INTER-AMERICAN TROPICAL TUNA COMMISSION
COMISION INTERAMERICANA DEL ATUN TROPICAL

68TH MEETING

SAN SALVADOR, EL SALVADOR

JUNE 19-21, 2001

BACKGROUND PAPER B1

TUNA-DOLPHIN PROGRAM

PREPARED JUNE 2001

TUNA-DOLPHIN PROGRAM

CONTENTS

1. INTRODUCTION

Yellowfin tuna in the size range of about 10 to 40 kg frequently associate with marine mammals, especially spotted dolphins (*Stenella attenuata*), spinner dolphins (*S. longirostris*), and common dolphins (*Delphinus delphis* and, to a lesser extent, *D. capensis*) in the eastern Pacific Ocean (EPO). Purse-seine fishermen have found that their catches of yellowfin in the EPO can be maximized by searching for herds of dolphins or flocks of seabirds which frequently occur with dolphins and tunas, setting their nets around the dolphins and tunas, retrieving most of the net, "backing down" to enable the dolphins to escape over the corkline of the net, and finally retrieving the rest of the net and bringing the fish aboard the vessel. Unfortunately, particularly during the 1960s and 1970s, many dolphins became entangled in the nets and died.

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 tunas 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 fishing through the collection of data aboard tuna purse seiners fishing in the EPO, (2) to analyze these data and make appropriate recommendations for the conservation of dolphins, (3) to study the causes of mortality of dolphins during fishing operations and encourage fishermen to adopt fishing techniques which minimize the mortalities of dolphins, and (4) to study the effects of different modes of fishing on the various fish and other animals of the pelagic ecosystem.

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. The IDCP, among other things, established annual overall limits and individual-vessel limits on the mortalities of dolphins caused by the fishery. Vessels that reached their limits had to refrain from fishing for tunas associated with dolphins for the rest of the year. If the overall limit had been reached all vessels would have had to refrain from fishing for tunas associated with dolphins for the rest of the year. The events that led to the establishment of the IDCP and the objectives and functions of the two working groups established under the IDCP, the International Review Panel (IRP) and the Scientific Advisory Board (SAB), are described on pages 60-62 of the IATTC Annual Report for 1993.

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 came into effect on February 15, 1999. The Parties to this agreement would be "committed to ensure the sustainability of tuna stocks in the eastern Pacific Ocean and to progressively reduce the incidental dolphin mortalities 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." The principal differences between the AIDCP and the 1992 La Jolla Agreement are that: (1) the AIDCP is binding, whereas the earlier one was voluntary; (2) the AIDCP establishes mortality limits for individual stocks of dolphins, whereas the earlier one called only for a single dolphin mortality limit (DML) for all species combined; (3) the AIDCP includes, as one of its objectives, "avoiding, reducing and minimizing bycatch and discards of juvenile tunas and non-target species," whereas the earlier one did not directly address bycatches and discards; (4) the AIDCP provides for "certification for fishing captains and crews," whereas the earlier one did not; (5), the AIDCP provides for "the establishment of a system for the tracking and verification of tuna harvested with and without mortality or serious injury of dolphins," whereas the earlier one did not; and (6) the AIDCP applies to the area bounded by the coastline of the Americas, 40°N latitude, 150°W longitude, and 40°S latitude, whereas the earlier one applied to "the eastern Pacific Ocean."

2. DATA COLLECTION

Observer coverage

The design for placement of observers during 2000 called for 100% coverage of fishing trips in the EPO by all Class-6 purse seiners (carrying capacity greater than 363 metric tons (400 short tons)). Both Venezuela and Ecuador began their own national observer programs during the year. Venezuela's Programa Nacional de Observadores de Venezuela (PNOV) began the year sampling approximately 25% of trips by its fleet and increased its sampling toward a goal of 50% coverage by mid-year. Ecuador's Programa Nacional de Observadores Pesqueros de Ecuador (PROBECUADOR) started sampling trips by its fleet in November and intends to increase to 50% coverage in 2001. Mexico's national program (Programa Nacional de Aprovechamiento del Atún y Protección de Delfines (PNAAPD)) continued to sample half of the trips by its fleet. The IATTC Tuna-Dolphin Program sampled the remainder of the trips by the fleets of Ecuador, Mexico, and Venezuela, as well as all trips by vessels of other fleets, except as noted below. The IATTC's international observer program and the national observer programs of Ecuador, Mexico, and Venezuela are part of the On-Board Observer Program of the AIDCP.

During 2000 observers from the On-Board Observer Program departed on 689 fishing trips. In addition, 33 vessels whose last trip of 1999 carried over into 2000 had observers aboard, bringing the total to 722 trips sampled in 2000 by the Program. The Program sampled vessels operating under the jurisdictions of Belize, Bolivia, Colombia, Ecuador, the European Community, Guatemala, Honduras, Mexico, Nicaragua, Panama, the United States, Vanuatu, and Venezuela.

An IATTC observer departed on one additional fishing trip during 2000 on a Bolivian-flag vessel, but the trip was only partially sampled due to the vessel's departure after a mid-trip port without the observer on board. That trip is not considered as an observed trip for sampling purposes. A Vanuatu-flag vessel did not have an observer on board during an entire trip due to vessel management's refusal to accept an IATTC observer.

There were 44 trips on vessels which at the time of their departure were flying the flag of a non-Party during 2000.

The sampling coverage of vessels of the international fleet by On-Board Observer Program is summarized in Table 1. The Program sampled 99.7% of all trips by Class-6 vessels, and the IATTC program sampled over 82% of all trips.

Observer training

There were no IATTC observer training courses during 2000. However, two IATTC staff members participated in the training of personnel for the new Ecuadorian national observer program, PROBECUADOR. That course took place during September 18-October 5, 2000 in Guayaquil, Ecuador.

3. GEAR PROGRAM

Dolphin safety panel alignments

During 2000 the IATTC staff conducted alignments of dolphin-safety panels (DSPs) and inspections of dolphin rescue gear aboard 29 vessels, 27 registered in Mexico, 1 in Ecuador, and 1 in the United States. A trial set, during which an IATTC employee observes the performance of the net from an inflatable raft during backdown, is made to check the alignment of the DSP. The IATTC employee transmits his observations, comments, and suggestions to the captain of the vessel, and attempts are made to resolve any problems that may arise. Afterward a report is prepared for the vessel owner or manager. This report contains a summary of the IATTC employee's observations and, if necessary, suggestions for improving the vessel's dolphin-safety gear and/or procedures.

Training and certification of fishing captains

The IATTC has conducted dolphin mortality reduction seminars for tuna fishermen since 1980. Article V of the AIDCP calls for the establishment, within the framework of the IATTC, of a system of both technical training and certification of fishing captains. Under the system, the IATTC staff is responsible for maintaining a list of all captains qualified to fish for tunas associated with dolphins in the EPO. The names of the captains who meet the requirements are to be supplied to the IRP for approval and circulation to the Parties to the AIDCP.

The requirements for new captains include (1) attending a training seminar organized by the IATTC staff or by the pertinent national program in coordination with the IATTC staff, (2) participation in a trial set that includes direct observations of the backdown channel, and (3) a practical training component, consisting of a trip during which it is intended to fish for tuna associated with dolphins aboard a vessel with a DML, accompanied by either a qualified captain or an approved technical advisor. These workshops are intended not only for captains, who are directly in charge of fishing operations, but also for other crew members and for administrative personnel responsible for vessel equipment and maintenance. The fishermen and others who attend the workshops are presented with certificates of attendance. No workshops were held during 2000.

Statements of Participation

Statements of Participation verify that vessels have been participating in the IDCP at the observer coverage level of 100%. In other words, it states that an observer has been aboard the vessel during each trip since it began its participation in the IDCP under current ownership. During 2000 the IATTC staff issued, on request, statements for 54 fishing trips by vessels under the jurisdictions of Colombia, Ecuador, Guatemala, Mexico, Nicaragua, Panama, the United States, Vanuatu, and Venezuela.

Other services

The IATTC also offers other services to help governments and fleet managers and operators of individual vessels to reduce dolphin mortality. Publications and videotapes on the subject are available at IATTC field offices. *Trip Analyses*, detailed reports of observed fishing trips, are prepared upon request and, after the required authorizations are obtained, provided to allow performance assessments of vessels and captains.

4. RESEARCH ON DOLPHINS

Preliminary estimates of the mortality of dolphins due to fishing

In 2000 the incidental mortality of dolphins increased to 1,636 animals (Table 2), a 21-percent increase relative to the mortality of 1,348 animals recorded in 1999. The mortalities for 1979-2000, by species and stock, are shown in Table 3, and the standard errors of these estimates are shown in Table 4. The mortalities of the principal dolphin species affected by the fishery show declines in the last decade (Figure 1) similar to that for the mortalities of all dolphins combined (Figure 2). Estimates of the abundances of the various stocks of dolphins for 1986-1990 and the relative mortalities (mortality/abundance) are also shown in Table 2. The highest levels of relative mortality occurred for northeastern spotted dolphins and eastern spinner dolphins (0.04%), and the central stock of common dolphins (0.05%). The upper bounds of the approximate 95% confidence intervals were less than 0.10% for all stocks except for the central stock of common dolphins with a value of 0.11. Other than the central stock of common dolphins, the highest values occurred for northeastern spotted dolphins (0.052%) and eastern spinner dolphins (0.065%).

The number of sets by Class-6 vessels on dolphin-associated schools of tuna increased by 7%, from 8,648 in 1999 to 9,250 in 2000, and the proportion of the total sets made which were made on dolphins increased from 44.6% in 1999 to 49.6% in 2000 (Background Paper A1, Table 6). The average mortality per set increased from 0.16 dolphin in 1999 to 0.174 dolphin in 2000 if mortalities that occurred in accidental dolphin sets are excluded (0.177 including mortalities that occurred in accidental dolphin sets). The estimated spatial distribution of the average mortalities per set during 2000 is shown in Figure 3. Patches of relatively high mortalities per set were found throughout the fishing area. The trends in the numbers of sets on dolphin-associated fish, mortality per set, and total mortality in recent years are shown in Figure 2.

The catches of dolphin-associated yellowfin increased by 2% in 2000 as compared to the catches in 1999. The percentage of the catch of yellowfin taken in sets on dolphins increased from 57.2% of the total catch by Class-6 vessels in 1999 to 61.8% of that catch in 2000, but the average catch of yellowfin per set on dolphins decreased slightly from 17.9 to 17.2 metric tons per set. The mortality of dolphins per metric ton of yellowfin caught increased from 0.009 in 1999 to 0.010 in 2000.

The above figures include data from trips by tuna vessels covered by observers from the programs of the IATTC, the PNAAPD of Mexico, the PNOV of Venezuela and the PROBECUADOR of Ecuador. The comparisons in the next paragraph are based only on the IATTC data bases for 1986 through 2000.

Effort distribution

The year 2000 shows some significant changes in the spatial distribution of effort. Figures 4-9 compare the distribution of number of sets on floating objects, unassociated schools, and dolphins in 1999 and 2000.

Sets on floating objects: While in 1999 the effort was concentrated in a narrow latitudinal band mostly between 1°N and 6°N, in 2000 the sets are distributed in a very diffuse way over the whole southern and southwestern sectors, with somewhat higher density in the area from 94°W to 105°W between 4°S and 6°N.

Sets on unassociated schools: These distributions are more similar. There appears to be a trend towards more coastal sets in 2000 than in 1999.

Sets on dolphins: The traditional dolphin fishing areas had a clear east-west axis, centered on the parallel 10° N, and had two areas of high density, one closer inshore and the other around the longitudes 120° W to 140°W (IATTC Special Report 11). In recent years the axis has moved south, and the fishery is operating much less in the offshore areas than before. This tendency to operate closer inshore was accentuated in 2000.

Fishers' performance

Traditionally, the performance of fishers in reducing dolphin mortality has been measured using variables such as the average mortality per set (MPS), and their success in releasing all dolphins encircled (sets with zero mortality, number of dolphins left in the net after the backdown maneuver) and in reducing factors that cause high mortality (sets with major malfunctions, net canopies, net collapses, and others). Data on these variables for 1986-2000 are shown in Figure 7 and Table 5. The trends clearly indicate that the improvement has been steady since 1986, and it continues to drive the mortality per set down.

There have been requests for other ways to measure performance at the individual captain/crew level. Vessels operate in different areas, and set on different stocks of dolphins; these factors could result in unfairness if all captains/crews are judged on the basis of a single measure such as the average mortality per set. The performance of captains fishing in areas or on stocks with high mortalities per set because of larger herd sizes or behavioral characteristics of the stocks involved would appear to be worse than the others. In order to make all data comparable, a stratification scheme was developed and applied to all the data to standardize the results.

Trends in relative abundance based on tuna vessel observer data

Despite dramatic reductions in the mortality of dolphins associated with this fishery since the early 1970s, the indices of relative abundance of the major dolphin species affected by the fishery have not shown any clear increase in the last two decades (Table 6). Data collected by observers of the U.S. National Marine Fisheries Service (NMFS) and the IATTC aboard tuna vessels have been used to estimate indices of relative abundance of dolphins because they represent a large number of sightings collected at relatively low cost compared to research surveys. However, the use of these data has posed serious problems for estimation because of biases introduced through the opportunistic structure of the data. Tuna-vessel observer data have long been known to be susceptible to biases. If there are no trends in these biases, it is possible to estimate trends in relative abundance from these data. However, changes in modes of search and fishing strategies can impart temporal trends in biases that can, in turn, produce spurious trends in indices of relative abundance. In light of the proposed use of the indices of relative abundance in population dynamics models, a number of issues have been raised regarding the reliability of these indices to accurately capture trends in true dolphin abundance. The IATTC staff has just finished the first part of a major review and re-analysis of different sources of bias and their impact on the indices to determine if the existing methodologies need to be modified to take into account, and adjust for, changes in biases in recent years.

The staff of the IATTC, in collaboration with researchers at the Research Unit for Wildlife Population Assessment at the University of St. Andrews, Scotland, have identified several potential sources of bias which have developed in the last decade. First, in the early 1980s, distributions of perpendicular distance from the vessel showed an excess of sightings within 0.5 nautical miles (nm) of the track line due to the vessel turning toward the herd before the observer was aware of the sighting. Since the late 1980s, distributions of perpendicular distances began to show a deficit of sightings near the track line, with the deficit extending the furthest off the track line for sightings made by helicopters. The lack of sightings close to the track line was not expected, and is only partially explained by rounding error in the sighting angles. To remove the influence of these sightings on estimation of relative abundance, cruises with an average sighting angle of less than 20° were excluded from previous analyses. However, excess sightings near the track line not removed by this procedure exert considerable influence on the fit of the hazard-rate model to the distribution of perpendicular distances. Thus, in early years, any spike in the distribution of perpendicular distances near the track line will lead to an inflated estimate of relative abundance. With the development of a deficit in sightings near the track line in the 1990s, the tendency for inflated estimates of relative abundance would be diminished, imparting a temporal trend in bias.

Differences in the percentage of sightings that led to sets and in average total herd size, by sighting method, suggest that the degree of under-reporting of crew sightings to the observer varies in accordance with the type of gear used to make the sighting. An analysis of sightings of offshore spotted dolphin within the northeastern offshore spotted dolphin area (north of 5ºN and east of 120ºW) shows that not only were helicopter sightings more likely to lead to sets than binocular sightings, but that the percentage of helicopter sightings that led to sets increased over time. Prior to 1989, binocular sightings accounted for over 73% of all sightings, but only 26% in 2000. On average, 79% of helicopter sightings, 72% of radar sightings, and 62% of binocular sightings led to sets. A maximum difference of 28% between percentages of sightings that led to sets was found, occurring between helicopter and binocular sightings in 2000. In addition, helicopter sightings tended to involve larger dolphin herds than either binocular or radar sightings. Average herd size has been shown to be correlated with catch per set of yellowfin tuna, the dominant species of tuna caught in association with dolphins, suggesting that helicopters may be less likely to report dolphin herds that are not associated with tunas. The increasing trend in the percentage of sightings that were made by helicopters and radar, combined with the difference in under-reporting, will produce biased estimates if the indices from different search methods are not comparable.

To explore the effect of changes in the relative proportion of sightings near the trackline on estimated abundance of both northeastern offshore spotted dolphins and eastern spinner dolphins, previously published methods were modified by fitting a half-normal model, rather than a hazard-rate model, to the perpendicular distance data. The hazard rate model exhibits greater flexibility, and thus can model the spike in sightings near the track line, an undesirable property if the excess sightings are the result of a spurious process. The half-normal model is more robust to high proportions of detections near the trackline, and thus comparison of estimates of relative abundance obtained from the two different models provides a means of assessing the influence of excess sightings near the track line on trends. Smearing of the sighting data used to reduce spikes resulting from rounding off of angles was also excluded from the estimation procedures to avoid arbitrary re-distribution of excess sightings near the track line into perpendicular distance intervals where they may not belong.

In a separate analysis, the effect of changes in the dominant searching gear and under-reporting was explored for the northeastern offshore spotted dolphin by stratifying the sightings data by categories of gear aboard the vessels. Four categories were used: (1) neither helicopter nor radar aboard, (2) helicopter aboard, but no radar, (3) no helicopter aboard, but radar aboard, and (4) both helicopter and radar aboard. Estimates of relative abundance were computed for each category, and the trends in the estimates were compared.

From comparison of estimates of relative abundance based on the hazard-rate model with those based on the half-normal model, it appears that the overall decreasing trend in relative abundance from 1977 through approximately 1992 is at least partially dependent on the treatment of the spike in the distribution of perpendicular distances near the trackline (Table 6; Figure 8). If the spike is spurious, then much of the decreasing trend over this time period may also be spurious. For example, the 1989-1991 average of the estimates of relative abundance for northeastern spotted dolphins based on the hazard-rate model shows a decrease of 17% compared to the 1977-1979 average; however, the 1989-1991 average of estimates based on the half-normal model shows a decrease of 7% compared to 1977-1979 (Table 6). A similar, but smaller, effect was seen for the eastern spinner dolphin (Table 6).

Some differences in indices of relative abundance were seen by mode of search. Estimates for the northeastern offshore spotted dolphin based on data collected aboard vessels with no helicopters and no radar suggest a decrease in the index from the late 1970s through the early 1980s, and an increase beginning in the mid-1980s. However, because of the high degree of variability in the estimates, there is no clear evidence for any long-term pattern between 1977 and 1990 (Figure 8). Estimates based on data collected aboard vessels with helicopters but no radar are generally less variable over the same time period, and the index generally increases between 1980 and 1990 (Figure 9). Despite the high degree of variability, both modes of search suggest an increase in the index in the mid-1980s. During the last decade, estimates based on data from trips by vessels with radar but no helicopter, and with both helicopter and radar, show decreasing trends, although the rate of decrease varies by mode of search (Figure 9). The index based on data of vessels with radar but no helicopter shows a decreasing trend beginning in the early 1990s. On the other hand, the index based on data from vessels with both radar and helicopter does not begin to decrease until the late 1990s, perhaps due to the 1997-1998 El Niño, similar to the pattern seen for 1983 (Table 6).

Comparison of estimates of the transect strip width over which all animals would have been detected if detection were always certain (ESW) and encounter rate for modes of search with and without helicopters show patterns that are consistent with an increased level of under-reporting in the presence of a helicopter. Estimates of ESW of vessels with helicopters are generally greater than those of vessels without helicopters. However, the encounter rates for vessels with helicopters are generally less than those for vessels without helicopters. In the absence of changes in true abundance, this pattern would be consistent with an increased level of under-reporting of sightings on vessels with helicopters as compared to vessels without helicopters. (Current methodology assumes that detection on the trackline is certain.) This is also consistent with a higher percentage of helicopter sightings that led to sets.

With the caveat that it is as yet unknown how biases associated with each mode of search may have changed over time, a preliminary revised time series of relative abundance for the northeastern stock of spotted dolphin can be computed from the indices based on different modes of search. We excluded the index based on data of vessels with radar, but no helicopter, because we believe that the data exhibit a temporal trend in bias as a result of under-reporting, coupled with changes in fishing strategies. We also excluded data prior to 1984 because of issues relating to under-reporting, and the likelihood of poor data quality. We assume that the average difference between the other indices largely reflects under-reporting, and thus we can adjust the indices for vessels with helicopters upward by a factor that corrects for the additional level of under-reporting that likely occurs with the use of a helicopter. A preliminary revised index (Table 6) was then computed as a weighted average of the indices for the three modes of search, with weights equal to the inverse of the squared coefficient of variation. Comparison of the revised index to the previously published index shows that the majority of the decline in the previously published index between the late 1980's to early 1990's, and the mid-1990's, may be attributable to the choice of detection function (hazard-rate *versus* half-normal) and the presence of different levels of under-reporting, coupled with changes in fishing strategies by part of the fleet. For example, the average of previously published estimates from 1993-1997 shows a decrease of 20% compared to the 1987-1991 average. By contrast, the average of revised estimates from 1993-1997 shows a decrease of 4% as compared to 1981-1991 (Table 6).

These preliminary results suggest that a significant percentage of the previously-published long-term decreasing trend in the index of relative abundance for northeastern spotted dolphins is likely due to changes in data quality, fishing strategies, and levels of under-reporting. In fact, the preliminary revised index for the northeastern spotted dolphin has remained relatively constant from about 1985 to 1997. The continued decrease of the index through 2000 raises questions about the effects of long-term changes in ocean climate on geographically defined stocks and the effects of continued changes in under-reporting biases. There may, of course, be other undetected trends in biases in the later years' data which could lead to problems similar to those detected in this study. Further analyses on these topics are ongoing.

Trends in absolute abundance

Ideally, all data available would be used to answer the question: are the dolphin populations recovering from the high mortalities of past years? Data from observers on research and tuna vessels would be combined to maximize the information available. But, given the difficulties noted above with the use of observer data from tuna vessels to estimate the changes in dolphin abundance over the years, the IATTC staff believes that these biases are not completely understood or removed. However, the scientifically designed surveys conducted by the U.S. NMFS should not suffer from these problems.

The IATTC staff has previously estimated the population growth rates for eastern spinner and northeastern spotted dolphins by fitting a simple exponential population model to the U.S. NMFS marine mammal survey data for 1979-1998. This analysis has been updated with the addition of preliminary estimates for the 1999 NMFS surveys.

The population model is given as

$$N(t+1) = \exp(r(t))\,[N(t)-C(t)]$$

in which $N(t)$ is the population abundance in year t, $r(t)$ is the population growth rate in year t, and $C(t)$ is the total dolphin mortality in the purse-seine fishery in year t, as estimated by the IATTC staff. The relationship between dolphin abundance, as measured by the NMFS survey, and true abundance is assumed to be:

$$x(t) = \ln[N(t)] + e(t) + d(t)$$

in which $x(t)$ is the logarithmic transformation of the survey estimate of abundance in year t, $e(t)$ is the survey measurement error as characterized by the sample variance reported by NMFS, and $d(t)$ is an additional unreported survey error (or "process error") due to sources other than sample variance. The first error term, $e(t)$, is assumed to be normally distributed, with standard deviation equal to the survey sample coefficient of variation reported by NMFS; the second error term, $d(t)$, is assumed to be normally distributed with unknown variance V, which is an additional parameter to be estimated. A Bayesian statistical estimation procedure, the MCMC algorithm, was applied to calculate posterior probability intervals for net growth rate of the population and annual abundance. Prior distributions were chosen as uniform distributions on $r(t)$, $\ln[N(1979)]$, $\ln(V)$ because of the nearly linear structure of the problem under a logarithm transformation. Bounds of the uniform priors were chosen well beyond appreciable density of the likelihood function.

The above population model was fitted on the assumption that the growth rate was constant during 1979-1999. The growth rates of northeastern spotted dolphins (3.2 $\pm$ 3.1%) and eastern spinner dolphins (3.7% $\pm$ 2.4%) are nearly the same (Figures 10 and 11). The eastern spinner dolphin sample variance accounts for all the variance about the fitted line, so that there is no need for an additional variance component, as there is for the northeastern spotted dolphins. The net cumulative growth rate during 1979-1999 is given by $\ln[N(1999)/N(1979)]$. The results indicate that the probability that the population has grown during those years is greater than 65% for the northeastern spotted dolphin and greater than 85% for the eastern spinner dolphin (Figures 12 and 13). This model indicates that the population sizes have grown between 1979 and 1999 from about 633,000 to 813,000 for northeastern spotted dolphins and from about 435,000 to 745,000 for eastern spinner dolphins.]

5. THE INTERNATIONAL DOLPHIN CONSERVATION PROGRAM

The IATTC provides the Secretariat for the IDCP.

The overall dolphin mortality limit (DML) established for the international fleet in 2000 was 5,000 animals, and the unreserved portion of 4,900 was allocated to 109 vessels that requested and were qualified to receive a DML. The average individual vessel DML (ADML) was 44.55. Twenty-four of those vessels did not utilize their DMLs prior to April 1; 11 of those forfeited their DMLs, and the other 13 were allowed, due to extenuating circumstances, to keep them for the remainder of the year. A total of 89 vessels utilized their DMLs during the year. Seven vessels were allocated second-semester DMLs of 14 animals each, but none of these utilized its DML. The distribution of the mortality caused in 2000 by vessels with full-year DMLs is shown in Figure 17. The estimate of total mortality of dolphins caused by the fishery in 2000 is 1,636 animals.

International Review Panel

The International Review Panel (IRP) held its 23rd, 24th, and 25th meetings during 2000. The 23rd and 24th meetings were held in San Jose, Costa Rica, on January 24-25 and June 7-8 respectively, and the 25th meeting was held in La Jolla, California, on October 27. Information on what took place at these meetings is available in the minutes of the meetings, which appear on the IATTC's website, and in the Annual Report of the IRP for 2000, available on request from the IATTC. The IRP follows a general procedure for reporting the compliance by vessels with laws and regulations established for minimizing the mortalities of dolphins during fishing operations to the governments concerned. The observers who accompany the vessels on their fishing trips prepare summaries of information pertinent to dolphin mortalities, and these are sent to the governments having jurisdiction of the vessels by the Secretariat of the IRP (IATTC staff members) soon after the fishing trips are completed. The IRP reviews the observer data for all completed trips at its meetings, and after each meeting reports of possible infractions are sent to the governments of the nations that have jurisdiction over the vessels in question. The governments report back to the IRP on actions taken regarding infractions. The IRP then informs the governments of compliance and non-compliance by means of an annual report presented to the governments.

System for tracking and verifying tuna

Article V.1.f of the AIDCP calls for the establishment of a system for the tracking and verification of tuna caught with and without mortality or serious injury of dolphins. The Parties to the AIDCP developed a general tracking and verification system, and a tuna-tracking form (TTF) to be completed at sea by IATTC and national program observers. There are two versions of the TTF, which, except for the headings, are identical; Form 'A' documents tuna caught in sets without mortality or serious injury of dolphins ("dolphin safe"), and Form 'B' documents tuna caught in sets with mortality or serious injury of dolphins ("non-dolphin safe"). The Secretariat is responsible for producing the TTFs to be used throughout the Agreement Area by all the Parties. Each Party is to designate a national authority to be responsible for implementing and operating the tracking and verification program. Each Party is also to provide the Secretariat with a report detailing the tracking and verification program established by that Party under its national laws and regulations. These programs are to include periodic audits and spot checks for caught, landed, and processed tuna products, mechanisms for communication and cooperation between and among national authorities, and timely access to relevant data. The tuna tracking system began in 2000, and TTFs were completed for all observed trips by Party vessels that departed during the year and for which there was catch of tuna.]

At-sea reporting by observers

The Agreement on the International Dolphin Conservation Program (AIDCP) mandated that the Parties "establish a system, based on real-time observer reporting, to ensure effective implementation and compliance with the per-stock, per-year dolphin mortality cap." This system was implemented by requiring observers aboard all tuna purse seiners with a DML to report on a weekly basis via e-mail, fax, or radio. Prior to this year, the reporting rate had been disappointing, in part due to lack of the necessary equipment. This lack of reporting had little practical effect, as the dolphin mortalities were much lower than the Stock Mortality Limits (SMLs). Beginning in 2001, however, obtaining accurate and up-to-date dolphin mortality reports became more urgent because the SMLs are now half that of previous years (from 0.2% of N_{min} to 0.1% of N_{min}) as required by the AIDCP.

While the reporting rate has improved since last year, the weekly At-Sea Reports are typically received from less than half the vessels. As of April 29, 2001, the average reporting rate since the beginning of the year was 45%. The most recent weekly reporting rate was 45%, and 56% of vessels had reported within the last two weeks.

Monitoring dolphin mortality in real-time requires reports every week from each vessel. Alternatively, an extrapolation routine could be developed, but basing management actions upon the variable results of such extrapolations could cause problems. Given that virtually all vessels carry an observer, extrapolation should not be necessary.

As trips are completed, the mortality data from the At-Sea Reports are replaced by data recorded on the observer's forms and checked for errors. By combining data from the At-Sea Reports and completed trips, the overall percentage of days at sea for which mortality has been reported can be calculated. Mortality data from 8,090 of 9,197 days at sea (88%) have been reported in either the At-Sea Reports or completed trip reports since the first of the year.

Since January 1, 2001, the Secretariat has been reporting weekly to the Parties the cumulative mortality for seven stocks of dolphins. The most recent observed mortalities are shown in Table 7.

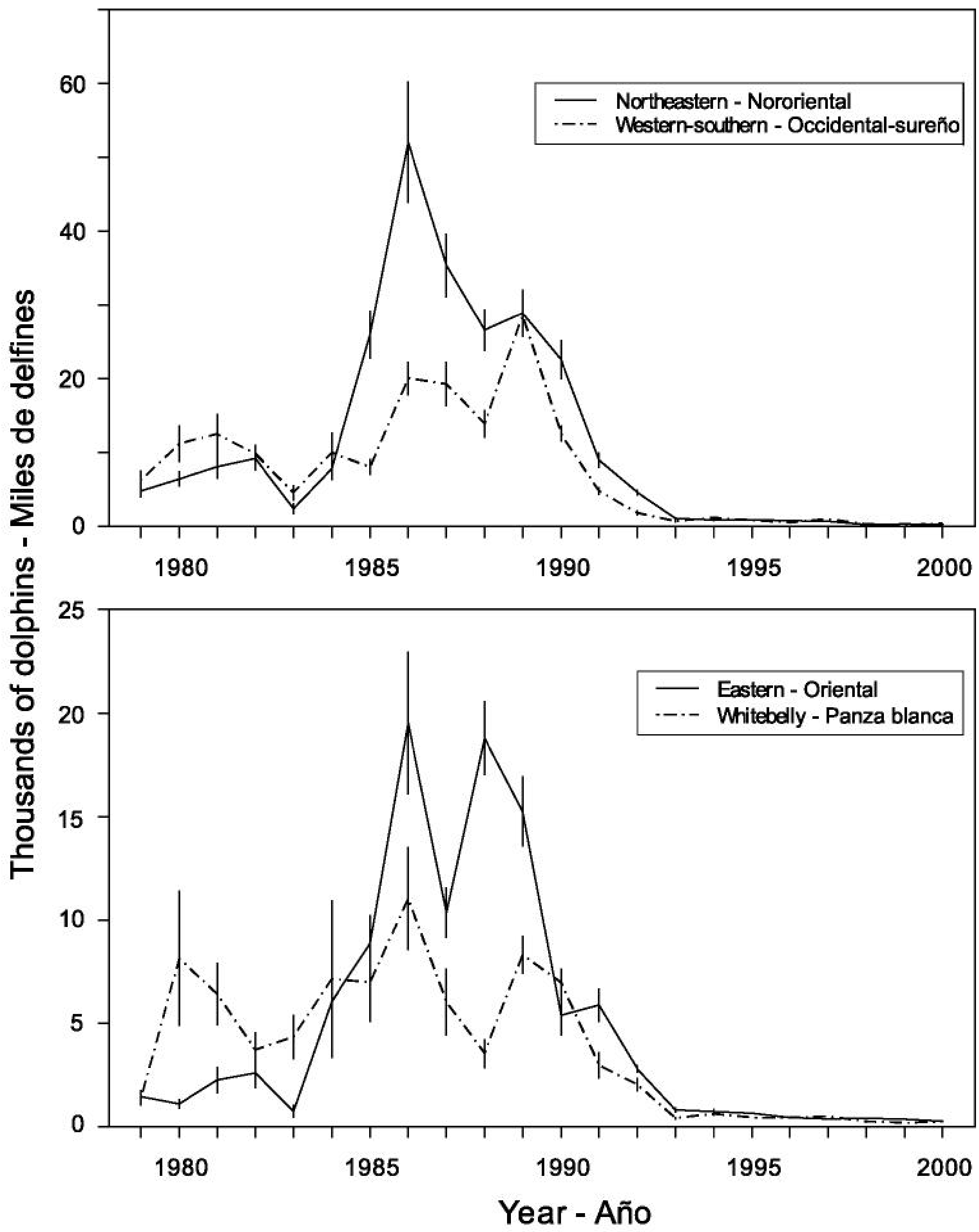

FIGURE 1. Estimated numbers of mortalities for the stocks of spotted and spinner dolphins in the EPO. Each vertical line represents one positive and one negative standard error.
FIGURA 1. Número estimado de mortalidades para los stocks de delfines manchado y tornillo en el OPO. Cada línea vertical representa un error estándar positivo y un error estándar negativo.

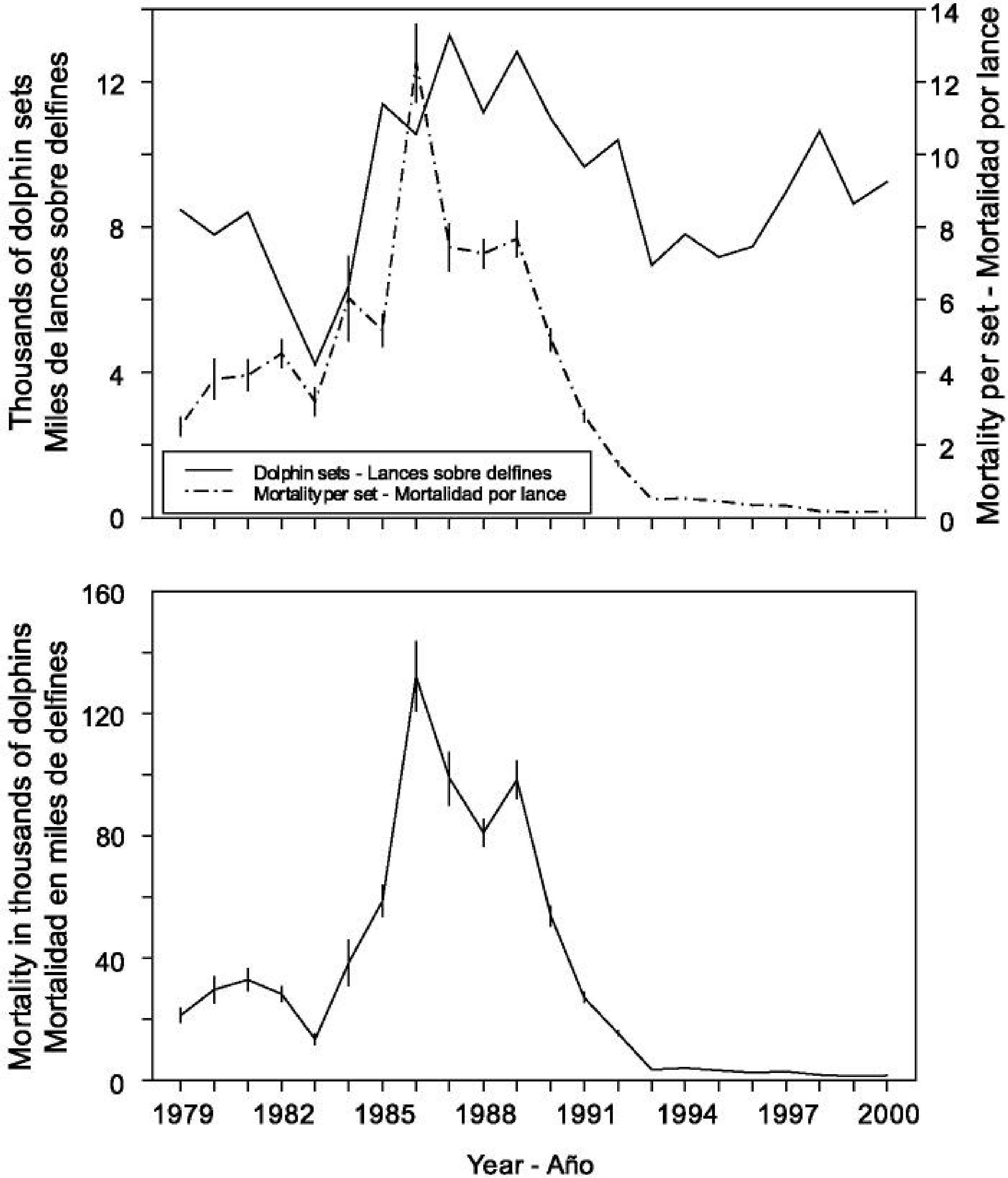

FIGURE 2. Estimated numbers of mortalities for all dolphins in the EPO. Each vertical line represents one positive and one negative standard error.

FIGURA 2. Número estimado de mortalidades para todos delfines en el OPO. Cada línea vertical representa un error estándar positivo y un error estándar negativo.

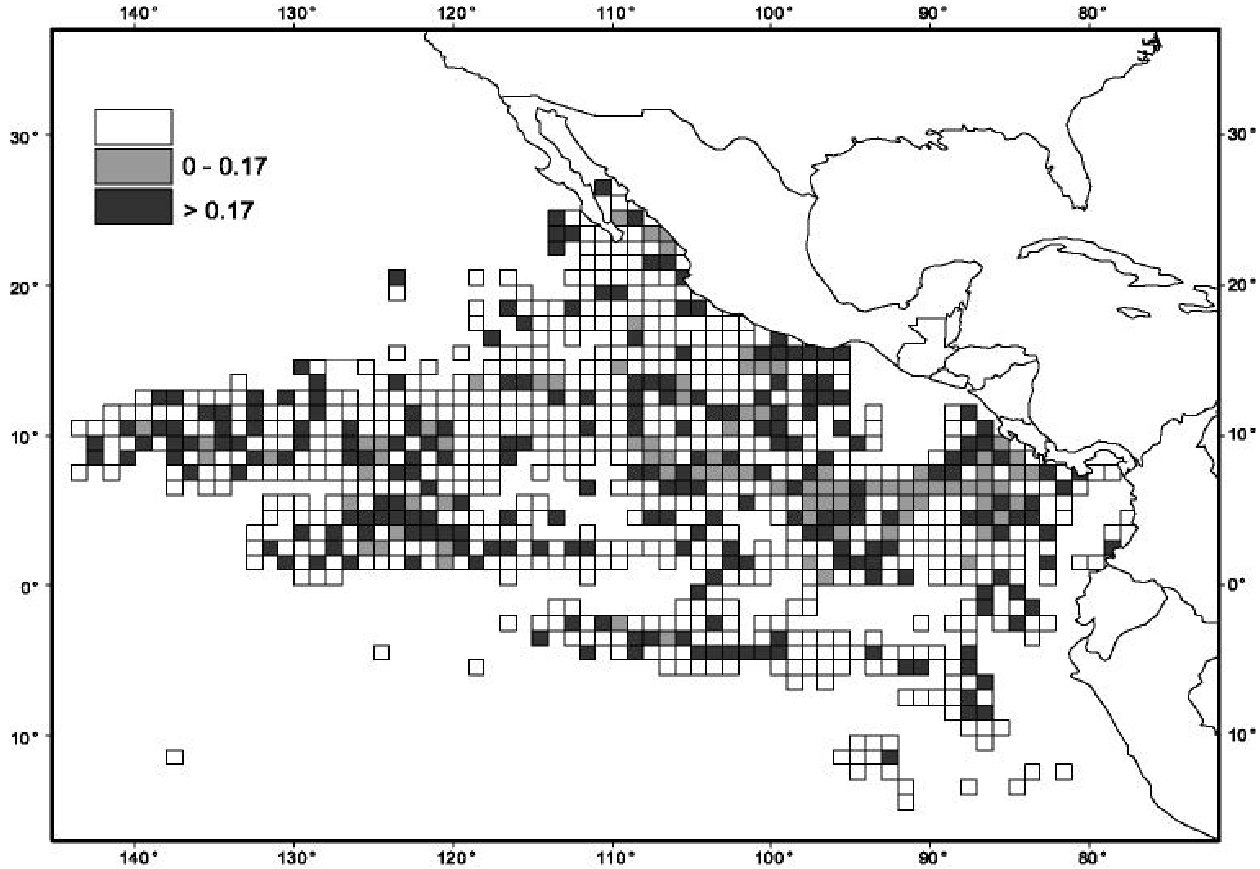

FIGURE 3. Spatial distributions of the average mortalities per set for all dolphins combined during 2000.
FIGURA 3. Distribuciones de las mortalidades medias por lance para todos los delfines combinados durante 2000..

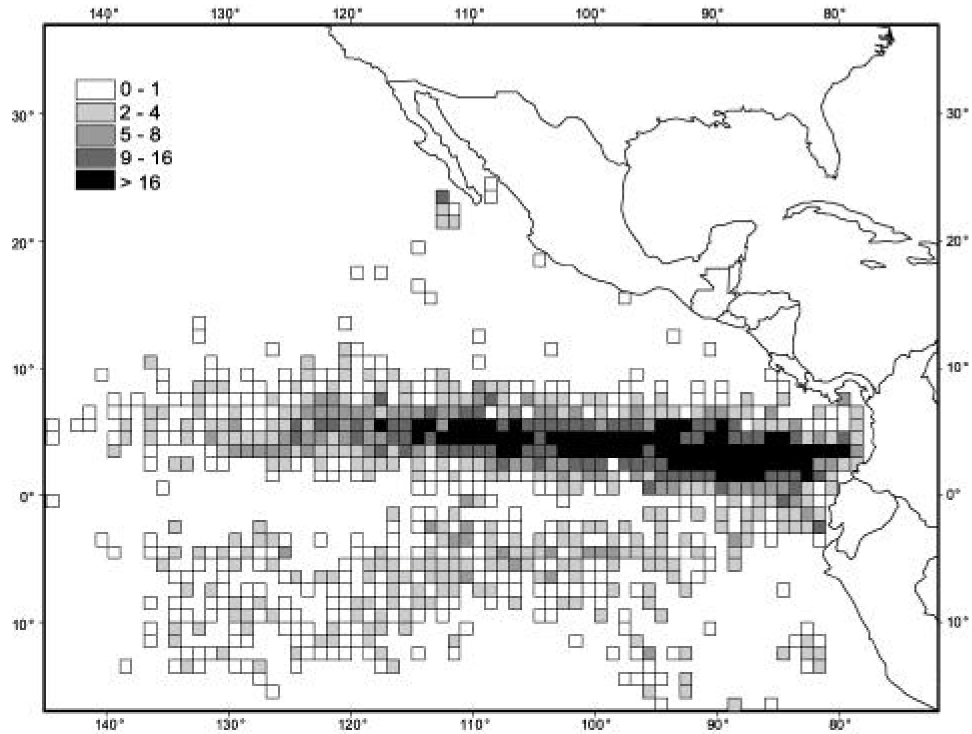

FIGURE 4a. Spatial distribution of the sets on floating objects during 1999.
FIGURA 4a. Distribución espacial de los lances sobre objetos flotantes durante 1999.

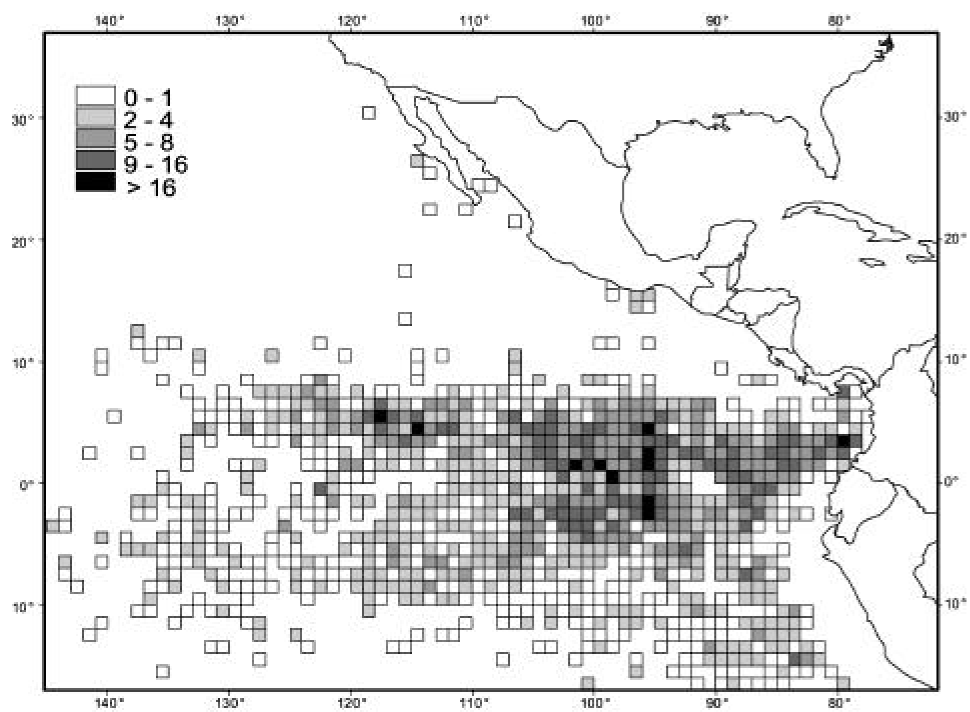

FIGURE 4b. Spatial distribution of the sets on floating objects during 2000.
FIGURA 4b. Distribución espacial de los lances sobre objetos flotantes durante 2000.

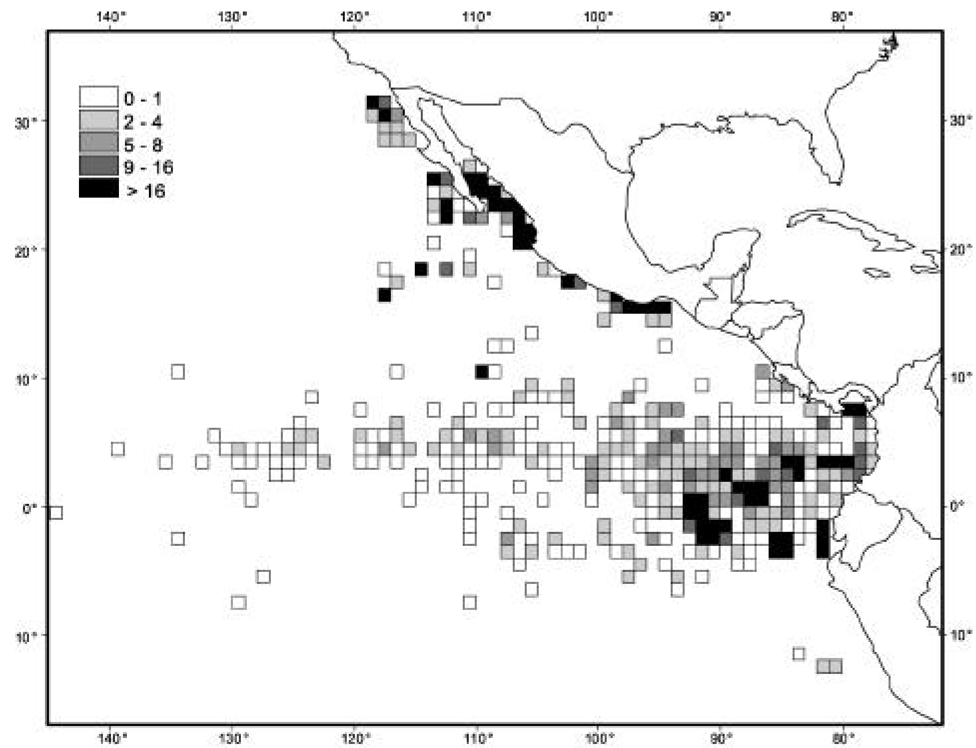

FIGURE 5a. Spatial distribution of the sets on unassociated schools during 1999.
FIGURA 5a. Distribución espacial de los lances sobre cardúmenes no asociados durante 1999.

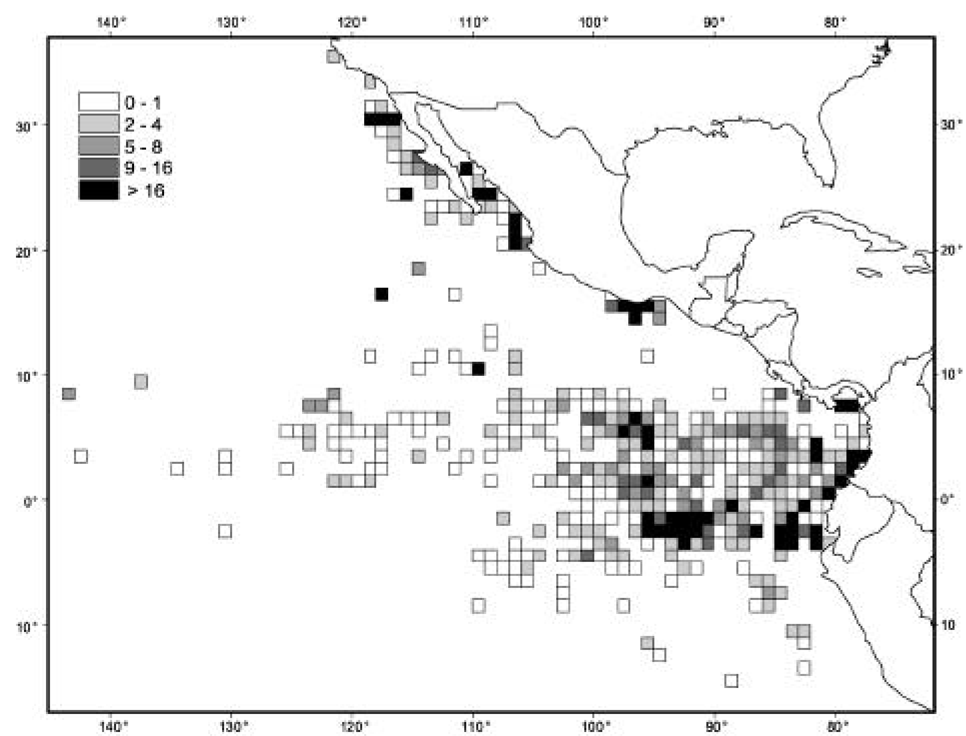

FIGURE 5b. Spatial distribution of the sets on unassociated schools during 2000.
FIGURA 5b. Distribución espacial de los lances sobre cardúmenes no asociadas durante 2000.

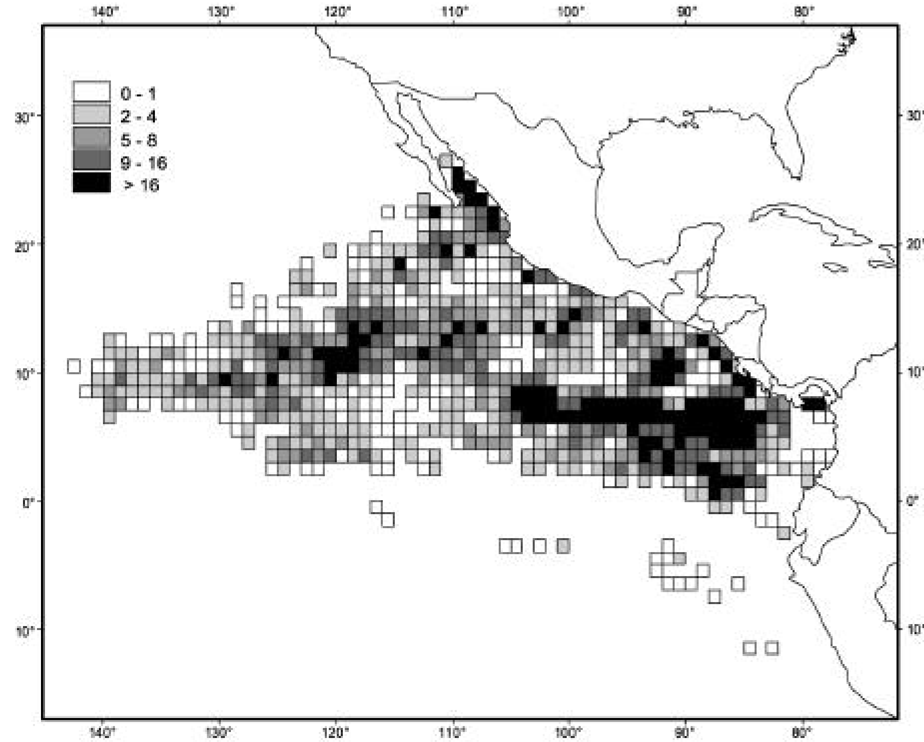

FIGURE 6a. Spatial distribution of the sets on dolphins during 1999.
FIGURA 6a. Distribución espacial de los lances sobre delfines durante 1999.

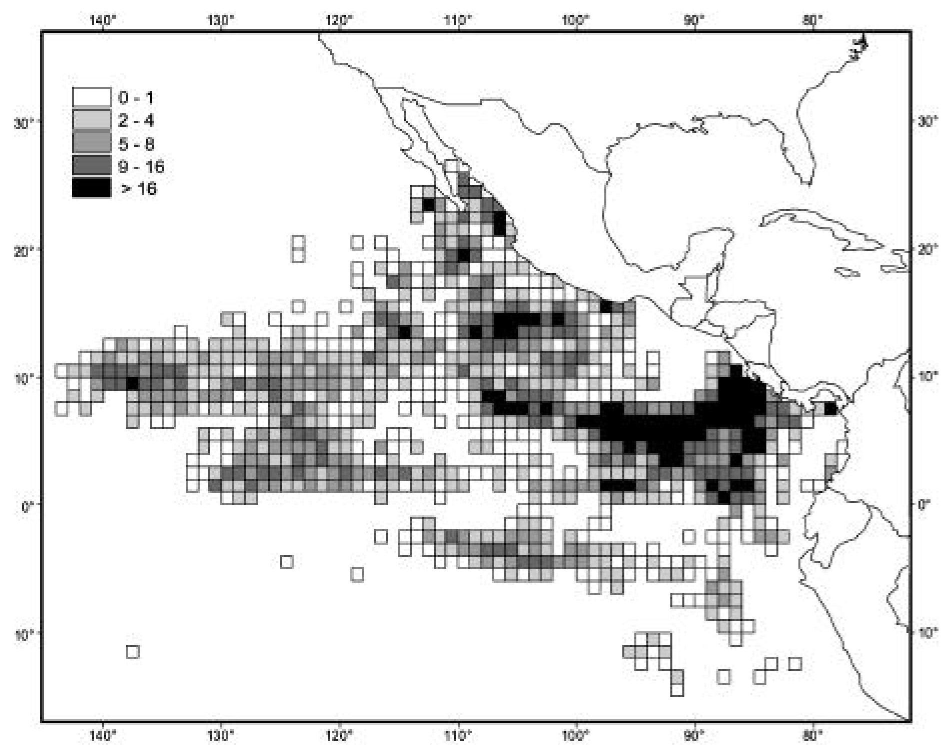

FIGURE 6b. Spatial distribution of the sets on dolphins during 2000.
FIGURA 6b. Distribución espacial de los lances sobre delfines durante 2000.

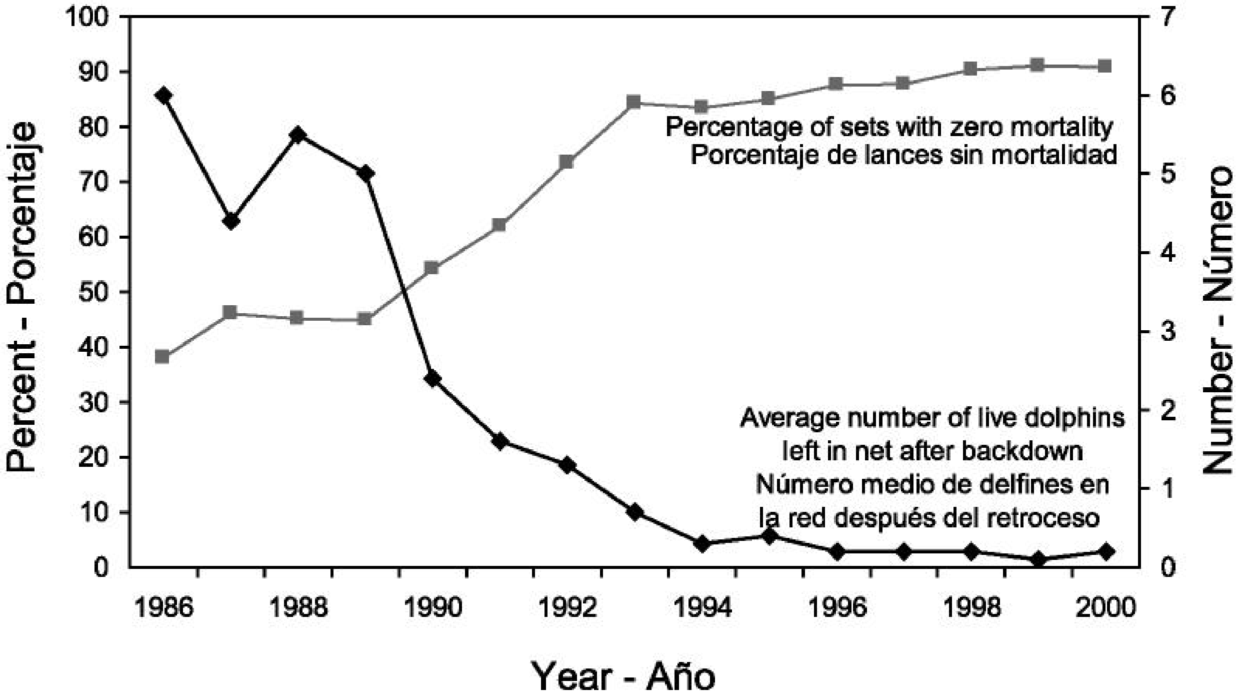

FIGURE 7a. Trends in indicators of performance in releasing dolphins alive.
FIGURA 7a. Tendencias en los indicadores de desempeño en la liberación de delfines vivos.

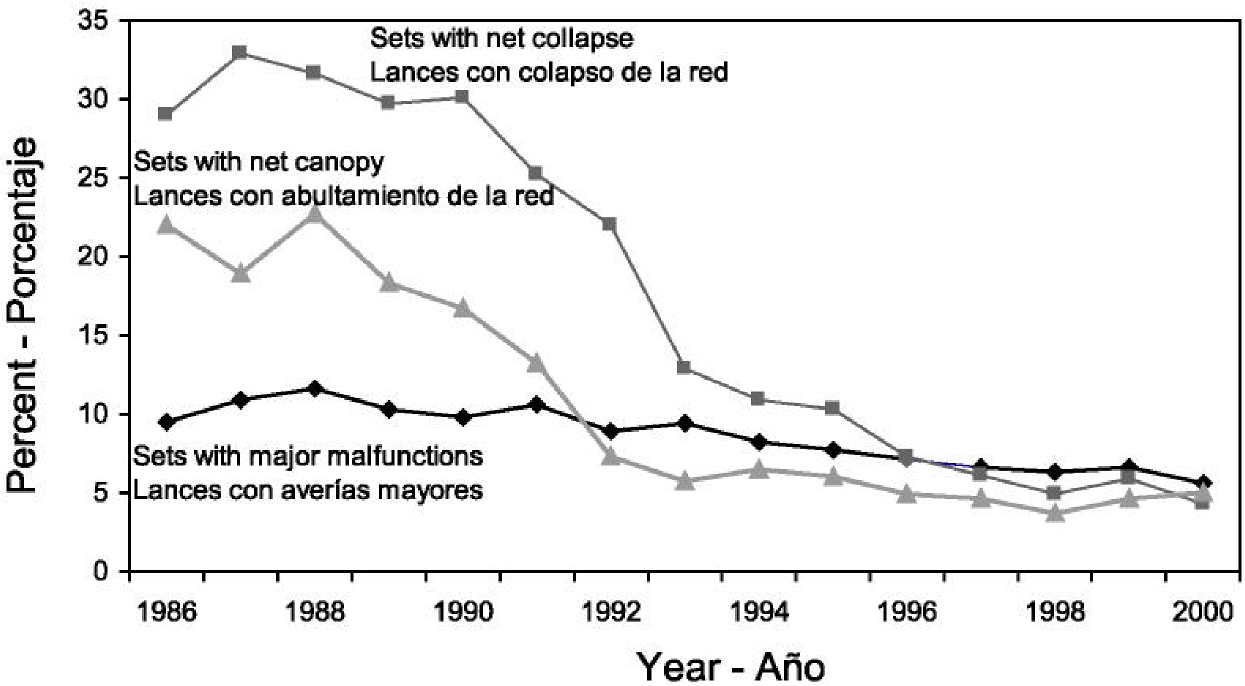

FIGURE 7b. Trends in the net malfunctions that can cause dolphin mortalities.
FIGURA 7b. Tendencias en averías de la red que pueden causar mortalidad de delfines.

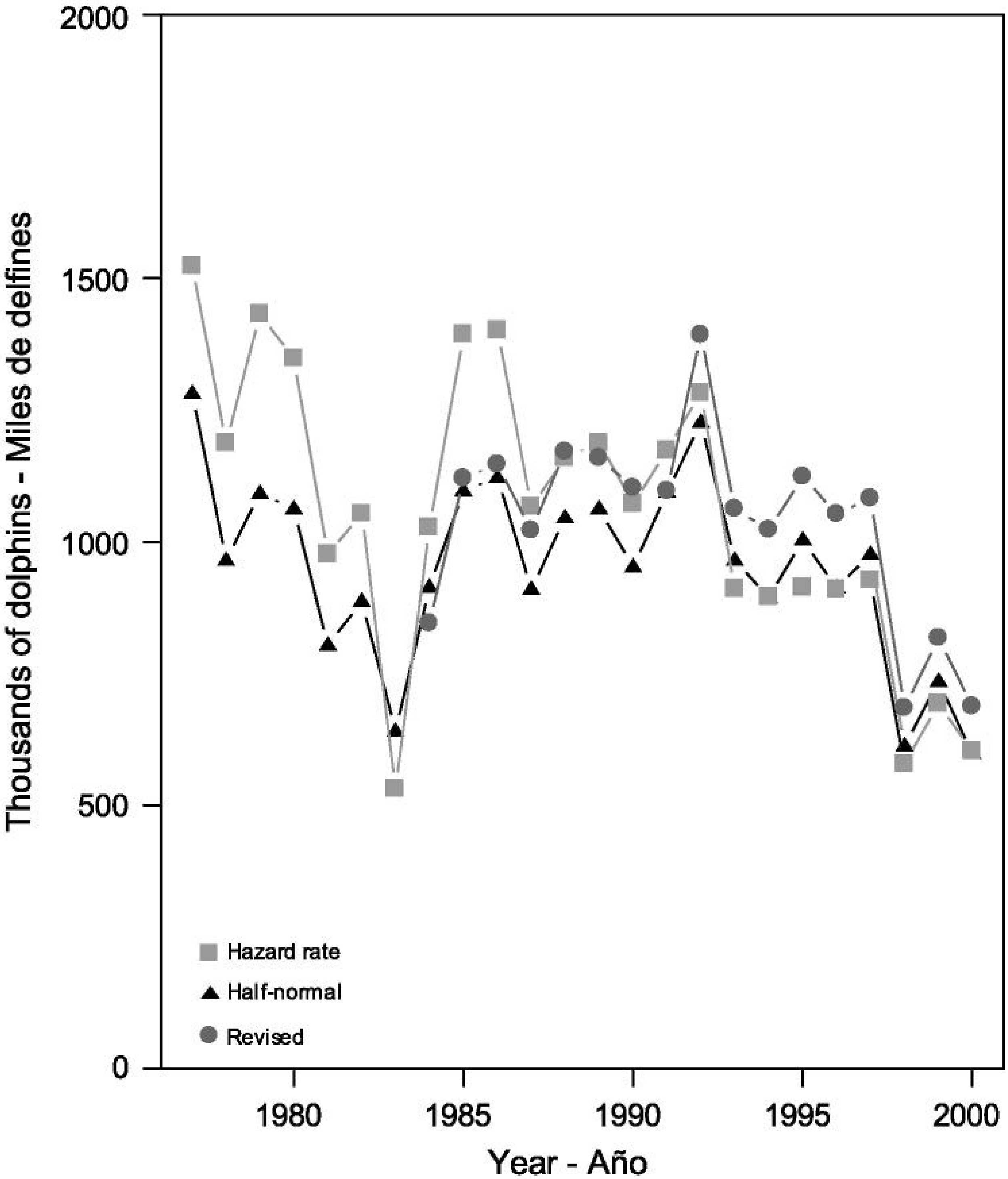

FIGURE 8. Estimates of indices of relative abundance for the northeastern stock of spotted dolphin using the hazard-rate model and the half-normal model (Table 6). The revised index (Table 6) is based on a weighted average of indices by mode of search.
FIGURA 8. Estimaciones de los índices de abundancia relativa para el delfín manchado nororiental usando los modelos de tasa de riesgo y *half normal* (Tabla 6). El índice revisado (Tabla 6) se basa en un promedio ponderado de los índices por modalidad de búsqueda.

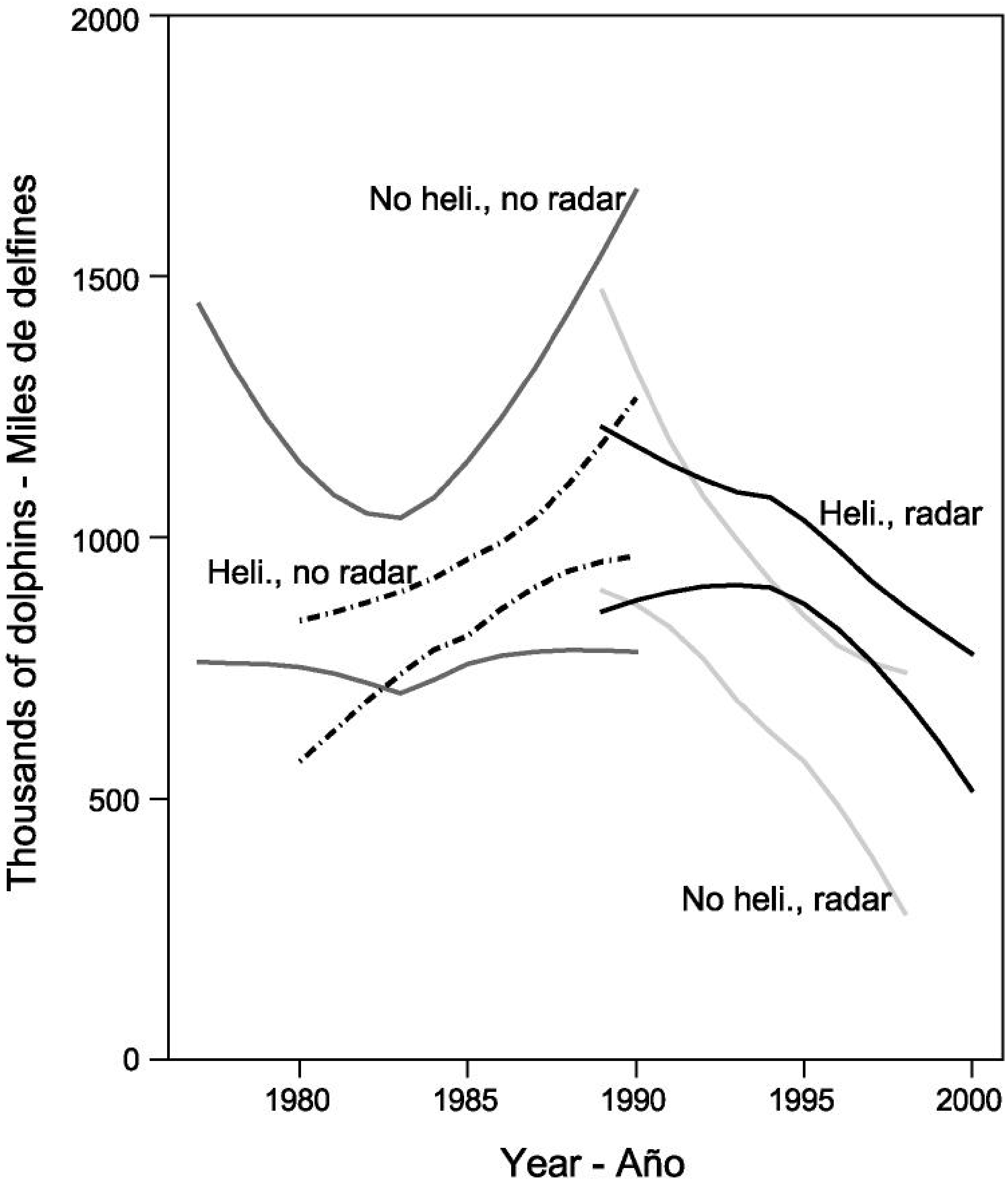

FIGURE 9. Approximate pointwise 95-percent confidence bands computed for a smoothing of the time series of indices of relative abundance of northeastern spotted dolphins by mode of search (smoothing based on a locally-weighted moving line with a smoothing parameter of 1.0).
FIGURA 9. Bandas de confianza puntuales de 95% aproximadas calculadas para una suavización de la serie de tiempo de los índices de abundancia relativa del delfín manchado nororiental por modalidad de búsqueda (suavización basada en una línea móvil con ponderación local con un prámetro de suavización de 1,0).

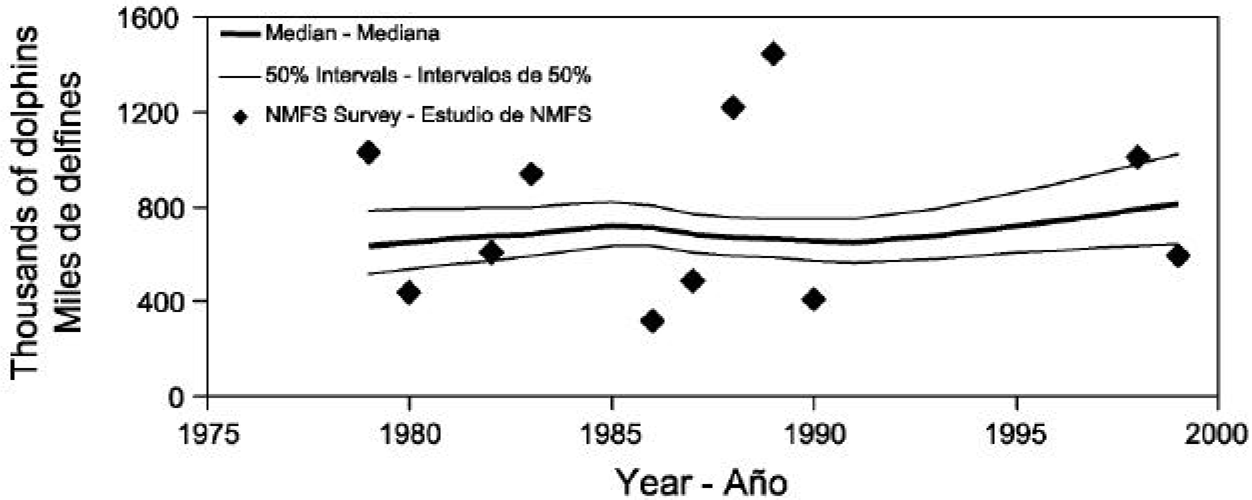

FIGURE 10. Trend in absolute abundance for northeastern spotted dolphins based on U.S. NMFS survey data, using a single *r* parameter. The plot shows median estimate and quartiles of fit to the data for 1979-1999.

FIGURA 10. Tendencia en la abundancia absoluta del delfín manchado nororiental, basada en datos de estudios de NMFS, usando un parámetro *r* sencillo. La gráfica ilustra la mediana y los cuartiles de la función ajustada a los datos para 1979-1999.

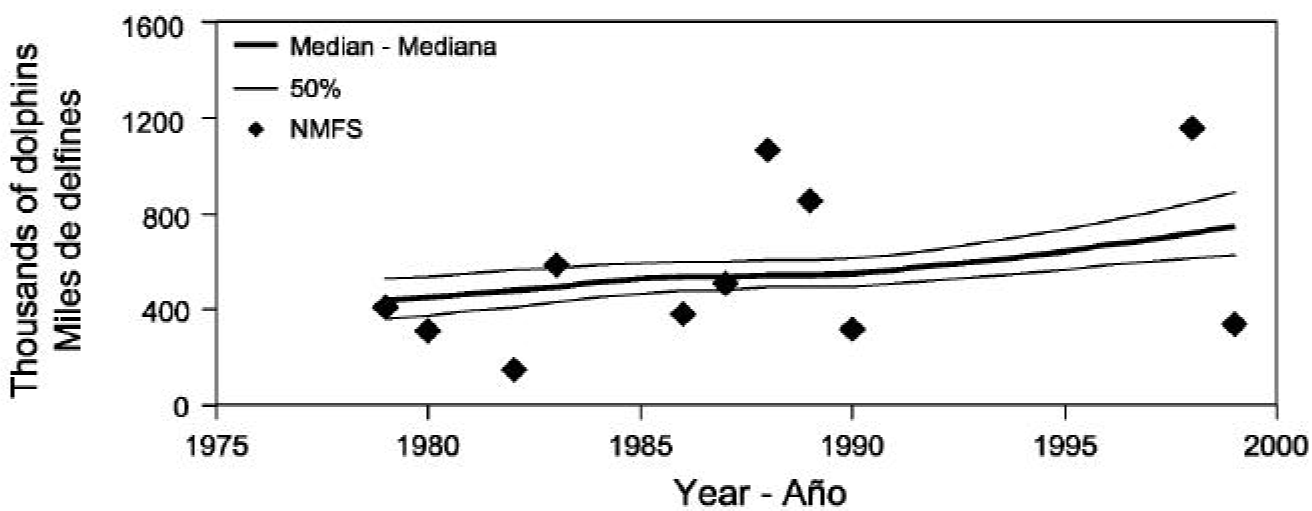

FIGURE 11. Trend in absolute abundance for eastern spinner dolphins based on U.S. NMFS survey data, using a single *r* parameter. Plot shows median estimate and quartiles of fit to the data for 1979-1999.

FIGURA 11. Tendencia en la abundancia absoluta del delfín tornillo oriental, basada en datos de estudios de NMFS, usando un parámetro *r* sencillo. . La gráfica ilustra la mediana y los cuartiles de la función ajustada a los datos para 1979-1999.

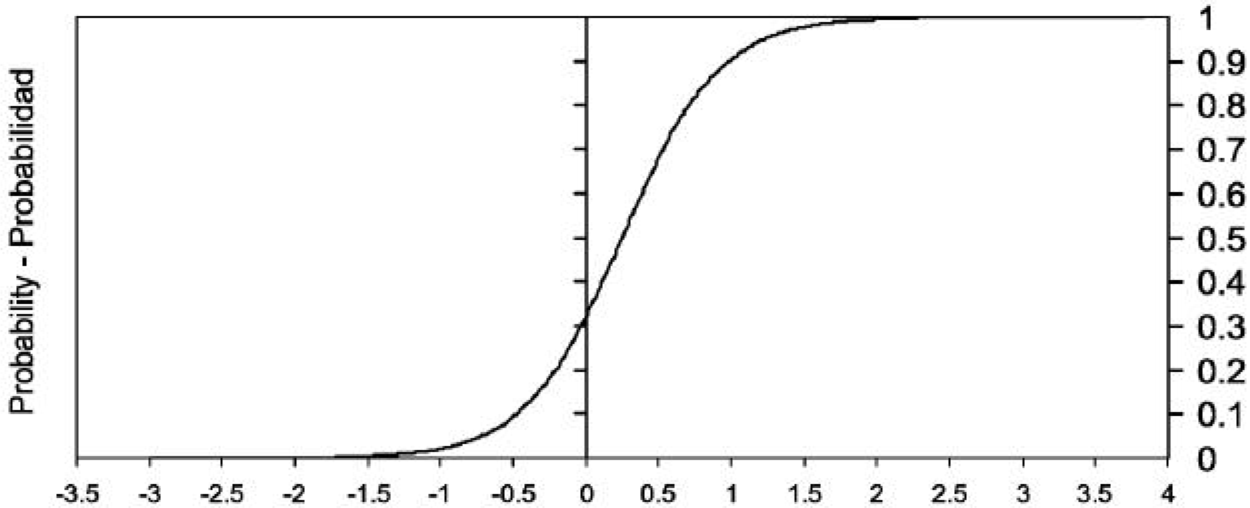

FIGURE 12. Cumulative distribution function of the net growth rate of northeastern spotted dolphins for 1979-1999 (single *r* parameter).
FIGURA 12. Función acumulativa de la distribución de la tasa neta de crecimiento del delfín manchado nororiental, 1979-1999 (parámetro *r* sencillo).

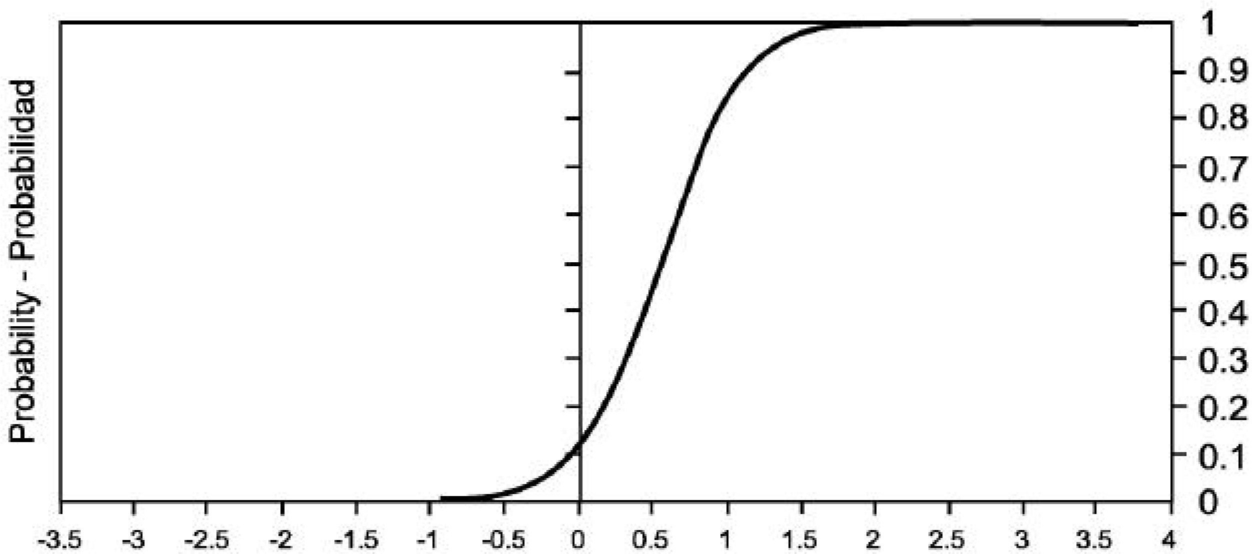

FIGURE 13. Cumulative distribution function of the net growth rate of eastern spinner dolphins for 1979-1999 (single *r* parameter).
FIGURA 13. Función acumulativa de la distribución de la tasa neta de crecimiento del delfín tornillo oriental, 1979-1999 (parámetro *r* sencillo).

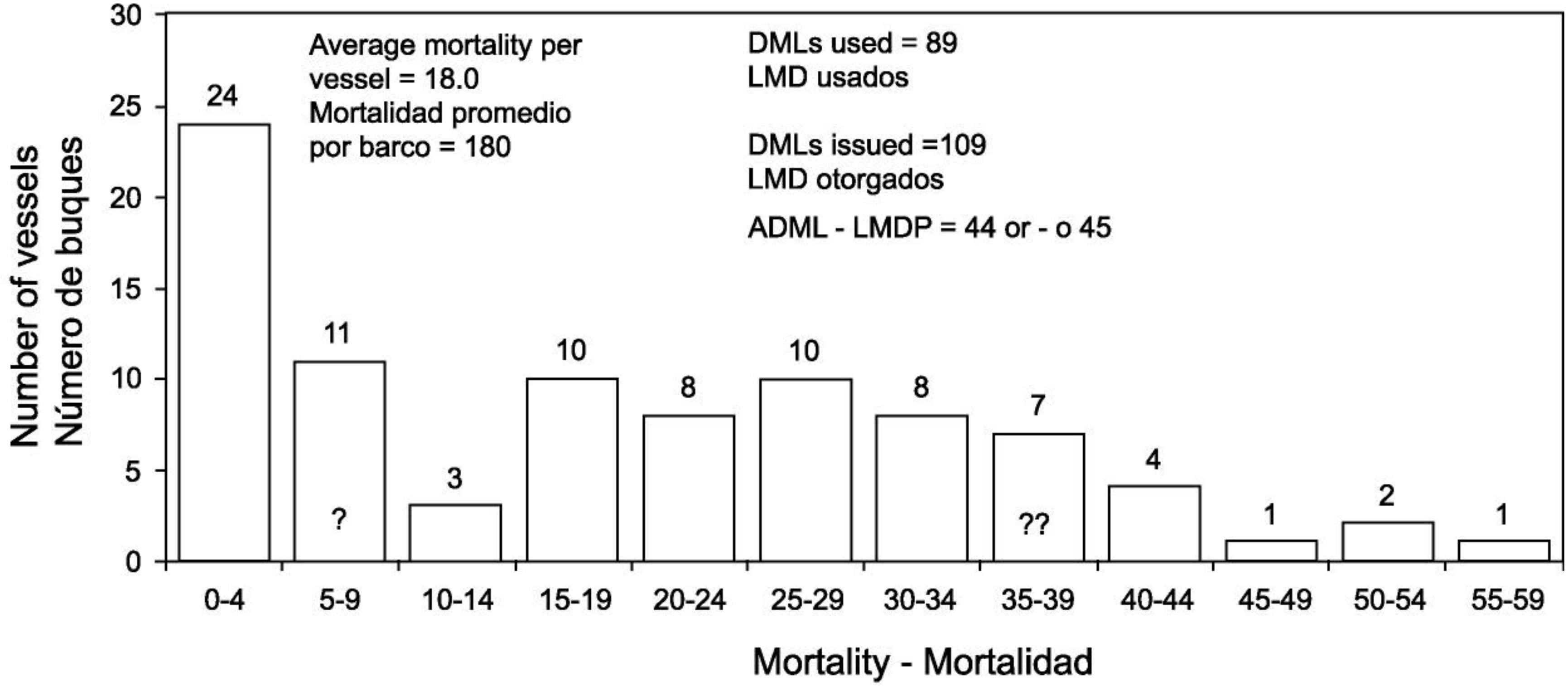

FIGURE 14. Distribution of dolphin mortality caused by vessels with full-year DMLs during 2000. ? indicates that one partially-observed trip is included; ?? indicates that one trip without an observer is included.
FIGURA 14. Distribución de la mortalidad de delfines causada por buques con LMD de año completo durante 2000. ? indica que incluye un viaje parcialmente observado; ?? indica que incluye un viaje sin observador.

TABLE 1. Sampling coverage of the IATTC and national programs during 2000 of trips by Class-6 vessels (capacity >400 short tons (>363 metric tons)).
TABLA 1. Cobertura de muestreo del los programas de la CIAT y nacionales en 2000 de viajes de barcos de la clase 6 (capacidad >400 toneladas cortas (<363 toneladas métricas)).

National fleet		Number of trips	Trips sampled by program			Percent sampled
			IATTC	National	Total	
Flota nacional		Número de viajes	Viajes muestreados por programa			Porcentaje muestreado
			CIAT	Nacional	Total	
Belize—Belice	BLZ	8	8	-	8	100.0
Bolivia	BOL	6	5[1]	-	5	83.3
Colombia	COL	21	21	-	21	100.0
Ecuador	ECU	240	234	6	240	100.0
España--Spain	ESP	35	35	-	35	100.0
Guatemala	GTM	35	35	-	35	100.0
Honduras	HND	8	8	-	8	100.0
México	MEX	181	92	89	181	100.0
Nicaragua	NIC	6	6	-	6	100.0
Panamá	PAN	24	24	-	24	100.0
USA—EE.UU.	USA	21	21	-	21	100.0
Venezuela	VEN	93	60	33	93	100.0
Vanuatu	VUT	46	45	-	45	97.8
Total		724	594[2]	128[3]	722	99.7

1 Does not include a partially-sampled trip -- No incluye un viaje parcialmente muestreado
2 Includes 33 trips which departed in late 1999 and ended in 2000, and 561 trips which departed in 2000-- Incluye 33 viajes iniciados a fines de 1999 y terminados en 2000, y 561 viajes iniciados durante 2000
3 All trips departed in 2000 Todos viajes iniciados durante 2000

TABLE 2. Incidental mortalities of dolphins in 2000, estimates of population abundance pooled for 1986-1990 (from Report of the International Whaling Commission, 43: 477-493), and estimates of relative mortality (with approximate 95-percent confidence intervals), by stock. All the data for 2000 are preliminary.
TABLA 2. Mortalidades incidentales de delfines en 2000, estimaciones de abundancia de poblaciones agrupadas para 1986-1990 (del Informe de la Comisión Ballenera Internacional, 43: 477-493), y estimaciones de abundancia relativa (con intervalos de confianza de 95% aproximados), por stock. Todos los datos de 2000 son preliminares.

Stock	Incidental mortality	Population abundance	Relative mortality (%)
	Mortalidad incidental	Abundancia de la población	Mortalidad relativa (%)
Offshore spotted—Manchado de altamar			
Northeastern—Nororiental	303	730,900	0.04 (0.032, 0.052)
Western/southern—Occidental y sureño	428	1,298,400	0.03 (0.026, 0.046)
Spinner dolphin—Tornillo			
Eastern—Oriental	272	631,800	0.04 (0.027, 0.065)
Whitebelly—Panza blanca	262	1,019,300	0.03 (0.016, 0.034)
Common dolphin—Común			
Northern—Norteño	56	476,300	0.01 (0.007, 0.025)
Central	222	406,100	0.05 (0.029, 0.107)
Southern—Sureño	9	2,210,900	<0.01 (<0.001,<0.001)
Other dolphins—Otros delfines[1]	84	2,802,300	<0.01 (0.002, 0.003)
Total	1,636	9,576,000	0.02 (0.015, 0.019)

1 "Other dolphins" includes the following species and stocks, whose observed mortalities were as follows: striped dolphins (*Stenella coeruleoalba*), 11; bottlenose dolphins (*Tursiops truncatus*), 4; Central American spinner dolphins (*Stenella longirostris centroamericana*), 2; rough-toothed dolphin (*Steno bredanensis*), 27; short-finned pilot whale (*Globicephala macrorhynchus*), 1; and unidentified dolphins, 39.
1 "Otros delfines" incluye las siguientes especies y stocks, con las mortalidades observadas correspondientes: delfín listado (*Stenella coeruleoalba*), 11; tonina (*Tursiops truncatus*), 4; delfín tornillo centroamericano (*Stenella longirostris centroamericana*), 2; delfín de dientes rugosos (*Steno bredanensis*), 27; ballenas piloto (*Globicephala macrorhynchus*), 1; y delfines no identificados, 39.

TABLE 3. Annual estimates of dolphin mortality, by species and stock. All the data for 2000 are preliminary. The estimates for 1979-1992 are based on a mortality-per-set ratio. The estimates for 1993-1994 are based on the sums of the IATTC species and stock tallies and the PNAAPD total dolphin mortalities, prorated to species and stock. The mortalities for 1995-2000 represent the sums of the observed species and stock tallies recorded by the IATTC, PNAAPD, PNOV and PROBECUADOR programs. The standard errors for 1979-1994 are shown in Table 4. The sums of the estimated mortalities for the northeastern and western-southern stocks of offshore spotted dolphins do not necessarily equal those for the previous stocks of northern and southern offshore spotted dolphins because the estimates for the two stock groups are based on different areal strata, and the mortalities per set and the total numbers of sets vary spatially.

TABLA 3. Estimaciones anuales de la mortalidad de delfines, por especie y stock. Todos los datos para 2000 son preliminares. Las estimaciones para 1979-1992 se basan en una razón de mortalidad por lance. Las estimaciones para 1993-1994 se basan en las sumas de las mortalidades por especie y stock registradas por la CIAT y las mortalidades totales registradas por el PNAAPD, prorrateadas a especies y stocks. Las mortalidades para 1995-2000 son las sumas de las mortalidades por especie y stock registradas por las programas de la CIAT, PNAAPD, PNOV y PROBECUADOR. En la Tabla 4 se detallan los errores estándar para 1979-1994. Las sumas de las mortalidades estimadas para los stocks nororiental y occidental y sureño del delfín manchado de altamar no equivalen necesariamente a las sumas de aquéllas para los antiguos stocks de delfín manchado de altamar norteño y sureño porque las estimaciones para los dos grupos de stocks se basan en estratos espaciales diferentes, y las mortalidades por lance y el número total de lances varían espacialmente.

	Offshore spotted		Spinner		Common			Others	Total
	North-eastern	Western-southern	Eastern	White belly	Northern	Central	Southern		
	Manchado de altamar		Tornillo		Común			Otros	Total
	Nor-oriental	Occidental y sureño	Oriental	Panza blanca	Norteño	Central	Sureño		
1979	4,828	6,254	1,460	1,312	4,161	2,342	94	880	21,331
1980	6,468	11,200	1,108	8,132	1,060	963	188	633	29,752
1981	8,096	12,512	2,261	6,412	2,629	372	348	367	32,997
1982	9,254	9,869	2,606	3,716	989	487	28	1,347	28,296
1983	2,430	4,587	745	4,337	845	191	0	353	13,488
1984	7,836	10,018	6,033	7,132	0	7,403	6	156	38,584
1985	25,975	8,089	8,853	6,979	0	6,839	304	1,777	58,816
1986	52,035	20,074	19,526	11,042	13,289	10,884	134	5,185	132,169
1987	35,366	19,298	10,358	6,026	8,216	9,659	6,759	3,200	98,882
1988	26,625	13,916	18,793	3,545	4,829	7,128	4,219	2,074	81,129
1989	28,898	28,530	15,245	8,302	1,066	12,711	576	3,123	98,451
1990	22,616	12,578	5,378	6,952	704	4,053	272	1,321	53,874
1991	9,005	4,821	5,879	2,974	161	3,182	115	990	27,127
1992	4,657	1,874	2,794	2,044	1,773	1,815	64	518	15,539
1993	1,139	757	821	412	81	230	0	161	3,601
1994	935	1,226	743	619	101	151	0	321	4,096
1995	952	859	654	445	9	192	0	163	3,274
1996	818	545	450	447	77	51	30	129	2,547
1997	721	1,044	391	498	9	114	58	170	3,005
1998	298	341	422	249	261	172	33	101	1,877
1999	358	253	363	192	85	34	1	62	1,348
2000	303	428	272	262	56	222	9	84	1,636

TABLE 4. Standard errors of annual estimates of dolphin species and stock mortality for 1979-1994. There are no standard errors for 1995-2000 because the coverage was at or nearly at 100% during those years (Table 1).

TABLA 4. Errores estándar de las estimaciones anuales de la mortalidad de delfines por especie y stock para 1979-1994. No hay errores estándar para 1995-2000 porque la cobertura fue de 100%, o casi, en esos años (Tabla 1).

	Offshore spotted		Spinner		Common			Other
	North-eastern	Western-southern	Eastern	Whitebelly	Northern	Central	Southern	
	Manchado de altamar		Tornillo		Común			Otros
	Nor-oriental	Occidental y sureño	Oriental	Panza blanca	Norteño	Central	Sureño	
1979	817	1,229	276	255	1,432	560	115	204
1980	962	2,430	187	3,239	438	567	140	217
1981	1,508	2,629	616	1,477	645	167	230	76
1982	1,529	1,146	692	831	495	168	16	512
1983	659	928	284	1,043	349	87	-	171
1984	1,493	2,614	2,421	3,773	-	5,093	3	72
1985	3,210	951	1,362	1,882	-	2,776	247	570
1986	8,134	2,187	3,404	2,454	5,107	3,062	111	1,722
1987	4,272	2,899	1,199	1,589	4,954	2,507	3,323	1,140
1988	2,744	1,741	1,749	668	1,020	1,224	1,354	399
1989	3,108	2,675	1,674	883	325	4,168	295	430
1990	2,575	1,015	949	640	192	1,223	95	405
1991	956	454	771	598	57	442	30	182
1992	321	288	168	297	329	157	8	95
1993	89	52	98	33	27	-	-	29
1994	69	55	84	41	35	8	-	20

TABLE 5. Percentages of sets with no dolphin mortalities, with major gear malfunctions, with net collapses, with net canopies, average times of backdown (in minutes), and average number of live dolphins left in the net at the end of backdown.
TABLA 5. Porcentajes de lances sin mortalidad de delfines, con averías mayores, con colapso de la red, con abultamiento de la red, duración media del retroceso (en minutos), y número medio de delfines en la red después del retroceso.

	Sets with zero mortality (%)	Sets with major malfunctions (%)	Sets with net collapse (%)	Sets with net canopy (%)	Average duration of backdown (minutes)	Average number of live dolphins left in net after backdown
	Lances sin mortalidad (%)	Lances con averías mayores (%)	Lances con colapso de la red (%)	Lances con abultamiento de la red (%)	Duración media del retroceso (minutos)	Número medio de delfines en la red después del retroceso
1986	38.1	9.5	29.0	22.2	15.3	6.0
1987	46.1	10.9	32.9	18.9	14.6	4.4
1988	45.1	11.6	31.6	22.7	14.3	5.5
1989	44.9	10.3	29.7	18.3	15.1	5.0
1990	54.2	9.8	30.1	16.7	14.3	2.4
1991	61.9	10.6	25.2	13.2	14.2	1.6
1992	73.4	8.9	22.0	7.3	13.0	1.3
1993	84.3	9.4	12.9	5.7	13.2	0.7
1994	83.4	8.2	10.9	6.5	15.1	0.3
1995	85.0	7.7	10.3	6.0	14.0	0.4
1996	87.6	7.1	7.3	4.9	13.6	0.2
1997	87.7	6.6	6.1	4.6	14.3	0.2
1998	90.3	6.3	4.9	3.7	13.2	0.2
1999	91.0	6.6	5.9	4.6	14.0	0.1
2000	90.8	5.6	4.3	5.0	14.9	0.2

TABLE 6. Estimates of indices of relative abundance for northeastern offshore spotted dolphins and eastern spinner dolphins, in thousands of animals, for the hazard-rate model (previously-published time series) and the half-normal model. Bootstrap standard errors shown in parentheses. Also shown for the northeastern offshore spotted dolphin is a preliminary revised index computed from indices based on different modes of search.

TABLA 6. Estimaciones de los índices de abundancia relativa de los delfines manchado de altamar nororiental y tornillo oriental, en miles de animales, para el modelo de tasa de riesgo (serie de tiempo publicada previamente) y el modelo *half-normal*. Errores estándar de *bootstrap* en paréntesis. Para el delfín manchado de altamar nororiental se presenta también un índice revisado preliminar calculado a partir de índices basados en distintas modalidades de búsqueda.

	Northeastern offshore spotted						Eastern spinner			
	Hazard-rate		Half-normal		Revised		Hazard-rate		Half-normal	
	Manchado de altamar nororiental						Tornillo oriental			
	Tasa de riesgo		*Half-normal*		Revisado		Tasa de riesgo		*Half-normal*	
1977	1,523	(257)	1,281	(268)			494	(137)	399	(127)
1978	1,187	(227)	965	(154)			428	(153)	277	(94)
1979	1,432	(282)	1,092	(181)			323	(184)	289	(146)
1980	1,348	(252)	1,063	(159)			381	(117)	293	(72)
1981	976	(117)	804	(98)			222	(120)	275	(83)
1982	1,054	(143)	887	(99)			212	(102)	222	(58)
1983	532	(116)	641	(96)			410	(133)	377	(97)
1984	1,027	(238)	914	(187)	846	(196)	375	(139)	329	(105)
1985	1,394	(183)	1,097	(115)	1,121	(165)	587	(136)	513	(98)
1986	1,401	(188)	1,122	(109)	1,147	(176)	590	(118)	476	(87)
1987	1,067	(68)	910	(61)	1,022	(146)	363	(100)	336	(71)
1988	1,159	(135)	1,046	(91)	1,171	(150)	717	(110)	630	(99)
1989	1,188	(129)	1,063	(84)	1,159	(166)	389	(71)	340	(63)
1990	1,072	(79)	952	(67)	1,103	(156)	358	(76)	305	(76)
1991	1,174	(94)	1,094	(87)	1,097	(191)	358	(65)	316	(67)
1992	1,282	(92)	1,226	(78)	1,393	(221)	410	(91)	456	(103)
1993	911	(68)	965	(77)	1,063	(178)	295	(54)	275	(54)
1994	895	(63)	894	(81)	1,023	(174)	408	(85)	336	(66)
1995	913	(61)	1,003	(87)	1,124	(182)	538	(83)	517	(93)
1996	910	(56)	913	(76)	1,053	(166)	483	(139)	436	(158)
1997	927	(54)	976	(57)	1,083	(168)	439	(127)	437	(110)
1998	579	(63)	613	(64)	685	(125)	275	(56)	309	(46)
1999	693	(57)	735	(61)	818	(144)	427	(75)	408	(59)
2000	603	(57)	599	(57)	688	(118)	288	(68)	325	(63)

TABLE 7. Preliminary reports of the mortalities of dolphins in 2001, to April 29.
TABLA 7. Informes preliminares de las mortalidades de delfines en 2001, hasta el 29 de abril.

Stock	Total mortality Mortalidad total	Limit Límite	Used (%) Usado (%)
Offshore spotted – Manchado de altamar			
Northeastern--Nororiental	84	648	13.0
Western-southern--Occidental-sureño	56	1,145	4.9
Spinner--Tornillo			
Eastern--Oriental	43	518	8.3
Whitebelly--Panza blanca	57	871	6.5
Common--Común			
Northern--Norteño	79	562	14.1
Central	54	207	26.1
Southern--Sureño	13	1,845	0.7
Others and unidentified--Otros y no identificados	23		
Total	**409**	**5,000**	**8.2**