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

October—December 2002
Octubre—Diciembre 2002

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The

QUARTERLY REPORT

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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

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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.

SPECIAL ANNOUNCEMENT

Vanuatu, which had been provisionally applying the provisions of the Agreement on the International Dolphin Conservation Program since August 26, 1999, ratified that agreement on October 16, 2002.

MEETINGS

The background documents and the minutes or chairman's reports of most of the IATTC and AIDCP meetings described below are, or soon will be, available on the IATTC's web site, www.iattc.org.

Meetings of the IATTC and the AIDCP

The following meetings took place during September and October 2002.

Meeting		Dates
	Meeting of the IATTC	
	Managua, Nicaragua	
9	Working Group on the IATTC Convention	Sep. 30-Oct. 5
	Meetings of the AIDCP	
	La, Jolla, California, USA	
1	Working Group on Vessel Assessments and Financing	Oct. 7
11	Permanent Working Group on Tuna Tracking	Oct. 7
31	International Review Panel	Oct. 8-9
8	Parties to the AIDCP	Oct. 10

Other meetings

In response to a recommendation made at the third meeting of the IATTC's Scientific Working Group, held on May 6-8, 2002, a workshop on diagnostics for stock assessment models was held in La Jolla on October 2-4, 2002. Representatives of the IATTC (Drs. Richard B. Deriso, Shelton J. Harley, Michael G. Hinton, and Mark N. Maunder), Fideicomiso de Investigación para el Desarrollo del Programa de Aprovechamiento del Atún y Protección de Delfines of Mexico, the Secretariat for the Pacific Community, and the U.S. National Marine Fisheries Service (Honolulu and La Jolla) participated in the meeting.

Dr. Richard B. Deriso participated in a meeting of the Scientific and Statistical Committee of the Western Pacific Fishery Management Council of the United States in Honolulu, Hawaii, on October 8-10, 2002.

Dr. Martín A. Hall participated in the second Open Science Meeting of GLOBEC (Global Ocean Ecosystem Dynamics) and the XI PICES (North Pacific Marine Science Organization) meeting at Qingdao, People's Republic of China, on October 17-25, 2002.

Dr. Richard B. Deriso participated in a meeting of the Ocean Sciences Board of the U.S. National Research Council in Washington, D.C., USA, on November 13-15, 2002.

Mr. Ernesto Altamirano participated in the International Fisheries Observer Conference in New Orleans, Louisiana, USA, on November 18-21, 2002, where he gave a talk entitled "The Role of the International Observer Program in the IATTC and the AIDCP."

Mr. Brian S. Hallman represented the IATTC at the Third Preparatory Conference for the Commission for the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific, held in Manila, Philippines, November 18-22, 2002. The meeting continued making slow, but steady, progress toward preparing this new commission for its work when the convention establishing it enters into force. The Federated States of Micronesia was selected from among six applicant nations as the site of the headquarters of the new commission.

Dr. Martín A. Hall participated in the Second International Fishers' Forum: Reducing Unintentional Catch of Seabirds and Sea Turtles, hosted by the Western Pacific Regional Fishery Management Council, in Honolulu, Hawaii, USA, on November 19-22, 2002, where he gave a talk on this subject.

Dr. Robin Allen participated in the FAO International Conference against Illegal, Unregulated and Unreported Fishing, held in Santiago de Compostela, Spain, on November 25-26, 2002. The meeting was organized by the government of Spain and FAO.

Mr. Marlon Román participated in the First International Workshop on Squids and the Second International Symposium on Pacific Squids in La Paz, Mexico, on November 25-29, 2002. At the symposium he gave a presentation entitled "Bites from Jumbo Squid (*Dosidicus gigas*) Damage Tuna Purse-Seine Catches in the Eastern Pacific Ocean." The presentation was coauthored by Dr. Robert J. Olson and Mr. Glenthon Macías, an observer from Manta.

Mr. Kurt M. Schaefer participated in a workshop entitled "Tying One On," conducted in conjunction with the principal investigators' meeting of the Pelagic Fisheries Research Program (PFRP) at the University of Hawaii, on December 4-6, 2002. He presented a report entitled "Tagging Tunas with Electronics: Current Knowledge and Future Research" at the workshop. The participants in the workshop were users and manufacturers of electronic tags, and its objective was to discuss the various attachment techniques utilized with marine fishes. His travel expenses were paid by the PFRP.

Drs. Shelton J. Harley and Mark N. Maunder participated in parts of the 18th North Pacific Albacore Workshop in La Jolla on December 4-11, 2002.

Dr. Robert J. Olson participated in a workshop at the National Center for Ecological Analysis and Synthesis (NCEAS) in Santa Barbara, California, on December 9-13, 2002. The workshop was the third meeting of a Working Group entitled "Models of Alternative Management Policies for Marine Ecosystems," which is funded by NCEAS. NCEAS is supported by the U.S. National Science Foundation and the state of California. The purpose of the Working Group is to use ecosystem modeling to identify robust approaches for incorporating ecological considerations into fisheries management objectives for five large marine ecosystems in the Pacific Ocean, including the tropical eastern Pacific.

Dr. Richard B. Deriso was appointed to the "Committee on Cooperative Research in the National Marine Fisheries Service" of the U.S. National Academies, and he participated in the first meeting of that committee in Seattle, Washington, USA, on December 15-17, 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 247 length-frequency samples and abstracted logbook information for 218 trips of commercial fishing vessels during the fourth quarter of 2002.

Also during the fourth quarter members of the field office staffs placed IATTC observers on 110 fishing trips by vessels that participate in the AIDCP On-Board Observer Program. In addition, 146 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 had fished in the eastern Pacific Ocean (east of 150°W; EPO) during 2002 is about 210,800 cubic meters (m^3) (Table 1). The weekly average at-sea capacity for the fleet, for the weekly periods ending October 1 through December 31, was about 99,469 m^3 (range: 154,400 to 26,600 m^3). The changes of flags and vessel names and additions to and deletions from the IATTC's fleet list for the period of October 1-December 31 are given in Table 2.

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

Catch statistics

The total retained catches of tunas in the EPO for the January 1-December 31, 2002, period were estimated to be about 414 thousand metric tons (mt) of yellowfin, 154 thousand mt of skipjack, and 34 thousand mt of bigeye. The averages and ranges for 1997-2001 are as follows: yellowfin, 296 thousand mt (258 to 395 thousand); skipjack, 182 thousand mt (131 to 263 thousand); bigeye, 47 thousand mt (32 to 70 thousand). For the fourth quarter the average estimated weekly retained catches of yellowfin, skipjack, and bigeye in the EPO were about 7 thousand, 2 thousand, and 1 thousand mt respectively. Summaries of the estimated retained catches, by flag of vessel, are shown in Table 3.

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 16.1 mt (range about 12.7 to 22.6 mt), whereas south of 5°N it averaged about 6.7 mt (range about 4.8 to 9.7 mt). Preliminary estimates for 2002 show the CPDFs of yellowfin north and south of 5°N to have been about 26.8 and 5.7 mt, respectively (Table 4).

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 10.4 mt (range: about 5.4 to 21.5 mt), whereas north of 5°N it averaged about 2.7 mt (range: about 2.2 to 3.8 mt). Preliminary estimates for 2002 show the CPDFs of skipjack south and north of 5°N to have been about 8.4 and 2.2 mt, respectively (Table 5).

The CPDF of bigeye in the EPO by purse seiners during the 2002 report period is estimated to have been about 3.1 mt, which falls within the range of the rates observed during the 1997-2001 period (2.1 to 4.8 mt) (Table 6).

The CPDF of yellowfin in the EPO by pole-and-line vessels during the 2002 report period is estimated to have been about 1.5 mt, which is below the range of the rates observed during the 1997-2001 report periods (1.6 to 3.6 mt) (Table 4). The CPDF of skipjack in the EPO by pole-and-line vessels during the 2002 report period is estimated to have been about 2.5 mt, which is above the range of the rates observed during the 1997-2001 report periods (0.2 to 2.2 mt) (Table 5).

Fishing by vessels not included in the IATTC Regional Vessel Register

During October 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
Mathawmarfach	Federated States of Micronesia
Cosmos Kim	Republic of Korea
Costa De Marfil	Republic of Korea
Deolinda	Republic of Korea
Lady Marion	Republic of Korea
Oriental Kim	Republic of Korea
Sajo Olympia	Republic of Korea
Sajo Victoria	Republic of Korea
Shilla Challenger	Republic of Korea
Shilla Harvester	Republic of Korea
Shilla Jupiter	Republic of Korea
Sara Crystal	Taiwan
Fair Crystal 707	Vanuatu

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 third 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 third quarter.) Two length-frequency histograms are presented for each species. For yellowfin, skipjack, and bigeye, the first shows the data by fishery (area, gear type, and set type) for the third quarter of 2002. The second shows the third-quarter catches for the current year and the previous five years. There were 193 wells sampled during the third 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 193 wells sampled, 178 contained yellowfin. The estimated size compositions of these fish are shown in Figure 2a. The catches of yellowfin during the third quarter of 2002 remained high in dolphin sets in the North and Inshore areas, where the largest fish were encountered. The catch of yellowfin taken in dolphin sets in the South de-

creased to a negligible amount during the quarter, and does not show well in the graph. The average weight was less than half those of the previous two quarters. 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 60 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, but less distinct than during the previous quarter, and a mode of larger fish between 110 and 150 cm was present in the Galapagos and Inshore floating-object fisheries.

The estimated size compositions of the yellowfin caught by all fisheries combined during the third 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 the third quarter of 2002, 12.1 kg, was similar to those of the third quarters of 2000 and 2001, but considerably less than that of the second quarter of 2002 (19.1 kg).

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 193 wells sampled, 97 contained skipjack. The estimated size compositions of these fish are shown in Figure 3a. The catch of skipjack in the floating-object fishery near the Galapagos Islands was three times that of any other fishery. Distinct modes of fish between about 30 and 50 cm had been present in the major fishing areas during the previous three quarters. These modes persisted in the floating-object fisheries of the North and South during the third quarter of 2002, but included substantial amounts of fish as large as 60 cm. However, a mode of larger fish caught in the Galapagos and Inshore floating-object fisheries appeared during the third quarter, making those distributions very left-skewed. Most of the fish taken by the fisheries on unassociated fish in the North and South were between about 50 and 65 cm in length. 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 third quarter of 1997-2002 are shown in Figure 3b. The average weight, 3.3 kg, is less than those for the third quarters of the previous three years, but greater those of the previous two quarters of 2002.

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 193 wells sampled, 67 contained bigeye. The estimated size compositions of these fish are shown in Figure 4a. In contrast to the first two quarters of 2002, when most of the bigeye were caught in the floating-object fishery of the South, during the third quarter most of the fish were caught in the floating-object fisheries of the North and Galapagos areas. The two distinct modes apparent in this fishery during the first two quarters of 2002, one between 40 and 55 cm and the other between 125 and 150 cm, were still present during the third quarter. However the upper bound of the first mode shifted right to 65 cm and the mode of larger bigeye widened to 90 to 140 cm. 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 third 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 three quarters of 2002 was 5,591 metric tons (mt). The corresponding amounts for 1997-2001 ranged from 3,128 to 12,489 mt.

Observer program

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), were 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) was to sample approximately one-third of the trips by vessels of its fleet, and IATTC observers were to sample the remainder of those trips.

IATTC, PNAAPD, PNOV, and PROBECUADOR observers departed on 154 fishing trips aboard purse seiners with carrying capacities of more than 363 mt during the fourth quarter of 2002. Preliminary coverage data for these vessels during the quarter are shown in Table 7.

Training

During the fourth quarter IATTC staff members conducted an observer training course in Manta, Ecuador, from November 25 to December 12, 2002, for 18 trainees; 9 from Ecuador, 5 from Venezuela, and 2 each from El Salvador and Panama. In addition, an IATTC staff member participated in the first observer training course conducted by the European Union's new national observer program, the Programa Nacional de Observadores de Tunidos, Océano Pacifico (PNOT). That course, which included 12 trainees, took place in Santa Cruz de Tenerife, Spain, during the period of October 16-31, 2002.

RESEARCH

Reproductive biology of bigeye tuna

A 2-year program to sample the gonads of bigeye, carried out by IATTC observers aboard purse-seine vessels fishing in the EPO, was initiated in January 2000. During 2000 and 2001 1,869 fish, ranging in length from 80 to 163 cm, were sampled from 120 sets made during 21 trips of purse-seiners. Only observers with previous experience in classification of sex, based on sampling gonads in the field, were utilized for this program.

In order to collect ovarian tissue samples from bigeye captured in suitable spawning habitat, the observers were instructed to sample only fish caught in waters with surface temperatures of 24°C or greater. Attempts were made to sample 20 fish from each set. The length and sex of each fish were recorded, along with catch information. For each fish identified as a female, a cross section from one of the two ovaries was removed and preserved in 10-percent neutral buffered formalin. The two ovaries were then placed in a plastic bag with a duplicate label and frozen. The testes of the males were not kept.

Of the 1,869 fish sampled, 1,006 (53.8 percent) of the fish were males and 863 (46.2 percent) were females. The overall sex ratio was significantly different ($\chi^2_{.05,1} = 10.94$) from the expected 1:1 ratio. Chi-square tests for the fish of individual 5-cm length classes, however, indicated no significant deviations from the expected 1:1 ratio (Table KMS1).

Histological examination of these tissues is necessary for classification of the fish as to sexual maturity. A portion of each sample of ovarian tissue was embedded in paraffin, sectioned at approximately 6 µm, and stained with hematoxylin, followed by eosin counterstain. The resulting slides were examined by light microscopy, and the fish were classified as active-mature, inactive-mature, or immature.

The smallest female bigeye classified as being sexually mature was 120 cm long,, and only about 4 percent of the 70 fish of 120.0 to 124.9 cm length interval were classified as sexually mature (Table KMS2). About 54 percent of the 35 fish of the of 140.0-144.9 cm length interval and 78 percent of the 9 fish of the 150.0-154.9 cm length interval were classified as sexually mature.

The gonad samples and corresponding data collected during 2000-2001 will be processed and analyzed during 2003 in order to provide an initial evaluation of the reproductive biology of bigeye tuna in the EPO, including spawning habitat, maturity, fecundity, and sex ratios.

Tuna tagging

Equatorial eastern Pacific Ocean

The IATTC conducted a tagging cruise in the equatorial eastern Pacific Ocean from March 1 to May 24, 2002, on the chartered baitboat *Her Grace*. Preliminary results from that tagging cruise can be found in the IATTC Quarterly Reports for April-June and July-September, 2002. The following is an update on this tagging project, as of the end of December 2002.

The numbers of releases and returns, as of the end of December 2002, are as follows:

Species	Tag type	Released	Returned	Percent returned
Bigeye	Conventional	1,418	477	33.6
Bigeye	Archival	26	7	26.9
Skipjack	Conventional	257	29	11.3
Skipjack	Archival	36	1	2.7
Yellowfin	Conventional	195	26	13.3

All but four of the fish returned to date have been recaptured by purse seine vessels fishing in the vicinity of fish-aggregating devices (FADs), the exceptions being one yellowfin and one skipjack caught

in separate sets on dolphin-associated fish and two bigeye caught in a set on unassociated fish. Accurate information on the positions and dates of recapture has been obtained for 465 of the 484 bigeye returned to date.

The times at liberty for the 477 bigeye with conventional tags that were returned ranged from 4 to 216 days (Figure 5). Of these, 23.7 percent were recaptured within 100 nautical miles (nm) of the release position, 94.8 percent within 1,000 nm of that position, and 98.3 percent within 2,000 nm of that position. The greatest net movement was 3,038 nm, in a west-northwesterly direction. There was a west to south-westerly directional component to the majority of the bigeye recaptures (Figure 6).

The 26 bigeye released with archival tags received Mk9 tags furnished by Wildlife Computers at no charge, in a continuing testing agreement of new products with the IATTC. The lengths of release of these fish ranged from 49 to 95 cm. To date, seven of those fish have been returned. Their linear displacements ranged from 21 to 655 nm, their times at liberty from 18 to 164 days, and their lengths at recapture from 52 to 109 cm.

The lengths at release of the 29 skipjack with conventional tags that were returned ranged from 43 to 75 cm. The linear displacements of these fish ranged from 4 to 1,303 nm, the times at liberty from 16 to 141 days, and the lengths at recapture from 57 to 76 cm. The fish that traveled 1,303 nm moved in a westerly direction, and was at liberty for 102 days.

Of the 36 skipjack tagged with archival tags, 30 received dummy tags and 6 received functional recycled Mk7 tags manufactured by Wildlife Computers. These fish ranged in length from 47 to 67 cm at release. As of the end of December 2002, only one fish with an archival-tag (a dummy tag) had been returned. It was recaptured 291 nm west of the release location after 122 days at liberty, and was 65 cm long at that time.

The lengths at release of the 26 yellowfin with conventional tags that were returned ranged from 30 to 66 cm. The times at liberty ranged from 12 to 206 days. All of the recaptures were made within 1,000 nm of the release locations, except for one fish that was recaptured 1,662 nm west of the release location after 109 days at liberty.

Northern Baja California

The IATTC conducted a pilot yellowfin tuna-tagging project in collaboration with the Tagging of Pacific Pelagics (TOPP) program, which is being conducted within the framework of the Census of Marine Life (COML), an international research program whose goal is assessing and explaining the diversity, distribution, and abundance of marine organisms in the world's oceans. Two IATTC staff members spent the period of October 9-19, 2002, on a regularly-scheduled trip aboard the long-range sport-fishing vessel *Royal Star*, on which they tagged 281 yellowfin tuna. This included 25 fish with LTD2310 archival tags manufactured by LOTEK Fish and Wildlife Monitoring Systems, 2 with pop-up archival transmitting (PAT) tags manufactured by Wildlife Computers, and 254 with conventional plastic dart tags.

The numbers of releases and returns, as of the end of December 2002, are as follows:

Location	Tag type	Released	Returned	Percent returned
NW of Magdalena Bay	Conventional	245	24	9.8
NW of Magdalena Bay	Archival	25	6	24.0
Alijos Rocks	Conventional	9	4	44.4
Alijos Rocks	PAT	2	2	100.0

All the fish with archival tags and 245 of those with conventional tags were released northwest of Magdalena Bay at approximately 25°44'N-113°08'W. The lengths at release of the fish with archival tags ranged from 60 to 98 cm, and those with conventional tags from 51 to 102 cm.

The six fish with archival tags that have been returned were at liberty from 10 to 14 days. All of these were recaptured in unassociated sets by purse-seine vessels within a few miles of the release location. The 24 fish with conventional tags were at liberty for 1 to 60 days, with 20 of them being at liberty less than 30 days. Twenty-one of these were recaptured within 5 nm of the release location, two of them 38 nm from that location, and one of them 78 nm from it.

Eleven yellowfin were released near Alijos Rocks at approximately 24°58'N-115°47'W, nine with conventional tags and two with PAT tags. Those with conventional tags ranged in length from 73 to 121 cm, and the two with PAT tags were 113 and 122 cm in length. All of the six recaptures of these fish were made near the location of release by long-range sportfishing vessels. The four fish with conventional tags were at liberty 7 to 28 days.

The two PAT tags were provided by Wildlife Computers at no charge, as this was the first field deployment of this latest PAT design. The first PAT-tagged fish was recaptured 10 days after release, the same day that the tag was scheduled to pop off. The tag did not function correctly, so the tag was still attached when the fish was caught. Four days of data were downloaded from the tag, however. The second PAT-tagged fish was recaptured 52 days after release. This tag also did not pop off as scheduled. Unfortunately, when the fish was recaptured the PAT tag was gone, and it had a conspicuous wound in the dorsal musculature at the point of attachment of the tag, indicating that it had been torn out. Both fish were reported to have been in excellent physical condition when they were recaptured.

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 (170,000 L capacity) at the Achotines Laboratory. At the end of November, 5 of the 12 fish remained. Two of these were sacrificed and three were moved to Tank 1 (1,362,000 L capacity). It is anticipated that the three fish moved to Tank 1 will spawn and provide data recorded in their archival tags on internal temperature variability associated with spawning.

A second trial with archival-tagged yellowfin will begin in early 2003. In preparation for this trial, Tank 2 was stocked with 16 yellowfin (2.5 to 3.0 kg each) captured during December. Capture efforts will continue in January 2003 until there are 20 healthy yellowfin in Tank 2.

Early life history studies

Yellowfin broodstock

The yellowfin broodstock in Tank 1 (1,362,000 L) at the Achotines Laboratory spawned daily during October through December. Spawning occurred as early as 9:20 p.m. and as late as 10:35 p.m. The water temperatures in the tank ranged from 27.8° to 28.8°C during the quarter. The numbers of eggs collected after each spawning event ranged from about 56,000 to 780,000.

During the quarter two fish, an 83-kg male and a 40-kg female, died, both after striking the tank wall. Three of five remaining fish carrying archival tags (see the section entitled ***Tuna tagging***) were moved from Tank 2 to Tank 1 during November. At the end of December there were three size groups of fish in Tank 1, including five 59- to 82-kg fish, nine 19- to 32-kg fish, and one 14-kg fish.

Rearing of yellowfin eggs, larvae, and juveniles

During the quarter the following parameters were recorded for most of the 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.

A size series of yellowfin larvae, from hatching to 108 hours after hatching, was collected and preserved for Dr. Kathryn Dickson, Department of Biological Science, California State University at Fullerton, to examine the development of their muscle fibers.

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 2 kg, have been raised in two 3.7-m diameter tanks 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 unfertilized. In October 2002 they resumed spawning, and some of the eggs collected were fertilized. No further spawning occurred during the rest of the quarter.

During the quarter the broodstock of 42 snappers that was established in 1996 continued to spawn intermittently. The larvae that hatched from fertilized eggs of the broodstock in August 2002 were used for rearing experiments, and at the end of the quarter there were approximately 4,000 juvenile snappers being maintained in concrete tanks at the laboratory. The juveniles will be transferred to floating sea pens during the next quarter for growth studies.

There are currently nine juvenile corvina in captivity. These will be raised to maturity, and their larvae 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, a sportfishing boat, the *Warrior*, and its owner, Mike Foster, fished for sailfish in the vicinity of the Achotines Laboratory. Five sailfish were hooked during a three-day period in December; three escaped capture, and two were towed toward the laboratory. One of the towed fish was released after it became distressed. The other was successfully brought back to the laboratory and placed in a tank, but it died after about 1 hour. Efforts to catch and transport live sailfish to the Achotines Laboratory will continue during 2003.

Inter-agency cooperation

During November 2002 Dr. Robin Allen signed a memorandum of understanding with the Autoridad Marítima de Panamá concerning the use of the facilities at the Achotines Laboratory, and another with the Smithsonian Tropical Research Institute (STRI) providing for use of the Achotines Laboratory by STRI scientists. As part of the STRI agreement, the Achotines Laboratory will appear on the STRI web site and in STRI brochures as an associated field research laboratory.

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 greater-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.

During September 2002 there was a band of water more than 1°C above normal extending along the equator from about 180° to 125°W, with a much smaller band of water more than 2°C above normal within it extending from about 170°W to 160°W (IATTC Quarterly Report for

July-September 2002, Figure 7). During October, November, and December the band of warm water was more pronounced, extending from about 180° (175°E in November) to about 90°W (85°W in December) (Figure 7). During October and November, as had been the case during September, there were smaller areas of warm water south of 10°S and far offshore, but these were no longer evident in December. In December the SSTs in the Gulf of California and the west coast of Mexico north of 20°N were more than 1°C above normal. The data in Table 10, for the most part, indicate that there was weak El Niño event during the fourth quarter of 2002. According to the Climate Diagnostics Bulletin of the U.S. National Weather Service for December 2002, "Most … forecasts indicate that El Niño conditions will continue through the northern spring of 2003. Thereafter the forecasts are more uncertain, during a time of the year when all of the techniques have difficulty in making skillful forecasts. Historically, most of the techniques have demonstrated more skill in forecasting the onset of El Niño episodes than in forecasting their demise."

GEAR PROGRAM

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

[this paragraph added on May 20, 2003] Four AIDCP seminars for fishing captains were held during the quarter, one by the IATTC staff in Panama, R.P, on December 3, and three by the Venezuelan national observer program (PNOV), one in Punta Fijo, Venezuela, on December 18, one in Cumaná, Venezuela, on December 20, and one in Panama, R.P., on December 27.

DOLPHIN-SAFE DESIGNATION

The International Dolphin Conservation Program Act, which was passed by the United States before it ratified the Agreement for the International Dolphin Conservation Program, requires that studies be undertaken to address the question as to whether the purse-seine fishery for tunas is having a significant adverse impact on any depleted dolphin stock in the EPO. The Act calls upon the Secretary of Commerce of the United States to decide whether the fishery is having such an impact, and, if so, tunas caught in sets made on fish associated with dolphins may not be sold with a dolphin-safe label in the United States, even if no dolphin mortalities occurred in those sets. In making this finding, the Secretary is required to consider, in addition to the above studies, information obtained under the International Dolphin Conservation Program, and any other relevant information.

The Act also requires that, in the conduct of this study, the Secretary consult with the IATTC and the U.S. Marine Mammal Commission. In this regard, on September 18, 2002, Dr. Robin Allen received from Dr. Michael F. Tillman, Director of the Southwest Fisheries Science Center (SWFSC) of the U.S. National Marine Fisheries Service (NMFS), a copy of the "Report of the Scientific Research Program under the International Dolphin Conservation Program Act" for review and comment by the IATTC.

A letter to the Secretary of Commerce prepared by the IATTC staff in October 2002 is available on the IATTC web site, www.iattc.org, under "Dolphin Safe."

The following is from the web site of the U.S. NMFS, www.nmfs.noaa.gov/pr/PR2/Tuna_Dolphin/tunadolphin.html:

"On December 31, 2002, the National Marine Fisheries Service (NOAA Fisheries), on behalf of the Secretary of Commerce, made a finding, based on the results of required research, information obtained under the International Dolphin Conservation Program (IDCP), and any other relevant information, that the intentional deployment on or encirclement of dolphins with purse seine nets is not [emphasis added] having a "significant adverse impact" on any depleted dolphin stock in the ETP. This finding means that the definition of dolphin-safe is that dolphins can be encircled or chased, but no dolphins can be killed or seriously injured in the set in which the tuna was harvested. The finding became effective immediately and applies to tuna harvested in the ETP by purse seine vessels with carrying capacity greater than 400 short tons and sold in the United States."

PUBLICATIONS

IATTC Annual Report for 2001

IATTC Stock Assessment Report 3

Outside journals

Allen, Robin. 2002. Las pesquerías de atunes tropicales en el OPO. Industrias Pesqueras, 1810: 22-24.

Loew, Ellis R., William N. McFarland, and Daniel Margulies. 2002. Developmental changes in the visual pigments of the yellowfin tuna, *Thunnus albacares.* Mar. Fresh. Behav. Physiol., 35 (4): 235-246.

Maunder, Mark N. 2002. The relationship between fishing methods, fisheries management and the estimation of maximum sustainable yield. Fish and Fisheries, 3 (4): 251-260.

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.

Schaefer, Kurt M., and Daniel W. Fuller. 2002. Movements, behavior, and habitat selection of bigeye tuna (*Thunnus obesus*) in the eastern equatorial Pacific, ascertained through archival tags. U.S. Nat. Mar. Fish. Serv., Fish. Bull., 100 (4): 765-788.

ADMINISTRATION

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. Shelton J. Harley was awarded the degree of Doctor of Philosophy from Dalhousie University, Halifax, Nova Scotia, Canada, on October 19, 2002.

Dr. Ashley J. Mullen resigned from his position at the IATTC on December 13, 2002. Dr. Mullen had been employed by the IATTC since 1981, and during his period of employment he authored or co-authored a number of significant papers on various aspects of tuna biology. He will be missed, but everyone wishes him well in his future endeavors.

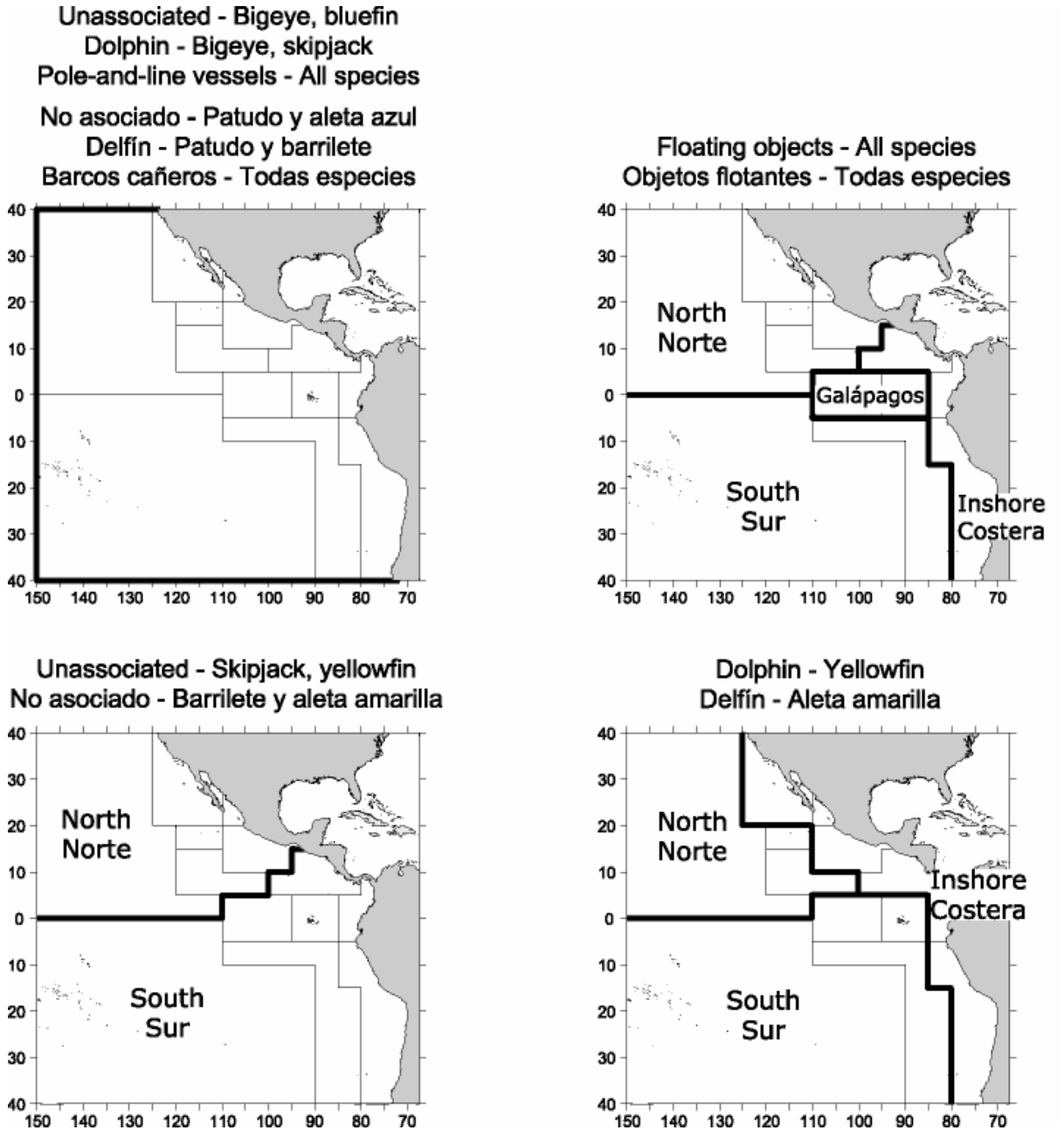

FIGURE 1. Spatial extents of the fisheries defined by the IATTC staff for stock assessment of yellowfin, skipjack, and bigeye in the EPO. The thin lines indicate the boundaries of the 13 length-frequency sampling areas, and the bold lines the boundaries of the fisheries.
FIGURA 1. Extensión espacial 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.

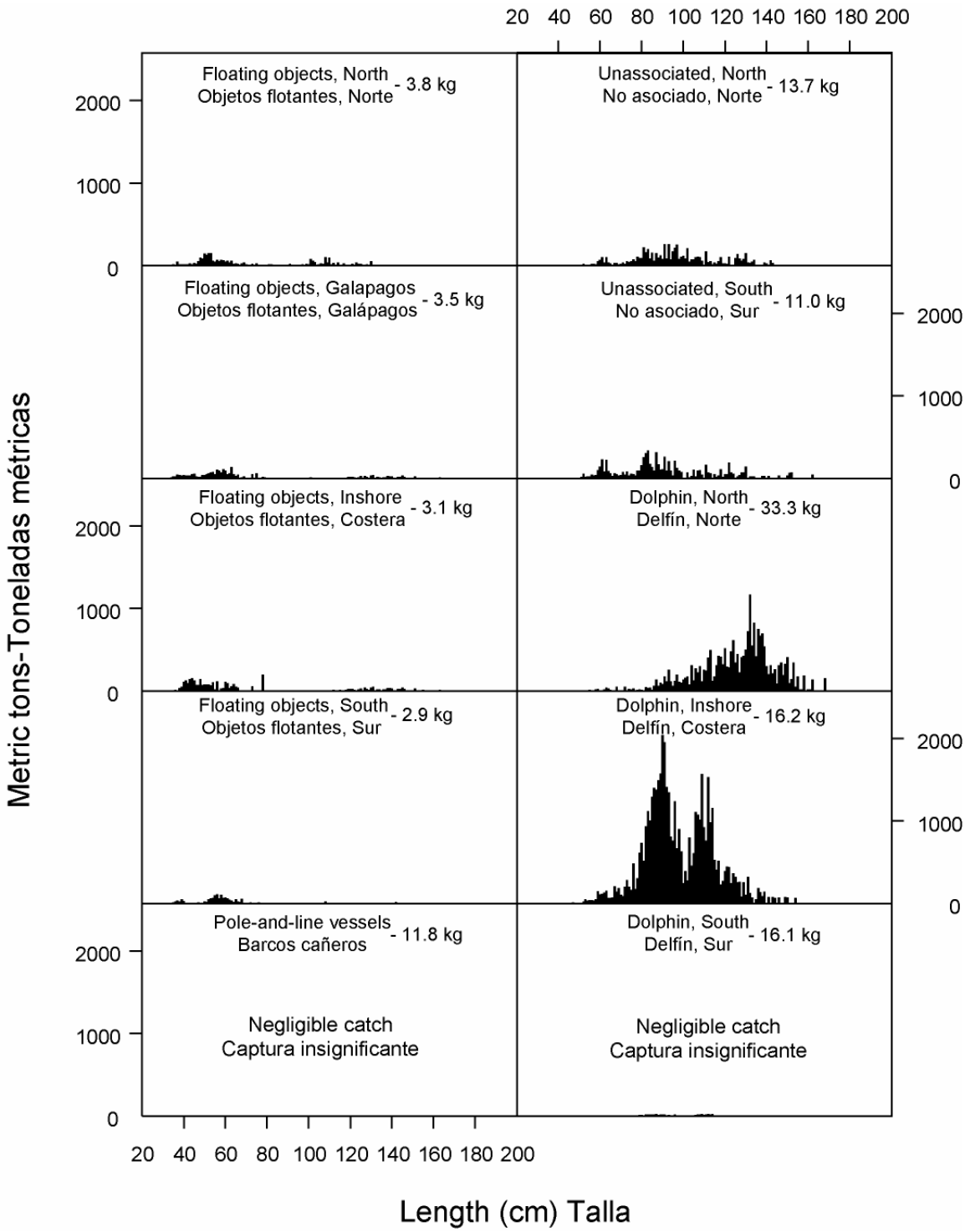

FIGURE 2a. Estimated size compositions of the yellowfin caught in each fishery of the EPO during the third quarter of 2002. The average weights of the fish in the samples are given at the tops of the panels.

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

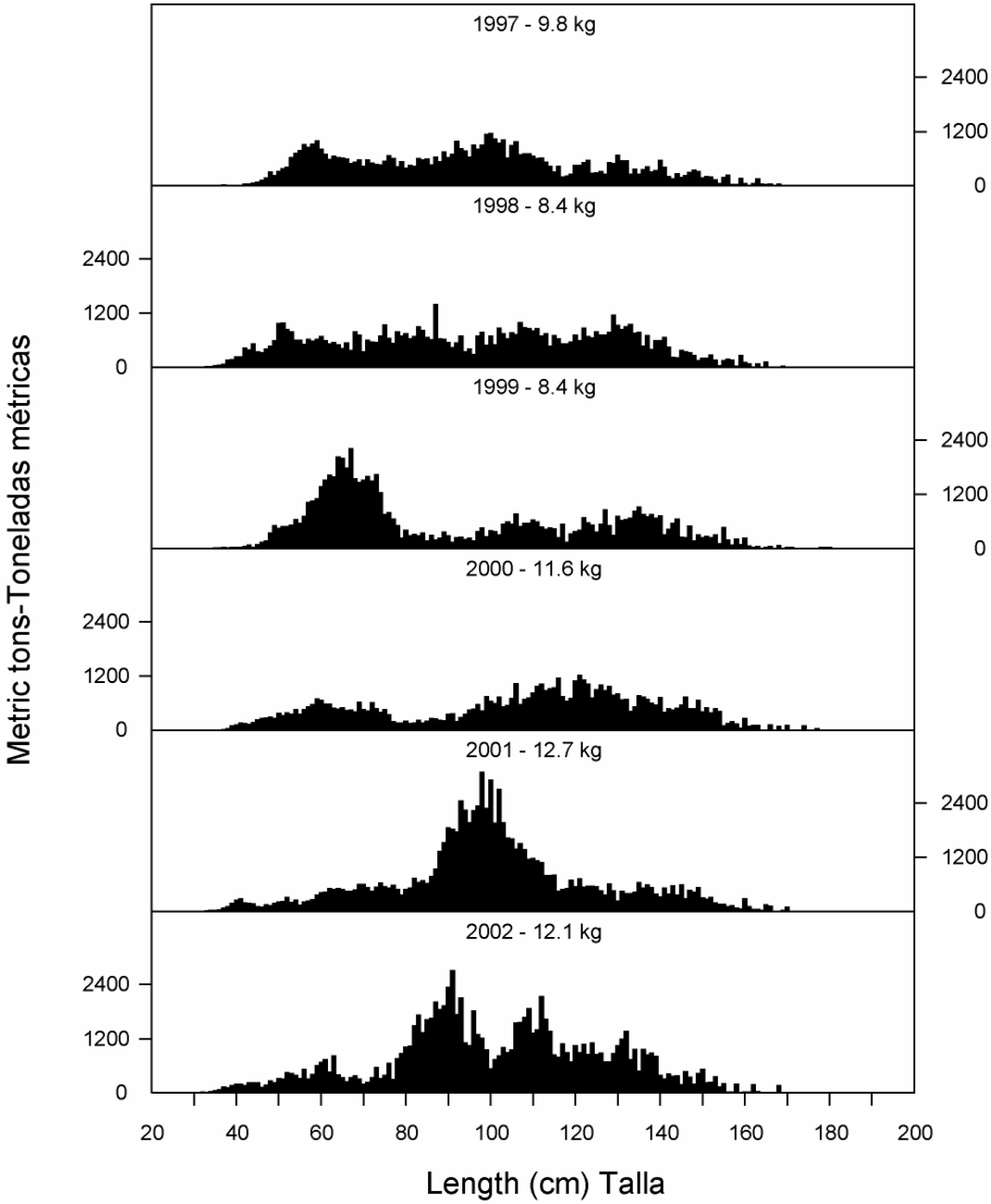

FIGURE 2b. Estimated size compositions of the yellowfin caught in the EPO during the third quarter of 1997-2002. The average weights of the fish in the samples are given at the tops of the panels.

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

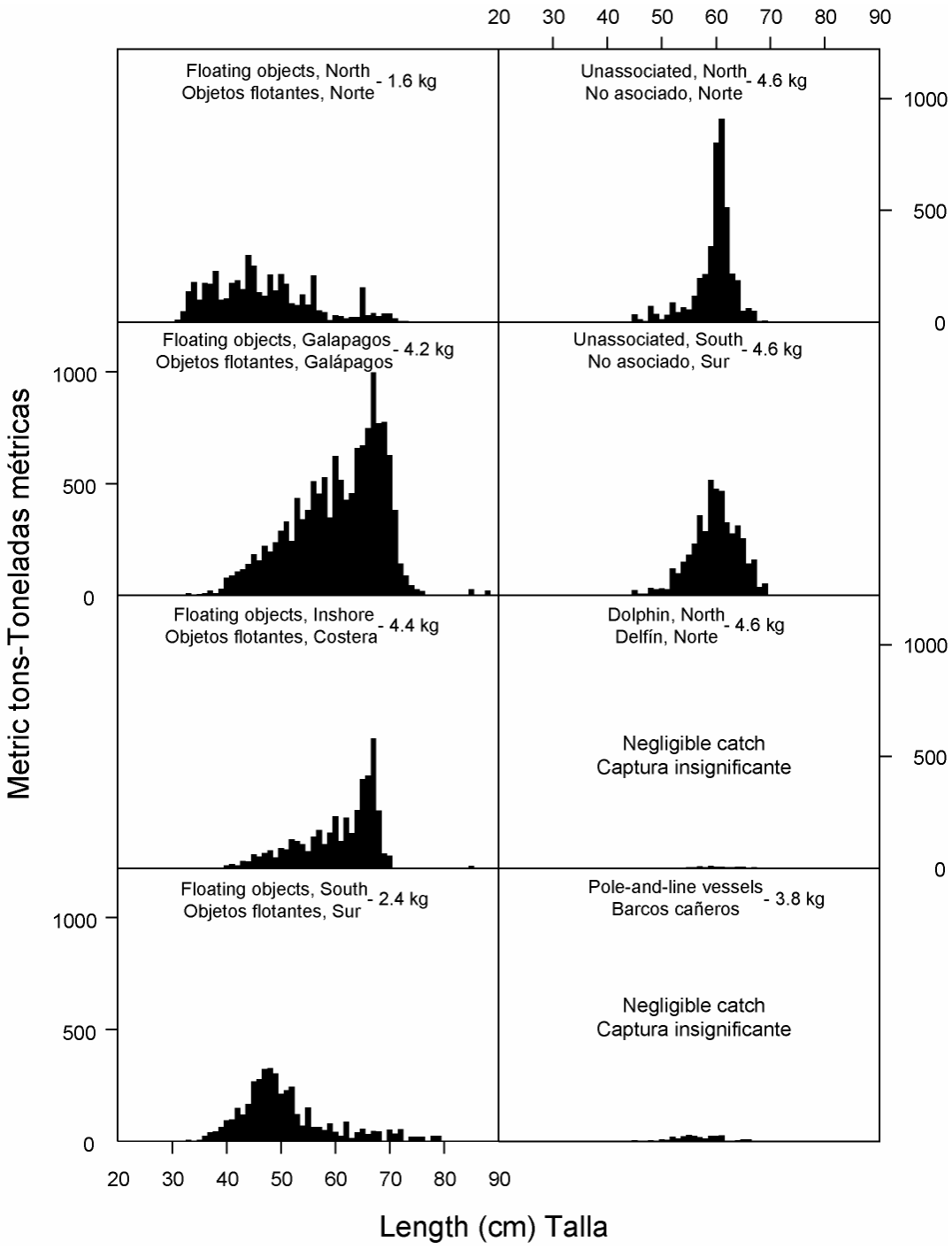

FIGURE 3a. Estimated size compositions of the skipjack caught in each fishery of the EPO during the third quarter of 2002. The average weights of the fish in the samples are given at the tops of the panels.

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

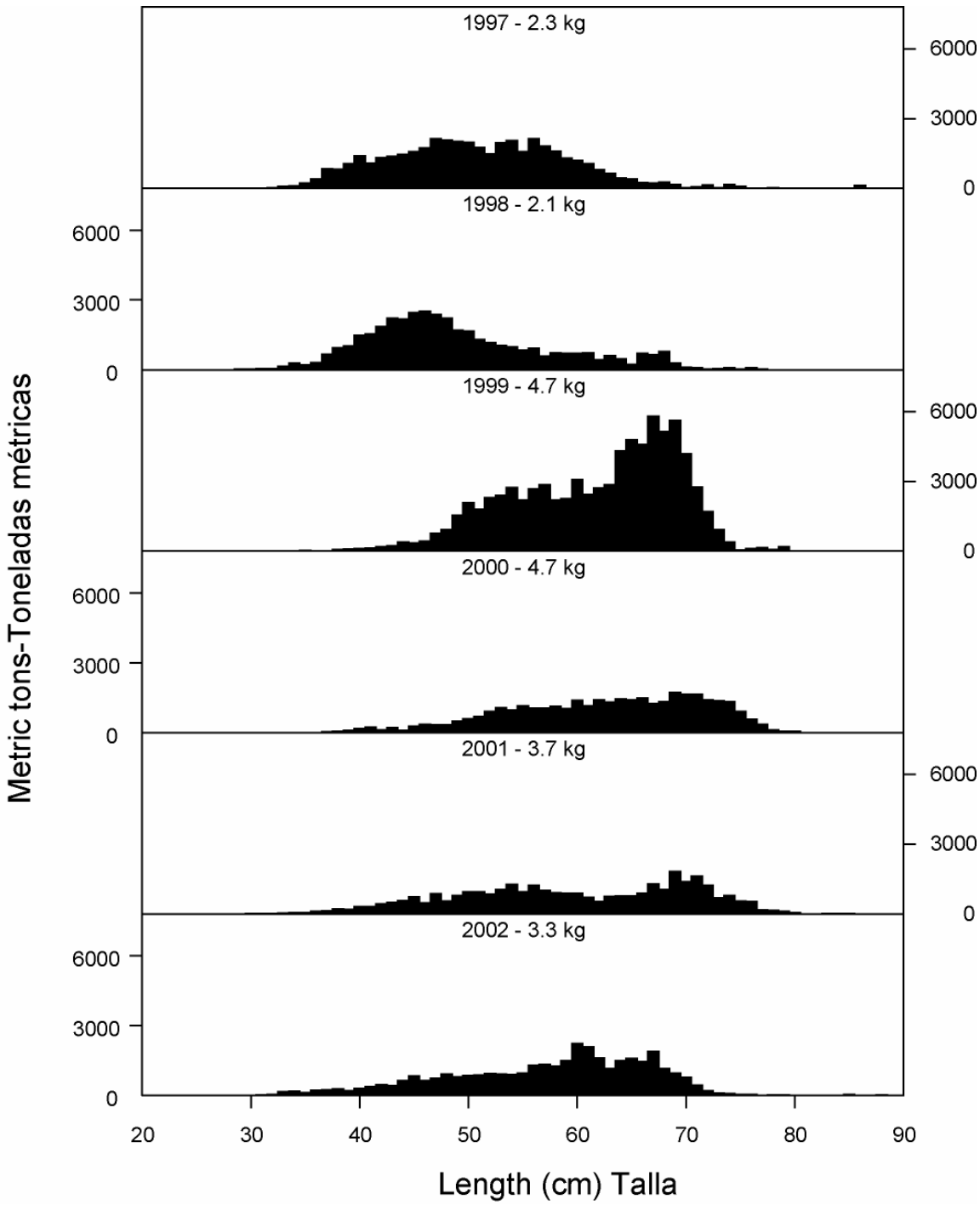

FIGURE 3b. Estimated size compositions of the skipjack caught in the EPO during the third quarter of 1997-2002. The average weights of the fish in the samples are given at the tops of the panels.

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

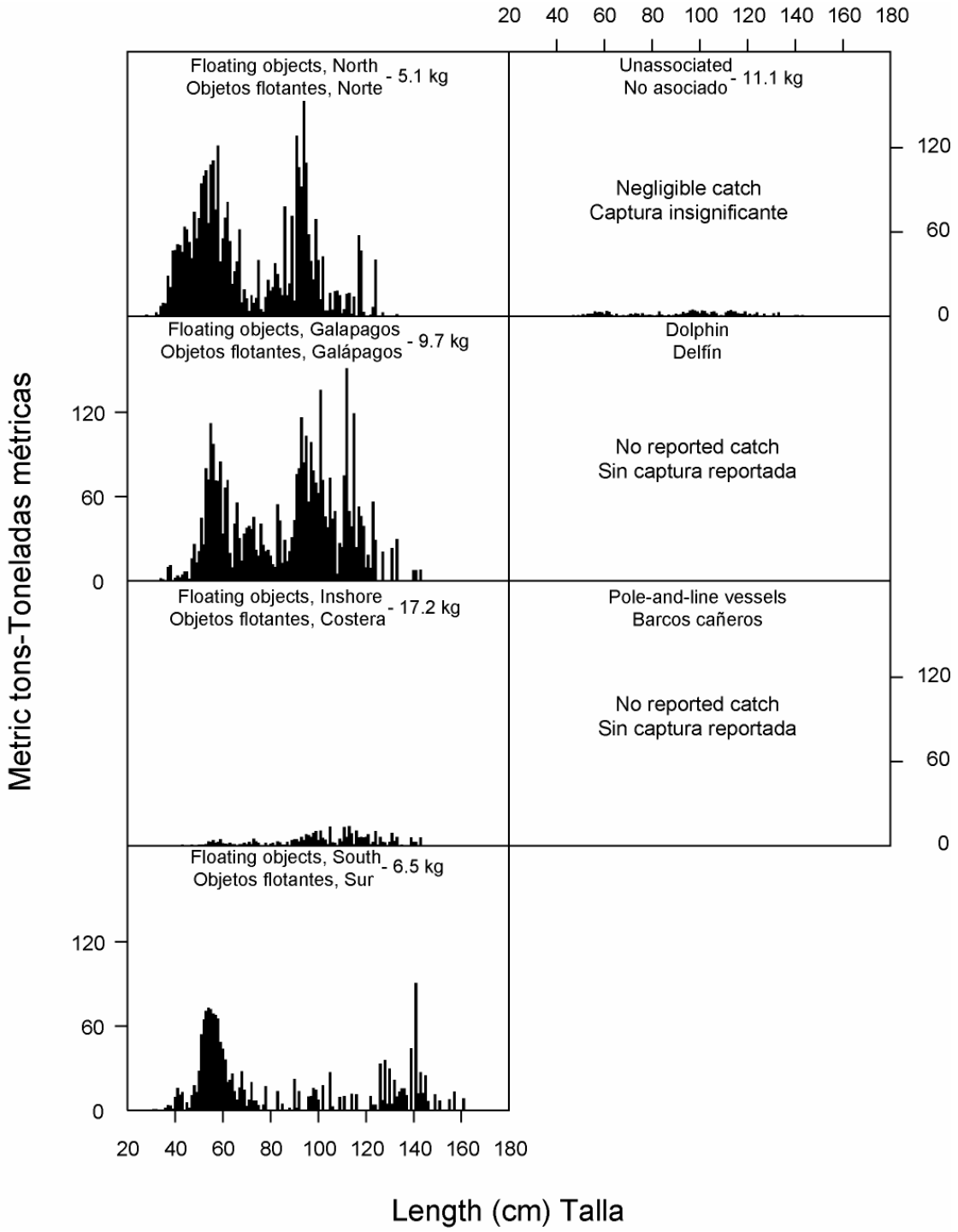

FIGURE 4a. Estimated size compositions of the bigeye caught in each fishery of the EPO during the third quarter of 2002. The average weights of the fish in the samples are given at the tops of the panels.

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

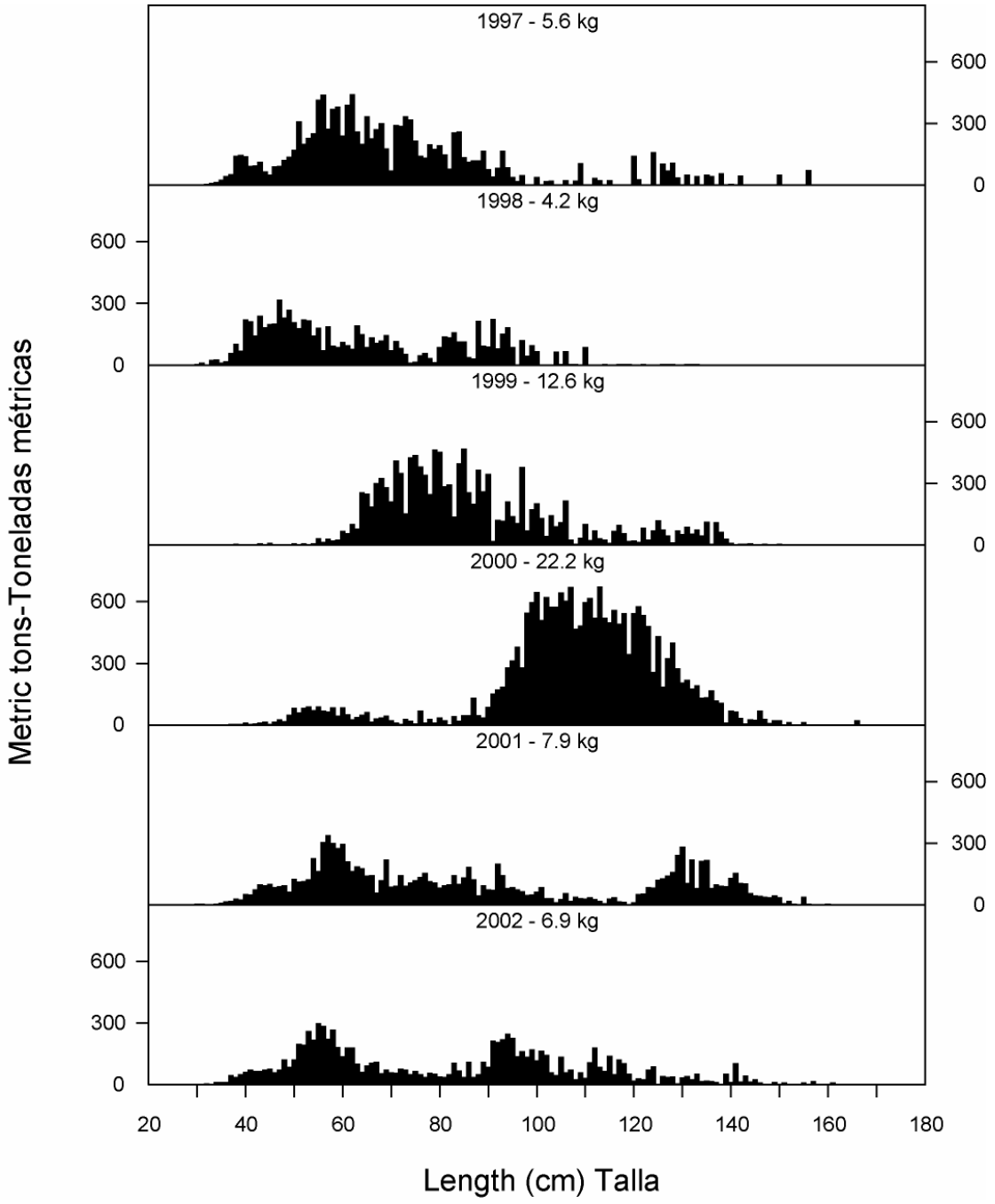

FIGURE 4b. Estimated size compositions of the bigeye caught in the EPO during the third quarter of 1997-2002. The average weights of the fish in the samples are given at the tops of the panels.

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

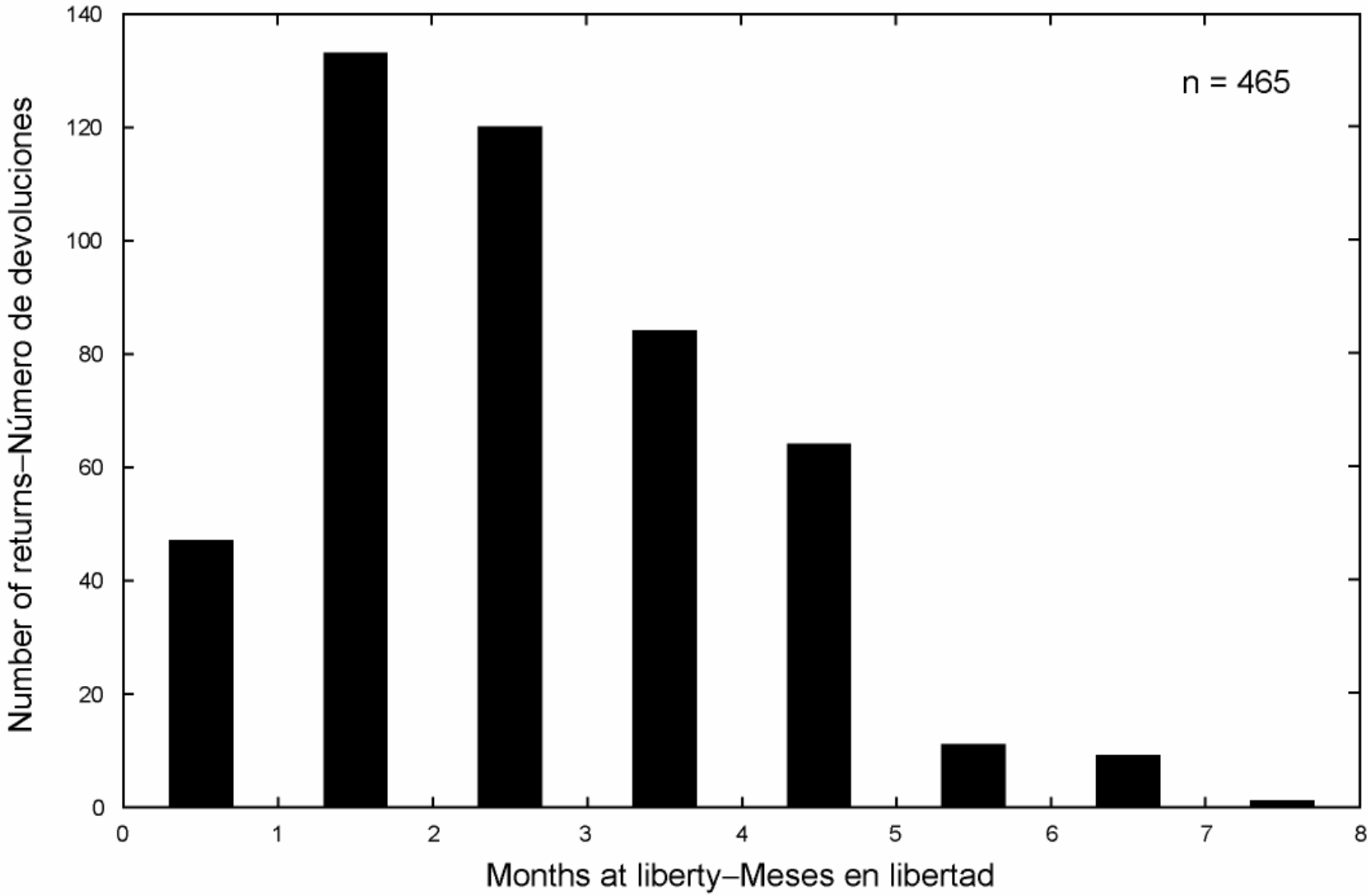

FIGURE 5. Numbers of returns of tagged bigeye tuna, by times at liberty.
FIGURA 5. Número de devoluciones de atunes patudo marcados, por tiempo en libertad.

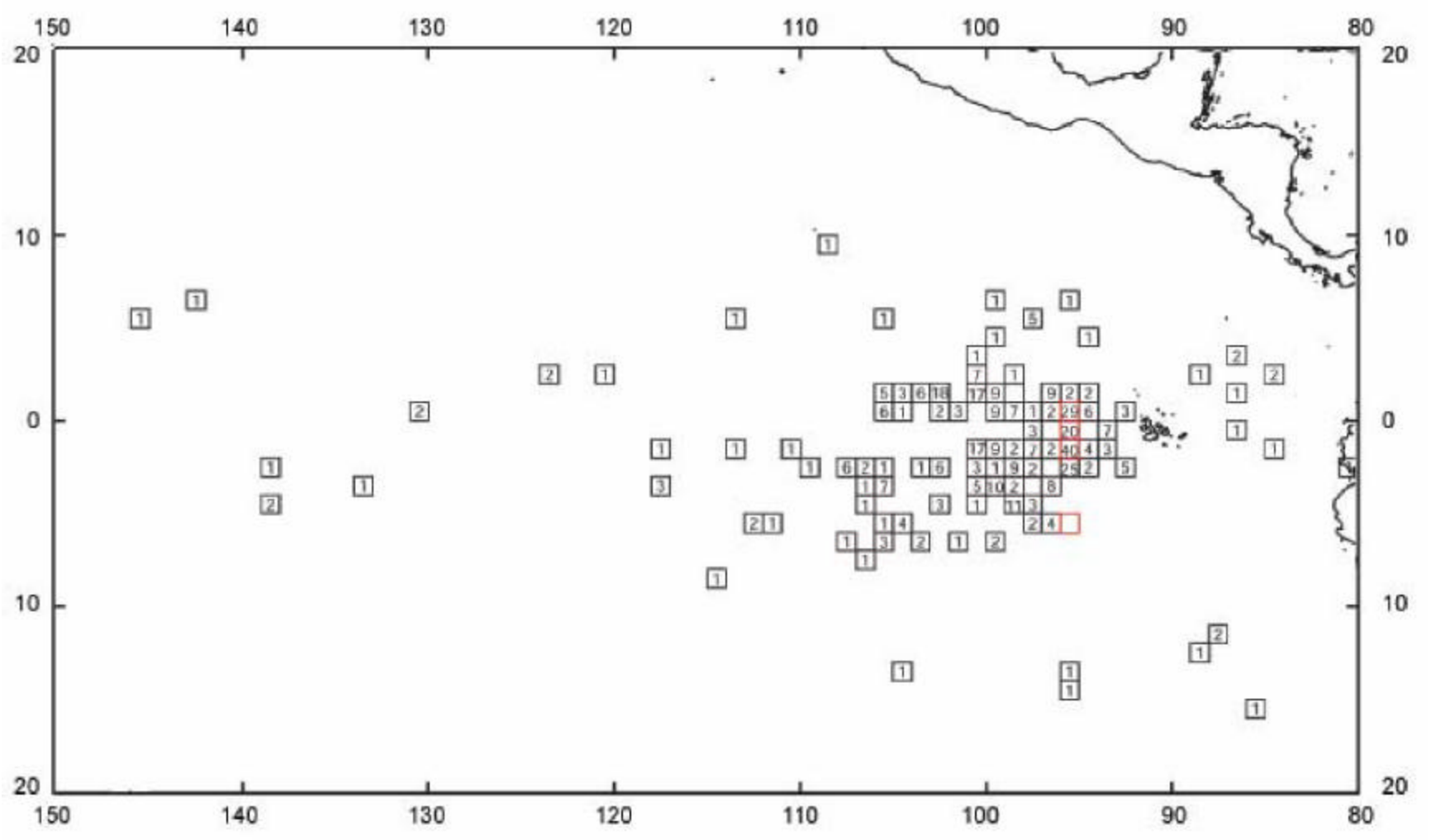

FIGURE 6. Locations of release (1-degree areas with red borders) and recapture (1-degree areas with numerals) for bigeye tuna tagged with conventional and archival tags in 2002.
FIGURA 6. Puntos de liberación (áreas de 1° con borde rojo) y recaptura (áreas de 1° numerados) de atunes patudo marcados con marcas convencionales y archivadoras en 2002.

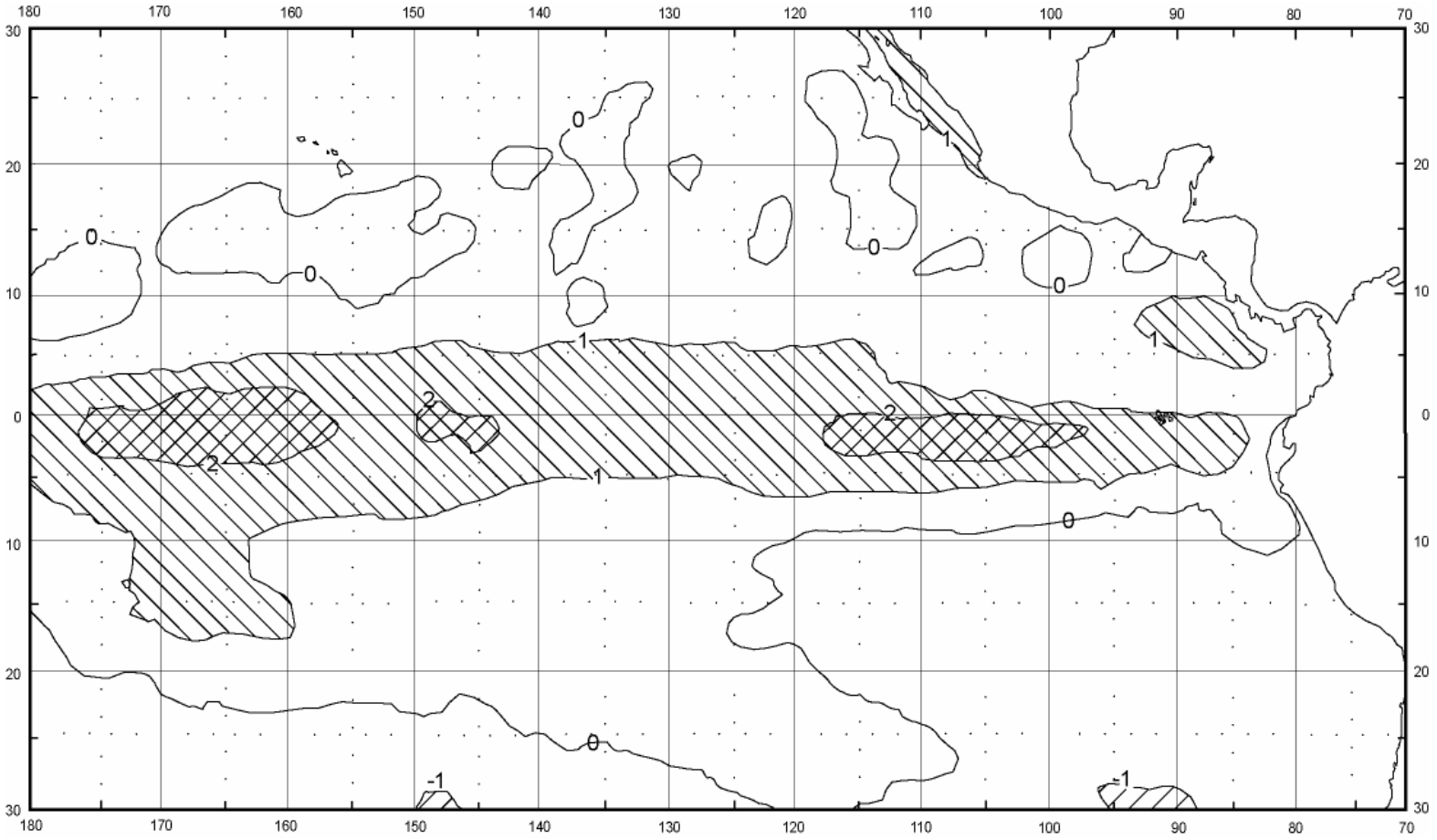

FIGURE 7. Sea-surface temperature (SST) anomalies (departures from long-term normals) for December 2002, based on data from fishing boats and other types of commercial vessels.
FIGURA 7. Anomalías (variaciones de los niveles normales a largo plazo) de la temperatura superficial del mar (TSM) en diciembre 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	2	1,018
Bolivia	PS	-	-	2	1	-	7	10	7,910
Colombia	PS	-	-	2	1	2	5	10	7,397
Ecuador	PS	-	7	12	13	8	37	77	48,306
	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	11	42	62	53,855
	PL	1	3	6	-	-	-	10	1,271
Nicaragua	PS	-	-	-	-	-	1	1	1,229
Panamá	PS	-	-		2	-	9	11	12,502
Perú	PS	-	-	-	-	-	1	1	1,022
El Salvador	PS	-	-	-	-	-	3	3	5,686
USA—EE.UU.	PS	-	-	2	-	2	9	13	14,105
Venezuela	PS	-	-	-	-	-	25	25	32,015
Vanuatu	PS	-	-	-	-	-	5	5	5,226
Unknown— Desconocida	PS	-	-	-	-	-	1	1	486
All flags— Todas banderas	PS	-	7	24	21	23	154	229	
	PL	2	3	6	-	-	-	11	
	PS + PL	2	10	30	21	23	154	240	
					Capacity—Capacidad				
All flags— Todas banderas	PS	-	758	4,397	5,960	9,924	188,416	209,455	
	PL	85	293	925	-	-	-	1,303	
	PS + PL	85	1,051	5,322	5,960	9,924	188,416	210,758	

TABLE 2. Changes in the IATTC fleet list recorded during the fourth quarter of 2002. PS = purse seine.
TABLA 2. Cambios en la flota observada por la CIAT registrados durante el cuarto trimestre de 2002. PS = cerquero.

Vessel name	Flag	Gear	Capacity (m^3)	Remarks
Nombre del buque	**Bande-ra**	**Arte**	**Capaci-dad (m^3)**	**Comentarios**
Vessels added to the fleet—Buques añadidos a la flota				
New entries—Nuevos ingresos				
Caribbean Star No.31	Belize	PS	209	
Contadora I	Panamá	PS	914	
Cape Ferrat	USA	PS	1,592	
Evelina Da Rosa	USA	PS	1,700	
Legacy	USA	PS	1,275	
Re-entries—Reingresos				
				Now—Ahora
Gabriela A	Ecuador	PS	323	
Roberto A	Ecuador	PS	323	
Monteneme	España	PS	1,217	El Salvador
Sea Encounter	USA	PS	2,123	
Sea Scout	USA	PS	169	
Changes of name or flag—Cambios de nombre o pabellon				
				Now—Ahora
Don Alvaro	Panamá	PS	180	Bolivia
Don Luis	Panamá	PS	180	Bolivia
Changes of carrying capacity—Cambios de capacidad de acarreo				
Jose Gerardo	México	PS	351	Size class changed to 5
				Tamaño cambiado a clase 5
Carmen D	Vanuatu	PS	503	Size class changed to 6
				Tamaño cambiado a clase 6
Vessels removed from fleet—Buques retirados de la flota				
Eli	Ecuador	PS	984	Sunk–Hundido
Southern Explorer	Ecuador	PS	244	Sunk–Hundido

TABLE 3. Preliminary estimates of the retained catches of tunas in the EPO from January 1 through December 31, 2002, by species and vessel flag, in metric tons.

TABLA 3. Estimaciones preliminares de las capturas retenidas de atunes en el OPO del 1 de enero al 31 de diciembre 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
Bandera	**Aleta amarilla**	**Barrilete**	**Patudo**	**Aleta azul**	**Albacora**	**Bonito**	**Barrilete negro**	**Otras[1]**	**Total**	**Porcentaje del total**
Colombia	29,297	1,582	156	-	-	-	-	134	31,169	5.2
Ecuador	35,539	75,543	17,396	-	-	-	344	541	129,363	21.4
España—Spain	5,144	21,770	4,463	-	-	-	-	-	31,377	5.2
México	151,521	8,079	3	1,168	-	29	390	-	161,190	26.6
Panamá	20,140	7,834	1,289	-	-	-	-	14	29,277	4.8
USA—EE.UU.	9,015	3,602	1,681	50	-	3	224	64	14,639	2.4
Venezuela	120,229	3,965	293	-	-	-	-	-	124,487	20.5
Vanuatú	5,190	6,658	1,928	-	-	-	-	-	13,776	2.3
Otros[2]	37,805	25,248	7,042	-	-	1		-	70,096	11.6
Total	413,880	154,281	34,251	1,218	-	33	958	753	605,374	

[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 4. Logged catches and catches per day's fishing[1] (CPDF) of yellowfin in the EPO, in metric tons, during the period of January 1-September 30, based on fishing vessel logbook information.

TABLA 4. Captura registrada y captura por día de pesca[1] CPDP) de aleta amarilla en el OPO, en toneladas métricas, durante el período de 1 de enero-30 de septiembre, 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 Al norte de 5°N	Catch—Captura CPDF—CPDP	141,200 16.4	119,200 14.0	132,000 14.8	99,400 12.7	144,800 22.6	154,300 26.8
South of 5°N Al sur de 5°N	Catch—Captura CPDF—CPDP	36,000 5.2	37,500 4.8	32,500 6.2	67,200 7.6	96,200 9.7	54,400 5.7
Total	Catch—Captura CPDF—CPDP	177,200 21.6	156,700 18.8	164,500 21.0	166,600 20.3	241,000 32.3	208,700 32.5
Annual total Total anual	Catch—Captura	214,700	193,900	195,800	206,400	286,200	225,500
Pole and line—Cañero							
Total	Catch—Captura CPDF—CPDP	3,100 3.4	2,500 2.8	1,100 1.6	1,400 2.5	2,500 3.6	300 1.5
Annual total Total anual	Catch—Captura	3,500	2,600	1,600	2,100	3,400	300

[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 5. Logged catches and catches per day's fishing[1] (CPDF) of skipjack in the EPO, in metric tons, during the period of January 1-September 30, based on fishing vessel logbook information.

TABLA 5. 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-30 de septiembre, 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 Al norte de 5°N	Catch—Captura CPDF—CPDP	22,700 2.6	21,900 2.6	34,200 3.8	19,600 2.5	14,400 2.2	12,600 2.2
South of 5°N Al sur de 5°N	Catch—Captura CPDF—CPDP	47,200 6.8	42,000 5.4	112,100 21.5	101,300 11.4	69,700 7.0	80,000 8.4
Total	Catch—Captura CPDF—CPDP	69,900 9.4	63,900 8.0	146,300 25.3	120,900 13.9	84,100 9.2	92,600 10.6
Annual total Total anual	Catch—Captura	104,300	99,300	164,300	131,100	107,000	99,300
Pole and line—Cañero							
Total	Catch—Captura CPDF—CPDP	1,700 1.8	900 1.0	1,600 2.2	100 0.2	200 0.2	500 2.5
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 6. Logged catches and catches per day's fishing[1] (CPDF) of bigeye in the EPO, in metric tons, during the period of January 1-September 30, based on purse-seine vessel log-book information.

TABLA 6. 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-30 de septiembre, 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	24,500	14,000	20,100	47,500	32,700	28,300
CPDF—CPDP	3.7	2.1	3.2	4.8	3.4	3.1
Total annual catch—Captura total anual	35,600	68,200	22,100	52,000	42,100	30,300

[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 7. Preliminary data on the sampling coverage of trips by vessels with capacities greater than 363 metric tons by the IATTC, Ecuadorian, Forum Fisheries Agency (FFA)[1], Mexican, and Venezuelan programs during the fourth quarter of 2002. The numbers in parentheses indicate cumulative totals for the year.

TABLA 7. 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, Forum Fisheries Agency (FFA)[1], México, y Venezuela durante el cuarto 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 and FFA[1]		Total			
Flota	**Número de viajes**		**Viajes muestreados por programa**						**Porcentaje muestreado**	
			CIAT		**Nacional y FFA[1]**		**Total**			
Belize—Belice	1	(5)	1	(5)			1	(5)	100.0	(100.0)
Bolivia	6	(38)	5	(33)			5	(33)	83.3	(86.8)
Colombia	6	(33)	6	(33)			6	(33)	100.0	(100.0)
Ecuador	43	(229)	29	(153)	14	(76)	43	(229)	100.0	(100.0)
España—Spain	7	(32)	7	(32)			7	(32)	100.0	(100.0)
Guatemala	4	(22)	4	(22)			4	(22)	100.0	(100.0)
Honduras	3	(12)	3	(12)			3	(12)	100.0	(100.0)
México	34	(188)	16	(94)	18	(94)	34	(188)	100.0	(100.0)
Nicaragua	0	(3)	0	(3)			0	(3)	-	(100.0)
Panamá	8	(35)	8	(35)			8	(35)	100.0	(100.0)
Perú	0	(4)	0	(4)			0	(4)	-	(100.0)
El Salvador	3	(13)	3	(13)			3	(13)	100.0	(100.0)
U.S.A.—EE.UU.	4	(20)	4	(16)	0[1]	(4)	4	(20)	100.0	(100.0)
Venezuela	33	(165)	21	(86)	12	(79)	33	(165)	100.0	(100.0)
Vanuatu[2]	3	(23)	3	(21)			3	(21)	100.0	(91.3)
Unknown—Desconocido	0	(1)	0	(0)			0	(0)	-	(0.0)
Total	155	(823)[3]	110	(562)	44	(253)	154	(815)[3]	99.4	(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 8. Sex ratios of bigeye tuna sampled in the eastern Pacific Ocean.
TABLA 8. Proporciones de sexos de atunes patudo muestreados en el Océano Pacífico oriental.

Length (cm)	Number observed		Percent male	Chi-square value
	Males	Females		
Talla (cm)	Número observado		Porcentaje macho	Valor de ji cuadrado
	Machos	Hembras		
80.0-84.9	89	75	54.3	1.20
85.0-89.9	67	85	44.1	2.13
90.0-94.9	114	92	55.3	2.35
95.0-99.9	80	82	49.4	0.02
100.0-104.9	71	68	51.1	0.06
105.0-109.9	61	49	55.5	1.31
110.0-114.9	92	69	57.1	3.29
115.0-119.9	78	61	56.1	2.08
120.0-124.9	85	68	55.6	1.89
125.0-129.9	77	60	56.2	2.11
130.0-134.9	66	52	55.9	1.66
135.0-139.9	45	42	51.7	0.10
140.0-144.9	45	34	57.0	1.53
145.0-149.9	26	18	59.1	1.45
150.0-154.9	10	8	55.6	0.22
Total	1,006	863	53.8	10.94

TABLE 9. Maturity of female bigeye tuna in the eastern Pacific Ocean.
TABLA. 9. Madurez de atunes patudo hembra en el Océano Pacífico oriental.

Length (cm)	Number observed	Proportion mature
Talla (cm)	Número observado	Proporción madura
80.0-84.9	75	0
85.0-89.9	82	0
90.0-94.9	89	0
95.0-99.9	81	0
100.0-104.9	65	0
105.0-109.9	49	0
110.0-114.9	67	0
115.0-119.9	60	0
120.0-124.9	68	0.043
125.0-129.9	60	0.067
130.0-134.9	51	0.216
135.0-139.9	42	0.233
140.0-144.9	34	0.543
145.0-149.9	18	0.778
150.0-154.9	8	0.778

TABLE 10. Oceanographic and meteorological data for the Pacific Ocean, July-December 2002. The values in parentheses are anomalies.

TABLA 10. Datos oceanográficos y meteorológicos del Océano Pacífico, julio-diciembre 2002. Los valores en paréntesis son anomalías.

Month—Mes	7	8	9	10	11	12
SST—TSM, 0°-10°S, 80°-90°W (°C)	21.0 (-0.8)	19.9 (-0.9)	19.9 (-0,6)	21.2 (0.3)	22.3 (0.6)	23.4 (0.6)
SST—TSM, 5°N-5°S, 90°-150°W (°C)	26.0 (0.5)	25.5 (0.5)	25,5 (0,7)	25.9 (1.0)	26.4 (1.4)	26.5 (1.4)
SST—TSM, 5°N-5°S, 120°-170°W (°C)	28.0 (0.9)	27.8 (1.1)	27.8 (1.1)	28.1 (1.5)	28.3 (1.8)	28.1 (1.6)
SST—TSM, 5°N-5°S, 150W°-160°E (°C)	29.5 (0.9)	29.4 (1.0)	29.4 (1.0)	29.6 (1.1)	29.8 (1.5)	29.5 (1.2)
Thermocline depth—Profundidad de la termoclina, 0°, 80°W (m)	50	40	40	40	40	50
Thermocline depth—Profundidad de la termoclina, 0°, 110°W (m)	80	80	70	90	110	100
Thermocline depth—Profundidad de la termoclina, 0°, 150°W (m)	140	160	150	170	170	150
Thermocline depth—Profundidad de la termoclina, 0°, 180°W (m)	170	170	140	170	160	160
Sea level—Nivel del mar, Baltra, Ecuador (cm)	-- (--)	-- (--)	-- (--)	-- (--)	-- (--)	-- (--)
Sea level—Nivel del mar, La Libertad, Ecuador (cm)	233.1 (2.8)	227.2 (-0.4)	222.3 (-5.6)	232.3 (2.8)	238.9 (9.3)	231.8 (1.4)
Sea level—Nivel del mar, Callao, Perú (cm)	104.1 (-6.0)	104.8 (-2.8)	94.8 (-11.2)	109.0 (3.4)	108.6 (1.7)	112.6 (4.0)
SOI—IOS	-0.7	-1.6	-0.7	-0.7	-0.6	-1.4
SOI*—IOS*	0.70	-2.74	-1.62	-2.67	0.62	-0.81
NOI*—ION*	-1.94	0.31	-2.72	-0.02	-1.92	-5.86