INTER-AMERICAN TROPICAL TUNA COMMMISSION
COMISIÓN INTERAMERICANA DEL ATÚN TROPICAL

QUARTERLY REPORT—INFORME TRIMESTRAL

July-September 2015—Julio-Septiembre 2015

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 2015.

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 65th 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 meeting

The 89th meeting of the IATTC took place in Guayaquil, Ecuador, on 29 June-3 July 2015. The following documents were presented at that meeting:

Documents

IATTC 89-04a	Tunas, Billfishes and Other Pelagic Species in the Eastern Pacific Ocean in 2014
IATTC-89-04c	Recommendations by the Scientific Advisory Committee
IATTC 89-04d	Recommendations by the Staff for Conservation Measures in the Eastern Pacific Ocean, 2015

IATTC 89-06 Utilization of Vessel Capacity under Resolutions C-02-03, C-12-06, and C-12-08

IATTC-89-07 Implementation of the IATTC Regional Observer Program for Transshipments at Sea

IATTC-89 INF-B Request by the Peruvian State for the Recognition of the Pending Carrying Capacity Equivalent to 5851 Cubic Meters, in the Framework of Resolution C-02-03

IATTC-89 INF-C Request by the Plurinational State of Bolivia for the Restitution of Carrying Capacity in the Framework of the Inter-American Tropical Tuna Commission

IATTC-89 INF-D Vanuatu Capacity Disputes "Esmeralda C"

Proposals

IATTC-89 A-1 (Submitted by Costa Rica) Amendment to Resolution C-05-03 on the Conservation of Sharks Caught in Association with Fisheries in the Eastern Pacific Ocean

IATTC-89 A-1A REV (submitted by Costa Rica and the European Union) Amendment to Resolution C-05-03 on the Conservation of Sharks Caught in Association with Fisheries in the Eastern Pacific Ocean

IATTC-89 A-2 (submitted by the European Union) Resolution on the Conservation of Sharks Caught in Association with Fisheries in the IATTC Convention Area

IATTC-89 A-3 (submitted by the European Union) Resolution on the Conservation of Silky Sharks Caught in Association with Fisheries in the IATTC Convention Area

IATTC-89 A-4 (submitted by the United States) Resolution on the Conservation of Hammerhead Sharks (Family Sphyrnidae) Caught in the IATTC Convention Area

IATTC-89 B-1 (submitted by El Salvador) Amendment to Resolution C-12-04 on *ad hoc* Financing for Fiscal Years 2013-2017 and Beyond

IATTC-89 C-1 (submitted by El Salvador) Amendment to Resolution C-13-05 on Data Confidentiality Policy and Procedures

IATTC-89 D-1 (submitted by the European Union) Resolution C-15-XX on the Conservation of Mobulid Rays Caught in Association with Fisheries in the IATTC Convention Area

IATTC-89 E-1 (submitted by the European Union) Revision of the Resolution C-11-07 Resolution on the Process for Improved Compliance of Resolutions Adopted by the Commission

IATTC-89 E-2 (submitted by Mexico) Resolution on the Use of Information on Compliance

IATTC-89 E-2A (submitted by Colombia, Costa Rica, El Salvador, Guatemala, Mexico, Nicaragua, Panama, Peru, and Venezuela) Resolution on the Use of Information on Compliance

IATTC-89 F-1 (submitted by the European Union) IATTC Resolution for an IATTC Scheme for Minimum Standards for Inspection in Port

IATTC-89 G-1 (submitted by the European Union) [Revision of] Resolution C-13-01 on the Basis of the Best Scientific Advice

IATTC-89 H-1 (submitted by the European Union) Revision of the Resolution C-02-03 Resolution on the Capacity of the Tuna Fleet Operating in the Eastern Pacific Ocean (Revised)

IATTC-89 H-2 (submitted by the European Union) Resolution on the Deadline Applicable to Revisions of Well Volume in Paragraph 6 of Resolution C-02-03

IATTC-89 I-1 (submitted by the United States) Amendment to Resolution C-05-07 on Establishing a List of Vessels Presumed to Have Carried Out Illegal, Unreported and Unregulated Fishing Activities in the Eastern Pacific Ocean

IATTC-89 J-1 REV2 (submitted by the United States) Resolution to Aid in Establishing a Rebuilding Plan for Pacific Bluefin Tuna

IATTC-89 K-1 (submitted by the United States) Amendment to Resolution C-11-02 to Mitigate the Impact on Seabirds of Fishing for Species Covered by the IATTC

IATTC-89 L-1 REV (submitted by the United States) Collection and Analyses of Data on Fish-Aggregating Devices

IATTC-89 M-1 (submitted by Mexico) Amendment to Resolution C-11-08 on Observers on Longline Vessels

IATTC-89 N-1 (submitted by Guatemala) Terms Of Reference for the Establishment of an *ad hoc* Working Group for the Review of the Rules of Procedure of the Inter-American Tropical Tuna Commission

IATTC-89 O-1 (submitted by Ecuador) Exhortation to the Western and Central Pacific Fisheries Commission (WCPFC)

Other documents

ISSF [International Seafood Sustainability Foundation] Position Statement
WWF [World Wildlife Fund] Position Statement
Pew [Pew Charitable Trusts] Position Statement
Humane Society International and Other Organizations Position Statement
MRAG Report on At-Sea Transshipment Program

Other meetings

Mr. Nickolas W. Vogel participated in the "II Taller Nacional–Programa de Observadores Pesqueros de Colombia–POPC" in Bogotá, Colombia, on 13-14 July 2015, where he gave a presentation on the history of the IATTC observer program, along with a description of IATTC data processing procedures. The workshop was organized by the Autoridad Nacional de Acuicultura y Pesca de Colombia (AUNAP) and Conservación Internacional Colombia (CI) to evaluate and standardize methodologies in the onboard collection of information from the Colombian industrial and artisanal fleets. The objectives of the Workshop included an evaluation of the principal national fisheries and prioritization of resources for the POPC observer program, with an emphasis on identifying the most appropriate data to collect. The participants gave presentations on data collection currently underway, along with discussions of experiences of onboard data collection at the national level. Mr. Vogel's travel expenses were paid by AUNAP-CI.

Dr. Guillermo A. Compeán participated in a meeting of the Directors of the tuna regional fishery management organizations in Rome, Italy, on 27 July 2015. The participants discussed the current activities of their organizations and possible future cooperation.

Dr. Guillermo A. Compeán participated in a meeting of the Second Project Steering Committee, as part of the Common Oceans Tuna Project, in Rome, Italy, on 28 July 2015. At this meeting the organizations that are part of this project discussed the progress that had been made during the year. Among the subjects of discussion were strengthening of governance, reducing Illegal, Unreported, and Unregulated fishing, reducing the impacts of tuna fishing on the ecosystem, proposals for new activities, and the budget of the project.

Mr. Kurt M. Schaefer participated in the 11th meeting of the Scientific Committee of the Western and Central Pacific Fisheries Commission in Pohnpei, Federated States of Micronesia, during 5-13 August, 2015. Mr. Schaefer presented at the meeting an overview of the EPO tuna fisheries through 2014, along with the current stock assessments for yellowfin, skipjack, and bigeye prepared by IATTC staff members. While at the meeting, Mr. Schaefer also participated in the Eighth Steering Committee meeting for the Pacific Tuna Tagging Programme, at which he presented an overview of the results on bigeye vertical movements, behavior, and habitat obtained from tagging experiments utilizing archival tags undertaken in the equatorial central Pacific by the Oceanic Fisheries Programme of the Secretariat of the Pacific Community and the IATTC. Most of the documents presented at the meeting can be seen at the following web site: https://www.wcpfc.int/meetings/11th-regular-session-scientific-committee

Dr. Guillermo Compeán attended a meeting of the Centro de Investigaciones Biológicas del Noroeste, S.C (CIBNOR) in Mazatlán, Mexico, on 26 August 2015. He participated as a member of the "Comisión Dictaminadora Externa (CDE)" for the "Cómite de Evaluación y Seguimiento del Programa Integral de Ordenamiento Pesquero del Golfo de Ulloa, B.C.S."

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 compositions 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. 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. 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 376 length-frequency samples from 222 wells and abstracted logbook information for 339 trips of commercial fishing vessels during the third quarter of 2015.

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), 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 2015 is about 249,531 m^3 (Table 1). The average weekly at-sea capacity for the fleet, for the weeks ending 5 July through 27 September, was about 135,100 m^3 (range: 113,300 to 181,900 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 2015, and the equivalent statistics for 2010-2014, were:

Species	2015	2010-2014			Weekly average, 2015
		Average	Minimum	Maximum	
Yellowfin	196,200	182,400	175,700	191,200	5,000
Skipjack	233,200	187,400	118,500	222,300	6,000
Bigeye	44,200	38,700	35,900	40,900	1,100

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 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 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 2015 and comparative statistics for 2010-2014 were:

Region	Species	Gear	2015	2010-2014		
				Average	Minimum	Maximum
N of 5°N	yellowfin	PS	18.1	15.5	14.1	17.6
S of 5°N			3.5	3.3	2.6	4.1
N of 5°N	skipjack	PS	1.5	1.9	1.1	2.9
S of 5°N			13.7	10.0	8.3	12.2
EPO	bigeye	PS	3.5	2.3	2.1	2.5
EPO	yellowfin	LP	0.0	4.2	0.0	11.2
EPO	skipjack	LP	0.0	1.9	0.0	4.5

Catch statistics for the longline fishery

IATTC Resolution C-13-01 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 2015 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 second quarters of 2010-2015 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 2015, and the second shows data for the combined strata for the second quarter of each year of the 2010-2015 period. Samples from 266 wells were taken during the second quarter of 2015.

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 266 wells sampled that contained fish caught during the second quarter of 2015, 187 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. The largest yellowfin were caught in the Northern area, with the majority in the 90 to160 cm range and an average weight of 29.5 kg. Lesser amounts of smaller yellowfin were produced by sets on dolphin-associated fish in the Inshore area. Small amounts of yellowfin were also taken in Northern unassociated fishery, the Equatorial floating-object fishery, and the Southern dolphin fishery.

The estimated size compositions of the yellowfin caught by all fisheries combined during the second quarters of 2010-2015 are shown in Figure 2b. The average weight of the yellowfin caught during the second quarter of 2015 (12.5 kg) was greater than all of the previous 5 years, with the exception of 2012, during which the fish averaged 17.4 kg.

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 266 wells sampled that contained fish caught during the second quarter of 2015, 145 contained skipjack. The estimated size compositions of these fish are shown in Figure 3a. Large amounts of skipjack in the 35- to 55-cm range were caught in all four of the floating-object fisheries and in the Southern unassociated fishery. Unlike the second quarter skipjack catch of the previous year, there was very little catch of large fish in the 60 to 70 cm range.

The estimated size compositions of the skipjack caught by all fisheries combined during the second quarters of 2010-2015 are shown in Figure 3b. The average weight for the second quarter of 2015 (1.6 kg) was less than those of the skipjack caught during the second quarter of any of the previous five years, which ranged from 1.8 to 2.6 kg.

There are seven surface fisheries for bigeye defined for stock assessments, four associated with floating objects, one on unassociated schools, one on fish associated with dolphins, and one pole-and-line fishery (Figure 1). The last three fisheries include all 13 sampling areas. Of the 266 wells sampled that contained fish caught during the second quarter of 2015, 59 contained bigeye. The estimated size compositions of these fish are shown in Figure 4a. Virtually all of the second-quarter bigeye catch was taken in floating-object sets, primarily in the Northern and Equatorial fisheries, with average weights of 3.9 and 4.8 kg, respectively.

The estimated size compositions of the bigeye caught by all fisheries combined during the second quarters of 2010-2015 are shown in Figure 4b. The average weight of bigeye caught during the second quarter of 2015 (4.5 kg) continued a declining trend from the high of 9.4 kg in 2011, 7.2 kg in 2012, 6.2 kg in 2013, and 5.7 kg in 2014.

The estimated retained purse-seine catch of bigeye less than 60 cm in length during the first two quarters of 2015 was 10,120 metric tons (t), or about 53 percent of the estimated total retained purse-seine catch of bigeye during that period. The corresponding amounts for the first two quarters of 2010-2014 ranged from 4,260 to 8,388 t, or 20 to 41 percent of the estimated total retained purse-seine catch.

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 except for 15-21 July, and 24 July. Spawning occurred between 11:05 p.m. and 1:10 a.m. The number of eggs collected ranged from 6,000 to 657,000 per day. The water temperatures in the tank ranged from 28.0 to 29.4°C.

At the end of the quarter there were five 50- to 56-kg, seven 43- to 44-kg, and five 14- to 31-kg yellowfin in Tank 1. There were 12 4- to 7-kg yellowfin 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 tunas. 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). Several KU faculty members, students, staff members, and ARAP biologists continued working with Achotines Laboratory staff members on trials and experiments that had been initiated during the second quarter of 2015. This work was completed in mid-July.

One of the SATREPS project objectives is the production of juvenile yellowfin tuna for stocking into a sea cage (see IATTC Quarterly Report for January-March 2014). A group of juvenile 52-day post-hatch yellowfin tuna was moved from the Achotines Laboratory into a sea cage (20 m diameter, 6 m in depth) during the second quarter of 2015 (see IATTC Quarterly Report for April-May 2015). This activity represents the first successful transfer worldwide of yellowfin early-juveniles to a sea cage. At that time, a separate, smaller group of juveniles (55 days post-hatch, 7-11 cm total length) was transferred from their rearing tank to a 170 metric ton capacity in-ground tank (Tank 6). On July 8, 2015, the yellowfin tuna juveniles remaining in the sea cage were harvested, with some being sacrificed for analysis, a few returned to the ocean, and 30 fish of about 13 to 17 cm FL were transferred from the sea cage to Tank 6 at the Achotines Laboratory. This group of 30 fish was combined with the remaining survivors already in tank 6. At the end of the quarter, the last juvenile in the rearing group died. This fish, which was about 28 cm in total length and 407 g in weight, was 158 days old. This is the longest time that a yellowfin has been reared from hatching at the Achotines Laboratory.

As part of the SATREPS project, scientists of the IATTC's Early Life History (ELH) group traveled to the Oshima Experimental Station, Kinki University, Wakayama Prefecture, Japan, to conduct continuing SATREPS comparative research with Pacific bluefin larvae. Experiments were initiated in July and were completed in August.

Although the adult life histories of Pacific bluefin and yellowfin tuna are markedly different, the early life histories of the two species are similar and occur in comparable warm oceanic waters. Larvae of both species are found in subtropical and tropical oceans where, potentially, they can encounter low background, suboptimal food levels. Pacific bluefin eggs and larvae are slightly larger than yellowfin larvae at each stage of development up to first-feeding. Previous feeding studies conducted by the ELH group during the SATREPS collaboration have indicated that yellowfin tuna larvae may be more capable feeders during the early larval stage at low or sub-optimal food conditions when foraging on uniformly small prey (see IATTC Quarterly Report for July-September 2014). Experiments were conducted during the third quarter to investigate prey selectivity patterns of each species to gain further insight into prey preferences and feeding capabilities on larger prey during the first week of feeding. Pacific bluefin larvae were offered a diet of *Artemia*, a mix of rotifers and *Artemia*, and an assemblage of wild plankton collected in Kushimoto Bay and size-graded between 50 and 500 microns during the first week of feeding.

Diel feeding abilities were also investigated. Multiple experiments were conducted in which Pacific bluefin larvae were sampled every hour over the course of an 18-hour period, through a light and dark cycle, while light levels and feeding conditions in the experimental tanks were monitored. Finally, several experiments were conducted to investigate digestion rates of Pacific bluefin larvae at the first-feeding stage and on the fourth day of feeding.

The data collected from these experiments will be analyzed during the fourth quarter of 2015. The results of the experiments will be compared to those from identical experiments conducted with yellowfin larvae at the Achotines Laboratory.

Workshop on physiology and aquaculture of pelagic fishes

The IATTC and the University of Miami (Miami, Florida, USA) held their thirteenth workshop, "Physiology and Aquaculture of Pelagics, with Emphasis on Reproduction and Early Developmental Stages of Yellowfin Tuna," from July 6 to 16, 2015. 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 three aquaculture/biology professionals from Mexico and the USA. A fee for the participants and students covered the costs of putting on the workshop. As part of the workshop, tuna larvae were cultured and wild tuna were captured to augment the Achotines Laboratory broodstock population. After their stay at the Achotines Laboratory, the workshop group spent several days at the Open Blue Cobia (*Rachycentron canadum*) culture laboratories and ocean cages on the Caribbean coast of Panama.

Other collaborative studies of yellowfin eggs and larvae

Cryoocyte, Inc., a research and technology company based in Boston, Massachusetts, USA, is collaborating with the Early Life History group on some pilot studies on the feasibility of cryopreservation techniques for yellowfin embryonic stages (IATTC Quarterly Report for April-June 2014). The trials began in 2014 and are continuing during 2015. Cryoocyte scientists conducted experiments from July 2015 through 9 September 2015, with plans to return later in 2015 or in early 2016 for additional trials. Cryoocyte, Inc. is providing the funding for the research trials.

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 September 2015, a small group of fish continued to be held in the broodstock snapper tank. These fish began spawning during the quarter.

Visitors at the Achotines Laboratory

On 30 September 2015, the Achotines Laboratory was visited by a large group consisting of Panamanian government officials, representatives of non-govenmental organizations, and a member of the diplomatic community. The visit was organized by Dr. Jorge Arango, the Minister of the Ministry of Agricultural Development (MIDA). Dr. Arango had learned about the Achotines Laboratory while on a trip to Guatemala, and thought that it was important that he and others learn more about the research activities there. Ministers, Directors, Administrators, and staff members of MIDA, the Secretaria Nacional de Ciencia, Tecnología e Innovación (SENACYT), the Japan International Cooperation Agency (JICA), the Autoridad de los Recursos Acuáticos de Panamá (ARAP), and the Ambassador of Israel in Panama were given a presentation and tour of the Laboratory, followed by lunch and a question and answer session.

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 April 2014 there were spots of cool water along the coast of South America that had persisted since the previous quarter. By May, however, those spots of cool water 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 that had first made its appearance during the first quarter of 2014 (IATTC Quarterly Report for January-March 2014: Figure 8) was still in existence (IATTC Quarterly Report for April-June 2014, Figure 5). During May, June, and July of 2014 here 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 (IATTC Quarterly Report for July-September 2014: Figure 5), but it persisted and strengthened during December (IATTC Quarterly Report for October-December 2014: Figure 5). 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 November and December (IATTC Quarterly Report for October-December 2014: Figure 5). By January 2015 the area of warm water off Mexico had expanded to the southwest, combining with an area of warm water along the equator that persisted through June (IATTC Quarterly Report for April-June 2015: Figure 5). During the third quarter of 2015 the areas of warm water off Baja California and along the equator grew larger and warmer (Figure 5). During the third quarter of 2015, the SSTs were above normal over much of the area north of 10°S, and off Peru and northern Chile, but nearly normal over most of the rest of the area south of the equator. The SSTs had been mostly below normal from October 2013 through March 2014, but during April 2014 through September 2015 they were virtually all above normal (Table 4).

According to the Climate Diagnostics Bulletin of the U.S. National Weather Service for September 2015, "There is an approximately 95% chance that El Niño will continue through Northern Hemisphere winter 2015-16, gradually weakening through spring 2016."

Yellowfin and bluefin tuna and dorado have been unusually abundant and vulnerable to capture off Southern California during 2014 and 2015, according to an article in the San Diego Union-Tribune dated 6 September 2015. The article stated that, "This scene … is appearing far up the coast as an unprecedented pattern of warm ocean currents lures migratory tunas and other tropical species deep into U.S. waters." The fish are more vulnerable to capture because they have been closer to the coast than in other years.

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 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 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-13-01 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.

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 tunas caught in each set from the time it is captured until it is unloaded (and, after that, until it is canned and labeled).

In 2015 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 to follow for the observers of the ROP 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 cross-endorsed observers be allowed to be deployed on three trips of vessels planning to operate in both areas during the third quarter of 2015. These requests were granted.

Observers from the IDCP On-Board Observer Program departed on 184 fishing trips aboard purse seiners covered by that program during the third quarter of 2015. Preliminary coverage data for these vessels during the quarter are shown in Table 5, which includes one vessel of a member Party to the IATTC, but not to the AIDCP, that had activity in the Agreement Area, but did not have an IDCP observer onboard. In contrast to other occasions, when Parties or non-Parties request a waiver to the requirement of an observer while in transit, the IATTC staff did not receive such a communication.

Training

During the third quarter of 2015, the IATTC staff conducted two observer training sessions. One, for 11 trainees members of the ROPs of the WCPFC who will participate in trips defined in the MOC as indicated above, while observing fishing activity in the IATTC convention area. This session took place in Kiritimati [Christmas] Island, Republic of Kiribati, during 20-25 August 2015. The instructors were Mr. Ernesto Altamirano of the IATTC staff and Mr. Karl Staisch, the observer program coordinator for the WCPFC. All costs of this training, including travel and accommodations for Mr. Altamirano, were paid by the WCPFC.

A second training seminar for IDCP-IATTC observers was held in Panama, Republic of Panama, for nine trainees, during 7-24 September 2015. The instructors were Mr. Erick Largacha, head of the IATTC office in Manta, Ecuador, and Mr. Ernesto Altamirano.

Gear project

The IATTC staff did not carry out any dolphin safety-gear inspection and safety-panel alignment procedure during the third quarter of 2015.

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Gilman, Eric, and Martín Hall. 2015. Potentially Significant Variables Explaining Bycatch and Survival Rates and Alternative Data Collection Protocols to Harmonize Tuna RFMOs' Pelagic Longline Observer Programmes. Appendix 1 to WCPFC-SC11-2015/EB-IP-05: 71 pp. Western and Central Pacific Fisheries Commission, Kolonia, Pohnpei, Federated States of Micronesia.

available online, https://www.wcpfc.int/system/files/EB-IP-05%20LL%20Obs%20bycatch%20data%20fields%20Rev%201%2028%20July.pdf

Hall, Martín A. 2015. More on bycatches: changes, evolution, and revolution. *In*:. Kruse, G.H, H.C. An, J. DiCosimo, C.A. Eischens, G.S. Gislason, D.N. McBride, C.S. Rose, and C.E. Siddon (editors). Fisheries Bycatch: Global Issues and Creative Solutions. Alaska Sea Grant, University of Alaska, Fairbanks. http://doi.org/10.4027/fbgics.2015.12.

Martinez-Ortiz, Jimmy, Alexandre M. Aires-da-Silva, Cleridy E. Lennert-Cody, and Mark Maunder. 2015. The Ecuadorian artisanal fishery for large pelagics: species composition and spatial dynamics. Plos One, 10 (8): E013513.

HONOR

The following is from the web site of the Canadian Journal of Fisheries and Aquatic Sciences:

“**Outstanding Reviewers**

The Editorial Team of Canadian Journal of Fisheries and Aquatic Sciences extends sincere thanks to the following [eight] individuals who over the last year have consistently and expeditiously delivered comprehensive, discerning reviews to the Journal's authors.”

Dr. Cleridy E. Lennert-Cody is among the eight reviewers who were honored.

VISITING SCIENTIST

Dr. Keisuke Sahoh, Head of the Skipjack and Albacore Group at the National Research Institute of Far Seas Fisheries, Shimizu, Japan, began a 4-month stay at the IATTC headquarters in La Jolla on 2 September 2015. While at La Jolla, he will work with members of the Stock Assessment Program on changes in the lengths of longline-caught bigeye tuna that took place in 1990 and with Dr. William H. Bayliff on the Japanese longline fishery for tunas and billfishes in the eastern Pacific Ocean during 2004-2013.

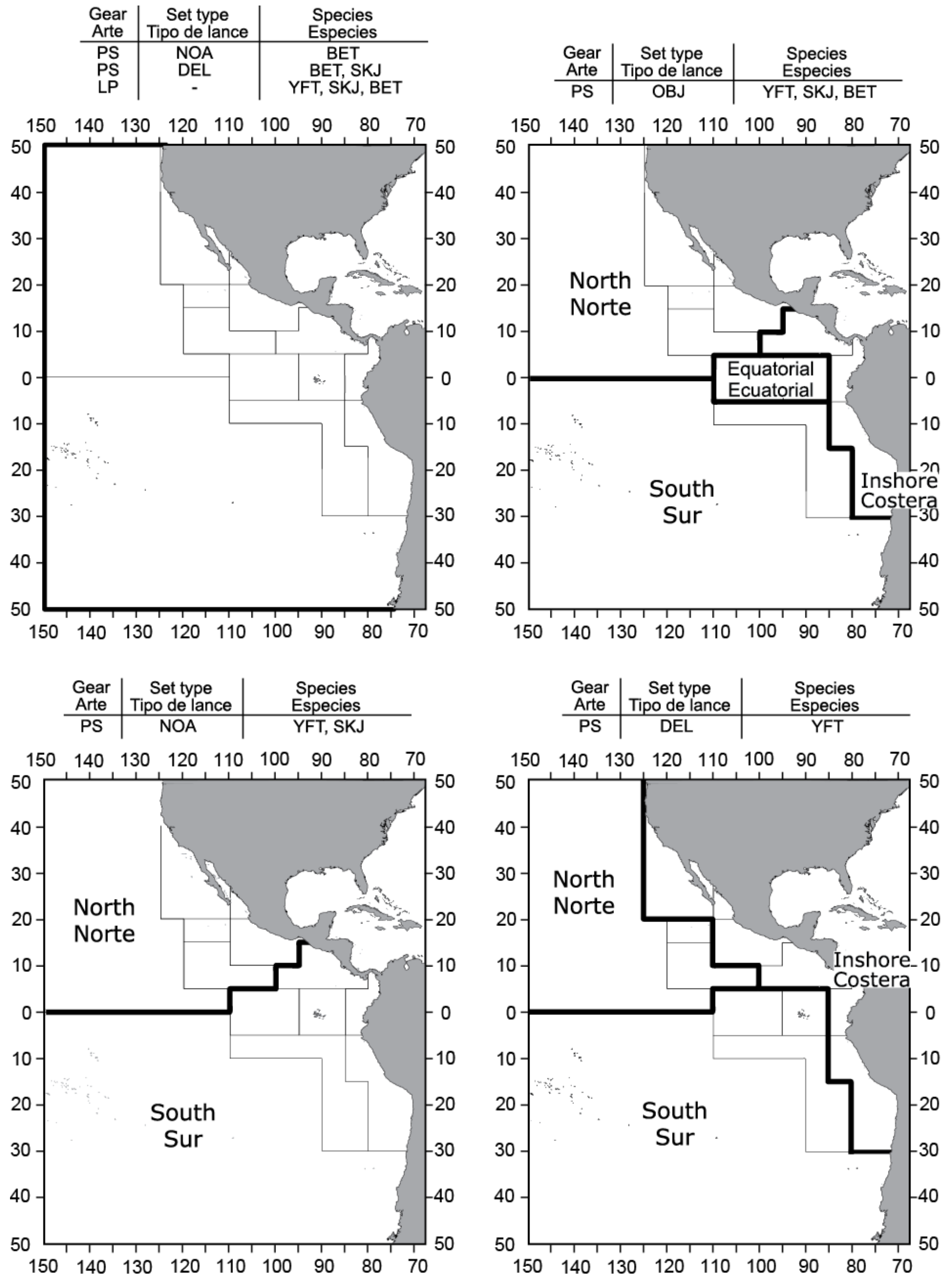

FIGURE 1. Spatial extents of the fisheries defined by the IATTC staff for stock assessment of yellowfin, skipjack, and bigeye in the EPO. The thin lines indicate the boundaries of the 13 length-frequency sampling areas, and the bold lines the boundaries of the fisheries. Gear: PS = purse seine, LP =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

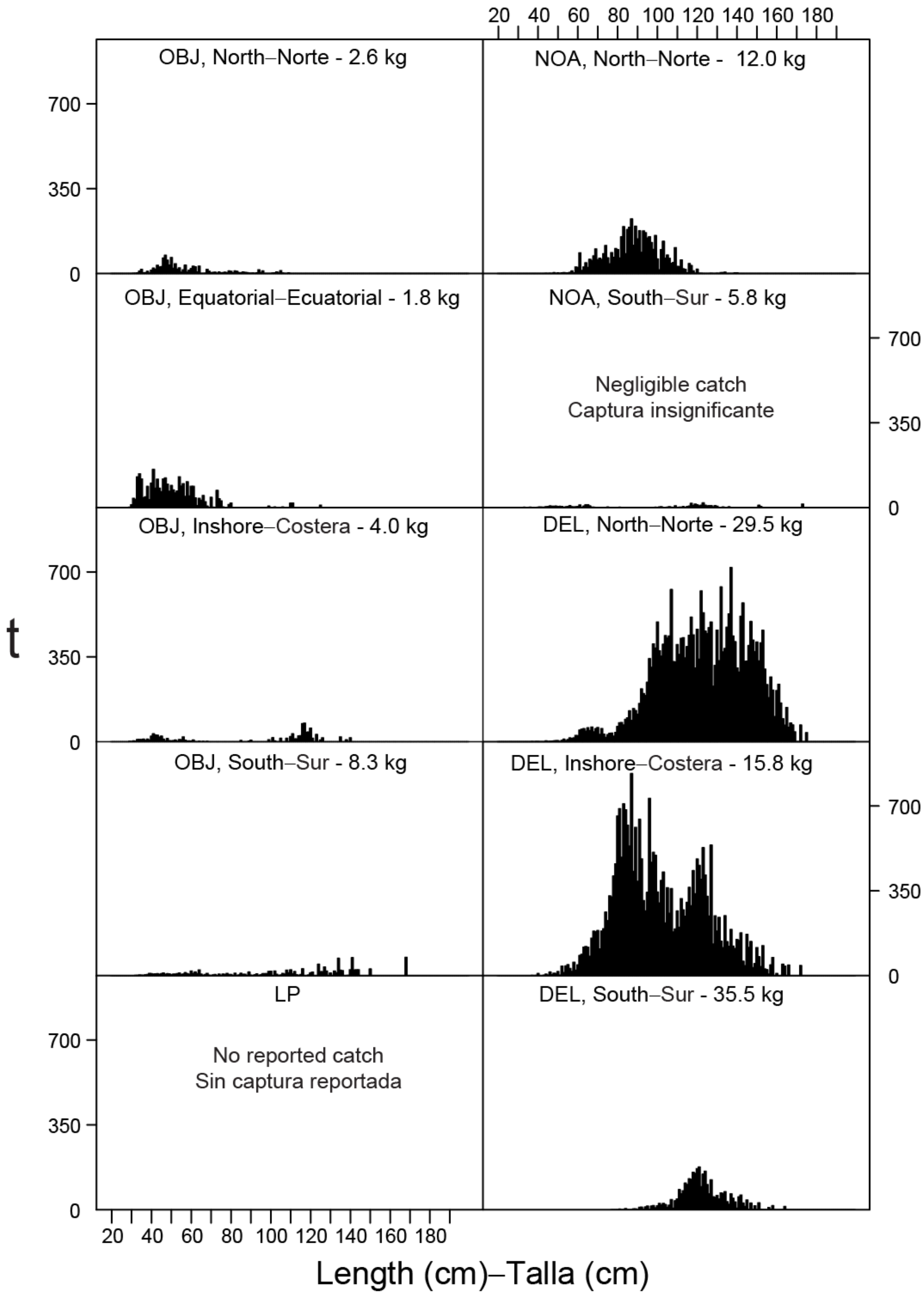

FIGURE 2a. Estimated size compositions of the yellowfin caught in each fishery of the EPO during the second quarter of 2015. The average weights of the fish in the samples are given at the tops of the panels. OBJ = floating object; LP = pole and line; NOA = unassociated; DEL = dolphin; t = metric tons.

FIGURA 2a. Composición por tallas estimada para el aleta amarilla capturado en cada pesquería del OPO durante el segundo trimestre de 2015. 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.

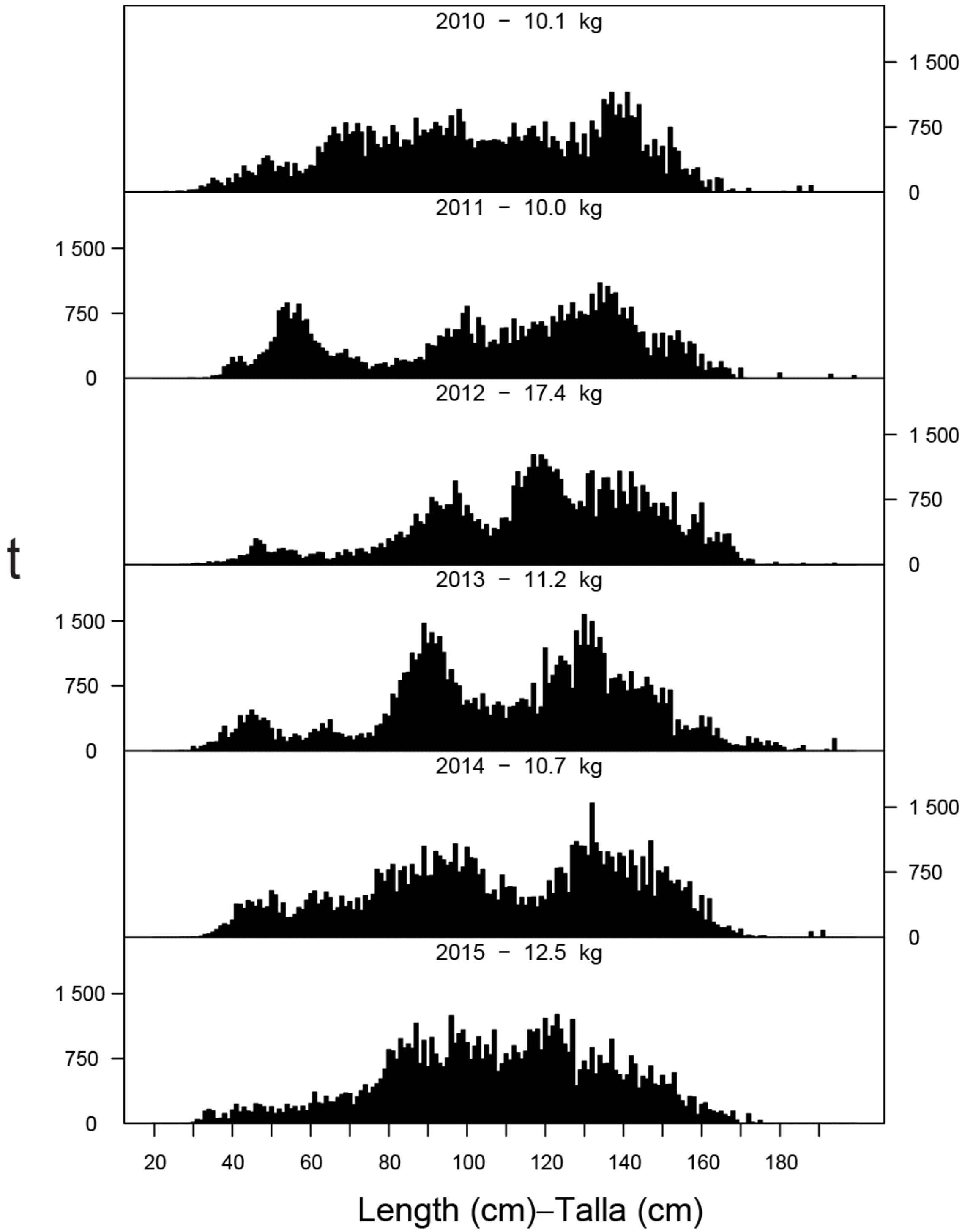

FIGURE 2b. Estimated size compositions of the yellowfin caught in the EPO during the second quarter of 2010-2015. The average weights of the fish in the samples are given at the tops of the panels. t = metric tons.

FIGURA 2b. Composición por tallas estimada para el aleta amarilla capturado en el OPO en el segundo trimestre de 2010-2015. En cada recuadro se detalla el peso promedio de los peces en las muestras; t = toneladas métricas.

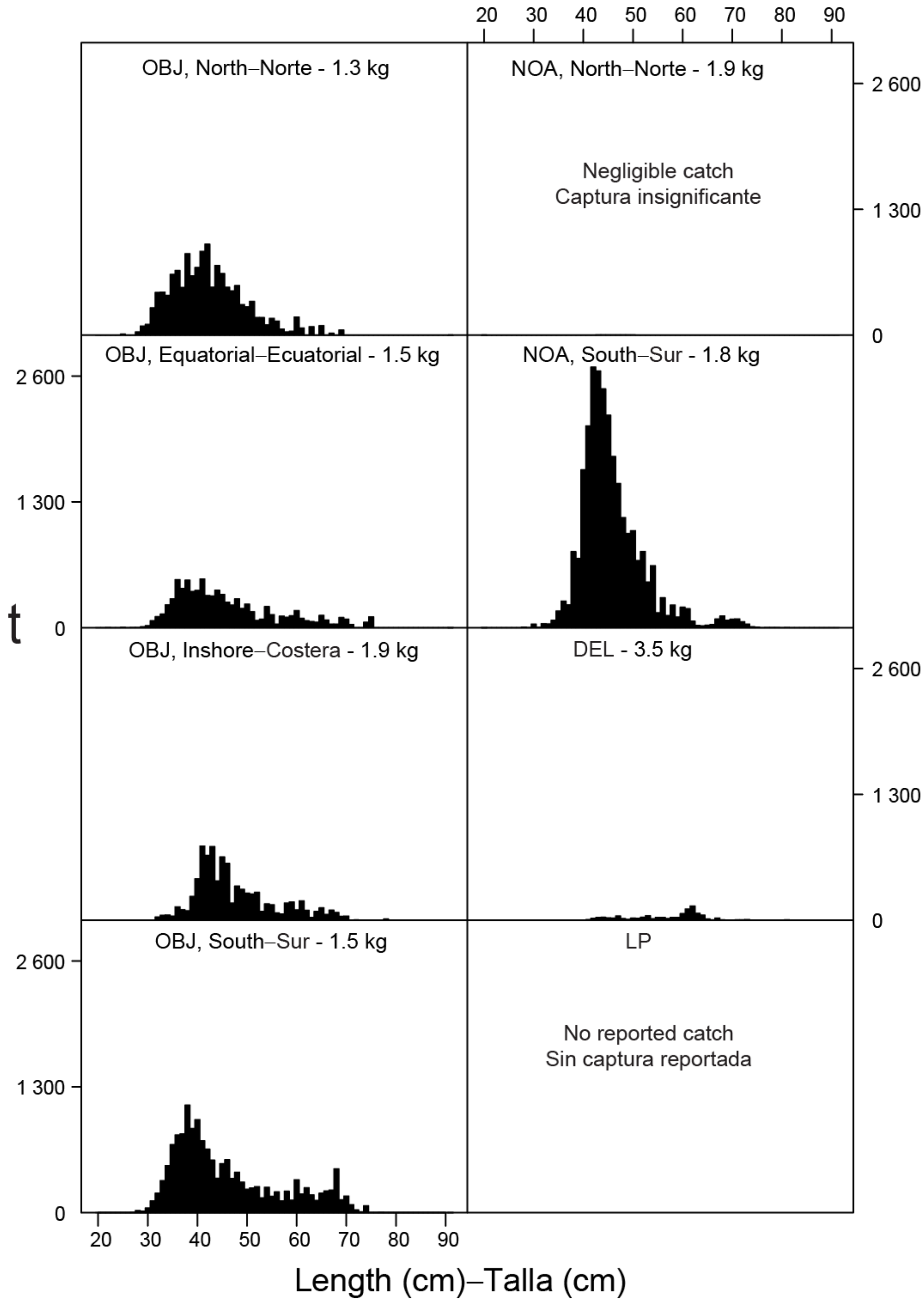

FIGURE 3a. Estimated size compositions of the skipjack caught in each fishery of the EPO during the second quarter of 2015. The average weights of the fish in the samples are given at the tops of the panels. OBJ = floating object; LP = pole and line; NOA = unassociated; DEL = dolphin; t = metric tons.

FIGURA 3a. Composición por tallas estimada para el barrilete capturado en cada pesquería del OPO durante el segundo trimestre de 2015. 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.

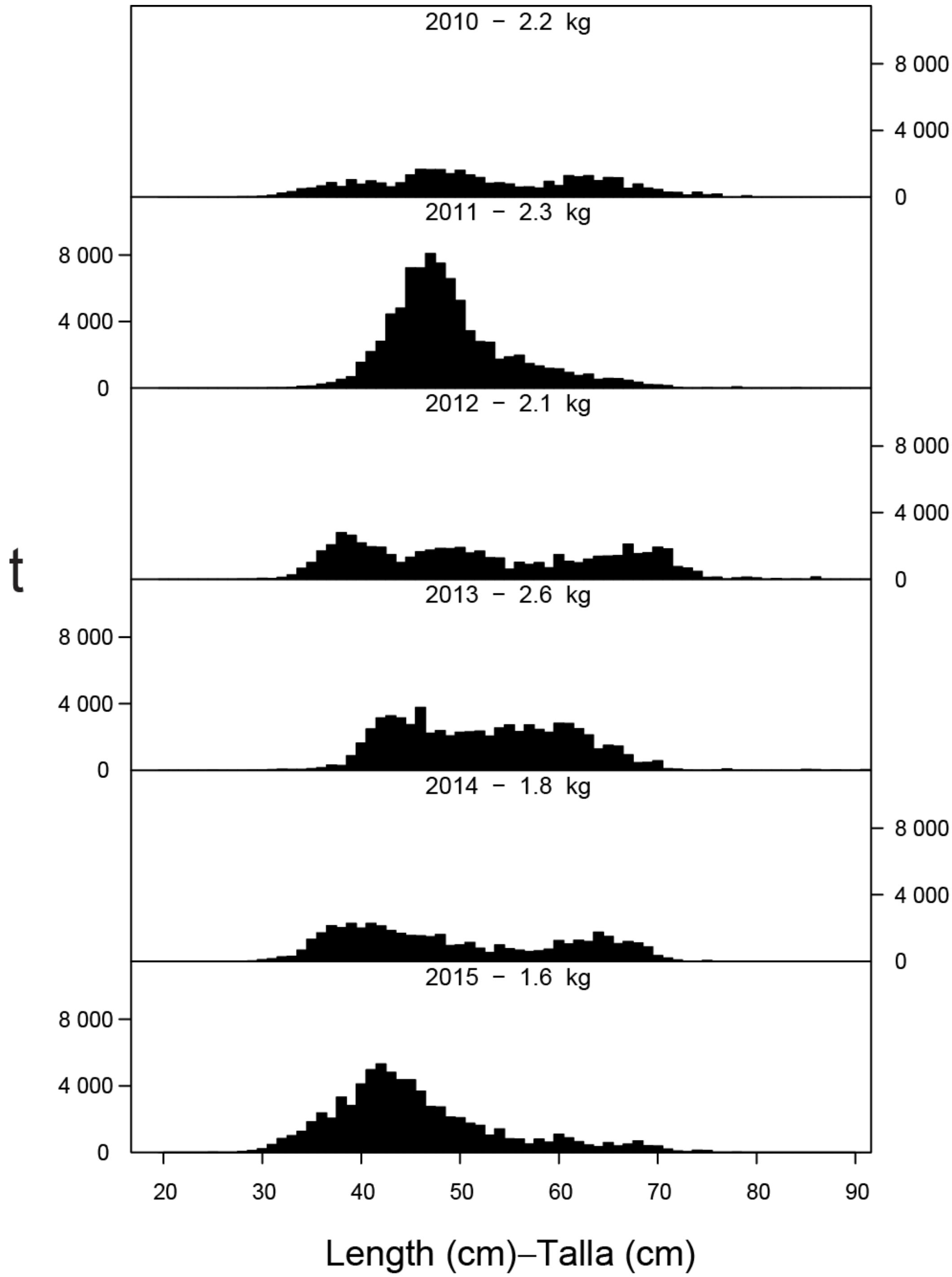

FIGURE 3b. Estimated size compositions of the skipjack caught in the EPO during the second quarter of 2010-2015. The average weights of the fish in the samples are given at the tops of the panels. t = metric tons.

FIGURA 3b. Composición por tallas estimada para el barrilete capturado en el OPO en el segundo trimestre de 2010-2015. En cada recuadro se detalla el peso promedio de los peces en las muestras. t = toneladas métricas.

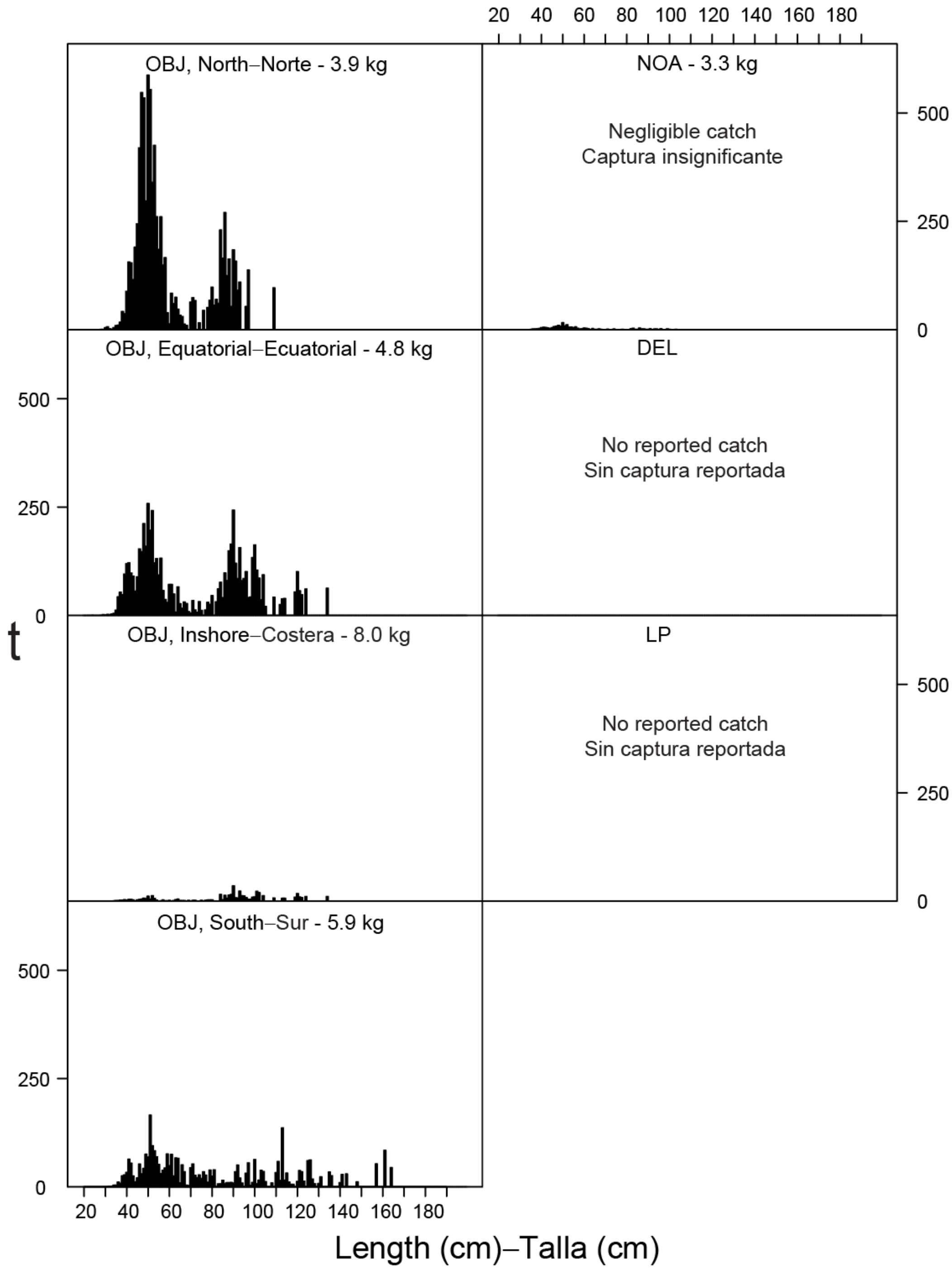

FIGURE 4a. Estimated size compositions of the bigeye caught in each fishery of the EPO during the second quarter of 2015. The average weights of the fish in the samples are given at the tops of the panels. OBJ = floating object; LP = pole and line; NOA = unassociated; DEL = dolphin; t = metric tons.

FIGURA 4a. Composición por tallas estimada para el patudo capturado en cada pesquería del OPO durante el segundo trimestre de 2015. 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.

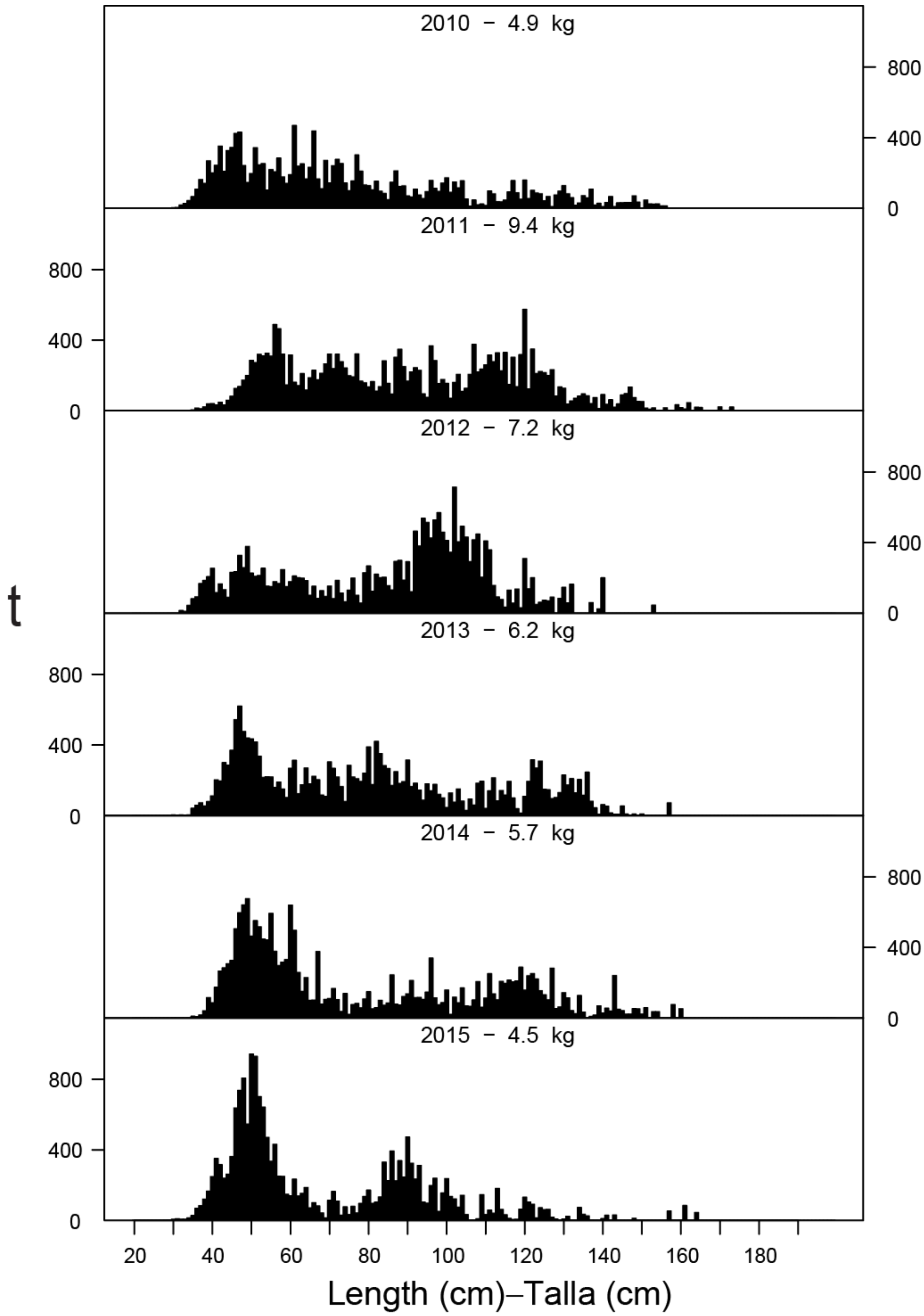

FIGURE 4b. Estimated size compositions of the bigeye caught in the EPO during the second quarter of 2010-2015. The average weights of the fish in the samples are given at the tops of the panels. t = metric tons.

FIGURA 4b. Composición por tallas estimada para el patudo capturado en el OPO en el segundo trimestre de 2010-2015. En cada recuadro se detalla el peso promedio de los peces en las muestras; t = toneladas métricas.

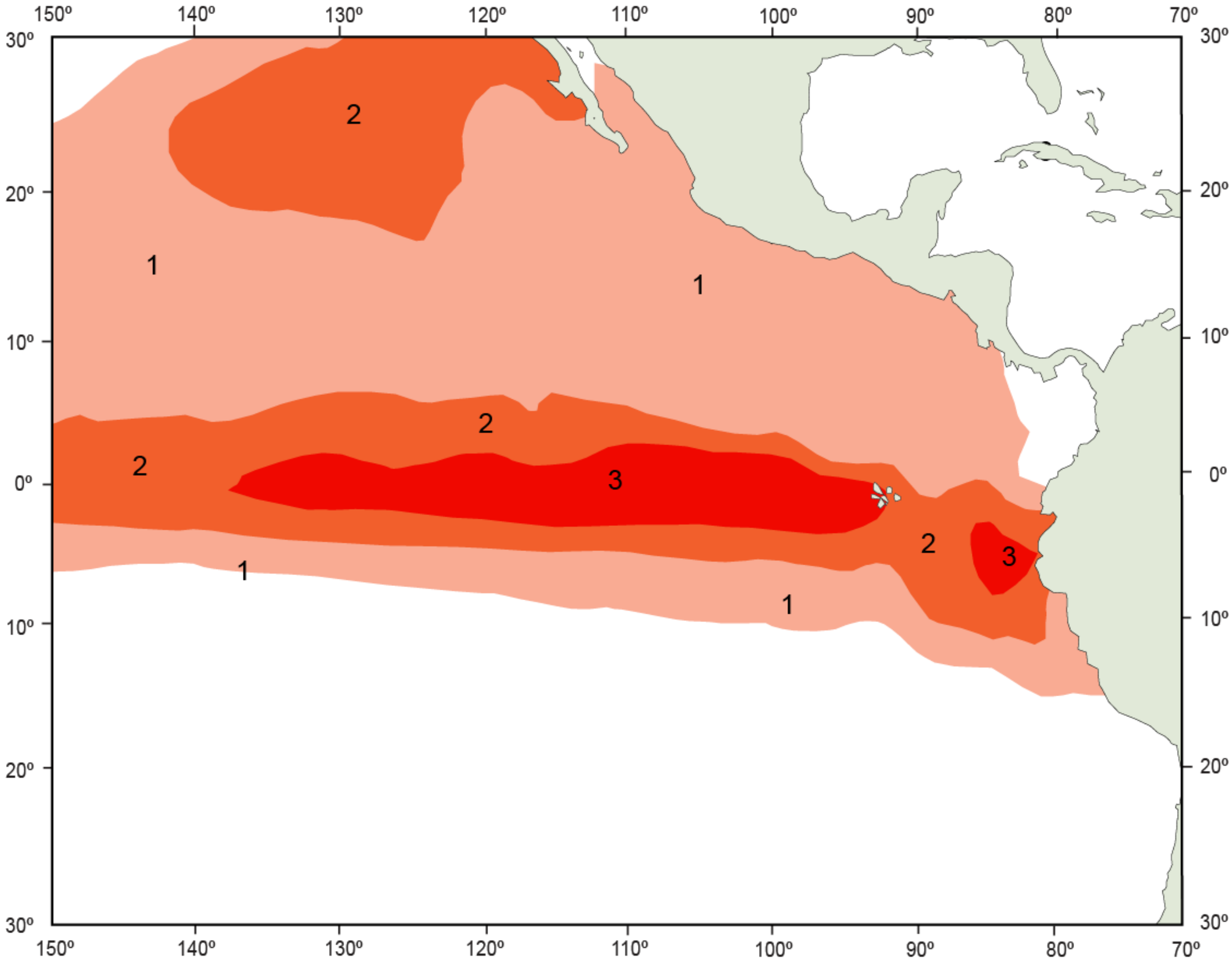

FIGURE 5. Sea-surface temperature (SST) anomalies (departures from long-term normals) for September 2015, based on data from fishing boats and other types of commercial vessels.
FIGURA 5. Anomalías (variaciones de los niveles normales a largo plazo) de la temperatura superficial del mar (TSM) en septiembre de 2015, 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 2015 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 2015, 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	Gear	Well volume–Volumen de bodega				Capacity
Bandera	Arte	1-900	901-1700	>1700	Total	Capacidad
				Number—Número		
Colombia	PS	4	10	-	14	14,860
Ecuador	PS	74	25	13	112	91,599
EU (España—Spain)	PS	-	-	4	4	10,116
Guatemala	PS	-	1	-	1	1,475
México	PS	10	36	1	47	57,502
	LP	1	-	-	1	125
Nicaragua	PS	-	5	1	6	8,478
Panamá	PS	2	8	4	14	19,794
Perú	PS	6	-	-	6	2,818
El Salvador	PS	-	1	3	4	7,892
USA—EE.UU	PS	8	5	3	16	13,982
Venezuela	PS	-	14	1	15	20,890
All flags—	PS	104	105	30	239	
Todas banderas	LP	1	-	-	1	
	PS + LP	105	105	30	240	
				Capacity—Capacidad		
All flags—	PS	47,333	139,518	62,555	249,406	
Todas banderas	LP	125	-	-	125	
	PS + LP	47,458	139,518	62,555	249,531	

TABLE 2. Estimates of the retained catches of tunas in the EPO from 1 January through 27 September 2015, 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 27 de septiembre de 2015, por especie y bandera del buque, en toneladas métricas**.**

Flag	Yellowfin	Skipjack	Bigeye	Pacific bluefin	Bonitos (*Sarda* spp.)	Albacore	Black skipjack	Other[1]	Total	Percentage of total
Bandera	**Aleta amarilla**	**Barrilete**	**Patudo**	**Aleta azul del Pacífico**	**Bonitos (*Sarda* spp.)**	**Albacora**	**Barrilete negro**	**Otras[1]**	**Total**	**Porcentaje del total**
Ecuador	29,922	157,800	31,275	-	36	-	784	387	220,204	45.8
México	98,218	11,596	247	3,082	613	-	2,271	45	116,072	24.1
Nicaragua	5,953	704	464	-	-	-	-	-	7,121	1.5
Panamá	19,949	23,748	7,581	-	-	-	-	71	51,349	10.7
USA—EE.UU	1,196	7,128	1,047	89	-	-	-	-	9,460	2.0
Venezuela	23,901	2,569	110	-	-	-	-	-	26,580	5.5
Other—Otros[2]	17,050	29,696	3,427	-	9	-	20	5	50,207	10.4
Total	196,189	233,241	44,151	3,171	658	-	3,075	508	480,993	

1 May include other tunas, sharks, mackerel, and miscellaneous fishes
1 Puede incluir otros túnidos, tiburones, caballas, y peces diversos
2 Includes Colombia, El Salvador, European Union (Spain), Guatemala and Peru; this category is used to avoid revealing the operations of individual vessels or companies.
2 Incluye Colombia, El Salvador, 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 2015 by longline vessels.
TABLA 3. Capturas reportadas de atún patudo en el OPO durante 2015 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	1,349	747	-	-	-	-	2,096
Japan—Japón	3,826	2,505	829	920	-	1,749	8,080
Republic of Korea—República de Corea	2,351	2,240	782	691	-	1,473	6,064
Chinese Taipei—Taipei Chino	938	1,007	252	-	-	252	2,197
USA—EE.UU	-	-	-	-	-	-	666
Vanuatu	33	-	-	-	-	-	33
Total	8,497	6,499	1,863	1,611	-	3,474	19,136

TABLE 4. Oceanographic and meteorological data for the Pacific Ocean, October 2014-September 2015. 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 2014-septiembre 2015. 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)	21.5 (0.8)	22.3 (0.7)	22.9 (0.1)	24.1 (-0.4)	25.6 (-0.6)	26.7 (0.1)
Area 2 (5°N-5°S, 90°-150°W	25.6 (0.7)	25.9 (0.9)	25.9 (0.8)	26.0 (0.4)	26.6 (0.2)	27.3 (0.2)
Area 3 (5°N-5°S, 120°-170°W)	27.2 (0.5)	27.5 (0.9)	27.4 (0.8)	27.1 (0.5)	27.3 (0.6)	27.8 (0.6)
Area 4 (5°N-5°S, 150W°-160°E)	29.3 (0.6)	29.5 (0.9)	29.4 (0.9)	29.2 (0.9)	29.1 (1.0)	29.3 (1.1)
Thermocline depth—Profundidad de la termoclina, 0°-80°W	40	50	30	20	20	10
Thermocline depth—Profundidad de la termoclina, 0°-110°W	70	115	70	50	50	50
Thermocline depth—Profundidad de la termoclina, 0°-150°W	160	150	120	150	150	145
Thermocline depth—Profundidad de la termoclina, 0°-180°	175	160	170	180	175	180
SOI—IOS	-0.6	-0.9	-0.6	-0.8	0.2	-0.7
SOI*—IOS*	-2.74	1.88	1.96	0,41	-0.58	-3.08
NOI*—ION*	-3.23	-1.82	-2.97	2.08	-1.67	0.93

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)	27.0 (1.4)	26.7 (2.4)	25.4 (2.5)	24.5 (2.9)	22.9 (2.3)	22.9 (2.6)
Area 2 (5°N-5°S, 90°-150°W	28.2 (0.7)	28.3 (1.2)	28.1 (1.2)	27.8 (2.2)	27.3 (2.3)	27.5 (2.6)
Area 3 (5°N-5°S, 120°-170°W)	28.6 (0.8)	28.9 (1.0)	29.0 (1.3)	28.8 (1.6)	28.9 (2.1)	29.0 (2.3)
Area 4 (5°N-5°S, 150W°-160°E)	29.7 (1.2)	29.9 (1.1)	29.9 (1.1)	29.8 (1.0))	29.7 (1.0)	29.7 (1.0)
Thermocline depth—Profundidad de la termoclina, 0°-80°W	45	85	45	50	40	30
Thermocline depth—Profundidad de la termoclina, 0°-110°W	100	95	100	90	100	110
Thermocline depth—Profundidad de la termoclina, 0°-150°W	150	150	140	150	150	145
Thermocline depth—Profundidad de la termoclina, 0°-180°	160	170	155	160	160	160
SOI—IOS	0.0	-0.7	-0.6	-1.1	-1.4	-1.6
SOI*—IOS*	-2.55	-2.40	-1.42	-1.61	-5.46	-5.42
NOI*—ION*	0.63	-2.50	-1.47	-4.05	-3.22	-2.71

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 third 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 tercer 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		WCPFC			
Bandera	**Viajes**		**Clase 6—Observado por programa**						**Porcentaje observado**	
			CIAT		**Nacional**		**WCPFC**			
Colombia	9	(34)	2	(17)	7	(17)			100.0	(100)
Ecuador	62	(251)	38	(162)	24	(86)	0	(3)	100.0	(100)
El Salvador	4	(15)	4	(12)			0	(3)	100.0	(100)
EU-UE (Spain)	7	(23)	5	(9)	2	(14)			100.0	(100)
EE.UU-USA	1	(2)					1	(2)	100.0	(100)
Guatemala	1	(4)	1	(4)					100.0	(100)
México	61	(183)	33	(91)	28	(92)			100.0	(100)
Nicaragua	5	(21)	3	(11)	2	(10)			100.0	(100)
Panamá	13	(51)	8	(28)	5	(23)			100.0	(100)
Venezuela	10	(39)	6	(20)	4	(19)			100.0	(100)
Total	173	(623)	100	(354)	72	(261)	1	(8)	100.0	(100)
			Classes 4 and 5—Clases 4 y 5							
Colombia	1	(1)	1	(1)					-[1]	-[1]
Ecuador	7	(7)	2	(2)	5	(5)			-[1]	-[1]
Total	181	631	103	357	77	266	1	(8)	100.0	100.0

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