INTER-AMERICAN TROPICAL TUNA COMMMISSION
COMISION INTERAMERICANA DEL ATUN TROPICAL
QUARTERLY REPORT—INFORME TRIMESTRAL

July-September 2002
Julio-Septiembre 2002

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The

QUARTERLY REPORT

July-Septiembre 2002

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

Julio-Septiembre 2002

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COMISION INTERAMERICANA DEL ATUN 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, and Peru in 2002. 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 which 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 June 17, 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. On May 21, 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 February 15, 1999. The Parties to this agreement, which in 2002 consisted of Bolivia, Colombia, Costa Rica, Ecuador, El Salvador, the European Union, Guatemala, Honduras, Mexico, Nicaragua, Panama, Peru, the United States, Vanuatu, and Venezuela, would be "committed to ensure the sustainability of tuna stocks in the eastern Pacific Ocean and to progressively reduce the incidental mortalities of dolphins in the tuna fishery of the eastern Pacific Ocean to levels approaching zero; to avoid, reduce and minimize the incidental catch and the discard of juvenile tuna and the incidental catch of non-target species, taking into consideration the interrelationship among species in the ecosystem."

To carry out these missions, 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 selected by the Director, who is directly responsible to the Commission.

The scientific program is now in its 52nd 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, also in the two languages.

MEETINGS

IATTC AND AIDCP MEETINGS

There were no IATTC or AIDCP meetings during the quarterly period.

OTHER MEETINGS

Dr. Michael G. Hinton served as co-chairman of the FIGIS-FIRMS [Fisheries Global Information System-Fisheries Resources Monitoring System] Methodological Workshop at FAO Headquarters, Rome, Italy, on July 1-5, 2002.

Dr. Martín A. Hall participated in a National Fisheries Conservation Center Workshop on the use of decision analysis in fisheries management in San Jose, California, on July 2, 2002.

Dr. Richard B. Deriso participated in a meeting of the Ocean Sciences Board of the U.S. National Research Council at Oregon State University, Corvallis, Oregon, USA, on July 10-12, 2002.

Dr. Martín A. Hall participated in the Monterey Bay Aquarium's Seafood Watch Workshop in Monterey, California, on July 15-16, 2002. Seafood Watch is a program of the Monterey Bay Aquarium designed to raise consumer awareness about the importance of choosing sustainable seafood in local markets and restaurants and to help consumers to become active supporters of environmentally-friendly fisheries and fish farms. The objective of the meeting was to discuss the criteria used for the recommendations of the Seafood Watch program. His travel expenses were paid for by the Monterey Bay Aquarium.

Dr. Robin Allen participated in the Second International Consultation for the Establishment of Multilateral Cooperation Regarding Swordfish in the Southeastern Pacific Ocean in Brussels, Belgium, on July 18-19, 2002.

Dr. Robert J. Olson attended a meeting of the principal investigators of a new food-web study in Honolulu, Hawaii, on July 18-19, 2002. The three-year project, which is funded by a grant from the Pelagic Fisheries Research Program of the University of Hawaii, involves research on the trophic structure (including plankton, forage organisms, and top predators) in the pelagic equatorial eastern, central, and western Pacific Ocean, using stable carbon and nitrogen isotopes and stomach contents. The principal investigators are Dr. Valerie Allain, Secretariat of

the Pacific Community, Dr. Felipe Galván Magaña, Centro Interdisciplinario de Ciencias Marinas, Instituto Politécnico Nacional, of Mexico, Dr. Brian Popp, University of Hawaii, and Dr. Olson. The project will officially begin in 2003, and this meeting was the initial planning session.

Dr. Mark N. Maunder and Mr. Shelton J. Harley were in Honolulu, Hawaii, during the second half of July. They spent two days (July 16-17) working with Dr. John Hampton of the Secretariat for the Pacific Community on a Pacific-wide bigeye assessment model and two days (July 18-19) at a meeting of the working group of the Scientific Committee on Tuna and Billfish (SCTB) on methods. At the working group meeting Dr. Maunder presented a report entitled "Statistical testing of the habitat-based method to standardize effort," prepared in collaboration with Dr. Michael G. Hinton, Dr. Keith A. Bigelow (U.S. National Marine Fisheries Service (NMFS), Hawaii), and Mr. Harley, and one entitled "A statistical approach to the habitat-based effort standardization," prepared in collaboration with Dr. Hinton.

Dr. Maunder and Mr. Harley participated in the 15th meeting of the SCTB on July 22-27, 2002. (Mr. Harley left after the first day of the meeting.) At this meeting Dr. Maunder gave presentations on the IATTC staff's assessments of yellowfin, skipjack, and bigeye in the eastern Pacific Ocean, an assessment of the bigeye stock in the western and central Pacific Ocean, carried out with the IATTC A-SCALA model in collaboration with Drs. Chi-Lu Sun and Su-Zan Yeh (Institute of Oceanography, National Taiwan University), and Dr. George M. Watters (Pacific Fisheries Environmental Laboratory, U.S. NMFS). He also presented a report on the IATTC fisheries management resolutions for 2001-2002 and a summary of the IATTC tagging projects (on behalf of Messrs. Kurt M. Schaefer and Daniel W. Fuller).

Dr. Robin Allen participated in the first meeting of the Scientific Coordinating Group (SCG) in Honolulu, Hawaii, on July 29-30, 2002. The SCG is part of the preparatory process for establishing the new Commission for the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific.

Dr. Pablo R. Arenas participated in a forum on sustainable fisheries in Mazatlan, Mexico, on July 30, 2002, at which he gave a talk entitled "Tuna fisheries in the eastern Pacific Ocean." The meeting, which was attended by government officials, representatives of the private sector (fisheries), congressmen (mostly senators), and representatives of the academic community, was a preparatory meeting to the World Summit on Sustainable Development, which took place in Johannesburg, South Africa, in August 2002.

Mr. Brian S. Hallman attended the first meeting of the Parties to the Inter-American Convention for the Protection and Conservation of Sea Turtles, held in San Jose, Costa Rica, on August 6-8, 2002. The new Convention entered into force on May 2, 2001; the member States are Brazil, Costa Rica, Ecuador, Honduras, Mexico, the Netherlands Antilles, Peru, the United States, and Venezuela. At this early stage, the governments are deciding questions such as the establishment of a Secretariat, rules of procedure, funding options, *etc.* The next meeting is scheduled to take place in San Jose in early 2003.

Dr. Robin Allen participated in the Conference of the International Institute of Fisheries Economics and Trade in Wellington, New Zealand, on August 19-22, 2002, where he served as Chairman of the session on Fisheries Management through International Organizations.

Drs. Robin Allen and Robert J. Olson participated in the Conferencia Internacional de Ciencia Pesquera in Cancún, Mexico on September 4-6, 2002. The conference, part of AQUA-MAR Internacional 2002, the fifth Latin American Aquaculture Conference, was convened to celebrate the 40th anniversary of Mexico's Instituto Nacional de la Pesca. Dr. Allen gave a presentation entitled "The Tropical Tuna Fisheries of the Eastern Pacific Ocean", and Dr. Olson gave one entitled "Consideraciones Ecológicas en la Ciencia Pesquera: el Pacífico Oriental Tropical."

Dr. Michael G. Hinton participated in a meeting of the United States Argo Advisory Panel in Arlington, Virginia, USA, on September 16-17, 2002.

Mr. Shelton J. Harley spent part of September in Madrid, Spain, where he participated in a meeting on stock assessment of bigeye convened by the International Commission for the Conservation of Atlantic Tunas (ICCAT) on September 16-20, 2002, and a meeting of the ICCAT Tropical Tuna Working Group on September 23-25, 2002.

DATA COLLECTION

The IATTC has field offices at Las Playas and Manta, Ecuador; Ensenada and Mazatlan, Mexico; Panama, Republic of Panama; Mayaguez, Puerto Rico, USA; and Cumaná, Venezuela.

Personnel at these offices and in La Jolla collected 253 length-frequency samples and abstracted logbook information for 359 trips of commercial fishing vessels during the third quarter of 2002. In addition, 39 length-frequency samples of bluefin were obtained from recreational fishing vessels.

Also during the third quarter, members of the field office staffs placed IATTC observers on 127 fishing trips by vessels that participate in the AIDCP On-Board Observer Program (combined observer programs of the IATTC, Ecuador, Mexico, and Venezuela). In addition, 127 IATTC observers completed trips during the quarter, and were debriefed at the corresponding field offices.

Surface fleet and surface catch statistics

Statistical data are continuously being collected by personnel at the IATTC's field stations and processed at its headquarters in La Jolla. As a result, estimates of fisheries statistics with varying degrees of accuracy and precision are available, the most accurate and precise being those made after all available information has been entered into the data base, processed, and verified. The estimates for the current quarter are the most preliminary, while those made six months to a year after monitoring of the fishery are much more accurate and precise. While it may require a year or more to obtain some final information, much of the catch information is processed and available within two to three months of the return of a vessel from a fishing trip.

Fleet statistics

The estimated total carrying capacity of the vessels that are fishing, or are expected to fish, in the eastern Pacific Ocean (east of 150°W; EPO) during 2002 is about 201,200 cubic meters (m^3) (Table 1). The weekly average at-sea capacity for the fleet, for the weekly periods ending July 2 through September 30, was about 128,500 m^3 (range: 115,100 to 143,400 m^3). Data on the tuna fleet of the EPO are given in Table 2. The changes of flags and vessel names and additions to and deletions from the IATTC's fleet list for the period of July 2-September 30 are given in Table 3.

Catch and catch-per-unit-of-effort statistics

Catch statistics

The total retained catches of tunas in the EPO for the January 1-September 30, 2002, period were estimated to be about 321 thousand metric tons (mt) of yellowfin, 131 thousand mt of skipjack, and 27 thousand mt of bigeye. The averages and ranges for the comparable periods of 1997-2001 are as follows: yellowfin, 239 thousand mt (208 to 319 thousand); skipjack, 142 thousand mt (88 to 220 thousand); bigeye, 37 thousand mt (22 to 62 thousand). For the third quarter the average estimated weekly retained catches of yellowfin, skipjack, and bigeye in the EPO were about 8 thousand, 3 thousand, and 1 thousand mt respectively. Summaries of the estimated retained catches, by flag of vessel, are shown in Table 4.

Catch-per-unit-of-effort statistics based on vessel logbook abstracts

The logbook data used in the analyses have been obtained with the cooperation of vessel owners and captains. The catch and effort measures used by the IATTC staff are based on fishing trips landing predominantly yellowfin, skipjack, bigeye, and bluefin tuna. The great majority of the purse-seine catches of yellowfin and skipjack are made by Class-6 vessels (vessels with well volumes greater than 425 m^3), and only data for Class-6 purse seiners are included herein for comparisons among years. There are now far fewer pole-and-line vessels than in previous years, so the data for these vessels are combined without regard to size classes. There are no adjustments included for other 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.

During the 1997-2001 report periods the catch per day's fishing (CPDF) of yellowfin by purse seiners in the EPO north of 5°N averaged about 17.1 mt (range about 14.1 to 22.6 mt), whereas south of 5°N it averaged about 7.7 mt (range about 3.6 to 12.6 mt). Preliminary estimates for 2002 show the CPDFs of yellowfin north and south of 5°N to have been about 30.7 and 6.3 mt, respectively.

In general, the greatest catches of skipjack in the EPO are taken in waters south of 5°N. During the 1997-2001 periods the CPDF of skipjack by purse seiners south of 5°N averaged about 11.2 mt (range: about 5.7 to 22.3 mt), whereas north of 5°N it averaged about 2.1 mt (range: about 0.9 to 3.4 mt). Preliminary estimates for 2002 show the CPDFs of skipjack south and north of 5°N to have been about 9.1 and 1.6 mt, respectively.

The CPDF of bigeye in the EPO by purse seiners during the 2002 report period is estimated to have been about 2.6 mt, which falls within the range of the rates observed during the 1997-2001 period (1.5 to 5.2 mt) (Table 7).

The CPDF of yellowfin in the EPO by pole-and-line vessels during the 2002 report period is estimated to have been about 1.3 mt, which is below the range of the rates observed during the 1997-2001 report periods (1.7 to 4.5 mt) (Table 5). The CPDF of skipjack in the EPO by pole-and-line vessels during the 2002 report period is estimated to have been about 2.4 mt, which is above the range of the rates observed during the 1997-2001 report periods (0.2 to 0.5 mt) (Table 6).

Fishing by vessels not included in the IATTC Regional Vessel Register

During September several purse-seine vessels that normally fish in the western Pacific Ocean were sighted fishing east of 150°W, in the eastern Pacific Ocean. The following were not included in the IATTC Regional Vessel Register and, in accordance with the 2002 IATTC resolution on fleet capacity, were not authorized to fish for tunas in the EPO.

Name	Registry
Caribe	Federated States of Micronesia
Fong Seong No. 666	Vanuatu
Sajo Colombia	Republic of Korea
Sajo Olympia	Republic of Korea

After the governments of the nations in which the vessels were registered were informed of their presence and the conflict with the IATTC resolution, the vessels were withdrawn from the EPO.

Size compositions of the surface catches of tunas

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

Data for fish caught during the second quarter of 1997-2002 are presented in this report. (Because the average length of a fishing trip is about two months, many or most of the fish landed during a given quarter were caught during the previous quarter, so the length-frequency data presented in this Quarterly Report are for fish caught during the second quarter.) Two length-frequency histograms are presented for each species. The first shows the data by fishery (area, gear type, and set type) for the second quarter of 2002. The second shows the second-quarter catches for the current year and the previous five years. There were 227 wells sampled during the second quarter of 2002.

There are ten surface fisheries for yellowfin defined for stock assessments: four floating-object, two unassociated school, three dolphin, and one pole-and-line (Figure 1). The last fishery includes all 13 sampling areas. Of the 227 wells sampled, 181 contained yellowfin. The estimated size compositions of these fish are shown in Figure 2a. As was the case during the previ-

ous two quarters, the majority of the yellowfin catch during the second quarter of 2002 was taken in dolphin sets in the North and Inshore areas. The average weight of yellowfin caught in the dolphin fishery of the South area, 48.2 kg, was considerably greater than that of any other fishery. Small amounts of yellowfin were taken in floating-object sets and by pole-and-line vessels, but the estimated catches do not show well in the graphs. A distinct mode between 40 and 50 cm was present in all of the floating-object fisheries, another between 90 and 120 cm was present in the North and South floating-object fisheries, and a mode of larger fish between 120 and 150 cm was present in the Galapagos, Inshore, and South floating-object fisheries.

The estimated size compositions of the yellowfin caught by all fisheries combined during the second quarter of 1997-2002 are shown in Figure 2b. The size ranges of the fish are generally consistent over time (40-160 cm), but the size distributions differ among quarters and among years. The average weight of yellowfin caught during 2002, 19.1 kg, was greater than that of any other year of the 1997-2002 period.

There are eight fisheries for skipjack defined for stock assessments: four floating-object, two unassociated school, one dolphin, and one pole-and-line (Figure 1). The last two fisheries include all 13 sampling areas. Of the 227 wells sampled, 117 contained skipjack. The estimated size compositions of these fish are shown in Figure 3a. Most of the skipjack were caught in the floating-object and unassociated fisheries of the South. A distinct mode present during the previous two quarters, between 35 and 50 cm, was still present in all of the floating-object fisheries except that of the Galapagos area. Negligible amounts of skipjack were taken in dolphin sets and by pole-and-line vessels.

The estimated size compositions of the skipjack caught by all fisheries combined during the second quarter of 1997-2002 are shown in Figure 3b. The distribution of skipjack was similar to that of the first quarter, but the average weight was slightly greater.

There are seven surface fisheries for bigeye defined for stock assessments: four floating-object, one unassociated school, one dolphin, and one pole-and-line (Figure 1). The last three fisheries include all 13 sampling areas. Of the 227 wells sampled, 47 contained bigeye. The estimated size compositions of these fish are shown in Figure 4a. As was the case during the first quarter, most of the bigeye were caught in the floating-object fishery of the South. The two distinct modes apparent in this fishery during the first quarter, one between 40 and 55 cm and the other between 125 and 150 cm, were still present during the second quarter, although the latter was less evident. On average, the largest fish were taken in the floating-object fishery of the Galapagos area, where the average weight of the fish was much greater than that of the other floating-object fisheries. Small amounts of bigeye were caught in sets on unassociated schools and in the Inshore floating-object fishery. There were no recorded catches of bigeye in dolphin sets or by pole-and-line vessels.

The estimated size compositions of the bigeye caught by all fisheries combined during the second quarter of 1997-2002 are shown in Figure 4b. The average weight of bigeye caught continued to decrease during 2002, due to the greater incidence of fish less than 60 cm in length.

The estimated retained catch of bigeye less than 60 cm in length during the first half of 2002 was 5,554 metric tons (mt). The corresponding amounts for 1997-2001 ranged from 1,982 to 8,521 mt.

Observer program

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 when the Director determines that the use of an observer from the AIDCP On-Board Observer Program is not practical.

Coverage

The AIDCP requires that there be 100-percent coverage of fishing trips in the Agreement Area (the Pacific Ocean south of 40°N, east of 150°W, and north of 40°S) by purse seiners with carrying capacities of more than 363 mt, and that at least 50 percent of the observers on the vessels of each Party to the Agreement be IATTC observers. During 2002, Mexico's national observer program, the Programa Nacional de Aprovechamiento del Atún y de Protección de Delfines (PNAAPD), and Venezuela's national observer program, the Programa Nacional de Observadores de Venezuela (PNOV), are to evenly share the sampling of trips by vessels of their respective fleets with the IATTC . Ecuador's national observer program, the Programa Nacional de Observadores Pesqueros de Ecuador (PROBECUADOR) is to sample approximately one-third of the trips by vessels of its fleet, and IATTC observers are to sample the remainder of those trips. During the third quarter FFA observers sampled four trips by United States vessels that normally fish outside the Agreement Area.

IATTC, FFA, PNAAPD, PNOV, and PROBECUADOR observers departed on 190 fishing trips aboard purse seiners with carrying capacities of more than 363 mt during the third quarter of 2002. Preliminary coverage data for these vessels during the quarter are shown in Table 8.

Training

There were no IATTC observer training courses held during the third quarter of 2002.

RESEARCH

Age and growth of bigeye tuna

Fundamental information on the biology of bigeye tuna in the eastern Pacific Ocean (EPO) is largely lacking. Information on age and growth of any species is necessary for the application of population dynamics models to assess the effect of fishing on that species. If better information on the age and growth of bigeye were available the assessments would be more reliable.

The age and growth of bigeye tuna can be estimated from sagittal otoliths, provided the deposition rate of microincrements on them is known. Tagging and oxytetracycline (OTC)-

marking experiments were initiated, in cooperation with Pelagic Fisheries Research Program of the University of Hawaii at Manoa, off the island of Hawaii during 1995 (IATTC Annual Reports for 1995 (pages 29-30) and 1999 (pages 28-29)). One of the objectives of this work was to determine the deposition rate of microincrements in the sagittal otoliths and evaluate their usefulness for estimation of the age and growth of bigeye tuna. The OTC solution injected into the dorsal musculature of the tagged fish prior to their release is incorporated into the developing microincrement at the edge of the otolith, creating a mark that can be detected by its fluorescence under ultraviolet light.

Additional experiments have been conducted in the EPO in conjunction with bigeye tagging cruises in 2000 (IATTC Annual Report for 2000: 23-25) and 2002 (IATTC Quarterly Report for April-June 2002). Sagittal otoliths have been recovered from 52 bigeye previously injected with OTC and released during those two cruises. A subset of the otoliths from 23 bigeye (52-115 cm in length at release) at liberty from 25 to about 112 days was selected for analysis. In order to extend the size range over which the microincrement deposition rate could be determined, and to evaluate the deposition rates of bigeye from both the equatorial EPO and the northern central Pacific, otoliths from both sets of experiments were included in this study. The subset of OTC-marked otoliths from a total of 49 bigeye from the EPO and Hawaii includes fish ranging from 38 to 135 cm in length (at release) at liberty from 15 to 341 days.

This subset of otoliths was used to determine the optimum technique to be utilized for obtaining age estimates from the sagittal otoliths of bigeye. Sections of the otoliths mounted on microscope slides with thermoplastic were examined, using immersion oil with a light microscope at 1,440x magnification. Frontal sections, along the primordium to the post-rostral axis, provide the longer counting paths, and thus wider microincrements, than do transverse sections. Sectioning, polishing, and acid-etching techniques have been established.

The OTC marks and microincrements are clearly recognizable in all the sections prepared to date. The microincrements between the tetracycline mark and the tip of the postrostrum were counted five times by two individuals who did not know the numbers of days the fish were at liberty at the time that they made the counts. The averages of the five counts were calculated. A paired *t*-test indicated no significant differences in the average counts of the two readers, so grand means were calculated from the mean counts of the two readers and utilized in the subsequent analyses.

The regression coefficients for the linear relationships between days at liberty and number of microincrements were not significantly different from one, indicating that one microincrement is formed per day on the otoliths of fish between 38 and 135 cm in length. If the microincrements are deposited at the same rate on bigeye less than 38 cm in length, then microincrement counts on sagittal otoliths will provide estimates of the absolute ages of the fish up to 135 cm in length in days. Additional research on validation of microincrement deposition rate on the otoliths of smaller and larger bigeye will be conducted as opportunities arise.

A sampling program designed to collect otoliths, caudal vertebra, and gonads of bigeye tuna, along with lengths and weights, was initiated in January 2001 at the IATTC field offices in Las Playas and Manta, Ecuador. Bigeye specimens from the purse-seine fishery are being sampled across 12 10-cm length classes between 30 and 150 cm in length. Fifteen females and fif-

teen males are being selected for each length class, for a total of 360 specimens. As of the end of September 2002, 355 specimens have been sampled, and it is expected that the full complement of samples will be collected before the end of 2002. Otoliths, and potentially vertebrae as well, will be utilized to provide direct estimates of sex-specific age and growth of bigeye tuna in the EPO.

Tuna tagging

Tropical tunas

The IATTC initiated a multi-year bigeye tagging project in 2000, with a tagging cruise aboard the chartered baitboat *Her Grace* during March-May of that year. Pole-and-line, handline, and rod-and-reel fishing techniques were used to catch tunas in the equatorial eastern Pacific Ocean (EPO) for tagging with conventional and archival tags. A similar cruise was conducted aboard the same boat during March-May 2002.

Releases of March-May 2000

An archival tag was recently recovered from a bigeye recaptured after 825 days at liberty. The fish was released at 0°52'N-97°06'W on April 15, 2000, when it was 110 cm long, and recaptured at 0°32'N-85°56'W on July 20, 2002. The tag worked well, collecting light, temperature, and depth data for 359 days before the battery died. Geolocation estimates from the light data indicate that the fish remained east of 100°W during those 359 days (Figure 5).

Releases of March-May 2002

The numbers of releases and returns for the fish from this cruise, as of the end of September 2002, are as follows:

Species	Tag type	Released	Returned	Percent returned
Bigeye	Conventional	1,418	330	23.3
Bigeye	Archival	26	5	19.2
Skipjack	Conventional	257	21	8.2
Skipjack	Archival	36	1	2.7
Yellowfin	Conventional	195	21	10.8

The locations of release and recapture of the bigeye tagged with conventional tags are shown in Figure 6. There is a west-southwest directional component to the overall bigeye recoveries. The times at liberty for the bigeye have ranged from 4 to 141 days. The percentages of the recaptures made within 500 and 100 nautical miles (nm) of the locations of release were 83 and 31, respectively. The maximum linear displacement was 1,722 nm in a west-northwest direction.

The times at liberty for skipjack and yellowfin have ranged from 16 to 122 days and 11 to 123 days, respectively. The maximum linear displacement for skipjack was 740 nm in a south-southeastly direction, and that for yellowfin was 1,663 nm in a westerly direction.

With four exceptions, all of the returns to date have been from fish caught by purse seiners fishing around fish-aggregating devices (FADs) in the equatorial EPO. The exceptions were

one yellowfin and one skipjack caught in separate sets on dolphin-associated fish and two bigeye caught in a set on unassociated fish.

Bluefin tuna

Four tagged bluefin released in the eastern Pacific Ocean by personnel of the Monterey Bay Aquarium (three with IATTC tags and one with a U.S. National Marine Fisheries Service tag), all aboard the chartered sport-fishing vessel *Shogun*, have been recaptured recently by Japanese purse seiners in the western Pacific Ocean. The data for these are as follows:

Release			Recapture		
Location	**Date**	**Length (cm)**	**Location**	**Date**	**Length (cm)**
28°17'N-116°47'W	Jul. 9, 1999	103	38°47'N-148°51'E	Jul. 22, 2002	175
28°17'N-116°47'W	Jul. 9, 1999	106	40°53'N-157°02'E	Aug. 6, 2002	165
30°05'N-116°40'W	Jul. 16, 1999	83	41°27'N-155°06'E	Aug. 1, 2002	138
30°58'N-117°18'W	Jul. 24, 2001	107	38°14'N-153°24'E	Jul. 19, 2002	135

The data on the lengths at release and recapture are particularly valuable, as little information on the growth of large bluefin is available.

In addition, two bluefin with archival tags that had been placed on the fish in the western Pacific Ocean by personnel of the National Research Institute of Far Seas Fisheries were recaptured in the eastern Pacific Ocean. The release and recapture data for these fish are as follows:

Release			Recapture		
Location	**Date**	**Length (cm)**	**Location**	**Date**	**Length (cm)**
ca. 38°N-139°30'E	Nov. 20, 2000	50	31°37'N-117°53'W	Aug. 27, 2002	84
ca. 38°N-139°30'E	Nov. 20, 2000	52	off Baja California		

The second fish was found in a holding pen in Baja California. The staff is currently attempting to get more specific information on the recapture of this fish.

Also, two bluefin tagged with IATTC tags by personnel of the Monterey Bay Aquarium and one skipjack tagged by an IATTC employee, all aboard the *Shogun* in 2001, were recaptured in the EPO in 2002.

Finally, 68 bluefin with IATTC tags were released during August 2002 by scientists of the Monterey Bay Aquarium, who were performing research on the *Shogun*. Twenty-one of these fish were more than 100 cm long, and eight of those were more than 140 cm long.

Studies of yellowfin tuna with archival tags held in captivity

During January 2002 archival tags were implanted into the body cavities of 12 yellowfin, and these fish were placed into Tank 2 at the Achotines Laboratory. The experiment is being conducted to investigate whether feeding and/or spawning events can be detected by evaluating data on the temperatures of the peritoneal cavities of the fish recorded by the archival tags. At the end of the quarter there were six fish in the tank. Five of them were feeding well, and one was feeding intermittently.

Early life history studies

Yellowfin broodstock

The yellowfin broodstock in Tank 1 (1,362,000 L) at the Achotines Laboratory spawned daily during July through September. Spawning occurred as early as 11:15 p.m. and as late as 1:15 a.m. The water temperatures in the tank ranged from 27.2° to 29.0°C during the quarter. The numbers of eggs collected after each spawning event ranged from about 17,000 to 842,000.

During the quarter two fish died, one male (13 kg) by starvation, and one female (35 kg) after striking the tank wall. At the end of September there were four size groups of fish in Tank 1: one 76-kg fish, five 53- to 59-kg fish, six 22- to 27-kg fish, and two 15-kg fish.

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.

Studies of snappers and corvina

The work on snappers (*Lutjanus guttatus*) and corvina (*Umbrina xanti)* is carried out by the Dirección General de Recursos Marinos de Panamá.

Forty snappers, averaging 1 kg, have been raised at the Achotines Laboratory from egg to mature adult. They hatched in October 1998 from eggs obtained from the Achotines snapper broodstock, which was established in 1996. They spawned for the first time in August 2002, but the eggs collected were determined to be unfertilized.

There are currently nine juvenile corvina in captivity. These will be used as food for yellowfin larvae and juveniles.

Sailfish capture trials

The facilities of the Achotines Laboratory are being used in a joint study with the Aquaculture Program of the Rosenstiel School of Marine and Atmospheric Science, University of Miami, to investigate the feasibility of capturing, transporting, and culturing live sailfish, *Istiophorus platypterus*. The studies are being funded by the University of Miami. In support of the

study, the *Amangani*, a 13-meter sportfishing boat, was fishing in the vicinity of Achotines Bay on August 25-30, 2002. Mr. Robert Novey (the boat owner), Dr. Daniel Benetti (Director of the Aquaculture Program of the University of Miami), Mr. Tim Choate (a principal benefactor of the Center for Sustainable Fisheries Billfish Research Initiative at the University of Miami), Achotines staff members, and two other expert billfishermen participated in the capture attempts. During the five days of fishing, only one sailfish was caught. It was towed about 20 miles (37 km) from the point of capture to the Achotines Laboratory and transferred alive to a reserve broodstock tank. Unfortunately, the fish died after about 1 hour in the tank, probably due to the prolonged time it was towed. Efforts to catch and transport live sailfish to the Achotines Laboratory will continue during the fourth quarter of 2002.

Visitors at the Achotines Laboratory

Mr. Patrick Tracy, a graduate student at the University of Miami, spent the period of June 13-August 2, 2002, at the Achotines Laboratory, where he worked on the use of mesocosms for copepod culture.

Dr. Daniel D. Benetti, Director of the Aquaculture Program of the Rosenstiel School of Marine and Atmospheric Science, University of Miami, spent period the July 25-August 2, 2002, at the Achotines Laboratory, working with Achotines staff members in attempts to capture live sailfish and place them in captivity. He also worked with his graduate student, Mr. Patrick Tracy, whose work is described in the previous paragraph.

Mr. Yasuhiro Minamino, an instructor in fish culture at the Universidad de San Carlos de Guatemala, visited the Achotines Laboratory on September 5 and 6, 2002. Mr. Minamino's stay in Guatemala is sponsored by the Japan International Cooperation Agency.

Dr. Michael S. Roy, a Senior Lecturer at the University of Otago, Dunedin, New Zealand, and his assistant, Ms. Renata Sponer, spent the period of September 9-13, 2002, at the Achotines Laboratory. Dr. Roy, who is on a one-year sabbatical leave at the Smithsonian Tropical Research Institute in Panama, was collecting specimens of the tropical brittle star, *Ophiactis savigny*i, for systematic studies.

Oceanography and meteorology

Easterly surface winds blow almost constantly over northern South America, which causes 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 eastern tropical Pacific (ETP). 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. Each of the four El Niño events during

the 1969-1983 period was followed by better-than-average recruitment of yellowfin in the eastern Pacific Ocean two years later (Japan. Soc. Fish. Ocean., Bull., 53 (1): 77-80), and IATTC staff members are currently studying data for more recent years to see if this relationship has persisted and to see if it applies to skipjack and/or bigeye.

Two new indices, the SOI* and the NOI*, have recently been devised. These are described in the IATTC Quarterly Report for January-March 2001. The SOI* and NOI* values are both negative during El Niño events and positive during anti-El Niño events.

The SSTs during July and August 2002 were similar to those of June 2002 (IATTC Quarterly Report for April-June 2002: Figure 6), when there was a narrow band of water more than 1°C above normal that extended along the equator from about 105°W to about 165°E and small areas of water more than 1°C below normal off Ecuador and northern Peru and off Baja California. The band of warm water extended only from about 120°W to 180° during July and August, however. During September the same band of warm water was evident, but the areas of cooler water off northern South America and off Baja California had virtually disappeared (Figure 7). An area of warm water was also present south of 25°S between 115° and 130°W during June (IATTC Quarterly Report for April-June 2002: Figure 6). This disappeared in July, but reappeared in August and covered a larger area in September (Figure 7). The data in Table 9, for the most part, indicate that conditions were near normal during most of the April-September period. According to the Climate Diagnostics Bulletin of the U.S. National Weather Service for September 2002, "we expect SST anomalies to increase further in the eastern equatorial Pacific, … with the establishment of basin-wide mature El Niño conditions during December 2002-February 2003. Furthermore, … we expect that this event will be substantially weaker than the 1997-1998 El Niño" event.

GEAR PROGRAM

During the third quarter IATTC staff members participated in dolphin safety-gear inspection and safety-panel alignment procedures aboard three Mexican-flag purse seiners.

There were no dolphin mortality reduction workshop held during the quarter.

PUBLICATIONS

Special Report

Leatherwood, Stephen, Randall R. Reeves, William F. Perrin, y William E. Evans, con el Anexo A sobre Marcación por Larry Hobbs. 2002. Ballenas, Delfines y Marsopas del Pacífico Nororiental y de las Aguas Articas Adyacentes: una Guía para su Identificación. Special Report 6 (second printing): v, 245 pp.

Outside publications

Olson, R. J., G. M. Watters, K. Y. Aydin, C. H. Boggs, T. E. Essington, R. C. Francis, J. F. Kitchell, J. J. Polovina, and C. J. Walters. 2002. Interactive effects of climate variability and fishing: a modelling analysis for the eastern tropical Pacific pelagic ecosystem. ACP-EU Fish. Res. Rep., 12: 31-32.

Pabst, D. A., W. A. McLellan, E. M. Meagher, A. J. Westgate, M. D. Scott, and K. A. Forney. 2002. Measuring temperature and heat flux from dolphins in the eastern tropical Pacific: is thermal stress associated with chase and capture in the tuna purse-seine fishery? [abstract]. The Physiologist, 45 (4): 353.

Wells, Randall S., and Michael D. Scott. 2002. Bottlenose dolphins (*Tursiops truncatus* and *T. aduncus*). *In* William F. Perrin, Bernd Würsig, and J. G. M. Thewissen (editors), Encyclopedia of Marine Mammals, Academic Press, San Diego: 122-128.

ADMINISTRATION

Mr. Pablo Mosely was hired as maintenance supervisor at the Achotines Laboratory on July 15, 2002. He replaces Mr. Roberto Yau, who resigned on April 30, 2002.

Mr. Abdiel Juarez was hired for the position of supervisory biologist at the Achotines Laboratory on July 15, 2002. He replaces Mr. Neil Bonilla, who resigned on February 28, 2002, to enter graduate school in Spain.

Due to the heavy workload in Manta, Mr. Aldo X. Basantes Cuesta was transferred from the Las Playas field office to the Manta field office on September 11, 2002.

Mr. Witold L. Klawe, senior scientist emeritus, received the Commander's Cross of the Order of Merit from Ambassador Pawel Dobrowolski of the Republic of Poland, in Toronto, Ontario, Canada, on September 6, 2002.

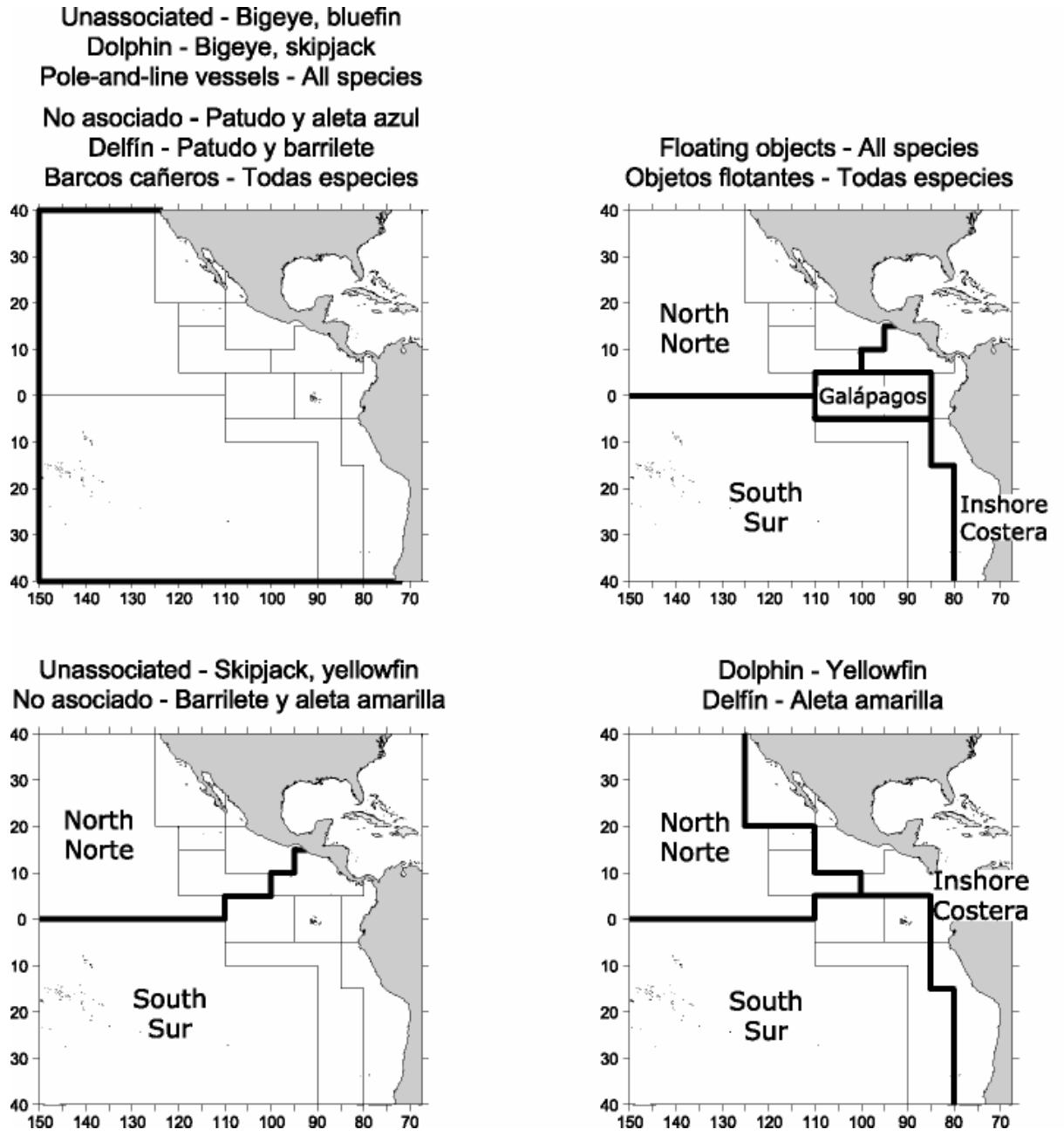

FIGURE 1. Spatial extents of the fisheries defined by the IATTC staff for stock assessment of yellowfin, skipjack, and bigeye in the EPO. The thin lines indicate the boundaries of the 13 length-frequency sampling areas, and the bold lines the boundaries of the fisheries.
FIGURA 1. Extensión espacial de las pesquerías definidas por el personal de la CIAT para la evaluación de los stocks 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.

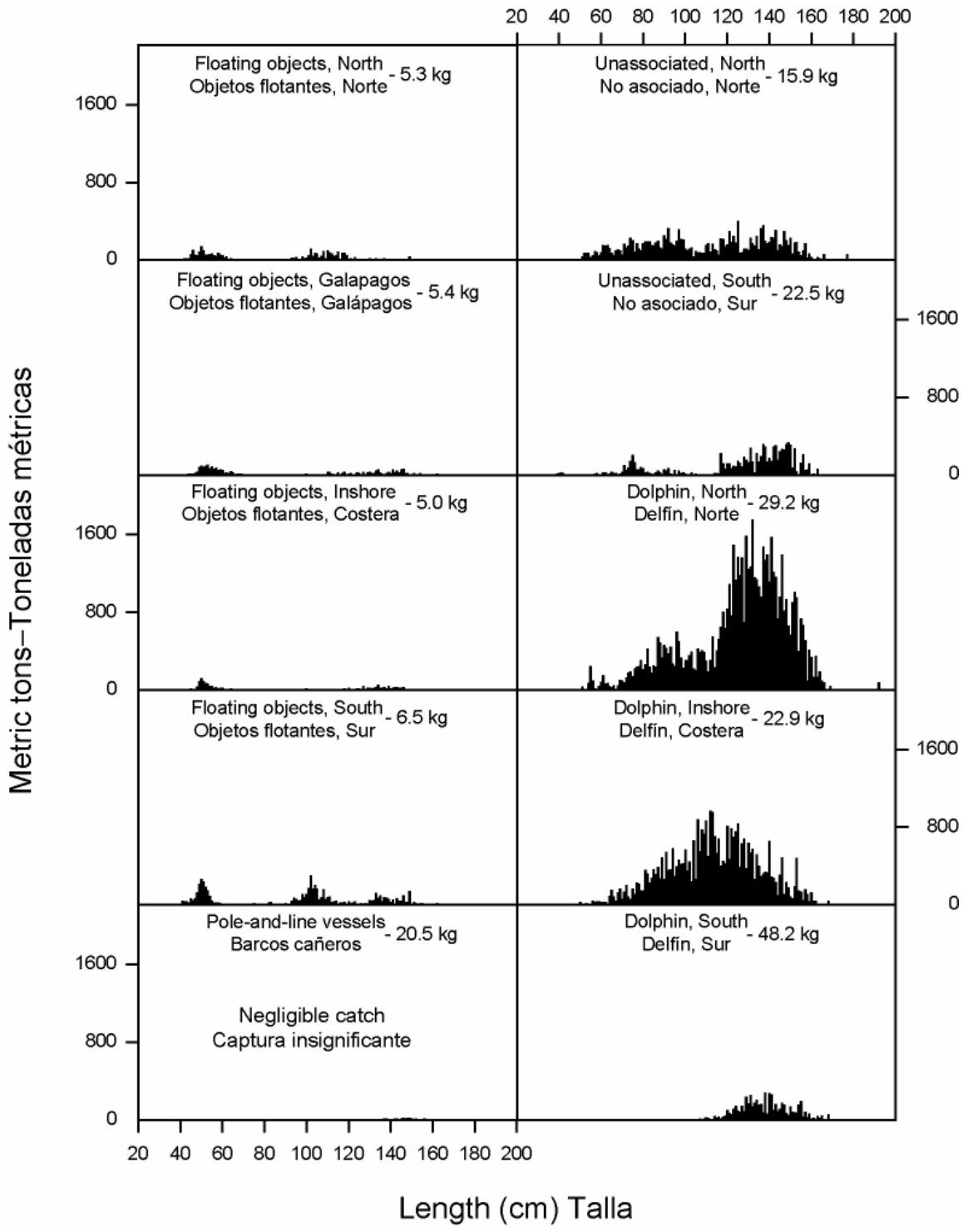

FIGURE 2a. Estimated size compositions of the yellowfin caught in each fishery of the EPO during the second quarter of 2002. The average weights of the fish in the samples are given at the tops of the panels.

FIGURA 2a. Composición por tallas estimada para el aleta amarilla capturado en cada pesquería del OPO durante el segundo trimestre de 2002. En cada recuadro se detalla el peso promedio de los peces en las muestras.

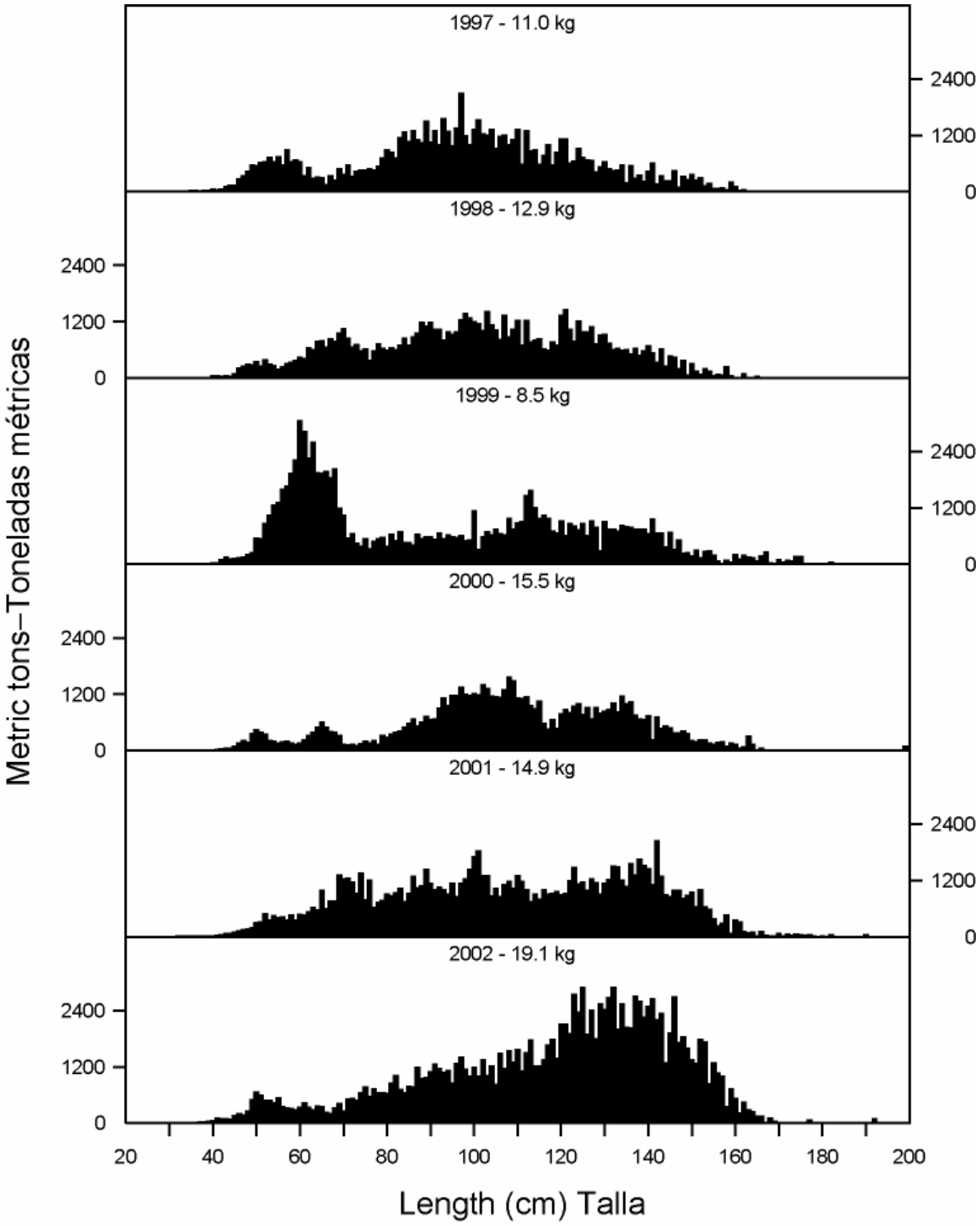

FIGURE 2b. Estimated size compositions of the yellowfin caught in the EPO during the second quarter of 1997-2002. The average weights of the fish in the samples are given at the tops of the panels.

FIGURA 2b. Composición por tallas estimada para el aleta amarilla capturado en el OPO en el segundo trimestre de 1997-2002. En cada recuadro se detalla el peso promedio de los peces en las muestras.

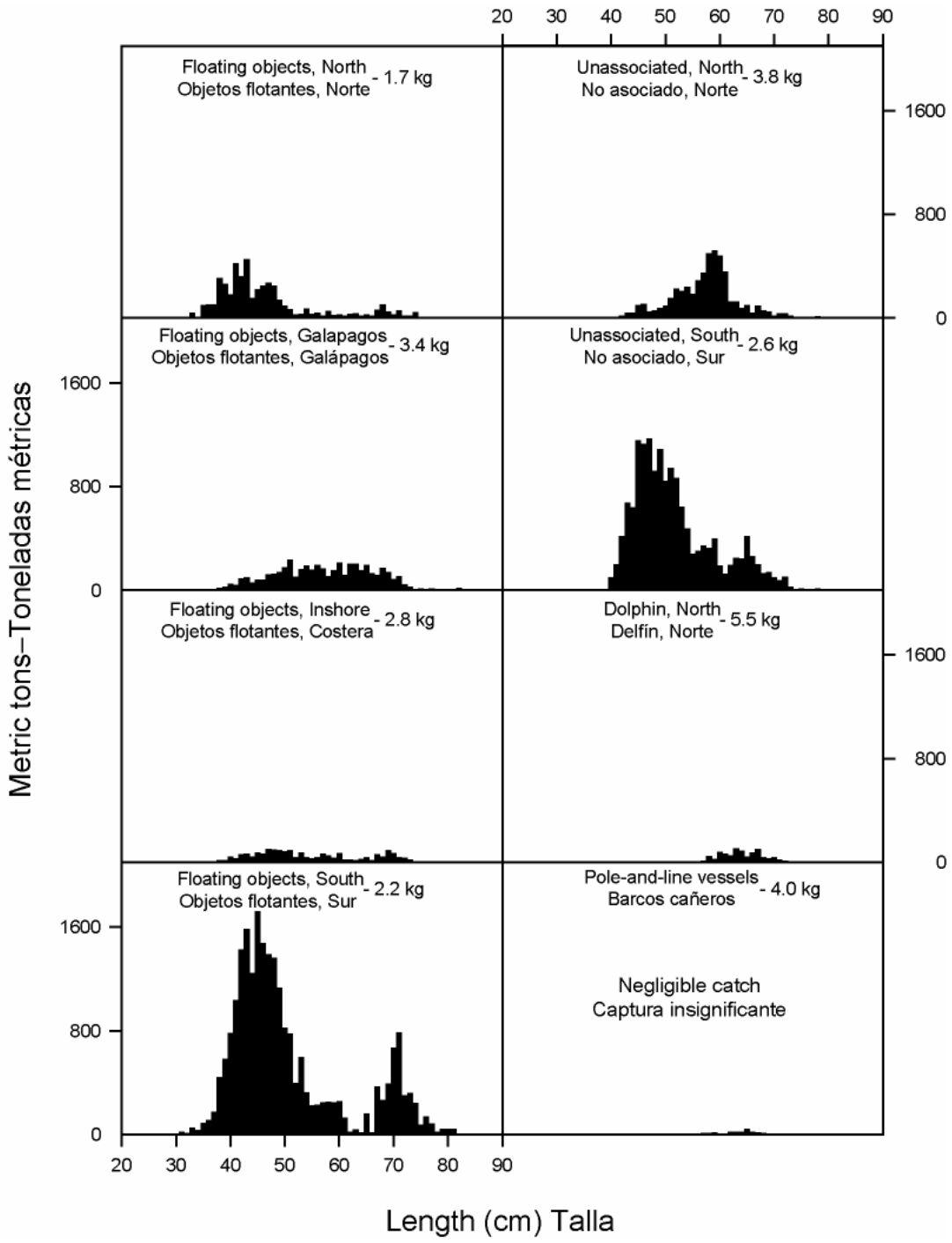

FIGURE 3a. Estimated size compositions of the skipjack caught in each fishery of the EPO during the second quarter of 2002. The average weights of the fish in the samples are given at the tops of the panels.

FIGURA 3a. Composición por tallas estimada para el barrilete capturado en cada pesquería del OPO durante el segundo trimestre de 2002. En cada recuadro se detalla el peso promedio de los peces en las muestras.

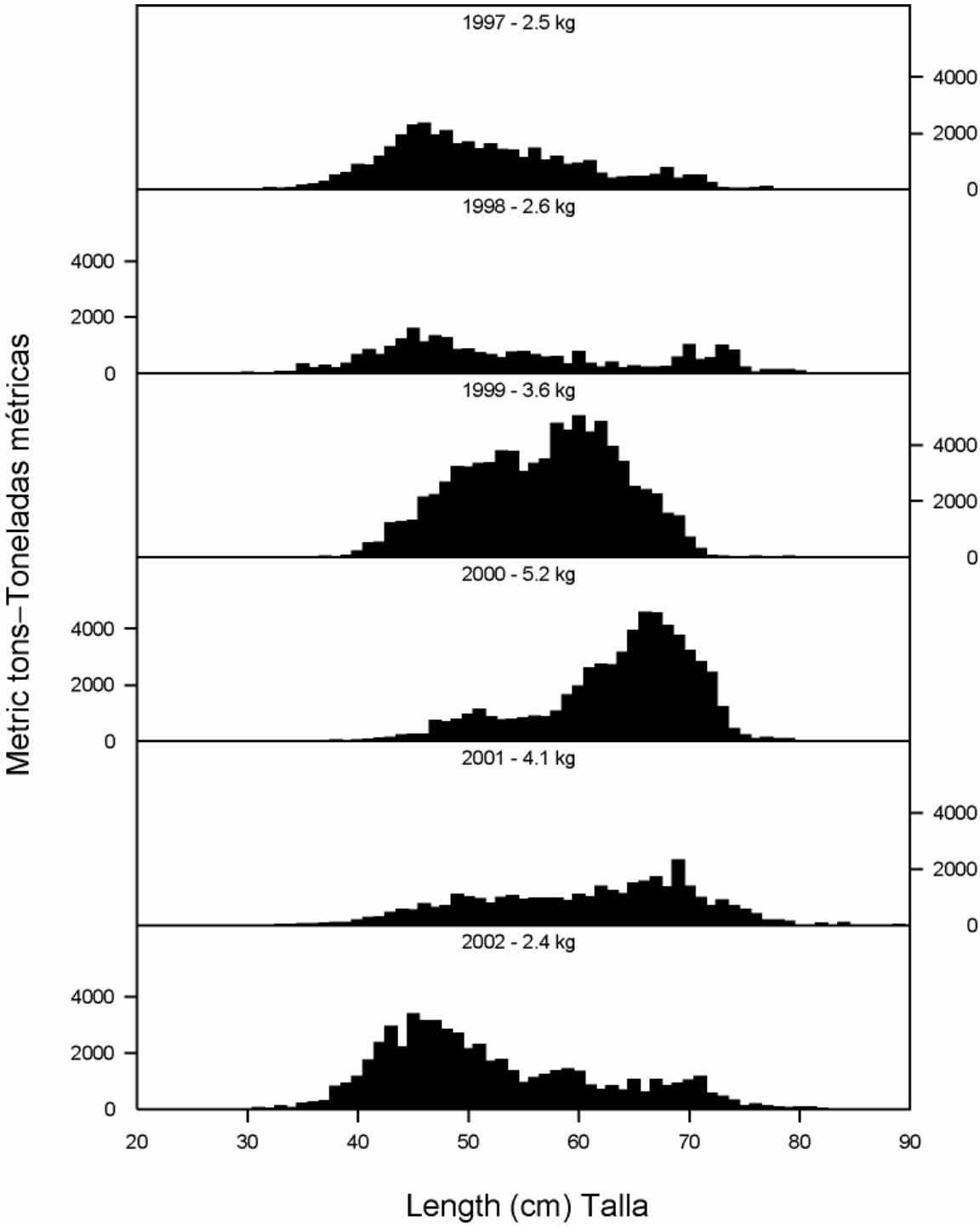

FIGURE 3b. Estimated size compositions of the skipjack caught in the EPO during the second quarter of 1997-2002. The average weights of the fish in the samples are given at the tops of the panels.

FIGURA 3b. Composición por tallas estimada para el barrilete capturado en el OPO en el segundo trimestre de 1997-2002. En cada recuadro se detalla el peso promedio de los peces en las muestras.

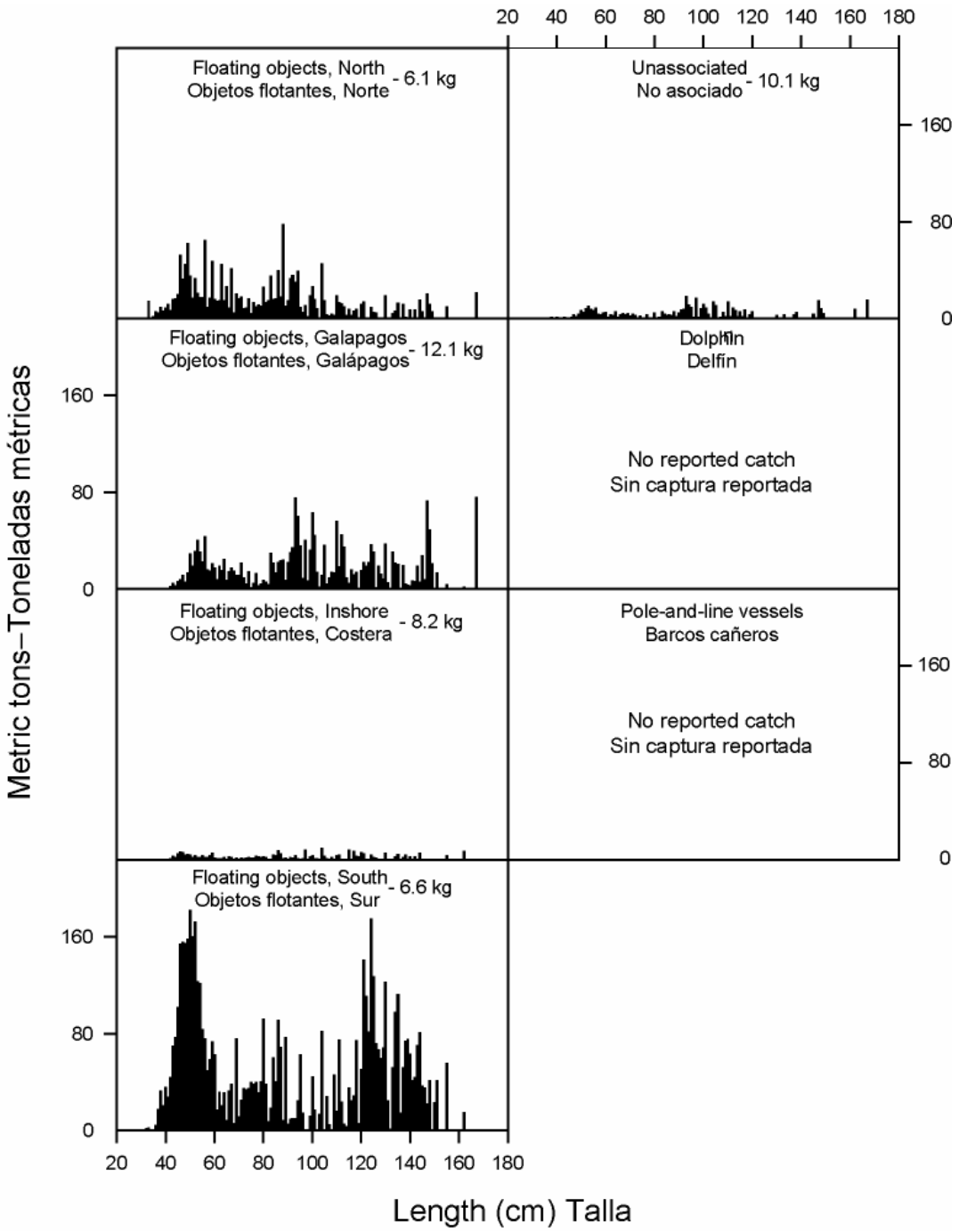

FIGURE 4a. Estimated size compositions of the bigeye caught in each fishery of the EPO during the second quarter of 2002. The average weights of the fish in the samples are given at the tops of the panels.

FIGURA 4a. Composición por tallas estimada para el patudo capturado en cada pesquería del OPO durante el segundo trimestre de 2002. En cada recuadro se detalla el peso promedio de los peces en las muestras.

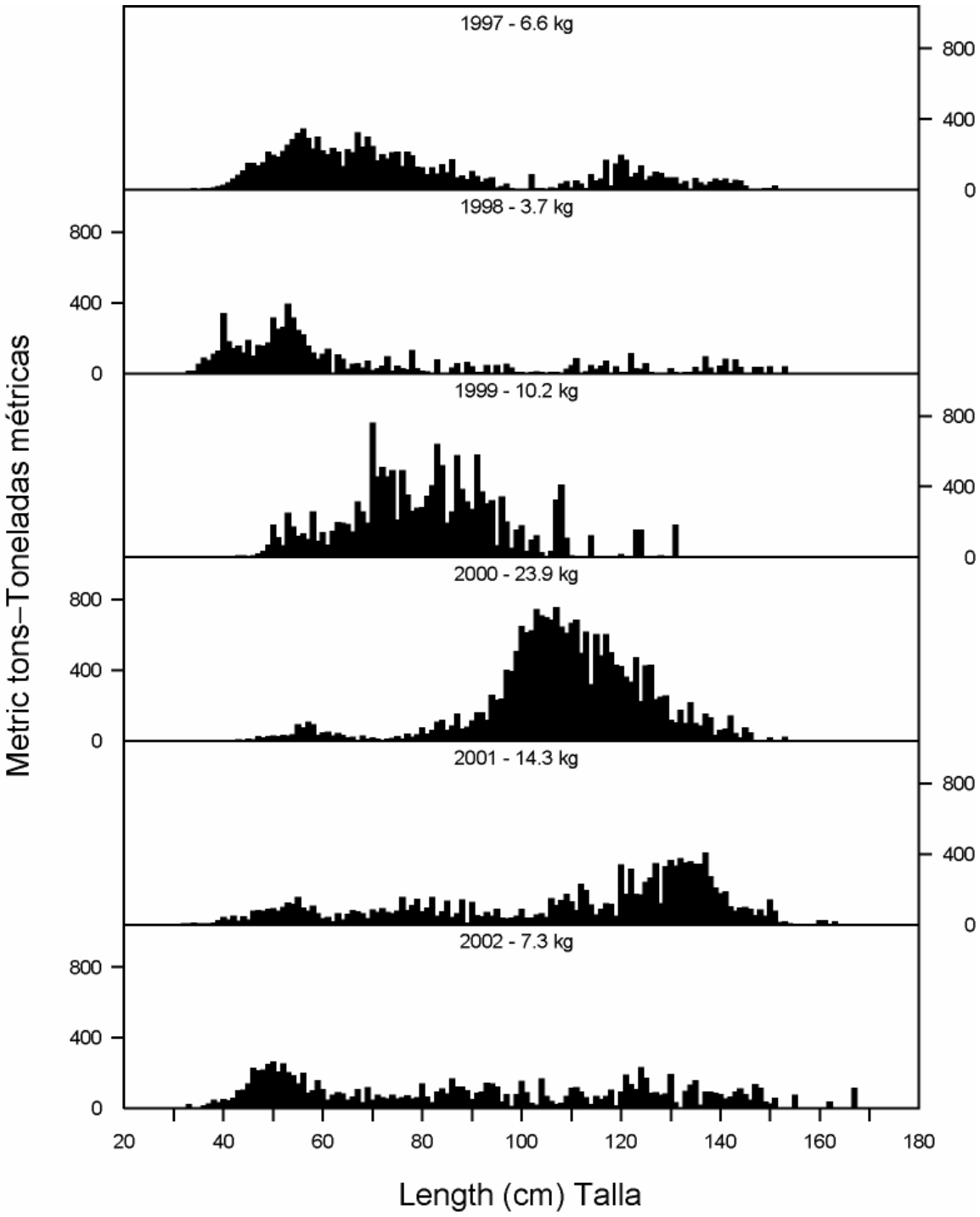

FIGURE 4b. Estimated size compositions of the bigeye caught in the EPO during the second quarter of 1997-2002. The average weights of the fish in the samples are given at the tops of the panels.

FIGURA 4b. Composición por tallas estimada para el patudo capturado en el OPO en el segundo trimestre de 1997-2002. En cada recuadro se detalla el peso promedio de los peces en las muestras.

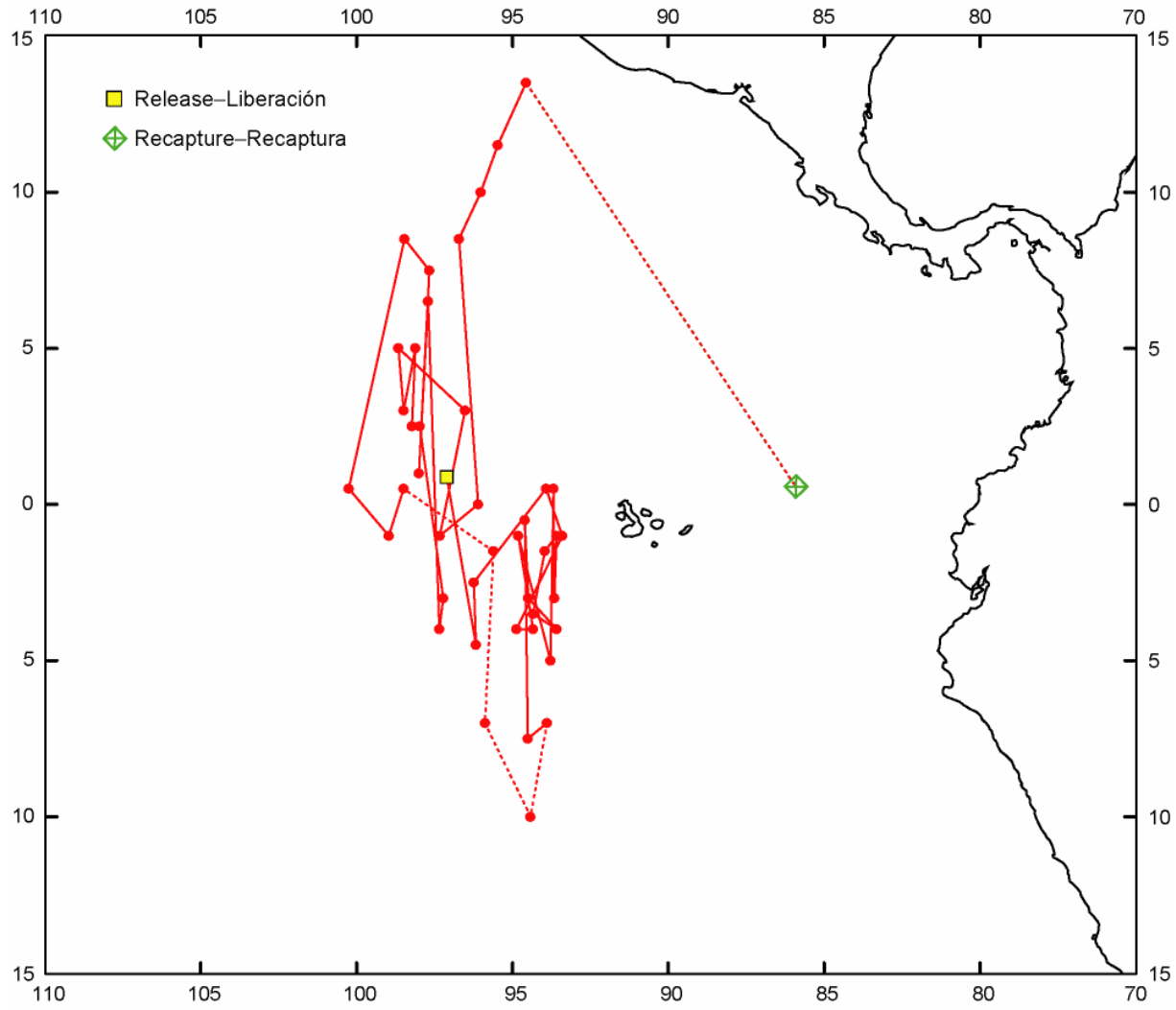

FIGURE 5. Movements of a tagged bigeye released on April 15, 2000, and recaptured on July 20, 2002. The dashed lines between dots correspond to the equinoctial period, when it was not possible to obtain reliable estimates of the latitude. The dashed line leading to the location at which the fish was recaptured corresponds to the period after the battery had failed.
FIGURA 5. Desplazamientos de un patudo marcado liberado el 15 de abril de 2000 y recapturado el 20 de julio de 2002. Las líneas de trazos entre puntos corresponden al período de equinoccio, cuando no fue posible obtener estimaciones fiables de la latitud. La línea de trazos que conduce al punto de recaptura corresponde al período después de agotarse la batería.

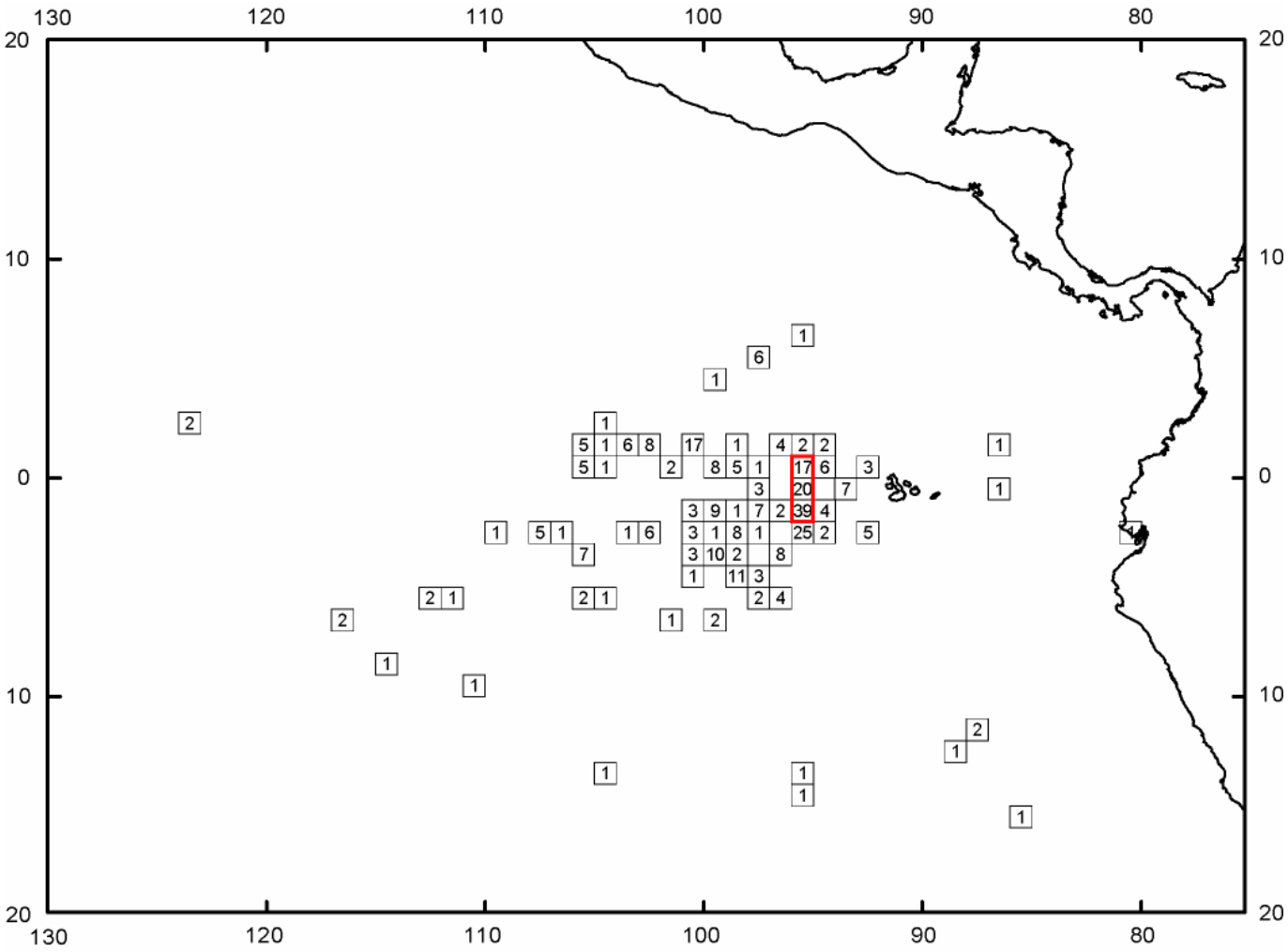

FIGURE 6. Locations of release (1-degree areas with heavy borders) and recapture (1-degree areas with numerals) for bigeye tagged with conventional tags in 2002.
FIGURA 6. Puntos de liberación (zonas de 1° con borde grueso) y recaptura (zonas de 1° con número) de patudos con marcas convencionales en 2002.

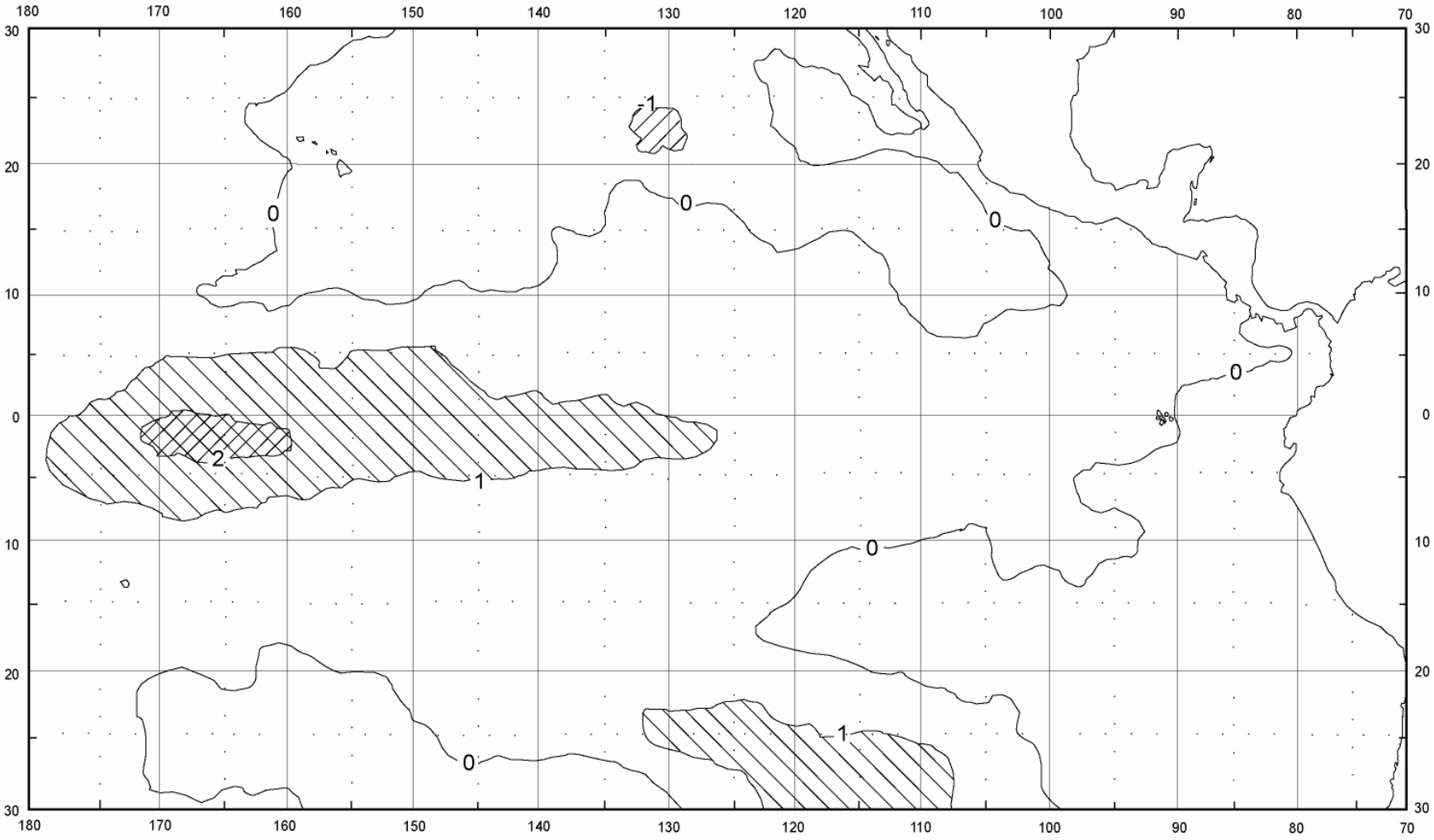

FIGURE 7. Sea-surface temperature (SST) anomalies (departures from long-term normals) for September 2002, based on data from fishing boats and other types of commercial vessels.
FIGURA 7. Anomalías (variaciones de los niveles normales a largo plazo) de la temperatura superficial del mar (TSM) en septiembre de 2002, basadas en datos tomados por barcos pesqueros y otros buques comerciales.

TABLE 1. Preliminary estimates of the numbers and carrying capacities, in cubic meters, of purse seiners and baitboats operating in the EPO in 2002 by flag, gear, and size class. 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; PL = pole-and-line vessel.

TABLA 1. Estimaciones preliminares del número de buques cerqueros y de carnada que pescan en el OPO en 2002, y de la capacidad de acarreo de los mismos, en metros cúbicos, por bandera, arte de pesca, y clase de arqueo. 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; PL = buque cañero.

Flag Bandera	Gear Arte	Size class—Clase de arqueo							Capacity Capacidad
		1	2	3	4	5	6	Total	
					Number—Número				
Belize—Belice	PS	-	-	-	-	-	1	1	809
Bolivia	PS	-	-	-	1	-	7	8	7,550
Colombia	PS	-	-	2	1	2	5	10	7,397
Ecuador	PS	-	7	12	11	8	37	75	47,931
	PL	1	-	-	-	-	-	1	32
España—Spain	PS	-	-	-	-	-	5	5	12,177
Guatemala	PS	-	-	-	-	-	4	4	7,640
Honduras	PS	-	-	-	-	-	2	2	1,798
México	PS	-	-	5	4	10	43	62	54,014
	PL	1	3	6	-	-	-	10	1,271
Nicaragua	PS	-	-	-	-	-	1	1	1,229
Panamá	PS	-	-	2	2	-	8	12	11,948
Perú	PS	-	-	-	-	-	1	1	902
El Salvador	PS	-	-	-	-	-	2	2	4,469
United States—Estados Unidos	PS	-	-	1	-	2	5	8	7,246
Venezuela	PS	-	-	-	-	-	25	25	32,015
Vanuatu	PS	-	-	-	-	1	4	5	5,213
Unknown—Desconocida	PS	-	-	-	-	-	1	1	486
All flags—Todas banderas	PS	-	7	22	19	23	148	219	
	PL	2	3	6	-	-	-	11	
	PS + PL	2	10	28	19	23	148	230	
					Capacity—Capacidad				
All flags—Todas banderas	PS	-	758	4,019	5,314	10,063	179,753	199,907	
	PL	85	293	925	-	-	-	1,303	
	PS + PL	85	1,051	4,944	5,314	10,063	179,753	201,210	

TABLE 2. Eastern Pacific Ocean surface fleet, by flag, vessel name, gear type (PS = purse seine; PL = pole-and-line), and cubic meters of fish-carrying capacity, as of September 30, 2002.
TABLA 2. La flota atunera de superficie del Océano Pacífico oriental, por bandera, nombre del barco, tipo de arte (PS = cerquero; PL = cañero), y metros cúbicos de capacidad de acarreo de pescado, hasta el 30 de septiembre de 2002.

Flag and vessel name	Gear type	Capacity	Flag and vessel name	Gear type	Capacity
Bandera y nombre de buque	**Tipe de arte**	**Capacidad**	**Bandera y nombre de buque**	**Tipe de arte**	**Capacidad**
Belize—Belice			**Ecuador (cont.)**		
Atun IV	PS	809	*Gloria A*	PS	543
			Ile Aux Moines	PS	750
Bolivia			*Indico*	PS	267
Amanda S	PS	1268	*Ingalapagos*	PS	285
Blue Tuna	PS	1012	*Intrepido*	PS	85
Cabo De Hornos	PS	680	*Isabel Victoria V*	PS	307
Don Italo	PS	486	*Jacques Cartier*	PS	962
Gold Coast	PS	1194	*Jambeli IV*	PS	320
Mar Cantabrico	PS	222	*José Antonio*	PS	142
Nazca	PS	1414	*Joselito*	PS	91
Sea Gem	PS	1274	*Killa*	PS	412
			Lizi	PS	1038
Colombia			*Ljbuica M.*	PS	275
American Eagle	PS	1275	*Lucia T*	PS	738
Eillen Marie	PS	350	*Lucy*	PS	245
El Dorado	PS	382	*Malula*	PS	849
El Rey	PS	1168	*Manuel Ignacio F*	PS	644
Enterprise	PS	1272	*Maria*	PS	168
Grenadier	PS	1176	*Maria Fatima*	PS	338
Patricia Lynn	PS	270	*Maria Francisca*	PS	1041
Rocio Del Pilar	PS	191	*Maria Isabel*	PS	276
Sandra C	PS	1175	*Mariajosé*	PS	1013
			Medjugorje	PS	843
Ecuador			*Milagros A*	PS	1550
Alize	PS	688	*Miry Ann D*	PS	497
Aurora	PS	490	*Monte Cristi*	PS	1232
Balbina	PS	217	*North Queen*	PS	257
Betty C	PS	1010	*Ramoncho*	PS	96
Betty Elizabeth	PS	290	*Roberto M*	PS	1161
Cap. Berny B.	PS	1285	*Rocio*	PS	1366
Charo	PS	2023	*Romeo*	PS	125
Chasca	PS	249	*Rosa F*	PS	662
Diana Maria	PS	154	*Rosa Isabel*	PL	32
Dominador	PS	162	*Sajambre*	PS	694
Don Antonio	PS	197	*San Andres*	PS	1862
Don Bartolo	PS	495	*San Antonio V*	PS	248
Don Mario	PS	552	*San Lorenzo*	PS	217
Don Quijote	PS	374	*San Mateo*	PS	1033
Don Santiago	PS	1881	*Saturno*	PS	106
Doña Luz	PS	786	*Southern Explorer*	PS	244
Doña Roge	PS	863	*Southern Queen*	PS	137
Doña Tula	PS	603	*Sun Ranger*	PS	1033
Drennec	PS	1140	*Tarqui*	PS	459
Eli	PS	984	*Ugavi*	PS	1695
Elizabeth Cinco	PS	1265	*Via Simoun*	PS	1324
Elizabeth F	PS	738	*Victor Andres*	PS	115
Emperador	PS	82	*Western Pacific I*	PS	274
Fernandito	PS	147	*Yelisava*	PS	855
Fiorella L	PS	390	*Yolanda L*	PS	1168

TABLE 2. (continued)
TABLE 2. (continuación)

Flag and vessel name	Gear type	Capacity	Flag and vessel name	Gear type	Capacity
Bandera y nombre de buque	**Tipe de arte**	**Capacidad**	**Bandera y nombre de buque**	**Tipe de arte**	**Capacidad**
España—Spain			**México (cont.)**		
Albacora	PS	3318	*Excalibur*	PS	160
Albacora Quince	PS	1900	*Gabiero*	PS	1118
Albacora Uno	PS	2800	*Guaymas*	PS	359
Aurora B.	PS	2079	*Jose Gerardo*	PS	511
Rosita C	PS	2080	*Juan Pablo I*	PS	300
			Juan Pablo II	PS	250
Guatemala			*Judith I*	PS	809
Albacora Catorce	PS	1880	*Lupe Del Mar*	PS	1298
Albacora Doce	PS	1880	*Macel*	PS	808
Sant Yago Dos	PS	1940	*Manolo*	PS	300
Sant Yago Uno	PS	1940	*Maranatha*	PL	125
			Maria Antonieta	PS	1118
Honduras			*Maria Del Mar*	PS	1242
Eastern Pacific	PS	628	*Maria Fernanda*	PS	1232
Esthercho	PS	1170	*Maria Gabriela*	PL	112
			Maria Luisa	PS	1168
México			*Maria Rosana*	PS	1142
Aguila Descalza	PS	410	*Maria Veronica*	PS	1232
Ana Maria	PL	188	*Maria W*	PL	102
Ariete	PS	490	*Mazatun*	PS	1482
Arkos I Chiapas	PS	1348	*Mazcu I*	PS	240
Arkos II Chiapas	PS	1348	*Mazpesca*	PS	410
Atilano Castano	PS	1297	*Nair*	PS	1346
Atun VI	PS	809	*Nair II*	PS	1275
Atun VII	PS	751	*Nair III*	PS	240
Atun VIII	PS	751	*Neptuno*	PS	793
Azteca 1	PS	1202	*Oscar I*	PS	135
Azteca 10	PS	1627	*Tamara*	PS	410
Azteca 11	PS	410	*Tatiana*	PL	97
Azteca 12	PS	410	*Theresa Janene*	PS	1275
Azteca 2	PS	1274	*Tizoc*	PS	180
Azteca 3	PS	1524	*Tlaloc*	PS	810
Azteca 4	PS	1278	*Tono I*	PS	166
Azteca 5	PS	1282	*Tutankamon*	PS	784
Azteca 6	PS	1283			
Azteca 7	PS	1383	**Panamá**		
Azteca 8	PS	1157	*Capt. Joe Jorge*	PS	1229
Azteca 9	PS	733	*Cervantes*	PS	775
Bonnie	PS	1277	*Don Alvaro*	PS	180
Buena Ventura I	PS	1005	*Don Luis*	PS	180
Buena Ventura II	PS	1005	*Geminis*	PS	255
Cabo San Lucas	PS	1478	*Genesis I*	PS	586
Camila	PS	410	*Julie L*	PS	2056
Cartadedeces	PS	807	*Mary Lynn (Mazcu IV)*	PS	285
Chac Mool	PS	1190	*Panama Tuna*	PS	3300
Delfin V	PL	160	*Raffaello*	PS	1104
Delfin X	PL	160	*San Marino I*	PS	796
Don José	PL	53	*Tiuna*	PS	1202
Donna Cristina	PS	1282			
Edgar Ivan	PS	316	**Perú**		
Ensenada	PS	381	*Danielle. D*	PS	902
Erika	PL	94			
Estado 29	PS	725			

TABLE 2. (continued)
TABLE 2. (continuación)

Flag and vessel name	Gear type	Capacity	Flag and vessel name	Gear type	Capacity
Bandera y nombre de buque	**Tipe de arte**	**Capacidad**	**Bandera y nombre de buque**	**Tipe de arte**	**Capacidad**
El Salvador			**Venezuela (cont.)**		
Montelucia	PS	2550	*Falcon*	PS	1137
Monterocio	PS	1919	*Jane*	PS	1242
			Judibana	PS	1231
USA—EE.UU.			*La Foca*	PS	1287
Atlantis	PS	1275	*La Parrula*	PS	889
Bold Adventuress	PS	1593	*Los Roques*	PS	1262
Capt Vincent Gann	PS	1593	*Lucile*	PS	1583
Connie Jean	PS	605	*Maria Del Mar A*	PS	1784
Donna B	PS	163	*Marinero*	PS	1244
Lady Elizabeth	PS	337	*Napoleon*	PS	1250
Mauritania	PS	397	*Orinoco II*	PS	1581
South Seas	PS	1275	*Sea Royal*	PS	1488
			Taurus I	PS	1191
Venezuela			*Taurus Tuna*	PS	1175
Amazonas	PS	1115	*Templario*	PS	1268
Calypso	PS	1168	*Ventuari*	PS	1542
Canaima	PS	1094			
Carirubana	PS	1137	**Vanuatú**		
Carmela	PS	1241	*Carmen D*	PS	490
Caroni II	PS	1438	*Chiara*	PS	803
Cayude	PS	1274	*Esmeralda C.*	PS	1358
Conquista	PS	1168	*Mirelur*	PS	1360
Don Abel	PS	1226			

TABLE 3. Changes in the IATTC fleet list recorded during the third quarter of 2002. PS = purse seine.
TABLA 3. Cambios en la flota observada por la CIAT registrados durante el tercer trimestre de 2002. PS = cerquero.

Vessel name	Flag	Gear	Capacity (m^3)	Remarks	
Nombre del buque	**Bandera**	**Arte**	**Capacidad (m^3)**	**Comentarios**	
Vessels added to the fleet—Buques añadidos a la flota					
New entries—Nuevos ingresos					
Mar Cantabrico	Bolivia	PS	222		
Re-entries—Reingresos					
				Now—Ahora	
Angel	Ecua-	PS	154	*Diana Maria*	
Estado 29	México	PS	725		
Oscar I	México	PS	135		
Cape May	USA	PS	1,438	*Caroni II*	Venezuela
Changes of name or flag—Cambios de nombre o pabellon					
Amanda	Bolivia	PS	1,268	*Amanda S*	
Eileen Marie	Co-	PS	350	*Eillen Marie*	
Aurora	México	PS	490		Ecuador
Tiuna	Vanu-	PS	1,202		Panamá
Vessels removed from fleet—Buques retirados de la flota					
Jorge IV	Ecua-	PS	162	Sunk–Hundido	
Bold Adventuress	USA	PS	1,593	Fishing in the western Pacific Ocean–Pescando en el Océano Pacífico occi-	

TABLE 4. Preliminary estimates of the retained catches of tunas in the EPO from January 1 through September 30, 2002, by species and vessel flag, in metric tons.

TABLA 4. Estimaciones preliminares de las capturas retenidas de atunes en el OPO del 1 de enero al 30 septiembre de 2002, por especie y bandera del buque, en toneladas métricas.

Flag	Yellowfin		Skipjack	Bigeye	Bluefin	Albacore	Bonito	Black skipjack	Other[1]	Total	Percentage of total
	CYRA	Outside									
Bandera	Aleta amarilla		Barrilete	Patudo	Aleta azul	Albacora	Bonito	Barrilete negro	Otras[1]	Total	Porcentaje del total
	ARCAA	Exterior									
Colombia	20,261	2,736	1,440	137	-	-	-	-	134	24,708	5.1
Ecuador	24,767	3,099	63,727	13,586	-	-	-	344	534	106,057	22.0
España—Spain	2,951	1,688	18,162	3,771	-	-	-	-	-	26,572	5.5
México	112,242	8,240	7,021	-	1,617	31	-	195	-	129,346	26.9
Panamá	13,761	1,385	6,449	891	-	-	-	-	-	22,486	4.7
United States—Estados Unidos	819	452	2,700	1,416	50	3	-	222	64	5,726	1.2
Venezuela	82,061	11,834	3,534	225	-	-	-	-	-	97,654	20.3
Vanuatú	4,903	320	5,830	1,633	-	-	-	-	-	12,686	2.6
Other—Otros[2]	23,979	5,458	21,704	5,260	-	-	-	-	-	56,401	11.7
Total	285,744	35,212	130,567	26,919	1,667	34	-	761	732	481,636	

[1] Includes mackerel, sharks, other tunas, and miscellaneous fishes

[1] Incluye caballas, tiburones, otros túnidos, y peces diversos

[2] Includes Belize, Bolivia, El Salvador, Guatemala, Honduras, Nicaragua, Peru, and unknown. This category is used to avoid revealing the operations of individual vessels or companies.

[2] Incluye Belice, Bolivia, El Salvador, Guatemala, Honduras, Nicaragua, Perú, y desconocida. Se usa esta categoría para no revelar información sobre faenas de buques o empresas individuales.

TABLE 5. Logged catches and catches per day's fishing[1] (CPDF) of yellowfin in the EPO, in metric tons, during the period of January 1-July 1, based on fishing vessel logbook information.

TABLA 5. Captura registrada y captura por día de pesca[1] CPDP) de aleta amarilla en el OPO, en toneladas métricas, durante el período de1 de enero-1 de julio, basado en información de los cuadernos de bitácora de buques pesqueros.

Area	Fishery statistic Estadística de pesca	Year-Año 1997	1998	1999	2000	2001	2002[2]
Purse seine—Red de cerco							
North of 5°N	Catch—Captura	95,800	84,000	96,400	64,700	86,800	93,300
Al norte de 5°N	CPDF—CPDP	17.9	15.9	15.2	14.1	22.6	30.7
South of 5°N	Catch—Captura	32,500	20,700	22,500	53,000	85,700	42,000
Al sur de 5°N	CPDF—CPDP	6.8	3.6	6.4	9.0	12.6	6.3
Total	Catch—Captura	128,300	104,700	118,900	117,700	172,500	135,300
	CPDF—CPDP	24.7	19.5	21.6	23.1	35.2	37.0
Annual total Total anual	Catch—Captura	214,800	193,900	195,700	205,300	270,200	147,900
Pole and line—Cañero							
Total	Catch—Captura	1,600	1,600	600	400	2,000	200
	CPDF—CPDP	2.9	3.3	1.8	1.7	4.5	1.3
Annual total Total anual	Catch—Captura	3,500	2,600	1,600	2,100	3,400	200

[1] Purse-seiners, Class-6 only; all pole-and-line vessels. The catch values are rounded to the nearest 100, and the CPDF values to the nearest 0.1.

[1] Cerqueros de las Clase 6; todos buques cañeros. Se redondean los valores de captura al 100 más cercano, y los de CPDP al 0.1 más cercano.

[2] Preliminary

[2] Preliminar

TABLE 6. Logged catches and catches per day's fishing[1] (CPDF) of skipjack in the EPO, in metric tons, during the period of January 1-July 1, based on fishing vessel logbook information.

TABLA 6. Captura registrada y captura por día de pesca[1] (CPDP) de barrilete en el OPO, en toneladas métricas, durante el período de 1 de enero-1 de julio, basado en información de los cuadernos de bitácora de buques pesqueros.

Area	Fishery statistic Estadística de pesca	Year-Año					
		1997	1998	1999	2000	2001	2002[2]
Purse seine—Red de cerco							
North of 5°N	Catch—Captura	8,700	4,600	15,800	15,600	9,000	5,000
Al norte de 5°N	CPDF—CPDP	1.6	0.9	2.5	3.4	2.3	1.6
South of 5°N	Catch—Captura	32,800	32,600	78,800	82,100	49,400	60,900
Al sur de 5°N	CPDF—CPDP	6.8	5.7	22.3	13.9	7.3	9.1
Total	Catch—Captura	41,500	37,200	94,600	97,700	58,400	65,900
	CPDF—CPDP	8.4	6.6	24.8	17.3	9.6	10.7
Annual total Total anual	Catch—Captura	104,300	99,300	164,300	128,900	102,400	72,500
Pole and line—Cañero							
Total	Catch—Captura	200	300	100	<100	<100	400
	CPDF—CPDP	0.4	0.5	0.3	0.4	0.2	2.4
Annual total Total anual	Catch—Captura	2,300	1,000	1,800	100	300	500

[1] Purse-seiners, Class-6 only; all pole-and-line vessels. The catch values are rounded to the nearest 100, and the CPDF values to the nearest 0.1.

[1] Cerqueros de las Clase 6; todos buques cañeros. Se redondean los valores de captura al 100 más cercano, y los de CPDP al 0.1 más cercano.

[2] Preliminary

[2] Preliminar

TABLE 7. Logged catches and catches per day's fishing[1] (CPDF) of bigeye in the EPO, in metric tons, during the period of January 1-July 1, based on purse-seine vessel logbook information.

TABLA 7. Captura registrada y captura por día de pesca[1] (CPDP) de patudo en el OPO, en toneladas métricas, durante el período de 1 de enero-1 de julio, basado en información de los cuadernos de bitácora de buques cerqueros.

Fishery statistic—Estadística de pesca	Year—Año					
	1997	1998	1999	2000	2001	2002[2]
Catch—Captura	15,600	9,100	13,300	30,800	21,100	16,200
CPDF—CPDP	3.3	1.5	3.5	5.2	3.1	2.6
Total annual catch—Captura total anual	35,500	20,300	22,100	49,300	40,500	18,700

[1] Class-6 vessels only. The catch values are rounded to the nearest 100, and the CPDF values to the nearest 0.1.

[1] Buques de las Clase 6 solamente. Se redondean los valores de captura al 100 más cercano, y los de CPDF al 0.1 más cercano.

[2] Preliminary

[2] Preliminar

TABLE 8. Preliminary data on the sampling coverage of trips by vessels with capacities greater than 363 metric tons by the IATTC, Ecuadorian, FFA[1], Mexican, and Venezuelan programs during the third quarter of 2002. The numbers in parentheses indicate cumulative totals for the year.
TABLA 8. Datos preliminares de la cobertura de muestreo de viajes de buques con capacidad más que 363 toneladas métricas por los programas de la CIAT, Ecuador, FFA[1], México, y Venezuela durante el tercero trimestre de 2002. Los números en paréntesis indican totales acumulados para el año.

Fleet	Number of trips		Trips sampled by program						Percent sampled	
			IATTC		National		Total			
Flota	Número de viajes		Viajes muestreados por programa						Porcentaje muestreado	
			CIAT		Nacional		Total			
Belize	1	(4)	1	(4)			1	(4)	100.0	(100.0)
Bolivia	7	(32)	6	(28)			6	(28)	85.7	(87.5)
Colombia	8	(27)	8	(27)			8	(27)	100.0	(100.0)
Ecuador	49	(186)	32	(124)	17	(62)	49	(186)	100.0	(100.0)
España—Spain	7	(25)	7	(25)			7	(25)	100.0	(100.0)
Guatemala	4	(18)	4	(18)			4	(18)	100.0	(100.0)
Honduras	2	(9)	2	(9)			2	(9)	100.0	(100.0)
México	49	(155)	27	(79)	22	(76)	49	(155)	100.0	(100.0)
Nicaragua	0	(3)	0	(3)			0	(3)	-	(100.0)
Panamá	11	(27)	11	(27)			11	(27)	100.0	(100.0)
Perú	2	(4)	2	(4)			2	(4)	100.0	(100.0)
El Salvador	2	(10)	2	(10)			2	(10)	100.0	(100.0)
U.S.A.—EE.UU.	7	(17)	3	(13)	4[1]	(4)	7	(17)	100.0	(100.0)
Venezuela	37	(132)	17	(65)	20	(67)	37	(132)	100.0	(100.0)
Vanuatu[2]	5	(20)	5	(18)			5	(18)	100.0	(90.0)
Unknown—Desconocido	0	(1)	0	(0)			0	(0)	-	(0.0)
Total	191	(670)[3]	127	(454)	63	(209)	190	(663)[3]	99.5	(99.0)

[1] FFA observers approved pursuant to Annex II of the AIDCP
[1] Observadores del FFA aprobados de conformidad con el Anexo II del APICD
[2] The government of Vanuatu has determined that one of its vessels is not required to participate in the IDCP.
[2] El gobierno de Vanuatu determinó que uno de sus buques no necesita participar en el PICD.
[3] Includes 68 trips that began in late 2001 and ended in 2002
[3] Incluye 68 viajes iniciados a fines de 2001 y completados en 2002

TABLE 9. Oceanographic and meteorological data for the Pacific Ocean, April-September 2002. The values in parentheses are anomalies.

TABLA 9. Datos oceanográficos y meteorológicos del Océano Pacífico, abril-septiembre 2002. Los valores en paréntesis son anomalías.

Month—Mes	**4**	**5**	**6**	**7**	**8**	**9**
SST—TSM, 0°-10°S, 80°-90°W (°C)	26.5 (1.1)	24.8 (0.5)	22.7 (-0.4)	21.0 (-0.8)	19.9 (-0.9)	19.9 (-0.6)
SST—TSM, 5°N-5°S, 90°-150°W (°C)	27.6 (0.2)	27.2 (0.2)	27.1 (0.7)	26.0 (0.5)	25.5 (0.5)	25,5 (0.7)
SST—TSM, 5°N-5°S, 120°-170°W (°C)	27.9 (0.3)	28.2 (0.4)	28.4 (0.9)	28.0 (0.9)	27.8 (1.1)	27.8 (1.1)
SST—TSM, 5°N-5°S, 150W°-160°E (°C)	29.1 (0.7)	29.5 (0.8)	29.6 (1.0)	29.5 (0.9)	29.4 (1.0)	29.4 (1.0)
Thermocline depth—Profundidad de la termoclina, 0°, 80°W (m)	70	40	40	50	40	40
Thermocline depth—Profundidad de la termoclina, 0°, 110°W (m)	50	40	60	80	80	70
Thermocline depth—Profundidad de la termoclina, 0°, 150°W (m)	150	130	120	140	160	150
Thermocline depth—Profundidad de la termoclina, 0°, 180°W (m)	180	150	160	170	170	140
Sea level—Nivel del mar, Baltra, Ecuador (cm)	--	--	--	--	--	--
	--	--	--	--	--	--
Sea level—Nivel del mar, La Libertad, Ecuador (cm)	231.4	231.7	228.2	233.1	227.2	222.3
	(0.6)	(-0.6)	(-4.7)	(2.8)	(-0.4)	(-5.6)
Sea level—Nivel del mar, Callao, Perú (cm)	105.6	106.8	100.9	104.1	104.8	94.8
	(-8.9)	(-6.7)	(-11.1)	(-6.0)	(-2.8)	(-11.2)
SOI—IOS	-0.4	-1.2	-0.7	-0.7	-1.6	-0.7
SOI*—IOS*	3.86	-4.11	2.40	0.70	-2.74	-1.62
NOI*—ION*	0.23	-0.13	0.50	-1.94	0.31	-2.72