

**INTER-AMERICAN TROPICAL TUNA COMMISSION
COMISIÓN INTERAMERICANA DEL ATÚN TROPICAL**

QUARTERLY REPORT—INFORME TRIMESTRAL

July-September 2010—Julio-Septiembre 2010

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 originally entered into by the governments of Costa Rica and the United States. 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). Under this provision Panama adhered in 1953, Ecuador in 1961, Mexico in 1964, Canada in 1968, Japan in 1970, France and Nicaragua in 1973, Vanuatu in 1990, Venezuela in 1992, El Salvador in 1997, Guatemala in 2000, Peru in 2002, Spain in 2003, the Republic of Korea in 2005, and Colombia in 2007. Canada withdrew from the IATTC in 1984.

The original convention stated that the Commission was to “make investigations concerning the abundance, biology, biometry, and ecology of yellowfin ... and skipjack ... tuna in the waters of the eastern Pacific Ocean fished by the nationals of the High Contracting Parties, and the kinds of fishes commonly used as bait in the tuna fisheries ... and of other kinds of fish taken by tuna fishing vessels; and the effects of natural factors and human activities on the abundance of the populations of fishes supporting all of these fisheries.” Further it was to “recommend from time to time, on the basis of scientific investigations, proposals for joint action by the High Contracting Parties designed to keep the populations of fishes covered by this Convention at those levels of abundance which will permit the maximum sustained catch.” (In practice, the Commissioners appointed the Director, the Director appointed the staff, and the Director and staff performed the research and made recommendations for conservation and management, when appropriate, to the Commissioners.)

At its 70th meeting, on 24-27 June 2003, the Commission adopted the Resolution on the Adoption of the Convention for the Strengthening of the Inter-American Tropical Tuna Commission Established by the 1949 Convention between the United States of America and the Republic of Costa Rica (“the Antigua Convention”). 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.

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 60th 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

An IATTC Technical Meeting on Sharks was held in La Jolla, California, USA, on 30 August 2010. Drs. Martín A. Hall and Alexandre Aires-da-Silva served as co-chairmen of the meeting. Representatives of the Autoridad de los Recursos Acuáticos de Panamá; the Centro Interdisciplinario de Ciencias Marinas (Ensenada and La Paz, Mexico); the Centro Nacional de Pesca of El Salvador; the Comisión Nacional de Acuacultura y Pesca of Mexico; the Fisheries Agency of Japan; Gómez-Hall Associates of Mexico; the Humane Society International; the Instituto Costarricense de Pesca y Acuicultura; the Instituto Español de Oceanografía; the Instituto Nacional de Pesca of Mexico; the Ministerio de Agricultura y Desarrollo Rural of Colombia; the National Fisheries Research and Development Institute of Japan; the National Research Institute of Far Seas Fisheries of Japan; the Organización del Sector Pesquero y Acuícola del Istmo Centroamericano; the Pew Environmental Group; Shanghai Ocean University; Starkist Ecuador; the Subsecretaría de Recursos Pesqueros of Ecuador; The Billfish Foundation; the U.S. Department of State; the U.S. National Marine Fisheries Service (La Jolla, California, Long Beach, California, and Honolulu, Hawaii); and the Universidad Católica del Norte of Chile participated in the meeting. The following presentations were made by IATTC staff members:

Welcome and Introduction, Guillermo A. Compeán

A Review of Stock Assessment Approaches with Potential Applicability to Sharks in the EPO, Mark N. Maunder

Early Steps in the Construction of a Stock Assessment for the Silky Shark in the EPO, Alexandre Aires-da-Silva, Mark N. Maunder, and Cleridy Lennert-Cody

A Review of the Shark Fishery Statistics Available from the IATTC Observer Program, Marlon Román-Verdesoto, Nickolas Vogel, Cleridy Lennert-Cody, and Martín Hall

Purse-Seine Fisheries, Martín Hall

Spatial Approaches to Mitigation: Some Options

Improving Survival of Captured Sharks: Opportunities and Discussion of Research Agenda

Proposals to Standardize Data Collection in the Region, Martín Hall

Shark Landings Data

Observer Data from Shark Fishing Boats (Longliners)

Fishers' Logbooks

The first meeting of the IATTC Scientific Advisory Committee was held in La Jolla, California, USA, on 31 August-3 September 2009. Dr. Guillermo A. Compeán presided at the meeting and Drs. Robert J. Olson and Daniel Margulies served as rapporteurs. Nearly all of the organizations that were represented at the Technical Meeting on Sharks were also represented at the meeting of the IATTC Scientific Advisory Committee. The following presentations were made by IATTC staff members:

Susceptibility Measures Derived from Fisheries Observer Data

The Fishery for Tunas and Billfishes in the Eastern Pacific Ocean in 2009

Status of Bigeye Tuna in the Eastern Pacific Ocean in 2009 and Outlook for the Future, Alexandre Aires-Da-Silva and Mark N. Maunder

Additional Sensitivity Analyses in the Stock Assessment of Bigeye Tuna in the Eastern Pacific Ocean, May 2010, Alexandre Aires-Da-Silva and Mark N. Maunder

Status of Yellowfin Tuna in the Eastern Pacific Ocean in 2009 and Outlook for the Future, Mark N. Maunder and Alexandre Aires-Da-Silva

Updated Indicators of Stock Status for Skipjack Tuna in the Eastern Pacific Ocean, Mark N. Maunder

Assessment of Striped Marlin in the Eastern Pacific Ocean in 2008 and Outlook for the Future, Michael G. Hinton, Mark N. Maunder, and Alexandre Aires-Da-Silva

The IATTC Program for In-Port Sampling of Tuna Catches

Regional Tuna Tagging Project

Effects of the Tuna Fisheries on the Ecosystem of the Eastern Pacific Ocean, Robert J. Olson

A Fishery-Impact-Based Management Reference Level for Pacific Bluefin Tuna in the Eastern Pacific Ocean Mark Maunder, Alexandre Aires-Da-Silva, and Rick Deriso

Plan for Future Activities

The following meetings of the IATTC and the IDCP and their working groups were held in Antigua, Guatemala, in September and October 2010:

Inter-American Tropical Tuna Commission		
Meeting		Dates
1	Committee for the Review of Implementation of Measures Adopted by the Commission	24 September 2010
10	Working Group on Finance	25 September 2010
81	Inter-American Tropical Tuna Commission	27 September-1 October 2010

International Dolphin Conservation Program		
Meeting		Dates
28	Permanent Working Group on Tuna Tracking	23 September 2010
15	Working Group to Promote and Publicize the AIDCP Dolphin Safe Tuna Certification System	23 September 2010
49	International Review Panel	23 September 2010
23	Parties to the AIDCP	24 September 2010

IATTC and IDCP		
Meeting		Date
9	Joint Working Group on Fishing by Non-Parties	25 September 2010

The English and Spanish versions of the minutes of the IATTC meeting are available at:
<http://www.iattc.org/Meetings2010/PDF/Sept/agendas/IATTC-81-Agenda-Sep-2010-ENG.pdf>
and
<http://www.iattc.org/Meetings2010/PDF/Sept/agendas/IATTC-81-Agenda-Sep-2010-SPN.pdf>

Other meetings

The Commission had agreed at the fifth meeting of the Parties to the AIDCP in June 2001 that U.S. vessels that ordinarily fish in the western Pacific Ocean may make one trip in the eastern Pacific Ocean each year with observers from the Forum Fisheries Agency. To ensure that all relevant IATTC and AIDCP data are collected during such trips, Mr. Ernesto Altamirano Nieto participated in an informal workshop with members of the staff of the U.S. National Marine Fisheries Service (NMFS) and observers from the Marshall Islands, Solomon Islands, and Federated States of Micronesia in Honolulu, Hawaii, USA, from 27 June to 2 July 2010. His expenses were paid by the NMFS.

Dr. Guillermo A. Compeán participated, with the Grupo Interagencial de Desarrollo Rural of Mexico, in the FAO Expert Meeting, “Diagnóstico del Sector Rural y Pesquero de México” in Mexico City on 5-7 July 2010.

Dr. Mark N. Maunder (with Dr. Anders Nielsen of the Technical University of Denmark) taught a one-day course, Introduction to AD Model Builder, at the University of Kent, Canterbury, UK, on 5 July 2010. The course focused on the use of random-effects models to cater to the large number of WinBUGS users. (WinBUGS is statistical software for Bayesian analysis using Markov chain-Monte Carlo methods. It is based on the BUGS (Bayesian inference Using Gibbs Sampling) project started in 1989.) Twenty-five people, including quantitative ecologists, wildlife statisticians, and biometricians, participated in the course.

Dr. Mark N. Maunder participated in the International Statistical Ecology Conference, held at the University of Kent, Canterbury, UK, on 6-9 July 2010, at which he gave a presentation entitled “A General Covariate Based Approach for Modeling the Population Dynamics of Protected Species: Application to Black Footed Albatross (*Phoebastria nigripes*).” The manuscript on which the presentation was based was co-authored with Drs. Carlos Alvarez-Flores of Okeanos-Oceanides and Simon Hoyle of the Secretariat of the Pacific Community.

Dr. Maunder’s expenses for the course and for the meeting were paid by the AD Model Builder Foundation.

Mr. Marlon Román Verdesoto participated in the “III Taller Interregional para la Ordenación y Conservación de Tiburones en el Océano Pacífico Oriental,” in Manta, Ecuador, on 6-9 July 2010. Dr. Martín A. Hall participated in the first day of that workshop.

Drs. Richard B. Deriso and Martín A. Hall participated in the Fifth International Fishers Forum in Taipei, Chinese Taipei, on 3-6 August 2010, at which they gave the following presentations:

Effects on the Bigeye Tuna Stock in the Eastern Pacific Ocean from the Inter-American Tropical Tuna Commission’s Measures for Allocation of Tuna by Gear Type, Richard B. Deriso;

Assessment and Mitigation of Problematic Bycatch in Small Scale Coastal Fisheries of Latin America, Martín A. Hall;

Creating Incentives for the Development and Uptake of Effective Bycatch Mitigation and Management Methods, Martín A. Hall.

Their expenses were paid by the organizers of the meeting.

Mr. Kurt M. Schaefer participated at the Sixth Scientific Committee meeting of the Western and Central Pacific Fisheries Commission, which took place in Nukualofa, Tonga, on 10-19 August 2010. He presented an overview of the EPO tuna fisheries through the 2009 fishing year and summaries of the IATTC staff's most recent stock assessments of yellowfin, skipjack, and bigeye tuna in the EPO. Mr. Schaefer also participated in the Fourth Pacific Tuna Tagging Program Steering Committee meeting, which took place concurrently at the same location, and at that meeting he presented a review of tuna tagging experiments currently being conducted in the EPO, and a proposal for a large-scale regional tuna tagging project to be conducted in the EPO.

Mr. Kurt M. Schaefer participated, as a committee member, at an International Seafood Sustainability Foundation (ISSF) planning meeting on field studies to address Bycatch Reduction in Tuna Purse Seine Fisheries, in Paris, France, on 8 September 2010. His travel expenses were paid by the ISSF.

RESEARCH

DATA COLLECTION AND DATA BASE PROGRAM

The IATTC had field offices at Las Playas and Manta, Ecuador; Manzanillo and Mazatlan, Mexico; Panama, Republic of Panama; and Cumaná, Venezuela, during the third quarter of 2010. Personnel at these offices collected 272 length-frequency samples from 179 wells and abstracted logbook information for 215 trips of commercial fishing vessels during the third quarter of 2010.

Fisheries statistics

The data on the catches of tunas in the eastern Pacific Ocean (EPO) collected by the IATTC staff are virtually complete, the principal exceptions being some of the catches by artisanal and recreational fisheries, and the catches, if any, by longline vessels fishing illegally in the EPO. The information reported herein is for the portion of the EPO east of 150°W between 50°N and 50°S, unless noted otherwise. The catches are reported in metric tons (t), vessel capacities in cubic meters (m³) of well volume, 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 end of a fishing trip. Thus, the estimates for the most recent periods (week or quarter) are the most preliminary, while those made a year later are much more accurate and precise. Statistics are developed using data from many sources, including landings, vessel logbooks, and observer records, collected either by IATTC staff members or by governmental agencies and then made available to the IATTC staff.

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

The IATTC Regional Vessel Register 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 2010 is about 212,700 m³ (Table 1). The average weekly at-sea capacity for the fleet, for the weeks ending 28 June through 3 October, was about 132,300 m³ (range: 99,700 to 175,800 m³).

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 2010, and the equivalent statistics for 2005-2009, were:

Species	2010	2005-2009			Weekly average, 2010
		Average	Minimum	Maximum	
Yellowfin	185,900	174,900	148,800	224,800	4,800
Skipjack	118,500	198,000	150,600	238,400	3,000
Bigeye	35,900	41,400	31,600	49,200	1,000

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

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

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

The measures of CPUE used in these analyses are based on data from fishing trips landing predominantly yellowfin, skipjack, bigeye, and bluefin tuna. The great majority of the purse-seine catches of yellowfin, skipjack, and bigeye are made by 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 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 first two quarters of 2010 and comparative statistics for 2005-2009 were:

Region	Species	Gear	2010	2005-2009		
				Average	Minimum	Maximum
N of 5°N	yellowfin	PS	15.4	11.3	9.4	14.2
S of 5°N			2.3	3.1	2.2	5.4
N of 5°N	skipjack	PS	1.1	2.4	0.6	3.6
S of 5°N			7.5	9.1	6.4	11.7
EPO	bigeye	PS	1.5	2.1	1.5	3.1
EPO	yellowfin	LP	0.2	1.6	0.0	3.9
EPO	skipjack	LP	0.4	0.4	0.0	0.9

Catch statistics for the longline fishery

IATTC Resolution C-09-01 requires nations whose annual catches of bigeye by longline gear in the EPO exceed 500 metric tons to report their catches monthly. The catches reported for January-September 2010 are shown in Table 3.

Size compositions of the surface catches of tunas

Length-frequency samples are the basic source of data used for estimating the size and age compositions of the various species of fish in the landings. This information is necessary to obtain age-structured estimates of the population. Samples of yellowfin, skipjack, bigeye, Pacific bluefin, and, occasionally, black skipjack from the catches of purse-seine, pole-and-line, and recreational vessels in the EPO are collected by IATTC personnel at ports of landing in Ecuador, Mexico, Panama, the USA, and Venezuela. The catches of yellowfin and skipjack were first sampled in 1954, bluefin in 1973, and bigeye in 1975.

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

Data for fish caught during the second quarters of 2005-2010 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 2010, and the second shows data for the combined strata for the second quarter of each year of the 2005-2010 period. Samples from 209 wells were taken during the second quarter of 2010.

There are ten surface fisheries for yellowfin defined for stock assessments, four associated with floating objects, two unassociated school, three associated with dolphins, and one pole-and-line (Figure 1). The last fishery includes all 13 sampling areas. Of the 209 wells sampled that contained fish caught during the second quarter of 2010, 151 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. There were also lesser amounts of large yellowfin (120-160 cm) taken in schools associated with dolphins in the Northern, Inshore, and Southern areas. Lesser amounts of yellowfin were taken in floating-object sets, and in sets on unassociated schools.

The estimated size compositions of the yellowfin caught by all fisheries combined during the second quarters of 2005-2010 are shown in Figure 2b. The average weight of the yellowfin caught during the second quarter of 2010 (10.3 kg) was considerably less than that of 2009.

There are eight fisheries for skipjack defined for stock assessments, four associated with floating objects, two unassociated school, one associated with dolphins, and one pole-and-line (Figure 1). The last two fisheries include all 13 sampling areas. Of the 209 wells sampled that contained fish caught during the second quarter of 2010, 84 contained skipjack. The estimated size compositions of these fish are shown in Figure 3a. Large amounts of skipjack in the 35- to 50-cm range were caught in the Southern unassociated fishery, and the Northern and Southern floating-object fisheries. Larger skipjack in the 65- to 70-cm range were taken primarily in the Northern and Southern floating-object fisheries and in the Southern unassociated fishery.

The estimated size compositions of the skipjack caught by all fisheries combined during the second quarters of 2005-2010 are shown in Figure 3b. The average weight for the second quarter of 2010 (2.4 kg) was greater than those of 2006, 2008, and 2009, but less than those of 2005 and 2007.

There are seven surface fisheries for bigeye defined for stock assessments: four associated with floating objects, one unassociated school, one associated with dolphins, and one pole-and-line (Figure 1). The last three fisheries include all 13 sampling areas. Of the 209 wells sampled that contained fish caught during the second quarter of 2010, 46 contained bigeye. The estimated size compositions of these fish are shown in Figure 4a. The majority of the catch was taken in floating-object sets in the Northern, Equatorial, and Southern areas. Smaller amounts of larger bigeye (120-140 cm) were taken in the Inshore floating-object fishery.

The estimated size compositions of the bigeye caught by all fisheries combined during the second quarters of 2005-2010 are shown in Figure 4b. The average weight of bigeye during the second quarter of 2010 (5.3 kg) was less than those of 2005, 2007, 2008, and 2009, but greater than that of 2006.

The estimated retained purse-seine catch of bigeye less than 60 cm in length during the first two quarters of 2010 was 7,613 metric tons (t), or about 30 percent of the estimated total retained purse-seine catch of bigeye during that period. The corresponding amounts for the first two quarters of 2005-2009 ranged from 8,273 to 20,323 t, or 16 to 47 percent. These values may differ slightly from those given in previous Quarterly Reports due to changes in the estimation procedure.

Purse-seine sets by set type

There are three types of purse-seine sets, sets on tunas associated with dolphins, sets on free-swimming tunas (unassociated sets), and sets on tunas associated with floating objects. The types of sets vary over the year due to variation in environmental conditions, fishing regulations, *etc.* The monthly percentages of the three types of sets made during 2002-2009 are shown in Table 4. In almost all years, closures of the fishery reduced the total numbers of sets during specific months, which, in turn, affected the annual percentages of sets by set type.

BIOLOGY AND ECOSYSTEM PROGRAM

Ecological modeling

Dr. Mark N. Maunder, Dr. Beth Gardner, Assistant Professor of Fisheries, Wildlife, and Conservation Biology, Department of Forestry and Environmental Resources, North Carolina State University, Raleigh, North Carolina, USA, and Dr. Benjamin M. Bolker, Professor, departments of Mathematics and Statistics and of Biology, McMaster University, Hamilton, Ontario, Canada, have been awarded funding from the National Center for Ecological Analysis and Synthesis (NCEAS) for a project entitled “Evaluating and Improving Open Source Software for Nonlinear Statistical Modeling in Ecology.” Dr. Maunder is the principal investigator of the project. The work will consist of a two one-week working group meetings at the NCEAS facilities at the University of California at Santa Barbara, USA. The participants will conduct analyses between the two meetings to compare the results obtained with three computer programs for ecological modeling, ADMB (Automatic Differentiation Model Builder), BUGS (Bayesian Inference Using Gibbs Sampling), and R. Dr. Cleridy E. Lennert-Cody will be among the participants at the meetings of the working groups.

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 on 12, 13, 17, and 18 July and during 1-16 August. Spawning occurred between 10:05 p.m. and 00:10 a.m. The numbers of eggs collected after each spawning event ranged from about 19,000 to 697,000. The water temperatures in the tank during the quarter ranged from 26.9° to 28.7°C.

During July, five 8- to 12-kg yellowfin were transferred from Tank 2 to Tank 1. There were four 48- to 52-kg yellowfin (one with an archival tag), and nine 12- to 34-kg yellowfin in Tank 1 at the end of September.

During late 2008, 6 of the 15 yellowfin (7 to 10 kg) held in the 170,000-L reserve broodstock tank (Tank 2) were implanted with prototype archival tags and transferred to Tank 1. At the end of the quarter, one of the October 2008 group, bearing an archival tag, remained in Tank 1.

From 16-28 September, seven yellowfin tuna in Tank 2 died following possible exposure to a biotoxin associated with a dense phytoplankton bloom that occurred locally and may have leached through the seawater system filters. Water samples taken from local waters and laboratory cartridge filters confirmed the presence of *Cochlodinium* sp. (probably *C. polykrikoides*), a “noxious” dinoflagellate and known “red tide” fish kill causative organism. Additional samples have been sent to Dr. Carmelo Tomas at the University of North Carolina at Wilmington for further confirmation of the causative species. At the end of the quarter there were four yellowfin weighing about 2 kg each in 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, hatching rate, lengths of hatched larvae, and duration of yolk-sac stage. The weights of the eggs, yolk-sac larvae, and first-feeding larvae, and the lengths and selected morphometrics of these, were measured periodically.

Approximately 2000 yellowfin tuna larvae from experiments conducted in August through early September (see below) were maintained in a 4400-liter tank. At the end of the quarter, approximately 50 juveniles of 38 to 39 days of age, ranging in total length from about 2 to 4 cm, remained in the tank.

Experiments with yellowfin tuna larvae

During the quarter, an experiment was conducted to examine the interactive effect of different stocking densities and food levels on the growth of 9 to 15 days post-hatch yellowfin tuna larvae. A two-fold difference in densities and a 10-fold difference in food levels (cultured and wild-caught plankters) were tested over 7 days of feeding. Previous experiments conducted at the Achotines Laboratory have used a single factor approach to examine the effect of stocking densities on growth during different stages of development (*i.e.* preflexion, flexion, postflexion, and juvenile transformation) and stage-specific effects of fish density and food availability on growth have been implicated (IATTC Quarterly Report for April-June 2009).

Preliminary results from the 2010 experiment suggest a possible interactive effect between stocking densities and food levels on growth for flexion to early-stage postflexion yellowfin larvae. Two-factor analysis of variance testing indicated that mean lengths and dry weights were significantly greater for larvae stocked at lower densities than for those stocked at higher densities when fed at lower food concentrations. At the higher food levels, the mean lengths and weights were not significantly different, regardless of stocking density. The lower food concentrations were 10 to 85 percent lower than those used in past density experiments at lower food levels, and the higher food concentrations were 0 to 33 percent higher than those used in past density trials of higher food levels.

Further experiments will be conducted to test the interactive effect of stocking density and food concentration on growth during all larval stages of development.

Dr. Gidon Minkoff of Global Royal Fish, who had been working with culture of yellowfin tuna larvae at the Achotines Laboratory since 20 June 2009, departed on 15 August 2010. Mr. Isacio Sigüero Sanchez, a consultant to Global Royal Fish, who had been working with Dr. Minkoff since 22 January 2010, departed on 2 July 2010.

Respiratory gas exchange in yellowfin tuna larvae

Marine fish larvae experience many physiological and morphological changes during metamorphosis. In tuna larvae, it is unknown at what stage of development the transition from cutaneous to active, branchial respiration occurs. During the quarter, yellowfin tuna larvae were sampled from 3 to 18 days post-hatching in order to examine changes in gill morphology. Dr.

Nicholas Wegner, a tuna physiologist at Scripps Institution of Oceanography, will examine these specimens during the following quarter using scanning electron microscopy.

Studies of snappers

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

During 1996-2009, the staff of ARAP had conducted full life cycle research on spotted rose snappers (*Lutjanus guttatus*) in captivity. During the second and third quarters of 2009, the broodstock fish died due to low water temperatures and feeding problems. The mortality coincided with ARAP's plans to commence spawning and rearing studies during 2010 with a new, more commercially-important species of snapper. Yellow snapper (*Lutjanus argentiventris*) was chosen as the new species of snapper for study. In addition, ARAP decided to rebuild its spotted rose snapper broodstock. The fish were acquired from local fishermen.

During the third quarter, collection of broodstock yellow snappers, as well as spotted rose snappers, continued in local waters. During August, there were 62 spotted rose snappers and 19 yellow snappers being held in broodstock tanks at the Laboratory. However, by the end of September only nine spotted rose snappers remained following exposure to a biotoxin associated with a dinoflagellate bloom discussed above.

Research grant

In November 2009, the Early Life History group of the IATTC ARAP, and Kinki University of Osaka, Japan, had submitted research project applications to agencies in Japan that were provisionally accepted for funding in April 2010. The applications covered a single research project entitled "Comparative studies of the early life history of Pacific bluefin tuna (*Thunnus orientalis*) and yellowfin tuna (*Thunnus albacares*) for purposes of resource management and aquaculture development." From 5-17 September 2010, Japan-based representatives of the Japan International Cooperation Agency (JICA), Japan Science and Technology (JST), and Kinki University visited Panama for joint planning meetings with ARAP and the IATTC. Dr. Daniel Margulies and Mr. Vernon P. Scholey represented the IATTC, and there were also Panama-based representatives of JICA and a Washington, DC, USA-based JST representative present. The meetings were held at the ARAP offices in Panama City and at the Achotines Laboratory. The minutes of the meetings were signed by all parties on 16 September 2010. A draft "Record of Discussion" is presently in review by all parties and tentatively scheduled for signing in Panama on 15 November 2010.

Visitors at the Achotines Laboratory

On 29 July 2010, Ing. Rolando Velasquez, a geodetics specialist at the Panamanian Instituto Tommy Guardia/PRONAT [Programa Nacional de Administración de Tierras], visited the Achotines Laboratory while carrying out tidal range measurements in the area. He is interested in installing a tide gauge on the Achotines Laboratory pier.

On 3 August 2010, Dr. Ricardo Radulovich, a professor working with near-shore mariculture at the University of Costa Rica and two of his students visited the Achotines Laboratory.

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). 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.

Weak El Niño conditions were in effect in the EPO during the last seven months of 2009. The SSTs were all normal or above normal during the third and fourth quarters of that year (IATTC Quarterly Report for October-December 2009: Figure 6; Table 5). Also, the depths of the thermoclines were greater and the sea levels at Callao, Peru, were higher during the fourth quarter. The band of warm water that had existed along the equator since June 2009 persisted throughout the first quarter of 2010 (IATTC Quarterly Report for January-March 2010: Figure 5). An area of cool water that had formed offshore off Peru in late 2009 reached its maximum area in January 2010, and then it diminished in February and March. The conditions were quite different in April 2010, with cool water along the equator from about 120°W to about 160°E and a large area of cool water centered at about 15°N-125°W. Most of the cool water dissipated during May, but in June it reappeared as a narrow band of cool water extending along the equator from about 90°W to about 150°W (IATTC Quarterly Report for April-June 2010: Figure 5). The cooling increased during the third quarter, and by September the band of cool water along the equator extended to beyond 180° (Figure 5). Also, there were sizeable areas of cool water off northern and central Mexico and off Peru, particularly during September. The SSTs were mostly above average from January through April, about average during May, and below average, with one exception, during June through September (Table 5). The thermoclines along the equator at 110°W and 150°W during May through September were relatively shallow, and the sea levels at Callao, Peru, during the second and third quarters were below average, both indicating anti-El Niño conditions. Also, the NOI*s and SOI*s during the third quarter were mostly positive, indicating anti-El Niño conditions. The value of 8.65 for the SOI* index is the second only to that of 8.66 for May 1956; the series includes data for 1948 through 2010. According to the Climate Diagnostics Bulletin of the U.S. National Weather Service for September 2010, anti-El Niño conditions are “expected to last at least into the Northern Hemisphere spring [of] 2011.”

BYCATCH AND AIDCP PROGRAM

Data collection

The IATTC had field offices at Las Playas and Manta, Ecuador; Manzanillo and Mazatlan, Mexico; Panama, Republic of Panama; and Cumaná, Venezuela, during the third quarter of 2010. Members of the field office staffs placed IATTC observers on 95 fishing trips by vessels that participate in the AIDCP On-Board Observer Program during the quarter. In addition, 116 IATTC observers completed trips during the quarter, and were debriefed by field office personnel.

Observer program

Coverage

The Agreement on the International Dolphin Conservation Program (AIDCP) requires 100-percent coverage by observers on trips by purse seiners with carrying capacities greater than 363 metric tons that fish for tunas in the eastern Pacific Ocean (EPO). This mandate is carried out by the AIDCP On-Board Observer Program, made up of the IATTC's international observer program and the observer programs of Colombia, Ecuador, the European Union, Mexico, Nicaragua, Panama, and Venezuela. The observers are biologists trained to collect a variety of data on the mortalities of dolphins associated with the fishery, sightings of dolphin herds, catches of tunas and bycatches of fish and other animals, oceanographic and meteorological data, and other information used by the IATTC staff to assess the conditions of the various stocks of dolphins, study the causes of dolphin mortality, and assess the effect of the fishery on tunas and other components of the ecosystem. The observers also collect data relevant to compliance with the provisions of the AIDCP, and data required for the tuna-tracking system established under the AIDCP, which tracks the "dolphin-safe" status of tuna caught in each set from the time it is captured until it is unloaded (and, after that, until it is canned and labeled).

In 2010 the observer programs of Colombia, the European Union, Mexico, Nicaragua, Panama, and Venezuela are to sample half, and that of Ecuador approximately one-third, of the trips by vessels of their respective fleets, while IATTC observers are to sample the remainder of those trips. Except as described in the next paragraph, the IATTC is to cover all trips by vessels registered in other nations that are required to carry observers.

At the fifth meeting of the Parties to the AIDCP in June 2001, observers from the international observer program of the South Pacific Forum Fisheries Agency (FFA) were approved to collect pertinent information for the On-Board Observer Program, pursuant to Annex II (9) of the AIDCP in cases for which the Director determines that the use of an observer from the AIDCP On-Board Observer Program is not practical.

Observers from the On-Board Observer Program departed on 156 fishing trips aboard purse seiners covered by that program during the third quarter of 2010. Two of those trips were by vessels of 363 or less metric tons. Preliminary coverage data for these vessels during the quarter are shown in Table 6.

Training

There were no IATTC observer training courses conducted during the quarter.

GEAR PROJECT

During the third quarter, an IATTC staff member participated in one dolphin safety-gear inspection and safety-panel alignment procedure aboard a Mexican-flag purse seiner at Ensenada, Mexico.

ADMINISTRATION

Mr. Simon P. Roberts was hired on 16 July 2010 as assistant computer systems manager, replacing Mr. Roberto Uriarte, who had resigned effective 8 June 2010.

Ms. Ariadna L. Sosa, a graduate of the Colegio Nacional de Ciencia y Tecnología in Mexico, was also hired on 16 July 2009. She is helping Ms. María Teresa Musano with accounting, and also assisting Mss. Laura J. Bowling and Nancy L. Haltof with entering logbook data into the IATTC's electronic data bases.

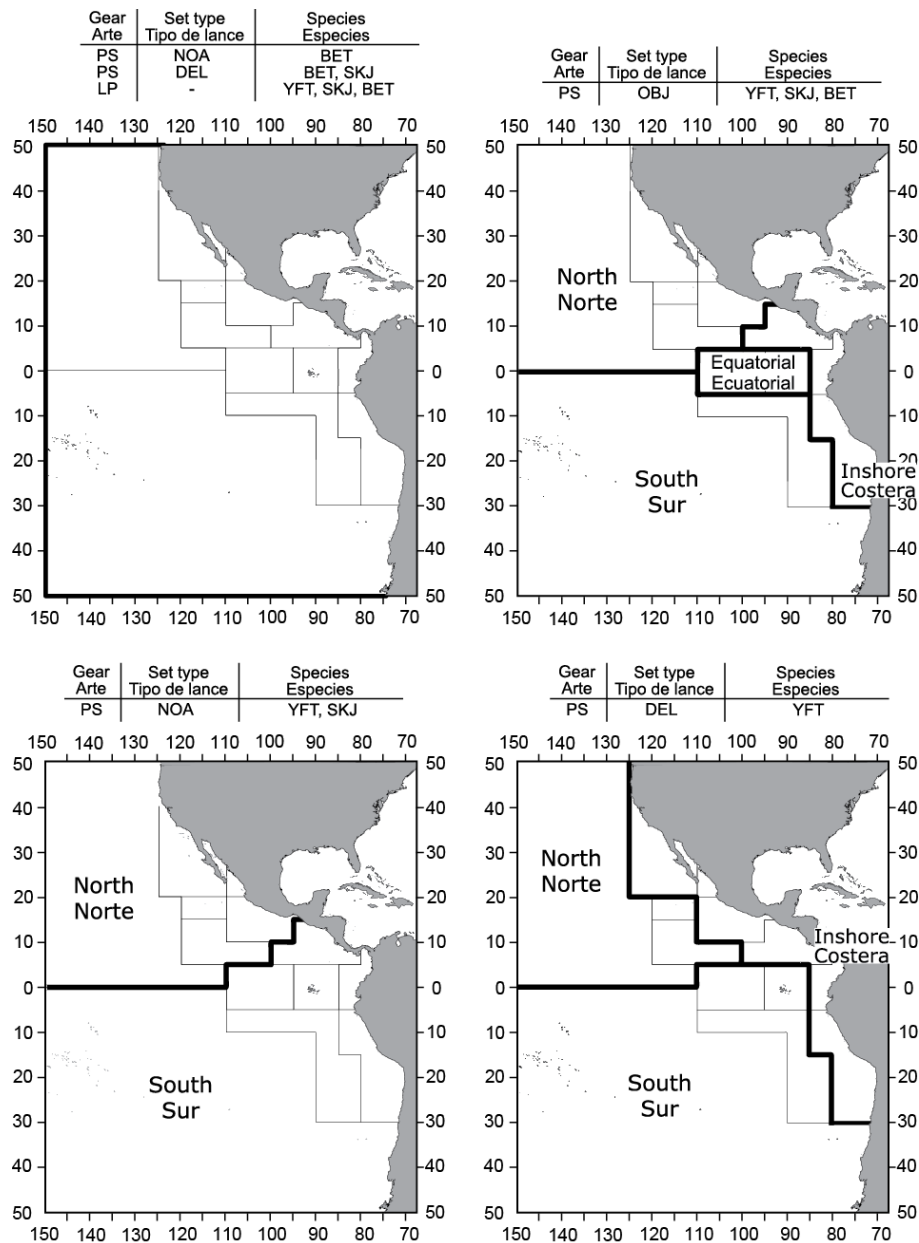


FIGURE 1. Spatial extents of the fisheries defined by the IATTC staff for stock assessment of yellowfin, skipjack, and bigeye in the EPO. The thin lines indicate the boundaries of the 13 length-frequency sampling areas, and the bold lines the boundaries of the fisheries. Gear: PS = purse seine, LP =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

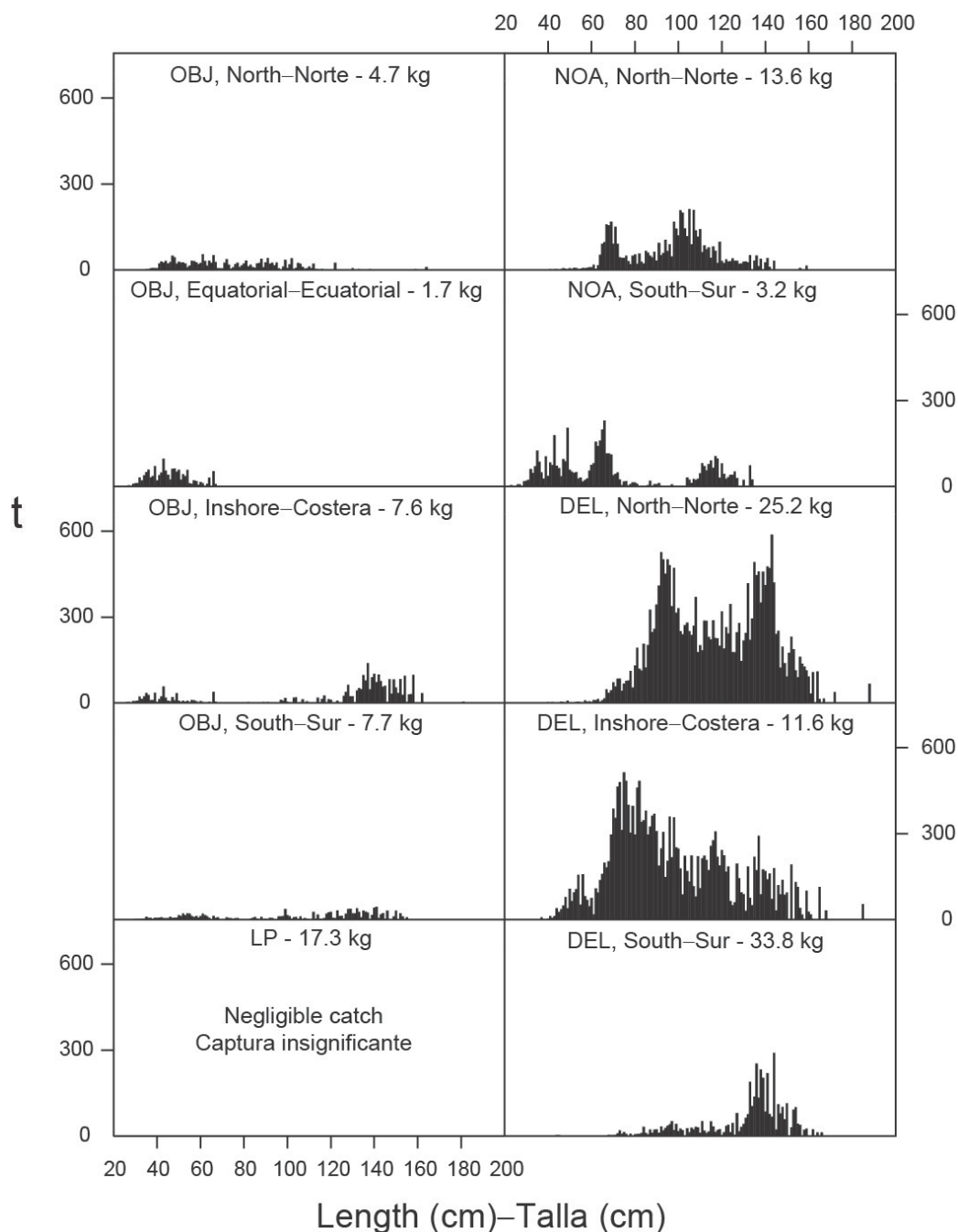


FIGURE 2a. Estimated size compositions of the yellowfin caught in each fishery of the EPO during the second quarter of 2010. The average weights of the fish in the samples are given at the tops of the panels. OBJ = floating object; LP = pole and line; NOA = unassociated; DEL = dolphin. t = metric tons.

FIGURA 2a. Composición por tallas estimada para el aleta amarilla capturado en cada pesquería del OPO durante el segundo trimestre de 2010. 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.

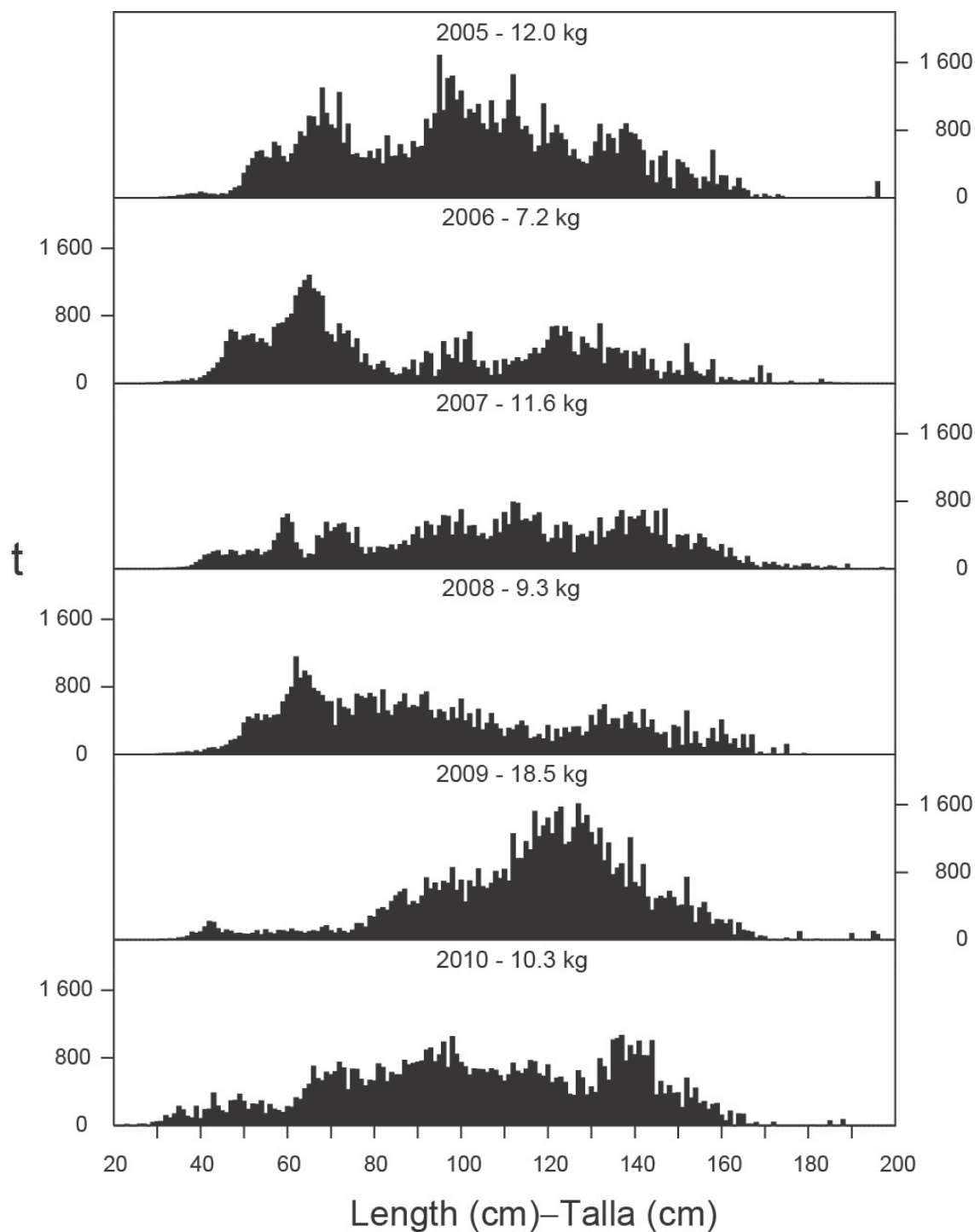


FIGURE 2b. Estimated size compositions of the yellowfin caught in the EPO during the second quarter of 2005-2010. The average weights of the fish in the samples are given at the tops of the panels. t = metric tons.

FIGURA 2b. Composición por tallas estimada para el aleta amarilla capturado en el OPO en el segundo trimestre de 2005-2010. En cada recuadro se detalla el peso promedio de los peces en las muestras. t = toneladas métricas.

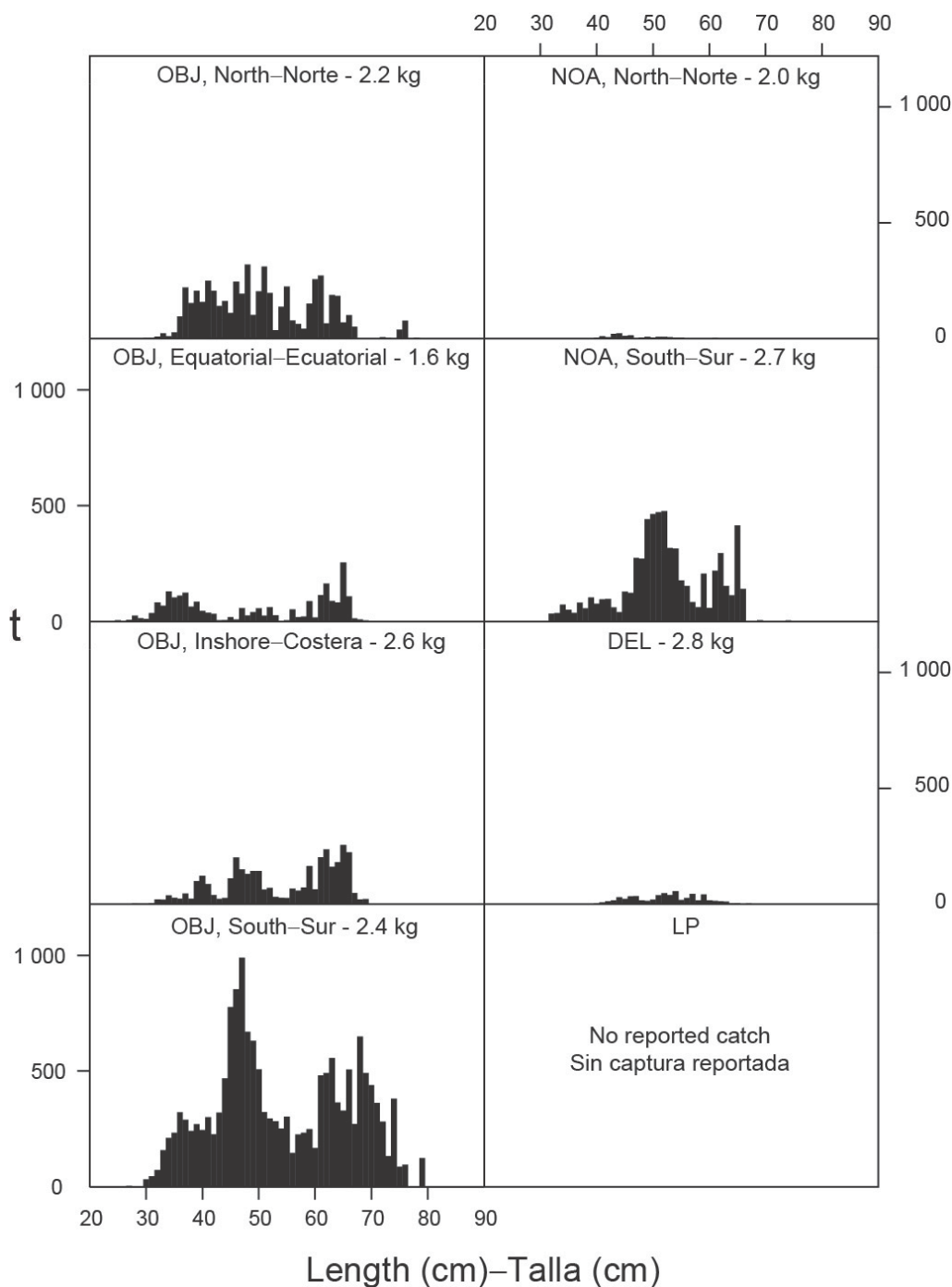


FIGURE 3a. Estimated size compositions of the skipjack caught in each fishery of the EPO during the second quarter of 2010. The average weights of the fish in the samples are given at the tops of the panels. OBJ = floating object; LP = pole and line; NOA = unassociated; DEL = dolphin. t = metric tons.

FIGURA 3a. Composición por tallas estimada para el barrilete capturado en cada pesquería del OPO durante el segundo trimestre de 2010. 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.

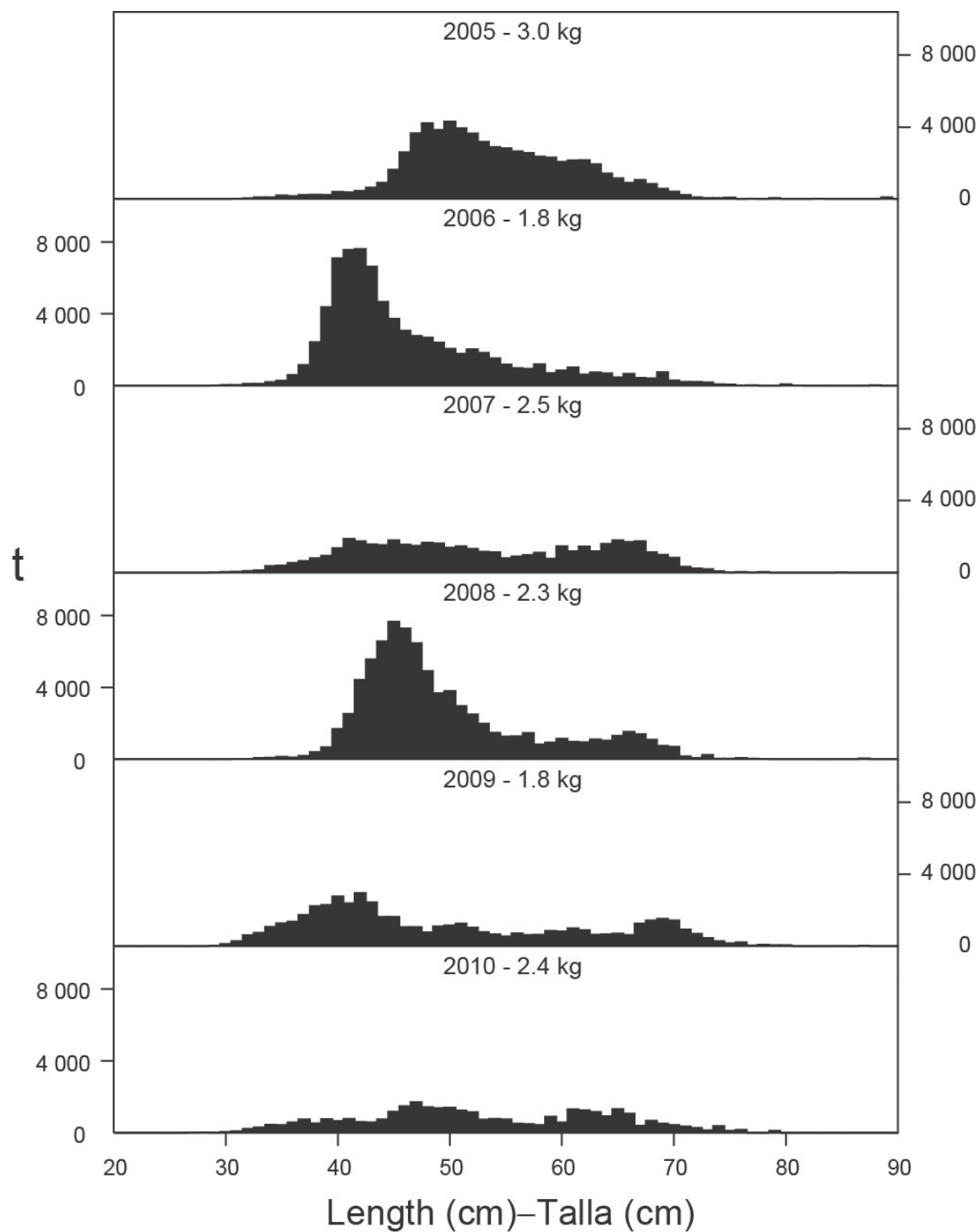


FIGURE 3b. Estimated size compositions of the skipjack caught in the EPO during the second quarter of 2005-2010. The average weights of the fish in the samples are given at the tops of the panels. t = metric tons.

FIGURA 3b. Composición por tallas estimada para el barrilete capturado en el OPO en el cuarto trimestre de 2005-2010. En cada recuadro se detalla el peso promedio de los peces en las muestras. t = toneladas métricas.

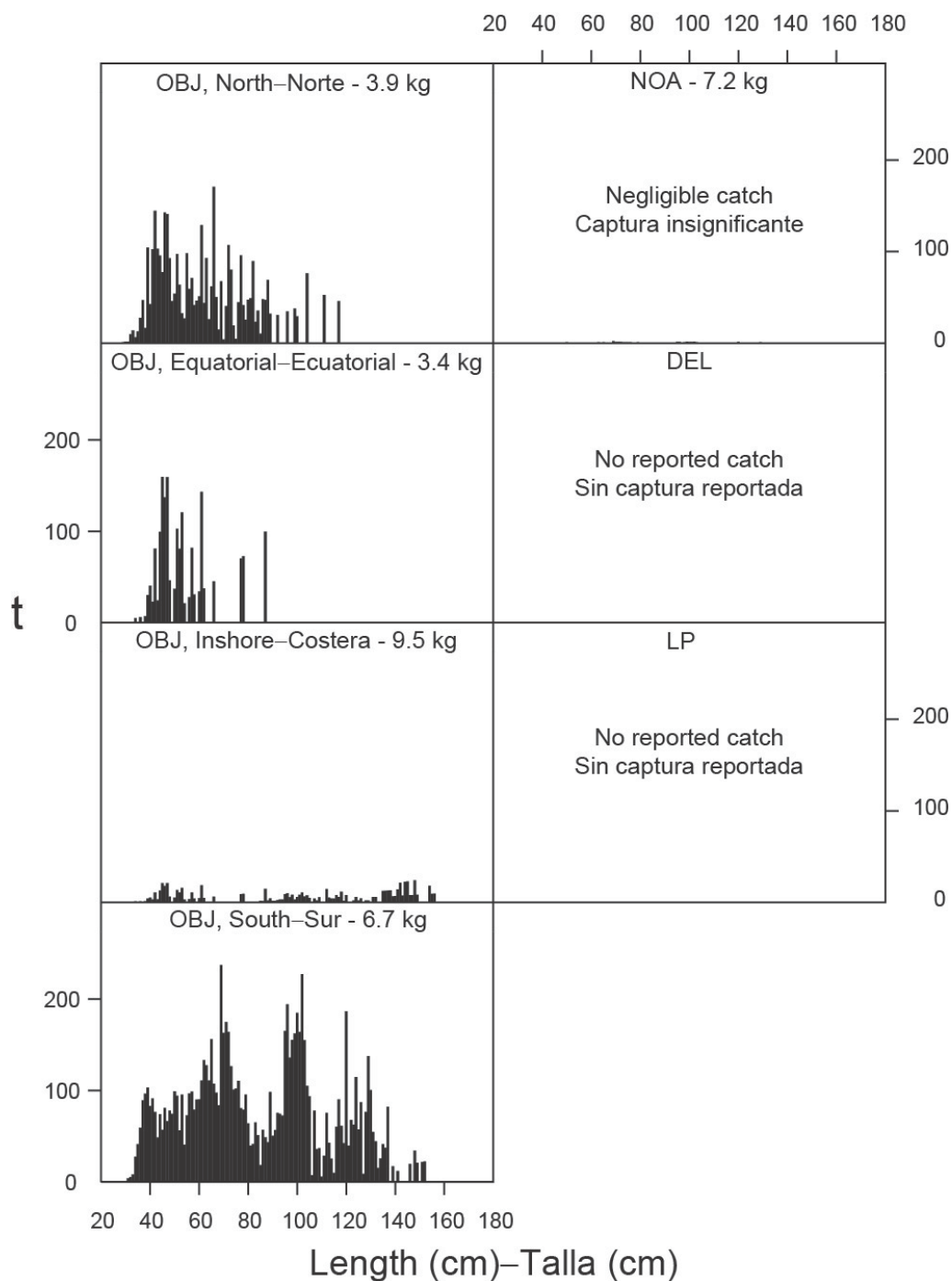


FIGURE 4a. Estimated size compositions of the bigeye caught in each fishery of the EPO during the second quarter of 2010. The average weights of the fish in the samples are given at the tops of the panels. OBJ = floating object; LP = pole and line; NOA = unassociated; DEL = dolphin. t = metric tons.

FIGURA 4a. Composición por tallas estimada para el patudo capturado en cada pesquería del OPO durante el segundo trimestre de 2010. 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.

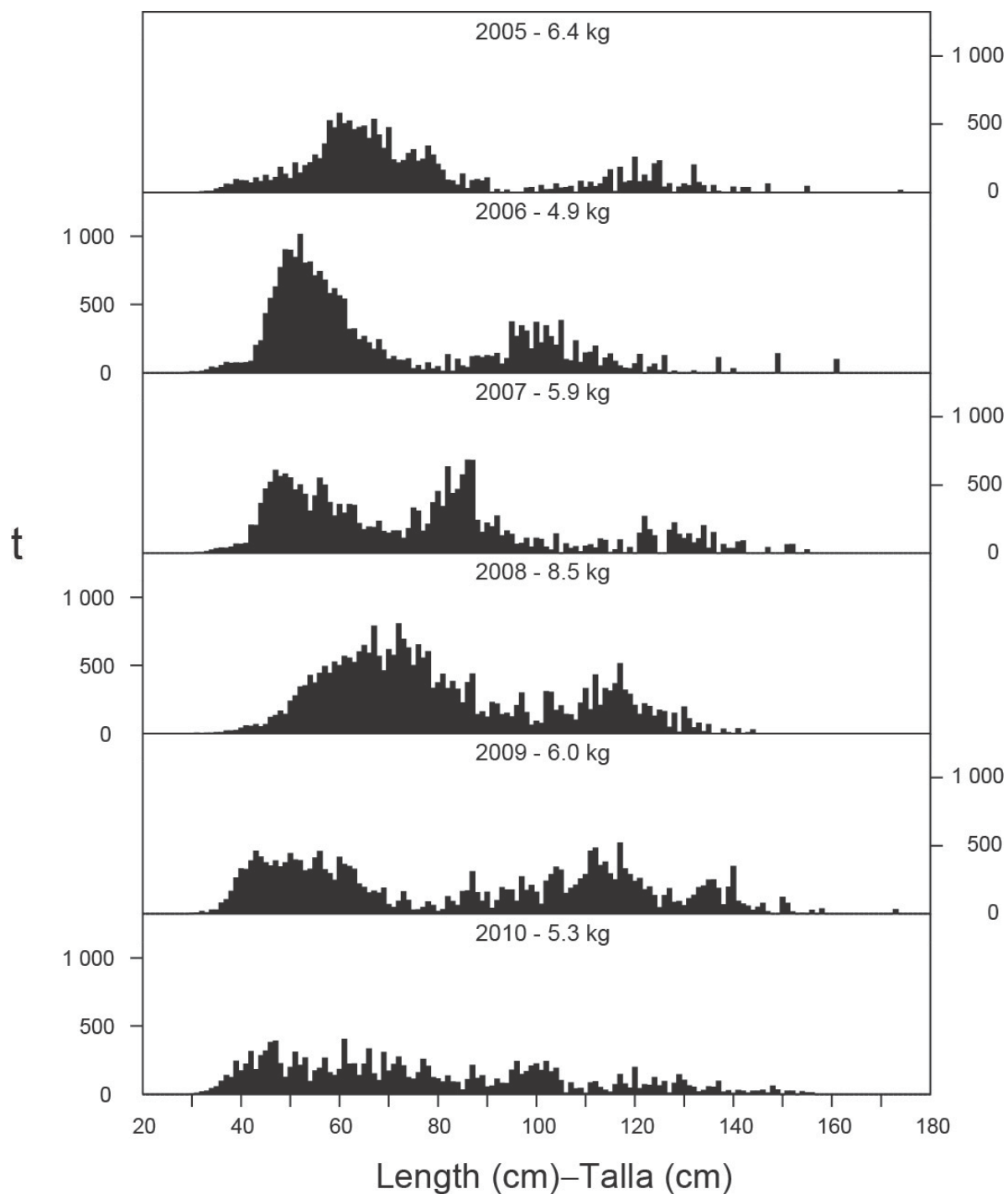


FIGURE 4b. Estimated size compositions of the bigeye caught in the EPO during the second quarter of 2005-2010. The average weights of the fish in the samples are given at the tops of the panels. t = metric tons.

FIGURA 4b. Composición por tallas estimada para el patudo capturado en el OPO en el segundo trimestre de 2005-2010. En cada recuadro se detalla el peso promedio de los peces en las muestras. t = toneladas métricas.

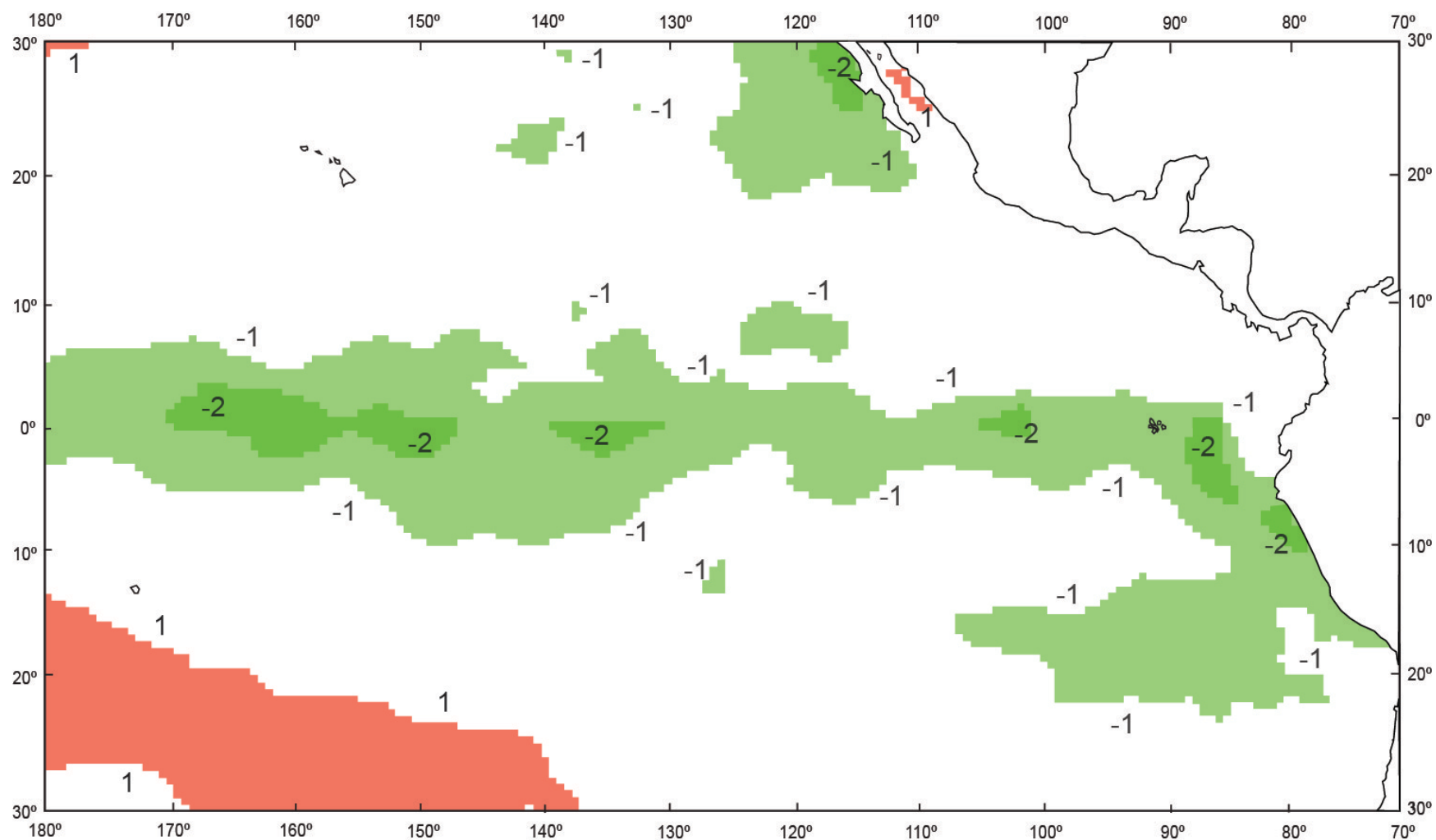


FIGURE 5. Sea-surface temperature (SST) anomalies (departures from long-term normals) for September 2010, based on data from fishing boats and other types of commercial vessels.

FIGURA 5. Anomalías (variaciones de los niveles normales a largo plazo) de la temperatura superficial del mar (TSM) en septiembre de 2010, 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 2009 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 2009, y de la capacidad de acarreo de los mismos, en metros cúbicos, por bandera, arte de pesca, y volumen de bodega. Se incluye cada buque en los totales de cada bandera bajo la cual pescó durante el año, pero solamente una vez en el total de la flota; por consiguiente, los totales de las flotas no son siempre iguales a las sumas de las banderas individuales. PS = cerquero; LP = cañero.

Flag Bandera	Gear Arte	Well volume—Volumen de bodega			Total	Capacity
		1-900	901-1700	>1700		Capacidad
Number—Número						
Bolivia	PS	1	-	-	1	222
Colombia	PS	4	10	-	14	14,860
Ecuador	PS	64	14	9	87	61,712
España—Spain	PS	-	-	4	4	10,116
Guatemala	PS	-	1	1	2	3,575
Honduras	PS	1	1	-	2	1,559
México	PS	16	32	1	49	51,968
	LP	4	-	-	4	380
Nicaragua	PS	-	5	-	5	6,353
Panamá	PS	5	17	3	25	31,811
Perú	PS	2	-	-	2	1,000
El Salvador	PS	-	1	3	4	7,415
USA—EE.UU.	PS	-	1	2	3	5,315
Venezuela	PS	-	20	2	22	30,629
Vanuatu	PS	1	2	-	3	3,609
All flags—	PS	93	104	25	222	
Todas banderas	LP	4	-	-	4	
	PS + LP	97	104	25	226	
Capacity—Capacidad						
All flags—	PS	42,022	133,661	53,996	229,679	
Todas banderas	LP	380	-	-	380	
	PS + LP	42,402	133,661	53,996	230,059	

TABLE 2. Estimates of the retained catches of tunas in the EPO from 1 January through 27 September 2009, 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 2009, por especie y bandera del buque, en toneladas métricas.

Flag	Yellowfin	Skipjack	Bigeye	Pacific bluefin	Bonitos (<i>Sarda</i> spp.)	Albacore	Black skipjack	Other ¹	Total	Percentage of total
Bandera	Aleta amarilla	Barrilete	Patudo	Aleta azul del Pacífico	Bonitos (<i>Sarda</i> spp.)	Albacora	Barrilete negro	Otras ¹	Total	Porcentaje del total
Ecuador	13,324	86,491	23,179	-	-	3	37	512	123,546	29.9
México	86,154	8,050	1,344	2,520	6,879	2	3,712	26	108,687	26.3
Nicaragua	5,412	3,269	927	-	-	-	-	-	9,608	2.3
Panamá	25,070	19,123	5,957	-	-	-	34	98	50,282	12.2
Venezuela	23,625	14,431	1,438	-	-	-	6	58	39,558	9.6
Other—Otros ²	33,613	38,195	9,801	-	-	-	-	51	81,660	19.7
Total	187,198	169,559	42,646	2,520	6,879	5	3,789	745	413,341	

¹ Includes other tunas, sharks, and miscellaneous fishes

¹ Incluye otros túnidos, tiburones, y peces diversos

² Includes Bolivia, Colombia, El Salvador, Guatemala, Honduras, Peru, Spain, United States, and Vanuatu; this category is used to avoid revealing the operations of individual vessels or companies.

² Incluye Bolivia, Colombia, El Salvador, España, Estados Unidos, Guatemala, Honduras, Perú, y Vanuatú; se usa esta categoría para no revelar información sobre faenas de buques o empresas individuales.

TABLE 3. Reported catches of bigeye tuna in the EPO during 2009 by longline vessels.**TABLA 3.** Capturas reportadas de atún patudo en el OPO durante 2009 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	494	677	159	238	301	698	1,869
Japan—Japón	3,362	2,825	1,106	1,275	717	3,098	9,285
Republic of Korea— República de Corea	1,314	1,526	652	446	-	1,098	3,938
Chinese Taipei—Taipei Chino	461	625	-	-	-	-	1,086
USA—EE.UU	-	-	-	-	-	-	-
Vanuatu	-	-	-	-	-	-	-
Total	5,631	5,653	1,917	1,959	1,018	4,894	16,178

TABLE 4. Percentages of sets by set type and month for Class-6 vessels (vessels with fish-carrying capacity greater than 363 metric tons).

TABLA 4. Porcentajes de lances por tipo de lance y mes para buques de Clase 6 (buques con capacidades de acarreo de peces más de 363 toneladas métricas).

2002				2003			
Month	Dolphin	Unassociated	Floating object	Month	Dolphin	Unassociated	Floating object
Mes	Delfín	No asociado	Objeto flotante	Mes	Delfín	No asociado	Objeto flotante
1	50.6	20.1	29.3	1	57.0	22.3	20.7
2	58.2	14.8	27.0	2	58.8	25.2	16.0
3	52.7	9.3	38.0	3	58.5	26.0	15.6
4	54.1	19.9	26.1	4	55.2	26.2	18.6
5	50.8	23.5	25.7	5	48.7	35.3	15.9
6	51.6	21.7	26.6	6	50.1	25.9	24.0
7	57.9	17.0	25.1	7	57.9	20.6	21.6
8	61.8	12.1	26.1	8	63.5	7.6	28.9
9	57.9	12.6	29.5	9	65.3	6.1	28.6
10	61.3	10.6	28.1	10	58.1	12.9	29.0
11	65.4	13.7	20.9	11	53.2	15.2	31.6
12	97.0	0.0	3.0	12	44.0	30.0	26.0

2004				2005			
Month	Dolphin	Unassociated	Floating object	Month	Dolphin	Unassociated	Floating object
Mes	Delfín	No asociado	Objeto flotante	Mes	Delfín	No asociado	Objeto flotante
1	40.8	45.6	13.7	1	50.2	28.0	21.8
2	61.8	17.3	21.0	2	47.7	39.6	12.7
3	61.9	10.6	27.5	3	35.3	51.1	13.6
4	52.2	33.0	14.8	4	57.0	27.2	15.8
5	56.5	25.8	17.7	5	62.7	19.7	17.6
6	50.7	34.7	14.6	6	55.4	18.2	26.3
7	44.8	30.5	24.6	7	49.7	26.3	24.1
8	64.7	21.9	13.4	8	18.0	71.1	11.0
9	56.5	21.3	22.2	9	53.5	19.2	27.2
10	46.1	20.7	33.1	10	57.0	15.6	27.4
11	51.0	16.5	32.5	11	51.9	17.2	30.9
12	26.4	20.3	53.3	12	22.5	49.5	27.9

TABLE 4. (continued
TABLA 4. (continuación)

2006			
Month	Dolphin	Unassociated	Floating object
Mes	Delfín	No asociado	Objeto flotante
1	41.5	39.8	18.6
2	35.5	49.4	15.0
3	35.2	41.4	23.4
4	30.5	49.1	20.3
5	34.9	35.8	29.3
6	41.3	24.5	34.2
7	31.5	31.4	37.1
8	51.1	25.9	23.0
9	42.5	22.0	35.4
10	42.9	19.4	37.7
11	35.9	25.4	38.7
12	22.7	20.1	57.3

2008			
Month	Dolphin	Unassociated	Floating object
Mes	Delfín	No asociado	Objeto flotante
1	43.0	43.6	13.4
2	48.3	27.3	24.3
3	43.1	23.2	33.7
4	35.0	35.9	29.1
5	36.0	30.1	33.9
6	35.1	23.9	41.0
7	38.1	23.6	38.3
8	41.0	24.7	34.3
9	37.5	28.4	34.1
10	51.9	13.3	34.7
11	58.2	18.7	23.1
12	29.1	42.5	28.4

2007			
Month	Dolphin	Unassociated	Floating object
Mes	Delfín	No asociado	Objeto flotante
1	51.1	23.1	25.8
2	30.1	43.7	26.2
3	31.8	50.7	17.6
4	53.2	27.6	19.2
5	51.0	24.8	24.2
6	40.3	21.7	38.0
7	24.3	47.6	28.0
8	32.5	55.9	11.6
9	49.7	20.4	29.9
10	51.1	20.2	28.7
11	47.0	18.8	34.2
12	15.3	34.4	50.3

2009			
Month	Dolphin	Unassociated	Floating object
Mes	Delfín	No asociado	Objeto flotante
1	46.1	42.8	11.2
2	53.7	31.8	14.5
3	49.3	23.8	26.9
4	51.7	23.2	25.1
5	57.8	14.8	27.3
6	49.4	9.7	40.9
7	47.4	13.0	39.7
8	51.2	18.3	30.5
9	49.7	15.2	35.1
10	50.6	7.0	42.4
11	39.5	13.0	47.5
12	36.4	8.7	54.9

TABLE 5. Oceanographic and meteorological data for the Pacific Ocean, October 2009-September 2010. The values in parentheses are anomalies. SST = sea-surface temperature; SOI = Southern Oscillation Index; SOI* and NOI* are defined in the text.

TABLA 5. Datos oceanográficos y meteorológicos del Océano Pacífico, octubre 2009-septiembre 2010. Los valores en paréntesis son anomalías. TSM = temperatura superficie del mar; IOS = Índice de Oscilación del Sur; IOS* y ION* están definidas en el texto.

Month—Mes	10	11	12	1	2	3
SST—TSM (°C)						
Area 1 (0°-10°S, 80°-90°W)	20.9 (0.0)	22.1 (0.5)	23.1 (0.3)	24.7 (0.2)	26.0 (0.0)	26.2 (-0.2)
Area 2 (5°N-5°S, 90°-150°W)	25.7 (0.8)	26.2 (1.3)	26.7 (1.6)	26.6 (1.0)	27.1 (0.7)	27.7 (0.7)
Area 3 (5°N-5°S, 120°-170°W)	27.6 (1.0)	28.2 (1.7)	28.3 (1.8)	28.1 (1.6)	27.9 (1.2)	28.3 (1.1)
Area 4 (5°N-5°S, 150W°-160°E)	29.6 (1.2)	29.9 (1.5)	29.7 (1.4)	29.6 (1.4)	29.1 (1.1)	29.2 (1.1)
Talara, Perú	16.8 (-1.1)	18.4 (0.3)	21.2 (2.5)	21.8 (1.8)	22.5 (1.1)	20.7 (-0.5)
Callao, Perú	15.1 (-0.1)	16.6 (0.9)	16.0 (-0.2)	19.5 (3.1)	18.7 (1.2)	18.7 (0.6)
Thermocline depth—Profundidad de la termoclina, 0°, 80°W (m)	40	45	55	40	25	25
Thermocline depth—Profundidad de la termoclina, 0°, 110°W (m)	75	130	110	95	60	85
Thermocline depth—Profundidad de la termoclina, 0°, 150°W (m)	155	165	165	150	150	125
Thermocline depth—Profundidad de la termoclina, 0°, 180°W (m)	180	170	170	145	155	160
Sea level—Nivel del mar, Callao, Perú (cm)	107.0 (1.4)	113.2 (6.3)	117.2 (8.6)	113.3 (1.8)	107.1 (-7.1)	116.4 (1.7)
SOI—IOS	-1.7	-0.8	-1.0	-1.5	-2.1	-1.4
SOI*—IOS*	-3.40	0.07	-0.54	2.31	-1.43	-2.03
NOI*—ION*	-0.42	1.02	-3.44	-8.05	-6.33	-0.18

Month—Mes	4	5	6	7	8	9
SST—TSM (°C)						
Area 1 (0°-10°S, 80°-90°W)	26.1 (0.6)	24.5 (0.1)	22.8 (-0.2)	20.2 (-1.7)	19.3 (-1.5)	18.9 (-1.6)
Area 2 (5°N-5°S, 90°-150°W)	28.7 (0.7)	27.1 (0.0)	25.9 (-0.5)	24.6 (-1.0)	23.9 (-1.1)	23.6 (-1.2)
Area 3 (5°N-5°S, 120°-170°W)	28.4 (0.7)	27.7 (0.0)	27.1 (-0.4)	26.1 (-0.9)	25.5 (-1.2)	25.1 (-1.6)
Area 4 (5°N-5°S, 150W°-160°E)	29.2 (0.8)	29.1 (0.4)	28.7 (0.1)	28.1 (-0.5)	27.5 (-1.0)	27.1 (-1.4)
Talara, Perú	18.2 (-1.8)	20.8 (1.5)	17.4 (-1.3)	16.9 (-0.8)	15.9 (-1.7)	15.1 (-2.8)
Callao, Perú	16.6 (-1.0)	17.0 (-0.2)	16.2 (-0.4)	15.0 (-1.2)	14.3 (-1.5)	14.2 (-1.2)
Thermocline depth—Profundidad de la termoclina, 0°, 80°W (m)	25	40	35	30	35	40
Thermocline depth—Profundidad de la termoclina, 0°, 110°W (m)	70	40	30	20	20	15
Thermocline depth—Profundidad de la termoclina, 0°, 150°W (m)	150	110	90	100	100	120
Thermocline depth—Profundidad de la termoclina, 0°, 180°W (m)	200	150	160	170	150	150
Sea level—Nivel del mar, Callao, Perú (cm)	112.4 (-2.1)	108.4 (-4.9)	101.2 (-10.5)	99.0 (-10.6)	94.6 (-12.7)	93.1 (-12.8)
SOI—IOS	1.2	0.9	0.4	1.8	1.8	2.2
SOI*—IOS*	2.93	6.13	5.58	8.65	0.54	2.74
NOI*—ION*	-1.75	3.50	2.77	-0.04	0.45	1.17

TABLE 6. Preliminary data on the sampling coverage of trips by vessels with capacities greater than 363 metric tons by the observer programs of the IATTC, Colombia, Ecuador, the European Union, Mexico, Nicaragua, Panama, and Venezuela initiated during the second quarter of 2010. The numbers in parentheses indicate cumulative totals for the year.

TABLA 6. Datos preliminares de la cobertura de muestreo de viajes de buques con capacidad más que 363 toneladas métricas por los programas de observadores de la CIAT, Colombia, Ecuador, México, Nicaragua, Panamá, el Unión Europea, y Venezuela iniciados durante el segundo trimestre de 2010. Los números en paréntesis indican totales acumulados para el año.

Flag	Trips		Observed by program						Percent observed	
			IATTC		National		Total			
Bandera	Viajes		Observado por programa						Porcentaje observado	
			CIAT		Nacional		Total			
Colombia	8	(19)	2	(9)	6	(10)	8	(19)	100.0	(100.0)
Ecuador	66	(126)	46	(86)	20	(40)	66	(126)	100.0	(100.0)
España—Spain	7	(12)	4	(6)	3	(6)	7	(12)	100.0	(100.0)
Guatemala	2	(5)	2	(5)			2	(5)	100.0	(100.0)
Honduras	1	(2)	1	(2)			1	(2)	100.0	(100.0)
México	50	(108)	25	(53)	25	(55)	50	(108)	100.0	(100.0)
Nicaragua	4	(12)	2	(5)	2	(7)	4	(12)	100.0	(100.0)
Panamá	26	(54)	15	(28)	11	(26)	26	(54)	100.0	(100.0)
El Salvador	6	(12)	6	(12)			6	(12)	100.0	(100.0)
Venezuela	13	(31)	7	(14)	6	(17)	13	(31)	100.0	(100.0)
Vanuatu	4	(8)	4	(8)			4	(8)	100.0	(100.0)
Total	187	(389) ¹	114	(228)	73	(161)	187	(389) ¹	100.0	(100.0)

¹ Includes 50 trips (29 by vessels with observers from the IATTC program and 21 by vessels with observers from the national programs) that began in late 2009 and ended in 2010

¹ Incluye 50 viajes (29 por observadores del programa del CIAT y 21 por observadores de los programas nacionales) iniciados a fines de 2009 y completados en 2010