INTER-AMERICAN TROPICAL TUNA COMMMISSION
COMISIÓN INTERAMERICANA DEL ATÚN TROPICAL

QUARTERLY REPORT—INFORME TRIMESTRAL

October-December 2009—Octubre-Diciembre 2009

COMMISSIONERS—COMISIONADOS

COLOMBIA
José Alfredo Ramos
Carlos Robles
Yadir Salazar Mejía
Xiomara Sanclemente

COSTA RICA
Bernal Alberto Chavarría Valverde
Asdrubal Vásquez Nuñez
Carlos Villalobos Sole

ECUADOR
Jimmy Martínez Ortiz
Ramón Montaño Cruz
Guillermo Morán Velásquez
Luis Torres Navarrete

EL SALVADOR
Manuel Calvo Benivides
Manuel Ferín Oliva
Sonia Salaverría
José Emilio Suadi Hasbun

ESPAÑA—SPAIN
Rafael Centenera Ulecia
Fernando Curcio Ruigómez
Samuel J. Juárez Casado

FRANCE—FRANCIA
Marie-Sophie Dufau-Richet
Christiane Laurent-Monpetit
Jonathan Lemeunier
Michel Sallenave

GUATEMALA
Hugo Andrés Alsina Lagos
Bryslie Siomara Cifuentes Velasco
Rómulo Dimas Gramajo Lima
Manuel de Jesús Ixquiac Cabrera

JAPAN—JAPÓN
Yutaka Aoki
Masahiro Ishikawa
Shingo Ota

MÉXICO
Marío Aguilar Sanchez
Miguel Ángel Cisneros Mata
Ramón Corral Ávila
Michel Dreyfus León

NICARAGUA
Steadman Fagoth Müller
Julio César Guevara
Danilo Rosales Pichardo
Armando Segura Espinoza

PANAMÁ
María Patricia Díaz
Ramón González
Carlos Eduardo Isaza
George Novey

PERÚ
Gladys Cárdenas Quintana
Alfonso Miranda Eyzaguirre
Doris Sotomayor Yalan
Jorge Vértiz Calderón

REPUBLIC OF KOREA—REPÚBLICA DE COREA
Chiguk Ahn
Il Jeong Jeong
Jeongseok Park

USA—EE.UU.
Robert Fletcher
Rodney McInnis
Patrick Rose

VANUATU
Christophe Emelee
Roy Mickey Joy
Dimitri Malvirlani
Laurent Parenté

VENEZUELA
Alvin Delgado
Gilberto Gimenez
Nancy Tablante

DIRECTOR

Dr. Guillermo A. Compeán

HEADQUARTERS AND MAIN LABORATORY—OFICINA Y LABORATORIO PRINCIPAL
8604 La Jolla Shores Drive
La Jolla, California 92037-1508, USA
www.iattc.org

The

QUARTERLY REPORT

October-December 2009

of the

INTER-AMERICAN TROPICAL TUNA COMMISSION

is an informal account, published in English and Spanish, 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

Octubre-Diciembre 2009

de la

COMISIÓN INTERAMERICANA DEL ATÚN TROPICAL

es un relato informal, publicado en inglés y español, 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.

Editor—Redactor:
William H. Bayliff

INTRODUCTION

The Inter-American Tropical Tuna Commission (IATTC) operates under the authority and direction of a convention originally entered into by Costa Rica and the United States. The convention, which came into force in 1950, is open to adherence by other governments whose nationals fish 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 IATTC's responsibilities are met with two programs, the Tuna-Billfish Program and the Tuna-Dolphin Program.

The principal responsibilities of the Tuna-Billfish Program specified in the IATTC's convention were (1) to study the biology of the tunas and related species of the eastern Pacific Ocean to estimate the effects that fishing and natural factors have on their abundance and (2) to recommend appropriate conservation measures so that the stocks of fish could be maintained at levels that would afford maximum sustainable catches. It was subsequently given the responsibility for collecting information on compliance with Commission resolutions.

The IATTC's responsibilities were broadened in 1976 to address the problems arising from the incidental mortality in purse seines of dolphins that associate with yellowfin tuna in the EPO. The Commission agreed that it "should strive to maintain a high level of tuna production and also to maintain [dolphin] stocks at or above levels that assure their survival in perpetuity, with every reasonable effort being made to avoid needless or careless killing of [dolphins]" (IATTC, 33rd meeting, minutes: page 9). The principal responsibilities of the IATTC's Tuna-Dolphin Program are (1) to monitor the abundance of dolphins and their mortality incidental to purse-seine fishing in the EPO, (2) to study the causes of mortality of dolphins during fishing operations and promote the use of fishing techniques and equipment that minimize these mortalities, (3) to study the effects of different modes of fishing on the various fish and other animals of the pelagic ecosystem, and (4) to provide a secretariat for the International Dolphin Conservation Program, described below.

On 17 June 1992, the Agreement for the Conservation of Dolphins ("the 1992 La Jolla Agreement"), which created the International Dolphin Conservation Program (IDCP), was adopted. The main objective of the Agreement was to reduce the mortality of dolphins in the purse-seine fishery without harming the tuna resources of the region and the fisheries that depend on them. This agreement introduced such novel and effective measures as Dolphin Mortality Limits (DMLs) for individual vessels and the International Review Panel to monitor the performance and compliance of the fishing fleet. On 21 May 1998, the Agreement on the International Dolphin Conservation Program (AIDCP), which built on and formalized the provisions of the 1992 La Jolla Agreement, was signed, and it entered into force on 15 February 1999. In 2009 Costa Rica, Ecuador, El Salvador, the European Union, Guatemala, Honduras, Mexico, Nicaragua, Panama, Peru, the United States, Vanuatu, and Venezuela were Parties to this agreement, and Bolivia and Colombia were applying it provisionally. The objectives of the AIDCP are to ensure the sustainability of the tuna stocks in the eastern Pacific Ocean, to progressively reduce the incidental mortalities of dolphins in the tuna fishery of the eastern Pacific Ocean to levels approaching zero, and to minimize the incidental catches and discards of juvenile tunas and non-target species, taking into consideration the interrelationships among the species in the ecosystem. This agreement established Stock Mortality Limits, which are similar to DMLs except that (1) they apply to all vessels combined, rather than to individual vessels, and (2) they apply to individual stocks of dolphins, rather than to all stocks of dolphins combined. The IATTC provides the Secretariat for the International Dolphin Conservation Program (IDCP) and its various working groups and panels and coordinates the On-Board Observer Program and the Tuna Tracking and Verification System. (The former is described later in this report and the latter in recent Annual Reports of the IATTC.)

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"). This convention will replace the original one 15 months after it has been ratified or acceded to by seven Parties that were Parties to the 1949 Convention on the date that the Antigua Convention was open for signature. It has been ratified or acceded to by Mexico on 14 January 2005, El Salvador on 10 March 2005, the Republic of Korea on 13 December 2005, the European Union on 7 June 2006, Nicaragua on 13 December 2006, Belize on 12 June 2007, Panama on 10 July 2007, France on 20 July 2007, Japan on 11 July 2008, and Costa Rica on 27 May 2009. Of these, Costa Rica, El Salvador, France, Japan, Mexico, Nicaragua, and Panama were Parties to the 1949 Convention on the date that the Antigua Convention was open for signature, so it will enter into force on 27 August 2010.

To carry out its responsibilities, the IATTC conducts a wide variety of investigations at sea, in ports where tunas are landed, and in its laboratories. The research is carried out by a permanent, internationally-recruited research and support staff appointed by the Director, who is directly responsible to the Commission.

The scientific program is now in its 59th 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.

JAMES JOSEPH, 1930-2009

Dr. James Joseph, Director of the Inter-American Tropical Tuna Commission (IATTC) for 30 years, from 1969 to 1999, died suddenly on December 16, 2009.

He was born in Los Angeles, California, in 1930. After graduating from high school, he entered Humboldt State College (now Humboldt State University), in Arcata, California. His education was interrupted by service in the U.S. Army from 1952 to 1954. He then returned to Humboldt State, from which he obtained a B.S. degree in 1956 and an M.S. degree in 1958. He was then hired by the IATTC, and spent the next two years in Manta, Ecuador, studying baitfishes and tagging tunas. He was then transferred to Terminal Island, California, and then to La Jolla, California. Because of his obvious ability, Dr. J.L. Kask, Director of the IATTC at the time, named him Principal Scientist of the IATTC in 1964. He earned his Ph.D. degree from the University of Washington, where he studied population dynamics under the late Dr. Gerald J. Paulik, in 1967. In 1969, when Dr. Kask retired, Dr. Joseph was selected as the new Director of the IATTC.

Many changes took place in the tuna fisheries of the world, especially those of the eastern Pacific Ocean (EPO), during the three decades during which Dr. Joseph was Director of the IATTC. Larger, more efficient boats were constructed, and many of them were registered in nations that had not previously been important participants in the fishery. The concept of 200-mile Exclusive Economic Zones was not widely recognized at the beginning of this period, but by the end of his tenure these are vigorously enforced by most nations. The catches of tunas in the EPO and in other parts of the world increased greatly during this period, and many stocks of tunas now appear to be fully exploited. At least two of them, Atlantic bluefin and southern bluefin, are considered to be overexploited. As a result, many fisheries for tunas are now regulated. Dr. Joseph was definitely the right person at the right time for Director of the IATTC. His vision and leadership were crucial in resolving the often contentious differences that arose among the countries, industries, and people involved. He commanded the highest respect and admiration for his extensive knowledge of all matters related to fisheries, his dedication, his fairness, and his extraordinary ability to get things done. He had the gift of finding the common ground among conflicting parties, and of bringing about consensus when none seemed possible. His reputation for unimpeachable probity made him perhaps the most widely respected and admired figure in international fisheries management. His uncanny knack for making all parties feel that they mattered, his ability to get along with a wide variety of people of every social, cultural, and national background, and his perspectives on many matters were unique. He thought, rightly, that in the complex world of fisheries conservation and management, in which many different parties—governments, fishermen, processors, environmentalists, scientists—have an interest, no lasting solution is possible unless all parties were involved.

In addition, there has been much concern about the effect of fishing on incidentally-caught species, particularly marine mammals. During most years of the 1960s, 1970s, and early 1980s the annual mortalities of dolphins in the EPO due to the purse-seine fishery for tunas exceeded 100,000 animals. In 1972 the U.S. Marine Mammal Protection Act (MMPA), which profoundly affected the fisheries for tunas in the EPO was passed, and its provisions were gradually strengthened during the ensuing period. Under Dr. Joseph's leadership, the IATTC initiated its Tuna-Dolphin Program, placing observers aboard fishing vessels to collect data on fishing activities and dolphin mortality, sponsoring seminars to facilitate the transfer of dolphin-saving techniques from the more skilled to the less skilled fishermen, and conducting basic research on the population dynamics of dolphins. In 1986, the first year in which the IATTC placed observers aboard tuna vessels of all nations, the annual mortality exceeded 133,000 animals. In June 1992 the nations involved in the fishery adopted the Agreement for the Conservation of Dolphins ("the 1992 La Jolla Agreement"), a voluntary instrument designed to reduce or eliminate the mortality of dolphins, and by 1998 this had decreased to less than 2,000 animals, a biologically-insignificant amount. On May 21, 1998, the Agreement on the International Dolphin Conservation Program, which formalizes, extends, and adds to the provisions of the 1992 La Jolla Agreement, was signed, and it subsequently came into effect on February 15, 1999, when four nations had ratified it. During the period when the dolphin mortalities were decreasing precipitously the catches of tunas in the EPO were increasing, demonstrating that it is not necessary to curtail fishing to protect dolphins. Dr. Joseph provided leadership through the many years of this complex and difficult process, and he deserves much of the credit for this remarkable achievement.

Tunas and billfishes were certainly not neglected during this period. For example, the IATTC staff has pioneered in the development of methods for stock assessment of tunas, and the population dynamics of yellowfin tuna in the EPO are probably better understood those of any other stock of tuna. Also, great strides in understanding of the reproduction and early life history of tunas have been made through work in the field and at the IATTC's Achotines Laboratory in Panama, established during Dr. Joseph's tenure as Director. Ecosystem studies also increased in importance during his tenure, and set the stage for advances that came later. The IATTC staff, in cooperation with several other organizations, developed multi-species modeling approaches to evaluate the relative ecological implications of alternative fishing strategies in the EPO and the effect of climate variation on the food web. Dr. Joseph appreciated the value of improving the understanding of food-web dynamics in the pelagic EPO, given that accurate depictions of trophic connections and flows are the backbone of ecosystem models. Studies of stable isotopes of nitrogen and carbon and of predator diets have provided insight into ecosystem modeling.

After his retirement in 1999, Dr. Joseph served as a consultant for various organizations in many parts of the world. At the time of this death, he was Chairman of the Science Committee of the International Seafood Sustainability Foundation.

Dr. Joseph was an affiliate professor at the University of Washington and at the Universidad Nacional Autónoma de México. He had served on numerous advisory committees, task forces, and consultative groups in the United States and elsewhere, including those of the U.S. National Academy of Sciences, Department of Commerce, and Department of the Interior. He lectured on subjects relating to marine research and resource conservation all over the world. Additionally, he served as a technical advisor to many international organizations, government ministries, and heads of state on matters pertaining to marine science, especially marine resource development, management, and conservation. He published numerous papers and articles in scholarly and trade journals, and co-authored three books.

His many awards and honors include the Distinguished Alumnus Award, Humboldt State University; Outstanding Achievement Award for Contributions to Marine Science, Portuguese Historical Society, San Diego; Outstanding Graduate in Fisheries, Humboldt State University; Nautilus Award, Marine Technological Society; Dave Wallace Award, Nautilus Press, Inc.; *Docteur Honoris Causa*, Université de Bretagne, Brest, France; Roger Revelle Award, San Diego Oceans Foundation; *Al Mérito Pesquero* Award, Ministry of Commerce of Ecuador; Condecoración del Orden Antonio José de Sucre, Government of Venezuela. In addition, the IATTC was selected as the recipient of the Carl L. Sullivan Fishery Conservation Award of the American Fisheries Society in 1994.

Dr. Joseph is survived by his wife Patricia, two sons, Jerry and Michael, five grandchildren, three brothers, and three sisters.

MEETINGS

IATTC and IDCP meetings

The following meetings of the International Dolphin Conservation Program were held in La Jolla, California, USA, during October 2009:

Meeting		Date
27	Permanent Working Group on Tuna Tracking	29 October
14	Working Group to Promote and Publicize the AIDCP Dolphin Safe Tuna Certification System	29 October
48	International Review Panel	29 October
7	Scientific Advisory Board	30 October
22	Parties to the AIDCP	30 October

A Shark Assessment Workshop, convened by Dr. Mark N. Maunder, was held in La Jolla, California, USA, on 2 November 2009. Emphasis was placed on using the program Stock Synthesis to evaluate the condition of stocks of sharks. Scientists and observers from the Asociación de Atuneros del Ecuador**,** California Department of Fish and Game, the Centro de Investigación Científica y de Educación Superior de Ensenada, Baja California, the Centro Nacional de Pesca of El Salvador, the Commonwealth Scientific and Industrial Research Organisation of Australia, the Fundación Internacional de Pesca of Panama, the Humane Society International, the Instituto Costarricense de Pesca y Acuicultura, the Instituto Español de Oceanografía, the Instituto de Fomento Pesquero of Chile, the International Pacific Halibut Commission, the National Research Institute of Far Seas Fisheries of Japan, Shanghai Ocean University of China, Stanford University, the Secretariat of the Pacific Community, the Subsecretaría de Recursos Pesqueros of Ecuador, the U.S. National Marine Fisheries Service (La Jolla, Long Beach, Miami, Seattle, and Woods Hole), the Universidad Católica del Norte of Chile, the University of California (San Diego and Santa Barbara), the University of Southern California, and the University of Washington participated in the meeting. In addition to Dr. Maunder, Drs. Guillermo A. Compeán, Alexandre Aires-da-Silva, Richard B. Deriso, Martín A. Hall, Michael G. Hinton, Cleridy E. Lennert-Cody, and Robert J. Olson, and Messrs. Ricardo Belmontes and Marlon Román participated in the workshop. Dr. Compeán gave the introductory address, Dr. Maunder gave one talk and Dr. Aires-da-Silva gave three, one co-authored with Drs. Maunder and Lennert-Cody and the other two co-authored with Dr. Maunder and outside contributors.

A workshop entitled "Modeling Population Processes: Natural Mortality, Recruitment, Growth, and Selectivity: Spatial Analysis for Stock Assessment," also convened by Dr. Maunder, was held in La Jolla on 3-6 November 2009. Scientists and observers from the Asociación de Atuneros del Ecuador**,** California Department of Fish and Game, the Centro de Investigación Científica y de Educación Superior de Ensenada, Baja California, the Commonwealth Scientific and Industrial Research Organisation of Australia, the Fundación Internacional de Pesca of Panama, the Humane Society International, the Instituto Costarricense de Pesca y Acuicultura, the Instituto Español de Oceanografía, the Instituto de Fomento Pesquero of Chile, the International Pacific Halibut Commission, the National Research Institute of Far Seas Fisheries of Japan, Shanghai Ocean University of China, Stanford University, the Secretariat of the Pacific Community, the Subsecretaría de Recursos Pesqueros of Ecuador, the U.S. National Marine Fisheries Service (La Jolla, Long Beach, Miami, Seattle, and Woods Hole), the Universidad Católica del Norte of Chile, the University of California (San Diego and Santa Barbara), the University of

Southern California, and the University of Washington participated in the meeting. In addition to Dr. Maunder, Drs. Guillermo A. Compeán, Alexandre Aires-da-Silva, Richard B. Deriso, Martín A. Hall, Michael G. Hinton, Cleridy E. Lennert-Cody, and Mr. Ricardo Belmontes participated in all or parts of the workshop. Dr. Compeán gave the introductory address, and Dr. Maunder gave six talks, including one co-authored with Dr. Deriso, one co-authored with Dr. Aires-da-Silva, and two co-authored with outside contributors. Work in which Messrs. Kurt M. Schaefer and Daniel W. Fuller had participated was presented by other scientists.

Other meetings

Dr. Guillermo A. Compeán met with representatives of the Comisión Nacional de Acuacultura y Pesca and the fishing industry in Mazatlan, Mexico, on 2 October 2009.

Dr. Martín A. Hall participated in a consultation in San Jose, Costa Rica, on 18-21 October 2009 with representatives of the U.S. State Department and the World Wildlife Fund on the results of the Sea Turtle Project.

Dr. Richard B. Deriso participated in the National Meeting of the Regional Fishery Management Councils' Scientific and Statistical Committees in St. Thomas, U.S. Virgin Islands, on 10-13 November 2009, at which he gave a presentation. His travel expenses were paid by the Regional Fishery Management Councils.

Dr. Guillermo A. Compeán participated in the XII Foro Nacional sobre el Atún, held in Ensenada, Mexico, on 18-20 November 2009, at which he presented a talk entitled "Conservación de Atunes en el Océano Pacífico Oriental."

Dr. Compeán attended a ceremony marking the formal establishment of the Red Nacional de Información e Investigación de Pesca y Acuicultura (RNIIPA), which will eventually become the Programa Nacional de Investigación Científica y Tecnológica en Pesca y Acuicultura (PNICTPA), held in Mexico City on 24 November 2009.

Dr. Martín A. Hall and Mr. Kurt M. Schaefer participated in a meeting of scientists and captains of tuna-fishing vessels, sponsored by the International Seafood Sustainability Foundation (ISSF), at AZTI Tecnalia, Sukarrieta, Spain, on 24-27 November 2009. Its purpose was to discuss measures for reducing the catches of small bigeye and of non-target species, such as sharks and sea turtles, captured by purse-seine vessels fishing for tunas associated with fish-aggregating devices. Dr. Hall served as chairman of the steering committee for the meeting. The following "challenges" were discussed: (1) Reducing the catches of small bigeye and yellowfin tuna; (2) Releasing sharks; (3) Releasing sea turtles; (4) Reducing bycatches of dorado, *etc*. Dr. Hall served as Chairman for about half of the discussion of the first challenge and all of that of the fourth challenge. Dr. Hall's and Mr. Schaefer's travel expenses were paid by the ISSF.

Dr. James Joseph, former Director of the IATTC and at that time Chairman of the ISSF Science Committee, also played an important role in the meeting.

Dr. Martín A. Hall participated in the FAO expert consultation on "International Guidelines for Bycatch Management and Reduction of Discards," in Rome, Italy, on 29 November-4 December 2009.

Dr. Daniel Margulies participated in the second Global Centre of Excellence Symposium of Kinki University [Japan] entitled "Sustainable Aquaculture of the Bluefin and Yellowfin Tuna–Closing the Life Cycle for Commercial Production" held at the South Australian Research and Development Institute, Adelaide, Australia, on 1-2 December 2009, at which he gave a talk entitled "Recent Advances in Yellowfin Tuna Larval Rearing and Juvenile Culture in Panama."

Dr. Michael G. Hinton participated in a meeting of the Billfish Working Group of the International Scientific Committee for Tunas and Tuna-like Species in the North Pacific, which took place in Honolulu, Hawaii, USA, on 30 November-4 December 2009.

Dr. Guillermo A. Compeán participated in the sixth Regular Session of the Western and Central Pacific Fisheries Commission (WCPFC) in Papeete, Tahiti, on 7-11 December 2009. Among other things, he signed a Memorandum of Cooperation (MOC) on the Exchange and Release of Data between the IATTC and the WCPFC. The MOC provides for exchange of "catch and effort (including by-catch of mammals, turtles, sharks and billfish), observer, unloading, transshipment and port inspection data" and also "monitoring, surveillance, inspection and enforcement data"… "subject to fulfilling internal requirements of each Commission regarding data confidentiality and information security".

Drs. Martín A. Hall and Cleridy E. Lennert-Cody participated in a meeting, funded by the International Seafood Sustainability Foundation, at the Institut Français de Recherche pour l'Exploitation de la Mer, in Sète, France, on 8-10 December 2009. The principal subject of the meeting was data issues in studying bycatches in purse-seine fisheries.

Dr. Hall participated in a conference, "Towards Ecosystem-based Fishery Management, Even If We Don't Know What It Means," held at the Université de Montpellier, Sète, France, on 10 December 2009.

In addition, in mid-December, Dr. Hall gave seminars on the outcome of the meeting on measures for reducing the catches of non-target species caught by purse-seine vessels fishing for tunas associated with fish-aggregating devices that he had attended on 24-27 November 2009 at the Marine Stewardship Council and Greenpeace International, both in London, U.K.

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 fourth quarter of 2009.

Personnel at these offices collected 252 length-frequency samples from 134 wells and abstracted logbook information for 195 trips of commercial fishing vessels during the fourth quarter of 2009.

Also during the fourth quarter, members of the field office staffs placed IATTC observers on 84 fishing trips by vessels that participate in the AIDCP On-Board Observer Program. In addition, 115 IATTC observers completed trips during the quarter, and were debriefed by field office personnel.

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 50ºN and 50°S, unless noted otherwise. The catches are reported in metric tons (t), vessel capacities in cubic meters (m^3) 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 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 2009 is about 224,400 m^3 (Table 1). The average weekly at-sea capacity for the fleet, for the weeks ending 28 September through 31 December, was about 116,600 m^3 (range: 58,400 to 179.200 m^3).

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

Catch statistics

The estimated total retained catches, in metric tons, of tropical tunas from the EPO during the period of January-December 2009, and the equivalent statistics for 2004-2008, were:

Species	2009	2004-2008			Weekly average, 2009
		Average	Minimum	Maximum	
Yellowfin	234,100	220,900	178,400	279,900	4,600
Skipjack	230,700	247,800	194,600	297,500	4,500
Bigeye	56,700	54,300	48,900	60,000	1,100

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

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

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

The measures of CPUE used in these analyses are based on data from fishing trips landing predominantly yellowfin, skipjack, bigeye, and bluefin tuna. The great majority of the purse-seine catches of yellowfin, skipjack, and bigeye are made by 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 capacity.

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 three quarters of 2009 and comparative statistics for 2004-2008 were:

Region	**Species**	**Gear**	**2009**	**2004-2008**		
				Average	**Minimum**	**Maximum**
N of 5°N	yellowfin	PS	14.7	9.8	8.4	11.3
S of 5°N	yellowfin	PS	2.2	3.6	2.0	6.2
N of 5°N	skipjack	PS	1.0	3.3	2.3	4.4
S of 5°N	skipjack	PS	7.9	8.4	5.8	10.4
EPO	bigeye	PS	2.3	2.1	1.7	2.8
EPO	yellowfin	LP	2.0	2.5	1.8	3.1
EPO	skipjack	LP	0.1	1.0	0.5	1.7

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-December 2009 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 third quarters of 2004-2009 are presented in this report. Two sets of length-frequency histograms are presented for each species; the first shows the data by stratum (gear type, set type, and area) for the third quarter of 2009, and the second shows data for the combined strata for the third quarter of each year of the 2004-2009 period. Samples from 168 wells were taken during the third quarter of 2009.

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 168 wells sampled that contained fish caught during the third quarter of 2009, 130 contained yellowfin. The estimated size compositions of these fish are shown in Figure 2a. The majority of the yellowfin catch during the third quarter was taken by sets on dolphins in the Northern, Inshore, and Southern areas. Smaller amounts of yellowfin were taken in floating-object sets, primarily in the Northern, Equatorial, and Southern areas, and on sets on unassociated schools in the North.

The estimated size compositions of the yellowfin caught by all fisheries combined during the third quarters of 2004-2009 are shown in Figure 2b. The average weight of the yellowfin caught during the third quarter of 2009 (13.8 kg) was greater than that 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 1). The last two fisheries include all 13 sampling areas. Of the 168 wells sampled that contained fish caught during the third quarter of 2009, 94 contained skipjack. The estimated size compositions of these fish are shown in Figure 3a. Large amounts of skipjack in the 30- to 50-cm range were caught in the Northern, Equatorial, and Southern floating-object fisheries, and also in the Southern unassociated fishery during the third quarter. Larger skipjack in the 60- to 70-cm range were taken in the Southern unassociated fishery and in the Northern and Equatorial floating-object fisheries.

The estimated size compositions of the skipjack caught by all fisheries combined during the third quarters of 2004-2009 are shown in Figure 3b. The average weight for the third quarter of 2009 (1.6 kg) was less than that 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 1). The last three fisheries include all 13 sampling areas. Of the 168 wells sampled that contained fish caught during the third quarter of 2009, 63 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.

The estimated size compositions of the bigeye caught by all fisheries combined during the third quarters of 2004-2009 are shown in Figure 4b. The average weight of bigeye during the third quarter of 2009 (5.3 kg) was considerably less than that of 2008 (7.6 kg), but similar to those of 2004-2007.

Pacific bluefin tuna are caught by purse-seine and recreational gear off California and Baja California from about 23°N to 35°N, with most of the catch being taken during May through October. During 2009 bluefin were caught between 26°N and 32°N from June through August. The majority of the catches of bluefin by both commercial and recreational vessels were taken during June and July. In the past, commercial and recreational catches have been reported separately. The inability to collect sufficient numbers of samples during 2004 through 2009, however, has made it infeasible to estimate the catches and size compositions separately. Therefore, the commercial and recreational catches of bluefin were combined for each year of the 2004-2009 period. The estimated size compositions are shown in Figure 5. The average weight of the fish caught during 2009 was greater than that of any of the previous five years.

The estimated retained purse-seine catch of bigeye less than 60 cm in length during the first three quarters of 2009 was 24,100 metric tons (t), or about 35 percent of the estimated total retained purse-seine catch of bigeye during that period. The corresponding amounts for the first three quarters of 2000-2008 ranged from 3,632 to 29,694 t, or 4 to 48 percent. These values may differ slightly from those given in previous Quarterly Reports due to changes in the estimation procedure.

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 2009 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 136 fishing trips aboard purse seiners covered by that program during the fourth quarter of 2009. Preliminary coverage data for these vessels during the quarter are shown in Table 4.

Training

Mr. Ernesto Altamirano participated in the third observer training session for the European Union's observer program for the International Dolphin Conservation Program, Programa Nacional de Observadores de Túnidos, Océano Pacífico, held at the Instituto Oceanográfico Español (IOE) in Santa Cruz de Tenerife, Spain, on 10-20 November 2009, for 13 trainees and 1 IOE staff member. His travel expenses were paid by the observer program of the European Union.

RESEARCH

Tuna tagging

Two IATTC staff members spent the period of 1 October-14 November 2009, aboard the chartered, Hawaii-based fishing vessel, *Ao Shibi Go*, on which they tagged tunas at the TAO (Tropical Atmosphere Ocean) buoys at 0°-l55°W¸ 2°N-140°W, and 2°S-140°W. The numbers of fish tagged were as follows: bigeye, 4,825, including 107 with archival tags; yellowfin, 232, including 22 with archival tags; skipjack, 63. This trip was a collaborative effort between the Oceanic Fisheries Programme of the Secretariat of the Pacific Community and the IATTC, within the framework of the Pacific Tuna Tagging Project of the Western and Central Pacific Fisheries Commission.

Early life history studies

Yellowfin broodstock

The yellowfin broodstock in Tank 1 (1,362,000 L) at the Achotines Laboratory spawned daily during the quarter. Spawning occurred between 9:50 p.m. and 11:05 p.m. The numbers of eggs collected after each spawning event ranged from about 19,000 to 1,125,000. The water temperatures in the tank during the quarter ranged from 27.6° to 28.7°C.

There were one 56-kg yellowfin and ten 3- to 15-kg yellowfin in Tank 1 at the end of December.

In late January 2007, 10 yellowfin (4 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. Another 15 reserve-broodstock yellowfin held in Tank 2 were transferred to Tank 1 during late 2008; 5 of the October-stocked fish and 1 of the December-stocked fish were implanted with archival tags before they were moved to Tank 1. At the end of December 2009, one of the January 2007 group and three of the October 2008 group, all bearing archival tags, remained in Tank 1. In addition, 11 yellowfin (3 to 15 kg) were transferred from Tank 2 to Tank 1 during December 2009.

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.

Global Royal Fish trials

Plans for joint research by IATTC and Global Royal Fish (GRF) scientists are described in the IATTC Quarterly Report for January-March 2009. During the fourth quarter, GRF scientists and Achotines Laboratory staff members initiated several trials designed to increase the growth and survival of larval and juvenile yellowfin tuna. These trials will be continued through the first quarter of 2010.

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, ARAP staff had conducted full life cycle research on spotted rose snapper (*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 plans to commence spawning and rearing studies with a new, more commercially-important species of snapper. Yellow snapper (*Lutjanus argentiventris*) was chosen as the new species of snapper for study. During the fourth quarter, collection of broodstock yellow snapper began in local waters. At the end of December there were eight yellow snappers being held in reserve holding tanks at the Laboratory.

Visitors at the Achotines Laboratory

On 29 October 2009, Mr. Carlos Zambrano of the Panama City office of the Japan International Cooperation Agency (JICA) visited the Achotines Laboratory to discuss and review a potential IATTC-Kinki University-ARAP joint project. On the same day, Messrs. Francisco García and Alexis Fernández visited the Laboratory to review progress on the three current projects funded by the Secretaría Nacional de Ciencia, Tecnología e Innovación (SENACYT) at the Laboratory.

In August 2009, the Early Life History Group and Hubbs Sea World Research Institute of San Diego, California, USA, were awarded a grant through the Saltonstall-Kennedy Program of the U.S. National Oceanic and Atmospheric Administration to conduct feasibility studies of the air shipment and subsequent rearing of yellowfin tuna eggs and larvae. The studies will commence with air shipment of yellowfin eggs and larvae to San Diego in early 2010. On 9 November 2009, a three-person mission from the Ministerio de Comercio e Industria of Panama and the Panamanian customs office visited the Achotines Laboratory to initiate the paperwork process for the permissions needed to export tuna eggs and larvae.

As part of a visit to Panama to establish a joint Costa Rica-Panama committee for fisheries and aquaculture, a 12-person group from the Instituto Costarricense de Pesca y Acuicultura toured the Achotines Laboratory on 15 December 2009.

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.

The SSTs were near normal throughout the fourth quarter of 2008, with only a few scattered areas, mostly small, of warm or cool water (IATTC Quarterly Report for October-December 2008: Figure 6). A band of cool water formed along the equator from about 110°W to about 180° in January 2009. It weakened in February, but then became stronger in March, extending from the coast to about 140°W (IATTC Quarterly Report for January-March 2009: Figure 8). It can be seen in Table 5 that all of the SST values for the first quarter were below normal, that the SOI* and NOI* indices, with one exception, were well above normal during the first quarter, and that the thermocline was very shallow in the equatorial eastern Pacific Ocean from January through March, all of which are indicative of anti-El Niño conditions. (However, the SOI indices were close to normal from January through March, and the charts from which Figure 8 of the IATTC Quarterly Report for January-March 2009 was taken and the equivalent charts for October 2008 through February 2009 indicate, for the most part, near-normal conditions.) The band of cool water that had existed along the equator during the first four months of 2009 virtually disappeared in May, and in June it was replaced by a band of warm water that persisted for the rest of the year. The SSTs were mostly above normal during the second quarter of 2009 and all normal or above normal during the third and fourth quarters of that year (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. According to the Climate Diagnostics Bulletin of the U.S. National Weather Service for December 2009, "El Niño is expected to strengthen and last through the Northern Hemisphere Winter [of] 2009-2010. The models … disagree on the eventual peak strength of El Niño. At this time, it is expected that the … SST average will exceed +1.5°C during the [northern] winter … Regardless of its precise peak strength, El Niño is expected to exert a significant influence on the global weather and climate in the coming months. Most models indicate that SST anomalies in the … region will begin to decrease in early 2010, and that El Niño will persist through April-May-June 2010."

INTERNATIONAL DOLPHIN CONSERVATION PROGRAM

Mr. Ernesto Altamirano participated in the third observer training session for the European Union's observer program for the International Dolphin Conservation Program, Programa Nacional de Observadores de Túnidos, Océano Pacífico, held at the Instituto Oceanográfico Español (IOE) in Santa Cruz de Tenerife, Spain, on 10-20 November 2009, for 13 trainees and 1 IOE staff member. His travel expenses were paid by observer program of the European Union.

Mr. Nickolas W. Vogel traveled to Ensenada, Mexico, on 23 November 2009, where he worked with staff members of the Programa Nacional de Aprovechamiento de Atún y Protección de Delfines (PNAAPD) to resolve some remaining issues related to the data bases and data entry and editing programs used to process observer data. In 2009, the staff of PNAAPD began using the data base structures and data entry and editing routines used by the IATTC and the other national observer programs.

GEAR PROJECT

During the fourth quarter, an IATTC staff member participated in a dolphin safety-gear inspections and safety-panel alignment procedures aboard a Mexican-flag purse seiner in Manzanillo, Mexico. Prior to the trial set, he met with staff members of the Programa Nacional de Aprovechamiento del Atún y de Protección de Delfines (PNAAPD) of Mexico to discuss dolphin safety-gear requirements and dolphin-safety panel alignment procedures.

INTER-AGENCY COOPERATION

Dr. Alexandre Aires-da-Silva taught a course, Introduction to Population Dynamics Models and Fisheries Stock Assessment, organized by the Subsecretaria de Recursos Pesqueros del Ecuador, in Manta, Ecuador, on 5-9 October 2009. He also created a web site for the course: http://www.iattc.org/alexdasilva/Courses/SA_Ecu_Oct09/Descripcion.htm.

Dr. Michael D. Scott chaired the annual meeting of the Pacific Scientific Review Group (PSRG) held in Del Mar, California, USA, on 3-5 November 2009. The PSRG reviews scientific marine mammal research and management by the U.S. National Marine Fisheries Service in U.S waters in the Pacific Ocean.

Dr. Scott gave a lecture on the tuna-dolphin association to marine biology students at Point Loma Nazarene College, San Diego, California, USA, on 19 November 2009.

VISITING SCIENTIST

Mr. José Miguel Carvajal Rodríguez of the Instituto Costarricense de Pesca y Acuicultura, San José, Costa Rica, spent the period of 2 November-4 December 2009, at the IATTC headquarters in La Jolla, California, USA, where, among other things, he discussed the possibility of cooperative analyses of data for the Costa Rican longline fishery for sharks, tunas, and billfishes with Drs. Guillermo A. Compeán and Alexandre Aires-da-Silva and Mr. Alejandro Pérez.

PUBLICATIONS

IATTC

Schaefer, Kurt M., and Daniel W. Fuller. 2009. Horizontal movements of bigeye tuna (*Thunnus obesus*) in the eastern Pacific Ocean, as determined from conventional and archival tagging experiments initiated during 2000-2005. Inter-Am. Trop. Tuna Comm., Bull., 24 (2): 189-248.

Outside journals

Aires-da-Silva, Alexandre M., Mark N. Maunder, Vincent F. Gallucci, Nancy E. Kohler, and John J. Hoey. 2009. A spatially structured tagging model to estimate movement and fishing mortality rates for the blue shark (*Prionace glauca*) in the North Atlantic Ocean. Marine and Freshwater Research, 60 (10): 1029-1043.

Bayliff, William, and Jacek Majkowski (editors). 2009. Estimation of tuna fishing capacity from stock assessment-related information: workshop to further develop, test and apply a method for the estimation of tuna fishing capacity from stock assessment-related information. FAO Fish. Aqua. Proc., 16: vii, 53 pp.

Dambacher, Jeffrey M., Jock W. Young, Robert J. Olson, and Valérie Allain. 2009. A graph-theoretic approach to analyzing food webs leading to top predators in three regions of the Pacific Ocean. PFRP [Pelagic Fisheries Research Program, University of Hawai'i at Manoa], 14 (1): 4-12. (This article summarizes research that has recently been accepted for publication in the journal Progress in Oceanography.)

Essington, Tim, Mary Hunsicker, Robert J. Olson, Mark Maunder, and Jim Kitchell. 2009. Predation, cannibalism, and the dynamics of tuna populations. PFRP [Pelagic Fisheries Research Program, University of Hawai'i at Manoa], 14 (1): 1-4.

Robles-Ruiz, Humberto, Michel Dreyfus-León. Guillermo Compeán-Jiménez, José Luis Rivera-Ulloa, and Armando Ceseña-Ojeda. 2009. Análisis preliminar del funcionamiento de alerones en las redes de cerco atuneras, para mejorar la liberación de delfines en el Océano Pacífico oriental. Ciencia Pesquera, 17 (1): 59-64.

Also, Vol. 1, No. 4, of the ADMB Foundation newsletter, edited by Dr. Mark N. Maunder, was published on the ADMB web site, http://admb-foundation.org, in October 2009.

ADMINISTRATION

Ms. Mary Carmen López, bilingual secretary for the Tuna-Dolphin Program since 26 January 2009, resigned on 20 December 2009.

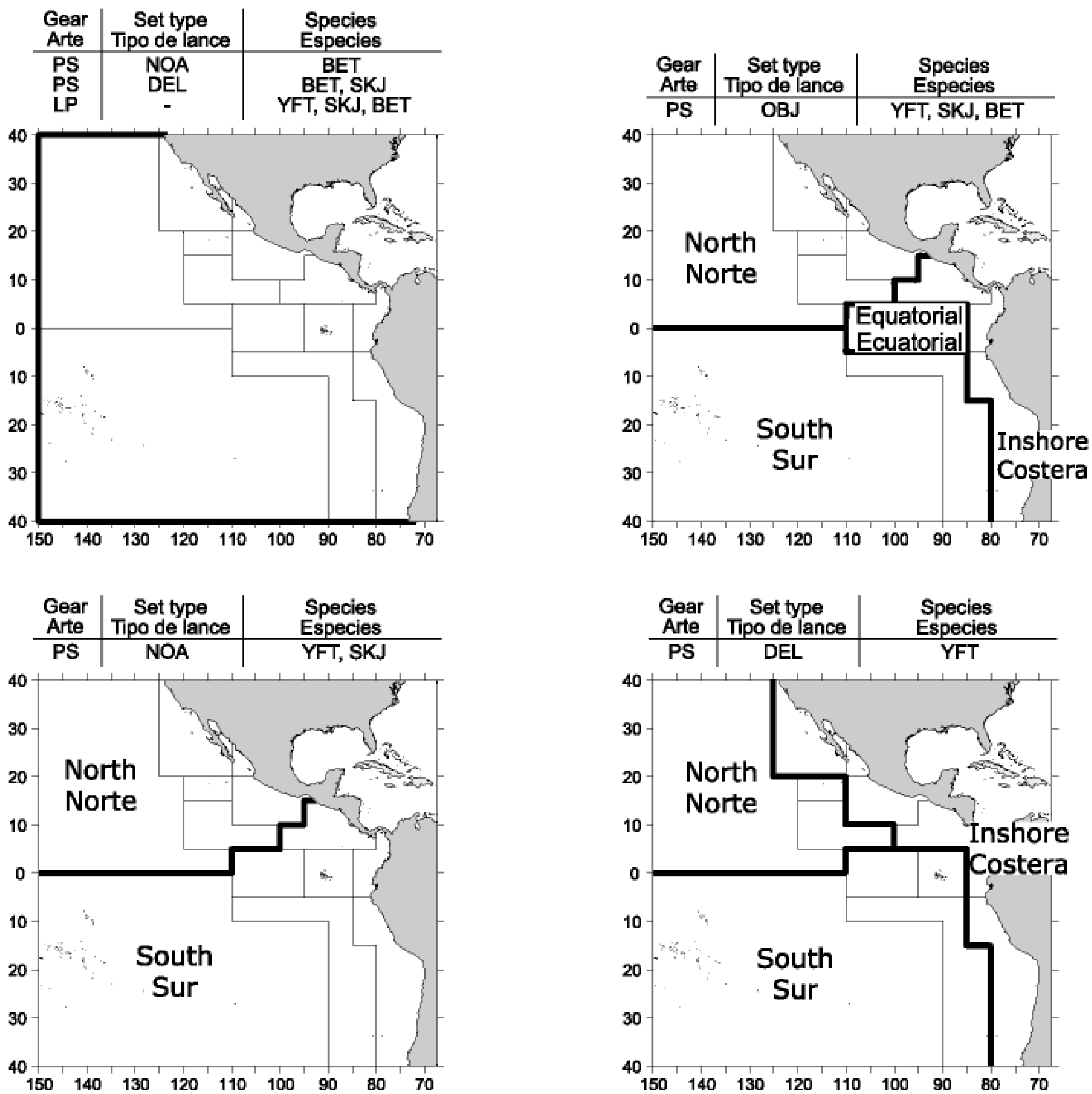

FIGURE 1. Spatial extents of the fisheries defined by the IATTC staff for stock assessment of yellowfin, skipjack, and bigeye in the EPO. The thin lines indicate the boundaries of the 13 length-frequency sampling areas, and the bold lines the boundaries of the fisheries. Gear: PS = purse seine, LP = pole and line; Set type: NOA = unassociated, DEL = dolphin, OBJ = floating object; Species: YFT = yellowfin, SKJ = skipjack, BET = bigeye.

FIGURA 1. Extensión espacial de las pesquerías definidas por el personal de la CIAT para la evaluación de las poblaciones de atún aleta amarilla, barrilete, y patudo en el OPO. Las líneas delgadas indican los límites de las 13 zonas de muestreo de frecuencia de tallas, y las líneas gruesas los límites de las pesquerías. Artes: PS = red de cerco, LP = caña; Tipo de lance: NOA = peces no asociados, DEL = delfín; OBJ = objeto flotante; Especies: YFT = aleta amarilla, SKJ = barrilete, BET = patudo.

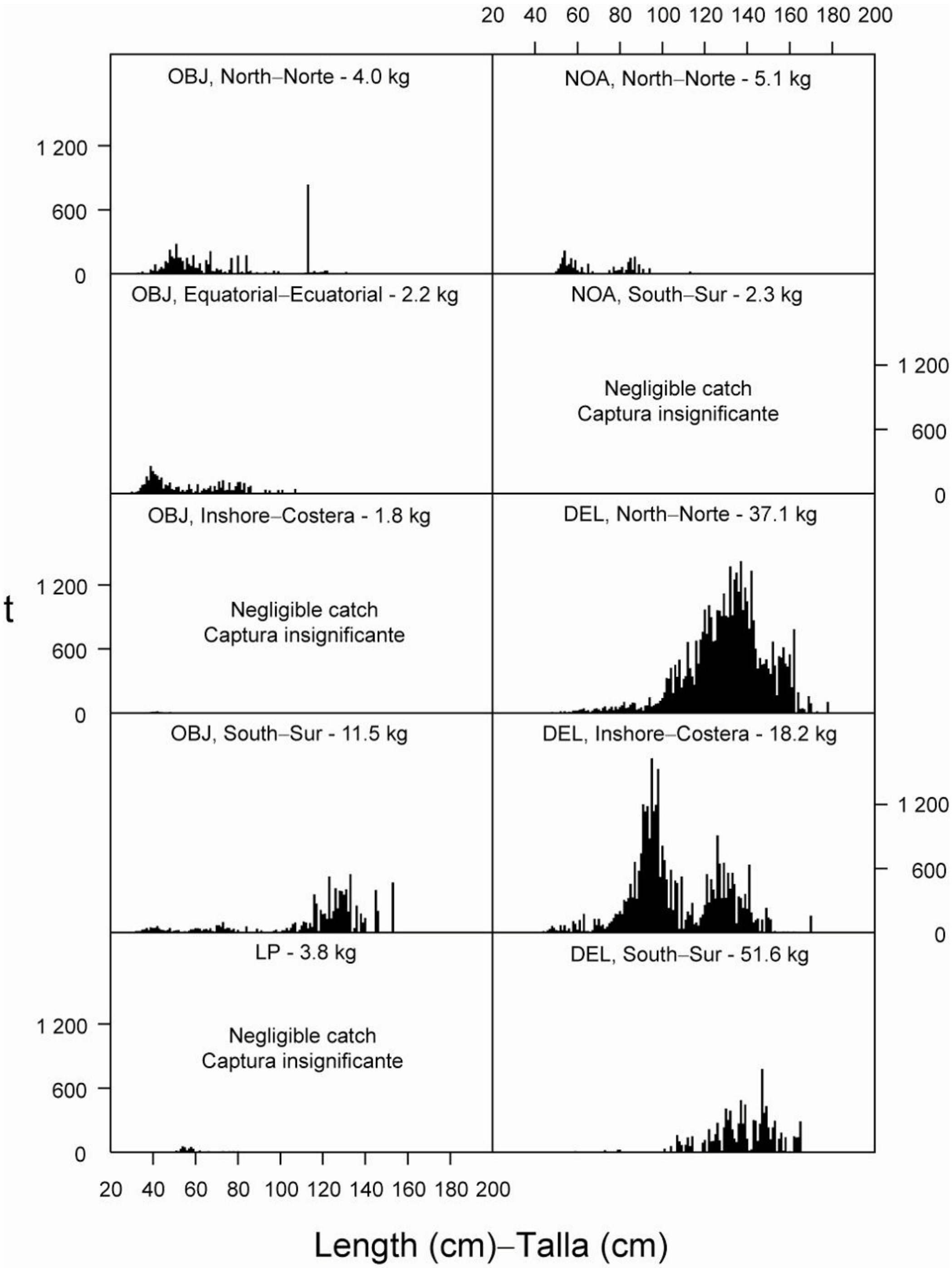

FIGURE 2a. Estimated size compositions of the yellowfin caught in each fishery of the EPO during the third quarter of 2009. The average weights of the fish in the samples are given at the tops of the panels. OBJ = floating object; LP = pole and line; NOA = unassociated; DEL = dolphin; t = metric tons.

FIGURA 2a. Composición por tallas estimada para el aleta amarilla capturado en cada pesquería del OPO durante el tercer trimestre de 2009. En cada recuadro se detalla el peso promedio de los peces en las muestras. OBJ = objeto flotante; LP = caña; NOA = peces no asociados; DEL = delfín; t = toneladas métricas.

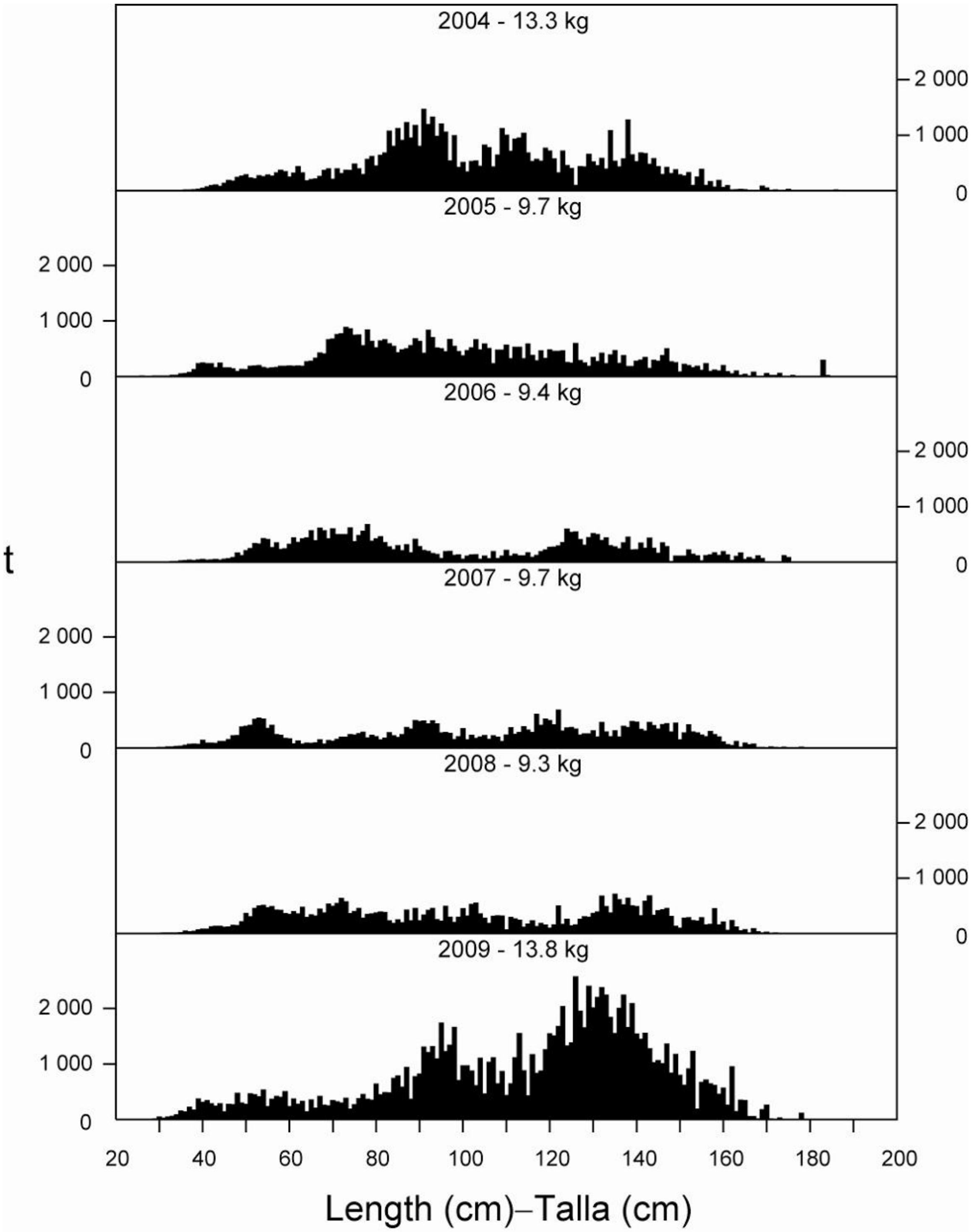

FIGURE 2b. Estimated size compositions of the yellowfin caught in the EPO during the third quarter of 2004-2009. The average weights of the fish in the samples are given at the tops of the panels. t = metric tons.
FIGURA 2b. Composición por tallas estimada para el aleta amarilla capturado en el OPO en el tercer trimestre de 2004-2009. En cada recuadro se detalla el peso promedio de los peces en las muestras. t = toneladas métricas.

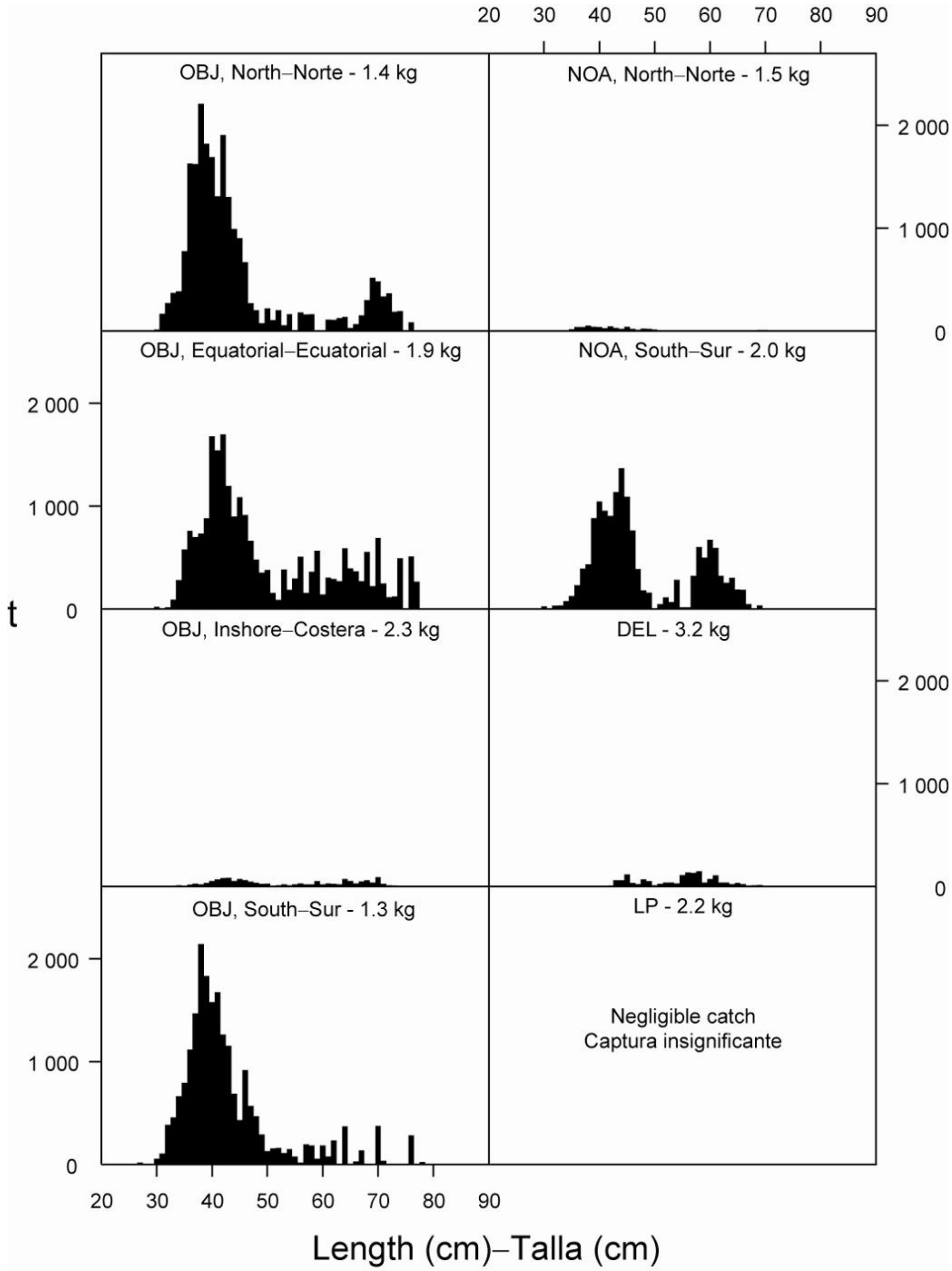

FIGURE 3a. Estimated size compositions of the skipjack caught in each fishery of the EPO during the third quarter of 2009. The average weights of the fish in the samples are given at the tops of the panels. OBJ = floating object; LP = pole and line; NOA = unassociated; DEL = dolphin. t = metric tons.

FIGURA 3a. Composición por tallas estimada para el barrilete capturado en cada pesquería del OPO durante el tercer trimestre de 2009. En cada recuadro se detalla el peso promedio de los peces en las muestras. OBJ = objeto flotante; LP = caña; NOA = peces no asociados; DEL = delfín. t = toneladas métricas.

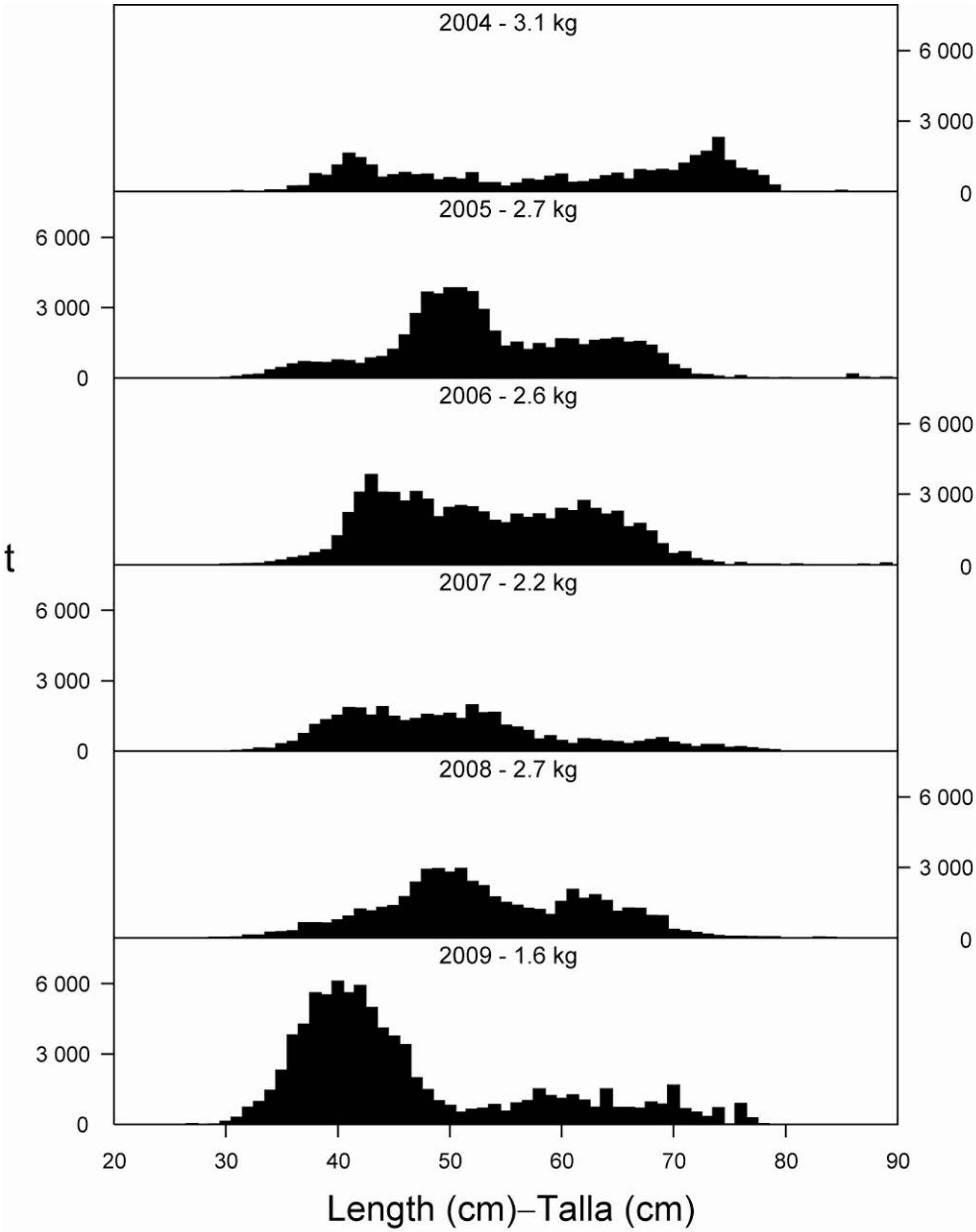

FIGURE 3b. Estimated size compositions of the skipjack caught in the EPO during the third quarter of 2004-2009. The average weights of the fish in the samples are given at the tops of the panels. t = metric tons.

FIGURA 3b. Composición por tallas estimada para el barrilete capturado en el OPO en el tercer trimestre de 2004-2009. En cada recuadro se detalla el peso promedio de los peces en las muestras. t = toneladas métricas.

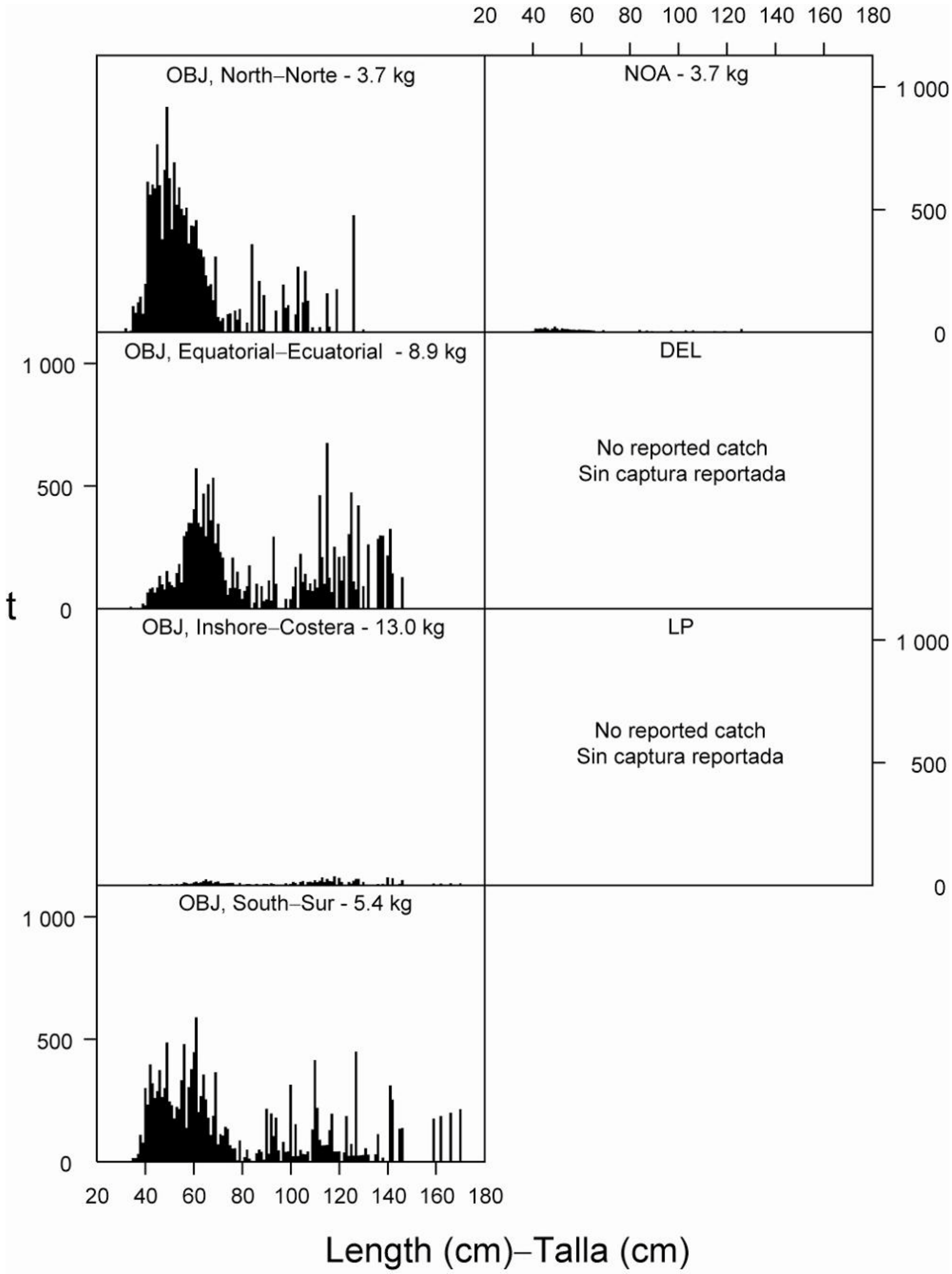

FIGURE 4a. Estimated size compositions of the bigeye caught in each fishery of the EPO during the third quarter of 2009. The average weights of the fish in the samples are given at the tops of the panels. OBJ = floating object; LP = pole and line; NOA = unassociated; DEL = dolphin. t = metric tons.

FIGURA 4a. Composición por tallas estimada para el patudo capturado en cada pesquería del OPO durante el tercer trimestre de 2009. En cada recuadro se detalla el peso promedio de los peces en las muestras. OBJ = objeto flotante; LP = caña; NOA = peces no asociados; DEL = delfín. t = toneladas métricas.

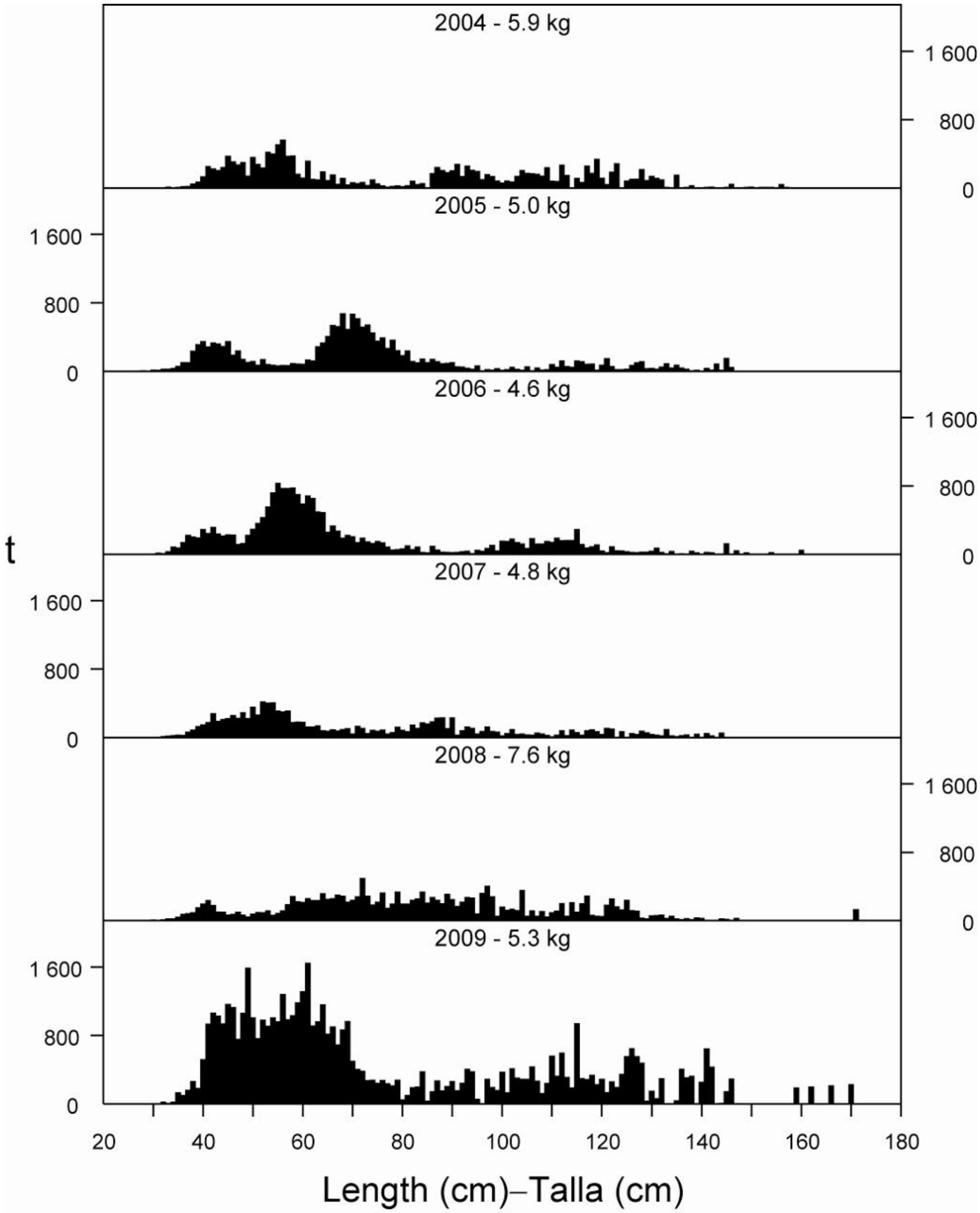

FIGURE 4b. Estimated size compositions of the bigeye caught in the EPO during the third quarter of 2004-2009. The average weights of the fish in the samples are given at the tops of the panels. t = metric tons.

FIGURA 4b. Composición por tallas estimada para el patudo capturado en el OPO en el tercer trimestre de 2004-2009. En cada recuadro se detalla el peso promedio de los peces en las muestras. t = toneladas métricas.

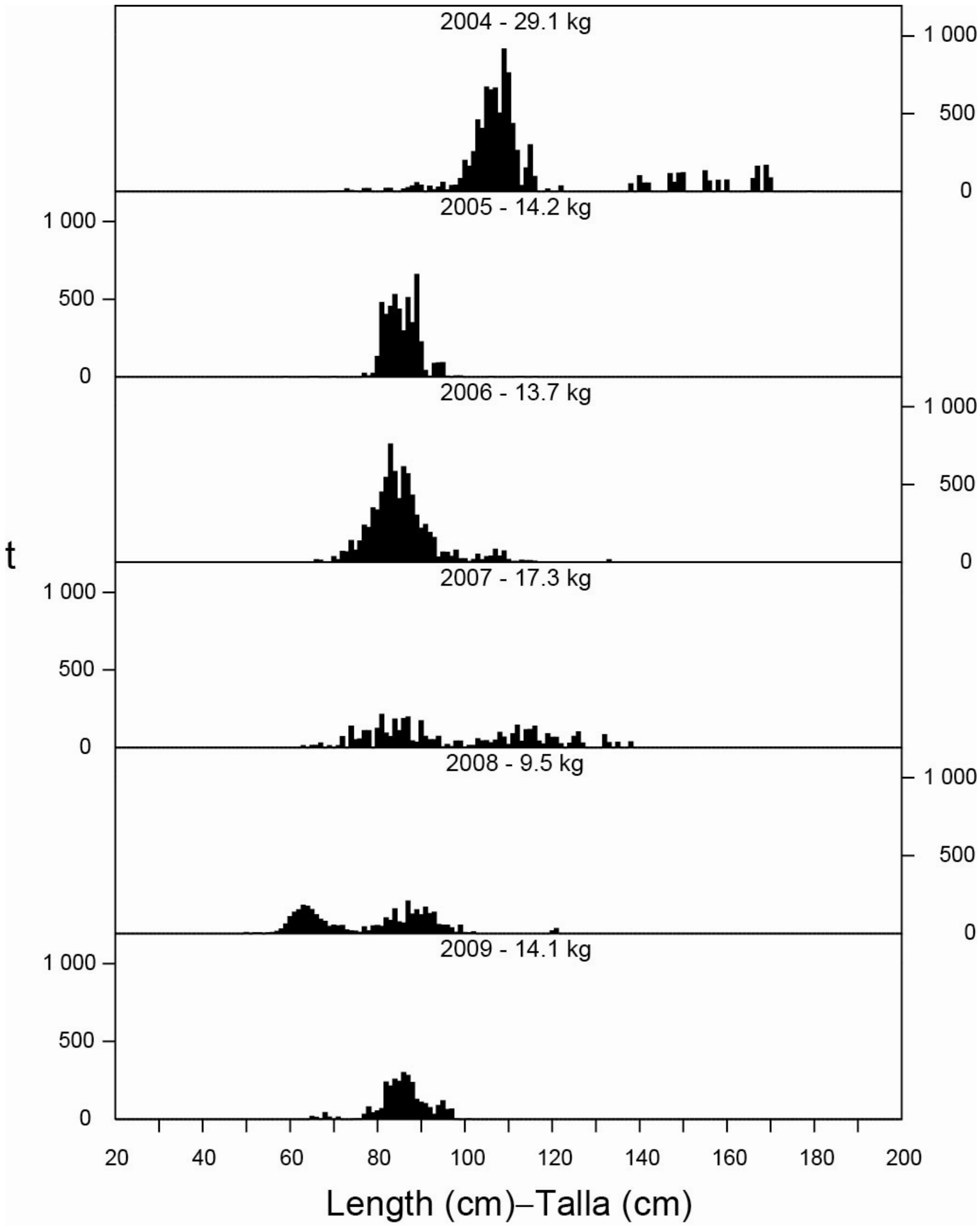

FIGURE 5. Estimated catches of Pacific bluefin by purse-seine and recreational gear in the EPO during 2004-2009. The values at the tops of the panels are the average weights. t = metric tons.
FIGURE 5. Captura estimada de aleta azul del Pacífico con arte de cerco y deportiva en el OPO durante 2004-2009. El valor en cada recuadro representa el peso promedio. t = toneladas métricas.

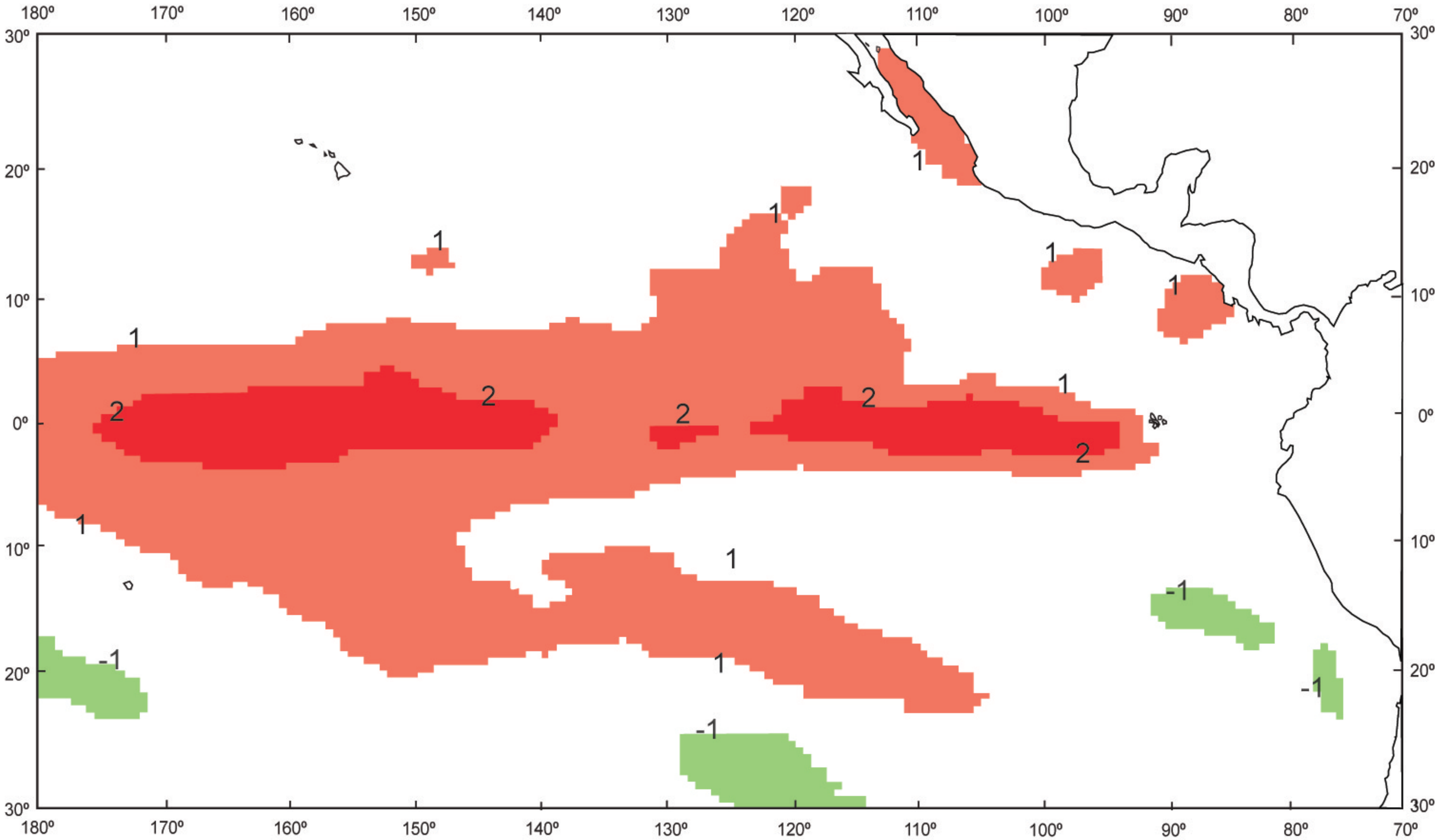

FIGURE 6. Sea-surface temperature (SST) anomalies (departures from long-term normals) for December 2009, based on data from fishing boats and other types of commercial vessels.
FIGURA 6. Anomalías (variaciones de los niveles normales a largo plazo) de la temperatura superficial del mar (TSM) en diciembre de 2009, 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 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 (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 Bandera	Gear Arte	Well volume–Volumen de bodega 1-900	901-1700	>1700	Total	Capacity Capacidad
		Number—Número				
Bolivia	PS	1	-	-	1	222
Colombia	PS	4	10	-	14	14,860
Ecuador	PS	64	12	9	85	60,096
España—Spain	PS	-	-	4	4	10,116
Guatemala	PS	-	1	1	2	3,575
Honduras	PS	1	1	-	2	1,559
México	PS	13	32	1	46	50,254
	LP	4	-	-	4	380
Nicaragua	PS	-	5	-	5	6,353
Panamá	PS	4	17	3	24	31,225
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	-	19	2	21	29,403
Vanuatu	PS	1	2	-	3	3,609
All flags—	PS	88	101	25	214	
Todas banderas	LP	4	-	-	4	
	PS + LP	92	101	25	218	
		Capacity—Capacidad				
All flags—	PS	39,528	130,471	53,996	223,995	
Todas banderas	LP	380	-	-	380	
	PS + LP	39,908	130,471	53,996	224,375	

TABLE 2. Estimates of the retained catches of tunas in the EPO, from 1 January through 31 December 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 31 de diciembre de 2009, por especie y bandera del buque, en toneladas métricas**.**

Flag	**Yellowfin**	**Skipjack**	**Bigeye**	**Pacific bluefin**	**Bonitos (*Sarda* spp.)**	**Albacore**	**Black skipjack**	**Other[1]**	**Total**	**Percentage of total**
Bandera	**Aleta amarilla**	**Barrilete**	**Patudo**	**Aleta azul del Pacífico**	**Bonitos (*Sarda* spp.)**	**Albacora**	**Barrilete negro**	**Otras[1]**	**Total**	**Porcentaje del total**
Ecuador	20,301	119,140	30,573	-	-	3	37	1,599	171,653	31.9
México	99,197	9,310	1,383	2,505	7,609	2	3,744	97	123,847	23.0
Nicaragua	8,244	4,401	1,031	-	-	-	-	-	13,676	2.5
Panamá	35,973	26,891	8,005	-	-	-	34	133	71,036	13.2
Venezuela	29,484	19,920	2,778	-	-	-	6	59	52,247	9.7
Other—Otros[2]	41,858	51,065	12,933	-	-		-	319	106,175	19.7
Total	235,057	230,727	56,703	2,505	7,609	5	3,821	2,207	538,634	

[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 eastern Pacific Ocean during 2009 by longline vessels.
TABLA 3. Captures reportado de atún patudo en el Océano Pacífico oriental durante 2009 por buques palangreros.

Flag	Quarter				Month			Fourth quarter	Total
	1	2	3	1-3	10	11	12		
Bandera	**Trimestre**				**Mes**			**Cuarto trimestre**	**Total**
	1	**2**	**3**	**1-3**	**10**	**11**	**12**		
China	494	677	698	1,869					1,869
Japan—Japón	3,362	2,825	3,380	9,567	1,093	1,340	1,477	3,910	13,477
Republic of Korea—República de Corea	1,314	1,526	1,503	4,343	496	485	710	1,691	6,034
Chinese Taipei—Taipei Chino	461	625	641	1,727	372	385		757	2,484
United States—EE.UU.									
Vanuatu									
Total	5,631	5,653	6,222	17,506	1,961	2,210	2,187	6,358	23,864

TABLE 4. 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 during the fourth quarter of 2009. The numbers in parentheses indicate cumulative totals for the year.

TABLA 4. Datos preliminares de la cobertura de muestreo de viajes de buques con capacidad mayor que 363 toneladas métricas por los programas de observadores de la CIAT, Colombia, Ecuador, México, Nicaragua, Panamá, la Unión Europea, y Venezuela durante el cuarto trimestre de 2009. 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	12	(46)	7	(24)	5	(22)	12	(46)	100.0	(100.0)
Ecuador	54	(220)	30	(143)	24	(77)	54	(220)	100.0	(100.0)
España—Spain	4	(22)	2	(12)	2	(10)	4	(22)	100.0	(100.0)
Guatemala	2	(9)	2	(9)			2	(9)	100.0	(100.0)
Honduras	2	(12)	2	(12)			2	(12)	100.0	(100.0)
México	15	(183)	12	(99)	3	(84)	15	(183)	100.0	(100.0)
Nicaragua	5	(19)	4	(10)	1	(9)	5	(19)	100.0	(100.0)
Panamá	20	(94)	8	(49)	12	(45)	20	(94)	100.0	(100.0)
Perú	0	(3)	0	3			0	(3)	100.0	(100.0)
El Salvador	7	(24)	7	24			7	(24)	100.0	(100.0)
U.S.A.—EE.UU.	0	(6)	0	(5)		(1)[1]	0	(6)	100.0	(100.0)
Venezuela	14	(70)	9	(35)	5	(35)	14	(70)	100.0	(100.0)
Vanuatu	0	(11)	0	(11)			0	(11)	100.0	(100.0)
Total	135	(719)[2]	83	(436)	52	(283)	135	(719)[2]	100.0	(100.0)

[1] One trip by a U.S.-flag vessel was sampled by the national observer program of Panama (PRONAOP). The vessel was Panamanian flag until just prior to its departure and a national observer had already been assigned to the vessel.

[1] El Programa Nacional de Observadores Panameños (PRONAOP) muestreo un viaje de un buque de EE.UU. El buque tuvo bandera panameña justo antes del zarpe, y el observador del Programa Nacional de Observadores Panameños ya había sido asignado.

[2] Includes 65 trips (40 by vessels with observers from the IATTC program and 25 by vessels with observers from the national programs) that began in late 2008 and ended in 2009

[2] Incluye 65 viajes (40 por observadores del programa del CIAT y 25 por observadores de los programas nacionales) iniciados a fines de 2008 y completados en 2009

TABLE 5 Oceanographic and meteorological data for the Pacific Ocean, January-December 2009. 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, enero-diciembre 2009. Los valores en paréntesis son anomalías. TSM = temperatura superficie del mar; IOS = Índice de Oscilación del Sur; IOS* y ION* están definidas en el texto.

Month—Mes	**1**	**2**	**3**	**4**	**5**	**6**
SST—TSM (°C)						
Area 1 (0°-10°S, 80°-90°W)	24.3 (-0.2)	26.0 (-0.1)	26.4 (-0.1)	26.0 (0.5)	24.9 (0.6)	23.7 (0.7)
Area 2 (5°N-5°S, 90°-150°W	25.0 (-0.6)	25.8 (-0.6)	26.4 (-0.6)	27.4 (0.0)	27.4 (0.4)	27.1 (0.7)
Area 3 (5°N-5°S, 120°-170°W)	25.9 (-1.0)	26.0 (-0.7)	26.7 (-0.5)	27.5 (-0.2)	28.0 (0.3)	28.1 (0.6)
Area 4 (5°N-5°S, 150W°-160°E)	27.4 (-0.7)	27.4 (-0.7)	27.8 (-0.3)	28.4 (0.0)	29.0 (0.3)	29.2 (0.6)
Talara, Perú	22.1 (0.8)	20.4 (0.6)	20.8 (2.0)	18.2 (-1.8)	18.8 (-0.5)	19.5 (0.5)
Callao, Perú	15.6 (-1.7)	16.9 (-0.7)	17.0 (0.3)	16.6 (-1.0)	16.8 (-0.5)	16.8 (0.2)
Thermocline depth—Profundidad de la termoclina, 0°, 80°W (m)	20	10	10	10	10	30
Thermocline depth—Profundidad de la termoclina, 0°, 110°W (m)	25	25	70	60	90	90
Thermocline depth—Profundidad de la termoclina, 0°, 150°W (m)	140	130	130	150	160	150
Thermocline depth—Profundidad de la termoclina, 0°, 180°W (m)	180	180	190	210	190	160
Sea level—Nivel del mar, Callao, Perú (cm)	107.7	110.2	113.7	112.4	121.7	120.9
SOI—IOS	1.2	0.8	-0.1	0.7	-0.4	-0.3
SOI*—IOS*	3.18	3.66	1.06	137	1.81	-5.62
NOI*—ION*	6.76	-1.16	4.57	3.12	1.11	-2.38

Month—Mes	**7**	**8**	**9**	**10**	**11**	**12**
SST—TSM (°C)						
Area 1 (0°-10°S, 80°-90°W)	23.7 (0.9)	21.6 (0.8)	20.8 (0.3)	20.9 (0.0)	22.1 (0.5)	23.1 (0.3)
Area 2 (5°N-5°S, 90°-150°W	26.6 (1.0)	25.9 (1.0)	25.7 (0.8)	25.7 (0.8)	26.2 (1.3)	26.7 (1.6)
Area 3 (5°N-5°S, 120°-170°W)	28.0 (0.9)	27.5 (0.8)	27.5 (0.8)	27.6 (1.0)	28.2 (1.7)	28.3 (1.8)
Area 4 (5°N-5°S, 150W°-160°E)	29.2 (0.6)	29.2 (0.8)	29.3 (0.8)	29.6 (1.2)	29.9 (1.5)	29.7 (1.4)
Talara, Perú	20.0 (2.3)	18.3 (0.7)	17.3 (-0.6)	16.8 (-1.1)	18.4 (0.3)	21.2 (2.5)
Callao, Perú	17.6 (1.4)	15.7 (-0.1)	15.5 (0.1)	15.1 (-0.1)	16.6 (0.9)	16.0 (-0.2)
Thermocline depth—Profundidad de la termoclina, 0°, 80°W (m)	20	25	25	40	45	55
Thermocline depth—Profundidad de la termoclina, 0°, 110°W (m)	70	40	90	75	130	110
Thermocline depth—Profundidad de la termoclina, 0°, 150°W (m)	140	155	130	155	165	165
Thermocline depth—Profundidad de la termoclina, 0°, 180°W (m)	180	175	180	180	170	170
Sea level—Nivel del mar, Callao, Perú (cm)	105.4	112.0	108.4	107.0	113.2	117.2
SOI—IOS	0.1	-0.7	0.3	-1.7	-0.8	-1.0
SOI*—IOS*	4.55	-2.58	4.92	-3.40	0.07	-0.54
NOI*—ION*	0.20	-0.26	1.42	-0.42	1.02	-3.44