INTER-AMERICAN TROPICAL TUNA COMMMISSION
COMISIÓN INTERAMERICANA DEL ATÚN TROPICAL

QUARTERLY REPORT—INFORME TRIMESTRAL

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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 first quarter of 2012.

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." The Convention 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 62nd 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 AND WORKSHOPS

Drs. Martín A. Hall, Alexandre Aires-da-Silva, and Takaya Namba of the Overseas Fishery Cooperation Foundation of Japan spent the period of 8-14 January 2012 in El Salvador, where, with scientists from the region, they visited several ports to study the possibilities and needs for a sampling program to assess the landings of several species (tunas, sharks, dorado, *etc*.) by the artisanal longline fleet of that country. The participants included scientists from the Centro Nacional de Pesca of El Salvador (CENDEPESCA), the Instituto Costaricense de Pesca y Acuacultura (INCOPESCA), the Dirección de Normatividad de la Pesca y Acuicultura (DISPESCA-MAGA) of Guatemala, and the Universidad del Salvador. The group met twice with authorities of CENDEPESCA and once with authorities of the Organización del Sector Pesquero y Acuícola de Centroamerica (OSPESCA). Calibrations of the measurements of the lengths of several species of fish were made by comparing lengths obtained by the traditional method with those obtained with a device based on a laser meter being developed by S. Siu of CEN-DEPESCA and J.M. Carvajal of INCOPESCA.

Dr. Guillermo A. Compeán participated in the “Taller sobre Empleo de Tecnología para Combatir la Pesca Ilegal, No Declarada y No Reglamentada” in Tegucigalpa, Honduras, on 15-17 February 2012, at which he gave a presentation on the tuna tracking technologies of the members of the IATTC.

Dr. Richard B. Deriso participated in a meeting of the Science and Statistical Committee of the Western Pacific Regional Fishery Management Council in Honolulu, Hawaii, USA, on 21-23 February 2012.

Dr. Daniel Margulies, Mr. Vernon P. Scholey, and Ms. Jeanne B. Wexler participated in the World Aquaculture Society’s “Aquaculture America 2012” meeting, held in Las Vegas, Nevada, USA, from 28 February to 1 March 2012. All three participated in a special session entitled “Tuna Culture and Stock Management for Sustainability.” Dr. Margulies was a co-chair of the session, at which IATTC staff members made the following presentations:

The Use of Indices of Wind-Induced Microturbulence and Larval Growth as Indicators of Pre-Recruit Survival of Yellowfin Tuna *Thunnus albacares*, by Daniel Margulies, Maria Santiago, Jeanne Wexler, Shingo Kimura, Vernon Scholey, and Hideaki Nakata;

Status of the Tuna Fisheries in the Eastern Pacific Ocean, by Daniel Margulies, Guillermo Compeán, Richard Deriso, Mark Maunder, Alexandre Aires-da-Silva, Michael Hinton, Edward Everett, Vernon Scholey, Jeanne Wexler, and Maria Santiago;

Reproductive Biology and Spawning Patterns of Yellowfin Tuna *Thunnus albacares*, by Vernon Scholey, Daniel Margulies, Jeanne Wexler, and Maria Santiago;

Temperature and Dissolved Oxygen Requirements for Survival of Yellowfin Tuna *Thunnus albacares* Larvae, by Jeanne Wexler, Daniel Margulies, Vernon Scholey, and Maria Santiago.

Dr Martín A. Hall and Messrs. Nickolas W. Vogel and Ernesto Altamirano Nieto participated in a workshop, organized by Dr. Hall and sponsored by the International Seafood Sustainability Foundation (ISSF), held at the laboratory of AZTI-Tecnalia, Sukarrieta, Spain, on 5-9 March 2012. The goal of the workshop was to improve research on bycatch mitigation, stock assessment, and other areas by encouraging the different organizations involved in tuna research to improve the consistency in their data collection and data bases. Specifically, the emphasis was on observer programs. In addition to Dr. Hall and Messrs. Vogel and Altamirano, representatives of AZTI-Tecnalia, the Institut de Recherche pour le Développement of France, the Instituto Español de Oceanografía, the International Commission for the Conservation of Atlantic Tunas, the Secretariat of the Pacific Community, the U.S. National Oceanic and Atmospheric Administration, and the Western and Central Pacific Fisheries Commission participated in the workshop. The expenses of all the participants were paid by the ISSF.

Dr. Guillermo A. Compeán participated in a Reunión de la Comisión Dictaminadora Externa at the Centro de Investigaciones Biologicas del Noroeste in La Paz, Mexico, on 6-7 March 2012.

Drs. Guillermo A. Compeán, Martín A. Hall, Michael G. Hinton, and Alexandre Aires-da-Silva participated in a Meeting on Sharing Information on the Recent Program OFCF-

IATTC-Eastern Pacific Countries on Artisanal Fisheries of the Region in La Jolla, California, USA, on 12-13 March 2012. OFCF stands for Overseas Fishery Cooperation Foundation (of Japan). In addition to representatives of the IATTC and the OFCF, representatives of the Organización del Sector Pesquero y Acuícola de Centroamerica and national organizations of Costa Rica, Ecuador, Guatemala, Nicaragua, and Panama participated in the meeting. The following presentations were given by IATTC staff members:

Opening speech, Guillermo A. Compean;

Evolution of the program OFCF-IATTC-eastern Pacific countries: past, present, and future steps. Mitigating bycatches, improving data collection, promoting fisheries management, and building capacity in the region, Martín A. Hall;

Stock assessment of silky shark in the eastern Pacific Ocean: a brief report on progress and current challenges, Alexandre Aires-da-Silva;

Shark fishing and fishing boat tracking by VMS [vessel monitoring system] in Mexico, Guillermo A. Compean;

Using PHAM [Pelagic Habitat Analysis Module] for analyzing the environmental data for the fisheries, Michael G. Hinton**.**

Drs. Richard B. Deriso, Mark N. Maunder, Robert J. Olson, and Cleridy E. Lennert-Cody participated in a workshop, "Use of Reference Points for Bycatch Risk Assessment of Marine Megafauna," in La Jolla, California, USA, on 6-8 March 2012. Dr. Maunder made a presentation, "Assessing Non-Target Species at the IATTC," at the workshop.

Dr. Mark N. Maunder chaired an AD Model Builder Developers' Workshop in Honolulu, Hawaii, USA, on 13-16 March 2012.

Dr. Martín A. Hall gave two seminars in the Netherlands, one at the main campus of Wageningen University, Wageningen, on 1 March 2012, and the other at the Institute for Marine Resources and Ecosystem Studies laboratory of Wageningen University at Ijmuiden, on 22 March 2012. The subject of the seminars was "Beyond Dolphin Friendly: Tuna By-catch Challenges in the Pacific," but they were not the same.

Dr. Guillermo A. Compeán participated in the Eighth Regular Session of the Commission for the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean in Tumon, Guam, on 26-30 March 2012.

RESEARCH

DATA COLLECTION AND DATABASE PROGRAM

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

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

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

IATTC personnel at stationed at its field offices collected 240 length-frequency samples from 161 wells and abstracted logbook information for 220 trips of commercial fishing vessels during the first quarter of 2012.

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^3), 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 fishery

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 2012 is about 211,900 m^3 (Table 1). The average weekly at-sea capacity for the fleet, for the weeks ending 1 January through 1 April, was about 132,900 m^3 (range: 42,900 to 159,600 m^3).

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

Catch statistics

The estimated total retained catches (t) of tropical tunas from the EPO during the period of January-March 2012, and comparative statistics for 2007-2011, were:

Species	**2012**	**2007-2011**			**Weekly average, 2012**
		Average	**Minimum**	**Maximum**	
Yellowfin	62,600	59,400	52,600	66,900	4,800
Skipjack	58,100	69,000	50,800	93,100	4,500
Bigeye	12,200	11,300	8,500	15,500	900

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

Catch statistics for 2011

Estimates of the annual retained and discarded catches of the various species of tunas and other fishes by purse seiners and pole-and-line vessels fishing at least part of the year in the EPO for yellowfin, skipjack, bigeye, or bluefin during 1981-2011 are shown in Table 3. The retained catch data for skipjack and bluefin are essentially complete except for insignificant catches made by the longline, recreational (for skipjack), and artisanal fisheries. The catch data for yellowfin and bigeye do not include catches by longline vessels, as the data for these fisheries are received much later than those for the surface fisheries. About 5 to 10 percent of the total catch of yellowfin is taken by longlines. Until recently, the great majority of the catch of bigeye had been harvested by the longline fishery.

There were no restrictions on fishing for tunas in the EPO during 1980-1997. However, there were restrictions on fishing for yellowfin in the Commission's Yellowfin Regulatory Area (CYRA) (IATTC Annual Report for 2001: Figure 1) from 26 November through 31 December 1998, from 14 October through 31 December 1999, from 1 through 31 December 2000, and from 27 October through 31 December 2001. Purse-seine fishing for tunas was prohibited in the EPO from 1 through 31 December 2002, and in a portion of the EPO from 1 through 31 December 2003. In 2004-2007, there were restrictions on purse-seine fishing for tunas for vessels of some countries from 1 August through 11 September, and from 20 November through 31 December for vessels of other countries. The members of the IATTC could not agree on regulations for 2008, but most of the countries adopted regulations similar to those that they had had during 2007. In addition, fishing for tunas associated with fish-aggregating devices (FADs) was prohibited in the EPO from 9 November through 31 December 1999 and from 15 September through 15 December 2000. Furthermore, regulations placed on purse-seine vessels directing their effort at tunas associated with dolphins have probably affected the way that these vessels operate, especially since the late 1980s. There was a major El Niño event, which began in mid-1982 and persisted until late 1983. The catch rates in the EPO were low before and during this El Niño episode, which caused a shift of fishing effort from the eastern to the western Pacific, and the fishing effort remained relatively low during 1984-1986. During 1997-1998 another major El Niño event occurred in the EPO, but the effects of this on the vulnerability of the fish to capture were apparently less severe.

Preliminary estimates of the retained catches, in metric tons, of yellowfin, skipjack, and bigeye in the EPO during 2011, and final estimates of the 1996-2010 annual averages of those species, based on the methods described at the beginning of this section, are as follows:

Species	**2011**	**Average**	**Minimum**	**Maximum**
			1996-2010	
Yellowfin	202,000	267,000	167,000	412,000
Skipjack	279,000	205,000	104,000	297,000
Bigeye	57,000	65,000	44,000	95,000

The 2011 catch of yellowfin was about 65 thousand t (24 percent) less than the average for 1996-2010. The 2011 skipjack catch was about 74 thousand t (36 percent) greater than the average for 1996-2010. The 2011 bigeye catch was about 8 thousand t (12 percent) less than the average for 1996-2010.

The average annual distributions of the purse-seine catches of yellowfin, skipjack, and bigeye, by set type, in the EPO during 2006-2010, are shown in Figures 1a, 2a, and 3a, and preliminary estimates for 2011 are shown in Figures 1b, 2b, and 3b. The majority of the yellowfin catches in 2011 were taken from the areas north of 5°N and east of 140°W. The catches of yellowfin associated with dolphins were greatest in the inshore areas off Southern Mexico. The catches of yellowfin associated with floating objects and in unassociated schools in 2011 were similar to the average annual distributions for 2006-2010, while the sets on fish associated with dolphins in the area from 0° to 5°S decreased slightly. The catches of skipjack in 2011 were lower in the inshore areas off Ecuador, but greater in the offshore equatorial areas around the Galapagos Islands. The skipjack catches between 10°S and 20°S were also somewhat greater in 2011 than during 2006-2010. The distributions of the catches of bigeye in 2011 were similar to those of 2006-2010.

Bigeye are not often caught by surface gear north of about 7°N, and the catches of bigeye have decreased in the inshore areas off South America for several years. With the development of the fishery for tunas associated with fish-aggregating devices (FADs), the relative importance of the inshore areas has decreased, while that of the offshore areas has increased. Most of the bigeye catches are taken in sets on fish associated with FADs between 5°N and 5°S.

While yellowfin, skipjack, and bigeye tunas comprise the most significant portion of the retained catches of the purse-seine and pole-and-line fleets in the EPO, other tunas and tuna-like species, such as black skipjack, bonito, wahoo, and frigate and bullet tunas, contribute to the overall harvest in this area. The total retained catch of those other species by these fisheries was about 10 thousand t in 2011, which is greater than the 1996-2010 annual average retained catch of about 5 thousand t (range: 500 to 19 thousand t).

Preliminary estimates of the retained catches in the EPO in 2011, by flag, and by country, are given in Table 4.

Preliminary estimates of the most significant (equal to or greater than about 5 percent of the total) retained catches, of all species combined, during 2011 were as follows:

Flag	**Retained catches**	
	Metric tons	**Percentage**
Ecuador	212,100	38
Mexico	124,900	23
Panama	56,600	10
Venezuela	46,100	8

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

There are no adjustments 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 vessels with fish-carrying capacities greater than about 425 m^3, 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 carrying capacity.

The estimated nominal catches per day of fishing for yellowfin, skipjack, and bigeye in the EPO during the fourth quarter of 2011 and comparative statistics for 2006-2010 are:

Region	Species	Gear	2011	2006-2010		
				Average	Minimum	Maximum
N of 5° N	Yellowfin	PS	12.1	10.2	8.2	12.7
S of 5° N			3.1	2.3	2.0	2.6
N of 5° N	Skipjack	PS	2.4	2.2	1.1	3.2
S of 5° N			10.7	8.3	6.2	9.9
EPO	Bigeye	PS	1.9	1.9	2.0	2.6
EPO	Yellowfin	LP	1.9	1.9	1.6	2.4
EPO	Skipjack	LP	0.1	0.7	0.3	1.2

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 (C-09-01 Tuna-conservation 2009 2011). The catches that have been reported for January-December 2010 are shown in Table 5a, and preliminary estimates of those reported for the first quarter of 2011 are shown in Table 5b.

Size compositions of the surface catches of tunas

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

Data for fish caught during the fourth quarter of 2006-2011 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 fourth quarter of 2011, and the second shows data for the combined strata for the fourth quarter of each year of the 2006-2011 period. Samples from 176 wells were taken during the fourth quarter of 2011.

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 4). The last fishery includes all 13 sampling areas. Of the 176 wells sampled that contained fish caught during the fourth quarter of 2011, 80 contained yellowfin. The estimated size compositions of these fish are shown in Figure 5a. The majority of the yellowfin catch during the fourth quarter was taken by sets on dolphins in the Northern and Inshore areas. Small amounts of yellowfin were also taken in the Southern dolphin fishing area, in floating object sets, and in the Northern and Southern unassociated set areas.

The estimated size compositions of the yellowfin caught by all fisheries combined during the fourth quarters of 2006-2011 are shown in Figure 5b. The average weight of the yellowfin caught during the fourth quarter of 2011 (16.9 kg) was greater than those of any of the previous five years.

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 4). The last two fisheries include all 13 sampling areas. Of the 176 wells sampled that contained fish caught during the fourth quarter of 2011, 130 contained skipjack. The estimated size compositions of these fish are shown in Figure 6a. Large amounts of skipjack in the 60- to 70-cm range were caught in the Northern, and Equatorial floating-object fisheries, with lesser amounts being caught in the Inshore and Southern floating-object fisheries. Even greater amounts of skipjack in the 50- to 60-cm range were caught in the Southern unassociated fishery.

The estimated size compositions of the skipjack caught by all fisheries combined during the fourth quarter of 2006-2011 are shown in Figure 6b. The average weight of the skipjack caught during the fourth quarter of 2011 (3.6 kg) was greater than those of any of the previous five years.

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 4). The last three fisheries include all 13 sampling areas. Of the 176 wells sampled that contained fish caught during the fourth quarter of 2011, 28 contained bigeye. The estimated size compositions of these fish are shown in Figure 7a. The majority of the catch was taken in floating-object sets in the Northern, Equatorial, and Southern areas, with a large portion of this catch in the 40- to 80-cm range. Smaller amounts of bigeye were taken in the Northern unassociated fishery.

The estimated size compositions of the bigeye caught by all fisheries combined during the fourth quarter of 2006-2011 are shown in Figure 7b. The average weight of bigeye caught during the fourth quarter of 2011 (7.5 kg) was greater than those of any of the previous five years.

The estimated retained purse-seine catch of bigeye less than 60 cm in length during the fourth quarter of 2011 was 1,182 t, or about 15 percent of the estimated total retained purse-seine catch of bigeye during that period. The corresponding amounts for 2006-2010 ranged from 4,021 to 5,152 t, or 37 to 23 percent. These values may differ slightly from those given in previous Quarterly Reports due to changes in the estimation procedure.

BIOLOGY AND ECOSYSTEM PROGRAM

Early life history studies

Yellowfin broodstock

The yellowfin broodstock in Tank 1 (1,362,000 L) at the Achotines Laboratory spawned daily during the quarter except during 18-19 February and 21 February-5 March 2012. Spawning occurred between 3:05 p.m. and 10:20 p.m. The numbers of eggs collected after each spawning event ranged from about 5000 to 440,000. The water temperatures in the tank during the quarter ranged from 22.7° to 27.7°C. Spawning occurred at temperatures as low as 22.8°C during March; these are the lowest temperatures at which spawning has been observed since captive yellowfin tuna began spawning at the Laboratory in 1996.

At the end of the quarter there were eight 45- to 59-kg yellowfin and two 29- to 30-kg yellowfin in Tank 1. There were 11 4- to 7-kg yellowfin in the 170,000-L reserve broodstock tank (Tank 2).

Rearing of yellowfin eggs, larvae, and juveniles

During the quarter, the following parameters were recorded for most spawning events: times of spawning, egg diameter, duration of egg stage, 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.

Comparative studies of yellowfin and Pacific bluefin larvae

A joint Kinki University-IATTC-ARAP [Autoridad de los Recursos Acuáticos de Panamá] 5-year research project is being supported in Panama by the Japan International Cooperation Agency (JICA) (see Quarterly Report for January-March 2011). This project, which is being conducted through the Science and Technology Research Partnership for Sustainable Development (SATREPS) Program, involves comparative studies of the early life histories of Pacific bluefin and yellowfin. As part of the SATREPS project, several upgrades to the Achotines Laboratory were completed during the quarter. The upgrades include a new cold storage facility, construction of additional office and library and conference space, an enclosed algae and rotifer culture annex, and the delivery of a new research vessel, which was custom-built to transport live tuna.

In early March, Dr. Yoshifumi Sawada of Kinki University visited the Achotines Laboratory to discuss the 2012 research schedule of all participating SATREPS members.

During the quarter, Mr. Luis Tejada received training at the Uragami Fisheries Laboratory of Kinki University, Wakayama Prefecture, Japan in advanced methods of rotifer culture and nutritional analysis of rotifers and larval tunas as part of the joint IATTC-Kinki University-Autoridad de los Recursos Acuáticos de Panamá SATREPS project. While there, he also passed the entrance examination for admission to the Kinki University working Ph.D. program, which he will be pursuing over the next three years. Mr. Tejada's expenses were paid by the Global Center of Excellence Program of Kinki University.

Studies of snappers

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

During 1996-2009, the ARAP staff had conducted full life cycle research on spotted rose snappers (*Lutjanus guttatus*) in captivity. 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 August 2010 there were 62 spotted rose snappers and 19 yellow snappers being held in broodstock tanks at the Laboratory, but by the end of August 41 of the snappers had died of skin infections (possibly due to stress associated with a high stocking density). At the end of September only nine spotted rose snappers remained due to exposure to a biotoxin associated with a nearshore phytoplankton bloom (see IATTC Quarterly Report for July-September 2010). The collection of more spotted rose snappers began in February 2011 and by the end of that year there were 10 snappers in a broodstock tank at the Laboratory. Seven of these fish died of skin infections during February of 2012, and by the end of the first quarter three fish remained in the tank.

Visitors at the Achotines Laboratory

A group of 24 students and 4 instructors from the Students without Borders Academy of British Columbia, Canada, visited the Achotines Laboratory on 4 January2012 as part of a 5-week field study in Panama.

Dr. Axel Meyer, an evolutionary biologist and Professor of Zoology and Evolutionary Biology at the Universität Konstanz, Germany, visited the Achotines Laboratory from 25-27 January 2012. Dr. Meyer, in Panama while on a sabbatical leave, discussed possible research areas for his students and associates during his visit to the laboratory.

Dr. Martin Grosell and Messrs. John Stieglitz and Ed Mager of the University of Miami, Rosenstiel School of Marine and Atmospheric Science (RSMAS), visited the Achotines Laboratory from 15 to 24 March 2012. They conducted some laboratory preparation activities related to some short-term larval rearing trials to be conducted by RSMAS scientists in April 2012.

Oceanography and meteorology

Easterly surface winds blow almost constantly over northern South America, which cause upwelling of cool, nutrient-rich subsurface water along the equator east of 160ºW, in the coastal regions off South America, and in offshore areas off Mexico and Central America. El Niño events are characterized by weaker-than-normal easterly surface winds, which cause above-normal sea-surface temperatures (SSTs) and sea levels and deeper-than-normal thermoclines over much of the tropical eastern Pacific Ocean (EPO). In addition, the Southern Oscillation Indices (SOIs) are negative during El Niño episodes. (The SOI is the difference between the anomalies of sea-level atmospheric pressure at Tahiti, French Polynesia, and Darwin, Australia. It is a measure of the strength of the easterly surface winds, especially in the tropical Pacific in the Southern Hemisphere.) Anti-El Niño events, which are the opposite of El Niño events, are characterized by stronger-than-normal easterly surface winds, below-normal SSTs and sea levels, shallower-than-normal thermoclines, and positive SOIs. Two additional indices, the NOI* (Progress Ocean., 53 (2-4): 115-139) and the SOI*, have recently been devised. The NOI* is the difference between the anomalies of sea-level atmospheric pressure at the North Pacific High (35°N-130°W) and Darwin, Australia, and the SOI* is the difference between the anomalies of sea-level atmospheric pressure at the South Pacific High (30°S-95°W) and Darwin. Ordinarily, the NOI* and SOI* values are both negative during El Niño events and positive during anti-El Niño events.

There was a sizeable area of cool water in the eastern and central Pacific Ocean during the fourth quarter of 2010, which reached a maximum in December of that year (IATTC Quarterly Report for October-December 2010: Figure 6). The size of that area decreased during the first quarter of 2011 (IATTC Quarterly Report for January-March 2011: Figure 8), and during the second quarter some small areas of warm water appeared off northern South America (IATTC Quarterly Report for April-June 2011: Figure 5). The SSTs were below average, with only one exception, from July 2010 through March 2011, but the SST anomalies in Area 1 were above average during April, May, and June of 2011 (Table 6). The thermoclines along the equator were somewhat deeper during January-June 2011 than they had been during July-December 2010, indicating the weakening and subsequent disappearance of the anti-El Niño conditions of late 2010 and early 2011. During the third quarter, however, the warming trend came to an end, as small areas of cool water appeared in July and August, and then more cool water appeared in September, especially off southern Peru and northern Chile (IATTC Quarterly Report for July-September 2011: Figure 5). The cooling trend continued during the fourth quarter of 2011, and by December 2011 there was a band of cool water along the equator from the coast of South America to west of 180° (IATTC Quarterly Report for October-December 2011: Figure 6). During March 2012 there was an area of cool water between the equator and 20°N and between 120°W and 150°W and an area of warm water south of 20°S between the coast of South America and 100°W, making the conditions somewhat similar to those of the first quarter of 2008 (IATTC Quarterly Report for January-March 2008: Figure 8). The situation in 2011-2012 appears to be somewhat similar to that for 2010-2011—cooling during the fourth quarter, reaching a maximum in December, followed by warming during the first quarter. However, the cooling during the fourth quarter was more extensive during 2010 (IATTC Quarterly Report for October-December 2010: Figure 6) than during 2011 (IATTC Quarterly Report for October-December 2011: Figure 6). There were no positive temperature anomalies in Areas 1-4 from August 2011 through January 2012 (Table 6). The SOIs were all positive from January 2011 through March 2012, but a few of the SOI*s and NOI*s during that period were negative. According to the Climate Diagnostics Bulletin of the U.S. National Weather Service for March 2011, "A majority of [the] models predict ENSO [El Niño-Southern Oscillation]-neutral conditions for March-May 2012, continuing through the Northern Hemisphere summer [of] 2012 ... Based on the continued weakening of the negative SST anomalies during March 2012, and on the historical tendency for [anti-El Niño conditions] to dissipate during the Northern Hemisphere spring, we continue to expect the [anti-El Niño conditions] to dissipate during April 2012. ENSO-neutral conditions are then expected to persist through the summer. Thereafter, there is considerable uncertainty in the forecast, which slightly favors ENSO-neutral or developing El Niño conditions over a return to [anti-El Niño] conditions during the remainder of 2012."

BYCATCH PROGRAM AND INTERNATIONAL DOLPHIN CONSERVATION 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 first quarter of 2012. Members of the field office staffs placed IATTC observers on 144 fishing trips by vessels that participate in the AIDCP On-Board Observer Program during the quarter. In addition, 98 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 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 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 2012 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 247 fishing trips aboard purse seiners covered by that program during the first quarter of 2012. Preliminary coverage data for these vessels during the quarter are shown in Table 7.

Training

The Programa Nacional de Observadores de Colombia (PNOC) held an observer training course for nine trainees in Bogotá, Colombia, on 5-23 March 2012. Mr. Ernesto Altamirano Nieto participated in the last five days of that course. His travel expenses were paid by the PNOC.

Gear project

IATTC staff members participated in 11 dolphin safety-gear inspections and safety-panel alignment procedures aboard purse seiners during the first quarter of 2012.

PUBLICATIONS

Chang, Shui-Kai, and Mark N. Maunder. 2012. Aging material matters in the estimation of von Bertalanffy growth parameters for dolphinfish (*Coryphaena hippurus*). Fish. Res., 119-120: 147-153.

Garcia, S.M. J. Kolding, J. Rice, M.-J. Rochet, S. Zhou, T. Arimoto, J.E. Beyer, L. Borges, A. Bundy, D. Dunn, E.A. Fulton, M. Hall, M. Heino, R. Law, M. Makino, A.D. Rijnsdorp, F. Simard, and A.D.M. Smith. 2012. Reconsidering the consequences of selective fisheries. Science, 335 (6072): 1045-1047.

Gerrodette, Tim, Robert Olson, Stephen Reilly, George Watters, and William Perrin. 2012. Ecological metrics of biomass removed by three methods of purse-seine fishing for tunas in the eastern tropical Pacific Ocean. Cons. Biol., 26 (2): 248-256.

Hunsicker, Mary E., Robert J. Olson, Timothy E. Essinger, Mark N. Maunder, Leanne M. Duffy, and James F. Kitchell. 2012. Potential for top-down control of tropical tunas based on size structure of predator-prey interactions. Mar. Ecol. Prog. Ser., 445: 263-277.

Kuhnert, Petra M., Leanne M. Duffy, Jock W. Young, and Robert J. Olson. 2012. Predicting fish diet composition using a bagged classification tree approach: a case study using yellowfin tuna (*Thunnus albacares*). Mar. Biol., 159 (1): 87-100.

Lee, Hui-Hua, Mark N. Maunder, Kevin R. Piner, and Richard D. Methot. 2012. Reply to 'The reliability of estimates of natural mortality from stock assessment models.' Fish. Res., 119-120: 154-155.

Lee, Hui-Hua, Mark N. Maunder, Kevin R. Piner, and Richard D. Methot. 2012. Can steepness of the stock-recruitment relationship be estimated in fishery stock assessment models? Fish. Res., 125-126: 254-261.

Zhu, Jiangfeng, Yong Chen, Xiaojie Dai, Shelton J. Harley, Simon D. Hoyle, Mark N. Maunder, and Alexandre M. Aires-da-Silva. 2012. Implications of uncertainty in the spawner-recruitment relationship for fisheries management: an illustration using bigeye tuna (*Thunnus obesus*) in the eastern Pacific Ocean. Fish. Res., 119-120: 89-93.

The following paper:

Minami, M., C.E. Lennert-Cody, W. Gao, and M. Román-Verdesoto. 2007. Modeling shark bycatch: the zero-inflated negative binomial regression model with smoothing. Fish. Res., 84 (2): 210-221.

was first in a recent list of citations among papers published since 2007 in the journal Fisheries Research.

ADMINISTRATION

Ms. Sonia María Salaverría, a graduate of Tulane University, New Orleans, Louisiana, USA, was hired on 1 January 2012. Ms. Salaverria's degree is in marine biology, and she has worked with tuna-related issues in El Salvador for more than 10 years. In addition, she has been involved in the management of local fisheries resources for the government of El Salvador. She will be visiting the offices of government officials and other people involved in the fishing industry in Costa Rica, El Salvador, Guatemala, and Nicaragua to obtain information on unloading weights, transshipments, *etc*. Her office will be in San Salvador. (San Salvador is not a port city, but it is the capital of El Salvador, and most of the people involved in fisheries in El Salvador work in San Salvador, rather than in port cities.)

Mr. Kruger Loor, who had been a member of the IATTC staff at the Manta field office since 1August 1999, resigned on 15 January 2012 to accept other employment. Previous to his IATTC employment, between October 1990 and July 1999, he made 39 trips as an observer on tuna purse seiners. Mr. Loor was a good worker, and everyone wishes him well in his future endeavors.

Ms. Paola Gaeta, a graduate of San Diego State University, was hired as a secretary for the IATTC on 26 March 2012. She replaced Ms. Denisse Bonares, who resigned on 31 March 2012.

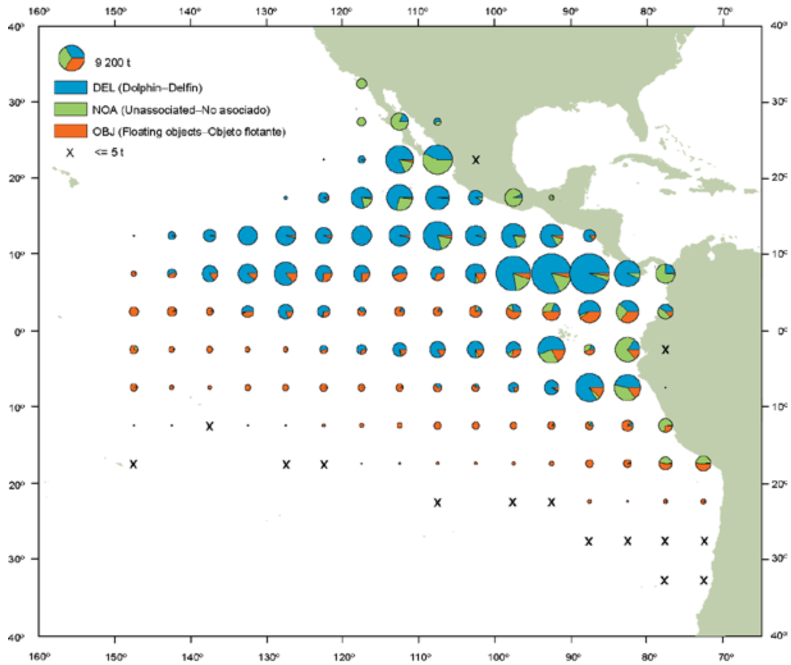

FIGURE 1a. Average annual distributions of the purse-seine catches of yellowfin, by set type, 2006-2010. The sizes of the circles are proportional to the amounts of yellowfin caught in those 5° by 5° areas.
FIGURA 1a. Distribución media anual de las capturas cerqueras de aleta amarilla, por tipo de lance, 2006-2010. El tamaño de cada círculo es proporcional a la cantidad de aleta amarilla capturado en la cuadrícula de 5° x 5° correspondiente.

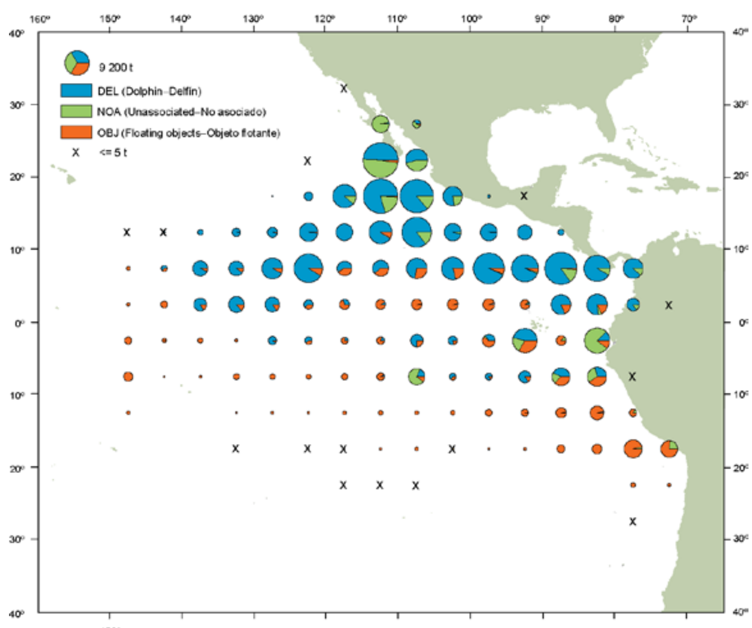

FIGURE 1b. Annual distributions of the purse-seine catches of yellowfin, by set type, 2011. The sizes of the circles are proportional to the amounts of yellowfin caught in those 5° by 5° areas.
FIGURA 1b. Distribución anual de las capturas cerqueras de aleta amarilla, por tipo de lance, 2011. El tamaño de cada círculo es proporcional a la cantidad de aleta amarilla capturado en la cuadrícula de 5° x 5° correspondiente.

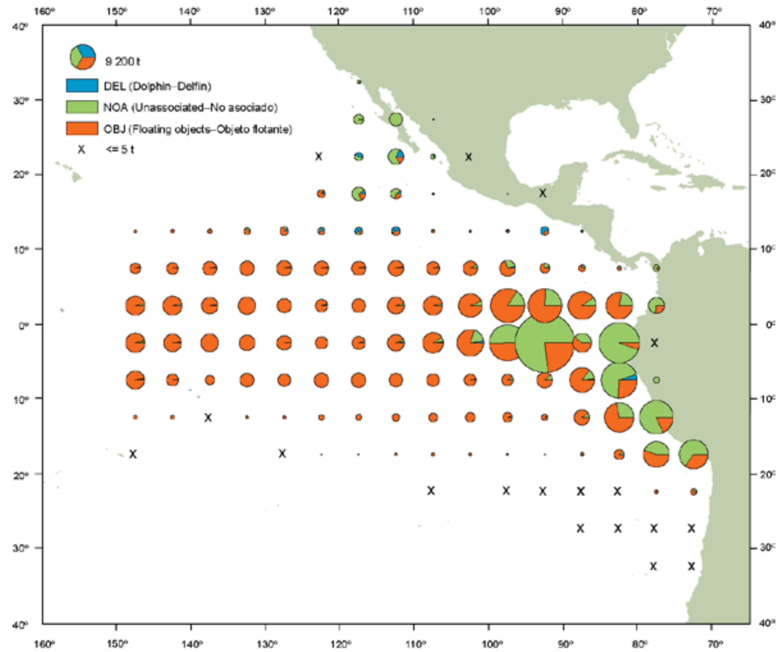

FIGURE 2a. Average annual distributions of the purse-seine catches of skipjack, by set type, 2006-2010. The sizes of the circles are proportional to the amounts of skipjack caught in those 5° by 5° areas.
FIGURA 2a. Distribución media anual de las capturas cerqueras de barrilete, por tipo de lance, 2006-2010. El tamaño de cada círculo es proporcional a la cantidad de barrilete capturado en la cuadrícula de 5° x 5° correspondiente.

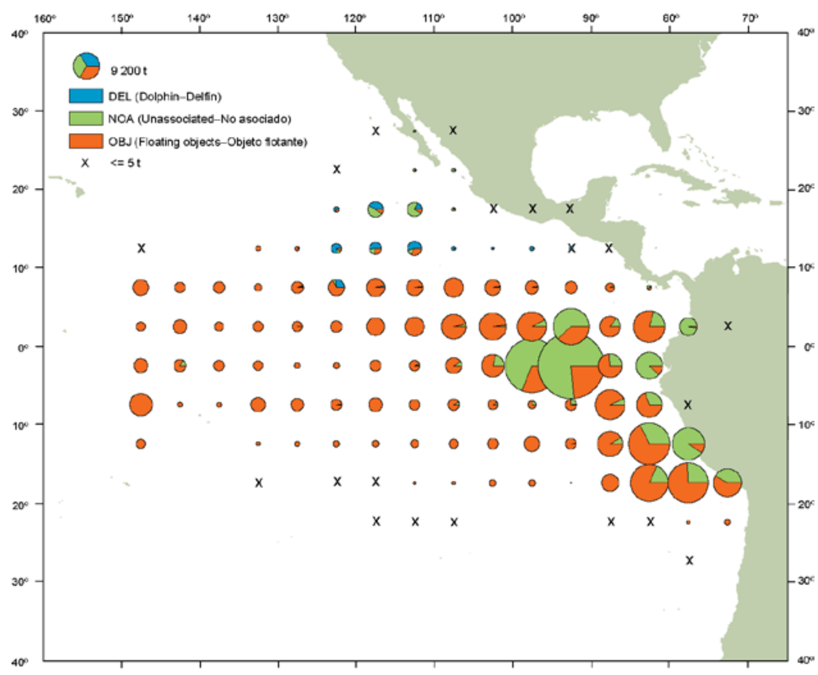

FIGURE 2b. Annual distributions of the purse-seine catches of skipjack, by set type, 2011. The sizes of the circles are proportional to the amounts of skipjack caught in those 5° by 5° areas.
FIGURA 2b. Distribución anual de las capturas cerqueras de barrilete, por tipo de lance, 2011. El tamaño de cada círculo es proporcional a la cantidad de barrilete capturado en la cuadrícula de 5° x 5° correspondiente.

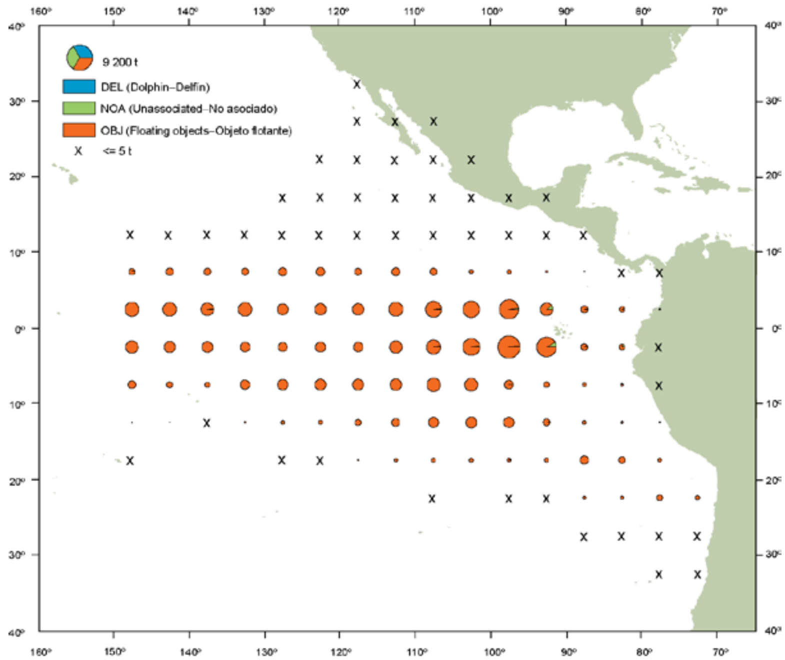

FIGURE 3a. Average annual distributions of the purse-seine catches of bigeye, by set type, 2006-2010. The sizes of the circles are proportional to the amounts of bigeye caught in those 5° by 5° areas.
FIGURA 3a. Distribución media anual de las capturas cerqueras de patudo, por tipo de lance, 2006-2010. El tamaño de cada círculo es proporcional a la cantidad de patudo capturado en la cuadrícula de 5° x 5° correspondiente.

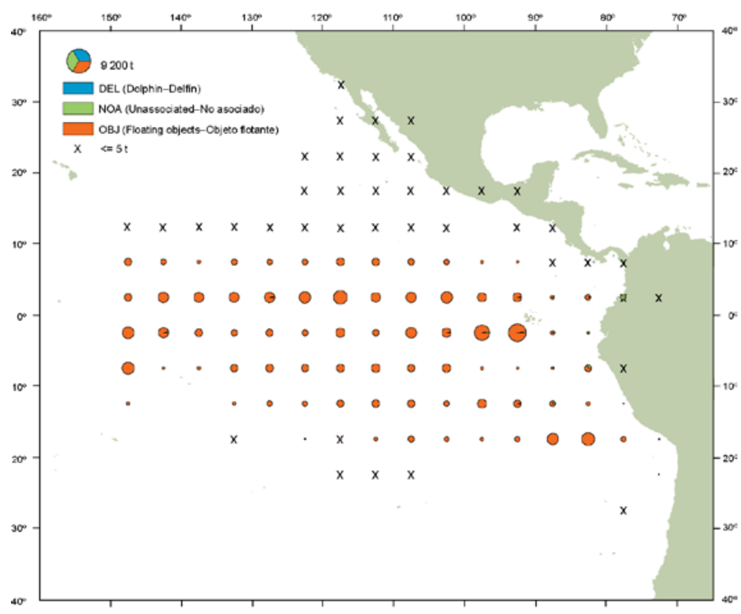

FIGURE 3b. Annual distributions of the purse-seine catches of bigeye, by set type, 2011. The sizes of the circles are proportional to the amounts of bigeye caught in those 5° by 5° areas.
FIGURA 3b. Distribución anual de las capturas cerqueras de patudo, por tipo de lance, 2011. El tamaño de cada círculo es proporcional a la cantidad de patudo capturado en la cuadrícula de 5° x 5° correspondiente.

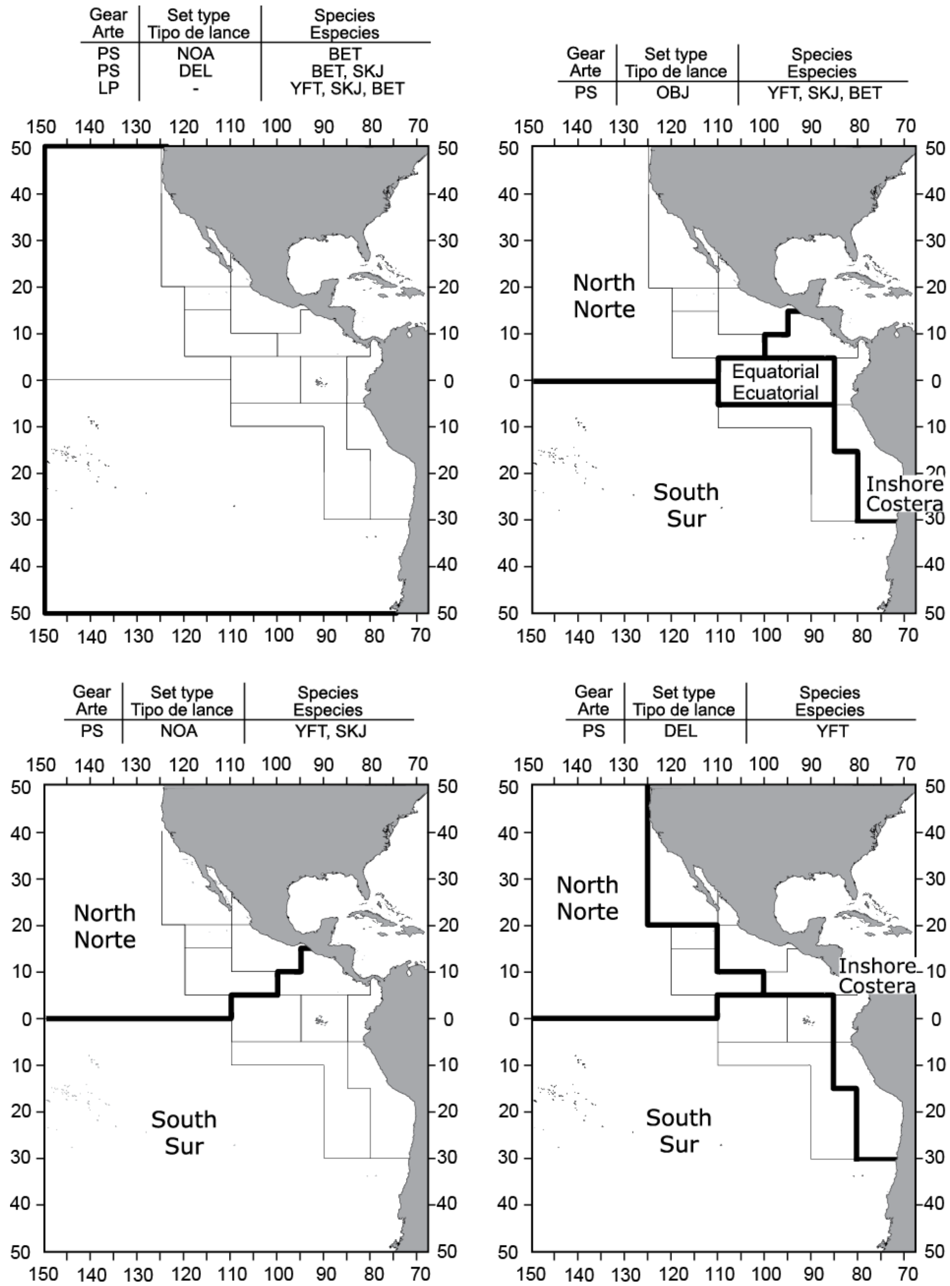

FIGURE 4. Spatial extents of the fisheries defined by the IATTC staff for stock assessment of yellowfin, skipjack, and bigeye in the EPO. The thin lines indicate the boundaries of the 13 length-frequency sampling areas, and the bold lines the boundaries of the fisheries. Gear: PS = purse seine, LP = pole and line; Set type: NOA = unassociated, DEL = dolphin, OBJ = floating object; Species: YFT = yellowfin, SKJ = skipjack, BET = bigeye.

FIGURA 4. 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.

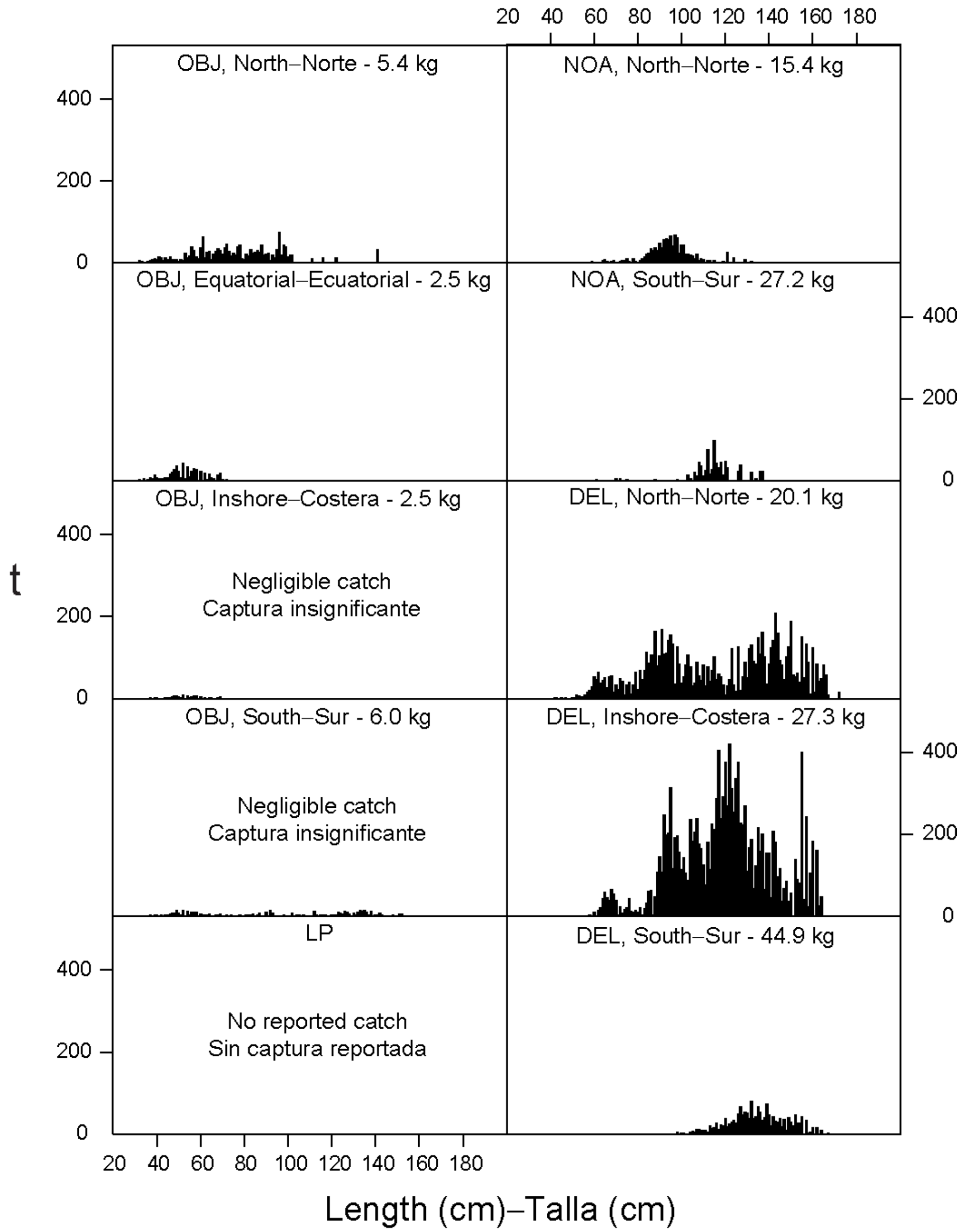

FIGURE 5a. Estimated size compositions of the yellowfin caught in each fishery of the EPO during the fourth quarter of 2011. The average weights of the fish in the samples are given at the tops of the panels. OBJ = floating object; LP = pole and line; NOA = unassociated; DEL = dolphin; t = metric tons.

FIGURA 5a. Composición por tallas estimada para el aleta amarilla capturado en cada pesquería del OPO durante el cuarto trimestre de 2011. 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.

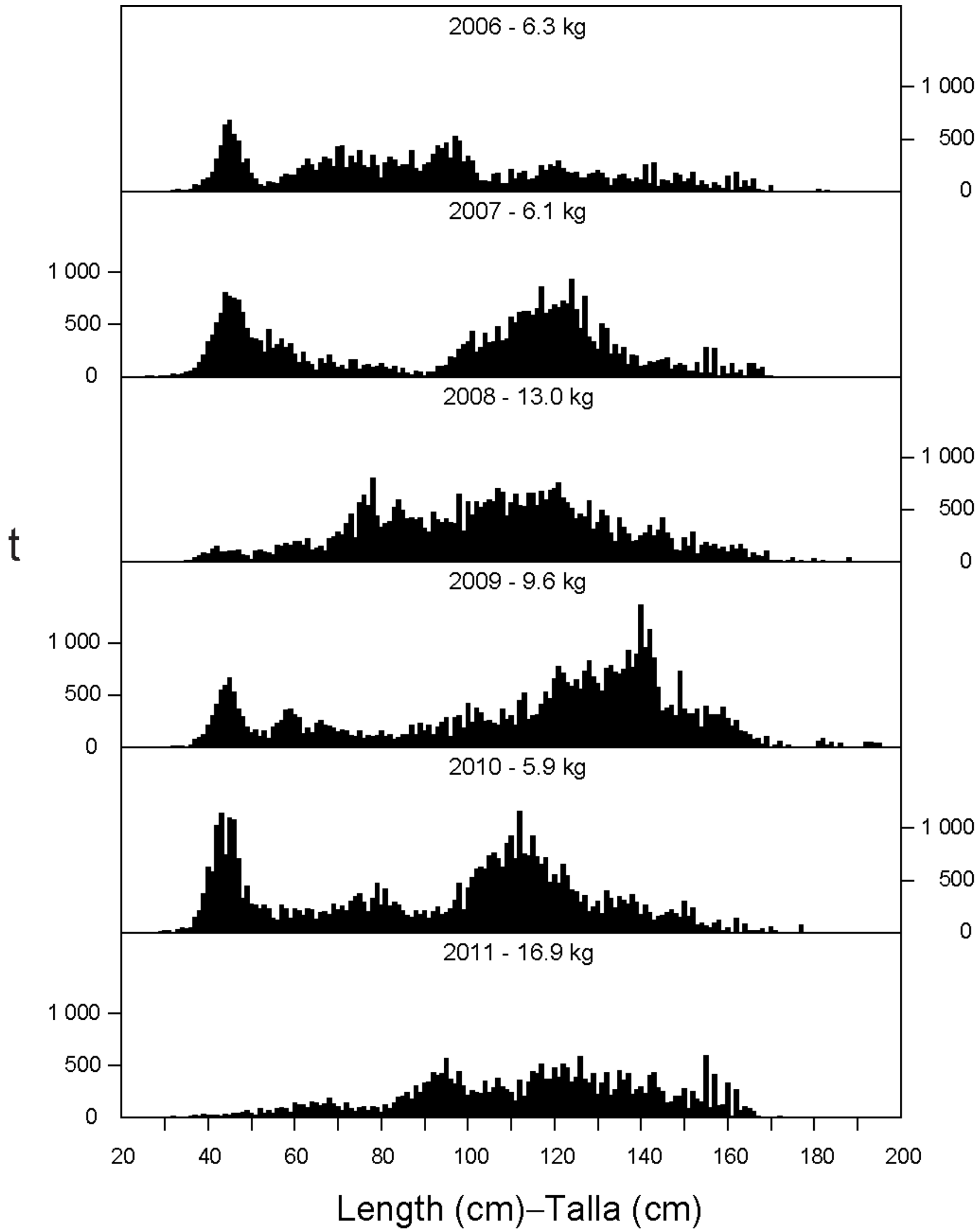

FIGURE 5b. Estimated size compositions of the yellowfin caught in the EPO during the fourth quarter of 2006-2011. The average weights of the fish in the samples are given at the tops of the panels. t = metric tons.

FIGURA 5b. Composición por tallas estimada para el aleta amarilla capturado en el OPO en el cuarto trimestre de 2006-2011. En cada recuadro se detalla el peso promedio de los peces en las muestras; t = toneladas métricas.

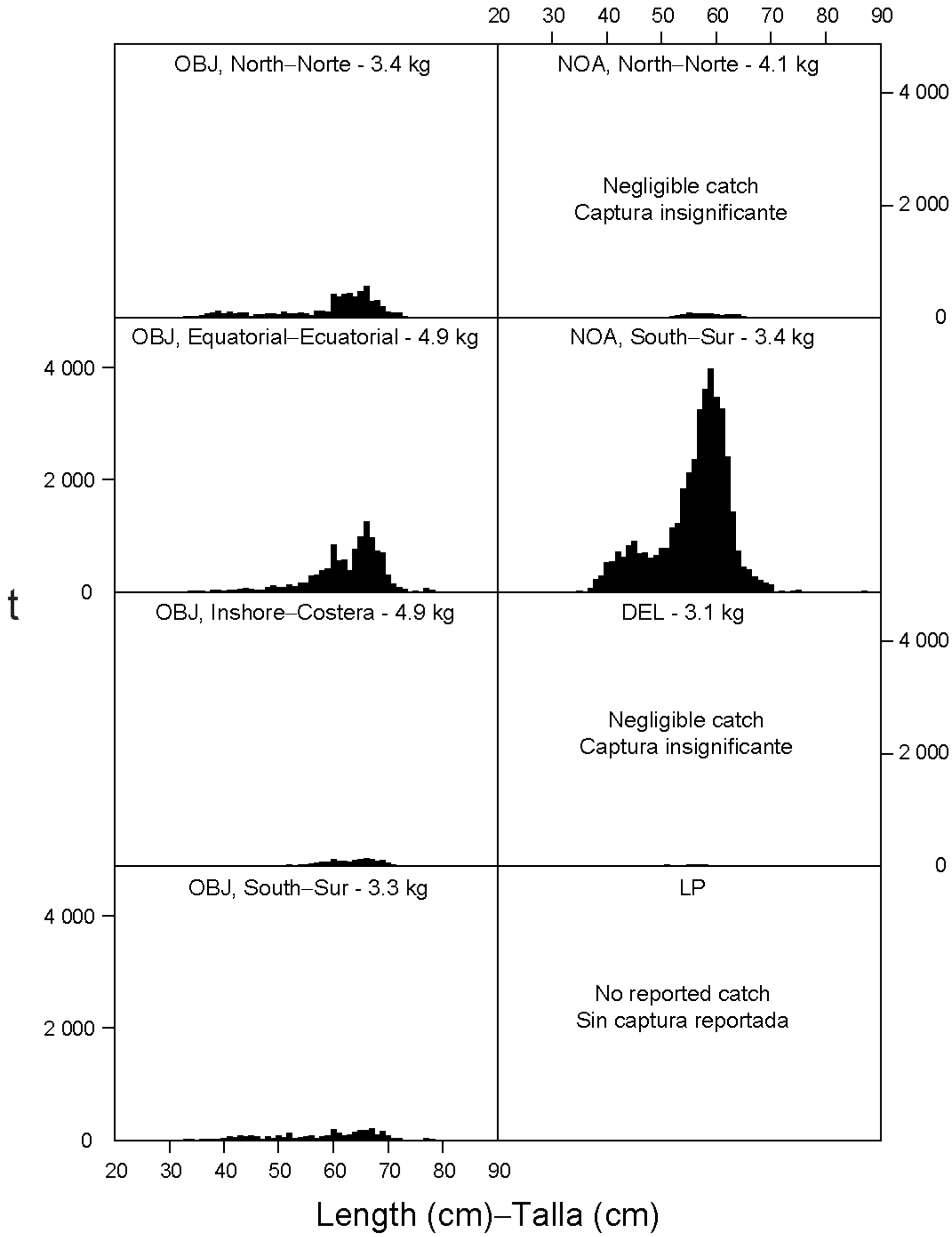

FIGURE 6a. Estimated size compositions of the skipjack caught in each fishery of the EPO during the fourth quarter of 2011. The average weights of the fish in the samples are given at the tops of the panels. OBJ = floating object; LP = pole and line; NOA = unassociated; DEL = dolphin; t = metric tons.

FIGURA 6a. Composición por tallas estimada para el barrilete capturado en cada pesquería del OPO durante el cuarto trimestre de 2011. 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.

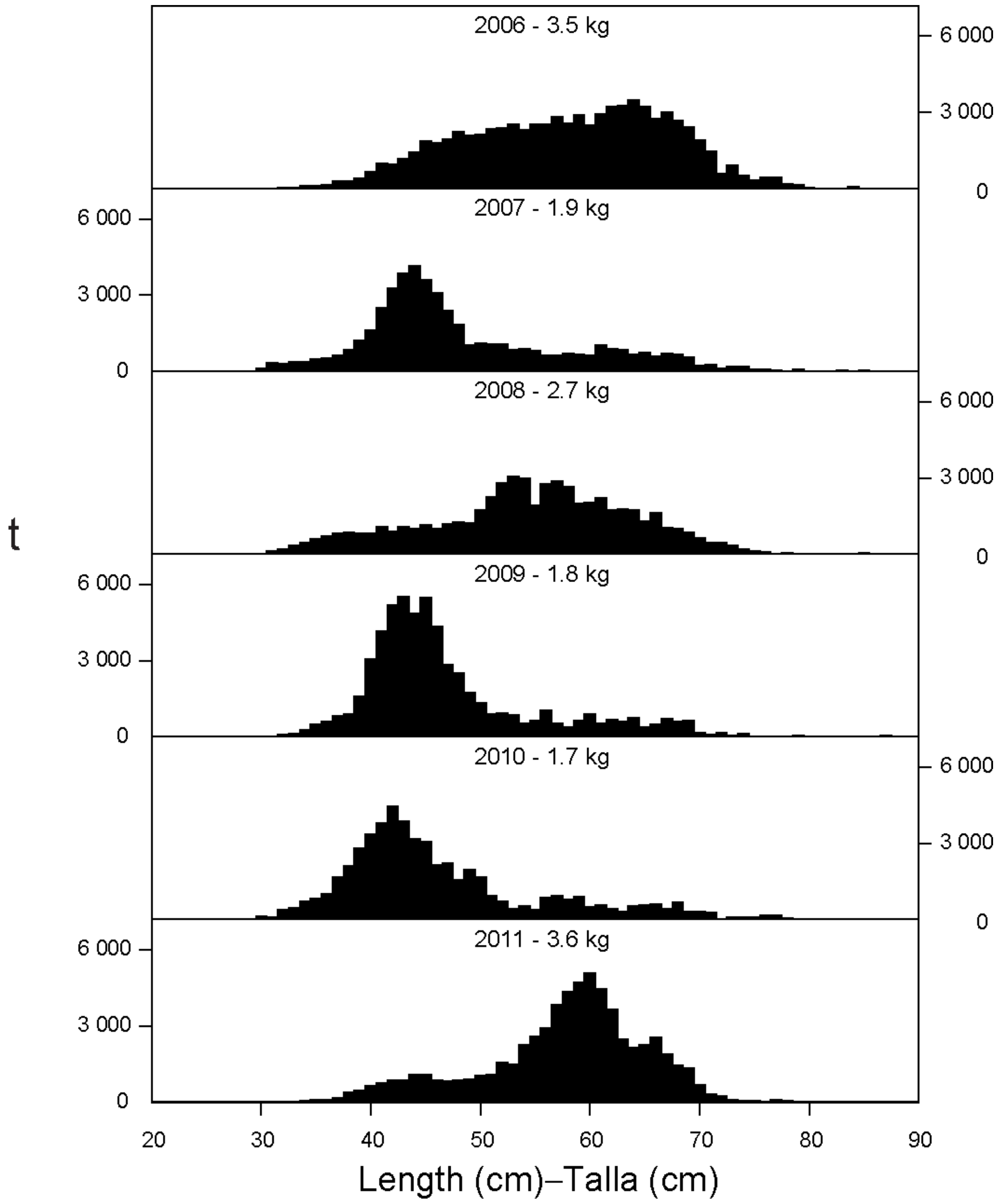

FIGURE 6b. Estimated size compositions of the skipjack caught in the EPO during the fourth quarter of 2006-2011. The average weights of the fish in the samples are given at the tops of the panels. t = metric tons.

FIGURA 6b. Composición por tallas estimada para el barrilete capturado en el OPO en el cuarto trimestre de 2006-2011. En cada recuadro se detalla el peso promedio de los peces en las muestras. t = toneladas métricas.

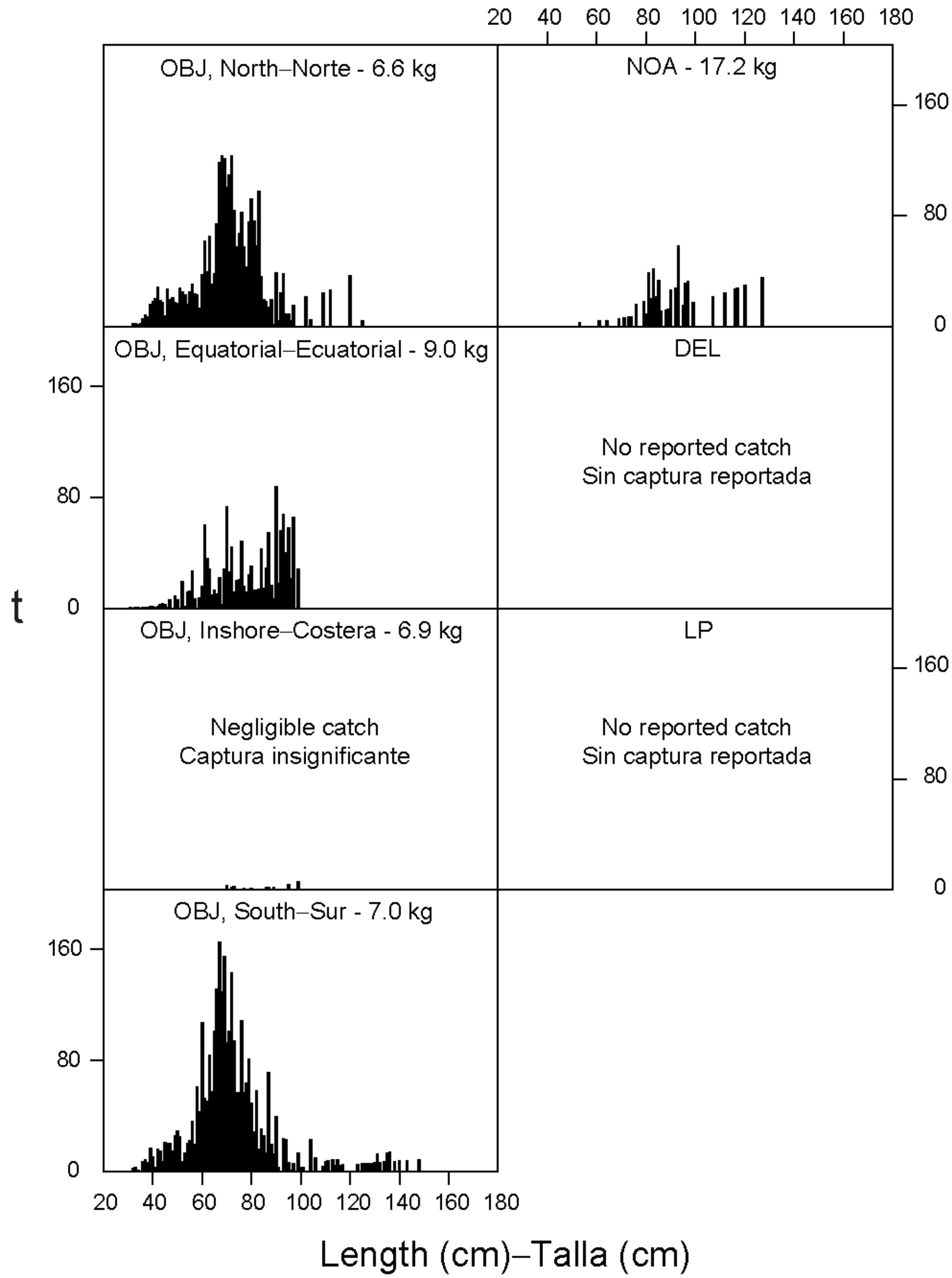

FIGURE 7a. Estimated size compositions of the bigeye caught in each fishery of the EPO during the fourth quarter of 2011. The average weights of the fish in the samples are given at the tops of the panels. OBJ = floating object; LP = pole and line; NOA = unassociated; DEL = dolphin; t = metric tons.

FIGURA 7a. Composición por tallas estimada para el patudo capturado en cada pesquería del OPO durante el cuarto trimestre de 2011. 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.

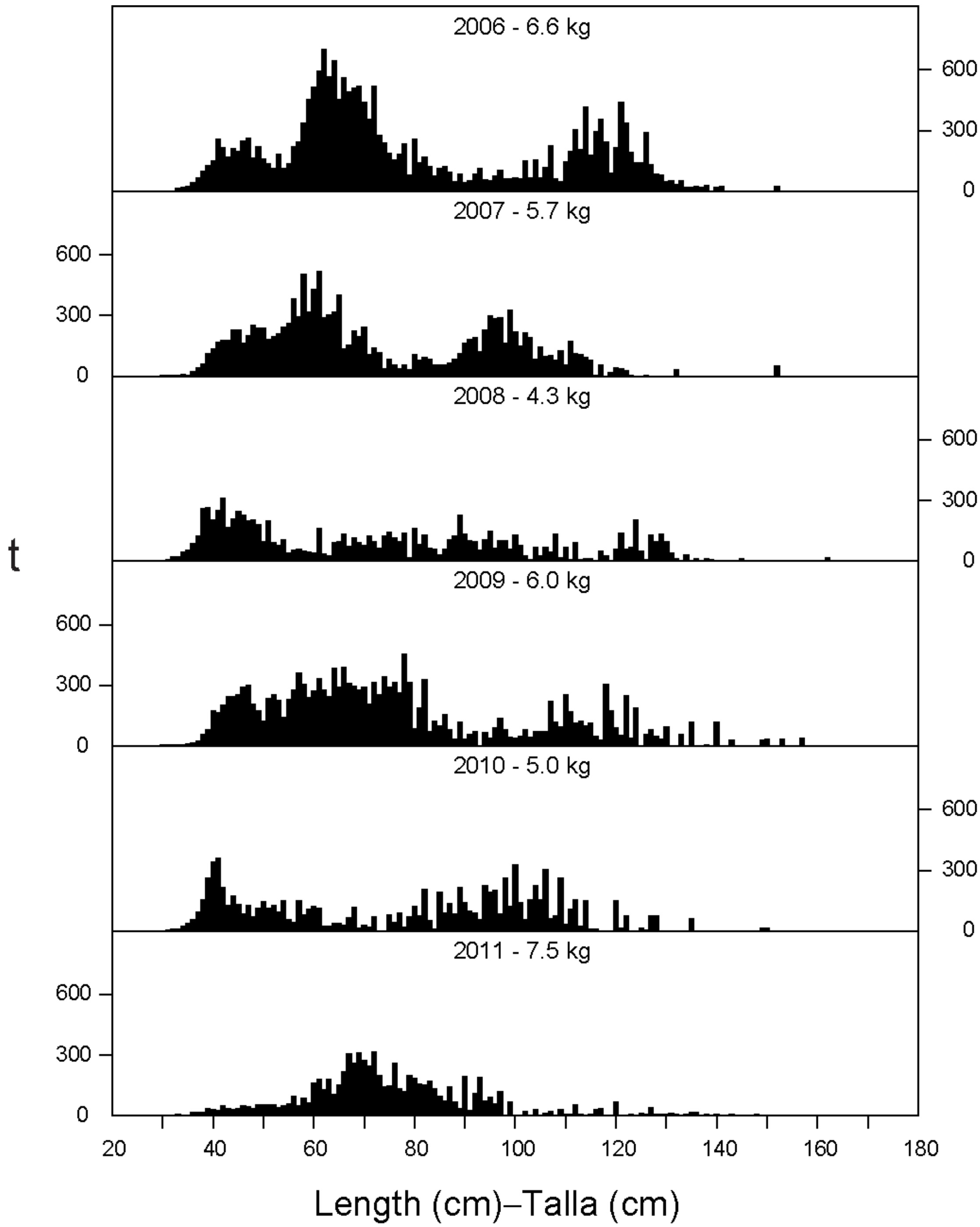

FIGURE 7b. Estimated size compositions of the bigeye caught in the EPO during the fourth quarter of 2006-2011. The average weights of the fish in the samples are given at the tops of the panels. t = metric tons.

FIGURA 7b. Composición por tallas estimada para el patudo capturado en el OPO en el cuarto trimestre de 2006-2011. En cada recuadro se detalla el peso promedio de los peces en las muestras; t = toneladas métricas.

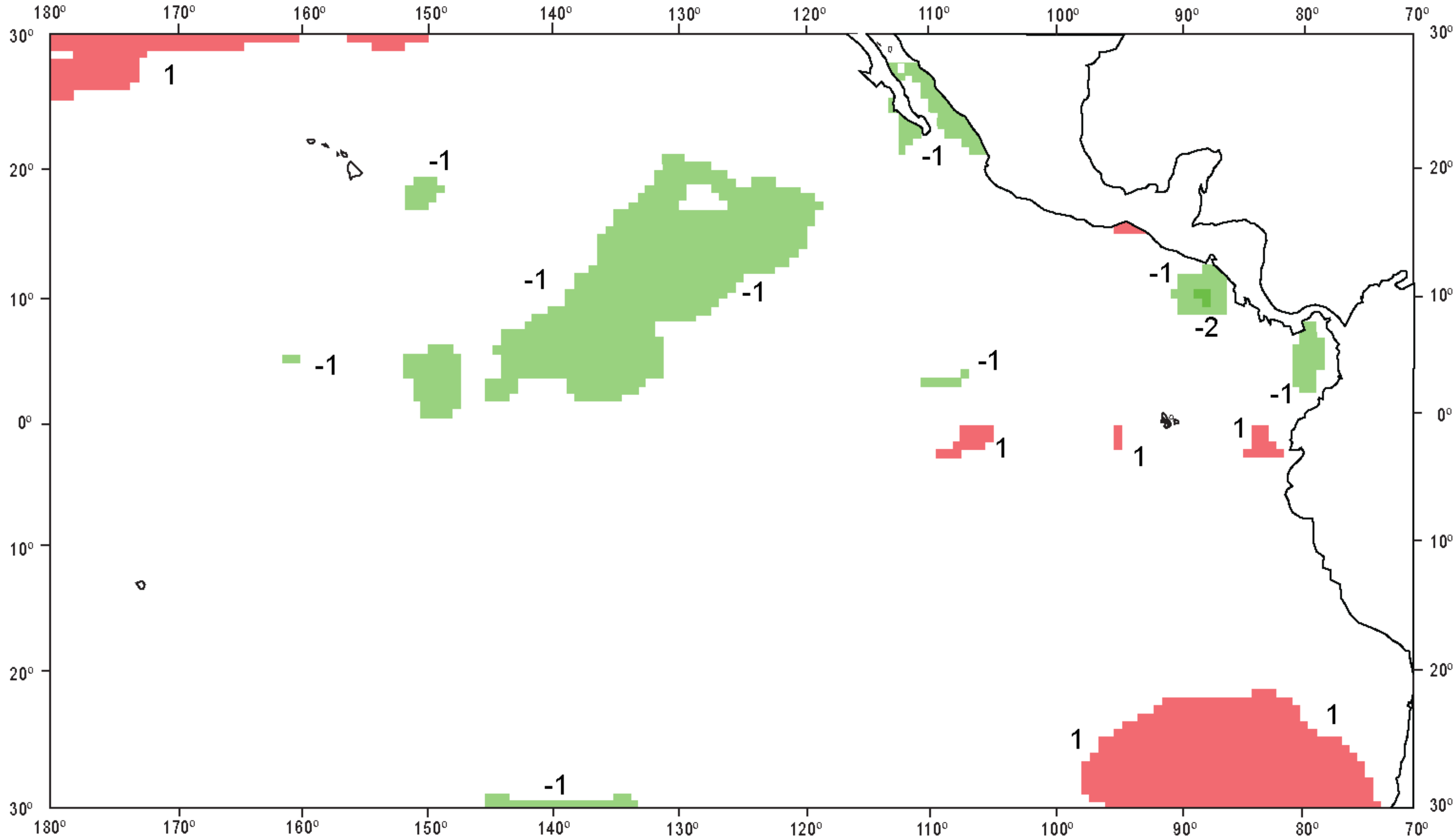

FIGURE 8. Sea-surface temperature (SST) anomalies (departures from long-term normals) for March 2012, based on data from fishing boats and other types of commercial vessels.

FIGURA 8. Anomalías (variaciones de los niveles normales a largo plazo) de la temperatura superficial del mar (TSM) en marzo de 2012, basadas en datos tomados por barcos pesqueros y otros buques comerciales.

TABLE 1. Estimates of the numbers and capacities (m^3) of purse seiners and pole-and-line vessels operating in the EPO in 2012 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 2012, y de la capacidad de acarreo (m^3) 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	Gear	Well volume–Volumen de bodega				Capacity
Bandera	Arte	1-900	901-1700	>1700	Total	Capacidad
		Number—Número				
Colombia	PS	4	10	-	14	14,860
Ecuador	PS	71	17	10	98	72,878
España—Spain	PS	-	-	4	4	10,116
Guatemala	PS	-	1	1	2	3,575
México	PS	10	31	1	42	48,054
	LP	2	-	-	2	143
Nicaragua	PS	-	5	1	6	8,478
Panamá	PS	2	10	3	15	20,451
El Salvador	PS	-	1	3	4	7,892
USA—EE.UU.	PS	-	1	-	1	1,274
Venezuela	PS	-	17	-	17	22,862
Vanuatu	PS	-	1	-	1	1,360
All flags—	PS	87	94	23	204	
Todas banderas	LP	2	-	-	2	
	PS + LP	89	94	23	206	
		Capacity—Capacidad				
All flags—	PS	40,987	122,158	48,655	211,800	
Todas banderas	LP	143	-	-	143	
	PS + LP	41,130	122,158	48,655	211,943	

TABLE 2. Estimates of the retained catches of tunas in the EPO, from 1 January through 1 April 2012, 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 1 de abril de 2012, por especie y bandera del buque, en toneladas métricas**.**

Flag	Yellowfin	Skipjack	Bigeye	Pacific bluefin	Bonitos (*Sarda* spp.)	Albacore	Black skipjack	Other[1]	Total	Percentage of total
Bandera	**Aleta amarilla**	**Barrilete**	**Patudo**	**Aleta azul del Pacífi-co**	**Bonitos (*Sarda* spp.)**	**Albacora**	**Barrilete negro**	**Otras[1]**	**Total**	**Porcentaje del total**
Ecuador	10,085	30,987	9,437	-	1,047	-	10	9	51,575	38.4
México	28,346	1,545	-	-	-	-	269	-	30,160	22.5
Panamá	5,475	7,861	1,402	-	25	-	1	15	14,779	11.0
Venezuela	7,193	8,757	25	-	-	-	-	1	15,976	11.9
Other—Otros[2]	11,493	8,944	1,356	-	-	-	-	-	21,793	16.2
Total	62,592	58,094	12,220	-	1,072	-	280	25	134,283	

1 Includes other tunas, sharks, and miscellaneous fishes

1 Incluye otros túnidos, tiburones, y peces diversos

2 Includes Colombia, El Salvador, Guatemala, Nicaragua, and Spain; this category is used to avoid revealing the operations of individual vessels or companies.

2 Incluye Colombia, El Salvador, España, Guatemala, y Nicaragua; se usa esta categoría para no revelar información sobre faenas de buques o empresas individuales.

TABLE 3. Estimated retained and discarded catches, in metric tons, by purse-seine and pole-and-line vessels of the EPO tuna fleet. “Other” includes other tunas, sharks, and miscellaneous fishes. The data for 2010-2011 are preliminary. Discard data were first collected by observers in 1993.

TABLA 3. Estimaciones de capturas retenidas y descartadas, en toneladas métricas, de buques cerqueros y caneros de la flota atunera del OPO. “Otros” incluye otros atunes, tiburones, y peces diversos. Los datos de 2010-2011 son preliminares. Los observadores toman datos sobre descartes desde 1993.

Year	Yellowfin			Skipjack			Bigeye			Pacific bluefin		
	Retained	Discarded	Total	Retained	Discarded	Total	Retained	Discarded	Total	Retained	Discarded	Total
Año	Aleta amarilla			Barrilete			Patudo			Aleta azul del Pacífico		
	Retenido	Descartado	Total	Retenido	Descartado	Total	Retenido	Descartado	Total	Retenido	Descartado	Total
1982	116,293	-	116,293	104,259	-	104,259	6,981	-	6,981	3,145	-	3,145
1983	87,936	-	87,936	61,238	-	61,238	4,614	-	4,614	836	-	836
1984	138,776	-	138,776	62,743	-	62,743	8,863	-	8,863	839	-	839
1985	212,529	-	212,529	51,775	-	51,775	6,058	-	6,058	3,996	-	3,996
1986	263,049	-	263,049	67,555	-	67,555	2,686	-	2,686	5,040	-	5,040
1987	267,115	-	267,115	66,252	-	66,252	1,177	-	1,177	980	-	980
1988	281,016	-	281,016	91,438	-	91,438	1,540	-	1,540	1,379	-	1,379
1989	282,141	-	282,141	97,874	-	97,874	2,030	-	2,030	1,108	-	1,108
1990	265,929	-	265,929	75,192	-	75,192	5,921	-	5,921	1,491	-	1,491
1991	234,113	-	234,113	63,945	-	63,945	4,901	-	4,901	419	-	419
1992	231,910	-	231,910	86,240	-	86,240	7,179	-	7,179	1,928	-	1,928
1993	224,443	4,758	229,201	87,602	10,598	98,200	9,657	653	10,310	580	-	580
1994	212,033	4,527	216,560	73,366	10,501	83,867	34,899	2,266	37,165	969	-	969
1995	216,702	5,275	221,977	132,300	16,373	148,673	45,321	3,251	48,572	656	-	656
1996	242,369	6,312	248,681	106,528	24,503	131,031	61,311	5,689	67,000	8,329	-	8,329
1997	249,296	5,516	254,812	156,716	31,338	188,054	64,272	5,402	69,674	2,607	3	2,610
1998	259,044	4,698	263,742	142,315	22,644	164,959	44,129	2,822	46,951	1,772	-	1,772
1999	283,703	6,547	290,250	263,609	26,046	289,655	51,158	4,932	56,090	2,558	54	2,612
2000	255,694	6,207	261,901	205,878	24,508	230,386	95,282	5,417	100,699	3,773	-	3,773
2001	387,852	7,028	394,880	143,613	12,815	156,428	60,518	1,254	61,772	1,156	3	1,159
2002	413,236	4,140	417,376	154,162	12,506	166,668	57,421	949	58,370	1,761	1	1,762
2003	383,749	5,950	389,699	274,606	22,453	297,059	53,052	2,326	55,378	3,236	-	3,236
2004	274,441	3,009	277,450	198,354	17,182	215,536	65,471	1,749	67,220	8,880	19	8,899
2005	269,923	2,929	272,852	264,528	17,228	281,756	67,895	1,952	69,847	4,743	15	4,758
2006	167,317	1,665	168,982	296,703	12,403	309,106	83,838	2,385	86,223	9,928	-	9,928
2007	170,910	1,947	172,857	208,571	7,159	215,730	63,450	1,039	64,489	4,189	-	4,189
2008	185,869	1,019	186,888	297,104	9,166	306,270	75,028	2,287	77,315	4,407	14	4,421
2009	237,465	1,482	238,947	230,674	6,903	237,577	76,799	1,104	77,903	3,448	24	3,472
2010	251,469	1,145	252,614	147,239	3,419	150,658	57,752	653	58,405	7,746	-	7,746
2011	202,610	563	203,173	279,004	5,667	284,671	56,526	731	57,257	2,730	4	2,734

TABLE 3. (continued)
TABLA 3. (continuación)

Year	Albacore			Bonitos (*Sarda* spp.)			Black skipjack			Other			Total		
	Retained	Discarded	Total	Retained	Discarded	Total	Retained	Discarded	Total	Retained	Discarded	Total	Retained	Discarded	Total
Año	**Albacora**			**Bonitos (*Sarda* spp.)**			**Barrilete negro**			**Otros**			**Total**		
	Retenido	**Descartado**	**Total**	**Retenido**	**Descartado**	**Total**	**Retenido**	**Descartado**	**Total**	**Retenido**	**Descartado**	**Total**	**Retenido**	**Descartado**	**Total**
1982	553	-	553	2,122	-	2,122	1,338	-	1,338	47	-	47	234,738	-	234,738
1983	456	-	456	3,829	-	3,829	1,222	-	1,222	60	-	60	160,191	-	160,191
1984	5,351	-	5,351	3,514	-	3,514	662	-	662	6	-	6	220,754	-	220,754
1985	919	-	919	3,604	-	3,604	288	-	288	19	-	19	279,188	-	279,188
1986	133	-	133	490	-	490	569	-	569	181	-	181	339,703	-	339,703
1987	321	-	321	3,316	-	3,316	571	-	571	481	-	481	340,213	-	340,213
1988	288	-	288	9,550	-	9,550	956	-	956	79	-	79	386,246	-	386,246
1989	22	-	22	12,096	-	12,096	801	-	801	36	-	36	396,108	-	396,108
1990	209	-	209	13,849	-	13,849	787	-	787	200	-	200	363,578	-	363,578
1991	834	-	834	1,289	-	1,289	421	-	421	4	-	4	305,926	-	305,926
1992	255	-	255	977	-	977	105	-	105	24	-	24	328,618	-	328,618
1993	1	-	1	600	12	612	104	4,144	4,248	9	2,013	2,022	322,996	22,178	345,174
1994	85	-	85	8,693	147	8,840	188	854	1,042	9	497	506	330,242	18,792	349,034
1995	465	-	465	8,010	55	8,065	203	1,448	1,651	11	626	637	403,668	27,028	430,696
1996	83	-	83	654	1	655	704	2,304	3,008	37	1,028	1,065	420,015	39,837	459,852
1997	60	-	60	1,105	4	1,109	100	2,512	2,612	71	3,383	3,454	474,227	48,158	522,385
1998	123	-	123	1,337	4	1,341	528	1,876	2,404	13	1,233	1,246	449,261	33,277	482,538
1999	274	-	274	1,719	-	1,719	171	3,413	3,584	27	3,092	3,119	603,219	44,084	647,303
2000	157	-	157	636	-	636	293	1,995	2,288	190	1,410	1,600	561,903	39,537	601,440
2001	160	-	160	17	-	17	2,258	1,019	3,277	191	679	870	595,765	22,798	618,563
2002	412	-	412	-	-	-	1,467	2,283	3,750	576	1,863	2,439	629,035	21,742	650,777
2003	93	-	93	1	-	1	439	1,535	1,974	80	1,238	1,318	715,256	33,502	748,758
2004	231	-	231	16	35	51	884	387	1,271	256	973	1,229	548,533	23,354	571,887
2005	68	-	68	313	18	331	1,472	2,124	3,596	190	1,922	2,112	609,132	26,188	635,320
2006	110	-	110	3,519	80	3,599	1,999	1,972	3,971	50	1,910	1,960	563,464	20,415	583,879
2007	208	-	208	16,013	628	16,641	2,306	1,625	3,931	598	1,222	1,820	466,245	13,620	479,865
2008	1,099	-	1,099	7,880	37	7,917	3,622	2,251	5,873	137	1,380	1,517	575,146	16,154	591,300
2009	2,277	2	2,279	10,053	15	10,053	4,359	1,020	5,379	162	469	631	565,237	11,019	576,256
2010	1,899	-	1,899	2,822	19	2,841	3,426	1,079	4,505	136	708	844	472,489	7,023	479,512
2011	10	-	10	7,958	29	7,987	2,197	737	2,934	94	877	971	551,129	8,608	559,737

TABLE 4. Preliminary estimates of the retained catches in metric tons, of tunas and bonitos caught by purse-seine, pole-and-line, and recreational vessels in the EPO in 2010 and 2011, by species and vessel flag. The data for yellowfin, skipjack, and bigeye tunas have been adjusted to the species composition estimates, and are preliminary.

TABLA 4. Estimaciones preliminares de las capturas retenidas, en toneladas métricas, de atunes y bonitos por buques cerqueros, cañeros, y recreacionales en el OPO en 2010 y 2011, por especie y bandera del buque. Los datos de los atunes aleta amarilla, barrilete, y patudo fueron ajustados a las estimaciones de composición por especie, y son preliminares.

	Yellowfin	Skipjack	Bigeye	Pacific bluefin	Albacore	Black skipjack	Bonito	Unidentified tunas	Total	Percent
	Aleta amarilla	Barrilete	Patudo	Aleta azul	Albacora	Barrilete negro	Bonito	Atunes no identificados	Total	Porcentaje
2010	**Retained catches—Capturas retenidas**									
Colombia	20,493	11,400	4,206	-	-	11	-	1	36,111	7.6
Ecuador	34,764	82,280	34,902	-	-	555	9	117	152,627	32.2
España	2,820	1,569	579	-	-	-	-	-	4,968	1.0
México	105,429	3,057	11	7,746	25	2,661	2,815	6	121,750	25.7
Nicaragua	9,422	5,242	1,934	-	-	70	-	1	16,669	3.5
Panamá	34,538	19,213	7,089	-	-	3	-	-	60,843	12.8
Venezuela	21,245	11,818	4,361	-	-	9	-	-	37,433	7.9
Other-Otra[1]	22,962	12,660	4,671	123	2,559	116	97	12	43,200	9.3
Total	251,673	147,239	57,753	7,869	2,584	3,425	2,921	137	473,601	
2011	**Retained catches–Capturas retenidas**									
Colombia	18,261	24,167	2,804	-	10	-	-	-	45,242	8.2
Ecuador	27,158	151,461	33,351	-	-	97	3	26	212,096	38.4
España	1,089	5,614	3,718	-	-	-	-	-	10,421	1.9
México	102,739	8,840	648	2,730	-	1,990	7,957	43	124,947	22.7
Nicarague	7,696	4,124	2,042	-	-	-	-	-	13,862	2.5
Panamá	18,530	31,003	7,018	-	-	-	-	-	56,551	10.2
Venezuela	18,133	27,533	409	-	-	39	-	10	46,124	8.4
Other-Otra[2]	9,004	26,262	6,536	456	-	69	-	17	42,344	7.7
Total	202,610	279,004	56,526	3,186	10	2,195	7,960	96	551,587	

[1] Includes Bolivia,, El Salvador, Guatemala, Honduras, Peru, United States, and Vanuatu. This category is used to avoid revealing the operations of individual vessels or companies.

[1] Incluye Bolivia,, El Salvador, Estados Unidos, Guatemala, Honduras, Perú, y Vanuatú. Se usa esta categoría para no revelar información sobre las actividades de buques o empresas individuales.

[2] Includes Bolivia, El Salvador, Guatemala, Honduras, United States, and Vanuatu. This category is used to avoid revealing the operations of individual vessels or companies.

[2] Incluye Bolivia, El Salvador, Estados Unidos, Guatemala, Honduras, y Vanuatú. Se usa esta categoría para no revelar información sobre las actividades de buques o empresas individuales.

TABLE 5a. Catches of bigeye tuna, in metric tons, in the eastern Pacific Ocean during 2011 by longline vessels more than 24 meters in overall length.
TABLA 5a. Capturas de atún patudo, en toneladas métricas, en el Océano Pacífico oriental durante 2011 por buques palangreros de más de 24 metros en eslora total.

Flag—Bandera	Quarter—Trimestre				Total
	1	2	3	4	
China	767	1,045	1,683	1,956	5,451
Japan—Japón	2,776	2,802	2,975	3,947	12,500
Republic of Korea—República de Corea*	2,618	1,016	1,283	2,132	7,049
Chinese Taipei—Taipei Chino	723	395	1,089	1,857	4,064
United States—Estados Unidos	-	-	-	-	-
Vanuatu	279	206	178	336	999
Total	7,163	5,464	7,208	10,228	30,063

* Round weight obtained by adjustment applied to processed weight—Peso entero obtenido mediante ajuste aplicado al peso procesado provisto

TABLE 5b. Preliminary estimates of the catches of bigeye tuna, in metric tons, in the eastern Pacific Ocean during the first quarter of 2012 by longline vessels more than 24 meters in overall length.
TABLA 5b. Estimaciones preliminares de las capturas de atún patudo, en toneladas métricas, en el Océano Pacífico oriental durante el primer trimestre de 2012 por buques palangreros de más de 24 metros en eslora total.

Flag—Bandera	Month—Mes			Total
	1	2	3	
China	630	427	564	1,621
Japan—Japón	1,377	1,144	1,063	3,584
Republic of Korea—República de Corea*	702	439	416	1,557
Chinese Taipei—Taipei Chino	270	270	322	862
United States— Estados Unidos	-	-	-	-
Vanuatu	100	56	39	195

* Round weight obtained by adjustment applied to processed weight—Peso entero obtenido mediante ajuste aplicado al peso procesado provisto

TABLE 6. Oceanographic and meteorological data for the Pacific Ocean, April 2011-March 2012. The values in parentheses are anomalies. SST = sea-surface temperature; SOI = Southern Oscillation Index; SOI* and NOI* are defined in the text.
TABLA 6. Datos oceanográficos y meteorológicos del Océano Pacífico, abril 2011-marzo 2012. 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	**4**	**5**	**6**	**7**	**8**	**9**
SST—TSM (°C)						
Area 1 (0°-10°S, 80°-90°W)	25.8 (0.2)	25.0 (0.8)	23.8 (0.9	22.1 (0.5)	20.6 (0.0)	19.7 (-0.6)
Area 2 (5°N-5°S, 90°-150°W	27.2 (-0.3)	27.0 (-0.1)	26.6 (0.1)	25.7 (0.1)	24.6 (-0.4)	24.2 (-0.6)
Area 3 (5°N-5°S, 120°-170°W)	27.0 (-0.8)	27.4 (-0.5	27.5 (-0.2)	27.0 (-0.2)	26.2 (-0.6)	26.0 (-0.7)
Area 4 (5°N-5°S, 150W°-160°E)	27.9 (-0.7)	28.3 (-0.5)	28.5 (-0.4)	28.5 (-0.30	28.3 (-0.4)	28.1 (-0.6)
Thermocline depth—Profundidad de la termoclina, 0°, 80°W	15	25	25	35	35	35
Thermocline depth—Profundidad de la termoclina, 0°,	40	55	40	55	55	35
Thermocline depth—Profundidad de la termoclina, 0°,	140	125	115	120	110	115
Thermocline depth—Profundidad de la termoclina, 0°, 180°W (m)	180	185	180	175	165	165
SOI—IOS	1.9	0.4	0.2	1.0	0.4	1.0
SOI*—IOS*	4.09	1.27	3.29	3.77	-0.11	0.14
NOI*—ION*	3.59	0.95	-0.36	-0.39	0,47	0.29

Month—Mes	**10**	**11**	**12**	**1**	**2**	**3**
SST—TSM (°C)						
Area 1 (0°-10°S, 80°-90°W)	20.2 (-0.6)	20.8 (-0.8)	21.8 (-1.1)	23.7 (-0.8)	26.3 (0.2)	26.9 (0.3)
Area 2 (5°N-5°S, 90°-150°W	24.0 (-1.0)	23.9 (-1.1)	24.2 (-1.0)	24.8 (-0.8)	26.2 (-0.2)	26.9 (-0,2)
Area 3 (5°N-5°S, 120°-170°W)	25.7 (-1.0)	25.6 (-1.1)	25.5 (-1.0)	25.5 (-1.1)	26.0 (-0.7)	26.6 (-0.6)
Area 4 (5°N-5°S, 150W°-160°E)	27.9 (-0.7)	27.9 (-0.8)	27.4 (-1.1)	27.1 (-1.2)	27.2 (-0.9)	27.5 (-0.7)
Thermocline depth—Profundidad de la termoclina, 0°, 80°W	35	30	30	15	15	10
Thermocline depth—Profundidad de la termoclina, 0°,	30	25	60	50	45	60
Thermocline depth—Profundidad de la termoclina, 0°,	110	140	145	150	120	110
Thermocline depth—Profundidad de la termoclina, 0°,	180	180	180	180	190	180
SOI—IOS	0.8	1.1	2.5	1.1	0.5	0.7
SOI*—IOS*	3.17	0.20	3.74	-0.28	-1.61	0.80
NOI*—ION*	1.41	1.72	7.89	4.86	3.72	0.16

TABLE 7. Preliminary data on the sampling coverage of trips by Class-6 vessels (vessels with fish-carrying capacities greater than 363 metric tons) by the IATTC program and the national programs of Colombia, Ecuador, the European Union, Mexico, Nicaragua, Panama, and Venezuela during the first quarter of 2012.[1]

TABLA 7. Datos preliminares de la cobertura de muestreo de viajes de buques de Clase 6 (buques con capacidad de acarreo más que 363 toneladas métricas) por el programa de la CIAT y los programas nacionales de Colombia, Ecuador, México, Nicaragua, Panamá, el Unión Europea, y Venezuela durante el primero trimestre de 2012.[1]

Flag	Trips	Observed by program			Percent observed
		IATTC	National	Total	
Bandera	**Viajes**	**Observado por programa**			**Porcentaje observado**
		CIAT	**Nacional**	**Total**	
Colombia	17	9	8	17	100.0
Ecuador	118	77	41	118	100.0
España—Spain	3	1	2	3	100.0
Guatemala	3	3		3	100.0
México	63	33	30	63	100.0
Nicaragua	11	4	7	11	100.0
Panamá	26	14	12	26	100.0
El Salvador	3	3		3	100.0
Venezuela	28	14	14	28	100.0
Total1	272	158	114	272	100.0

[1] The table includes 29 trips that began in late 2011 and ended in 2012. It also includes one trip of a vessel with a fish-carrying capacity of less than 363 metric tons that was required to carry an observer during that trip. It does not include 11 observed trips by vessels that fished entirely outside the IATTC's area of jurisdiction.

[1] La tabla incluye 29 viajes que comenzaron a fines de 2011 y terminaron en 2012. Incluye también un viaje de un buque de menos de 363 toneladas de capacidad de acarreo obligado a llevar un observador durante ese viaje. No incluye 11 viajes observados de buques que pescaron exclusivamente fuera de la zona de jurisdicción de la CIAT.