

INTER-AMERICAN TROPICAL TUNA COMMISSION  
COMISIÓN INTERAMERICANA DEL ATÚN TROPICAL

QUARTERLY REPORT—INFORME TRIMESTRAL

April-June 2015—Abril-Junio 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 second 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 meetings*

#### *May 2015*

The 6th meeting of the Scientific Advisory Committee took place in La Jolla, California, USA, on May 11-15, 2015. The following background papers were presented at the meeting:

SAC-06-03 The Fishery for Tunas and Billfishes in the Eastern Pacific Ocean in 2014

SAC-06-04a Evaluation of Including the Cost of Reproduction in a Growth Model for Bigeye Tuna in the Eastern Pacific Ocean, and the Effect on Stock Assessment Results and Management Advice, by Carolina V. Minte-Vera, Mark N. Maunder, Alexandre M. Aires-da-Silva, Kurt M. Schaefer, and Daniel W. Fuller

SAC-06-04b Dealing with Time-Varying Composition Data in Fisheries Stock Assessment through Selectivity: Adding Process or Simplifying, by Alexandre M. Aires-da-Silva and Mark N. Maunder

SAC-06-05 Status of Bigeye Tuna in the Eastern Pacific Ocean in 2014 and Outlook for the Future, by Alexandre Aires-da-Silva and Mark N. Maunder

SAC-06-06 Status of Yellowfin Tuna in the Eastern Pacific Ocean in 2014 and Outlook for the Future, by Carolina V. Minte-Vera, Alexandre Aires-da-Silva, and Mark N. Maunder

SAC-06-07 Status of Skipjack Tuna in the Eastern Pacific Ocean in 2014, by Mark N. Maunder

SAC-06-08a Stock Assessment of Albacore Tuna in the North Pacific Ocean in 2014: Report of the Albacore Working Group, International Scientific Committee for Tuna and Tuna-like Species in the North Pacific Ocean

SAC-06-08b Updated Stock Status Indicators for Silky Sharks in the Eastern Pacific Ocean (1994-2014) by Alexandre Aires-da-Silva, Cleridy Lennert-Cody, Mark N. Maunder, Marlon Román-Verdesoto, and Michael G. Hinton

SAC-06-08c Shark Research under the FAO-GEF Common Oceans Project, by Salvador Siu and Alexandre Aires-da-Silva

SAC-06-09 Ecosystem Considerations

SAC-06-10a Current and Planned Activities of the IATTC Staff

SAC-06-10b Preliminary Management Strategy Evaluation to Evaluate the IATTC Interim Reference Points and Proposed Harvest Control Rule, by Mark N. Maunder, Jiangfeng Zhu, and Alexandre Aires-da-Silva

SAC-06-10c Review of Research at the Ashotines Laboratory, by Daniel Margulies, Vernon P. Scholey, Jeanne B. Wexler, and Maria S. Stein

SAC-06-10d Growth: Theory, Estimation, and Application in Fishery Stock Assessment Models, CAPAM Workshop Series Report 2, March 2015, edited by M.N. Maunder, P.R. Crone, J.L. Valero, and B.X. Semmens

SAC-06-10e Extra-Budgetary Funded Research Projects

SAC-06-11 (REV) Recommendations by the Staff for Conservation Measures in the Eastern Pacific Ocean, 2015

Also, the following reports were made available to the attendees:

SAC-06 INF-E Report of Chinese Taipei's Scientific Observer Information of 2013 (Revised) and 2014 (Preliminary)

SAC-06 INF-F Report of Japan's Scientific Observer Program for Tuna Longline Fishery in the Convention Area of Inter-American Tropical Tuna Commission in 2014 Calendar Year

SAC-06 INF-G United States Summary of 2014 Observer Data Per Resolution C-11-08: Resolution On Scientific Observers for Longline Vessels

SAC-06 INF-H Programa de Observadores a Bordo de la Flota Palangrera en el Océano Pacífico México

SAC-06 INF-J CPC Observer Annual Report for the Year 2014 in the IATTC Convention Area China, by Feng Wu, Jiangfeng Zhu, and Xiaojie Dai

SAC-06 INF-M 2014 Annual Scientific Observer Report of Korean Tuna Longline Fishery in the IATTC Convention Area

SAC-06 INF-I Informe Anual 2014 de la UE-España

SAC-06 INF-K Informe Anual 2014 de Venezuela (Rev.)

SAC-06 INF-L National Tuna Fisheries Report in 2014 Japan

SAC-06 INF-A Computational Details of the Spatial Poststratification and the Pennington Sample Size for the 2014 Exploratory Assessments, by Cleridy E. Lennert-Cody

SAC-06 INF-B Scenarios of the Impact on the Tuna Resources in the EPO of Various Increases in Fleet Capacity

SAC-06 INF-D ISC Stock Assessment Reports

SAC-06 INF-N Relationships between Tuna Catch and Variable Frequency Oceanographic Conditions, by Franklin I. Ormaza-González, Alejandra Mora-Cervetto, and Raquel Bermúdez-Martínez

In addition, the following documents prepared by the European Union were presented at the meeting;

Monitoreo a Bordo de la Flota Atunera, prepared by AZTI Tecnalia, Sukarrieta, Spain

Verification of the code of good practices in ANABAC & OPAGAC tuna purse seiners, by Nicolas Goñi, Jon Ruiz, Hilario Murua, Iñigo Krug, Josu Santiagi, Begoña Sotillo de Olano, Alberto González de Zarate, Gala Moreno, and Jefferson Murua

Evaluating potential biodegradable twines for use in FADs, by G. Moreno, J.M. Ferarios, A. Roman, I. Sancristobal, J. Murua, N. Goñi, H. Murua, J. Ruiz, and J. Santiago

Towards Acoustic Discrimination of Tuna Species at FADs, by G. Moreno, G. Boyra, I. Rico, I. Sancristobal, J.D. Filmater, F. Forget, J. Murua, N. Goñi, H. Murua, J. Ruiz, and J. Santiago

ISSF Skipper Workshops: Understanding FADS from the Fishers' Perspective, by Jefferson Murua, Gala Moreno, and Victor Restrepo

***June-July 2015***

The following IATTC and IDCP meetings took place in Guayaquil, Ecuador, during the period of June 22-July 3, 2015:

<b>Number</b>	<b>Meeting</b>	<b>Dates</b>
35	Permanent Working Group on Tuna Tracking	June 22
22	Working Group to Promote and Publicize the AIDCP Dolphin Safe Tuna Certification System	June 22
57	International Review Panel	June 22
31	Parties to the Agreement on the International Dolphin Conservation Program	June 23
6	Committee for the Review of Implementation of Measures Adopted by the Commission	June 23-24
3	Committee on Administration and Finance	June 26
89	Inter-American Tropical Tuna Commission	June 29-July 3

The following documents were presented at the 89th meeting of the IATTC:

***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-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***

Drs. Guillermo A. Compean and Richard B. Deriso and Mr. Kurt M. Schaefer were invited to participate in a workshop, the Western and Central Pacific Ocean Purse Seine Bigeye Management Workshop, organized by the Western Pacific Regional Fishery Management Council (WPRFMC) and the International Seafood Sustainability Foundation and held in Honolulu, Hawaii, USA, on 8-10 April 2015. The objectives of the workshop were: (1) to develop a set of recommendations that will identify measures for the reduction of bigeye fishing mortality by purse-seine gear, and (2) to evaluate management measures with respect to conservation benefits, implementation impacts, and enforceability. The travel expenses for the participation at the workshop were covered by the WPRFMC.

Dr. Martin A. Hall participated in a meeting of the Seafood Watch Technical Advisory Committee in Monterey, California, USA, on 13-14 April, 2015. The objective of the meeting was to review the scientific support for the criteria used in the classification of fishery products.

Dr. Martin A. Hall gave a talk at the Hopkins Marine Station, Monterey, California, USA, on 14 April 2015, entitled "Bycatch and Ecosystem-Based Fisheries Management: Evolution, Change, and Revolution."

Dr. Guillermo A. Compeán and Ms. Nora Roa-Wade participated in the Annual General Meeting of the Members of the International Fisheries Commissions Pension Society in Ottawa, Ontario, Canada, on 14-16 April 2015. The objective of the meeting was to bring together representatives of the fisheries commissions in the United States and Canada to discuss various issues related to the pension plan.

Several members of the IATTC staff participated in all or parts of the 66th Tuna Conference at Lake Arrowhead, California, USA, on 18-21 May 2015. Dr. Caroline V. Minte-Vera served as co-chair (with Dr. John E. Graves of the Virginia Institute of Marine Science), and Ms. Joydelee C. Marrow served as coordinator of the conference. Mr. Kurt M. Schaefer served as moderator for a session on bluefin tuna. Talks were given by Drs. Michael G. Hinton, Daniel Margulies, and Mark N. Maunder, Messrs. Daniel W. Fuller, Marlon Román-Verdesoto, and Kurt M. Schaefer, and Ms. Maria S. Stein. In addition, research in which Drs. Cleridy E. Lennert-Cody, Daniel Margulies, and Mark N. Maunder, Messrs. Kurt M. Schaefer and Vernon



P. Scholey, and Mss. Susana M. Cusatti, Maria S. Stein, and Jeanne B. Wexler had participated was presented by other speakers.

Dr. Guillermo A. Compeán participated in the XXXV Congreso de Ciencias del Mar in Coquimbo, Chile, on 25-29 May 2015, at which he gave a talk entitled “La Ordenación de las Pesqueras de Atún en el OPO y el Enfoque Ecosistémico.”

Dr. Mark N. Maunder participated in The Statistics in Ecology and Environmental Monitoring (SEEM) 2015 meeting in Queenstown, New Zealand, on 21-26 June 2015, at which he gave a presentation entitled “Data Conflict: the Nemesis of Integrated Analysis.” His travel expenses were covered by the Center for the Advancement of Population Assessment Methodology (CAPAM).

## **RESEARCH**

### ***DATA COLLECTION AND DATABASE PROGRAM***

There are two major fisheries for tunas in the eastern Pacific Ocean (EPO; the region east of 150°W, south of 50°N, 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 composition 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, and the data that they collect include the locations and dates of each set, the type of each set (dolphin, floating object, or unassociated), the approximate total weights of each species caught in each set, and the wells in which the fish caught in each set are stored. Similar data are obtained from the logbooks of smaller purse seiners and of pole-and-line vessels, although these data may be less accurate or less precise than those collected by the observers. Then, when a vessel unloads its catch, the weight of the contents of each well is made available to the IATTC staff. These “reported catch statistics”—catch statistics obtained from every possible source, including observer records, fishing vessel logbooks, unloading records, and data compiled by governmental agencies—are compiled to provide an estimate of the total amount of tropical tunas (yellowfin, bigeye, and skipjack combined) caught annually by the surface fisheries. In addition, sample data on the species and length compositions 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 compositions 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 375 length-frequency samples from 257 wells and abstracted logbook information for 280 trips of commercial fishing vessels during the second quarter of 2015.

***Reported fisheries statistics***

Information reported herein is for the EPO, unless noted otherwise. Catch is reported in metric tons (t), vessel capacity in cubic meters (m<sup>3</sup>), and effort in days of 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 after 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.

***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](#). 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 240,300 m<sup>3</sup> ([Table 1](#)). The average weekly at-sea capacity for the fleet, for the weeks ending 5 April through 28 June, was about 169,400 m<sup>3</sup> (range: 158,600 to 189,600 m<sup>3</sup>).

***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 in the EPO during the period of January-June in 2015, and comparative statistics for 2010-2014, were:

Species	2015	2010-2014			Weekly average, 2014
		Average	Minimum	Maximum	
Yellowfin	139,000	131,000	124,800	135,700	5,300
Skipjack	167,000	129,800	88,700	158,900	6,400
Bigeye	30,600	26,800	23,800	29,700	1,200

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 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 catch rate used in analyses are based on fishing trips landing predominantly yellowfin, skipjack, bigeye, and bluefin tuna. The great majority of the purse-seine catches of yellowfin, skipjack, and bigeye are made by Class-6 vessels (vessels with fish-carrying capacities greater than 363 metric tons), and only data for these vessels are included in these measures of catch rate. 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 per day of fishing for yellowfin, skipjack, and bigeye in the EPO during the first 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	18.0	16.7	15.1	17.7
S of 5° N			4.8	3.5	2.4	4.9
N of 5° N	Skipjack	PS	1.4	0.9	0.4	1.6
S of 5° N			17.3	12.0	9.7	14.3
EPO	Bigeye	PS	2.4	1.9	1.5	2.4
EPO	Yellowfin	LP	0.0	1.5	0.0	5.6
EPO	Skipjack	LP	0.0	2.3	0.0	5.0

### *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 t (<http://iattc.org/PDFFiles2/C-13-01-Tuna-conservation-2014-2016.pdf>). Preliminary estimates of the catches reported for the first two quarters of 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, pole-and-line, and recreational 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 first quarter 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 first quarter of 2015, and the second shows data for the combined strata for the first quarter of each year of the 2010-2015 period. Samples were obtained from 262 wells containing fish that were caught during the first 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 262 wells sampled that contained fish caught during the first quarter of 2015, 176 contained yellowfin. The estimated size compositions of these fish are shown in [Figure 2a](#). The area of greatest yellowfin catch during the first quarter was taken by sets on dolphins in the Inshore area, with lesser amounts of large (>110 cm) yellowfin taken in the Southern dolphin area. The Inshore floating-object area, and the Northern and Southern unassociated areas, had lesser amounts of yellowfin of all sizes.

The estimated size compositions of the yellowfin caught by all fisheries combined during the first quarters of 2010-2015 are shown in [Figure 2b](#). The average weight of yellowfin caught during the first quarter of 2015 (15.8 kg) was the greater than any of the previous 5 year period, and significantly greater than the 2014 average of 9.3 kg, which was the least for the previous 5-year period. Most of the yellowfin caught during the first quarter of 2015 were either in the 85- to 100-cm range, or the 110- to 125-cm range.

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 262 wells sampled that contained fish caught during the first quarter of 2015, 175 contained skipjack. The estimated size compositions of these fish are shown in [Figure 3a](#). The majority of the skipjack was caught in the Inshore and Southern floating-object fisheries, with sizes in the 35- to 55-cm range, and in the Southern unassociated fishery, with sizes in the 40- to 60-cm range. Lesser amounts of skipjack were caught in the Northern and Equatorial floating-object fisheries.

The estimated size compositions of skipjack caught by all fisheries combined during the first quarter of 2010-2015 are shown in [Figure 3b](#). The average weight of skipjack caught during the first quarter of 2015 (1.9 kg) was equal to the least for the previous 5-year period (range 1.9- to 2.6-kg), with overall smaller individuals than in the previous year, in the 40- to 55-cm range.

There are seven surface fisheries for bigeye defined for stock assessments: four associated with floating objects, one with unassociated schools, one associated with dolphins, and one pole-and-line ([Figure 1](#)). The last three fisheries include all 13 sampling areas. Of the 262 wells sampled that contained fish caught during the first quarter of 2015, 41 contained bigeye. The estimated size compositions of these fish are shown in [Figure 4a](#). All of the catch was taken in floating-object sets, primarily in the Southern area.

The estimated size compositions of bigeye caught by all fisheries combined during the first quarter of 2010-2015 are shown in [Figure 4b](#). The average weight of bigeye caught during the first quarter of 2015 (6.3 kg) was less than most of those for the previous 5-year period (range 6.0- to 11.0-kg). The size distribution was fairly uniform, ranging from about 35 to 145 cm.

The estimated retained purse-seine catch of bigeye less than 60 cm in length during the first quarter of 2015 was 800 t, or about 31 percent of the estimated total retained purse-seine catch of bigeye during that period. The corresponding amounts for 2010-2014 ranged from 1,600 to 2,900 t, or 10 to 37 percent respectively. 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 except for June 14-15, 18-22, and 24. Spawning occurred between 1:15 a.m. and 3:00 p.m. The number of eggs collected ranged from 5,000 to 504,000 per day. The water temperatures in the tank ranged from 23.2° to 29.5°C.

At the end of the quarter there were five 47- to 55-kg, seven 38- to 39-kg, and seven 9- to 25-kg yellowfin in Tank 1. Seven yellowfin were captured during the quarter and placed 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).

During the quarter several KU faculty members, staff, and students, and ARAP biologists worked with Achotines laboratory staff members on multiple rearing trials and experiments with yellowfin larvae and juveniles as part of the SATREPS project. One of the objectives was to produce a large number of juvenile yellowfin in order to stock an anchored sea cage outside of Achotines Bay (see IATTC Quarterly Report for January-March 2014). Prior to the transfer of juveniles, preparations of the sea cage included the installation of the net, an anti-bird net, and automatic feeder, and deployment of a raft with solar panels and batteries to provide 24-hour lighting. On June 12, 239 yellowfin juveniles (52 days post-hatch, 9-13 cm total length) were transferred from a land-based rearing tank to the sea cage, and an additional 54 juveniles (55 days post-hatch, 7-11 cm total length) were transferred from their rearing tank to a 170 metric ton capacity in-ground tank (Tank 6) equipped with a material wall liner, automatic feeder, and 24-hour lighting. Daily trips to the sea cage were made to refill the automatic feeder and to monitor survival in the cage. This activity represents the first successful transfer worldwide of early-stage juvenile yellowfin to a sea cage.

The IATTC early life history (ELH) group worked with the Achotines staff during May and June on a series of feeding experiments to examine food selectivity of first feeding yellowfin larvae as part of the SATREPS project. The experiments examined food selectivity of smaller and larger size fractions of wild-caught microzooplankton, a mixed assemblage of rotifers and

Artemia, and cultured prey > 200 microns in width. Results of previous experiments with Pacific bluefin and yellowfin larvae indicated that yellowfin larvae exhibit greater growth potential and higher survival when foraging on small (<200 microns in width) prey (see Quarterly Report July-September 2014). However, the greater size of Pacific bluefin larvae at first feeding may confer feeding and growth advantages when foraging on larger prey, and this hypothesis is being experimentally investigated during 2015 with larvae of both species.

Ms. Michiko Kawahito was the JICA-SATREPS project counterpart stationed at the Achotines Laboratory from May 2014 through January 2015. Her replacement, Mr. Itsuo Kuzasa, arrived at the Achotines Laboratory on April 6, 2015, and he will serve as the JICA counterpart through the scheduled end of the project in March of 2016.

#### ***Other collaborative studies***

A member of the ELH group worked with the Achotines staff in May to obtain daily samples and a developmental growth series of 3 to 25 day old yellowfin larvae. These samples will be analyzed for stage-specific mode of respiration, acid/base regulation, and osmoregulation of yellowfin tuna larvae. Dr. Nicolas Wegner (U.S. National Marine Fisheries Service) and Dr. Martin Tresguerres (Scripps Institution of Oceanography) are collaborators on this project.

#### ***Presentation***

Mr. Vernon P. Scholey participated in a panel discussion and gave a presentation at the “Dialogue for Sustainable Production and Consumption of Tuna: Multi-Stakeholder Dialogue for Responsible Tuna Aquaculture.” The meeting, which was organized by the World Wildlife Fund (WWF) Japan, was held in Tokyo on 14 May 2015. The presentation, which was entitled “Overview of Broodstock Management, Spawning, Early Life History Studies, and Larval Rearing Trials of Yellowfin Tuna, *Thunnus albacares*, at Achotines Laboratory, Republic of Panama” was co-authored by Dr. Daniel Margulies and Mss. Jeanne B. Wexler and Maria S. Stein. Mr. Scholey’s travel expenses were paid by WWF Japan.

#### ***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 June 2015, a small group of fish continued to be held in the broodstock snapper tank.

#### ***Visitor at the Achotines Laboratory***

Mr. Wang Weihua, Chief of the Diplomatic-Commercial Mission of China to the Republic of Panama, visited the Achotines Laboratory on April 25, 2015. Mr. Weihua was given an extensive and detailed tour of the facilities by the Laboratory staff.

#### ***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 160°W, 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 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 water 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 (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 (Figure 5). Throughout the quarter, the SSTs were above normal over much of the area north of the equator, along the equator, and off Peru, but nearly normal over most 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 June 2015 they were virtually all above normal ([Table 4](#)).

According to the Climate Diagnostics Bulletin of the U.S. National Weather Service for June 2015, “Nearly all models predict El Niño to continue into the Northern Hemisphere winter 2015-16, with many multi-model averages predicting a strong event at its peak strength. ... Overall, there is a greater than 90% chance that El Niño will continue through Northern Hemisphere winter 2015-16, and around an 80% chance it will last into early spring 2016.”

## ***BYCATCH PROGRAM AND INTERNATIONAL DOLPHIN CONSERVATION PROGRAM***

### ***Observer program***

#### ***Coverage***

The Agreement on the International Dolphin Conservation Program (AIDCP) requires 100-percent coverage by observers on trips by Class-6 purse seiners (vessels with fish-carrying capacities greater than 363 metric tons) that fish for tunas in the eastern Pacific Ocean (EPO). This mandate is carried out by the IDCP On-Board Observer Program, made up of the IATTC’s international observer program and the observer programs of Colombia, Ecuador, the European Union, Mexico, Nicaragua, Panama, Venezuela, and the Regional Observer Program (ROP) under the umbrella of the WCPFC, based on a Memorandum of 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-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.

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 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 IDCPC 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 two trips of vessels planning to operate in both areas during the second quarter of 2015. These requests were granted.

Observers from the IDCPC On-Board Observer Program departed on 239 fishing trips aboard purse seiners covered by that program during the second quarter of 2015. Preliminary coverage data for these vessels during the quarter are shown in [Table 5](#).

### ***Training***

During the second quarter of 2015, the IATTC conducted one observer training session for 14 trainees, including 3 from the Programa Nacional de Observadores Pesqueros de Ecuador (PROBECUADOR). This session took place in Manta, Ecuador, during 6-23 April 2015. The instructors were Messrs. Erick Largacha, the head of the IATTC office in Manta, Ecuador, and Ernesto Altamirano of the main office in La Jolla.

### ***Gear project***

IATTC staff members carried out dolphin safety-gear inspection and safety-panel alignment procedures aboard two Mexican-flag purse seiners during the second quarter of 2015. The first, which took place at Puerto Madero, Mexico, on 10 April 2015, was conducted by Mr. Marlon Román, and the second, which took place at Manzanillo, Mexico, on 8 May 2015, was conducted by Mr. Enrique Ureña.

## **PUBLICATIONS**

- Madigan, Daniel J., Aaron B. Carlisle, Luke D. Gardner, Nishad Jayasundara, Fiorenza Micheli, Kurt M. Schaefer, Daniel W. Fuller, and Barbara A. Block. in press. Assessing niche width of endothermic fish from genes to ecosystem. *Proc. Nat. Acad. Sci.* [www.pnas.org/cgi/doi/10.1073/pnas.1500524112](http://www.pnas.org/cgi/doi/10.1073/pnas.1500524112).
- Squires, Dale, Lisa T. Ballance, Rick Deriso, James Ianelli, Mark Maunder, and Kurt Schaefer. in press. Comment on ‘Scope and compatibility of measures in international fisheries agreements’ by Finus and Schneider. *Oxford Economic Papers*, doi: 10.1093/oenp/gpv041.
- Wexler, Jeanne, Daniel Margulies, Maria Stein, Yang-Su Kim, Tsukasa Sasaki, Vernon Scholey, Tomoki Honryo, Angel Guillen, Susana Cusatti, and Yoshifumi Sawada. 2015. Comparative growth and survival studies of yellowfin (*Thunnus albacares*) and Pacific bluefin (*Thunnus orientalis*) tuna larvae. *Stages* (newsletter of the Early Life History Section of the American Fisheries Society), 36 (2): 3-4.

## **INTER-AGENCY COOPERATION**

Dr. Martin A. Hall’s participation in a meeting of the Seafood Watch Technical Advisory Committee in April 2015 is described in the Meetings section of this report.

At the invitation of the Comisión Nacional de Acuacultura y Pesca (CONAPESCA) of Mexico, Mr. Marlon Román-Verdesoto spent the period of 9-10 May 2015 in Aldolfo Lopez

Mateos, Baja California Sur, Mexico, where he gave a course on turtle and shark identification to Mexican observers as part of the Fishing Management Plan carried out by CONAPESCA to the artisanal fishery of Baja California Sur. Mr. Román's travel expenses were paid by CONAPESCA.

On 27 May 2015 Dr, Robert J. Olson and Ms. Leanne M. Duffy removed small samples of tissue from frozen yellowfin, skipjack, and bigeye tuna and dorado that the IATTC staff has in storage. The samples were given to Drs. Brian N. Popp, Department of Geology and Geophysics, University of Hawaii, and Jeffrey C. Drazen, Department of Oceanography, University of Hawaii. The samples will be used in a study of mercury in marine ecosystems, funded by the U.S. National Science Foundation.

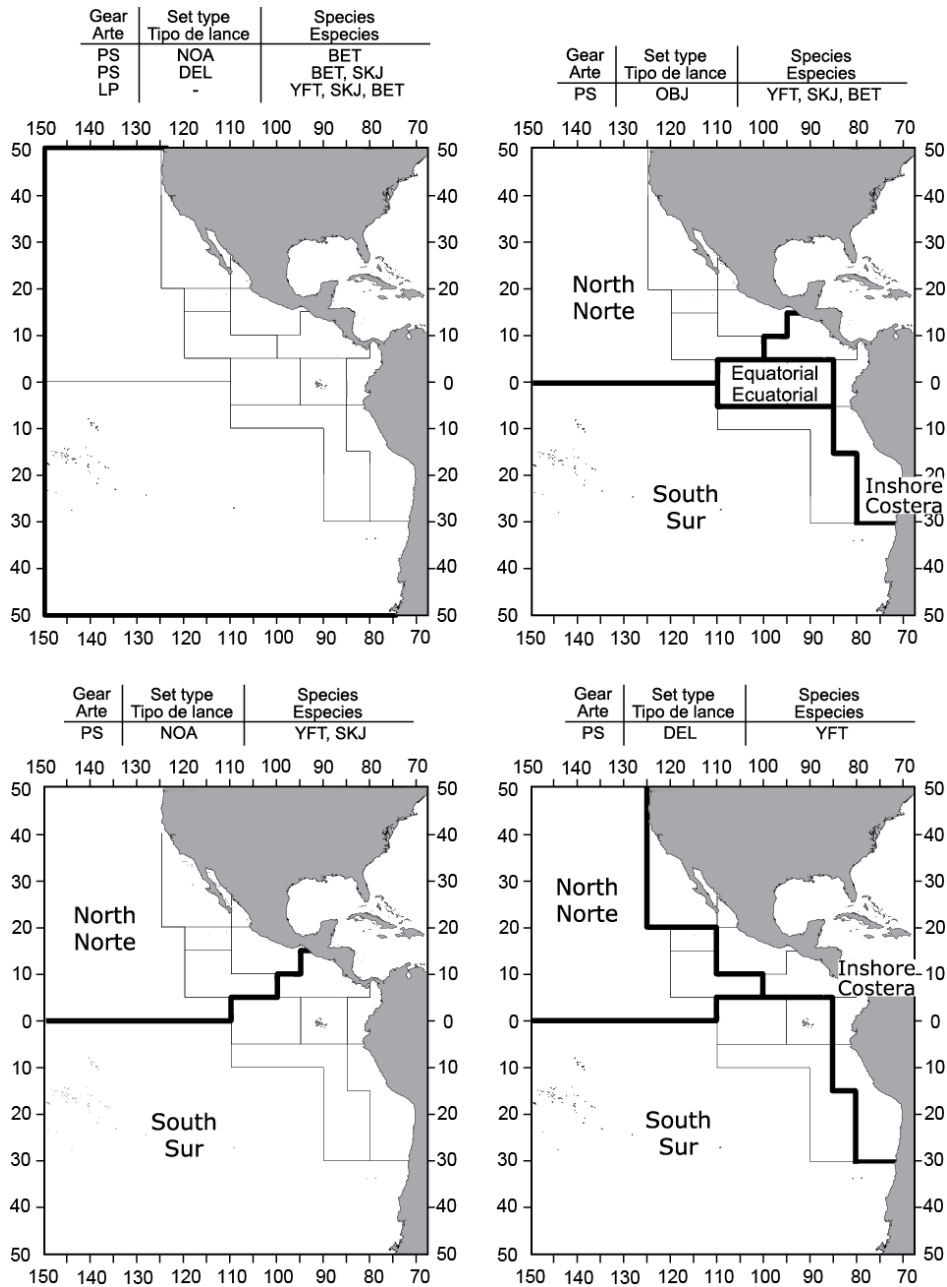
The collection of a developmental growth series of 3 to 25 day old yellowfin larvae for Dr. Nicolas C. Wegner (U.S. National Marine Fisheries Service) and Dr. Martin Tresguerres (Scripps Institution of Oceanography) is described in the Early Life History section of this report.

Mr. Vernon P. Scholey's activities at a World Wildlife Fund meeting in Japan in May 2015 are described in the Early Life History section of this report.

#### **ADMINISTRATION**

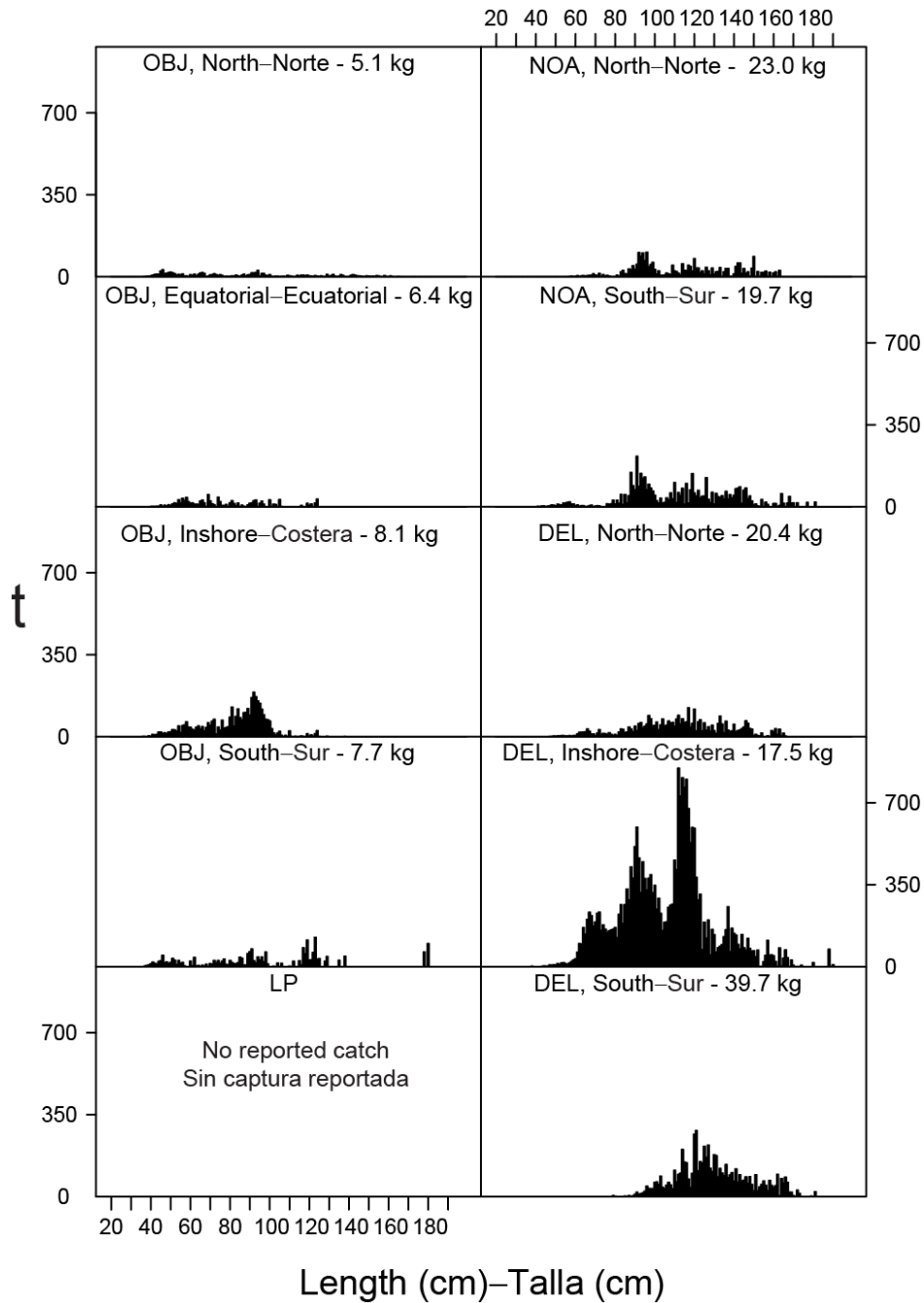
Ms. Zahir Dinubia, bilingual secretary at the La Jolla office since 1 September 2011, resigned her position, effective 15 April 2015 to devote more time to the care of her recently-born daughter. Ms. Dinubia performed her duties efficiently and cheerfully, so everyone is sorry to see her leave the staff.

Ms. Mary Carmen Lopez, a graduate of the Universidad Iberoamericana in Tijuana, Mexico, was hired on 19 June 2015 as a replacement for Ms. Zahir Dinubia. Ms. Lopez had previously worked for the IATTC from 26 January to 20 December 2009.



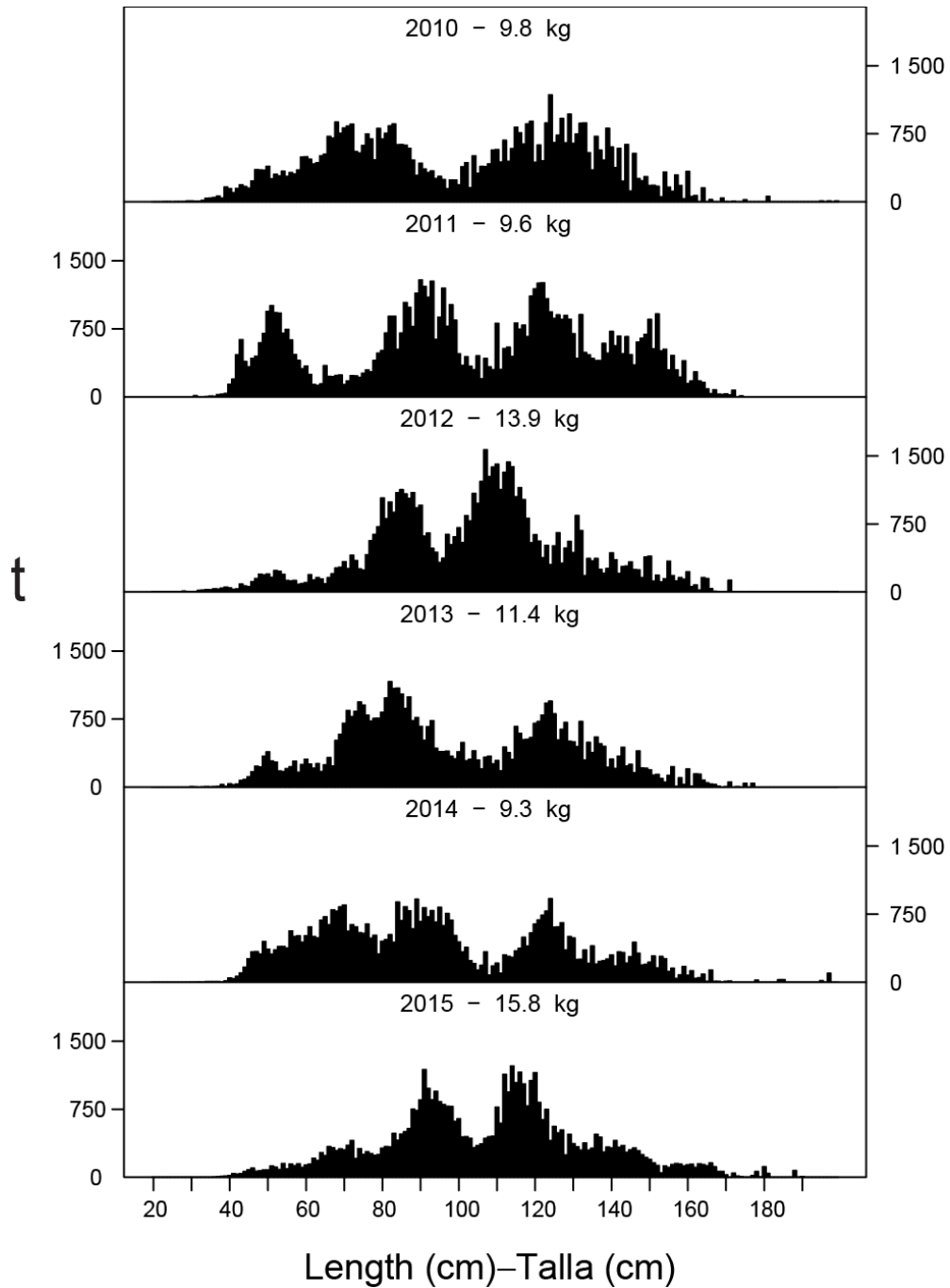
**FIGURE 1.** Spatial extents of the fisheries defined by the IATTC staff for stock assessment of yellowfin, skipjack, and bigeye in the EPO. The thin lines indicate the boundaries of the 13 length-frequency sampling areas, and the bold lines the boundaries of the fisheries. Gear: PS = purse seine, LP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



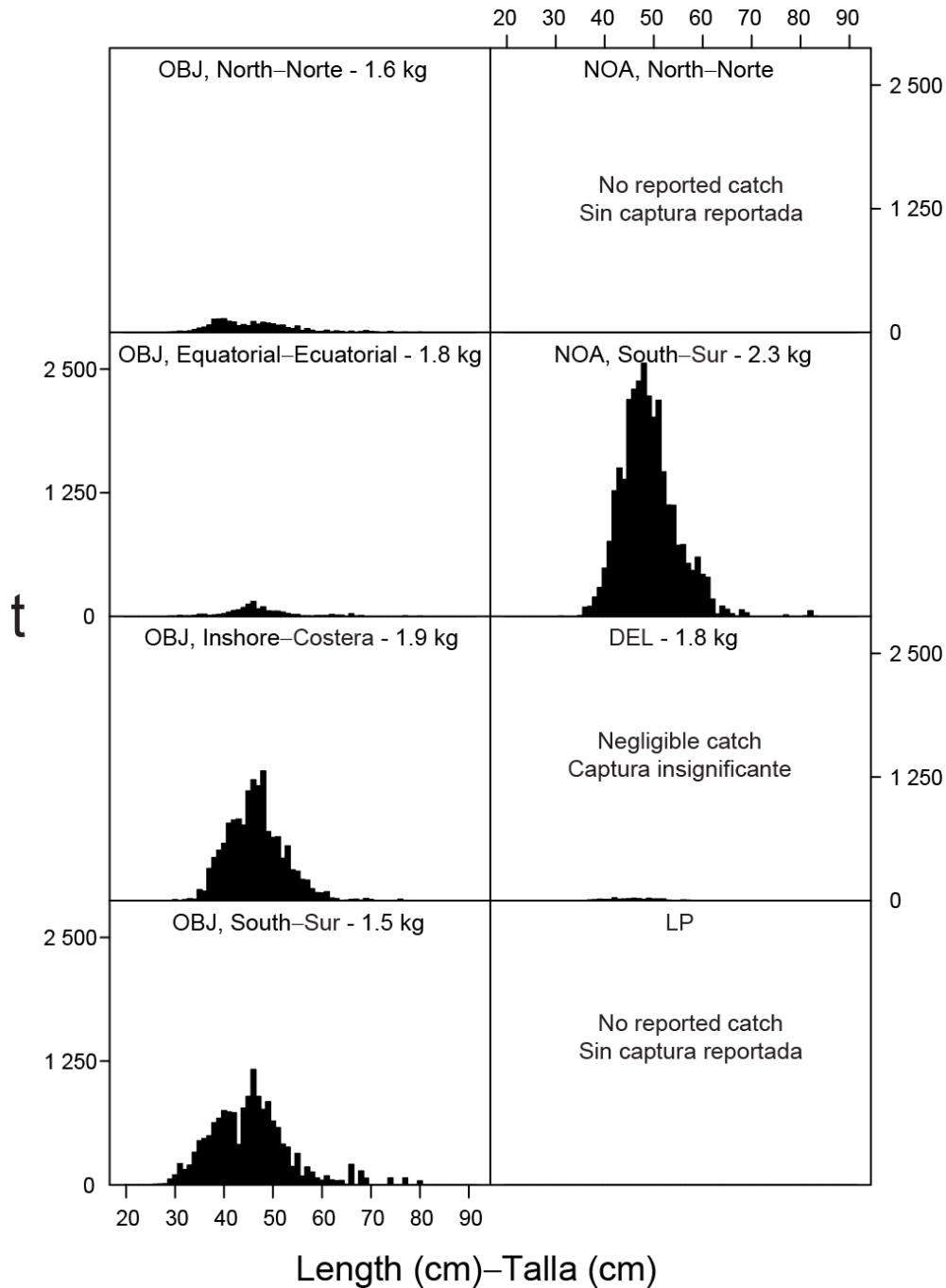
**FIGURE 2a.** Estimated size compositions of the yellowfin caught in each fishery of the EPO during the first quarter of 2015. The average weights of the fish in the samples are given at the tops of the panels. OBJ = floating object; LP = pole and line; NOA = unassociated; DEL = dolphin; t = metric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

**FIGURA 2a.** Composición por tallas estimada para el aleta amarilla capturado en cada pesquería del OPO durante el primero 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.



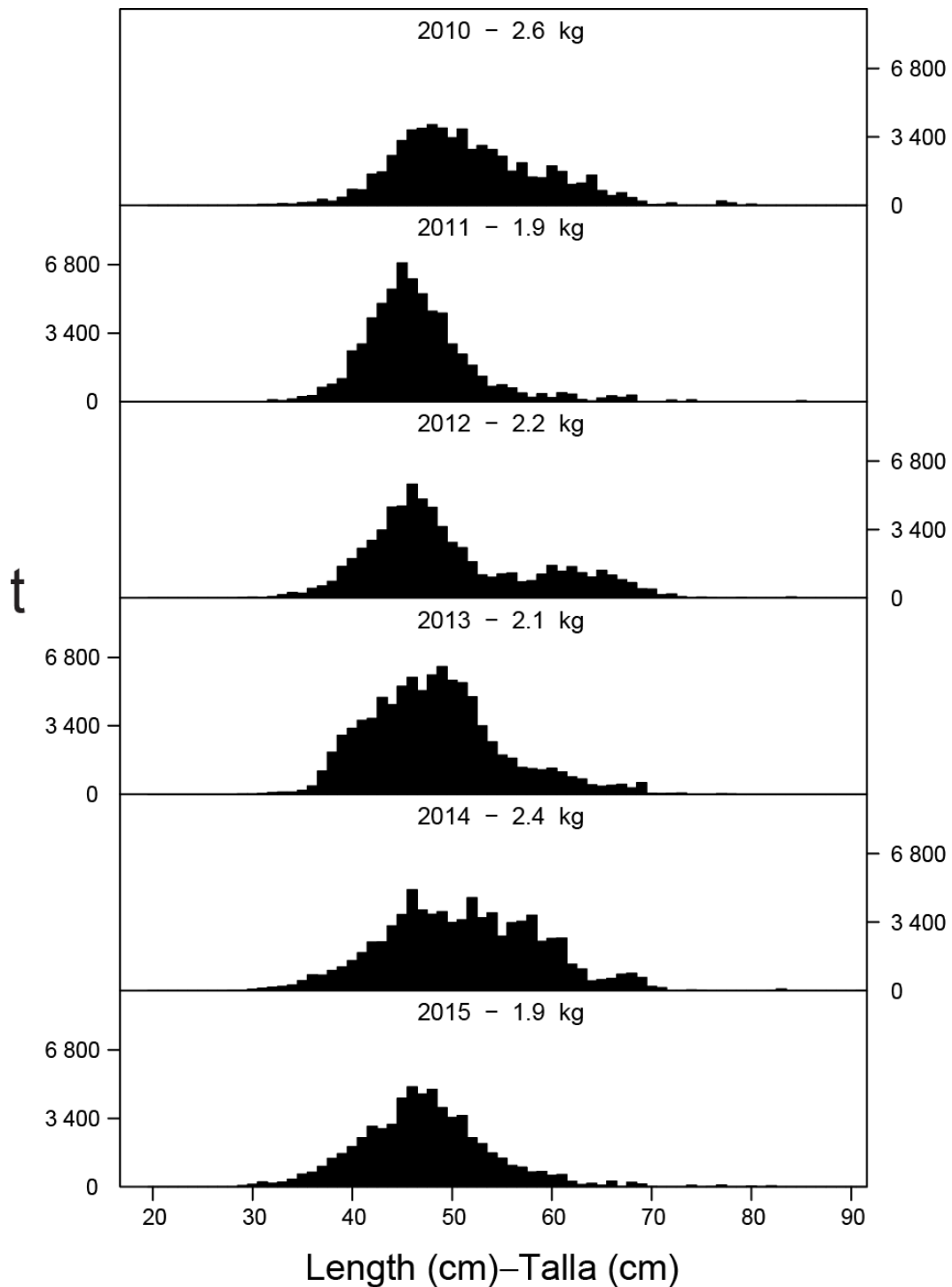
**FIGURE 2b.** Estimated size compositions of the yellowfin caught in the EPO during the first quarter of 2010-2015. The average weights of the fish in the samples are given at the tops of the panels. t = metric tons.

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



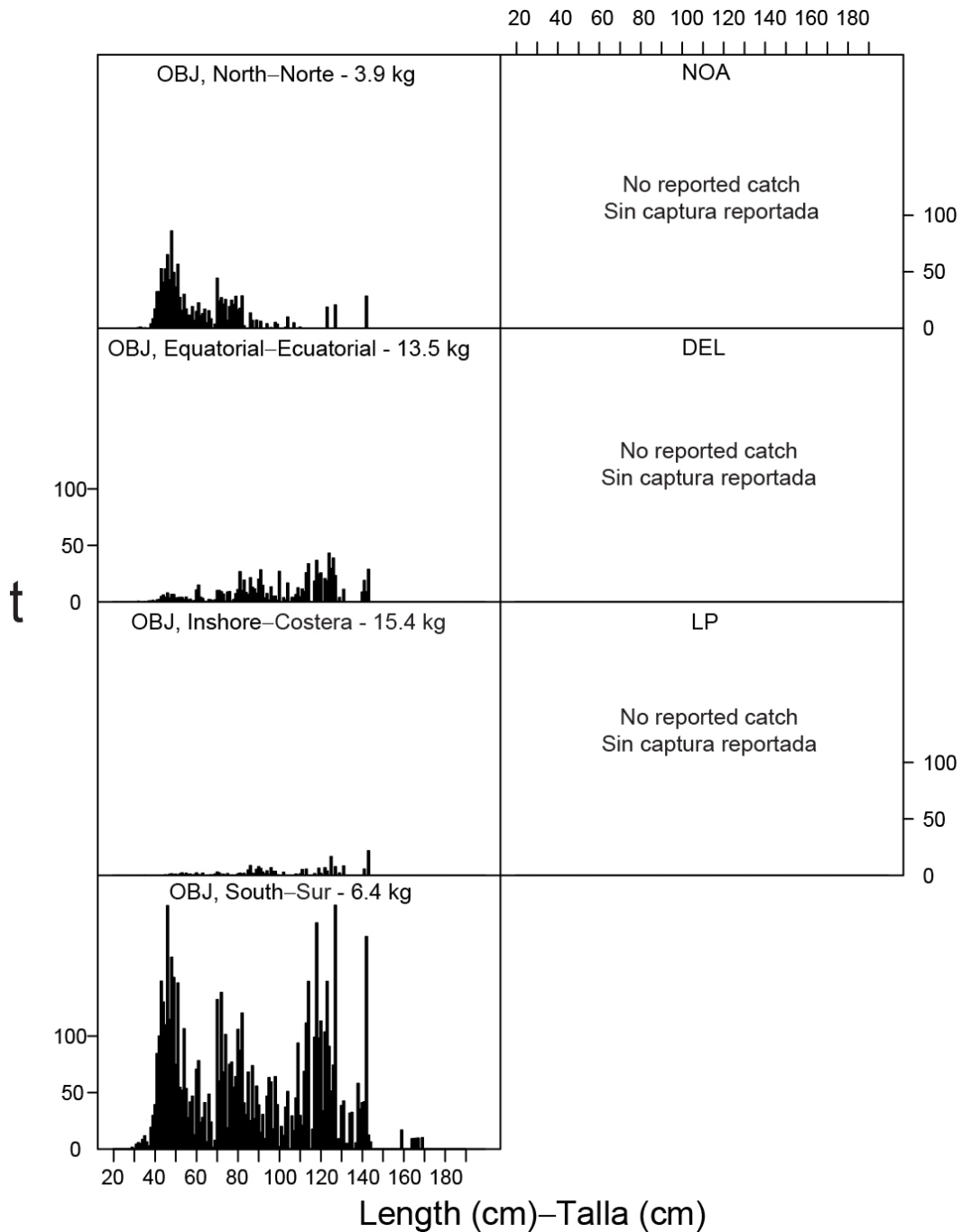
**FIGURE 3a.** Estimated size compositions of the skipjack caught in each fishery of the EPO during the first quarter of 2015. The average weights of the fish in the samples are given at the tops of the panels. OBJ = floating object; LP = pole and line; NOA = unassociated; DEL = dolphin; t = metric tons.

**FIGURA 3a.** Composición por tallas estimada para el barrilete capturado en cada pesquería del OPO durante el primero 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 first quarter of 2010-2015. The average weights of the fish in the samples are given at the tops of the panels. t = metric tons.

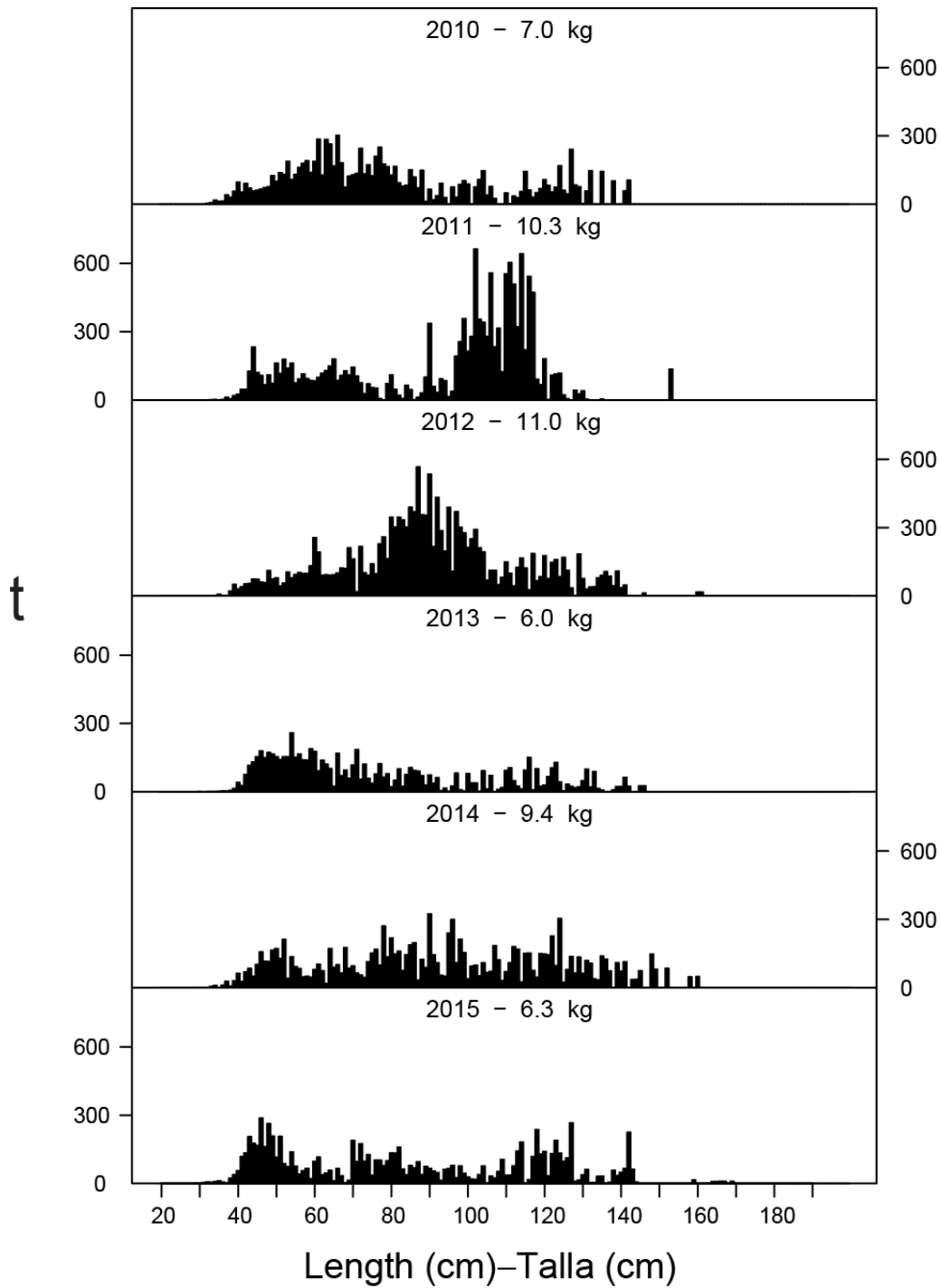
**FIGURA 3b.** Composición por tallas estimada para el barrilete capturado en el OPO en el primero trimestre de 2010-2015. En cada recuadro se detalla el peso promedio de los peces en las muestras. t = toneladas métricas.



**FIGURE 4a.** Estimated size compositions of the bigeye caught in each fishery of the EPO during the first 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.

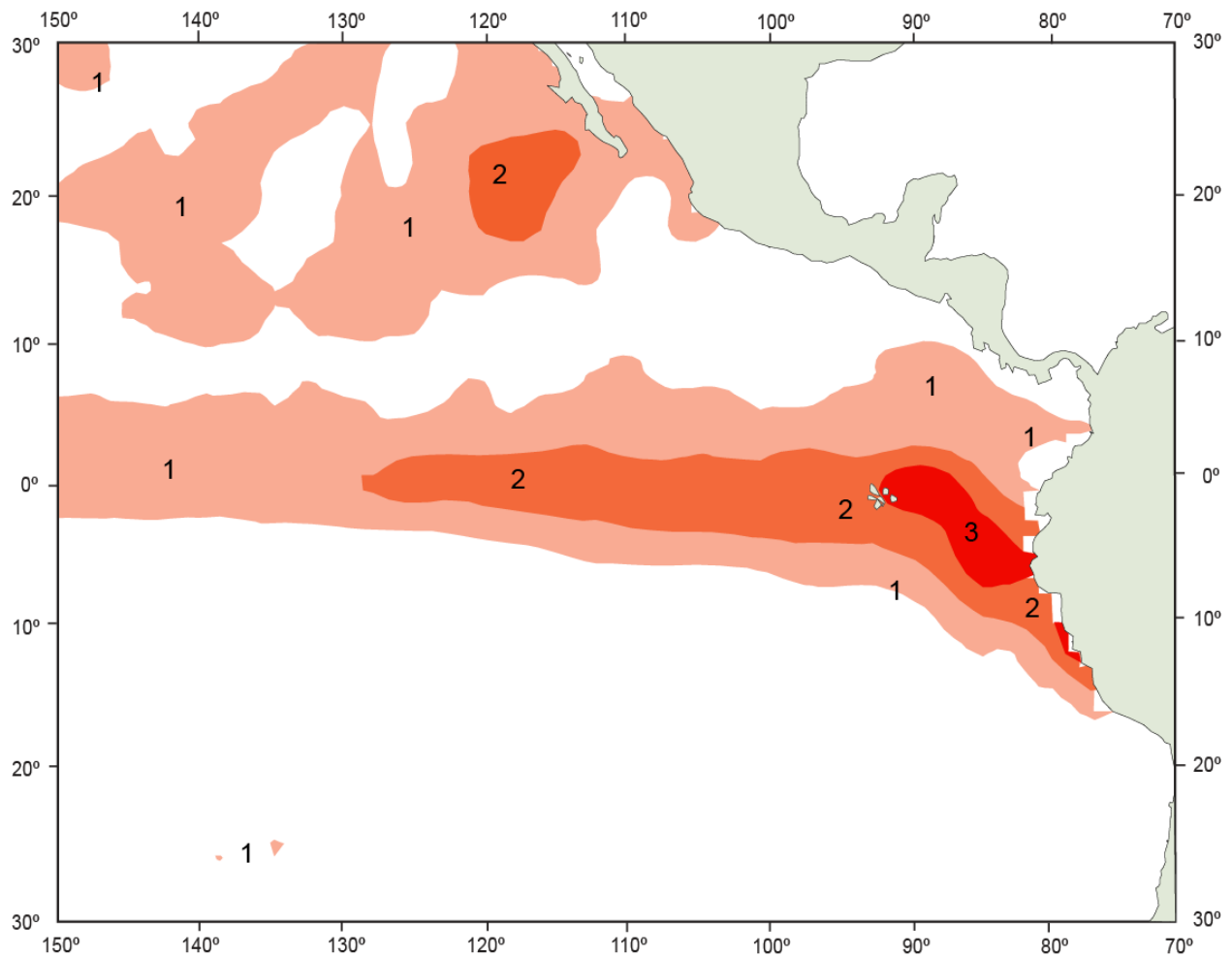
**FIGURA 4a.** Composición por tallas estimada para el patudo capturado en cada pesquería del OPO durante el primero trimestre de 2015. En cada recuadro se detalla el peso promedio de los peces en las muestras. OBJ = objeto flotante; LP = caña; NOA = peces no asociados; DEL = delfín; t = toneladas métricas.





**FIGURE 4b.** Estimated size compositions of the bigeye caught in the EPO during the first 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 primero 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 June 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 junio de 2015, basadas en datos tomados por barcos pesqueros y otros buques comerciales.

**TABLE 1.** Estimates of the numbers and capacities (m<sup>3</sup>) 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 (m<sup>3</sup>) de los mismos 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			Total	Capacity Capacidad
		1-900	901-1700	>1700		
<b>Number—Número</b>						
Colombia	PS	4	10	-	14	14,860
Ecuador	PS	74	25	13	112	91,599
European Union (Spain) —Unión Europea (España)	PS	-	-	4	4	10,116
Guatemala	PS	-	1	-	1	1,475
México	PS	10	35	1	46	55,854
	LP	1	-	-	1	125
Nicaragua	PS	-	5	1	6	8,478
Panamá	PS	2	8	4	14	19,794
Perú	PS	4	-	-	4	2,169
El Salvador	PS	-	1	3	4	7,892
USA—EE.UU.	PS	8	3	1	12	7,039
Venezuela	PS	-	14	1	15	20,890
All flags— Todas banderas	PS	102	102	28	232	
	LP	1	-	-	1	
	PS + LP	103	102	28	233	
<b>Capacity—Capacidad</b>						
All flags— Todas banderas	PS	46,684	134,764	58,718	240,166	
	LP	125	-	-	125	
	PS + LP	46,809	134,764	58,718	240,291	

**TABLE 2.** Estimates of the retained catches of tunas in the EPO, from 1 January through 28 June 2015, by species and vessel flag, in metric tons.

**TABLA 2.** Estimaciones preliminares de las capturas retenidas de atunes en el OPO del 1 de enero al 28 de junio 2015, por especie y bandera del buque, en toneladas métricas.

Flag	Yellowfin	Skipjack	Bigeye	Pacific bluefin	Bonitos ( <i>Sarda spp.</i> )	Albacore	Black skipjack	Other <sup>1</sup>	Total	Percentage of total
Bandera	Aleta amarilla	Barrilete	Patudo	Aleta azul del Pacífico	Bonitos ( <i>Sarda spp.</i> )	Albacora	Barrilete negro	Otras <sup>1</sup>	Total	Porcentaje del total
Ecuador	17,892	118,183	22,762	-	34	-	34	72	158,977	46.6
México	72,318	5,869	46	3,082	-	-	1,413	45	82,773	24.3
Nicaragua	4,732	853	539	-	-	-	-	-	6,124	1.8
Panamá	13,764	17,472	4,708	-	-	-	-	4	35,948	10.5
Venezuela	16,165	1,924	97	-	-	-	-	-	18,186	5.3
Other—Otros <sup>2</sup>	14,163	22,667	2,434	49	9	-	-	3	39,325	11.5
<b>Total</b>	<b>139,034</b>	<b>166,968</b>	<b>30,586</b>	<b>3,131</b>	<b>43</b>	<b>-</b>	<b>1,447</b>	<b>124</b>	<b>341,333</b>	

<sup>1</sup> Includes other tunas, sharks, and miscellaneous fishes

<sup>1</sup> Incluye otros túnidos, tiburones, y peces diversos

<sup>2</sup> Includes Colombia, El Salvador, European Union (Spain), Guatemala, Peru, and United States; this category is used to avoid revealing the operations of individual vessels or companies.

<sup>2</sup> Incluye Colombia, 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.** Preliminary estimates of the catches of bigeye tuna, in metric tons, in the eastern Pacific Ocean during the first and second quarters of 2015 by longline vessels more than 24 meters in overall length.

**TABLA 3.** Estimaciones preliminares de las capturas de atún patudo, en toneladas métricas, en el Océano Pacífico oriental durante el primero y segundo trimestres de 2015 por buques palangeros de más de 24 metros en eslora total.

Flag	First quarter	Month			Second quarter	Total to date
		4	5	6		
Bandera	Primer trimestre	Mes			Segundo trimestre	Total al fecha
		4	5	6		
China	1,349	747	-	-	747	2,096
Republic of Korea—República de Corea	2,351	925	699	616	2,240	4,591
Japan—Japón	3,826	958	850	697	2,505	6,331
Chinese Taipei—Taipei Chino	938	248	595	164	1,007	1,945
USA—EE.UU.	-	-	-	-	-	154
Vanuatu	33	-	-	-	-	33
Total	8,497	2,878	2,144	1,477	6,499	15,150

**TABLE 4.** Oceanographic and meteorological data for the Pacific Ocean, July 2014-June 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, julio 2014-junioo 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.

<b>Month—Mes</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>	<b>11</b>	<b>12</b>
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	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 4.** (continued)

**TABLA 4.** (continuación)

<b>Month—Mes</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>
SST—TSM (°C)						
Area 1 (0°-10°S, 80°-90°W)	24.1 (-0.4)	25.6 (-0.6)	26.7 (0.1)	27.0 (1.4)	26.7 (2.4)	25.4 (2.5)
Area 2 (5°N-5°S, 90°-150°W)	26.0 (0.4)	26.6 (0.2)	27.3 (0.2)	28.2 (0.7)	28.3 (1.2)	28.1 (1.2)
Area 3 (5°N-5°S, 120°-170°W)	27.1 (0.5)	27.3 (0.6)	27.8 (0.6)	28.6 (0.8)	28.9 (1.0)	29.0 (1.3)
Area 4 (5°N-5°S, 150W°-160°E)	29.2 (0.9)	29.1 (1.0)	29.3 (1.1)	29.7 (1.2)	29.9 (1.1)	29.9 (1.1)
Thermocline depth—Profundidad de la termoclina, 0°-80°W	20	20	10	45	85	45
Thermocline depth—Profundidad de la termoclina, 0°-110°W	50	50	50	100	95	100
Thermocline depth—Profundidad de la termoclina, 0°-150°W	150	150	145	150	150	140
Thermocline depth—Profundidad de la termoclina, 0°-180°	180	175	180	160	170	155
SOI—IOS	-0.8	0.2	-0.7	0.0	-0.7	-0.6
SOI*—IOS*	0.41	-0.58	-3.08	-2.55	-2.40	-1.42
NOI*—ION*	2.08	-1.67	0.93	0.63	-2.50	-1.42

**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 second quarter of 2015. 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 segundo trimestre de 2015. Los números entre paréntesis indican los totales acumulados para el año.

Flag	Trips		Observed by program						Percent observed			
			IATTC		National		WCPFC				Total	
Bandera	Viajes		Observado por programa						Porcentaje observado			
			CIAT		Nacional		WCPFC				Total	
<b>Class-6—Clase-6</b>												
Colombia	10	(21)	5	(11)	5	(10)			10	(21)	100.0	(100)
Ecuador	104	(227)	69	(150)	35	(77)			104	(227)	100.0	(100)
El Salvador	3	(7)	1	(4)			2	(3)	3	(7)	100.0	(100)
European Union (Spain) —Unión Europea (España)	7	(15)	5	(7)	2	(8)			7	(15)	100.0	(100)
Guatemala	1	(2)	1	(2)					1	(2)	100.0	(100)
México	70	(144)	33	(67)	37	(77)			70	(144)	100.0	(100)
Nicaragua	2	(9)	1	(3)	1	(6)			2	(9)	100.0	(100)
Panamá	21	(45)	11	(23)	10	(22)			21	(45)	100.0	(100)
Perú	5	(15)	5	(15)					5	(15)	100.0	(100)
U.S.A.—EE.UU.	3	(5)	3	(5)					3	(5)	100.0	(100)
Venezuela	12	(27)	7	(14)	5	(13)			12	(27)	100.0	(100)
Total	238	(517)	141	(301)	95	(213)	2	(3)	238	(517)	100.0	(100)
<b>Class-5—Clase-5</b>												
Ecuador	1	(1)	1	(1)					1	(1)	-	-
<b>Total</b>												
	239	(518)	142	(302)	95	(213)	2	(3)	239	(518)	100.0	(100)