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

April-June 2001
Abril-Junio 2001

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The

# QUARTERLY REPORT

April-June 2001

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.

The Quarterly Reports are sent to the Commissioners, their industry advisors, and a few organizations and individuals with needs for current knowledge of the tuna fishery.

El

# INFORME TRIMESTRAL

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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.

Los Informes Trimestrales son enviados a los Comisionados, a los asesores de la industria, y a algunas organizaciones y personas que necesitan estar al corriente de los acontecimientos de la pesca atunera.

Editor--Redactor:
William H. Bayliff

## 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 233 length-frequency samples and abstracted the logbook information for 232 trips of fishing vessels during the second quarter of 2001.

Also, during the second quarter members of the field office staffs placed IATTC observers on 124 fishing trips by vessels that participate in the on-board observer program. In addition, 125 IATTC observers completed trips during the quarter, and were debriefed at the corresponding field offices.

### *Surface fleet and surface catch statistics*

Statistical data from the IATTC's field stations are continuously being collected and processed. 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. In this report, therefore, only annual statistics are compared among years.

#### *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 2001 is about 195,300 cubic meters ($m^3$) (Table 1). The weekly average at-sea capacity for the fleet, for the weekly periods ending April 3 through July 2, was about 117,700 $m^3$ (range: 104,600 to 133,000 $m^3$). The changes of flag and additions to and deletions from the IATTC's fleet list for the period of April 3-July 2 are given in Table 2.

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

##### *Catch statistics*

The total catches of tunas in the EPO for the January 1-July 2, 2001, period were estimated to be about 224 thousand mt of yellowfin, 78 thousand mt of skipjack, and 22 thousand mt of bigeye. The averages and ranges for the comparable periods of 1996-2000 are as follows: yellowfin, 147 thousand mt (132 to 160 thousand); skipjack, 92 thousand mt (49 to 152 thousand); bigeye, 24 thousand mt (15 to 41 thousand). For this period the average estimated weekly catches of yellowfin, skipjack, and bigeye in the EPO were about 9 thousand, 3 thousand, and 1 thousand mt respectively. Summaries of the estimated 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 fish-

ing 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 carrying capacities greater than 363 mt), and only data for Class-6 purse seiners are included herein for comparisons among years. There are now far fewer baitboats than in previous years, so the baitboat data 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.

The catch per day of fishing (CPDF) for yellowfin in the Commission's Yellowfin Regulatory Area (CYRA) by purse seiners during the 2001 report period is estimated to have been about 20.7 mt, which is much greater than the range of rates observed during the 1996-2000 report periods (9.6 to 15.2 mt) (Table 4). The CPDF of yellowfin in the CYRA by baitboats during the 2001 report period is estimated to have been about 5.0 mt, which is also much greater than the range of rates observed during the 1996-2000 report periods (0.9 to 3.0 mt) (Table 4).

During the 1996-2000 report periods the CPDF of yellowfin by purse seiners north of 5°N ranged from about 14.1 to 19.4 mt, averaging about 16.5 mt, whereas south of 5°N it ranged from about 3.7 to 8.7 mt, averaging about 6.3 mt. Preliminary estimates for 2001 show the CPDFs of yellowfin north and south of 5°N to have been about 24.2 and 15.6 mt, respectively.

The CPDF of skipjack in the EPO by purse seiners during the 2001 report period is estimated to have been about 6.6 mt, which falls within the range of rates observed during the 1996-2000 report periods (3.3 to 11.4 mt) (Table 5). The CPDF of skipjack in the EPO by baitboats during the 2001 report period is estimated to have been about 0.1 mt, which is below the range of rates observed during the 1996-2000 report periods (0.3 to 2.7 mt) (Table 5).

In general, the greatest catches of skipjack are taken in waters south of 5°N. During the 1996-2000 periods the CPDF of skipjack by purse seiners south of 5°N averaged about 10.9 mt (range: about 5.6 to 22.1 mt), whereas north of 5°N it averaged about 2.1 mt (range: about 0.9 to 3.4 mt). Preliminary estimates for 2001 show the CPDFs of skipjack south and north of 5°N to have been about 8.4 and 2.4 mt, respectively.

The CPDF of bigeye in the EPO by purse seiners during the 2001 report period is estimated to have been about 1.8 mt, which falls within the range of the rates observed during the 1996-2000 period (0.9 to 2.9 mt) (Table 6).

***Size compositions of the surface catches of tunas***

The methods for sampling the catches of tunas have been changed, beginning on January 1, 2000, as described in the IATTC Quarterly Report for April-June 2000. Briefly, the fish in a well of a purse seiner or baitboat 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), based on the staff's most recent stock assessments.

Data for fish caught during the first quarter of 2001 are presented in this report. Two length-frequency histograms are presented for each species. The first shows the data by stratum (area, gear type, and set type) for the first quarter. The second, which is similar to those of previous years, shows the first-quarter catch for the current year and the previous five years.

There are ten yellowfin surface fisheries defined for stock assessments: four floating-object, two unassociated school, three dolphin, and one baitboat (Figure 1). Of the 310 wells sampled, 283 contained yellowfin. The estimated size compositions of the fish caught during the first quarter of 2001 are shown in Figure 2a. The majority of the yellowfin catch was taken in the southern and inshore areas of the fisheries. Small amounts of yellowfin were caught by baitboats, and in the floating-object fisheries in the northern and Galapagos areas.

The estimated size compositions of the yellowfin caught by all fisheries combined during the first quarter of 1996-2001 are shown in Figure 2b. The average weight of the yellowfin caught during the first quarter of 2001 was greater than those of the fish caught during the first quarters of any of the previous five years.

There are eight skipjack fisheries defined for stock assessments: four floating object, two unassociated school, one dolphin, and one baitboat (Figure 1). The last two fisheries include all 13 sampling areas. Of the 310 wells sampled, 143 contained skipjack. The estimated size compositions of the fish caught during the first quarter of 2001 are shown in Figure 3a. The majority of the fish was taken by floating-object sets in the southern area. Small amounts of skipjack were sampled from catches taken by baitboats, in dolphin sets, and in unassociated school sets in the north, but the estimated catches were too small to show well in the graphs.

The estimated size compositions of the skipjack caught by all fisheries combined during the first quarter of 1996-2001 are shown in Figure 3b. The estimated catch of skipjack taken during the first quarter of 2001 was considerably less than during the previous two years.

There are seven bigeye surface fisheries defined for stock assessments: four floating-object, one unassociated school, one dolphin, and one baitboat (Figure 1). The last three fisheries include all 13 sampling areas. Of the 310 wells sampled, 30 contained bigeye. The estimated size compositions of the fish caught during the first quarter of 2001 are shown in Figure 4a. The majority of the bigeye was caught in sets made on floating objects in the southern and Galapagos areas. A small amount of bigeye was caught in unassociated school sets. There were no recorded catches of bigeye in dolphin sets or by baitboats.

The estimated size compositions of the bigeye caught by all fisheries combined during the first quarter of 1996-2001 are shown in Figure 4b The average weight of the fish caught during the first quarter of 2001 was considerably greater than those of the fish caught during the first quarter of any of the previous years, and especially greater than those of 1996-1999.

### *Observer program*

#### *Data collection*

The design for placement of observers during 2001 calls for 100-percent coverage of fishing trips in the eastern Pacific Ocean (EPO) by Class-6 purse seiners (over 363 metric tons carrying capacity). 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 sample half of the trips by vessels of their respective fleets, while IATTC observers are to sample the other half of those trips. Ecuador's national observer program, the Programa Nacional de Observadores Pesqueros de Ecuador (PROBECUADOR) has been sampling approximately one quarter of the trips by vessels of its fleet this year, and IATTC observers are to sample the remainder of those

trips. The IATTC is to sample all trips of Class-6 vessels registered in other nations that fish for tunas in the EPO.

IATTC, PNAAPD, PNOV, and PROBECUADOR observers departed on 174 fishing trips aboard Class-6 purse seiners during the second quarter of 2001. Preliminary coverage data for these vessels during the quarter are shown in Table 7.

### *Training*

There were no IATTC observer training courses held during the second quarter of 2001.

## RESEARCH

### *Bluefin studies*

It is known that many Pacific bluefin tuna make at least one trans-Pacific migration from the western (WPO) to the eastern Pacific Ocean, but the costs and benefits of migrating *versus* remaining in the WPO are not understood. IATTC staff members are collaborating with colleagues from the National Research Institute of Far Seas Fisheries of Japan to use data from five bluefin tagged with archival tags to parameterize a bioenergetics model under hypothetical scenarios with different swimming speeds and growth rates at different locations along the migration path. The bioenergetics model for bluefin, based on published oxygen consumption rates for yellowfin tuna, predicts the food-consumption rates required to meet energy demands for metabolism, waste losses, and growth, given the water temperatures and prey types likely to have been encountered. This work is currently in progress, but preliminary results suggest that trans-Pacific migrants may have lower food-consumption requirements than fish that remain in the WPO.

### *Early life history studies*

#### *Yellowfin broodstock*

The yellowfin broodstock in Tank 1 (1,362,000 L) at the Achotines Laboratory spawned daily during April through June. The water temperatures in the tank ranged from 24.5° to 29.0°C during the quarter. The numbers of eggs collected after each spawning event ranged from about 34,000 to 2,861,000. Spawning occurred as early as 12:25 p.m. and as late as 5:30 p.m.

Four fish in Tank 1, ranging in weight from 16 to 61 kg, died during the quarter, and at the end of that period there were three large (48 to 56 kg) and nine medium (24 to 32 kg) fish in the tank. Two mortalities appeared to be due to wall strikes, one (the last remaining fish from those stocked in 1996) to an obstructed digestive tract, and one to starvation.

In March 2001 six yellowfin with archival tags (electronic data storage tags) surgically implanted in their peritoneal cavities were placed into Tank 6 (170,000 L) (IATTC Quarterly Report for January-March, 2001). The experiment is being conducted to investigate whether feeding and spawning events of yellowfin can be detected by evaluating the peritoneal cavity temperature data recorded by the archival tags. During the second quarter one fish was sacrificed, as it had ceased feeding. The remaining five fish were feeding well at the end of the quarter, but no spawning activity had been observed.

***Rearing of yellowfin eggs, larvae, and juveniles***

During the quarter the following parameters were recorded for each spawning event: time 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.

***Experiments with yellowfin larvae and juveniles***

During May and June several experiments with yellowfin larvae and juveniles were conducted at the Achotines Laboratory. Two experiments were carried out to estimate the density-dependent growth of late-stage yellowfin larvae between 10 and 19 days after hatching. Previous experiments had been conducted to estimate the density-dependent growth of larvae during the first week of feeding (3-7 days after hatching), and the results indicated that the larvae grow more rapidly when they are maintained at lower densities. Preliminary results of the experiments with older larvae indicate similar density effects on growth.

An experiment designed to examine the diel feeding abilities of juvenile yellowfin (20 days after hatching) was conducted in June. In July 2000 the diel feeding abilities of the larvae during the first week of feeding were examined, and preliminary results indicated that the larvae fed only during daylight hours. The stomach contents of the juveniles sampled from the recent experiment also indicated that feeding occurred only during daylight hours. Preserved samples from both experiments will also be analyzed to examine the gastric evacuation rates of yellowfin larvae and juveniles under simulated natural photoperiod conditions.

***Studies of the vision of yellowfin and black skipjack tunas***

In mid-June a study was initiated to examine the spectral sensitivity of vision in yellowfin and black skipjack tunas. The research was carried out by Drs. William McFarland, University of Washington, and Ellis Loew, Cornell University, working in collaboration with an IATTC scientist. The study was designed to identify the types of photoreceptor cells present in several life stages of yellowfin and in adult black skipjack. The investigation focused on the spectral absorptive characteristics of the visual pigments present in each type of photoreceptor cell in the retina. The research technique utilized a microspectrophotometer to determine the absorption of the visual pigment within single photoreceptor cells.

Specimens representing several life stages of yellowfin, including early larvae, late-larvae, early juvenile, and adult, and several specimens of adult black skipjack, were examined. The data on spectral sensitivity will be analyzed to determine if the photosensitivity of certain life stages can be related to stage-specific life histories or behaviors.

***Studies of snappers and corvina***

The work on snappers and corvina is carried out by the Dirección General de Recursos Marinos de Panamá.

The spotted rose snapper (*Lutjanus guttatus*) broodstock, which began to spawn at the end of May 2000, continued to spawn about twice a week during the second quarter . Another group of 44 fish, hatched in captivity in October 1998, is being held in two 12,000-L tanks. On average, these fish were about 45 cm long and weighed about 1.2 kg at the end of the quarter.

One group of 125 juvenile polla drum (*Umbrina xanti*), hatched in captivity in July 1999, is being held in a 12,000-L tank. These fish are about 25 cm long and weigh about 170 g, on average. These fish will be used as broodstock.

***Visitors***

Dr. Daniel D. Benetti, Director of the Aquaculture Program at the Rosenstiel School of Marine and Atmospheric Science, University of Miami, spent the period of May 25-30, 2001, at the Achotines Laboratory. In addition, six of his students in a graduate-level aquaculture management course spent the period of May 25-28 at the laboratory. During their stay they observed and photographed developmental stages of yellowfin eggs and larvae and feeding and spawning of broodstock tuna. Dr. Benetti was joined by Dr. Robert Cowen, Director of the Center for Sustainable Fisheries at the University of Miami, on May 29 and 30.

Drs. Ellis Loew, Cornell University, and William McFarland, University of Washington, spent the period of June 11-21, 2001, at the Achotines Laboratory, where they used microspectrophotometry techniques to investigate the visual pigments and color vision of larval, juvenile, and adult yellowfin.

Mr. Hernando Gamboa of the Instituto Nacional de Pesca y Acuicultura (INPA) of Colombia spent the period of June 18-20, 2001, at the Achotines Laboratory. During his stay he worked with Mr. Amado Cano to learn the basics of pargo husbandry and reproduction. Mr. Gamboa and Mr. Juan Velverde P., INPA Regional Coordinator for the Pacific coast, plan to return in September for additional training.

Messrs. José Deago and Rolando Perez of the Proyecto de Reforestación con Especies Nativas (PRORENA) spent the period of June 25-27, 2001, at the Achotines Laboratory, where they carried out a preliminary survey of the tropical dry forest and pasture land surrounding the Laboratory. PRORENA, a long-term research project focusing on the use of native species of trees for reforestation of degraded lands in Panama, is sponsored by the Smithsonian Center for Tropical Forest Science, the Center for International Development of Harvard University, and the Tropical Resources Institute of Yale University. Its scientists are working on methods to reintroduce dry tropical forest cover, while gathering data on species composition, successional dynamics, and appropriate reforestation techniques. Reforestation of the area surrounding Achotines Bay will help maintain the quality of the water draining into it.

***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 east-

ern 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 SOIx and the NOIx, have recently been devised. These are described in the IATTC Quarterly Report for January-March 2001. The SOIx and NOIx values are both negative during El Niño events and positive during anti-El Niño events.

Conditions in the ETP were essentially normal during the second quarter of 2001. During May there were few temperature anomalies anywhere in the tropical or subtropical Pacific east of 180° that were more than 1°C greater than or less than normal (Figure 5). The data in Table 8, for the most part, indicate that conditions were normal, although the thermocline was shallower than normal and the SOIx value for June 2001 was the greatest since July 1998.

## GEAR PROGRAM

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

## MEETINGS

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

### *IATTC meetings*

#### *Sixth meeting of the Working Group on the IATTC Convention*

The sixth meeting of the Working Group on the IATTC Convention was held in San Jose, Costa Rica, on April 16-20, 2001. Ambassador Jean-François Pulvenis of Venezuela presided at the meeting, which was attended by representatives of Costa Rica, Ecuador, El Salvador, France, Guatemala, Japan, Mexico, Nicaragua, the United States, and Venezuela, plus observers from Canada, Colombia, the European Union, Spain, Taiwan, the Center for Marine Conservation, the Humane Society of the United States, the Whale and Dolphin Conservation Society, and the World Wildlife Fund.

#### *Second meeting of the Scientific Working Group*

The second meeting of the Scientific Working Group was held in La Jolla, California, USA, on April 30-May 4, 2001. Dr. Robin Allen, Director of the IATTC, presided at the meeting, which was attended by representatives of Ecuador, Japan, Mexico, and the United States, plus observers from Chile, Peru, Spain, Taiwan, the International Commission for the Conservation of Atlantic Tunas, the Secretariat of the Pacific Community (SPC), the Billfish Foundation, and the Humane Society of the United States. Members of the IATTC staff presented their most recent assessments of yellowfin, skipjack, bigeye, bluefin, albacore, and blue marlin and the results of their ecosystem modeling. In addition, Dr. John Hampton of the SPC presented preliminary results on Pacific-wide stock assessment of bigeye tuna performed by staff members of the SPC, the National Research Institute of Far Seas Fisheries of Japan, and the IATTC.

***Meeting to collate information on swordfish and to assess swordfish stocks in the eastern Pacific Ocean***

A meeting to collate information on swordfish and to assess swordfish stocks in the eastern Pacific Ocean was held in La Jolla, California, USA, on May 7-8, 2001. Dr. Pablo R. Arenas of the IATTC staff presided at the meeting, which was attended by representatives of Japan, Mexico, and the United States, plus observers from Peru, Spain, Taiwan, the International Commission for the Conservation of Atlantic Tunas, the Wildlife Conservation Society, and the World Wildlife Fund. Presentations were made by Dr. Michael G. Hinton of the IATTC, Dr. Yuji Uozumi of the National Research Institute of Far Seas Fisheries of Japan, Dr. Pierre M. Kleiber of the U.S. National Marine Fisheries Service, Mr. Pedro Ulloa of the Instituto Nacional de Pesca of Mexico, Ms. Gladys Cárdenas Quintana of the Instituto del Mar del Perú, Dr. Javier Ariz of the Instituto Español de Oceanografía, and Dr. Oscar Sosa Nishikawa of the Centro de Investigación Científica y de Educación Superior de Ensenada (Mexico).

***Second meeting of the Permanent Working Group on Compliance***

The second meeting of the Permanent Working Group on Compliance was held in San Salvador, El Salvador, on June 16, 2001. Lic. Mara Murillo Correa of Mexico presided at the meeting, which was attended by representatives of Bolivia, Ecuador, El Salvador, Guatemala, Japan, Mexico, Nicaragua, Panama, the United States, Vanuatu, and Venezuela, plus observers from Colombia, the European Union, Norway, Peru, Spain, the Forum Fisheries Agency, the Forum Fisheries Committee, the Center for Marine Conservation, the Whale and Dolphin Conservation Society, and the World Wildlife Fund. The principal topics of discussion were possible violations of the resolutions on tender vessels, yellowfin and bigeye tuna, and bycatches, the regional register of vessels, fishing by vessels of nations that are not Parties to the Agreement on the International Dolphin Conservation Program or members of the IATTC, vessel monitoring systems, and at-sea reporting.

***Fourth meeting of the Working Group on Finance***

The fourth meeting of the Working Group on Finance was held in San Salvador, El Salvador, on June 18, 2001. Mr. James T. McCarthy of the United States presided at the meeting, which was attended by representatives of Ecuador, El Salvador, France, Guatemala, Japan, Mexico, Nicaragua, Panama, the United States, Vanuatu, and Venezuela, plus observers from Colombia, the European Union, Peru, Spain, the Forum Fisheries Agency, the Forum Fisheries Committee, the Center for Marine Conservation, and the World Wildlife Fund. After discussion of various matters, it was agreed that the Working Group would meet again in late August 2001 and consider further the draft resolution on financing agreed on at the third meeting of the Working Group in February 2001.

***68th meeting of the IATTC***

The 68th meeting of the IATTC was held in San Salvador, El Salvador, on June 19-21, 2001. Ambassador Jean-François Pulvenis of Venezuela presided at the meeting, which was attended by representatives of Costa Rica, Ecuador, El Salvador, France, Guatemala, Japan, Mexico, Nicaragua, Panama, the United States, Vanuatu, and Venezuela, plus observers from Colombia, the European Union, Peru, Spain, Taiwan, the Comisión Permanente del Pacífico Sur, the Forum Fisheries Agency, the Forum Fisheries Committee, the International Whaling Commission, the Organización Latinoamericana de Desarrollo Pesquero, Greenpeace International, the Ocean Conservancy, and the World Wildlife Fund. The Commission agreed on conservation

programs for yellowfin and bigeye for 2001, adopted a schedule of financial contributions for the 2001-2002 fiscal year, agreed to establish a joint working group with the Parties to the Agreement on the International Dolphin Conservation Program to address the problem of fishing by vessels of non-Party nations, and agreed to extend the prohibition of discards of tunas by purse seiners.

### *AICDP meetings*

#### *Sixth meeting of the Permanent Working Group on Tuna Tracking*

The sixth meeting of the Permanent Working Group on Tuna Tracking was held in San Jose, Costa Rica, on April 23-24, 2001. Ms. Pat Donley of the United States presided at the meeting, which was attended by representatives of Colombia, Costa Rica, Ecuador, El Salvador, the European Union, Mexico, Panama, the United States, Vanuatu, Venezuela, the Center for Marine Conservation, the Humane Society of the United States, and the Whale and Dolphin Conservation Society.

#### *Seventh meeting of the Permanent Working Group on Tuna Tracking*

The seventh meeting of the Permanent Working Group on Tuna Tracking was held in San Salvador, El Salvador, on June 11-20, 2001. Ms. Pat Donley of United States presided at the meeting, which was attended by representatives of Colombia, Costa Rica, Ecuador, El Salvador, the European Union, Mexico, Peru, the United States, Vanuatu, and Venezuela, plus observers from Bolivia, the Center for Marine Conservation, and the Whale and Dolphin Conservation Society. Mechanisms for the certification of tuna as dolphin-safe were discussed.

#### *27th meeting of the International Review Panel*

The 27th meeting of the International Review Panel (IRP) was held in San Salvador, El Salvador, on June 13-14, 2001. Lic. Mara Murillo Correa of Mexico presided at the meeting, which was attended by representatives of Colombia, Costa Rica, Ecuador, El Salvador, the European Union, Mexico, Peru, the United States, Vanuatu, and Venezuela, plus observers from Bolivia, Norway, the environmental community, and the tuna industry. The principal subjects of discussion were the list of qualified captains, Dolphin Mortality Limits, determination of patterns of violation, status of the real-time reporting system, observer data, actions by the Parties on possible infractions reported by the IRP, the Tuna Tracking Forms, and vessel assessments.

#### *Fifth meeting of the Parties to the AIDCP*

The fifth meeting of the Parties to the AIDCP was held in San Salvador, El Salvador, on June 15-20, 2001. Ing. Roberto Interiano, of El Salvador, assisted by Lic. Mario González, also of El Salvador, presided at the meeting, which was attended by representatives of Colombia, Costa Rica, Ecuador, El Salvador, the European Union, Mexico, Nicaragua, Peru, the United States, Vanuatu, and Venezuela, plus observers from Bolivia, Japan, Norway, the Forum Fisheries Agency, the Forum Fisheries Committee, the International Whaling Commission, the Center for Marine Conservation, the Whale and Dolphin Conservation Society, and the World Wildlife Fund. The principal subject of discussion was the establishment of a system for certification of dolphin-safe tuna, and the Parties adopted the "Resolution of San Salvador" (Resolution to Establish Procedures for AIDCP Dolphin Safe Certification).

***Other meetings***

Dr. Robin Allen attended the first preparatory conference for the establishment of the Commission created by the new Convention on the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean in Christchurch, New Zealand, on April 23-28, 2001.

Many staff members attended all or parts of the 52nd Tuna Conference at Lake Arrowhead, California, on May 21-24, 2001. The chairmanship of the meeting was shared by Dr. Mark N. Maunder and Ms. Sharon L. Hunt. Drs. Michael G. Hinton, Robert J. Olson, and George M. Watters served as moderators of the sessions on stock assessment, biology, and bigeye tagging, respectively. Presentations were made by Drs. Olson, Watters, and Daniel Margulies, and Mr. Kurt M. Schaefer.

Drs. Richard B. Deriso, Mark N. Maunder, and George W. Watters participated in a workshop on AD Model Builder that was held at the Southwest Fisheries Science Center in La Jolla on May 29-June 1, 2001.

A Multifan workshop was held at the Southwest Fisheries Science Center in La Jolla on June 4-8, 2001. Dr. Yukio Takeuchi participated in the entire workshop, and Drs. Mark N. Maunder and George M. Watters participated in parts of it.

Dr. Mark N. Maunder participated in an informal herring workshop, sponsored by the Department of Fisheries and Oceans of Canada, in Nanaimo, Canada, on June 12-14, 2001. He and two scientists from other organizations reviewed the current stock assessment methods and provided advice for improving the analyses.

## PUBLICATIONS


Schaefer, Kurt M. 2001. Assessment of skipjack tuna (*Katsuwonus pelamis*) spawning activity in the eastern Pacific Ocean. U.S. Nat. Mar. Fish. Serv., Fish. Bull., 99 (2): 343-350.

Scholey, Vernon, Daniel Margulies, Robert Olson, Jeanne Wexler, Jenny Suter, and Sharon Hunt. 2001. Lab culture and reproduction of yellowfin tuna in Panama. Global Aqua. Advocate, 4 (2): 17-18.

Chow, S., V. P. Scholey, A. Nakazawa, D. Margulies, J. B. Wexler, R. J. Olson, and K. Hazama. 2001. Direct evidence for Mendelian inheritance of the variations in the ribosomal protein gene introns in yellowfin tuna (*Thunnus albacares*). Mar. Biotech., 3 (1): 22-26.

Allen, Robin (chairman). 2001. Research implications of adopting the precautionary approach to management of tuna fisheries. FAO Fish. Circ., 963: xii, 74 pp.


## ADMINISTRATION

Mr. Mauricio X. Orozco Z., a graduate of the Escuela Superior Politécnica del Litoral, Guayaquil, Ecuador, was hired as a member of the La Jolla staff on June 1, 2001. He replaces Mr. Marco A. García, who resigned in October 1999.

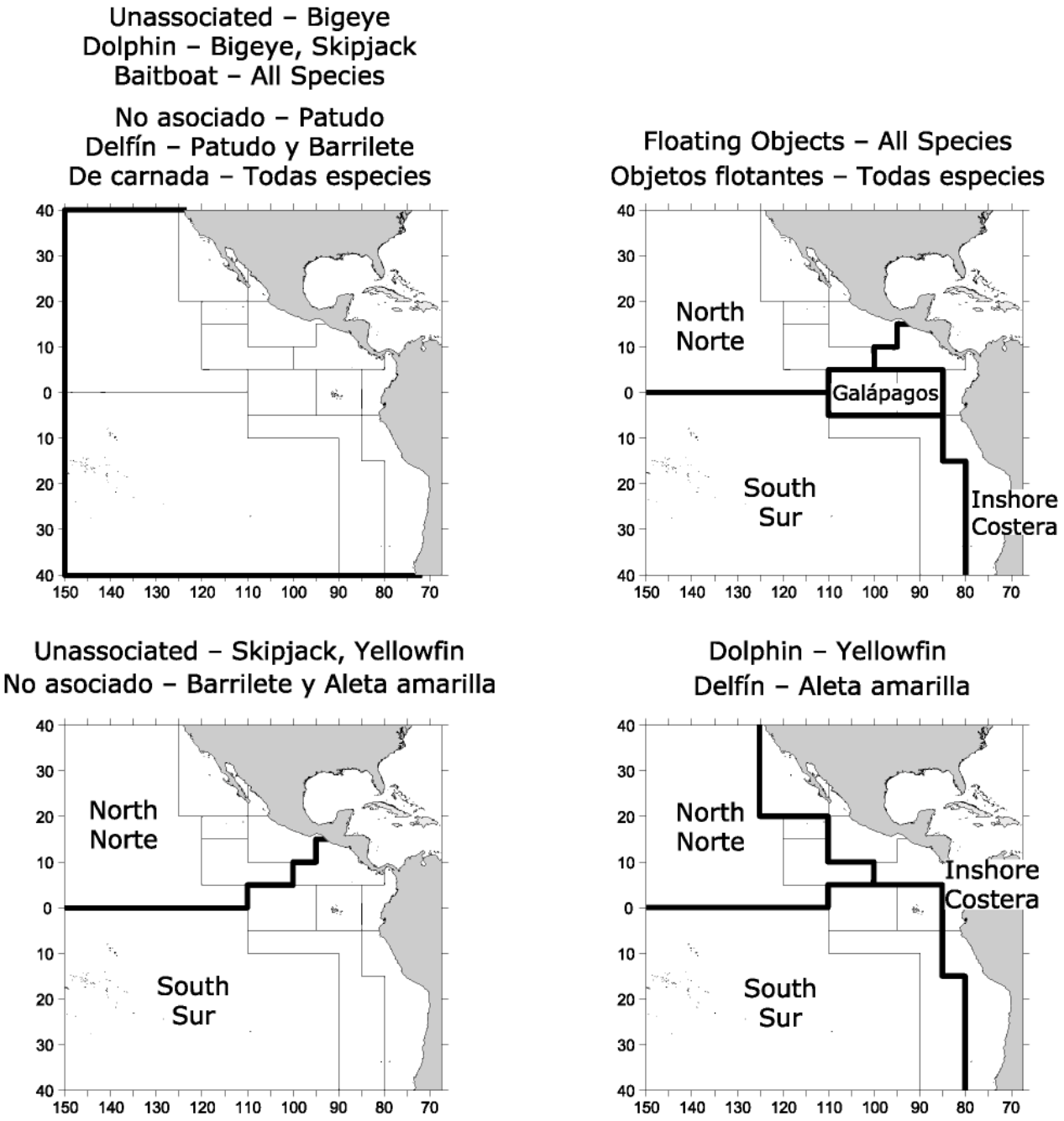


**FIGURE 1.** Spatial extents of the fisheries defined by the IATTC staff for stock assessment of yellowfin, skipjack, and bigeye in the EPO. The thin lines indicate the boundaries of the 13 length-frequency sampling areas, and the bold lines the boundaries of the fisheries.
**FIGURA 1.** Extensión especial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

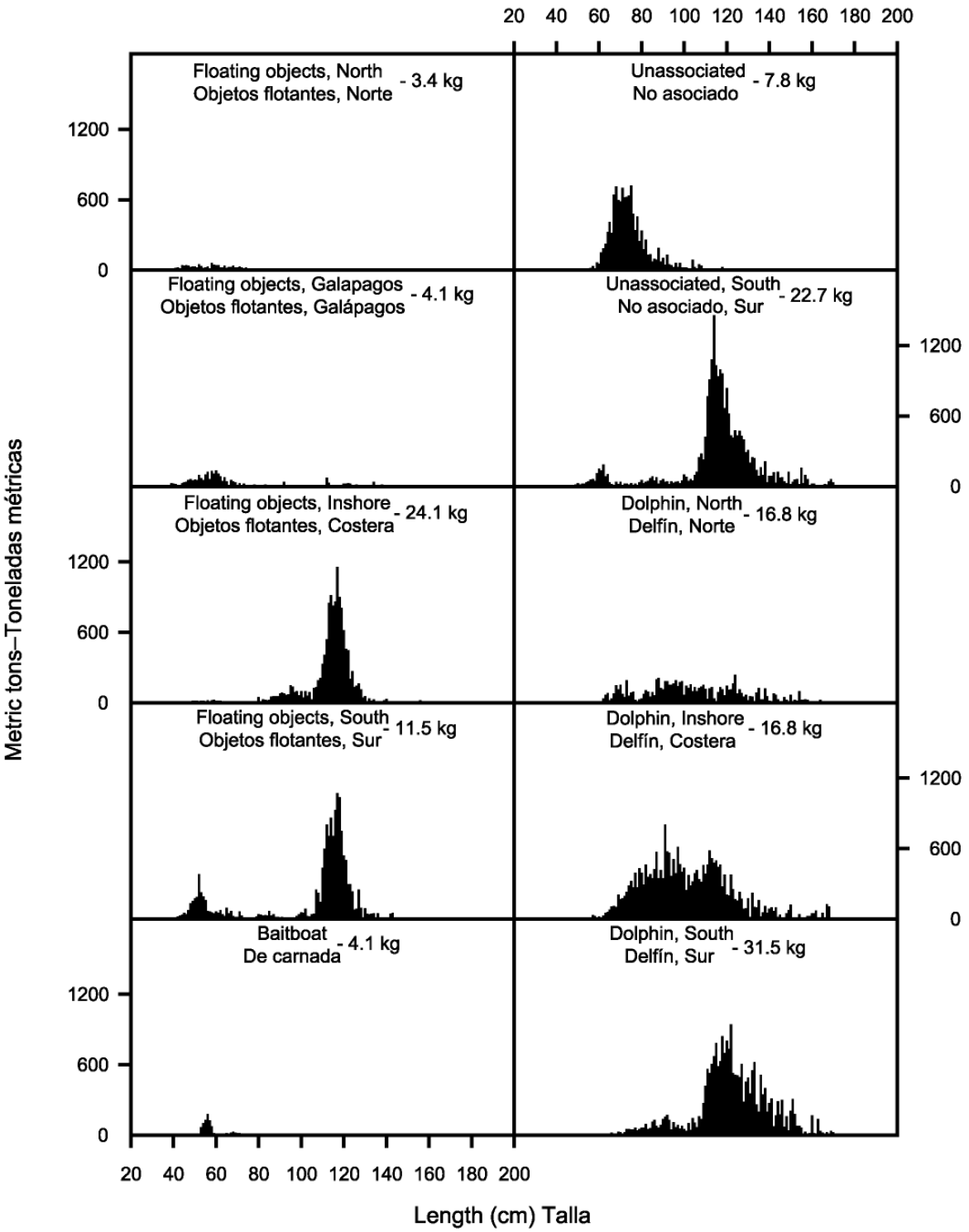


**FIGURE 2a.** Estimated size compositions of the yellowfin caught in each fishery of the EPO during the first quarter of 2001. The average weights of the fish in the samples are given at the tops of the panels.

**FIGURA 2a.** Composición por tallas estimada para el aleta amarilla capturado en cada pesquería del OPO durante el primer trimestre de 2001. En cada recuadro se detalla el peso promedio de los peces en las muestras.

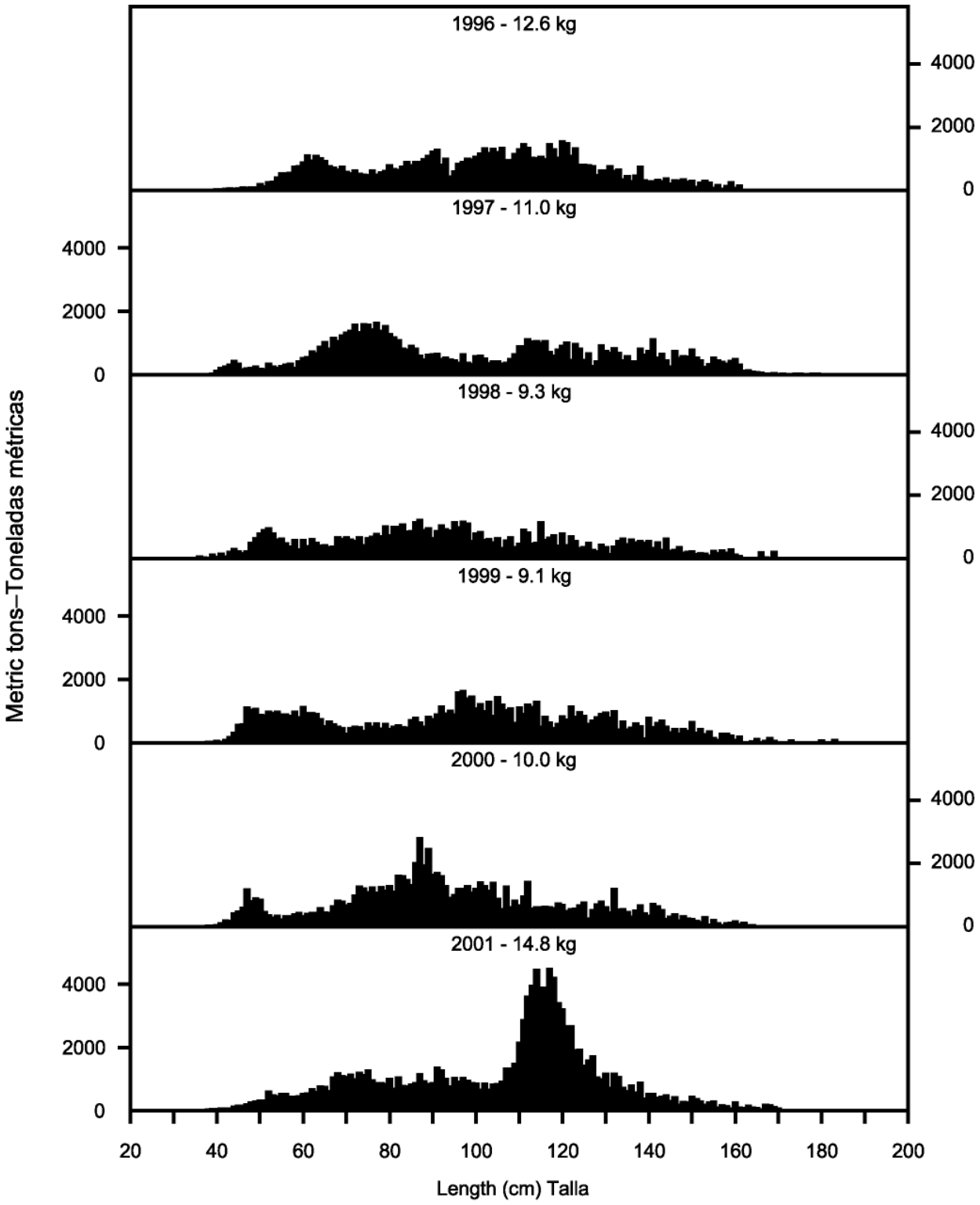


**FIGURE 2b.** Estimated size compositions of the yellowfin caught in the EPO during the first quarter of 1996-2001. The average weights of the fish in the samples are given at the tops of the panels.

**FIGURA 2b.** Composición por tallas estimada para el aleta amarilla capturado en el OPO en el primer trimestre de 1996-2001. En cada recuadro se detalla el peso promedio de los peces en las muestras.

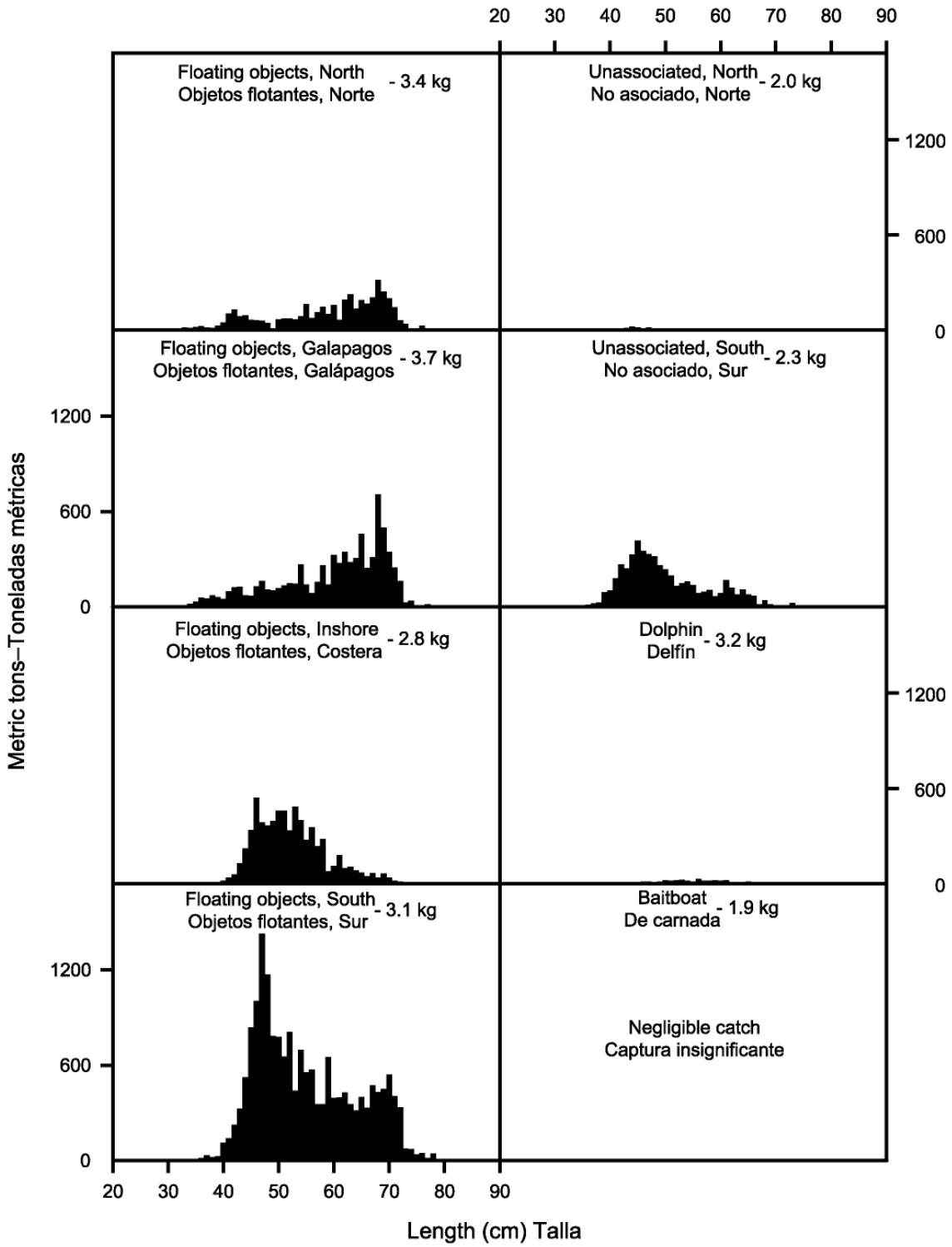


**FIGURE 3a.** Estimated size compositions of the skipjack caught in each fishery of the EPO during the first quarter of 2001. The average weights of the fish in the samples are given at the tops of the panels.

**FIGURA 3a.** Composición por tallas estimada para el barrilete capturado en cada pesquería del OPO durante el primer trimestre de 2001. En cada recuadro se detalla el peso promedio de los peces en las muestras.

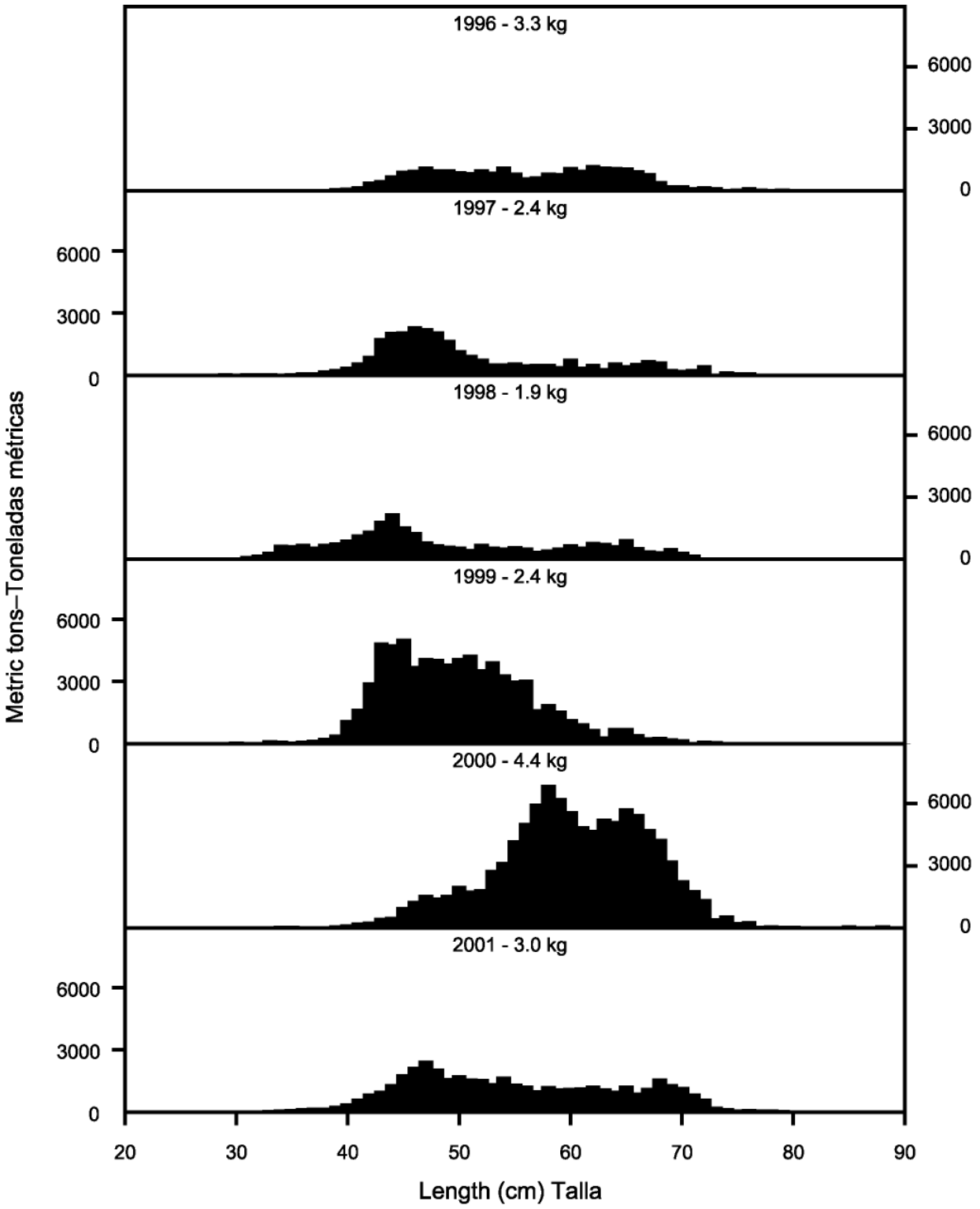


**FIGURE 3b.** Estimated size compositions of the skipjack caught in the EPO during the first quarter of 1996-2001. The average weights of the fish in the samples are given at the tops of the panels.

**FIGURA 3b.** Composición por tallas estimada para el barrilete capturado en el OPO en el primer trimestre de 1996-2001. En cada recuadro se detalla el peso promedio de los peces en las muestras.

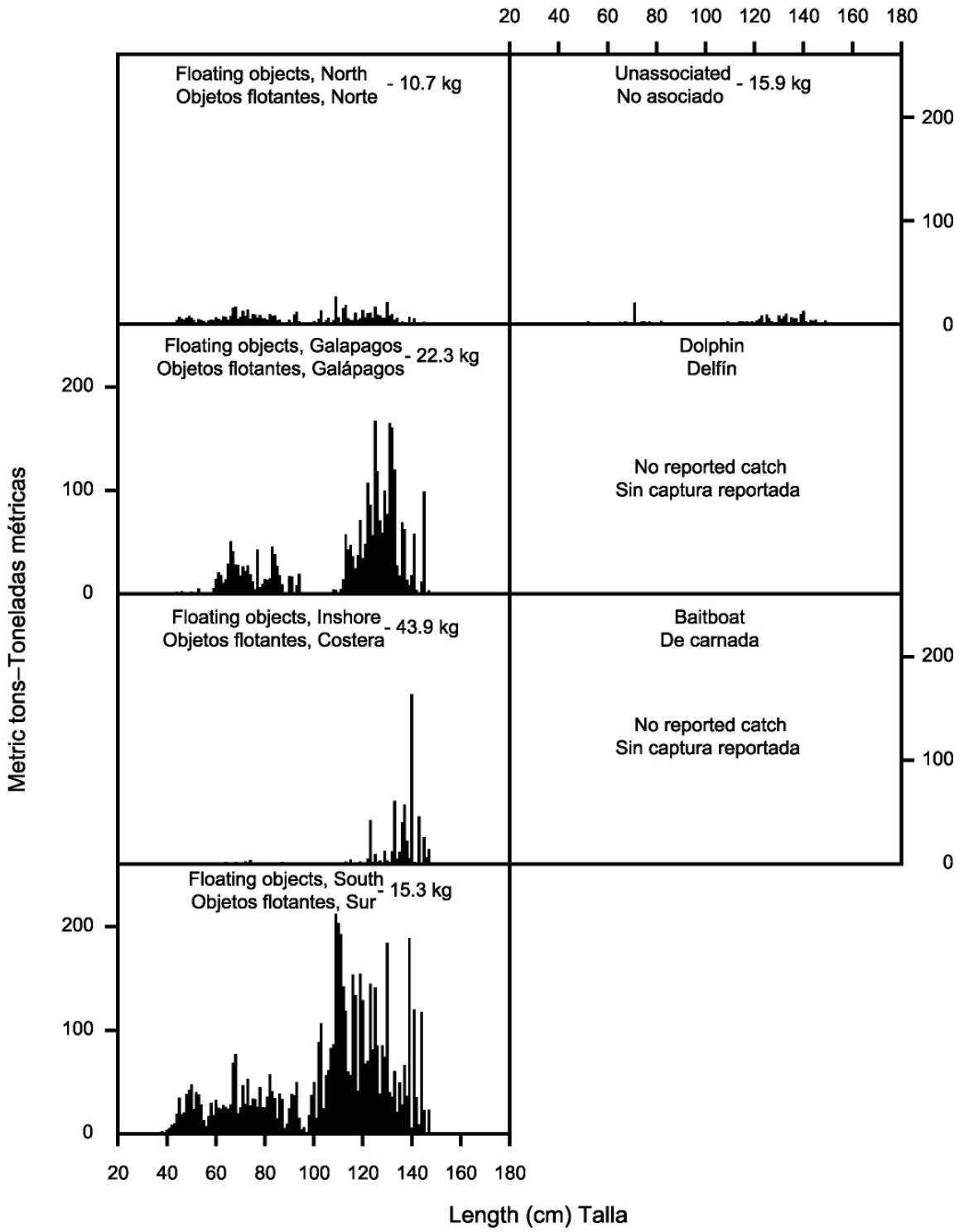


**FIGURE 4a.** Estimated size compositions of the bigeye caught in each fishery of the EPO during the first quarter of 2001. The average weights of the fish in the samples are given at the tops of the panels.

**FIGURA 4a.** Composición por tallas estimada para el patudo capturado en cada pesquería del OPO durante el primer trimestre de 2001. En cada recuadro se detalla el peso promedio de los peces en las muestras.

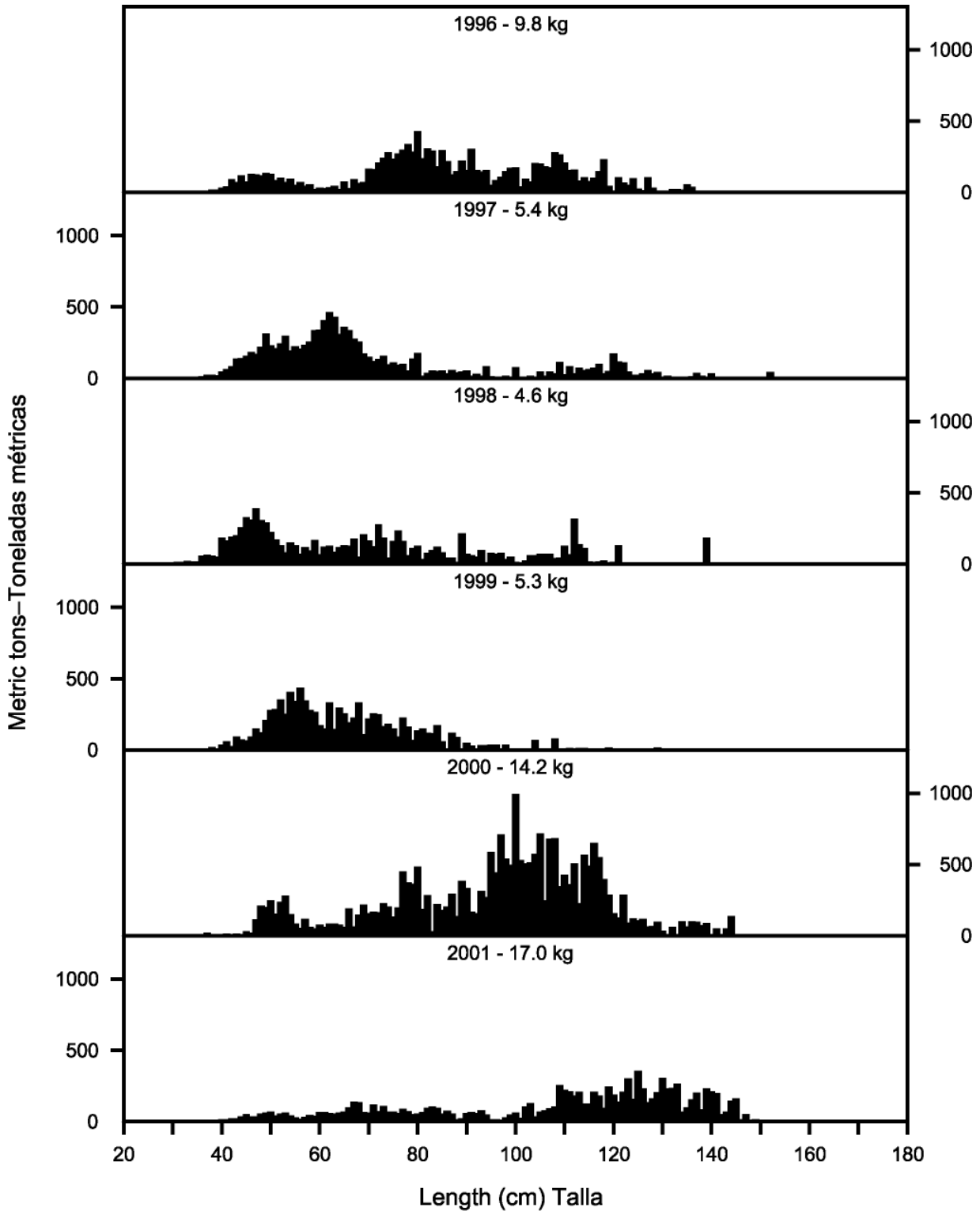


**FIGURE 4b.** Estimated size compositions of the bigeye caught in the EPO during the first quarter of 1996-2001. The average weights of the fish in the samples are given at the tops of the panels.

**FIGURA 4b.** Composición por tallas estimada para el patudo capturado en el OPO en el primer trimestre de 1996-2001. En cada recuadro se detalla el peso promedio de los peces en las muestras.

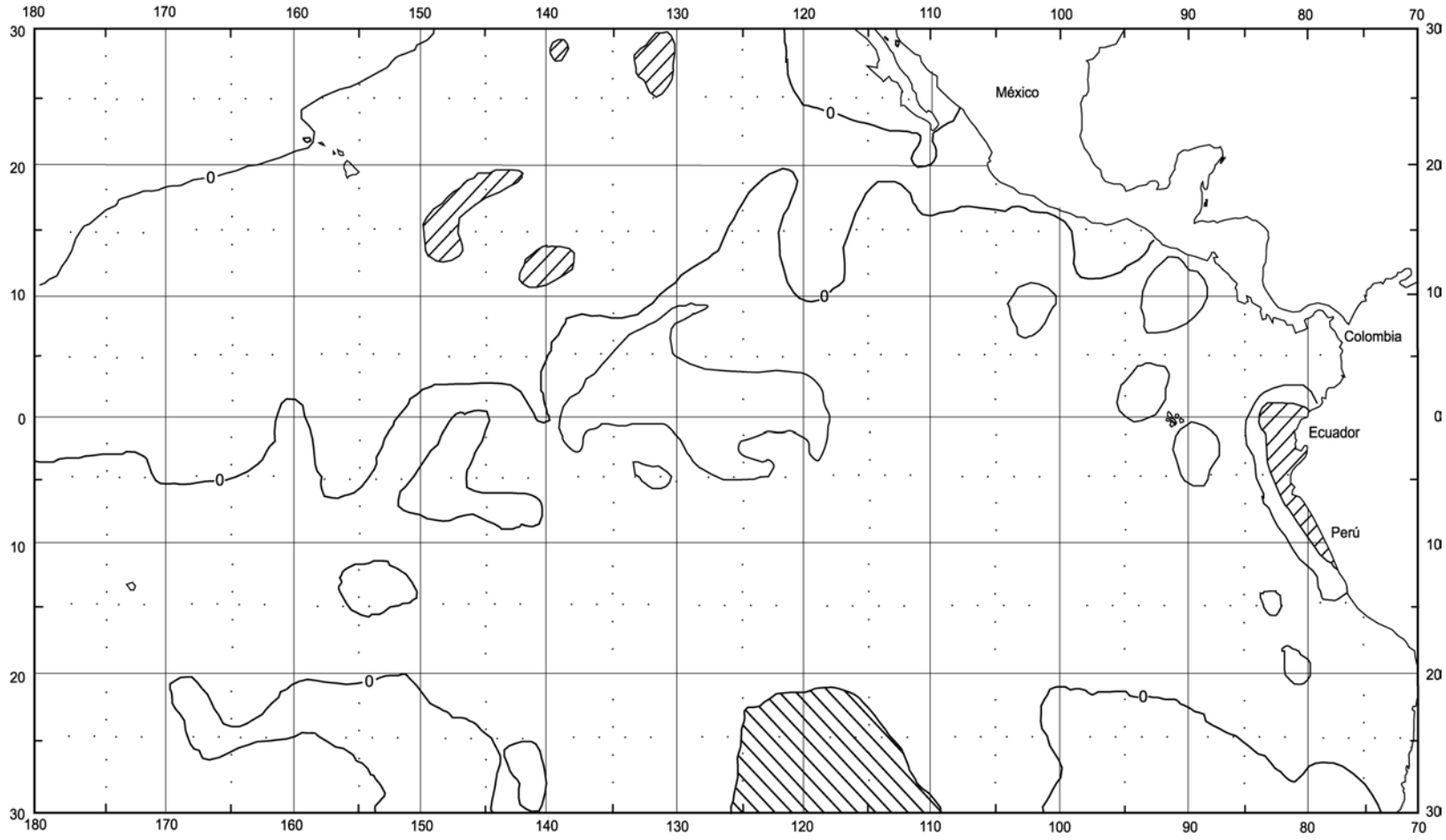


**FIGURE 5.** Sea-surface temperature (SST) anomalies (departures from long-term normals) for May 2001, based on data from fishing boats and other types of commercial vessels. The areas with SSTs more than 1°C below normal are hatched from lower left to upper right, and those with SSTs more than 1°C above normal are hatched from upper left to lower right.

**FIGURA 5.** Anomalías (variaciones de los niveles normales a largo plazo) de la temperatura superficial del mar (TSM) en mayo de 2001, basadas en datos tomados por barcos pesqueros y otros buques comerciales. Las zonas TSM más de 1°C inferiores a lo normal están sombreadas con rayas diagonales que suben hacia la derecha, y aquéllas con TSM más de 1°C superiores a lo normal con rayas diagonales que suben hacia la izquierda.

**TABLE 1.** Preliminary estimates of the numbers and carrying capacities, in cubic meters, of purse seiners and baitboats operating in the EPO in 2001 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; BB = baitboat.

**TABLA 1.** Estimaciones preliminares del número de buques cerqueros y de carnada que pescan en el OPO en 2001, y de la capacidad de acarreo de los mismos, en metros cúbicos, por bandera, arte de pesca, y clase de arqueo. Se incluye cada barco 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; BB = barco de carnada.

| Flag<br>Bandera | Gear<br>Arte | Size class -- Clase de arqueo | | | | | | | Capacity<br>Capacidad |
|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | Total | |
| | | | | | **Number—Número** | | | | |
| Belize--Belice | PS | - | - | - | 1 | 1 | 1 | 3 | 1,752 |
| Bolivia | PS | - | - | - | - | - | 4 | 4 | 4,636 |
| Colombia | PS | - | - | 2 | - | 2 | 5 | 9 | 7,130 |
| Ecuador | PS | - | 7 | 12 | 13 | 6 | 37 | 75 | 47,494 |
| | BB | 1 | - | - | - | - | - | 1 | 32 |
| España--Spain | PS | - | - | - | - | - | 5 | 5 | 12,137 |
| Guatemala | PS | - | - | - | - | - | 4 | 4 | 7,640 |
| Honduras | PS | - | - | - | - | - | 3 | 3 | 2,584 |
| México | PS | - | - | 6 | 4 | 6 | 42 | 58 | 51,777 |
| | BB | 1 | 4 | 6 | - | - | - | 11 | 1,349 |
| Nicaragua | PS | - | - | - | - | - | 1 | 1 | 1,229 |
| Panamá | PS | - | - | 2 | 2 | - | 6 | 10 | 9,517 |
| El Salvador | PS | - | - | - | - | - | 2 | 2 | 4,469 |
| U.S.A.--EE.UU. | PS | - | 3 | 2 | - | 2 | 5 | 12 | 7,864 |
| Venezuela | PS | - | - | - | - | - | 24 | 24 | 30,461 |
| Vanuatu | PS | - | - | - | - | - | 6 | 6 | 7,803 |
| All flags-- | PS | - | 10 | 24 | 20 | 17 | 143 | 214 | |
| Todas banderas | BB | 2 | 4 | 6 | - | - | - | 12 | |
| | PS + BB | 2 | 14 | 30 | 20 | 17 | 143 | 226 | |
| | | | | | **Capacity—Capacidad** | | | | |
| All flags-- | PS | - | 984 | 4,294 | 5,786 | 7,850 | 174,918 | 193,832 | |
| Todas banderas | BB | 85 | 383 | 913 | - | - | - | 1,381 | |
| | PS + BB | 85 | 1,367 | 5,207 | 5,786 | 7,850 | 174,918 | 195,213 | |

**TABLE 2.** Changes in the IATTC fleet list recorded during the second quarter of 2001. PS = purse seine; BB = baitboat. UND = unidentified

**TABLA 2.** Cambios en la flota observada por la CIAT registrados durante el segundo trimestre de 2001. PS = cerquero; BB = buque de carnada. UND = no identificada

| Vessel name | Flag | Gear | Size class | Capacity ($m^3$) | Remarks |
|---|---|---|---|---|---|
| Nombre del buque | Bandera | Arte | Clase de arqueo | Capacidad ($m^3$) | Comentarios |
| **Vessels added to the fleet—Buques agregados a la flota** | | | | | |
| *Azteca 11* | MEX | PS | 5 | 410 | New entry—1er ingreso |
| *Edgar Ivan* | MEX | PS | 4 | 316 | New entry—1er ingreso |
| *Mazpesca* | MEX | PS | 5 | 410 | New entry—1er ingreso |
| *Montelucia* | SLV | PS | 6 | 2,550 | New entry—1er ingreso |
| *Arkos I Chiapas* | MEX | PS | 6 | 1,348 | Re-entry—Reingreso<br>Formerly—Antes: *Arkos I* |
| *Gabiero* | MEX | PS | 6 | 1,118 | Re-entry—Reingreso<br>Formerly—Antes: *Guatuso* |
| **Vessels changing name and/or flag—Buques de nombre y/o bandera cambiada** | | | | | |
| *Mariano Otero* | MEX | PS | 6 | 1,482 | Name changed to—Ahora: *Mazatun* |
| *Bonnie* | USA | PS | 6 | 1,277 | Flag changed to—Ahora bandera: MEX |
| *Don Tampirio* | ECU | PS | 6 | 786 | Flag changed to—Ahora bandera: PAN |
| *Don Tampirio* | PAN | PS | 6 | 786 | Flag changed to—Ahora bandera: UND |
| *Don Tampirio* | UND | PS | 6 | 786 | Flag changed to—Ahora bandera: HND |
| *Templario* | UND | PS | 6 | 1,268 | Flag changed to—Ahora bandera: VEN |
| *Ugavi* | VUT | PS | 6 | 1,875 | Flag changed to—Ahora bandera: UND |
| *Ugavi* | UND | PS | 6 | 1,875 | Flag changed to—Ahora bandera: ECU |

**TABLE 3.** Preliminary estimates of the catches of tunas in the EPO from January 1 through July 2, 2001, by species and vessel flag, in metric tons.

**TABLA 3.** Estimaciones preliminares de las capturas de atunes en el OPO del 1 de enero al 2 julio de 2001, por especie y bandera del buque, en toneladas métricas.

| Flag | Yellowfin | | Skipjack | Bigeye | Bluefin | Bonito | Albacore | Black skipjack | Other[1] | Total | Percentage of total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | CYRA | Outside | | | | | | | | | |
| Bandera | Aleta amarilla | | Barrilete | Patudo | Aleta azul | Bonito | Albacora | Barrilete negro | Otras[1] | Total | Porcentaje del total |
| | ARCAA | Exterior | | | | | | | | | |
| Ecuador | 36,400 | 1,323 | 40,035 | 9,409 | - | - | - | 85 | 53 | 87,305 | 26.8 |
| España-Spain | 5,400 | 1,051 | 12,407 | 3,628 | - | - | - | - | - | 22,486 | 6.9 |
| México | 74,959 | 6,744 | 2,841 | 83 | 305 | - | - | - | - | 84,932 | 26.1 |
| Panamá | 6,271 | 75 | 3,305 | 1,098 | - | - | - | - | - | 10,749 | 3.3 |
| U.S.A.-EE.UU. | 4,291 | 601 | 3,115 | 1,114 | - | - | - | 60 | - | 9,181 | 2.8 |
| Venezuela | 48,079 | 3,612 | 1,003 | 4 | - | - | - | - | - | 52,698 | 16.2 |
| Vanuatu | 6,373 | 101 | 5,811 | 2,535 | - | - | - | - | - | 14,820 | 4.6 |
| Other-Otros[2] | 26,937 | 2,257 | 9,891 | 3,900 | - | - | - | 44 | - | 43,029 | 13.2 |
| Total | 208,710 | 15,764 | 78,408 | 21,771 | 305 | - | - | 189 | 53 | 325,200 | |

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

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

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

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

**TABLE 4.** Report period (January 1-March 30) logged yellowfin catch in metric tons [C(L)], and catch per day's fishing[1] [C(L)/E(L)], by year, area, and gear type, based on fishing vessel logbook information.

**TABLA 4.** Captura registrada de aleta amarilla [C(R)], y captura por día de pesca[1] [C(R)/E(R)], por año, área y tipo de arte, en toneladas métricas, en el período del informe (1 de enero-30 de marzo), basado en información de los cuadernos de bitácora de barcos pesqueros.

| Gear and area | Fishery statistic | Year-Año | | | | | |
|---|---|---|---|---|---|---|---|
| Arte y área | Estadística de pesca | 1996 | 1997 | 1998 | 1999 | 2000 | 2001[2] |
| Purse seine | C(L) | | | | | | |
| Red de cerco | C(R) | 62,500 | 60,100 | 45,000 | 59,500 | 60,300 | 86,300 |
| CYRA | C(L)/E(L) | | | | | | |
| ARCAA | C(R)/E(R) | 15.2 | 13.9 | 9.6 | 12.2 | 12.2 | 20.7 |
| Outside[3] | C(L) | | | | | | |
| Exterior[3] | C(R) | 2,900 | 3,800 | 3,500 | 1,000 | 4,000 | 2,000 |
| | C(L)/E(L) | | | | | | |
| | C(R)/E(R) | 5.3 | 6.5 | 4.1 | 3.4 | 8.9 | 5.8 |
| EPO[4] | C(L) | | | | | | |
| OPO[4] | C(R) | 65,400 | 63,900 | 48,500 | 60,500 | 64,300 | 88,300 |
| | C(L)/E(L) | | | | | | |
| | C(R)/E(R) | 14.0 | 13.0 | 8.7 | 11.7 | 11.9 | 19.6 |
| Annual total | C(L) | | | | | | |
| Total anual | C(R) | 201,200 | 209,900 | 192,400 | 205,900 | 199,200 | |
| Baitboat | C(L) | | | | | | |
| Carnada | C(R) | 200 | 500 | 700 | 100 | 100 | 800 |
| | C(L)/E(R) | | | | | | |
| | C(R)/E(R) | 1.0 | 2.0 | 3.0 | 0.9 | 1.1 | 5.0 |
| Annual total | | | | | | | |
| Total anual | | 2,800 | 3,500 | 2,600 | 1,600 | 1,900 | |

[1] Purse-seiners, class-6 only; all baitboats. The C(L) values are rounded to the nearest 100, and the C(L)/E(L) values to the nearest 0.1.

[1] Cerqueros de las clase 6; todos barcos de carnada. Se redondean los valores de C(R) al 100 más cercano, y los de C(R)/E(R) al 0.1 más cercano.

[2] Preliminary

[2] Preliminar

[3] Includes the area west of the CYRA but east of 150°W

[3] Incluye la zona al oeste del ARCAA al este de 150°O

[4] Includes the Pacific Ocean east of 150°W

[4] Incluye el Océano Pacífico al este de 150°O

**TABLE 5.** Report period (January 1- March 30) logged skipjack tuna catch in metric tons [C(L)] and catch per day's fishing[1] [C(L)/E(L)] in the EPO[2], by year and gear type, based on fishing vessel logbook information.

**TABLA 5.** Captura registrada de barrilete [C(R)], y captura por día de pesca[1] [C(R)/E(R)] en el OPO[2], por año y tipo de arte, en toneladas métricas, en el período del informe (1 de enero-30 de marzo), basado en información de los cuadernos de bitácora de barcos pesqueros.

| Gear | Fishery statistic | Year—Año | | | | | |
|---|---|---|---|---|---|---|---|
| Arte | Estadística de pesca | 1996 | 1997 | 1998 | 1999 | 2000 | 2001[3] |
| Purse seine | C(L) | | | | | | |
| Red de cerco | C(R) | 16,000 | 17,700 | 18,300 | 44,400 | 61,400 | 29,900 |
| | C(L)/E(L) | | | | | | |
| | C(R)/E(R | 3.4 | 3.6 | 3.3 | 8.6 | 11.4 | 6.6 |
| Annual total | C(L) | | | | | | |
| Total anual | C(R) | 74,900 | 98,800 | 97,200 | 177,400 | 128,500 | |
| Baitboat | C(L) | | | | | | |
| Carnada | C(R) | 400 | 100 | 200 | <100 | 100 | <100 |
| | C(L)/E(L) | | | | | | |
| | C(R)/E(R) | 2.7 | 0.6 | 0.7 | 0.3 | 1.0 | 0.1 |
| Annual total | C(L) | | | | | | |
| Total anual | C(R) | 1,800 | 2,300 | 1,000 | 1,800 | 100 | |

[1] Purse-seiners, class-6 only; all baitboats. The C(L) values are rounded to the nearest 100, and the C(L)/E(L) values to the nearest 0.1.

[1] Cerquero de la clase 6; todos barcos de carnada. Se redondean los valores de C(R) al 100 más cercano, y los de C(R)/E(R) al 0.1 más cercano.

[2] Includes the Pacific Ocean east of 150°W

[2] Incluye el Océano Pacífico al este de 150°W

[3] Preliminary

[3] Preliminar

**TABLE 6.** Report period (January 1- March 30) logged bigeye catch in the EPO[1] and catch per day of fishing (CPDF) in the EPO, in metric tons, based on logbook information from purse seiners.

**TABLA 6.** Captura registrada de atún patudo en el OPO[1] en el período del informe (1 de enero-30 de marzo) y captura por día de pesca (CPDP) en el OPO, en toneladas métricas, basadas en información de las bitácoras de barcos cerqueros.

| Fishery statistic—Estadística de pesca | Year—Año | | | | | |
|---|---|---|---|---|---|---|
| | 1996 | 1997 | 1998 | 1999 | 2000 | 2001[2] |
| Catch—Captura | 9,100 | 7,500 | 5,200 | 5,100 | 15,900 | 8,300 |
| CPDF—CPDP | 2.0 | 1.5 | 0.9 | 1.0 | 2.9 | 1.8 |
| Total annual catch--Captura total anual | 41,300 | 34,100 | 20,400 | 22,700 | 48,800 | |

[1] Includes the Pacific Ocean east of 150°W

[1] Incluye el Océano Pacífico al este de 150°O

[2] Preliminary

[2] Preliminar

**TABLE 7.** Preliminary data on the sampling coverage of trips by Class-6 vessels (capacity >363 metric tons) by the IATTC, Ecuadorian, Mexican, and Venezuelan programs during the second quarter of 2001. The numbers in parentheses indicate cumulative totals for the year.
**TABLA 7.** Datos preliminares de la cobertura de muestreo de viajes de buques de la Clase 6 (capacidad >363 toneladas métricas) por los programas de la CIAT, Ecuador, México, y Venezuela durante el segundo trimestre de 2001. 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--Belice | 1 | (3) | 1 | (3) | | | 1 | (3) | 100 | (100) |
| Bolivia | 6 | (11) | 0 | (1) | 2 | (2)[1] | 2 | (3) | 33.3 | (27.3) |
| Colombia | 5 | (13) | 5 | (13) | | | 5 | (13) | 100 | (100) |
| Ecuador | 56 | (149) | 43 | (113) | 13 | (36) | 56 | (149) | 100 | (100) |
| España--Spain | 8 | (19) | 8 | (19) | | | 8 | (19) | 100 | (100) |
| Guatemala | 5 | (15) | 5 | (15) | | | 5 | (15) | 100 | (100) |
| Honduras | 4 | (8) | 4 | (8) | | | 4 | (8) | 100 | (100) |
| México | 37 | (99) | 19 | (51) | 18 | (48) | 37 | (99) | 100 | (100) |
| Nicaragua | 2 | (4) | 2 | (4) | | | 2 | (4) | 100 | (100) |
| Panamá | 6 | (13) | 6 | (13) | | | 6 | (13) | 100 | (100) |
| El Salvador | 4 | (5) | 4 | (5) | | | 4 | (5) | 100 | (100) |
| U.S.A.-EE.UU. | 2 | (14) | 2 | (14) | | | 2 | (14) | 100 | (100) |
| Venezuela | 36 | (77) | 19 | (39) | 17 | (38) | 36 | (77) | 100 | (100) |
| Vanuatu | 7 | (23) | 6 | (21) | | | 6 | (21) | 85.7 | (91.3) |
| Total | 179 | (453)[2] | 124 | (319) | 50 | (124) | 174 | (443)[2] | 97.2 | (97.8) |

[1] Sampled by the Ecuadorian national observer program (PROBECUADOR)
[1] Muestreados por el programa nacional de observadores de Ecuador (PROBECUADOR)
[2] Includes 54 trips that began in late 2000 and ended in 2001
[2] Incluye 54 viajes iniciados a fines de 2000 y completados en 2001

**TABLE 8.** Oceanographic and meteorological data for the Pacific Ocean, January-June 2001. The values in parentheses are anomalies.

**TABLA 8.** Datos oceanográficos y meteorológicos del Océano Pacífico, enero-junio 2001. Los valores en paréntesis son anomalías.

| Month--Mes | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| SST--TSM, 0°-10°S, 80°-90°W (°C) | 23.8 (-0.5) | 25.8 (0.1) | 27.4 (1.3) | 26.4 (1.3) | 23.8 (-0.1) | 21.9 (-0.7) |
| SST--TSM, 5°N-5°S, 90°-150°W (°C) | 25.0 (-0.5) | 26.1 (-0.2) | 27.2 (0.3) | 27.5 (0.3) | 26.9 (0.1) | 26.3 (0.1) |
| SST--TSM, 5°N-5°S, 120°-170°W (°C) | 25.7 (-0.7) | 26.1 (-0.5) | 26.8 (-0.3) | 27.5 (0.0) | 27.6 (0.0) | 27.7 (0.2) |
| Thermocline depth--Profundidad de la termoclina, 0°, 80°W (m) | 30 | 25 | 25 | 25 | 25 | 35 |
| Thermocline depth--Profundidad de la termoclina, 0°, 110°W (m) | 60 | 50 | 50 | 25 | 40 | 50 |
| Thermocline depth--Profundidad de la termoclina, 0°, 150°W (m) | 150 | 140 | 110 | 150 | 140 | 130 |
| Sea level--Nivel del mar, Baltra, Ecuador (cm) | 174.5 | 188.3 | 184.9 | 183.8 | 182.0 | 178.4 |
| | (-6.4) | (6.1) | (3.1) | (1.1) | (0.7) | (-1.0) |
| Sea level—Nivel del mar, La Libertad, Ecuador (cm) | 229.1 | 240.8 | - | 224.6 | 222.3 | - |
| | (-1.6) | (9.1) | | (-6.2) | (-10.2) | |
| Sea level--Nivel del mar, Callao, Perú (cm) | 102.5 | 112.2 | 109.8 | 111.4 | 108.2 | 110.1 |
| | (-9.5) | (-1.0) | (-4.9) | (-3.1) | (-5.1) | (-0.1) |
| SOI--IOS | 1.1 | 1.5 | 0.5 | -0.1 | -0.8 | -0.1 |
| SOIx--IOSx | 0.20 | 2.44 | 1.31 | 2.83 | 2.19 | 4.40 |
| NOIx--IONx | 1.05 | 2.21 | 0.91 | 2.15 | -0.36 | 1.35 |