INTER-AMERICAN TROPICAL TUNA COMMMISSION
COMISIÓN INTERAMERICANA DEL ATÚN TROPICAL

QUARTERLY REPORT—INFORME TRIMESTRAL

October-December 2014—Octubre-Diciembre 2014

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 fourth quarter of 2014.

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 64th 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 International Dolphin Conservation Program (IDCP) meetings

Dr. Alexandre Aires-da-Silva and Mr. Marlon Román Verdesoto participated at the First IATTC Technical Meeting on Dorado in Manta, Ecuador, on 14-16 October 2014. The meeting was organized by Secretaria de Recursos Pesqueros of the Ministerio de Agricultura, Ganadería, Acuacultura y Pesca (SRP-MAGAP) of Ecuador and chaired by Dr. Aires-da-Silva.

There are two species of dorado, *Coryphaena hippurus* and *C. equiselis*. The former is much more important in the bycatches of the purse-seine fishery and in the artisanal longline fisheries of the EPO, and all of the discussions were about that species. The objectives of the meeting were to: (1) promote synergy in Member States for a regional investigation of dorado in the EPO; (2) review the current state of knowledge of dorado in the EPO; (3) identify and pool available data sets across fisheries and/or regions in the EPO; and (4) plan the next steps of the collaborative research activities. The meeting included a "mini-symposium" in which participants from different countries and/or regions described their studies on dorado. A total of 23 talks, covering topics such as current knowledge about the fisheries, life-history, and stock structure, were presented. Among those talks were one by Mr. Román Verdesoto entitled "Collection and Handling of Data on Dorado Occurrences in the Tuna Purse-Seine Fishery of the Eastern Pacific Ocean, and one by Dr. Aires-da-Silva entitled "Preliminary results from IATTC collaborative research activities on dorado in the EPO and future research plan." Open discussion sessions were conducted to identify and summarize available data sources and structure of a future collaborative research plan. Dorado is an important resource in the EPO, and the IATTC staff plans to continue studying dorado in cooperation with staff members of fishery organizations in the nations that utilize that resource. A second IATTC technical meeting on dorado is scheduled for October 2015 in Peru.

Dr. Aires-da-Silva's and Mr. Román Verdesoto's travel expenses were paid by the International Seafood Sustainability Foundation.

The following IATTC and IDCP meetings were held in La Jolla, California, USA, during the period of 26 October-1 November 2012:

Date(s)	Meeting	Number
26 October	Working Group to Promote and Publicize the AIDCP Dolphin Safe Tuna Certification System	21
26 October	International Review Panel	56
26 October	Parties [to the AIDCP]	30
27-29 October	Inter-American Tropical Tuna Commission	87 (resumed)
30 October	Permanent Working Group on Fleet Capacity	16
31 October -1 November	Inter-American Tropical Tuna Commission	88 (extraordinary)

The following proposals were submitted at the 87th meeting (resumed) of the IATTC:

Number	Proposal	Submitted by
87 A-1-1	Special Rules of Procedure for the Appointment of the Director of the Inter-American Tropical Tuna Commission	Belize, Costa Rica, El Salvador, Guatemala, Nicaragua, and Panama
87 A-2	Procedures for the Selection, Interview and Decision-Making Process for the Commission's Director	European Union
87-A-3	Appointment of the Director of the Inter-American Tropical Tuna Commission	Vanuatu
87-A-4	Procedure for Extending the Term of the Director	Vanuatu
87-A-5	Revision of IATTC Rules of Procedure	European Union
F-1B	Terms of Reference for the Organizational Assessment of the IATTC and AIDCP Secretariat	European Union
H-2A	IATTC Resolution for the Management of Fishing Capacity in the Eastern Pacific Ocean (EPO)	European Union
87 I-1B	Measures for the Conservation and Management of Pacific Bluefin Tuna in the Eastern Pacific Ocean to Establish a Multi-Annual Rebuilding Plan	Japan
87 I-3	Measures for the Conservation and Management of Pacific Bluefin Tuna in the Eastern Pacific Ocean	Mexico
87-I-3A	Measures for the Conservation and Management of Pacific Bluefin Tuna in the Eastern Pacific Ocean	Mexico, Japan, and the United States

The following proposed Working Documents were submitted at the 87th meeting:

	Commission Decision on the Duration of the Term of the Director	
	Terms of Reference for the Organizational Assessment of the IATTC and AIDCP	European Union

The following proposal was submitted at the 88th meeting of the IATTC:

88-A-1	Proposed Way Forward to Resolve Capacity Disputes	Vanuatu

Other meetings

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, USA, on 14-16 October 2014. His travel expenses were paid by the Western Pacific Fishery Management Council.

Dr. Michael D. Scott participated in a consultation via telephone and computer between the Pacific Scientific Review Group and the NMFS on 27 October 2014. Dr. Scott serves as chair of the Pacific Scientific Review Group, which provided advice on marine mammal mortality and serious injury in the Pacific Ocean and on the stock structure of false killer whales.

Dr. Guillermo A. Compeán participated in the XVII National Tuna Forum in Mazatán, Mexico, on 19-21 November 2014. The purpose of the meeting was to promote the analysis of data on tunas and the fishery for them and to generate awareness of the need to achieve sustainable fisheries for these species. This forum was organized by the Instituto Nacional de Pesca and the Comisión Nacional de Acuacultura y Pesca (CONAPESCA) of Mexico.

Dr. Compeán also participated in a forum on Sustainable Fisheries Management in Baja California in Ensenada, Mexico, on 26 November 2014. The meeting was organized by the government of Baja California for the purpose of informing the attendees of the different models for fisheries management that promotes environmental, economic, and social sustainability for the benefit of the sea, fishermen, and consumers.

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 catches of 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. 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.

IATTC personnel stationed at its field offices collected 296 length-frequency samples from 188 wells and abstracted logbook information for 257 trips of commercial fishing vessels during the fourth quarter of 2014.

Reported fisheries statistics

The information reported herein is 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), 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 scientific observers, fishing vessel logbooks, reports of landing, and data compiled by governmental agencies.

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

The lists of vessels authorized to fish for tunas in the EPO are given in the IATTC Regional Vessel Register (http://www.iattc.org/VesselListsENG.htm). The estimated total fish-carrying capacity of the purse-seine and pole-and-line vessels that have or are expected to fish in the EPO during 2014 is about 230,000 m^3 (Table 1). The average weekly at-sea capacity for the fleet, for the weeks ending 5 October through 31 December, was about 117,100 m^3 (range: 52,700 to 179,400 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-December 2014, and comparative statistics for 2009-2013, were:

Species	**2014**	**2009-2013**			**Weekly average, 2014**
		Average	**Minimum**	**Maximum**	
Yellowfin	237,700	219,600	203,500	235,100	4,600
Skipjack	258,400	242,000	170,700	272,700	5,000
Bigeye	52,800	50,000	44,100	56,700	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

No adjustments in the catch-per-unit-of-effort (CPUE) data are included for 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.

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 Class-6 vessels (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 carrying capacity.

The estimated nominal catches per day of fishing for 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 third quarter of 2014 and comparative statistics for 2009-2013 were:

Region	Species	Gear	2014	2009-2013		
				Average	Minimum	Maximum
N of 5° N	Yellowfin	PS	15.4	12.9	11.9	13.9
S of 5° N			2.7	2.9	2.4	3.5
N of 5° N	Skipjack	PS	1.5	2.0	0.8	2.7
S of 5° N			9.5	9.3	7.5	11.4
EPO	Bigeye	PS	1.9	2.4	2.3	2.5
EPO	Yellowfin	LP	0	5.4	2.8	9.2
EPO	Skipjack	LP	0	0.6	0.4	1.0

Catch statistics for the longline fishery

The catches of bigeye by longline gear in the EPO are reported by flag states whose annual catches have exceeded 500 metric tons (http://iattc.org/PDFFiles2/C-09-01-Tuna-conservation-2009-2011.pdf). Preliminary estimates of the catches reported for January-December 2014 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 and pole-and-line vessels in the EPO are collected by IATTC personnel at ports of landing in Ecuador, Mexico, Panama, 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 third quarter of 2009-2014 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 third quarter of 2014, and the second shows data for the combined strata for the third quarter of each year of the 2009-2014 period. Samples from 195 wells were taken during the third quarter of 2014.

There are ten surface fisheries for yellowfin defined for stock assessments: four associated with floating objects, two with unassociated tuna schools, three associated with dolphins, and one pole-and-line (Figure 1). The last fishery includes all 13 sampling areas. Of the 195 wells sampled that contained fish caught during the third quarter of 2014, 161 contained yellowfin. The estimated size compositions of these fish are shown in Figure 2a. During the third quarter the majority of the larger sized (>120 cm) yellowfin was taken by sets on dolphins in the Northern and, to a lesser extent, the Inshore area. Lesser amounts of smaller sized (60-120 cm) yellowfin were taken primarily in the Northern and Inshore dolphin fishery. Most of the smaller (<60 cm) yellowfin was taken in the Equatorial and Inshore floating object fisheries.

The estimated size compositions of the yellowfin caught by all fisheries combined during the third quarters of 2009-2014 are shown in Figure 2b. The average weight of yellowfin caught during the third quarter of 2014 (8.9 kg) was greater than the 7.3 kg average in 2013, but still less than the preceding four years, all of which were 10.0 kg or greater.

There are eight fisheries for skipjack defined for stock assessments: four associated with floating objects, two with unassociated tuna schools, one associated with dolphins, and one pole-and-line (Figure 1). Each of the last two fisheries includes all 13 sampling areas. Of the 195 wells sampled that contained fish caught during the third quarter of 2014, 109 contained skipjack. The estimated size compositions of these fish are shown in Figure 3a. Most of the skipjack was in the 40- to 70-cm range and was caught in all four of the floating-object fisheries and in the Southern unassociated fishery, with the majority caught in the Equatorial floating-object fishery. The smaller sized skipjack (<40 cm) was caught in the Northern and Southern floating-object fisheries.

The estimated size compositions of the skipjack caught by all fisheries combined during the third quarters of 2009-2014 are shown in Figure 3b. The average weight of skipjack caught during the third quarter of 2014 (2.2 kg) was close to the average of the previous five years (range: 1.6 to 2.7 kg).

There are seven surface fisheries for bigeye defined for stock assessments: four associated with floating objects, one with unassociated tuna schools, one associated with dolphins, and one pole-and-line (Figure 1). Each of the last three fisheries includes all 13 sampling areas. Of the 195 wells sampled that contained fish caught during the third quarter of 2014, 48 contained bigeye. The estimated size compositions of these fish are shown in Figure 4a. Most of the third quarter bigeye was caught in the Northern and Southern floating-object fisheries, with lesser amounts in the Equatorial floating-object fishery. Significant amounts of large bigeye >120 cm was caught in the Equatorial and Southern floating-object fisheries.

The estimated size compositions of the bigeye caught by all fisheries combined during the third quarter of 2009-2014 are shown in Figure 4b. The average weight of bigeye caught during the third quarter of 2014 (4.4 kg) was slightly greater than the 2013 average, but less than the 2009-2012 averages, which ranged from 4.7 to 5.6 kg. Bigeye greater than 140 cm in length were present in significant amounts for the first time since 2009.

The estimated retained purse-seine catch of bigeye less than 60 cm in length during the third quarter of 2014 was 4,800 metric tons (t), or about 38 percent of the estimated total retained purse-seine catch of bigeye during that period. The corresponding amounts for 2009-2013 ranged from 3,812 to 9,601 t, or 37 to 46 percent. These values may differ slightly from those given in previous Quarterly Reports due to changes in the estimation procedure.

BIOLOGY AND ECOSYSTEM PROGRAM

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 1:15 a.m. and 8:10 a.m. The number of eggs collected ranged from 17,000 to 1,017,000 per day. The water temperatures in the tank ranged from 27.9° to 28.8°C.

At the end of the quarter there were one 50-kg , six 38- to 43-kg , and seven 27- to 29-kg yellowfin in Tank 1. There were thirteen 3- to 9-kg yellowfin tuna in the 170,000-L reserve broodstock tank (Tank 2).

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, and hatching rate. The lengths of hatched larvae, duration of yolk-sac stage, weights of the eggs, yolk-sac larvae, and first-feeding larvae, and the lengths and selected morphometrics of these, were measured periodically.

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 IATTC 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. The research on Pacific bluefin, which is conducted at the Fisheries Laboratories of KU in Wakayama Prefecture, Japan, is being supported by the Japan Science and Technology Agency (JST).

As part of this project, multiple Kinki University scientists, including faculty members, research associates, and graduate students, arrived at the Achotines Laboratory in September 2014 and conducted experiments through December 2014. ARAP biologists joined the Kinki University scientists in working with the Achotines Laboratory staff on the experiments. A small group of early-juvenile yellowfin (7 cm average length, 6 weeks old) was moved from a juvenile rearing tank to one of the larger concrete tanks. The transfer was conducted to test handling methods that will be used on a larger group of juveniles when they are stocked in a juvenile sea cage in June 2015.

As part of the SATREPS program, Mss. Jeanne B. Wexler and Maria S. Stein of the IATTC's Early Life History Group spent the period of 1-20 December 2014 at the Achotines Laboratory. During their stay, they worked with Achotines Laboratory staff members on experiments investigating prey selection and feeding behaviors of yellowfin larvae. The experiments are part of current comparative studies of the early life stages of yellowfin and Pacific bluefin being conducted by the Early Life History Group, as part of the SATREPS project. The same feeding experiments will be conducted with Pacific bluefin larvae in Japan during July 2015 in order to obtain comparative feeding data for the larvae of both species.

The annual SATREPS Joint Coordination Committee (JCC) meeting was carried out in Panama, R.P., on 18 November 2014. Representatives from the IATTC, JICA, KU, and ARAP reviewed progress to date and plans for the final year of the project. Dr. Daniel Margulies and Mr. Vernon P. Scholey represented the IATTC at the meeting.

In late November 2014, several Japanese and Panamanian journalists visited the Achotines Laboratory for an on-site presentation of the SATREPS project. An NHK television news team from Tokyo streamed a live feed for the morning news in Japan and gathered footage for taped presentations; the team was joined by a newspaper journalist from Japan's Yomiuri Shimbun.

During the quarter, SATREPS-supported infrastructure upgrades were made at the Achotines Laboratory. These included the completion of a new concrete ramp at the base of the Achotines pier, providing beach access, and the activities of three technicians from Japan who worked with ARAP staff members to modify the anchoring and buoy system of the juvenile sea cage frames anchored off of the entrance to Achotines Bay. In June 2015, the sea cages will be stocked with juvenile yellowfin reared from the egg and larval stages in the Laboratory.

Inter-agency cooperation

Collaborative work between the IATTC and University of Maryland, Baltimore County

Since late 2012, the IATTC's Early Life History Group has been collaborating on joint research activities on yellowfin tuna with Dr. Yonathan Zohar, Professor and Chair of the Department of Marine Biotechnology at the Institute of Marine and Environmental Technology, University of Maryland, Baltimore County (UMBC), and his research group. In June 2014, an air shipment of yellowfin eggs and larvae was sent to UMBC's biosecure research facility in Baltimore with moderate survival on arrival. Dr. Francisco de Asis de la Serna Sabate of UMBC, who previously visited the Achotines Laboratory in April 2013, returned to the Achotines Laboratory in November 2014 and conducted preliminary rearing experiments with eggs and larvae of yellowfin tuna. Dr. Sabate's initial trials during the month were successful, and in early December he accompanied an air shipment of yellowfin eggs and larvae to the UMBC.

Other collaborative studies of yellowfin eggs and larvae

Cryoocyte, Inc., a research and technology company based in Boston, Massachusetts, USA, initiated a collaboration with the Early Life History Group on some pilot studies on the feasibility of cryopreservation techniques for yellowfin embryo stages (IATTC Quarterly Report for April-June 2014). On 1 December 2014, two Cryoocyte scientists visited the Achotines Laboratory for several days to set up laboratory space and analytical equipment for additional experiments. Three Cryoocyte staff members returned in mid-December and initiated research trials that were to continue into mid-January of 2015. Cryoocyte is providing the funding for the pilot research trials.

Collaboation with Yale University

Mr. Vernon P. Scholey spent the period of 29-31 October 2014 in New Haven, Connecticut, USA, having been invited by Yale University to give presentations and meet with faculty members, students, and administrators regarding Yale University present and potential activities at the Achotines Laboratory and the surrounding landscapes. Mr. Scholey gave one talk entitled "Fresh Tuna and So Much More: Tropical Pelagic and Coastal Research Activities and Opportunities at the Achotines Laboratory" to faculty members and students of the Yale Center for Coastal and Watershed Systems and a second talk entitled "A Marine Biologist Comes Ashore: Experiences in Tropical Dry Forest Restoration on Panama's Azuero Peninsula" to the students and faculty of the Yale School of Forestry and Environmental Studies. The first talk was co-authored with Dr. Daniel Margulies and Mss. Jeanne B. Wexler and Maria S. Stein.

Studies of snappers

The work on snappers (*Lutjanus* spp.) is carried out by the 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 of 2013, a major fishing effort was undertaken, and more than 100 spotted rose snappers were collected in local waters. At the end of December 2014, 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). (The depth of the thermocline is a proxy for the depth of the upper edge of the oxygen-minimum zone, a thick layer of oxygen-poor water underlying the upper mixed layer. In locations where the thermocline is shallow, the habitat for tunas, especially yellowfin tuna, is vertically compressed near the surface of the ocean, where they are vulnerable to capture by surface gear.) 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.

During December 2013 (IATTC Quarterly Report for October-December 2013: Figure 5) and January 2014, the SSTs were very close to normal throughout the entire tropical EPO. In February, however, a band of cool water, which extended along the equator from the coast of South America to about 145°W, appeared. Also some spots of warm appeared off Mexico and Central America. The band of cool water along the equator nearly disappeared in March, but there were spots of cool water along the coasts of Ecuador and Peru, and the spots of warm water off Mexico and Central America were more pronounced than they had been in February. By April the band of cool water along the equator had disappeared, but the spots of cool water along the coast of South America persisted. By May, however, the spots of cool water off South America had virtually disappeared. In May and June there was a band of warm water along the equator that extended from the coast of South America to west of 180° and the area of warm water off Mexico was still in existence (IATTC Quarterly Report for April-June 2014, Figure 5). In May, June, and July there was a band of cool water along 10°S that extended from the coast of South America to about 125°W. This band weakened during August and September. Meanwhile, extensive areas of warm water were developing north of about 10°S (IATTC Quarterly Report for July-September 2014, Figure 5)—the early onset of the El Niño event that had been predicted by the U.S. National Weather Service (IATTC Quarterly Report for January-March 2014). During October, November, and December, however, the warm water was confined mostly to the area north of the equator and, in fact, a small area of cool water appeared well south of the equator and grew larger in December (Figure 5). The SSTs were mostly below normal from October 2013 through March 2014, but during April-December 2014 they were virtually all above normal (Table 4).

According to the Climate Diagnostics Bulletin of the U.S. National Weather Service for December 2014, "Most models predict the SST anomalies to remain at weak El Niño levels (3-month values of the Niño-3.4 index [Area 3 in Table 4] between 0.5°C and 0.9°C) during December-February 2014-15, and lasting into the Northern Hemisphere spring 2015. If El Niño were to emerge, the forecaster consensus favors a weak event that ends in early Northern Hemisphere spring. In summary, there is an approximately 50-60 percent chance of El Niño conditions during the next two months, with ENSO[El Niño-Southern Oscillation]-neutral favored thereafter."

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 International Dolphin Conservation Program's (IDCP's) 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 and the Regional Observer Program (ROP) under the umbrella of the Western and Central Pacific Fisheries Commission (WCPFC), based on a Memorandum of Cooperation (MOC) signed by representatives of the IATTC and the WCPFC.

In addition, Resolution C-12-08 of the IATTC requires 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." 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 such vessel carries an observer of the IDCP On-Board Observer Program. Resolution A-02-01 also requires "purse-seine vessels of less than 363 metric tons carrying capacity … that have been identified by the IRP to have committed a possible infraction by intentionally setting on dolphins … to carry observers."

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 2014 the observer programs of Colombia, the European Union, Mexico, Nicaragua, Panama, and Venezuela were 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's 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, one party to both regional fisheries management organizations, and to the AIDCP, requested that a cross-endorsed observer be allowed to be deployed on one trip of vessel planning to operate in both areas during the fourth quarter of 2014. This request was granted.

Observers from the IDCP On-Board Observer Program departed on 147 fishing trips aboard Class-6 purse seiners covered by that program during the fourth quarter of 2014. Preliminary coverage data for these vessels during the quarter, plus data for one trip of an EPO-based vessel that operated in the EPO, but carried an ROP observer, are shown in Table 5. (If vessels based in ports in the western or central Pacific Ocean fish in the EPO, more rows, and possibly more columns, will be required in the tables equivalent to Table 5.)

In addition, there were nine trips 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 Register shall be required to carry an observer from the [IDCP]." The nine trips by Class-4 vessels in Table 5 were made on vessels making one 30-day trip during the selected closure period under the above-stated resolution.

Training

Messrs. Ernesto Altamirano and Erick Largacha conducted an IATTC-IDCP observer training course in Mazatlán, México, during 10-27 November 2014. There were 17 trainees, all to be collecting data for the IATTC observer program, in attendance.

Gear project

There were two dolphin safety-gear inspections and safety-panel alignment procedures carried out aboard purse-seiners during the fourth quarter of 2014. One was performed aboard a Mexican-flag vessel by a staff member of the Programa Nacional de Aprovechamiento del Atún y Protección de Delfines (PNAAPD) of Mexico, and the other aboard an Ecuadorian-flag vessel by Mr. Marlon Román Verdesoto of the IATTC staff.

INTER-AGENCY COOPERATION

The Center for the Advancement of Population Assessment Methodology (CAPAM) hosted a workshop on "Growth: Theory, Estimation, and Application in Fishery Stock Assessment Models" on 3-7 November 2014 at the Southwest Fisheries Science Center (SWFSC) in La Jolla, California, USA. The five-day meeting was part of a broader program under CAPAM that focuses on developing guidance for Good Practices in Stock Assessment Modeling. The workshop was sponsored by U.S. National Oceanic and Atmospheric Administration/National Marine Fisheries Service (NOAA/NMFS) and the International Seafood Sustainability Foundation (ISSF). Dr. Mark N. Maunder of the IATTC staff served as chairman for the technical forum. A diverse body participated in the workshop, including about 100 scientists from federal, state, and international fishery organizations, 30 scientists who contributed recent analyses and case studies pertaining to growth, and 5 invited keynote speakers, who provided reviews on major topics associated with growth parameterization and considerations in fishery assessment models. The keynote speakers were:

biological processes/ontogeny (Kai Lorenzen, University of Florida);

specification and estimation: age-structured models (R.I.C.C. Francis [New Zealand]) and length-structured models (André Punt, University of Washington);

spatial/temporal variation (Steve Martell, International Pacific Halibut Commission);

modeling growth in tuna assessments (Dale Kolody, Commonwealth Scientific and Industrial Organisation [Australia] Marine and Atmospheric Research).

The workshop was structured in a manner that allowed both novice practitioners and experienced analysts to gain insight into growth properties and parameterizations involved in developing robust stock assessment models. Each of the above topics was comprised of a review and several research presentations, followed by group discussion that addressed focus questions and outlined priorities for future research.

Additionally, two special sessions related to modeling growth in integrated assessment models were held as part of the overall workshop. The first session was based on the widely-used stock statistical modeling framework Stock Synthesis (Richard D. Methot, Jr., and Chantell R. Wetzel, 2013, Stock synthesis: a biological and statistical framework for fish stock assessment and fishery management, Fisheries Research, 142; 86-99), with Ian Taylor (Northwest Fisheries Science Center (NWFSC), U.S. NMFS) presenting an overview and tutorial for addressing growth parameter options available in Stock Synthesis. The second session was led by James Thorson (NWFSC), who provided an introduction to Template Model Builder, an AD Model Builder-inspired R-package for fitting flexible state-space and hierarchical models.

CAPAM is a collaborative effort, jointly supported by the Southwest Fisheries Science Center (SWFSC, NOAA Fisheries), the Inter-American Tropical Tuna Commission (IATTC), and Scripps Institution of Oceanography (SIO, University of California, San Diego). Workshop presentations and recordings are available online from the CAPAM web site (visit www.CAPAMresearch.org). Formal papers produced from proceedings of the workshop and other contributions will be included in a special issue publication of the journal Fisheries Research.

The following presentations were given by IATTC staff members:

Guidance for modelling the variability of length-at-age: lessons from data sets with no aging error, by C.V. Minte-Vera, S. Campana, and M. Maunder (presented by Dr. Carolina Minte-Vera);

Estimation of growth within stock assessment models: implications when using length composition data by J. Zhu, M.N. Maunder, A.M. Aires-da-Silva, and Y. Chen (presented by Dr. Mark N. Maunder).

In addition to Drs. Minte-Vera and Maunder, Drs. Alexandre Aires-da-Silva, Richard B. Deriso, Martin A. Hall, Michael G. Hinton, and Daniel Margulies, Messrs. Marlon Román-Verdesoto, Kurt M. Schaefer, and Patrick K. Tomlinson, and Ms. Jeanne B. Wexler participated in the workshop.

Mr. Raúl E. Lara Mendoza, a Ph.D. candidate at the Faculty of Ciencias del Mar, Universidad Autónoma de Sinaloa, Mexico, spent the period of 3-15 November 2014 at the IATTC headquarters in La Jolla. He worked with Dr. Carolina Minte-Vera to increase his understanding of the stock assessment techniques he acquired during the NOAA-IATTC Stock Synthesis 3 (SS3) course held at the Southwest Fisheries Science Center in La Jolla during June-July 2014. His activities included participation in the Center for the Advancement of Population Assessment Methodology (CAPAM) technical workshop on growth described above, a review of input file syntax for SS3, and the construction of a model with his own data on thresher sharks.

At the invitation of Professor Billy Ernst, Mr. Patrick K. Tomlinson gave a short course on sampling to some graduate students at the Universidad de Concepción in Concepción, Chile, on 9-12 December 2014.

Collaborations with the University of Maryland, Baltimore County, Cryoocyte, Inc., and Yale University are described in the section entitled Early Life History Studies.

PUBLICATIONS

IATTC Stock Assessment Report 15

Román-Verdesoto, Marlon, and Martin Hall. 2013. Updated summary regarding hammerhead sharks caught in the tuna fisheries in the eastern Pacific Ocean. Inter-Amer. Trop. Tuna Comm., Stock Assess. Rep. 15: 3-6.

Minte-Vera, Carolina V., Alexandre Aires-da-Silva, and Mark N. Maunder . 2014. Status of yellowfin tuna in the eastern Pacific Ocean in 2013 and outlook for the future. Inter-Amer. Trop. Tuna Comm., Stock Assess. Rep. 15: 7-24.

Aires-da-Silva, Alexandre, and Mark N. Maunder. 2014. Status of bigeye tuna in the eastern Pacific Ocean in 2013 and outlook for the future. Inter-Amer. Trop. Tuna Comm., Stock Assess. Rep. 15: 25-39.

Maunder, Mark N. 2014. Updated indicators of stock status for skipjack tuna in the eastern

Pacific Ocean. Inter-Amer. Trop. Tuna Comm., Stock Assess. Rep. 15: 40-46.

Maunder, Mark N., Kevin, R. Piner, and Alexandre Aires-da-Silva. 2014. Stock status of Pacific bluefin tuna and the urgent need for management action. Inter-Amer. Trop. Tuna Comm., Stock Assess. Rep. 15: 47-73.

Maunder , Mark N., and Alexandre Aires-da-Silva. 2014. Developing conservation measures for bluefin tuna in the eastern and western regions of the Pacific Ocean: factors to consider and fishery impact analysis. Inter-Amer. Trop. Tuna Comm., Stock Assess. Rep. 15: 74-99.

Maunder, Mark N. 2014. Management strategy evaluation (MSE) implementation in Stock Synthesis: application to Pacific bluefin tuna. Inter-Amer. Trop. Tuna Comm., Stock Assess. Rep. 15: 100-117.

Aires-da-Silva, Alexandre, Cleridy Lennert-Cody, Mark N. Maunder, and Marlon Román-Verdesoto. 2014. Stock status indicators for silky sharks in the eastern Pacific Ocean. Inter-Amer. Trop. Tuna Comm., Stock Assess. Rep. 15: 118-141.

Hinton, Michael G., Mark Maunder, Nick Vogel, Robert Olson, Cleridy Lennert, Alexandre Aires-da-Silva, and Martin Hall. 2014. Stock status indicators for fisheries of the eastern Pacific Ocean. Inter-Amer. Trop. Tuna Comm., Stock Assess. Rep. 15: 142-182.

Maunder, Mark N., and Richard B. Deriso. 2014. Evaluation of the relationship between active purse-seine fishing capacity and fishing mortality in the eastern Pacific Ocean. Inter-Amer. Trop. Tuna Comm., Stock Assess. Rep. 15: 183-192.

Maunder, Mark N., and Richard B. Deriso. 2014. Proposal for biomass and fishing mortality limit reference points based on reduction in recruitment. Inter-Amer. Trop. Tuna Comm., Stock Assess. Rep. 15: 193-206.

Outside journals

Guillen, Angel, Tomoki Honryo, Juan Ibarra, Amado Cano, Daniel Margulies, Vernon P. Scholey, Jeanne B. Wexler, Maria S. Stein, Toru Kobayashi, and Yoshifumi Sawada. 2014. Effect of water temperature on embryonic development of yellowfin tuna *Thunnus albacares* inhabiting the eastern Pacific Ocean. Aquaculture Science, 62 (3): 319-322.

Honryo, Tomoki, Teruyoshi Tanaka, Angel Guillen, Jeanne B. Wexler, Amado Cano, Daniel Margulies, Vernon P. Scholey, Maria S. Stein, and Yoshifumi Sawada. 2014. Effect of water surface condition on survival, growth and swim bladder inflation of yellowfin tuna, *Thunnus albacares* (Temminck and Schlegel), larvae. Aquaculture Research DOI: 10.1111/are.12641.

HONORS

Beginning in 2014, the Canadian Journal of Fisheries and Aquatic Sciences (CJFAS) will begin recognizing on its web site a few reviewers for their contributions to the review process of that journal. Dr. Cleridy E. Lennert-Cody will be one of the reviewers to be recognized in 2014 by the CJFAS.

Also, Dr. Lennert-Cody has been elected President-elect of the San Diego chapter of the American Statistical Association. She will serve as President-elect from October 2014 to October 2015 and as President from October 2015 to October 2016.

ADMINISTRATION

Mr. Salvador Siu joined the IATTC staff in early October 2014. He is working on a 3-year contract as Shark Data Collection Specialist under the FAO-GEF ABNJ [Food and Agriculture Organization of the United Nations-Global Environment Facility-Areas beyond National Jurisdiction] project. His responsibility is to improve collection of data on catches and bycatches of sharks in the member nations of the IATTC. This is being accomplished by identifying and describing available data sources on sharks in the EPO and reporting on existing logistical constraints and improvements needed to the data holdings. He is based at the IATTC field office in Panama, but he is traveling extensively in the region to carry out his responsibilities.

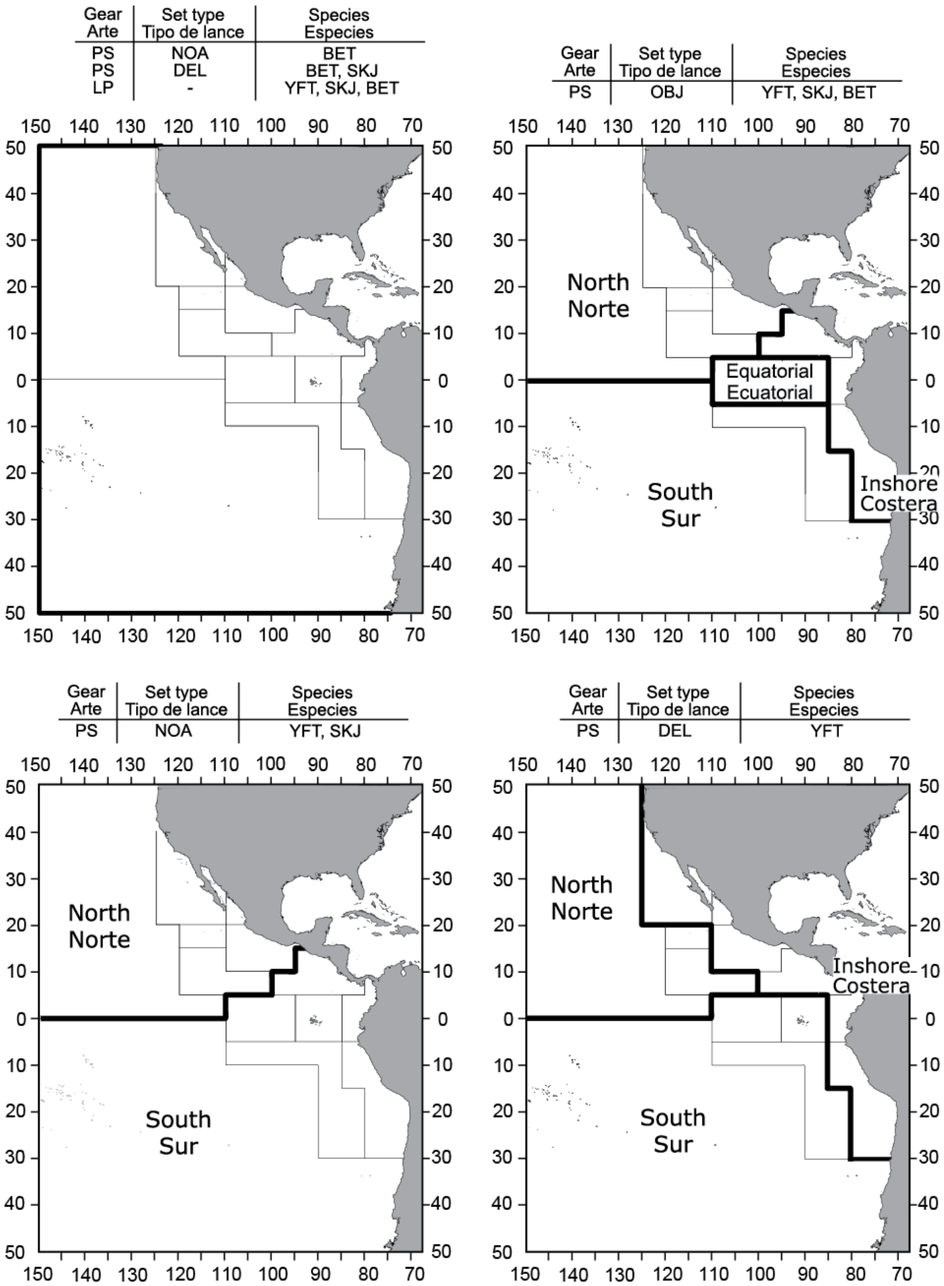

FIGURE 1. Spatial extents of the fisheries defined by the IATTC staff for stock assessment of yellowfin, skipjack, and bigeye in the EPO. The thin lines indicate the boundaries of the 13 length-frequency sampling areas, and the bold lines the boundaries of the fisheries. Gear: PS = purse seine, LP =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

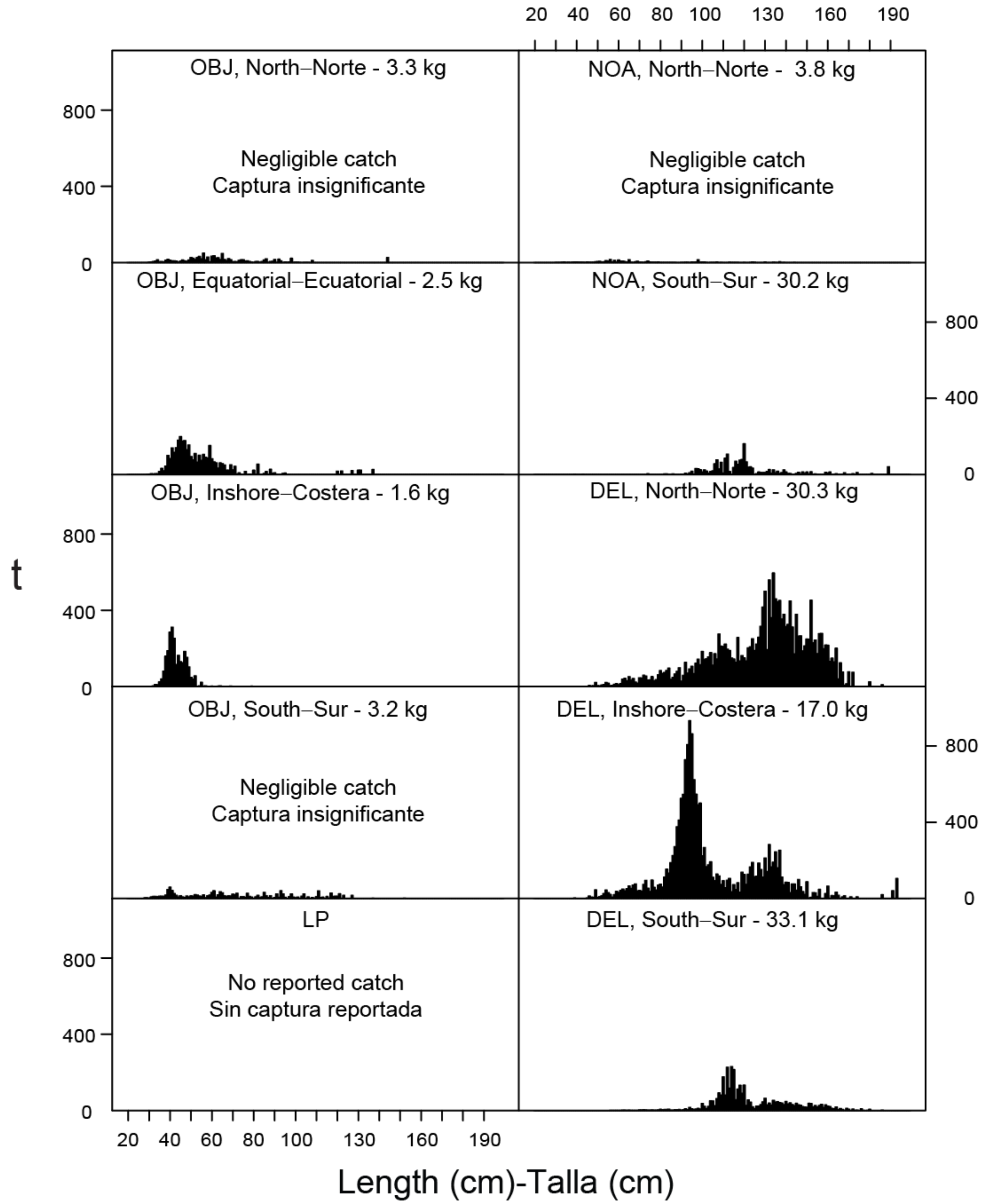

FIGURE 2a. Estimated size compositions of the yellowfin caught in each fishery of the EPO during the third quarter of 2014. The average weights of the fish in the samples are given at the tops of the panels. OBJ = floating object; LP = pole and line; NOA = unassociated; DEL = dolphin; t = metric tons.

FIGURA 2a. Composición por tallas estimada para el aleta amarilla capturado en cada pesquería del OPO durante el tercer trimestre de 2014. 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.

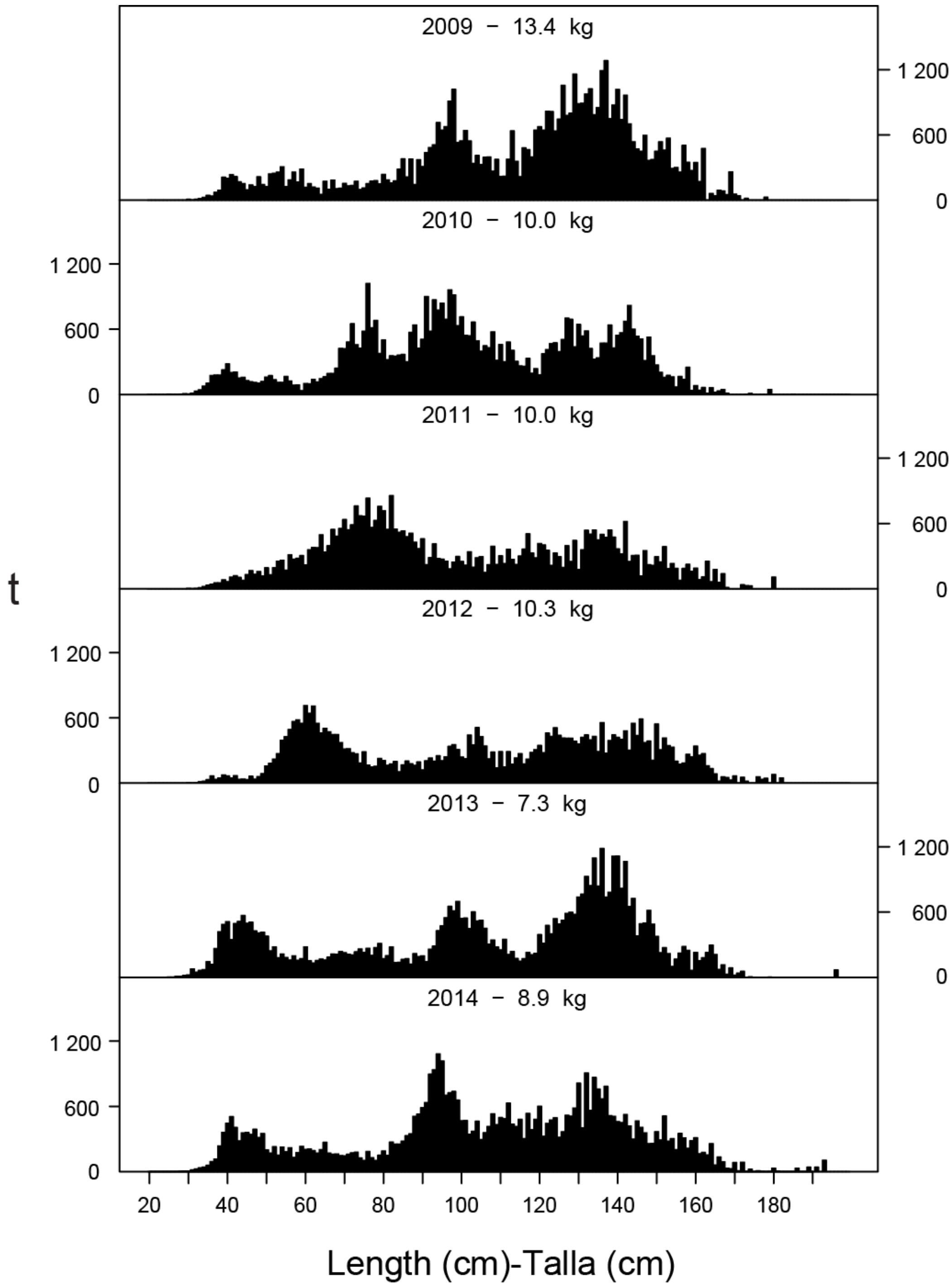

FIGURE 2b. Estimated size compositions of the yellowfin caught in the EPO during the third quarter of 2009-2014. The average weights of the fish in the samples are given at the tops of the panels. t = metric tons.

FIGURA 2b. Composición por tallas estimada para el aleta amarilla capturado en el OPO en el tercer trimestre de 2009-2014. En cada recuadro se detalla el peso promedio de los peces en las muestras; t = toneladas métricas.

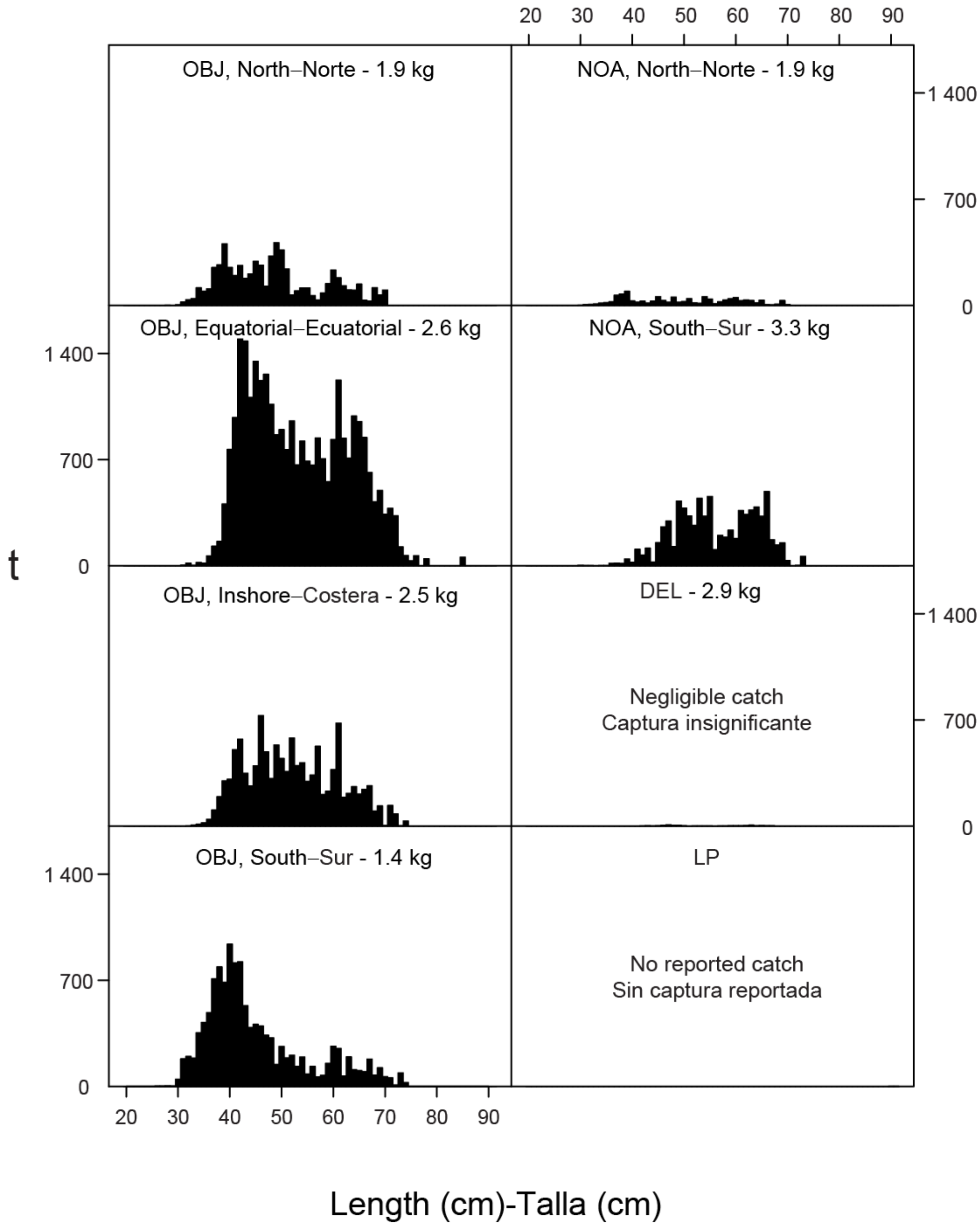

FIGURE 3a. Estimated size compositions of the skipjack caught in each fishery of the EPO during the third quarter of 2014. The average weights of the fish in the samples are given at the tops of the panels. OBJ = floating object; LP = pole and line; NOA = unassociated; DEL = dolphin; t = metric tons.

FIGURA 3a. Composición por tallas estimada para el barrilete capturado en cada pesquería del OPO durante el tercer trimestre de 2014. 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.

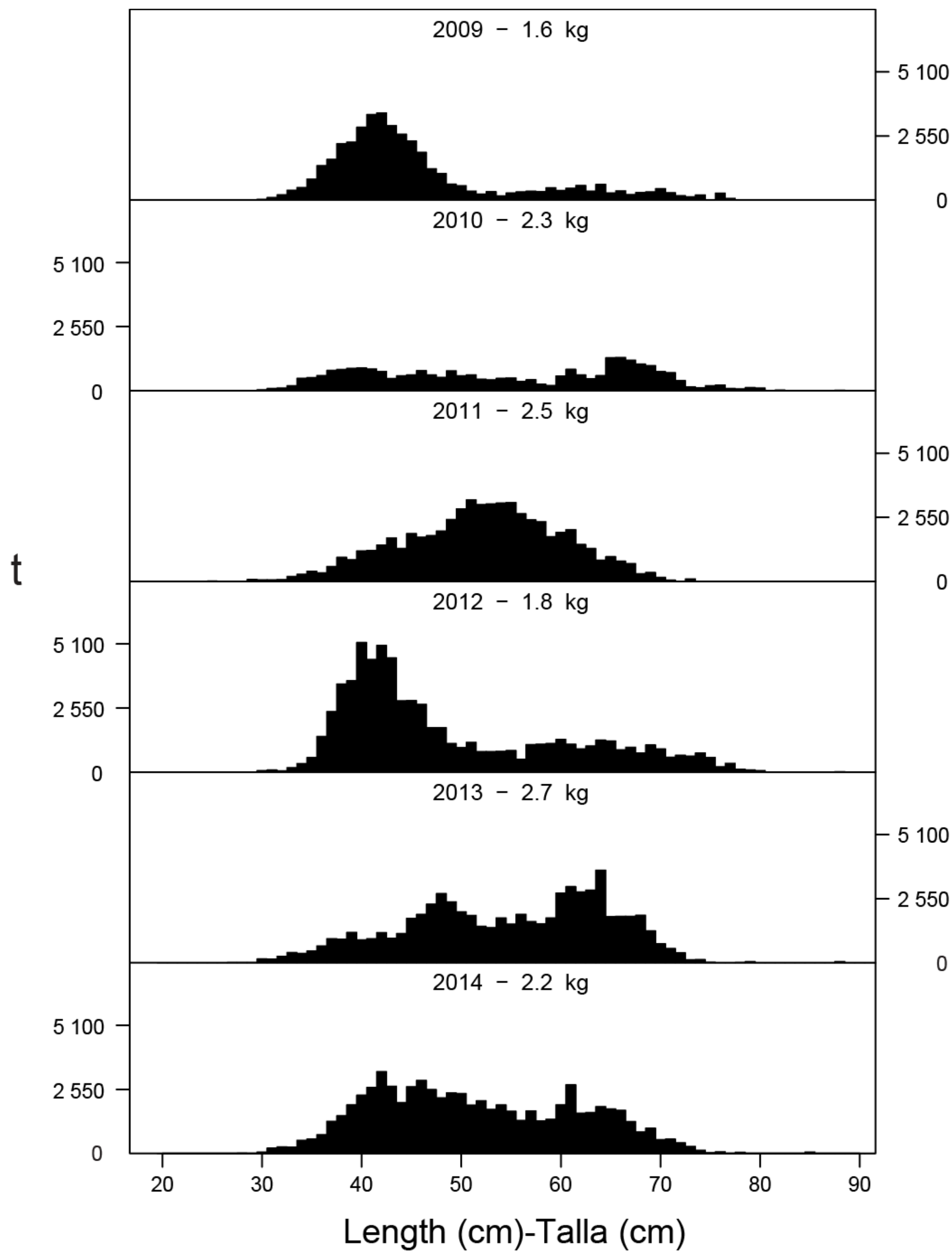

FIGURE 3b. Estimated size compositions of the skipjack caught in the EPO during the third quarter of 2009-2014. The average weights of the fish in the samples are given at the tops of the panels. t = metric tons.

FIGURA 3b. Composición por tallas estimada para el barrilete capturado en el OPO en el tercer trimestre de 2009-2014. En cada recuadro se detalla el peso promedio de los peces en las muestras. t = toneladas métricas.

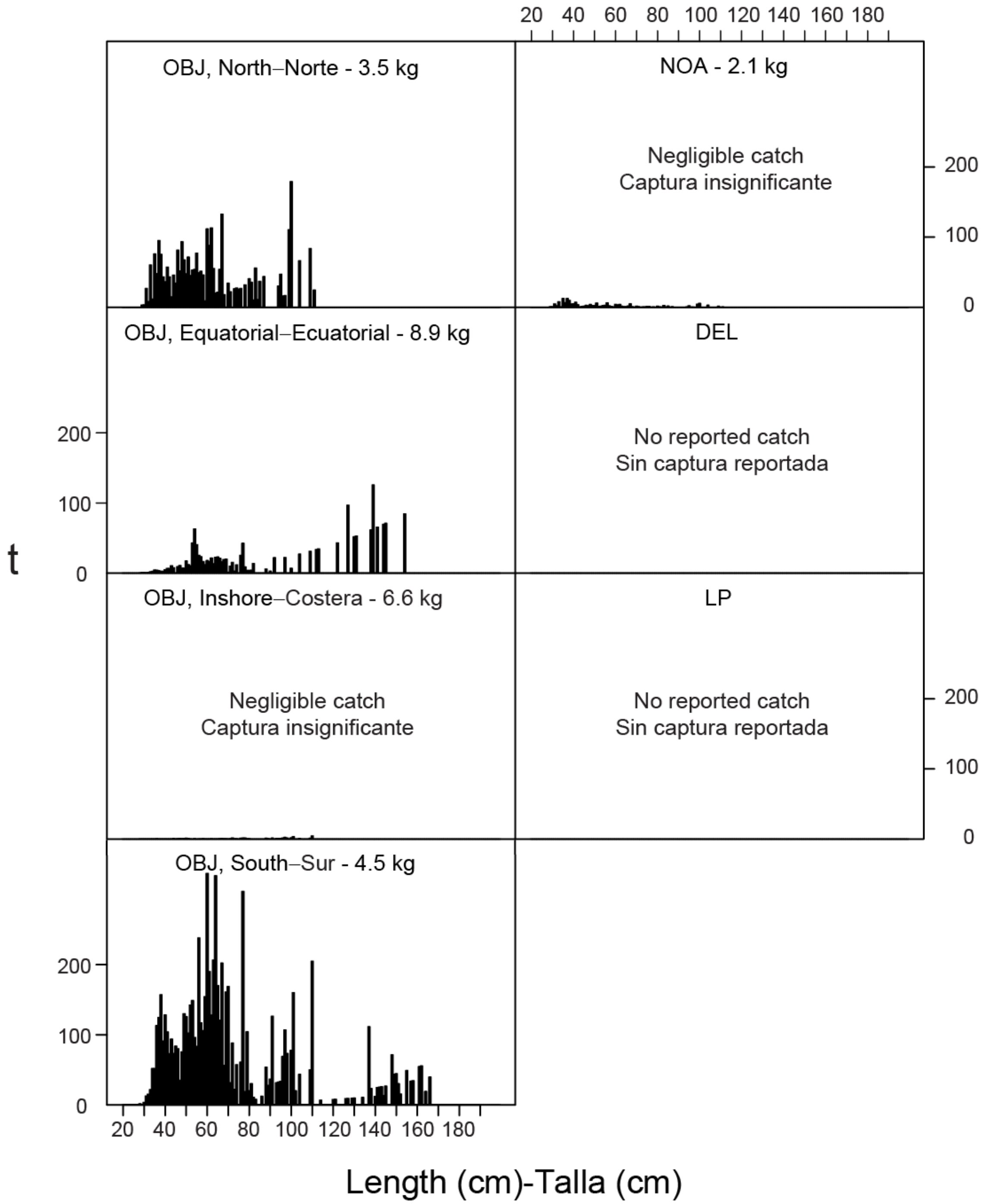

FIGURE 4a. Estimated size compositions of the bigeye caught in each fishery of the EPO during the third quarter of 2014. The average weights of the fish in the samples are given at the tops of the panels. OBJ = floating object; LP = pole and line; NOA = unassociated; DEL = dolphin; t = metric tons.

FIGURA 4a. Composición por tallas estimada para el patudo capturado en cada pesquería del OPO durante el tercer trimestre de 2014. 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.

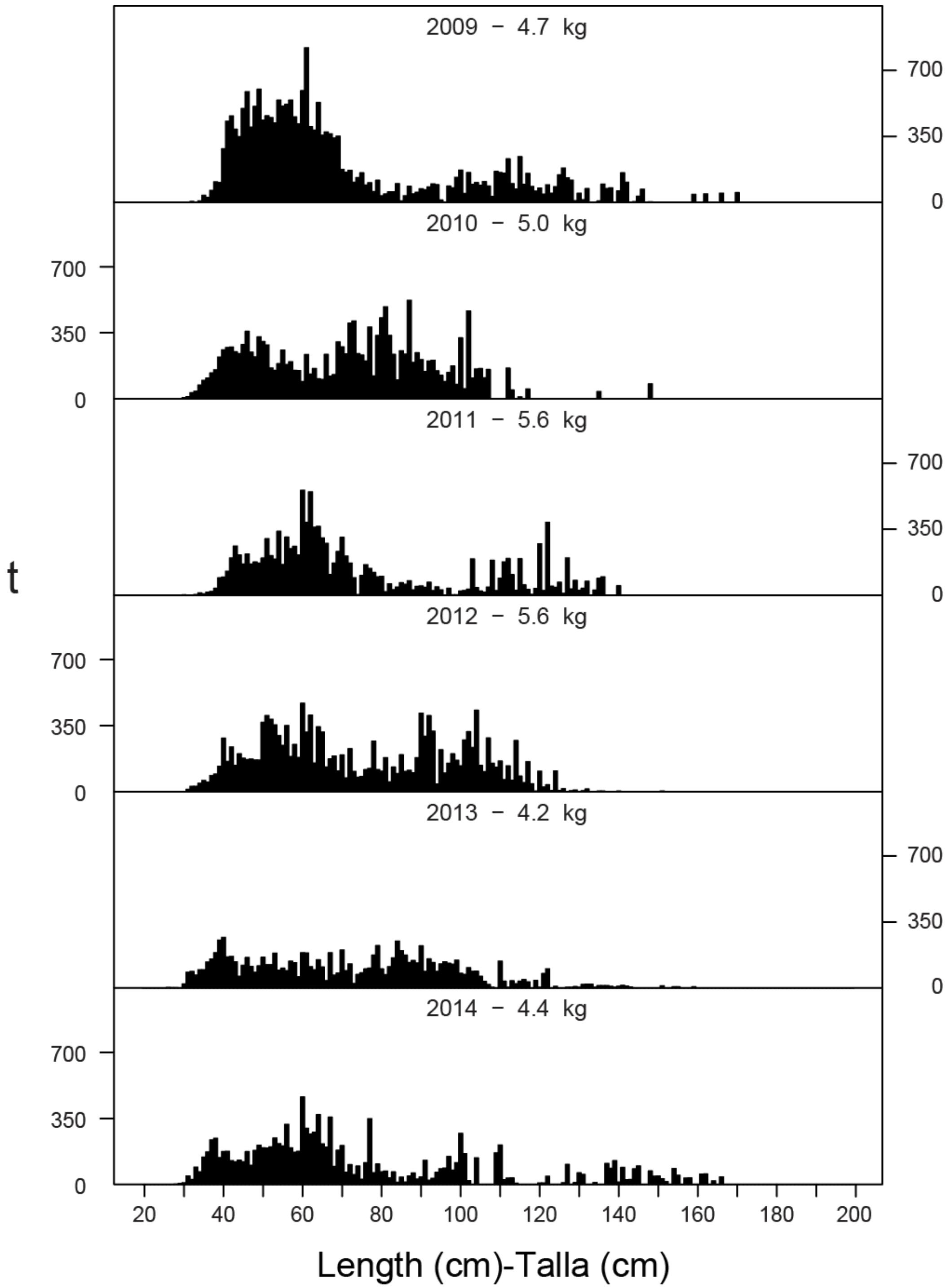

FIGURE 4b. Estimated size compositions of the bigeye caught in the EPO during the third quarter of 2009-2014. The average weights of the fish in the samples are given at the tops of the panels. t = metric tons.

FIGURA 4b. Composición por tallas estimada para el patudo capturado en el OPO en el tercer trimestre de 2009-2014. En cada recuadro se detalla el peso promedio de los peces en las muestras; t = toneladas métricas.

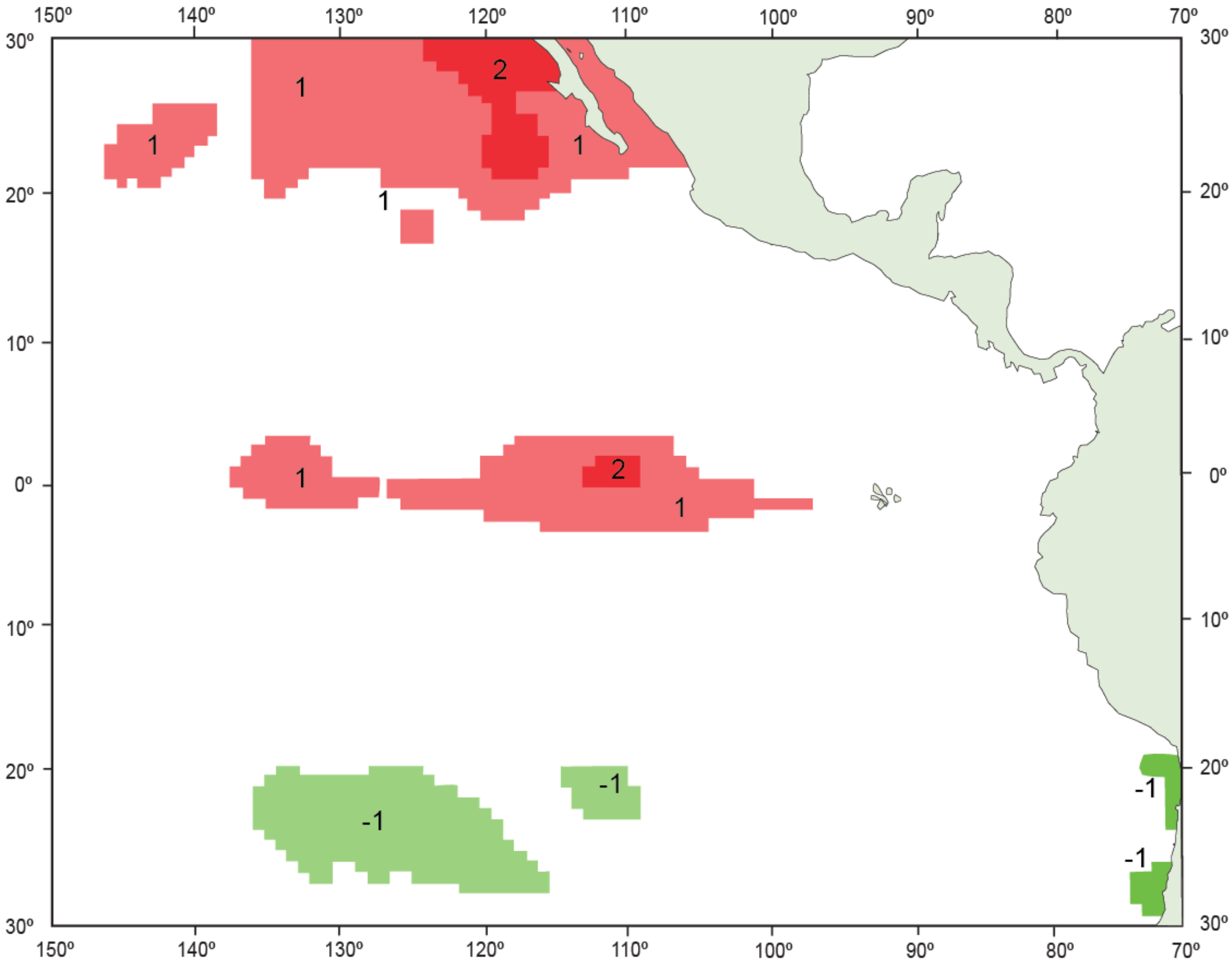

FIGURE 5. Sea-surface temperature (SST) anomalies (departures from long-term normals) for December 2014, based on data from fishing boats and other types of commercial vessels.
FIGURA 5. Anomalías (variaciones de los niveles normales a largo plazo) de la temperatura superficial del mar (TSM) en diciembre de 2014, 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 2014 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 2014 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	4	10	-	14	14,860
Ecuador	PS	75	24	12	111	88,966
EU (España—Spain)	PS	-	-	4	4	10,116
Guatemala	PS	-	1	-	1	1,475
México	PS	10	34	1	45	54,206
	LP	3	-	-	3	268
Nicaragua	PS	-	5	1	6	8,478
Panamá	PS	2	8	4	14	19,865
Perú	PS	4	-	-	4	1,736
El Salvador	PS	-	1	3	4	7,892
USA—EE.UU.	PS	-	1	-	1	1,251
Venezuela	PS	-	14	1	15	20,890
All flags—	PS	95	98	26	219	
Todas banderas	LP	3	-	-	3	
	PS + LP	98	98	26	222	
			Capacity—Capacidad			
All flags—	PS	45,521	129,280	54,934	229,735	
Todas banderas	LP	268	-	-	268	
	PS + LP	45,789	129,280	54,934	230,003	

TABLE 2. Estimates of the retained catches of tunas in the EPO from 1 January through 31 December 2014, 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 31 de diciembre de 2014, 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	18,374	21,824	1,788	-	-	-	10	-	41,996	7.5
Ecuador	36,437	174,776	35,323	-	1,857	-	552	1,075	250,020	44.4
México	122,426	7,468	17	4,862	1,085	-	3,210	89	139,157	24.7
Nicaragua	8,544	6,188	2,528	-	-	-	1	51	17,312	3.1
Panamá	20,633	21,114	6,922	-	2	-	5	253	48,929	8.7
Venezuela	24,340	12,255	863	-	-	-	6	-	37,464	6.7
Other—Otros[2]	6,905	14,813	5,371	404	-	-	-	-	27,493	4.9
Total	237,659	258,438	52,812	5,266	2,944	-	3,784	1,468	562,371	

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 United States; this category is used to avoid revealing the operations of individual vessels or companies.
2 Incluye El Salvador, Estados Unidos, Guatemala, Perú y Unión Europea (España); 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 2014 by longline vessels.
TABLA 3. Capturas reportadas de atún patudo en el OPO durante 2014 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	1,561	1,448	1,561	4,570	695	1,008	1,192	2,895	7,465
Japan—Japón	3,596	2,214	2,974	8,784	1,349	2,315	1,957	5,621	14,405
Republic of Korea—República de Corea	1,666	1,045	1,628	4,339	1,191	1,006	1,048	3,245	7,584
Chinese Taipei—Taipei Chino	1,304	193	859	2,356	361	-	-	361	2,717
United States—Estados Unidos	-	-	-	-	-	-	-	-	476
Vanuatu	-	-	-	-	-	-	-	-	-
Total	8,127	4,900	7,022	20,049	3,596	4,329	4,197	12,122	32,647

TABLE 4. Oceanographic and meteorological data for the Pacific Ocean, January-December 2014. 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, enero-diciembre-septiembre 2014. 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)	24.8 (0.3)	25.4 (-0.8)	25.9 (-0.8)	25.2 (-0.4)	25.6 (1.3)	24.6 (1.8)
Area 2 (5°N-5°S, 90°-150°W	25.3 (-0.4)	25.6 (-0.8)	26.9 (-0.2)	27.7 (0.2)	27.7 (0.6)	27.4 (0.9)
Area 3 (5°N-5°S, 120°-170°W)	26.1 (-0.5)	26.2 (-0.6)	27.0 (-0.2)	28.0 (0.2)	28.3 (0.5)	28.1 (0.5)
Area 4 (5°N-5°S, 150W°-160°E)	28.1 (-0.2)	28.4 (0.3)	28.7 (0.5)	29.1 (0.6)	29.6 (0.8)	29.5 (0.6)
Thermocline depth—Profundidad de la termoclina, 0°-80°W	35	15	10	50	70	50
Thermocline depth—Profundidad de la termoclina, 0°-110°W	45	25	60	110	90	95
Thermocline depth—Profundidad de la termoclina, 0°-150°W	140	150	160	150	150	130
Thermocline depth—Profundidad de la termoclina, 0°-180°	185	180	180	170	170	160
SOI—IOS	1.4	0.1	-0.9	0.8	0.5	0.2
SOI*—IOS*	1.61	1.77	1.20	4.67	2.33	1.19
NOI*—ION*	3.98	-0.95	-0.60	1.16	1.39	0.56

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

Month—Mes	**7**	**8**	**9**	**10**	**11**	**12**
SST—TSM (°C)						
Area 1 (0°-10°S, 80°-90°W)	23.0 (1.4)	21.9 (1.3)	21.3 (1.0)	21.5 (0.8)	22.3 (0.7)	22.9 (0.1)
Area 2 (5°N-5°S, 90°-150°W	26.3 (0.7)	25.5 (0.5)	25.3 (0.5)	25.6 (0.7)	25.9 (0.9)	25.9 (0.8)
Area 3 (5°N-5°S, 120°-170°W)	27.4 (0.2)	27.0 (0.2)	27.2 (0.5)	27.2 (0.5)	27.5 (0.9)	27.4 (0.8)
Area 4 (5°N-5°S, 150W°-160°E)	29.1 (0.3)	29.1 (0.5)	29.3 (0.7)	29.3 (0.6)	29.5 (0.9)	29.4 (0.9)
Thermocline depth—Profundidad de la termoclina, 0°-80°W	25	15	30	40	50	30
Thermocline depth—Profundidad de la termoclina, 0°-110°W	60	40	60	70	115	70
Thermocline depth—Profundidad de la termoclina, 0°-150°W	130	160	145	160	150	120
Thermocline depth—Profundidad de la termoclina, 0°-180°	160	175	175	175	160	170
SOI—IOS	-0.2	-0.7	-0.7	-0.6	-0.9	-0.6
SOI*—IOS*	0.28	-6.64	0.64	-2.74	1.88	1.96
NOI*—ION*	-0.95	-1.60	-3.84	-3.23	-1.82	-2.97

TABLE 5. Preliminary data on the sampling coverage of trips of tuna purse seine vessels deployed 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 fourth quarter of 2014. 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 asignados 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 cuarto trimestre de 2014. Los números entre paréntesis indican los totales acumulados para el año.

Flag	Trips		Class-6—Observed by program						Percent observed	
			IATTC		National					
Bandera	Viajes		Clase-6—Observado por programa						Porcentaje observado	
			CIAT		Nacional		WCPFC			
Colombia	8	(42)	4	(21)	4	(21)			100.0	(100)
Ecuador	84	(335)	60	(222)	24	(110)	0	(3)	100.0	(100)
El Salvador	5	(20)	5	(17)			0	(3)	100.0	(100)
EU – UE (ESP)	8	(31)	3	(12)	5	(19)			100.0	(100)
EE.UU. – USA	3	(5)	2	(2)			1	(3)	100.0	(100)
Guatemala	0	(4)	0	(4)					100.0	(100)
México	8	(191)	6	(97)	2	(94)			100.0	(100)
Nicaragua	4	(25)	3	(14)	1	(11)			100.0	(100)
Panamá	14	(65)	6	(34)	8	(31)			100.0	(100)
Perú	4	(4)	4	(4)					100.0	(100)
Venezuela	10	(49)	7	(27)	3	(22)			100.0	(100)
Total	148	(771)	100	(454)	47	(308)	1	(9)	100.0	(100)
ClassES-4 and 5 – Clasees-4 y 5										
Colombia	0	(1)	0	(1)					-[1]	-[1]
Ecuador	9	(16)	4	(6)	5	(10)			-[1]	-[1]
Total	157	(788)	104	(461)	52	(318)	1	(9)	100.0	(100)

[1] The AIDCP does not require vessels smaller than class-size 6 to be sampled at 100 percent.—El APICD no require que buques menores de clase 6 sean muestreados al 100%.