class-6 purse-seine vessels are required to carry observers on all fishing trips in the EPO. There are three reasons why a smaller vessel would carry an observer. First, it might have been required to carry an observer because it had been reported to have made one or more sets on tunas associated with dolphins, which vessels other than Class-6 vessels are not permitted to do by the AIDCP. Second, Paragraph 4 of IATTC Resolution C-12-01, adopted at the 83rd meeting of the IATTC in June 2012, specifies that a Class-4 purse seiner may make one trip of not more than 30 days

duration during the closure period applying to that vessel, provided there is an observer aboard the vessel. Third, IATTC Resolution C-12-08, also adopted at the 83rd meeting of the IATTC, requires that "any vessel with one or more of its wells sealed to reduce its well volume recorded on the Regional Vessel Regster shall be required to carry an observer from the [IDCP]." The two trips by a Class-4 vessel in Table 5 were made by a vessel with one or more wells sealed. (According to IATTC Resolution C-12-08, wells are sealed "in order for the reduced well volume of the vessel to be recorded on the Regional Vessel Register for purposes of the implementatioin of Resolution C-02-03 on fleet capacity …" The vessel had a fish-carrying capacith of 182 to 272 metric tons before one or more of its well were sealed, and, for purposes of regulation, it would have remained a Class-4 vessel even if its fish-carrying capacity had been reduced to less than 182 metric tons after one or more of its wells were sealed.)

Training

There were no observer training sessions held during the third quarter of 2013.

Gear project

There were no dolphin safety-gear inspections and safety-panel alignment procedures carried out aboard purse seiners during the third quarter of 2013.

PUBLICATIONS

The long series of numbers, letters, and symbols after some of the references are called Digital Object Identifiers (DOIs). The papers have been published online, but not yet in the printed editions of the journals, nor have volumes, issues, or page numbers been assigned to them. The DOIs are helpful to anyone who wants to read the papers online, provided he or she is eligible to do that. The fifth paper was published online in 2012, but the print edition that includes it is dated 2013.

Crone, Paul, Mark Maunder, Juan Valero, Jenny McDaniel, and Brice Semmens (editors). 2013. Selectivity: theory, estimation, and application in fishery stock assessment models. Center for the Advancement of Population Assessment Methodology (CAPAM), Workshop Series Report, 1: iii, 46 pp.

Fournier, David A., Hans J. Skaug, Johnoel Ancheta, James Ianelli, Arni Magnusson, Mark N. Maunder, Anders Nielsen, and John Sibert. 2012. AD Model Builder: using automatic differentiation for statistical inference of highly parameterized complex nonlinear models. 2012. Optimization Methods and Software, 27 (2): 233-249.

Gilman, E., P. Suuronean, M. Hall, and S. Kennelly. 2013. Causes and methods to estimate cryptic sources of fishing mortality. Jour. Fish Biology, DOI:10.1111/jfb.12148.

Griffiths, Shane P., Robert J. Olson, and George M. Watters. 2013. Complex wasp-waist regulation of pelagic ecosystems in the Pacific Ocean. Reviews in Fish Biology and Fisheries, DOI 10.1007/s11160-012-9301-7.

Lennert-Cody, Cleridy E., Jeremy D. Rusin, Mark N. Maunder, Edward H. Everett, Erick D. Largacha Delgado, and Patrick K. Tomlinson. 2013. Studying small purse-seine vessel

fishing behavior with tuna catch data: implications for eastern Pacific Ocean dolphin conservation. Mar. Mammal Sci., 29 (4): 643-668.

Schaefer, Kurt M., and Daniel W. Fuller. 2013. Simultaneous behavior of skipjack (*Katsuwonus pelamis*), bigeye (*Thunnus obsesus*), and yellowfin (*T. albacares*) tunas, within large multi-species aggregations associated with drifting fish aggregating devices (FADs) in the equatorial eastern Pacific Ocean. Mar. Biol., 160 (11): 3005-3014.

Schaefer, Kurt M., Daniel W. Fuller, and Gabriel Aldana. 2013. Movements, behavior, and habitat utilization of yellowfin tuna (*Thunnus albacares*) in waters surrounding the Revillagigedo Islands Archipelago Biosphere Reserve, Mexico. Fish. Ocean., DOI: 10.1111/fog.12047.

Van Noord, Joel E., Robert J. Olson, Jessica V. Redfern, and Ronald S. Kaufmann. 2013. Diet and prey selectivity in three surface-migrating myctophids in the eastern tropical Pacific. Ichthyological Research, 60 (3): 287-290, DOI 10.1007/s10228-013-0350-2.

ACHIEVEMENTS AND HONORS

Dr. Mark N. Maunder has been appointed to the editorial board of the ICES Journal of Marine Science, the world's most prestigious journal of fishery science.

The paper "AD Model Builder: using automatic differentiation for statistical inference of highly parameterized complex nonlinear models," co-authored by Dr. Mark N. Maunder, has been awarded the Charles Broyden Prize for the best paper published in the journal Optimization Methods and Software in 2012. Dr. Maunder is a co-founder and past president of the AD Model Builder Foundation.

INTER-AGENCY COOPERATION

Carolina Minte Vera spent the period of 22 July-1 September 2013, in Brazil, where she taught a graduate course, Introduction to Quantitative Ecology, at the State University of Maringa.

VISITING SCIENTISTS AND STUDENTS

La Jolla office

Ms. Xiomana Escovar-Fadul, a citizen of Colombia and a master's degree candidate at the University of Pennsylvania, Philadelphia, Pennsylvania, USA, who had been working as an intern at the IATTC since 17 June 2013 on shark policy and management in the EPO with Mr. Jean-Francois Pulvenis and Drs. Alexandre Aires-da-Silva and Mark N. Maunder, completed her work in La Jolla and returned to Philadelphia on 15 August 2013.

Ms. Elizabeth Hetherington, a master's degree candidate at the University of San Diego, spent the entire month of August 2013, working with Dr. Robert J. Olson at the La Jolla office. Ms. Hetherington's thesis entails a study of the trophic structure across a productivity gradient in the EPO, using compound-specific isotopic analysis of amino acids on taxa from different levels of the food web, from euphausiid crustaceans to tunas. The study is part of a grant from the Comparative Analysis of Marine Ecosystem Organization (CAMEO) program of the U.S.

National Science Foundation. Her stay began on 22 July 2013, and lasted through September 2013, at which time she started a Ph.D. program at the University of California at San Diego.

Ms. Liliana Roa Pascuali, a citizen of Colombia, a Ph.D. candidate at the Université de Montpellier II, Montpellier, France, and currently working at the Centre de Recherche Halieutique Méditerranéenne et Tropicale in Sète, France, spent the period of 8 July-1 October 2013, working with Dr. Martín A. Hall on characterization of the oceanographic environment of tropical tunas in the EPO, using data on the purse-seine fishery in that region.

Achotines Laboratory

Ms. Adeline Young, a doctoral student from Singapore working under Dr. John H. Christy, a Senior Staff Scientist at the Smithsonian Tropical Research Institute, spent the period of 20-31 July 2013 at the Achotines Laboratory. Her thesis work is focused on a long-term study of fiddler crabs (small, semi-terrestrial crabs of the genus *Uca*).

Mr. Deniz Akin of Vancouver Island University, Nanaimo, British Columbia, Canada, spent the period of 25 July-27 August 2013 as a student intern at the Achotines Laboratory, where he gained experience in algal and rotifer culture, feeding broodstock tuna, capture and transfer of wild yellowfin tuna, and raising marine fish larvae (dorado).

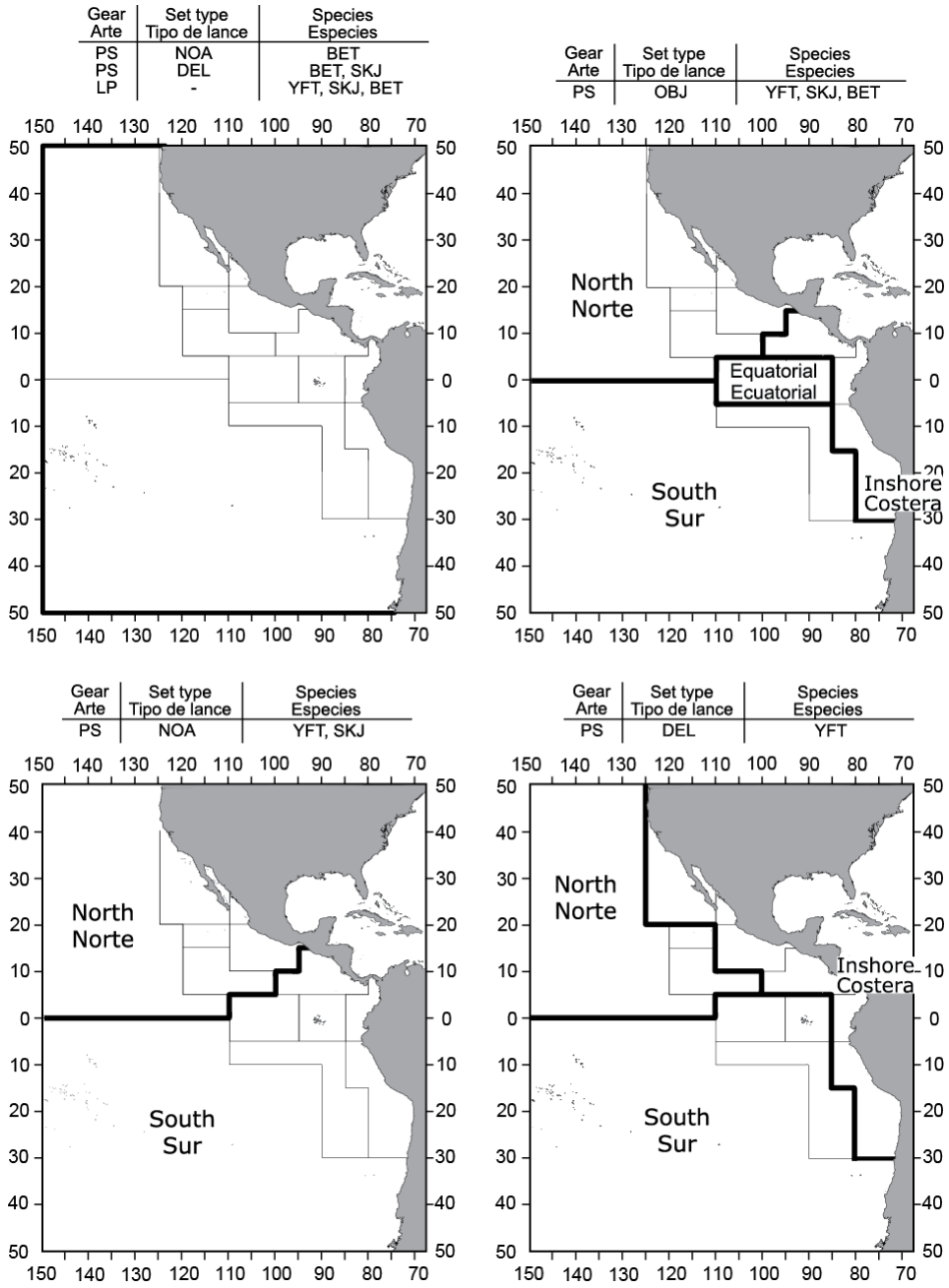

FIGURE 1. Spatial extents of the fisheries defined by the IATTC staff for stock assessment of yellowfin, skipjack, and bigeye in the EPO. The thin lines indicate the boundaries of the 13 length-frequency sampling areas, and the bold lines the boundaries of the fisheries. Gear: PS = purse seine, LP = 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.

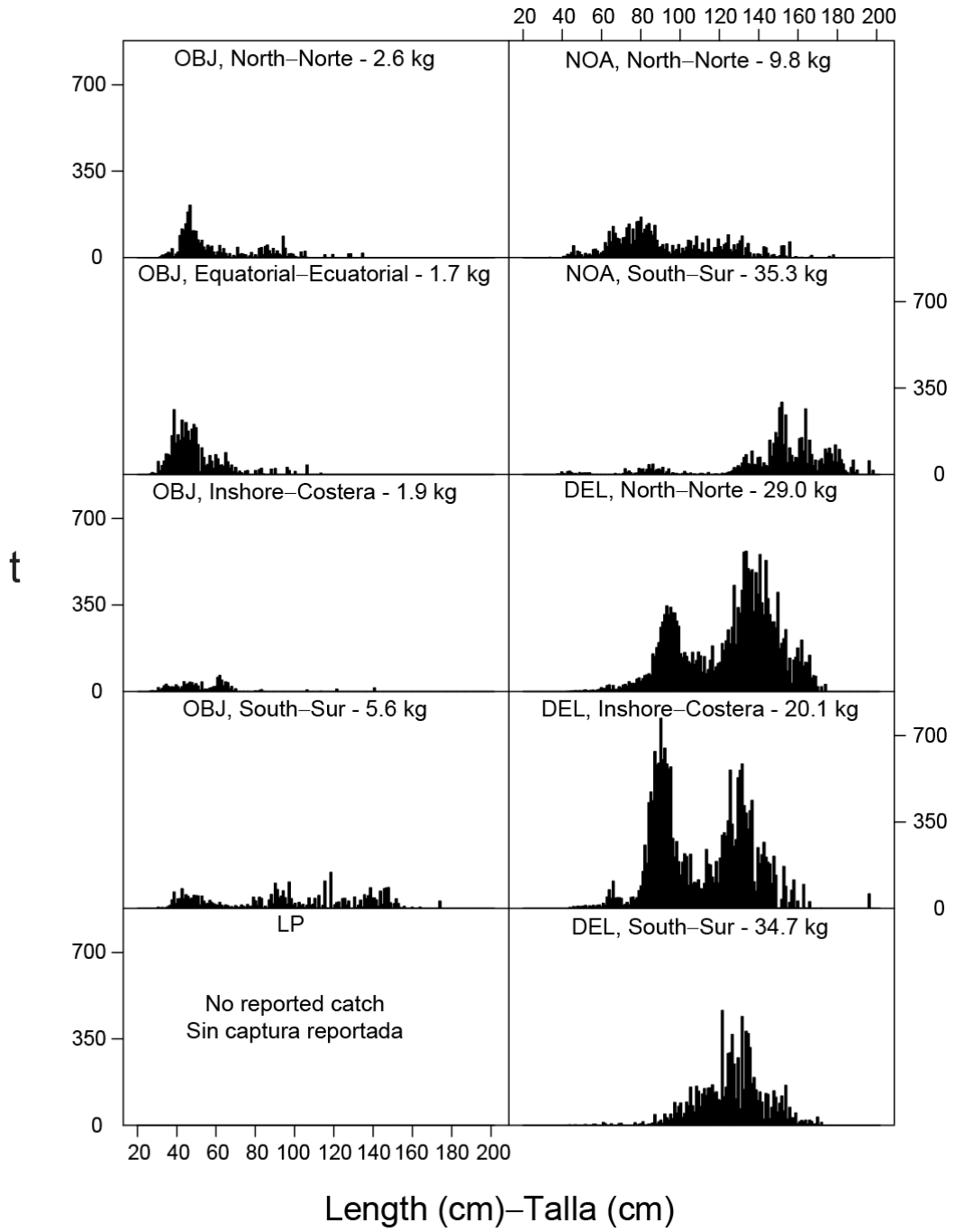

FIGURE 2a. Estimated size compositions of the yellowfin caught in each fishery of the EPO during the second quarter of 2013. The average weights of the fish in the samples are given at the tops of the panels. OBJ = floating object; LP = pole and line; NOA = unassociated; DEL = dolphin; t = metric tons.

FIGURA 2a. Composición por tallas estimada para el aleta amarilla capturado en cada pesquería del OPO durante el segundo trimestre de 2013. 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; t = toneladas métricas.

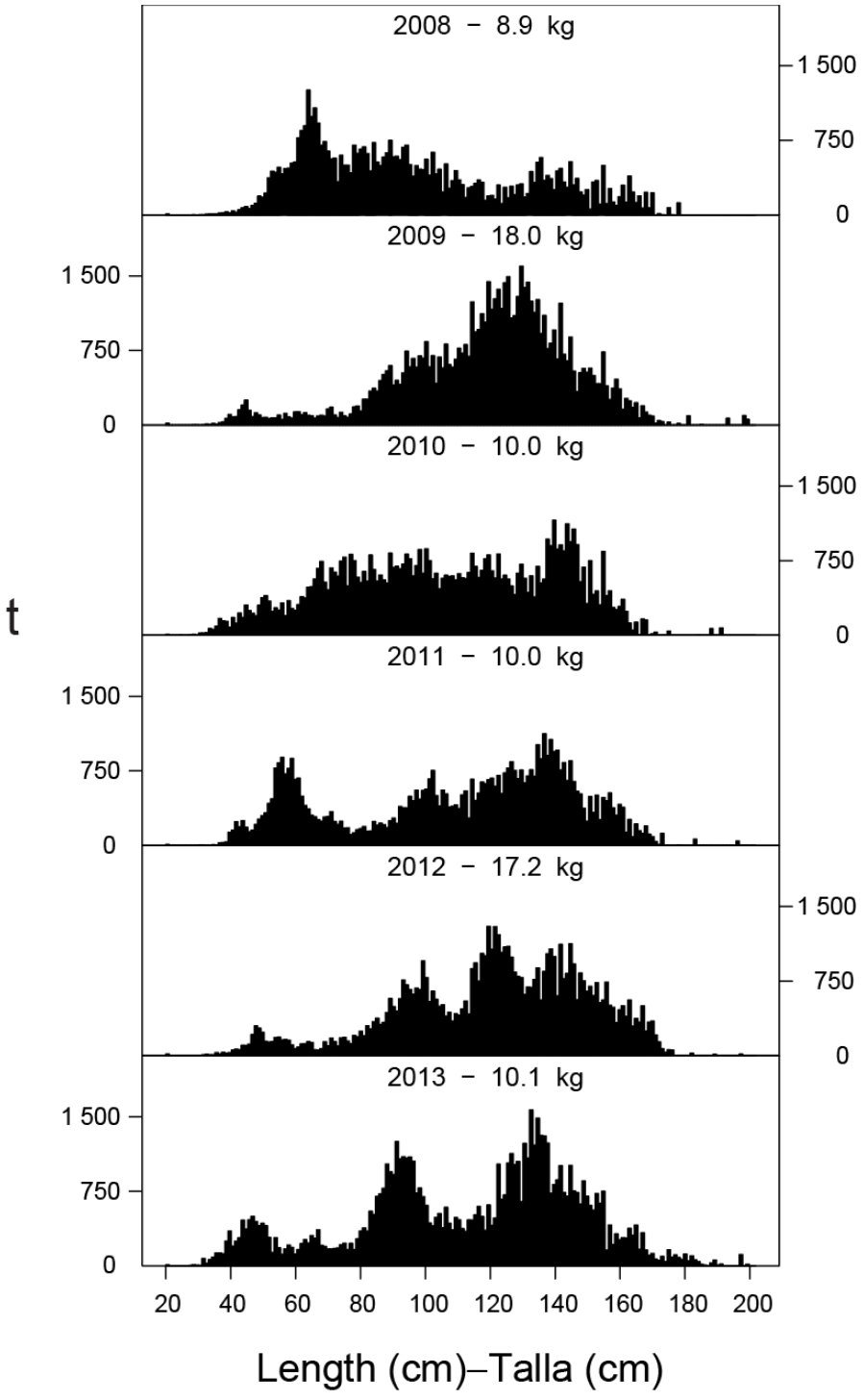

FIGURE 2b. Estimated size compositions of the yellowfin caught in the EPO during the second quarter of 2008-2013. The average weights of the fish in the samples are given at the tops of the panels. t = metric tons.

FIGURA 2b. Composición por tallas estimada para el aleta amarilla capturado en el OPO en el segundo trimestre de 2007-2012. En cada recuadro se detalla el peso promedio de los peces en las muestras; t = toneladas métricas.

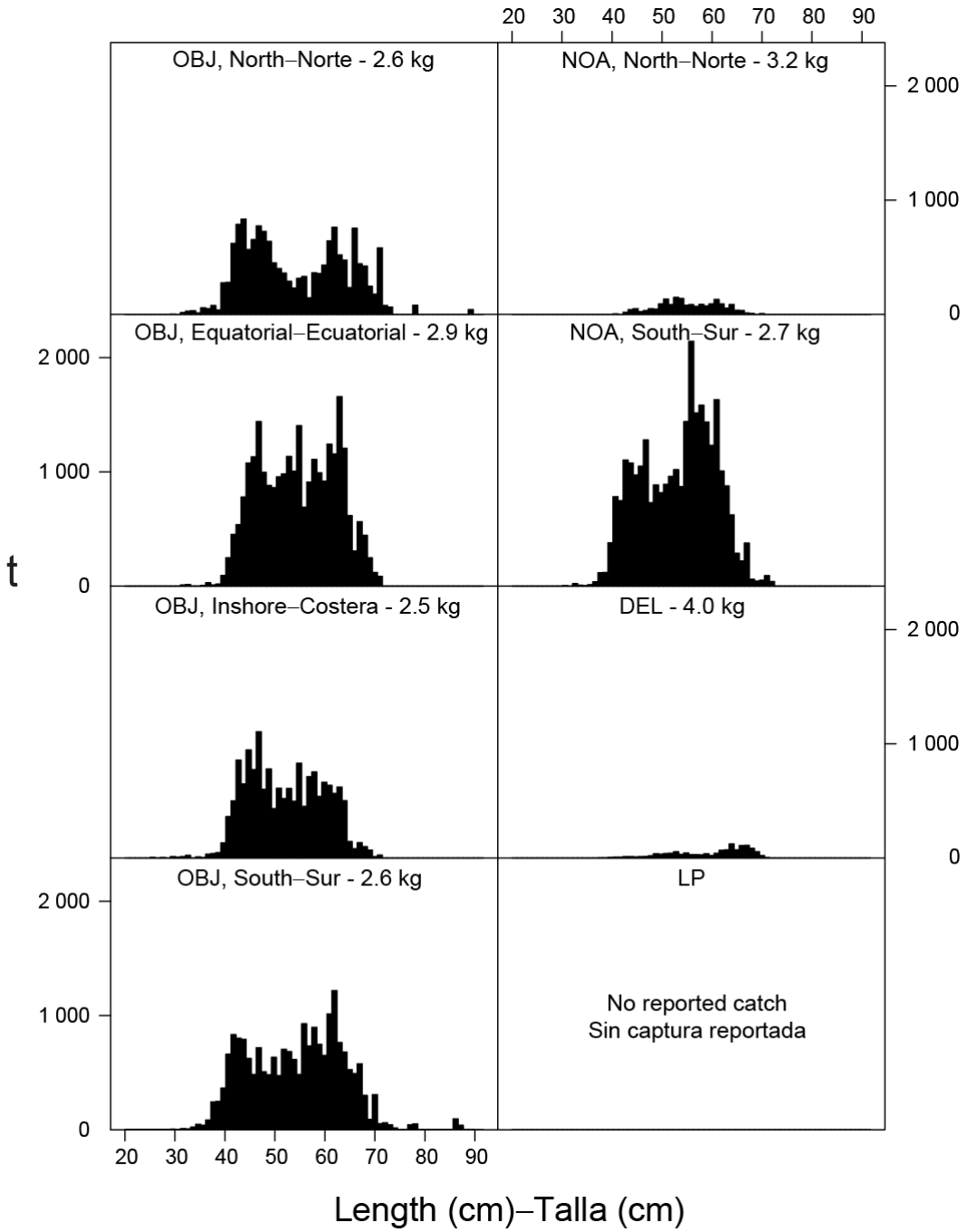

FIGURE 3a. Estimated size compositions of the skipjack caught in each fishery of the EPO during the second quarter of 2013. The average weights of the fish in the samples are given at the tops of the panels. OBJ = floating object; LP = pole and line; NOA = unassociated; DEL = dolphin; t = metric tons.

FIGURA 3a. Composición por tallas estimada para el barrilete capturado en cada pesquería del OPO durante el segundo trimestre de 2013. 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; t = toneladas métricas.

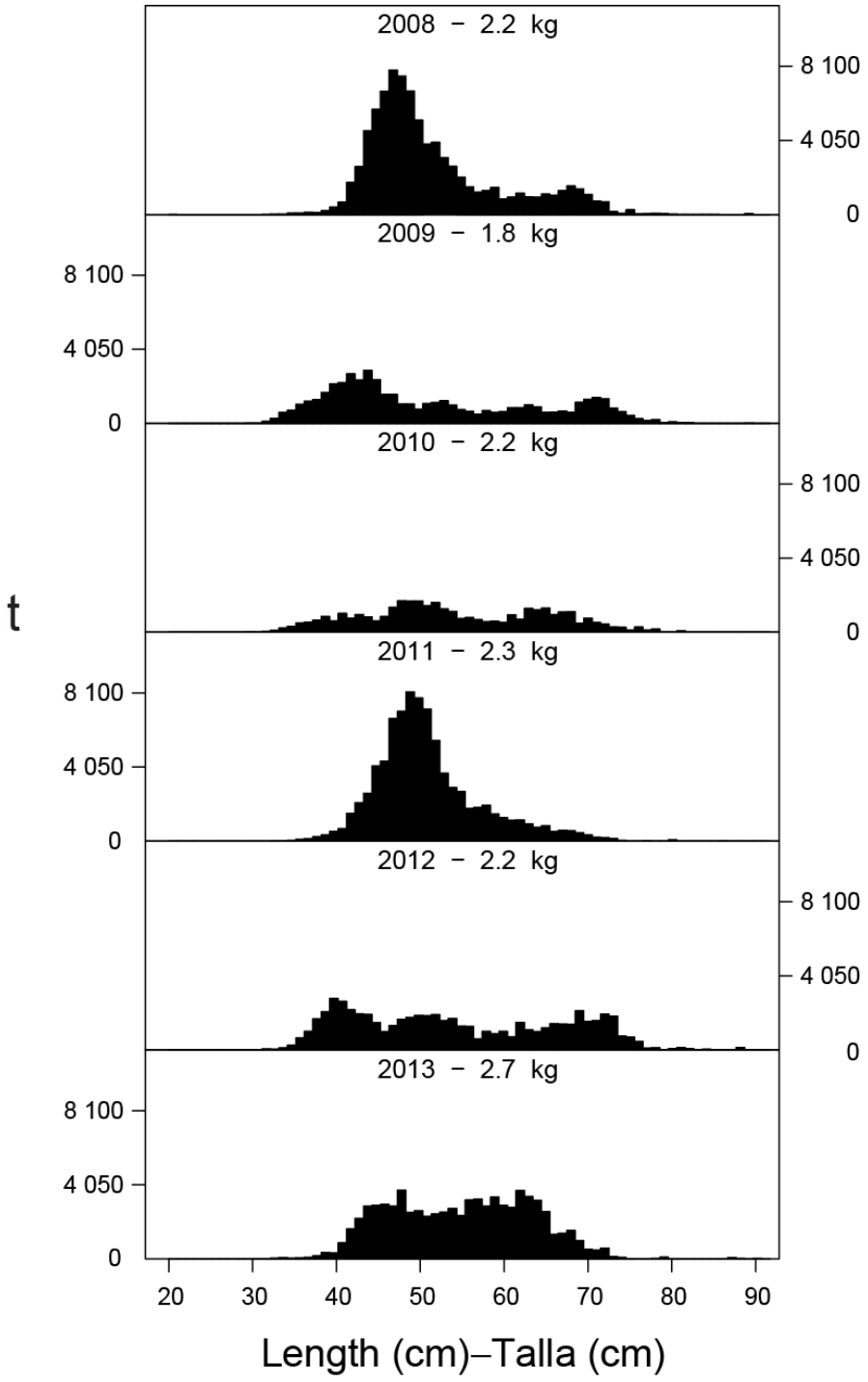

FIGURE 3b. Estimated size compositions of the skipjack caught in the EPO during the second quarter of 2008-2013. The average weights of the fish in the samples are given at the tops of the panels. t = metric tons.

FIGURA 3b. Composición por tallas estimada para el barrilete capturado en el OPO en el segundo trimestre de 2008-2013. En cada recuadro se detalla el peso promedio de los peces en las muestras. t = toneladas métricas.

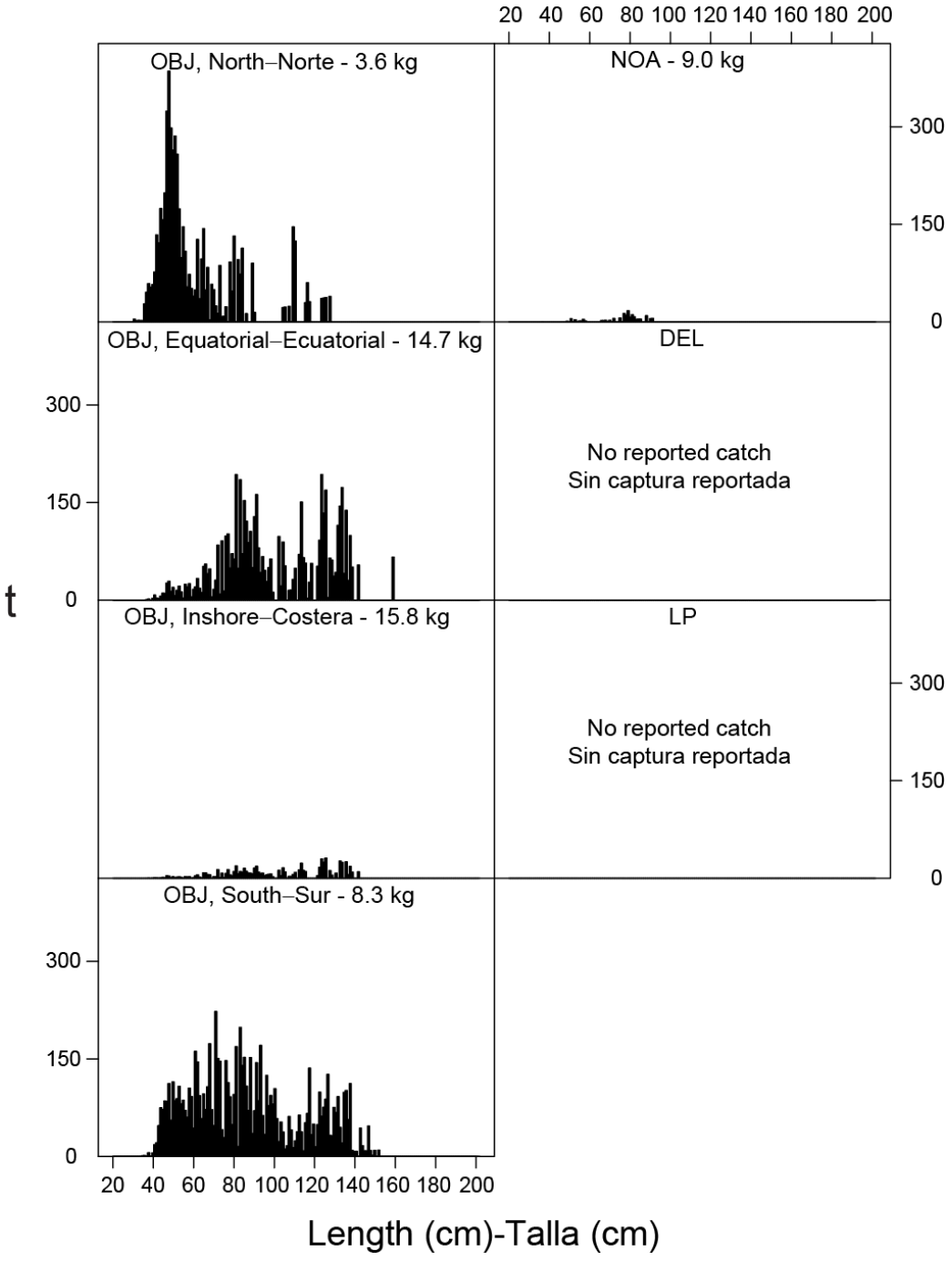

FIGURE 4a. Estimated size compositions of the bigeye caught in each fishery of the EPO during the second quarter of 2013. The average weights of the fish in the samples are given at the tops of the panels. OBJ = floating object; LP = pole and line; NOA = unassociated; DEL = dolphin; t = metric tons.

FIGURA 4a. Composición por tallas estimada para el patudo capturado en cada pesquería del OPO durante el segundo trimestre de 2013. 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; t = toneladas métricas.

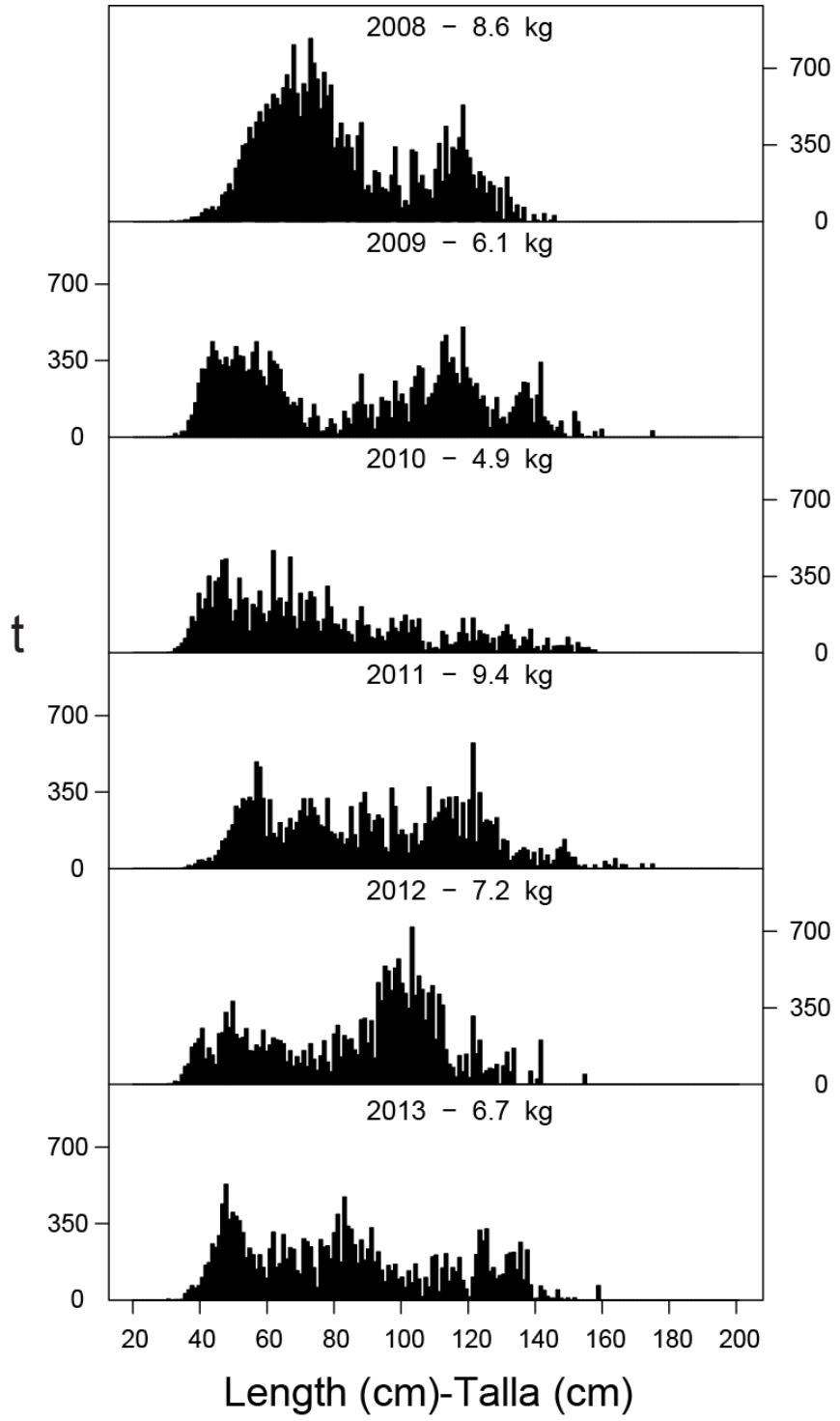

FIGURE 4b. Estimated size compositions of the bigeye caught in the EPO during the second quarter of 2008-2013. The average weights of the fish in the samples are given at the tops of the panels. t = metric tons.

FIGURA 4b. Composición por tallas estimada para el patudo capturado en el OPO en el segundo trimestre de 2008-2013. En cada recuadro se detalla el peso promedio de los peces en las muestras; t = toneladas métricas.

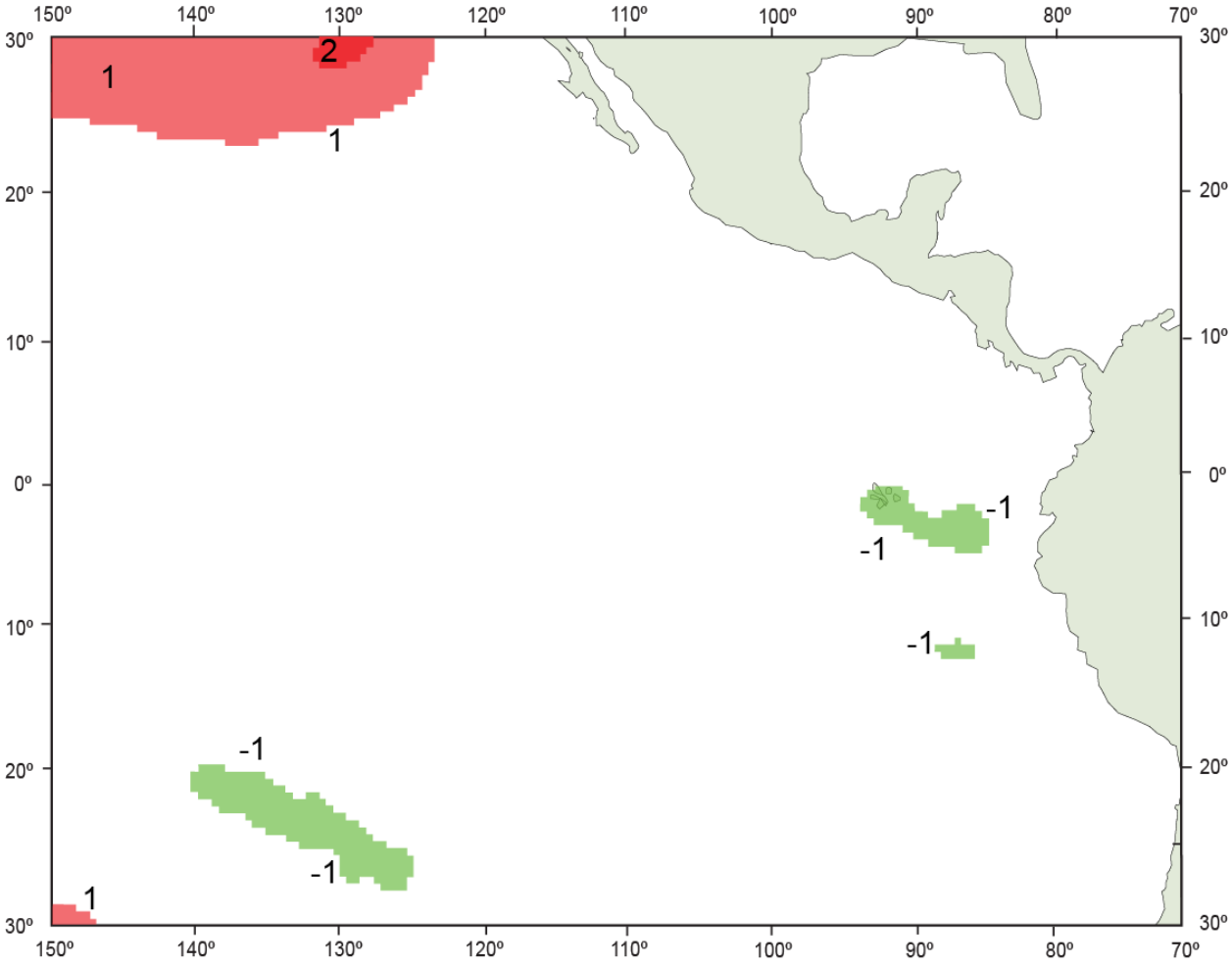

FIGURE 5. Sea-surface temperature (SST) anomalies (departures from long-term normals) for September 2013, based on data from fishing boats and other types of commercial vessels.
FIGURA 5. Anomalías (variaciones de los niveles normales a largo plazo) de la temperatura superficial del mar (TSM) en septiembre de 2013, basadas en datos tomados por barcos pesqueros y otros buques comerciales.

TABLE 1. Estimates of the numbers and capacities, in cubic meters, of purse seiners and pole-and-line vessels operating in the EPO in 2013 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 del número de buques cerqueros y cañeros que pescan en el OPO en 2013, 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				Capacity Capacidad
		1-900	901-1700	>1700	Total	
				Number—Número		
Colombia	PS	4	10	-	14	14,860
Ecuador	PS	73	21	11	105	81,691
EU (España—Spain)	PS	-	-	4	4	10,116
Guatemala	PS	-	1	-	1	1,475
México	PS	10	31	1	42	48,054
	LP	3	-	-	3	268
Nicaragua	PS	-	6	1	7	9,966
Panamá	PS	2	9	3	14	19,251
Perú	PS	1	-	-	1	299
El Salvador	PS	-	1	3	4	7,892
Venezuela	PS	-	15	1	16	22,300
Vanuatu	PS	-	1	-	1	1,360
All flags—Todas banderas	PS	90	94	24	208	
	LP	3	-	-	3	
	PS + LP	93	94	24	211	
				Capacity—Capacidad		
All flags—Todas banderas	PS	42,494	122,100	51,675	216,269	
	LP	268	-	-	268	
	PS + LP	42,762	122,100	51,675	216,537	

TABLE 2. Estimates of the retained catches of tunas in the EPO from 1 January through 29 September 2013, by species and vessel flag, in metric tons.
TABLA 2. Estimaciones de las capturas retenidas de atunes en el OPO del 1 de enero al 29 de septiembre de 2013, 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**
Colombia	13,478	18,061	998	-	-	-	2	-	32,539	7.2
Ecuador	20,254	134,913	26,337	-	802	-	248	1,162	183,716	40.7
México	99,589	14,985	111	3,154	1,283	-	1,898	6	121,026	26.8
Nicaragua	6,033	2,915	2,121	-	-	-	-	-	11,069	2.4
Panamá	14,650	25,717	4,761	-	-	-	-	15	45,143	10.0
Venezuela	21,306	15,141	489	-	-	-	13	6	36,955	8.2
Other—Otros[2]	5,480	10,586	5,121	-	-	-	-	14	21,201	4.7
Total	180,790	222,318	39,938	3,154	2,085	-	2,161	1,203	451,649	

[1] Includes other tunas, sharks, and miscellaneous fishes
[1] Incluye otros túnidos, tiburones, y peces diversos
[2] Includes El Salvador, European Union (Spain), Guatemala, Peru and Vanuatu; this category is used to avoid revealing the operations of individual vessels or companies.
[2] Incluye El Salvador, Guatemala, Perú, Unión Europea (España), y Vanuatú; se usa esta categoría para no revelar información sobre faenas de buques o empresas individuales.

TABLE 3. Reported catches of bigeye tuna in the EPO during 2013 by longline vessels.
TABLA 3. Capturas reportadas de atún patudo en el OPO durante 2013 por buques palangreros.

Country	First quarter	Second quarter	Third quarter				Total to date
			July	August	September	Total	
Pais	Primer trimestre	Segundo trimestre	Tercer trimestre				Total al fecha
			Julio	Agosto	Septiembre	Total	
China	1,279	-	-	-	-	-	1,279
Japan—Japón	-	-	-	-	-	-	-
Republic of Korea—República de Corea	2,791	1,656	257	243	269	769	5,216
Chinese Taipei—Taipei Chino	928	473	229	320	341	890	2,291
USA—EE.UU	-	-	-	-	-	-	-
Vanuatu	-	-	-	-	-	-	-
Total	4,998	2,129	486	563	610	1,659	8,786

TABLE 4. Oceanographic and meteorological data for the Pacific Ocean, October 2012-September 2013. The values in parentheses are anomalies. SST = sea-surface temperature; SOI = Southern Oscillation Index; SOI* and NOI* are defined in the text.
TABLA 4. Datos oceanográficos y meteorológicos del Océano Pacífico, octubre 2012-septiembre 2013. 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	**10**	**11**	**12**	**1**	**2**	**3**
SST—TSM (°C)						
Area 1 (0°-10°S, 80°-90°W)	20.7 (-0.1)	21.2 (-0.4)	22.0 (-0.9)	24.0 (-0.5)	25.7 (-0.4)	26.7 (0.1)
Area 2 (5°N-5°S, 90°-150°W	24.9 (0.0)	25.1 (0.1)	24.9 (-0.2)	25.1 (-0.6)	25.9 (-0.5)	27.2 (0.1)
Area 3 (5°N-5°S, 120°-170°W)	27.0 (0.3)	27.0 (0.4)	26.5 (-0.1)	26,2 (-0.4)	26.3 (-0.4)	27.0 (-0.2)
Area 4 (5°N-5°S, 150W°-160°E)	29.2 (0.5)	29.2 (0.5)	28.7 (0.3)	28.3 (0.0)	28.1 (0.0)	28.0 (-0.2)
Thermocline depth—Profundidad de la termoclina, 0°, 80°W	35	30	35	20	20	10
Thermocline depth—Profundidad de la termoclina, 0°, 110°W	100	100	100	20	25	75
Thermocline depth—Profundidad de la termoclina, 0°, 150°W	150	150	150	125	130	120
Thermocline depth—Profundidad de la termoclina, 0°, 180°W	175	165	180	175	175	180
SOI—IOS	0.3	0.3	-0.6	-0.1	-0.2	1.5
SOI*—IOS*	1.08	-0.23	1.51	0.52	-1.89	1.52
NOI*—ION*	-0.19	-2.34	0.02	6.64	8.00	2.06

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

Month—Mes	**4**	**5**	**6**	**7**	**8**	**9**
SST—TSM (°C)						
Area 1 (0°-10°S, 80°-90°W)	24.7 (-0.9)	22.9 (-1.4)	21.5 (-1.4)	20.3 (-1.3)	19.7 (-1.0)	19.8 (-0.6)
Area 2 (5°N-5°S, 90°-150°W	27.4 (-0.2)	26.4 (-0.7)	25.8 (-0.6)	25.0 (-0.7)	24.4 (-0.6)	24.7 (-0.1)
Area 3 (5°N-5°S, 120°-170°W)	27.7 (-0.1)	27.6 (-0.3)	27.4 (-0.2)	26.9 (-0,3)	26.5 (-0.3)	26.7 (-0.1)
Area 4 (5°N-5°S, 150W°-160°E)	28.5 (0.0)	28.7 (-0.1)	28.8 (-0.1)	28.8 (0.0)	28.7 (0.0)	28.7 (0.0)
Thermocline depth—Profundidad de la termoclina, 0°, 80°W	10	25	25	25	30	20
Thermocline depth—Profundidad de la termoclina, 0°, 110°W	55	30	60	60	55	60
Thermocline depth—Profundidad de la termoclina, 0°, 150°W	120	105	130	140	150	140
Thermocline depth—Profundidad de la termoclina, 0°, 180°W	175	180	175	170	170	160
SOI—IOS	0.2	0.8	1.2	0.8	0.2	0.3
SOI*—IOS*	-1.29	4.79	6.91	3.37	2.18	-0.80
NOI*—ION*	2.73	1.36	1.16	0.47	-1.30	-0.26

TABLE 5. Preliminary data on the sampling coverage of trips of tuna purse seine vessels fishing in the EPO by the observer programs of the IATTC, Colombia, Ecuador, the European Union, Mexico, Nicaragua, Panama, Venezuela, and under the MOC described above, departing during the third quarter of 2013. The numbers in parentheses indicate cumulative totals for the year.
TABLA 5. Datos preliminares de la cobertura de muestreo de viajes de buques atuneros de cerco que pescaron en el OPO por los programas de observadores de la CIAT, Colombia, Ecuador, México, Nicaragua, Panamá, la Unión Europea, Venezuela y bajo el MDC descrito arriba, durante el tercer trimestre de 2013. Los números entre paréntesis indican los totales acumulados para el año.

Flag	**Trips**		**Class-6 – Observed by program**						**Percent observed**	
			IATTC		**National**		**Total**			
Bandera	**Viajes**		**Clase-6 – Observado por programa**						**Porcentaje observado**	
			CIAT		**Nacional**		**Total**			
Colombia	11	(39)	6	(18)	5	(21)	11	(39)	100.0	(100)
Ecuador	66	(259)	47	(168)	19[1]	(91)	66	(259)	100.0	(100)
El Salvador	4	(14)	3	(10)	1[1]	4	4	(14)	100.0	(100)
EU – UE (ESP)	4	(22)	1	(8)	3	(14)	4	(22)	100.0	(100)
Guatemala	1	(4)	1	(4)			1	(4)	100.0	(100)
México	54	(174)	24	(84)	30	(90)	54	(174)	100.0	(100)
Nicaragua	7	(20)	5	(12)	2	(8)	7	(20)	100.0	(100)
Panamá	13	(53)	6	(24)	7	(29)	13	(53)	100.0	(100)
United States—EE.UU.	1	(1)	1	(1)			1	(1)	100.0	(100)
Venezuela	12	(53)	5	(27)	7	(26)	12	(53)	100.0	(100)
Vanuatu	1	(4)	1	(4)			1	(4)	100.0	(100)
Subtotal	174	(643)	100	(360)	74	(283)	174	(643)	100.0	(100)
			Class-4 – Clase-4							
Colombia	1	(1)	1	(1)			1	(1)	-[2]	-[2]
Ecuador	8	(11)	6	(8)	2	(3)	8	(11)	-[2]	-[2]
Total	183	(655)	107	(369)	76	(286)	183	(655)	100.0	(100)

[1] Includes 13 total trips sampled with observers of the WCPFC, according with the MOC–Incluye 13 viajes totales muestreados por observadores del WCPFC, de acuerdo al MDC.
[2] The AIDCP does not require Class-4 vessels to be sampled at 100 percent–El APICD no require que buques de clase 4 sean muestreados al 100%.