Report to Congress under Section 305 of the Marine Mammal Protection Act (16 U.S.C. 1415)

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I. Foreword

Section 305 of the Marine Mammal Protection Act (MMPA; 16 U.S.C. §1415) requires the Secretary of Commerce to submit annual reports to Congress. This report updates the 2007 Report to Congress and includes information through June 2008. This report provides information required by 16 U.S.C. §1415, which includes:

> *(1) results of research conducted pursuant to section 304;*
>
> *(2) a description of the status and trends of stocks of tuna;*
>
> *(3) a description of the efforts to assess, avoid, reduce, and minimize the bycatch of juvenile yellowfin tuna and bycatch of non-target species;*
>
> *(4) a description of the activities of the International Dolphin Conservation Program and of the efforts of the United States in support of the program's goals and objectives, including the protection of dolphin stocks in the eastern tropical Pacific Ocean, and an assessment of the effectiveness of the program;*
>
> *(5) actions taken by the Secretary under section 101(a)(2)(B) and section 101(d);*
>
> *(6) copies of any relevant resolutions and decisions of the Inter-American Tropical Tuna Commission, and any regulations promulgated by the Secretary under this title; and*
>
> *(7) any other information deemed relevant by the Secretary.*

NOAA's National Marine Fisheries Service (NMFS), on behalf of the U.S. Department of Commerce, implements the International Dolphin Conservation Program (IDCP) and other aspects of the U.S. Tuna/Dolphin Program, pursuant to the Marine Mammal Protection Act (MMPA) (16 U.S.C. §1361 et seq.) and the Dolphin Protection Consumer Information Act (DPCIA) (16 U.S.C. §1385). In addition, NMFS implements resolutions and conservation and management measures of the Inter-American Tropical Tuna Commission (IATTC) under the Tuna Conventions Act (16 U.S.C. §951 et seq.). NMFS compiled this report using available information from sources required by the statutes above. (NMFS used 2007 information in compiling this report unless 2008 data were available.) To supplement the contents of the report, additional materials on the topics discussed herein are appended to the report, and sources for additional information have been referenced.[1]

NMFS has consulted closely with other nations, the IATTC, the U.S. Department of State (DoS), the tuna industry, and nongovernmental organizations (NGOs) through previous processes to

[1]Additional information about NMFS Tuna/Dolphin Program, the associated domestic regulations, lists of nations whose tuna harvested in the eastern tropical Pacific Ocean (ETP) is currently prohibited, U.S. participation in the Agreement, the final finding on the definition of dolphin-safe, ongoing litigation, and other related topics are available online at http://www.nmfs.noaa.gov/ia/intlagree/aidcp.htm.

implement the International Dolphin Conservation Program Act (IDCPA) and the Agreement on the International Dolphin Conservation Program (Agreement). NMFS considered these consultations in preparing this report. In addition, the IATTC Secretariat provided assistance in obtaining information reported in this document. This report was prepared to fulfill each of the seven report requirements listed in 16 U.S.C. §1415.

II. Background on the Eastern Tropical Pacific Ocean Tuna Purse-seine Fishery and the Inter-American Tropical Tuna Commission

The United States is a member of the IATTC, which was established under the Convention for the Establishment of an Inter-American Tropical Tuna Commission signed in 1949. The IATTC was established to provide an international arrangement to ensure the effective international conservation and management of highly migratory species of fish in the Convention Area (defined as the waters of the eastern tropical Pacific Ocean [EPO]). Since 1998, conservation resolutions implemented within the IATTC have further defined the Convention Area as the area bounded by the coast of the Americas, the 40° N. and 40° S. parallels, and the 150° W. meridian. The IATTC has maintained a scientific research and fishery monitoring program for many years, and annually assesses the status of stocks of tuna and the fisheries to determine appropriate harvest limits or other measures to prevent overexploitation of tuna stocks and to promote viable fisheries. Member nations currently include Costa Rica, Colombia, Ecuador, El Salvador, France, Guatemala, Japan, Korea, Mexico, Nicaragua, Panama, Peru, Spain, United States, Vanuatu, and Venezuela. Cooperating Non-Party or Cooperating Fishing Entity status must be requested annually. In 2007, Cooperating Non-Parties or Cooperating Fishing Entities include Belize, Canada, China, Cook Islands, the European Union, Honduras, and Chinese Taipei (Taiwan).

In 2003, the IATTC adopted a resolution that approved the Antigua Convention, a major revision of the original convention establishing the IATTC. The revisions will modernize the Convention, bringing it in line with internationally accepted laws, agreements, and approaches regarding the conservation and management of living marine resources, including a mandate for a more ecosystem-based approach to management in the Pacific Ocean. The Antigua Convention Area is redefined to include the waters of the EPO bounded by the coast of the Americas, the 50° N. and 50° S. parallels, and the 150° W. meridian. The Antigua Convention shall enter into force 15 months after the deposit of the seventh instrument of ratification or accession by nations that were Parties to IATTC at the time the Antigua Convention was opened for signature on November 14, 2003. As of July 2008, 13 Parties to the original 1949 Convention, including the United States, have signed the Antigua Convention, but only six of those have deposited instruments of ratification. Thus, only one more instrument of ratification by a qualifying Party is needed to bring the Antigua Convention into force. The U.S. Senate provided advice and consent to ratification of the Antigua Convention, but implementing legislation has not yet been passed. In May 2006, the President transmitted proposed implementing legislation to Congress.[2] The Departments of Commerce and State have been

[2] As of June, 2008, the proposed implementing legislation is contained in Title IV of the "International Fisheries Stewardship and Enforcement Act," before the U.S. Senate Committee on Commerce, Science, and Transportation.

working together to secure U.S. ratification and adoption of implementing legislation, and have encouraged other nations to follow suit. In addition to the six nations that were members of IATTC prior to November 2003, Belize, the European Union, and Korea have also ratified the Antigua Convention, bringing the total count to nine.

The Origins of the Tuna/Dolphin Issue. In the 1950s, fishermen discovered that large, mature yellowfin tuna in the EPO aggregated beneath schools of certain dolphin stocks. Since that discovery, the predominant tuna fishing method in the EPO has been to encircle schools of dolphins with a "purse-seine" fishing net to capture the tuna concentrated below. Hundreds of thousands of dolphins died in the early years of this fishery. Public concern over high levels of dolphin mortality in the tuna purse-seine fishery in the EPO was one of the primary reasons the MMPA was enacted in 1972. Since then, the MMPA has been amended several times to allow for the continued taking of EPO dolphin stocks under a regime of gradually reducing mortality limits so the stocks could recover. United States participation in the EPO tuna fishery has greatly decreased over the years, coming to a virtual standstill by the early 1990s. Meanwhile, foreign participation in the EPO fishery continues to increase. The IDCP was developed in the early 1990s by the United States and other countries with tuna purse-seine vessels operating in the EPO, in conjunction with the IATTC, to address concerns about dolphin mortality. The improved fishing techniques and international cooperation under the IDCP, as well as the MMPA amendments, resulted in greatly reduced dolphin mortality in the tuna purse-seine fishery in the EPO (Figure 1). Annual dolphin mortality dropped from over 133,000 in 1986 to approximately 838 in 2007, a reduction in reported dolphin mortality of over 99 percent.[3]

[3] Trends in dolphin mortality for individual dolphin stocks, overall mortality, and mortality per set are provided in the Report on the International Dolphin Conservation Program 2007 (Appendix 2).

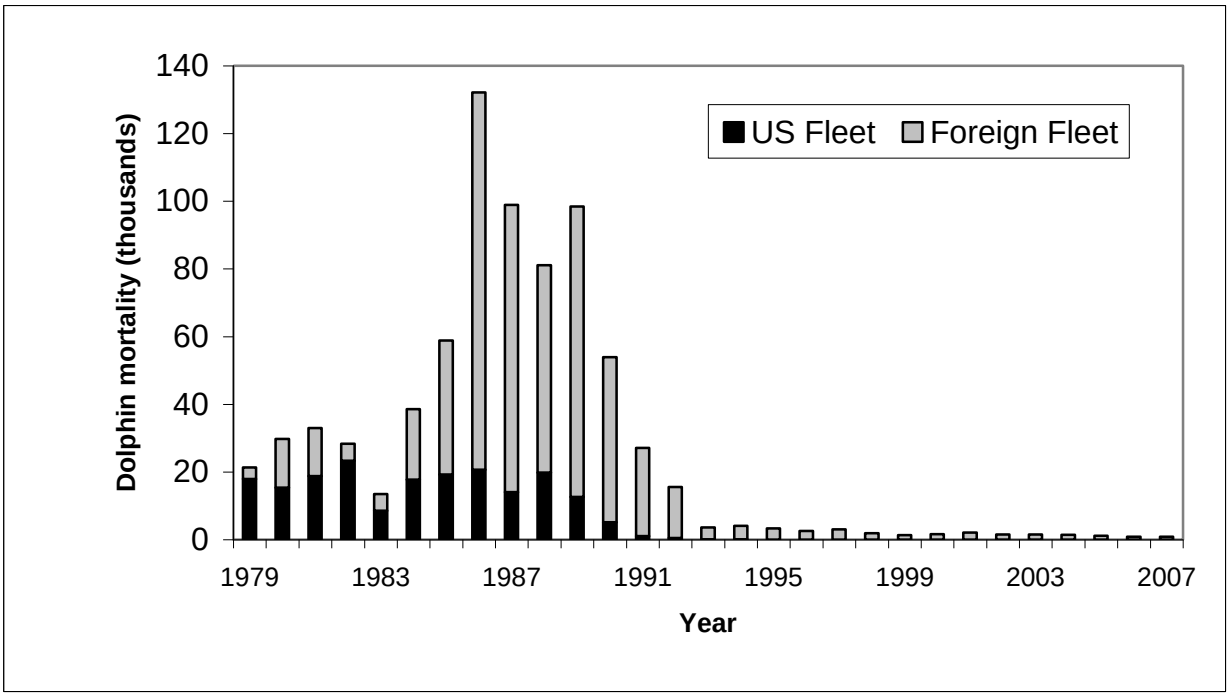

Figure 1. Total annual dolphin mortality in the EPO tuna purse-seine fishery, 1979–2007.

The La Jolla Agreement and the Panama Declaration. In fall 1992, nations participating in the EPO tuna purse-seine fishery signed the La Jolla Agreement, which established the IDCP and placed voluntary limits on the annual number of dolphins incidentally killed in the fishery. Under the La Jolla Agreement, the annual dolphin mortality limit would be decreased over 7 years, with a goal of eliminating dolphin mortality in the fishery. In 1991, the year before the La Jolla Agreement was negotiated, dolphin mortalities totaled 27,127. The goal of the La Jolla Agreement was to reduce dolphin mortalities to below 5,000 per year by 1999. In 1993, the first year of the program, dolphin mortalities fell to 3,601.

Even with this success, the U.S. market remained closed to tuna caught under the program. In hopes of resolving this issue, in 1995 the United States, nine other nations fishing in the EPO, and five prominent environmental NGOs negotiated the Panama Declaration, which established a framework to increase protection of dolphin populations in the EPO. Under the Panama Declaration, the countries participating in the fishery agreed to negotiate a legally binding agreement (which would become the Agreement on the IDCP) that would build on the success of the La Jolla Agreement and strengthen it in several ways. In addition to strengthening efforts to protect dolphins, the signatories to the Panama Declaration committed themselves to reduce bycatch in commercial fisheries, provide for additional protection for individual stocks of dolphins and for other living marine resources, and manage the fishery from an ecosystem perspective. Further, the efforts of the IATTC and the nations that negotiated the Panama Declaration resulted in 100 percent observer coverage for large (in excess of 400 short tons, or 362.8 metric tons) tuna purse-seine vessels in the EPO by 1995. This level of observer coverage is unprecedented in any multinational fishery. The nations that signed the Panama Declaration

anticipated the United States would amend the MMPA to allow the import of yellowfin tuna into the United States from nations participating in and operating in accordance with the IDCP. In fact, the commitment of the fishing countries to strengthen the La Jolla Agreement as outlined above was predicated on such changes to U.S. law.

Marine Mammal Protection Act Amendments of 1997 and the Agreement on the International Dolphin Conservation Program. In recognition of the success of the IDCP and in response to the Panama Declaration, Congress enacted the IDCPA (Public Law 105-32) in 1997, which amended the MMPA to implement the IDCP and other related matters. Specifically, the amendments (1) allowed for lifting the embargoes for countries fishing in accordance with the IDCP; (2) lifted the ban on the sale of non-dolphin-safe tuna under certain conditions; and (3) allowed for future changes in the definition of dolphin-safe to include tuna caught in accordance with the IDCP, provided no dolphins were killed or seriously injured in catching the tuna. With the amendments in place and in anticipation of a change in the U.S. definition of dolphin-safe, in February 1998 the nations participating in the tuna purse-seine fishery in the EPO successfully negotiated the Agreement on the IDCP (the Agreement), a legally-binding international instrument for dolphin conservation and ecosystem management in the tuna purse-seine fishery of the EPO. The Agreement built upon previous voluntary dolphin protection commitments adopted by the EPO tuna fishing nations beginning in the early 1990s. It was designed to strengthen the dolphin protection measures already in place, and afford access to the U.S. tuna market for nations harvesting tuna in the EPO in compliance with those measures. To date, Costa Rica, Ecuador, El Salvador, the European Union, Guatemala, Honduras, Mexico, Nicaragua, Panama, Peru, the United States, Vanuatu, and Venezuela have ratified the Agreement. Bolivia and Colombia are applying the Agreement provisionally. The IATTC staff provides Secretariat support to the Agreement and performs other functions set forth in the Agreement or agreed upon pursuant to the Agreement. The Agreement Area comprises the area of the Pacific Ocean bounded by the coastline of North, Central, and South America, and by the 40° N. parallel from the coast of North America to its intersection with the 150° W. meridian, the 150° W. meridian to its intersection with the 40° S. parallel, and the 40° S. parallel to its intersection with the coast of South America.

The Agreement on the International Dolphin Conservation Program. This Agreement is unique—it is the only international agreement for which detailed information on every set of every fishing trip is available and used to monitor compliance with mandatory conservation and management measures. The Agreement includes several features that make it the most closely monitored and most strictly enforced agreement for the conservation of marine resources anywhere in the world, including:

- 100 percent observer coverage on purse-seine vessels with carrying capacities greater than 400 short tons (362.8 metric tons, or Class 6);
- review of data by IATTC Secretariat staff from every set by such vessels;
- an International Review Panel (IRP) that identifies possible infractions to the provisions of the Agreement, and where the IRP deems an infraction may have occurred, referral of the incident to the flag state for review and action; and

- the requirement for each flag state to report back to the IRP on the results of its investigation into possible infractions.

The Agreement is widely recognized as a preeminent agreement for the conservation and management of living marine resources in terms of monitoring, enforcement, and transparency. The Agreement requires that the Parties promote transparency in its implementation, including public participation, as appropriate. Participation in the forum in which implementation of the Agreement is monitored is not limited to Parties; industry representatives and NGOs also attend and actively participate in meetings of the IRP and the Parties to the Agreement, and support the overall process. The intergovernmental organizations and NGOs are also given timely access to relevant information, subject to procedural rules on access to such information the Parties may adopt. More information on public involvement in the Agreement is described below.

Efforts to Strengthen the Agreement on the International Dolphin Conservation Program. Although the United States has a much smaller presence in this fishery than in the past, NMFS remains committed to the conservation of the EPO ecosystem and its living marine resources. Because the fishery in the EPO is multinational, it is only through multilateral efforts and cooperation that dolphin populations and the EPO marine ecosystem as a whole will be protected in the long term. Therefore, NMFS fully supports the Agreement and the efforts taken by Parties to eliminate dolphin mortality in the tuna fishery. Even with its successes, more can be done to improve the Agreement and further strengthen compliance with some of the Agreement's provisions. NMFS recognizes that full implementation of the Agreement is essential to promote the fastest recovery of depleted dolphin stocks associated with the fishery.

Improving and strengthening the AIDCP has always been a goal of the United States. This goal has been accomplished in several ways. The United States was the first country to have a national observer program. The Agreement's On-Board Observer Program is modeled after the original U.S. program. NMFS administers a dolphin research program that monitors dolphin populations in the EPO. The program includes shipboard surveys to assess and monitor dolphin abundance and studies of stress-related effects possibly caused by the chase and capture of dolphins associated with tuna. The United States encourages the Parties to the Agreement to support this program and other research efforts to improve gear, equipment, and fishing techniques on tuna fishing associated with dolphins. In addition, the United States successfully encouraged members of the IATTC to adopt a resolution on at-sea reporting, which reiterates the obligation of captains and crews, initially required under a June 2001 Resolution, to provide the on-board observer with the necessary equipment to send weekly reports to the IATTC Secretariat. The weekly reports contain important time-sensitive information for the implementation and management of the Agreement, and the monitoring of annual dolphin mortality limits (DMLs) and per-stock, per-year DMLs.

The United States has taken the lead in fulfilling the requirements of the Agreement by establishing a program to track and verify tuna harvested by vessels in the Agreement Area. At the suggestion of the United States, the Parties established a working group to develop an international tuna tracking and verification system. The United States was instrumental in

developing the international system and led the way in encouraging other Parties to develop their national tuna tracking and verification systems. In 2002, the United States presented its tuna tracking and verification program to the Permanent Working Group on Tuna Tracking. Since then, 13 additional countries have submitted to the IATTC Secretariat national tuna tracking and verification systems considered consistent with the Tuna Tracking and Verification Program. In addition, the Working Group has led the way in developing improvements to the tuna tracking systems adopted by the Parties.

The United States continually strives to enhance the success of the Agreement. In February 2003, it proposed a series of measures for strengthening and clarifying existing provisions within the Agreement, as well as enhancing key conservation goals envisioned by the Parties. An amended version of the proposed plan was adopted by the Parties to the Agreement in June 2003. The plan outlined 10 areas to strengthen the Agreement:

1. Establishing the Scientific Advisory Board called for in the Agreement;
2. Addressing non-compliance with prohibitions against intentional sets on dolphins by vessels not covered by the Agreement;
3. Analyzing statistical significance and cause for differences in various parameters between AIDCP and national observer programs;
4. Improving the level of national responses to alleged infractions and compliance with real-time reporting;
5. Evaluating the effectiveness of the guidelines regarding caps on dolphin herd sizes on which sets are made;
6. Improving the functioning of the organization;
7. Strengthening transparency in the operation of the AIDCP;
8. Initiating additional efforts to enhance the sustainability of living marine resources, as called for in the Agreement;
9. Strengthening and promoting the AIDCP dolphin-safe label; and
10. Undertaking efforts to protect and enhance the integrity and credibility of the Agreement's Dolphin-Safe Certification System.

A description of the accomplishments to date in each of these areas follows:

(1) *Establishing the Scientific Advisory Board called for in the Agreement.*
The Scientific Advisory Board (SAB) convened its first meeting in June 2004 in Lima, Peru. The SAB is composed of nine members, two of whom represent the United States, who were nominated by the Agreement's Secretariat and confirmed by the Parties to the Agreement. At its first meeting, the SAB discussed modification of current purse-seine technology to reduce dolphin mortality, means of capturing mature yellowfin tuna other than in association with dolphins, calculation standards for the minimum estimated abundance and annual mortality cap for each stock of dolphin, and a potential future workplan. The second meeting of the SAB took place in June 2005 in Lanzarote, Spain. At this meeting, the SAB agreed to reinitiate a sampling program of dolphins incidentally killed in the EPO purse-seine fishery for

life history studies. The SAB also supported a coastal spotted dolphin survey that would include research on the genetics, abundance, and distribution of coastal spotted dolphins *(Stenella attenuata graffmani)*. The SAB recommended the use of a data screening technique for measuring the performance of captains and vessels, to which the IRP agreed in October 2005. The fifth meeting of the SAB took place in June 2007 in Cancun, Mexico. During this meeting the SAB reviewed its workplan and agreed to maintain it as is without any significant changes. The SAB did not forward any recommendations to the Meeting of the Parties. A sixth meeting of the SAB was scheduled for Panama City, Panama in June, 2008, but was ultimately postponed until a later date. Recognizing that the SAB has the lead responsibility for addressing research and science issues within the Agreement, the United States continues to press for frequent SAB meetings to enable the Parties to move forward on these important issues. The SAB has agreed to continue to meet on an annual basis in conjunction with the AIDCP meetings held in June of each year. Should additional meetings be required in the interim, they may be scheduled during the October 2008 AIDCP Meeting of the Parties.

(2) *Noncompliance with prohibitions against intentional sets on dolphins by vessels not covered by the Agreement (i.e., Class 1–5 vessels).*
The United States and the other Parties to the Agreement take seriously allegations of small vessels setting on tuna associated with dolphins, and vessels of AIDCP size-classes 1–5 are prohibited from doing so. The IRP treats allegations of this type as "Special Cases." This classification ensures the Parties involved complete investigations and provide regular updates to the other Parties (also see section in this report titled "Special Cases of Infractions Involving Small Vessels").

The United States has taken several steps to lead the AIDCP to address the setting on tuna associated with dolphins by small vessels, to learn the degree to which small vessels may make dolphin sets, and to identify characteristics of vessels that engage in this practice. NMFS staff monitor tuna imports, analyze data, and enter information from the Certificate of Origin (NOAA Form 370) into a database. These efforts enable expedited electronic document searches. For example, searching and compiling information on tuna shipments from small boats can now be completed in minutes, whereas previously this type of information required a time-consuming, manual document search.

In addition, NMFS provided funding to the IATTC to expand international observer coverage on Class 1–5 foreign purse-seine vessels on a voluntary basis, sample in-port unloadings, and record gear and other characteristics of these vessels. The IATTC contract is supported by the Foreign Fishing Observer Fund.

(3) *Statistical significance and cause for differences in various parameters between AIDCP and national observer programs.*

At the request of the IRP, the IATTC staff conducted several analyses between AIDCP observer data and national observer program data. Comparisons were provided on seven data fields: (1) percentage of sets, by set type; (2) percentage of trips involving sets on dolphins; (3) average number of days per trip; (4) percentage of intentional dolphin sets with zero mortality; (5) average mortality per dolphin set; (6) average rate of possible observer interference infractions; and (7) average rate of possible procedural infractions (e.g., use of explosives and night sets).

The analyses do not indicate significant differences in the various parameters between the AIDCP and national observer programs. The Secretariat also reported that the IATTC has begun an analysis of IATTC observer data to look for instances of unusual patterns of reporting by observers. Advanced statistical analyses are being developed to detect observers whose data exhibit patterns of unusual set types, given other data related to the set (including unusually low dolphin mortality in circumstances in which higher mortality would be expected), and unusual patterns of tuna catches and dolphin mortality. This work is in an early stage but, if it is successful, applying this type of analysis to all observers will be more effective than focusing solely on differences among programs.

In addition, the United States is working with the AIDCP Parties to ensure continued monitoring of this issue. The IRP agreed to keep this matter as a continuing agenda item to allow systematic monitoring of the observer programs, and to detect and resolve any future inconsistencies. The United States requested that the IATTC Secretariat provide analyses comparing the data collected by the observer programs to the AIDCP Parties on an annual basis. If discrepancies between the national and On-Board observer programs emerge, the United States will work to secure the full support of the Parties to take additional measures to address this issue. Furthermore, the United States expects observer-by-observer comparisons to further strengthen the Agreement's On-Board Observer Program. Ensuring transparency and consistency among the observer programs is vital to the long-term success of the Agreement and to accurate monitoring of the status and recovery rate of depleted dolphin stocks.

(4) *Level of responses to alleged infractions and compliance with real-time reporting.* The United States monitors the type and frequency of responses provided by other Parties to various alleged infractions (see section titled "Identification of Possible Infractions" in this report for more information). However, it is difficult to quantify improvement with respect to sanctions for alleged infractions that are both timely and of an appropriate magnitude. The United States continues to seek specific information on the sanction imposed for confirmed infractions (e.g., amount of a monetary fine) that would facilitate this level of scrutiny. Currently, the amount of information provided to the Parties in response to alleged infractions varies from Party to Party. The United States remains optimistic that continued efforts will yield favorable results with the other Parties.

With respect to real-time reporting of observer data, the Secretariat continues to provide updated Party-by-Party analyses. These analyses indicate an average real-time reporting rate of 90 percent in 2007, up slightly from 85 percent in 2006 and 89 percent in 2005 (see section titled "Real-time Reporting" in this report for more information). The United States is pleased with the improvements in real-time reporting to date, but will seek continued improvements until compliance approaches 100 percent.

(5) *Evaluating the effectiveness of the guidelines regarding caps on dolphin herd sizes on which sets are made.*

In June 2002, the Parties established guidelines to decrease the number of sets on dolphin herds of more than 2,000 animals, reducing the risk of dolphin mortality from such high-risk sets. In October 2003, the IRP discussed an analysis on dolphin herd size set limits adopted by the Parties to the Agreement. The Secretariat reported that in the first 10 months following implementation of the program, sets on herds in excess of 2,000 dolphins were less frequent than before the guidelines were implemented. In 2006, the Secretariat indicated that observed dolphin mortalities in the purse-seine fishery fell below 1,000 individuals for the first time. Data suggest that observed dolphin mortalities in the fishery continue to decline year after year, an indication of the Agreement's success. The United States is monitoring progress on this issue to ensure that the proper dolphin herd size limit is implemented, and has requested an updated analysis of the guidelines' effectiveness for discussion at future meetings.

(6) *Improving the functioning of the organization.*

The Parties to the Agreement continue to discuss potential actions to improve the functioning of the organization. The Parties have aligned meetings and eliminated unnecessary ones (Annex VII was amended to reduce the minimum number of annual meetings of the IRP from three meetings per year to two meetings per year) to reduce travel costs and to maximize participation by all relevant representatives. There was also discussion at the June 2008 meeting in Panama to further reduce the number of Meetings of the Parties to a single annual October meeting in La Jolla and consolidate some working groups as a way to reduce costs and prevent vessel assessment fees from increasing. This topic is expected to come again for further consideration at the next Meeting of the Parties. Furthermore, the Secretariat to the Agreement continues to improve on the timely delivery of meeting working papers and reports. Although the operation of the Agreement is efficient, maximizing efficiency without compromising utility of meetings is a high priority for the United States and other Parties to the Agreement. The United States will continue to seek additional improvements. In 2006, there was only one technical correction made to the agreement regarding a reference, amending Annex IV.

In February 2005, the Working Group on Vessel Assessments and Financing met to discuss the current formula for calculating annual vessel assessments (i.e., observer

fees) with respect to the Agreement's budget for 2005–2006. The Secretariat indicated that the assessments received are not sufficient to cover the costs of the Agreement. The Secretariat recommended a 13 percent increase in vessel assessments and noted that, in the future, some optional services currently provided by the Secretariat should be covered by vessel owners. These recommendations were made to ensure the current deficit is covered by the end of 2007.

In April 2005, an ad hoc Well Volume Review Group met to complete a verification of purse-seine vessel well volumes for use in determining vessel assessments. After examining existing documentation for all vessels, two lists were drawn up: vessels whose well volume has been verified, and vessels whose well volume could not be verified and must be forwarded to the Parties for consultation. In October 2005, the first meeting of the Working Group on Vessel Measurement established that changes in well volume measurements from those verified by the Well Volume Review Group in April 2005, should be accepted as valid new measurements received from a vessel's flag government that had been verified according to the established procedures. The working group also recommended that vessels with sealed wells be listed on the Regional Vessel Register at their lower capacity but it should be indicated what capacity was both before and after the wells were sealed. In June 2008, the Parties agreed to maintain the assessment rate for vessels required by the AIDCP to carry an observer at a rate of $14.95 per cubic meter ($m^3$) of well volume. The assessments for those vessels whose well volume could be verified will pay assessments based on the verified well volume. For vessels whose well volume has not been verified by August 1 of any given year, the vessel assessment rate for the subsequent year will be calculated by applying a factor of 1.4 to convert the carrying capacity, in metric tons, to well volume in cubic meters.

(7) *Transparency in the operation of the AIDCP*.

The Plan of Action to Enhance the Success of the Agreement directs the Secretariat to prepare an annual Executive Report, publicize results of meetings through distribution of a press release, and review the Rules of Confidentiality to strengthen transparency in the operation of the AIDCP. The Parties will examine the Rules of Confidentiality to identify areas where transparency may be increased. Although the United States views the AIDCP as transparent in many respects, there is room for improvement. Therefore, the United States plans to pursue greater flexibility on this issue with the Parties in the future.

One element of transparency in the AIDCP is the report on the IDCP presented to the Parties by the Secretariat at the Meeting of the Parties to AIDCP in June 2008. Document MOP-19-05, *Report on the International Dolphin Conservation Program* (Appendix 2), characterized the fishery in 2007, described dolphin mortality with respect to vessel limits, discussed steps taken by the Parties to improve functioning and credibility of the AIDCP, and summarized possible infractions identified by the IRP during 2007.

(8) *Efforts to enhance the sustainability of living marine resources, as called for in the Agreement.*

The Parties to the Agreement have made significant progress implementing measures to promote the sustainability of living marine resources in the EPO. First, the SAB is engaged in discussions on programs to assess and minimize the bycatch of juvenile tuna and non-target species. NMFS conducted research in 2005 on gear to reduce bycatch of non-target species and methods to locate mature yellowfin tuna not associated with dolphins. NMFS' research in 2005 also focused on the effect of small purse-seine vessels on depleted dolphin stocks and EPO ecosystem changes in an effort to better characterize the effect of the fishery on these dolphin stocks. In 2006, NMFS convened a second workshop to address non-dolphin bycatch in the EPO tuna purse-seine fishery and conducted a cetacean and ecosystem assessment survey. In 2008, NMFS plans to continue to conduct research to enhance the sustainability of living marine resources in the EPO. Proposed studies include assessments of status and trends; abundance and monitoring of pelagic dolphin populations; cetacean stock structure in EPO pelagic waters; abundance, structure and monitoring of coastal dolphin stocks; EPO ecosystem studies; fishery effects; bycatch reduction; and data management.

(9) *Strengthening and promoting the AIDCP dolphin-safe label.*

The Working Group to Promote and Publicize the Agreement's Dolphin-Safe Tuna Certification System was established by the Parties to the Agreement. The Agreement's budget does not support activities developed through this working group; financial support is provided only by those nations that participate in the voluntary AIDCP Dolphin-Safe Certification System and that benefit from promotional activities. The working group met for the first time in February 2003, and has convened seven subsequent meetings. The working group organized several promotional events in coordination with international meetings.

The United States does not participate in the AIDCP Dolphin-Safe Certification System, and continues to play only a limited role in this working group due to the difference between the dolphin-safe labeling standard under the Agreement and the labeling standard in the United States. The U.S. labeling standard for dolphin-safe tuna is currently governed by the provisions of subsection (h)(2) of the DPCIA. Under this provision, tuna harvested in the EPO by purse-seine vessels with greater than 400 short tons of carrying capacity is deemed dolphin-safe if "no tuna were caught on the trip in which such tuna were harvested using a purse-seine net intentionally deployed on or to encircle dolphins, and no dolphins were killed or seriously injured during the sets in which the tuna were caught." However, the United States has continued to promote the success of the AIDCP in helping to reduce dolphin mortality and as a model of international cooperation, both at home and abroad. A project has been launched by NMFS, in conjunction with the Department of State and NOAA's National Ocean Service, to develop a web-based education

module that will highlight the accomplishments of the AIDCP and the complexity of international conservation efforts. The goal is to offer learning opportunities, including lesson plans and interactive programs, at a secondary high school education level. This website will also be a definitive source of information for the general public to access. It is believed that in time, this module can be translated and available for effective use by Parties throughout the world.

Under the Agreement, tuna caught in sets in which dolphins are not killed or seriously injured is defined as "dolphin-safe." During 2005, 37 valid dolphin-safe tuna certificates were issued by the Parties to the Agreement. The Agreement's System for Tracking and Verifying Tuna requires that the Parties establish and maintain programs to implement the system and ensure that tuna and tuna products receiving the AIDCP dolphin-safe label meet the labeling standards under the Agreement. Several of the activities described in this section strengthen the dolphin-safe label.

(10) *Efforts to protect and enhance the integrity and credibility of the Agreement's Dolphin-Safe Certification System.*
Two measures adopted in 2005 enhance the integrity and credibility of the Dolphin-Safe Certification System and System for Tuna Tracking and Verifying Tuna. First, the Parties amended the Agreement to require a Party to have a national plan for tracking and verifying tuna in place in order for its vessel to be eligible for a DML. Second, the Parties adopted a protocol for which numbers of Tuna Tracking Forms (TTFs) can be made public in cases where tuna was harvested in a manner not in compliance with IATTC resolutions. The Parties agreed to release the name of the flag state of the vessel and the numbers of TTFs for fishing trips conducted in contravention of an IATTC conservation and management resolution. These measures help to provide an important link between the certification of dolphin-safe tuna and other aspects of the AIDCP and IATTC.

III. Results of Research Conducted Pursuant to Section 304 of the Marine Mammal Protection Act

The Southwest Fisheries Science Center (SWFSC) conducts research pursuant to the IDCPA. IDCPA research conducted during 2007 was focused on evaluating the potential roles of the fishery and ecosystem in the apparent lack of recovery of depleted dolphin stocks in the eastern tropical Pacific Ocean (EPO) following a period of significant reductions in observed dolphin mortality in the EPO tuna purse-seine fishery. Research activities included: (1) a survey designed to collect fine-scale ecosystem data and assess standard methods for collecting dolphin sighting data; (2) ongoing work on ETP dolphin stock assessments; (3) other data analyses, processing, and publication; and (4) a small purse-seine vessel monitoring and observer program via contract.

*Stenella Abundance Research – Line Transect and Ecosystem Survey***.** In 2007, SWFSC conducted a Stenella Abundance Research – Line Transect and Ecosystem (STAR-LITE) cruise

to survey marine mammals and their habitat in the ETP. The primary objective of the STAR – LITE cruise was to investigate line-transect methodologies used on surveys in the eastern tropical Pacific Ocean and explore fine-scale spatial and temporal variability in the ecosystem. The project took a multidisciplinary approach. Data on cetacean distribution, school size and school composition were collected to examine cetacean density. Oceanographic data were collected to characterize habitat and its variation over time. Data on distribution and abundance of seabirds, flyingfish, and marine turtles will be used to further characterize the ecosystem. Skin biopsies of cetaceans provide a resource for investigations of stock structure and phylogenetic relationships. Photographs provide a tool to document geographic variation in dolphins and distribution of individual large whales.

This is the eleventh year of similar investigations conducted during the past 20 years, with previous cruises in 1986–1990, 1998–2000, 2003, and 2006. Using an ecosystem approach, we conducted research on physical and biological oceanography (dolphin habitat); mid trophic-level fishes and squids (dolphin prey); and seabirds, marine turtles, and other cetaceans (dolphin commensals, competitors, and predators). Data and analyses resulting from STAR surveys form the basis for many international measures adopted to conserve dolphin stocks and manage the tuna purse-seine fishery in the ETP.

ETP Dolphin Stock Assessments. During 2007, the SWFSC continued to publish and develop stock assessment models for both depleted and non-depleted dolphin stocks in the ETP. A paper using several stock assessment models to evaluate support for different hypotheses for the lack of ETP dolphin recovery was published in Marine Ecology Progress Series (Wade *et al.*, 2007). In addition, a paper describing reproductive patterns in ETP dolphins was revised in response to reviewers' comments and resubmitted to the same journal.

A NOAA Technical Memorandum is being prepared that includes new estimates of ETP dolphin abundance based on cruises conducted in 2003 and 2006. The latest estimates for northeastern offshore spotted and eastern spinner dolphins in the ETP are higher than past estimates. While these estimates are consistent with trends we would expect to see in recovering stocks, there are uncertainties that need to be resolved before we can definitively say that these dolphin stocks are recovering and that they are, in fact, increasing. SWFSC researchers emphasize the need to continue to monitor these stocks at sea through comprehensive ecosystem research cruises, and to conduct updated dolphin stock assessments that will include additional information on dolphin life history, fishery mortality, and the ecosystem. This will enable a more definitive interpretation as to whether these ETP dolphin stocks are recovering and the degree to which the fishery and other factors affect the conservation of these stocks.

Work continues on models developed for at least three stocks of short-beaked common dolphins (these stocks were not depleted). All of the models described here are Bayesian models that are fitted to estimates of abundance from line-transect methods and conditioned on historical estimates of mortality. The models are parameterized to consider hypotheses such as temporal changes in stock productivity and carrying capacity or under-reporting of true mortality. This type of work will continue in 2008.

Data Analyses, Processing, and Publication. The SWFSC's investigations of dolphin stocks depleted from their historic abundances by the ETP tuna purse-seine fishery (Pantropical spotted and spinner dolphins) are conducted with an ecosystem approach. In addition to investigating the status and trends of these dolphin stocks, auxiliary projects are conducted to improve our understanding of their surrounding environment. Data analyses, processing, and publications in 2007 included (1) direct work on depleted ETP dolphin stocks and (2) investigations of dolphin reproductive biology.

Depleted Dolphin Stocks

Fetal Mortality- A study to estimate fetal mortality rates in three ETP dolphin species is in progress. Hundreds of fetuses collected from incidentally killed dolphins were used to fit survivorship curves for each species and the management stocks recognized for each (Chivers *et al*., in prep). This work is expected to be submitted for publication during 2008.

Dolphin calf mortality- Between 1973 and 2000, the shortage of calves in the kill remained at a relatively constant fraction of the kill, about 14%, for both stocks of pantropical spotted dolphins. On the assumption that suckling calves do not survive separation from their mother (Archer *et al.* 2001; Edwards 2006), the estimated calf deficit represents a negative bias of approximately 14% in the reported kill (Archer *et al.* 2004). This is a minimum estimate of unobserved calf deaths because it only includes separations in which the mother was killed.

Given that dolphins exhibit some of their fastest swimming during release from the net (Chivers and Scott, submitted), calves waiting immediately outside or still inside the net may risk separation from their mothers as the school rushes rapidly away from the net. If this, or any of the other scenarios regarding the manner in which permanent separation can occur without the mother being killed (Archer *et al.* 2001), then the 14% calf deficit is an underestimate of the actual number of orphaned calves.

Research completed to date indicates that dolphin calves are likely to have difficulty remaining associated with their mothers during high-speed swimming and rapid maneuvering (similar to that observed during chase and back-down in tuna purse-seines sets), with quite severe difficulty for calves from birth to about a year postpartum, and likely critical for calves 0–1 month postpartum (Edwards 2006; Noren and Edwards 2007; Noren *et al.* 2006a; Noren *et al.* 2006b).

Vessel response behavior- The evasiveness of stocks that are frequently targeted by the tuna purse-seine fishery (northeastern spotted dolphins, eastern spinner dolphins, and short-beaked common dolphins) was greater in those sightings with more recent tuna purse-seine sets in the vicinity, while no significant relationship was found for those stocks that are rarely set on. These results indicate that the purse-seine fishery is affecting the behavior of dolphins, which might have consequences for their population dynamics (Archer *et al.*, submitted).

Dolphin reproductive biology

Reproductive status of ETP dolphins- The SWFSC Protected Resources Division has developed a method to diagnose pregnancy status from the blubber attached to most cetacean skin biopsies (Kellar *et al.* 2006). With sufficient samples, this allows estimation of pregnancy rates for entire populations. SWFSC scientists have determined the relationship between progesterone levels and reproductive stage (pregnant or not pregnant) in seven species of delphinid (including northeastern spotted dolphins, spinner dolphins and common dolphins) using specimens incidentally killed in eastern Pacific purse-seine and gillnet fisheries. While working with these animals, for which pregnancy status is known through gross observations, blind tests were conducted to estimate success rate of determining pregnancy using the progesterone quantification protocol alone. The method has been 100% successful in correctly identifying known pregnant dolphins (n = 64) and 99% successful in correctly identifying known non-pregnant ones (n = 234).

In 2007 this method was employed to estimate the proportion of pregnancies contained in a sample of female (immature and mature) pantropical spotted dolphin biopsies collected in the ETP. Out of 212 females sampled, 25 were found to be pregnant; approximately 11.8%. This preliminary study also found that the proportion pregnant in the sample varied with respect to location with greatest values in the north at the mouth of the Gulf of California (25.0%, n = 29) and smallest along the Mexican coast near Acapulco (3.5%, n = 40).

Port Sampling and Observer Program to Monitor Small Purse-seine Vessels. In January 2006, SWFSC awarded a contract to the IATTC to expand the at-sea observer and in-port sampling programs currently implemented in the ETP tuna purse-seine fishery under the AIDCP. During 2006 and 2007, the IATTC sampled 297 unloadings of Class 4 and 5 vessels in international ports. SWFSC and IATTC staff are collaborating to analyze tuna species and size composition data along with other catch characteristics to explore the feasibility of using this type of data to identify whether small purse-seine vessels have harvested tuna in association with dolphins. The selected approach relies on marked differences in the species and size of tuna generally caught in dolphin sets versus other set types. We then use the length-frequency data of vessels carrying on-board observers to build a classification algorithm for predicting the purse-seine set type (dolphin sets versus non-dolphin sets) of a length frequency sample collected from a vessel of a size not required to carry observers.

Pending further refinements, this work has several potential applications, including using unusual length-frequency data from small vessels to estimate potential unobserved dolphin mortality for inclusion in stock assessments and for consideration in management. A report of this analysis has been prepared, and if requested by AIDCP Parties, the report could be published during 2008 (Rusin *et al.* In prep.).

IV. Description of the Status and Trends of Stocks of Tuna

Yellowfin Tuna. Historically, the spawning biomass ratio (ratio of the spawning biomass to that of the unfished population, SBR) of yellowfin in the EPO was below the level corresponding to the maximum sustainable yield (MSY) during the lower productivity regime 1975–1983, but

above that level for most of the following years, until recently (2003–2007). The SBR at the start of 2008 is estimated to be above the level corresponding to MSY. The effort levels are estimated to be less than those that would support MSY level of catches (based on current distribution of effort), but recent catches are substantially below the MSY. If a stock recruitment relationship is assumed, the outlook is more pessimistic, and current biomass is estimated to be below the level corresponding to the MSY. Under current levels of effort, the biomass is predicted to increase slightly and then decrease, but remain above the current level. The SBR is predicted to follow a similar trend, remaining above the level corresponding to the MSY.

Although current estimates for EPO yellowfin tuna stocks lie in the management target zones, a low catch per unit effort (CPUE) on fish associated with dolphins, and other factors such as potential increases in effort and increased catches of juvenile fish cast doubt on an optimistic assessment. The declining number of sets on dolphins, which target larger fish, and increasing numbers of sets associated with schools (smaller fish), can make the stock appear in better shape than it is. Changes in the size composition of catch are important, and there are concerns that fishing with fish aggregation devices (FADs) and coastal seining are harvesting excessive numbers of fish that have not reached maturity.

Bigeye Tuna. The 2008 stock assessment for bigeye tuna in the EPO estimate the biomass and spawning stock biomass to be at or near historic lows. At the beginning of January, 2008, the SBR was about 0.17, or about 10% less than the level corresponding to the MSY. Recent catches are estimated to have been about the MSY level. If the fishing mortality is proportional to the fishing effort, and the current pattern of age-specific selectivity is maintained, the level of fishing effort corresponding to the MSY is about 82% of the current (2005-2007) level of effort. Recent spikes in recruitment are predicted to result in increased levels of SBR and longline catches for the next few years. However, high levels of fishing mortality are expected to subsequently reduce SBR. Under current effort levels, the population is unlikely to remain at levels that support MSY unless fishing mortality is greatly reduced or recruitment is above average for several consecutive years. The most recent recruitment is very uncertain because recently recruited bigeye are represented in only a few data sets. The large recruitment from 1995–1997, which provided large purse-seine catches in 2000 and improved longline catches in 2001, is now passing out of the fishery. Recruitments have been above average since 2000 and were particularly large in 2005 and 2006.

Skipjack Tuna. The recruitment of skipjack tuna to the fisheries in the EPO is highly variable and subject to immigration from the central Pacific. Skipjack tuna are highly fecund. Fishing mortality is estimated to be about the same as or less than the natural mortality. These levels of fishing mortality are supported by estimates from tagging data. Biomass fluctuates in response to variations in both recruitment and exploitation.

Purse-seine catches have been increasing since 1985. Except for a large peak in 1999, the floating-object CPUE has generally fluctuated around an average since 1990. The unassociated CPUE has been higher than average since about 2003. The standardized effort indicator of exploitation rate has been increasing since about 1991, and in 2007, is on the upper reference

level. The average weight of skipjack has been declining since 2000. The biomass, recruitment, and exploitation rate have been increasing over the last 20 years. The main concern with skipjack tuna is the constantly increasing exploitation rate. However, models have yet to detect any adverse consequences. The decline in average weight could be the result of overexploitation, or alternatively, the result of recent, strong recruitment events.

There is considerable variation in SBR for skipjack tuna in the EPO. In 2003 the SBR was at a high level (about 0.61). It appears the effects of the environment on recruitment and biomass are stronger than the effect of fishing effort. The results of the analysis were consistent with previous assessments, and suggest there is no management concern for skipjack tuna.

In conclusion, overfishing is not occurring on skipjack tuna.

Conclusion. The United States believes these EPO stocks of tropical tuna should be managed such that their stock levels are capable of supporting their respective MSYs. At present, stock assessment results for yellowfin and skipjack tuna indicate that overfishing is not occurring in these fisheries. Although assessments for yellowfin tuna are not showing signs that the stock is overfished, there are indications (e.g., increased purse-seine capacity, increasing purse-seine fishing efforts, falling recruitment levels, and optimistic spawner–recruit relationship in the stock assessment model) that the stock could quickly fall below levels required for MSY. For the bigeye tuna stock, the assessment results indicate the stock level is below the level needed to support the MSY. There is agreement that the bigeye tuna stock has reached a condition of overfishing.

The IATTC *Resolution for a Multi-Annual Program on the Conservation of Tuna in the EPO for 2004, 2005, and 2006*, required implementation of time-area closures in the EPO for the purse-seine fishery and catch limits for the longline fishery. Specifically, the Resolution called for IATTC members and cooperating nonmembers to prohibit fishing by all of its purse-seine vessels during one of two 6-week closure periods (August 1—September 11 or November 20–December 31). The closure periods were adopted in an effort to mitigate current trends of increased fishing effort by purse-seine vessels, which land the majority of the yellowfin tuna and bigeye tuna catches. In 2004, 2005, and 2006, the United States implemented the November 20–December 31 closure period for all of its purse-seine vessels fishing in the EPO. The Resolution also called for members and nonmembers to take measures to ensure total catches of bigeye tuna by their longline fleets do not exceed their respective 2001 catch levels.

In June 2006, the IATTC adopted the *Resolution for a Program on the Conservation of Tuna in the Eastern Pacific Ocean for 2007* (C-06-02). The provisions of this Resolution are the same as the multi-annual program for 2004, 2005, and 2006 described above, except with respect to catch limits for bigeye tuna by longline vessels. The 2007 Resolution limits catch levels of bigeye tuna by longline fleets to 500 metric tons or their respective 2001 catch levels, whichever is higher. The previous resolutions in 2005 and 2006 had limited U.S. longline catches of bigeye tuna to 150 metric tons. This adjustment allowed NMFS increased flexibility to implement closures of the U.S. longline fishery before the bigeye limit was exceeded. These measures were

designed to reduce the adverse effects of excessive fishing effort in the EPO on the yellowfin, skipjack, and bigeye tuna stocks.

Disappointingly, no tuna conservation measures were agreed upon for 2008. As a result, despite the urging of IATTC staff backed by the best available science, no seasonal closures or constraints on effort or catch will be in effect for 2008, or the foreseeable future beyond that. Without closures comparable to the last few years in place, effort can be expected to increase proportionally, and subsequent stock assessments will likely be much less optimistic, or worse, than those currently predicted. It is increasingly clear that some IATTC Members are unwilling to reduce fishing effort for the benefit of tuna stocks in the EPO. These positions are preventing consensus on conservation measures, and the credibility of the IATTC as a functioning tuna conservation body is being placed in serious jeopardy.

The issue of total capacity of tuna purse-seine vessels in the EPO is also a significant factor in the future outlook for these stocks. The anticipated capacity in 2008 is nearly 230,000 m^3. In 2002, the IATTC adopted Resolution C-02-03, which set the target level for the purse-seine fleet at 158,000 cubic meters. Recent developments, particularly at the June 2008 Meeting of the Parties to IATTC in Panama, indicate that that some nations are clearly more interested in adding to existing capacity rather than meeting the reduction mandate of the Resolution. Combined with the known elements of unregistered capacity already operating in the EPO, it is evident that the IATTC is struggling to address this aspect of sustainable fishing and tuna conservation.

V. Description of the Efforts to Assess, Avoid, Reduce, and Minimize the Bycatch of Juvenile Yellowfin Tuna and Bycatch of Non-Target Species

Bycatch of Juvenile Yellowfin Tuna and Non-Target Species. Reducing the bycatch of juvenile tuna and non-target species in the EPO tuna fisheries is key to sustaining these stocks. For this reason, bycatch reduction is one of NMFS' primary objectives. NMFS continues to work through the AIDCP and IATTC to develop fishing practices and gears to achieve this goal and incorporate ecosystem considerations in the management of EPO tuna fisheries.

The IATTC member nations have adopted several measures to reduce or mitigate bycatch of juvenile tuna, turtles, and non-target finfish. These measures include:

Juvenile tuna

(1) Support studies and research to develop technology for releasing juvenile tuna and apply technology for the identification of species and size composition in schools prior to making a set.

Sea turtles

(1) Develop a database on all sea turtle sightings, captures, and mortalities reported by observers.

(2) Adopt a Recommendation on Sea Turtles (C-03-10) that contemplates "the development of a three-year program including mitigation of sea turtle bycatch, biological research on sea turtles, improvement of fishing gears, industry education and other techniques to improve sea turtle conservation."

- In January 2004, the IATTC Working Group on Bycatch prepared a detailed program that includes all these elements and urges all nations with vessels fishing for tuna in the EPO to provide the IATTC with information on interactions with sea turtles, including both incidental and direct catches, and other impacts on sea turtle populations. NMFS submitted the required information to the IATTC Secretariat in May 2005.

(3) The IATTC adopted a Resolution on Bycatch in June 2004 (C-04-05) on releasing and handling of sea turtles captured in purse-seines, prohibiting disposal of plastic salt bags and other debris at sea, and modifying the design of FADs to reduce turtle entanglement.

(4) Resolution to Mitigate the Impact of Tuna Fishing Vessels on Sea Turtles (C-07-03) was adopted in June 2007. Building on previous measures addressing sea turtle conservation, this Resolution requires implementation of the Food and Agriculture Organization of the United Nations (FAO) guidelines to reduce bycatch, injury, and mortality, and improve handling procedures. Also, annual reporting to the IATTC on the progress of each Party and Cooperating Non-Party in compliance with the FAO guidelines is required. The United States submitted a Report on Sea Turtle Interactions in the U.S. Pacific Longline and Drift Gillnet Fisheries in June 2008 in compliance with this Resolution.

Other species

(1) The IATTC adopted a resolution in June 2005 (C-05-01) directing Parties and Cooperating Non-Parties to inform the Commission of the status of their National Plan of Action to for Reducing Incidental Catches of Seabirds in Longline Fisheries. In addition, Parties and Cooperating Non-Parties were encouraged to collect and voluntarily provide to the Commission information on interactions with seabirds to assess the impacts of the incidental catch of seabirds resulting from the activities of all the vessels fishing for tuna and tuna-like species in the eastern Pacific Ocean. The United States completed the *National Plan of Action for Reducing the Incidental Catch of Seabirds in Longline Fisheries* in February 2001.

(2) In June 2005 the Parties to the IATTC adopted the Resolution on the Conservation of Sharks Caught in Association with Fisheries in the EPO (C-05-03), which bans shark finning and also aims to improve information about sharks in EPO fisheries. The Shark Resolution mandates much needed shark data collection and assessment programs while encouraging research into shark nursery areas and ways to avoid incidental bycatch of sharks. This Resolution—co-sponsored by the United States, the European Union, Japan, and Nicaragua—calls on IATTC members to implement National Plans of Action for Shark Conservation in accordance with the United Nations Food and Agriculture Organization's (FAO) 1999 International Plan of Action

for Sharks. The United States completed the *National Plan of Action for the Conservation and Management of Sharks* in February 2001. The United States has provided documentation of full compliance with this Resolution to the IATTC and submitted a 2007 report covering the fishing year of January 1–December 31, 2006.

The IATTC is to work cooperatively with Western and Central Pacific Fisheries Commission to provide preliminary advice on the status of sharks and to propose a research plan. At its seventh meeting in May 2006, the IATTC Working Group to Review Stock Assessments presented a *Proposal for a Comprehensive Assessment of Key Shark Species Caught in Association with Fisheries in the Eastern Pacific Ocean* pursuant to the 2005 Resolution. General agreements to share data between these organizations have been agreed to, but little action beyond that has occurred since.

In addition, IATTC and NMFS staffs have provided training and equipment for proper handling and release of sea turtles to several Latin American, Asian, and other Pacific countries. In addition, the 2004 Resolution laid the groundwork for the FAO Technical Consultation on Sea Turtle Conservation in Fisheries, which was held in Bangkok, Thailand, in November 2004. The results of the consultation were accepted at the 2005 FAO Committee on Fisheries meeting, including the directive to FAO to develop Technical Guidelines on sea turtle bycatch in fisheries, which is basis for the 2007 sea turtle conservation measure.

Several countries, including the United States and Japan, have experimented with their longline fleets to modify gear for reducing interactions and mortalities with sea turtles. Some of these experiments have shown that large circle hooks and mackerel or fish-type bait significantly reduce sea turtle interactions.

The United States is concerned about the potential for shark and seabird bycatch in longline tuna fisheries in the EPO. As previously mentioned, resolutions addressing the issue of seabird and shark bycatch in the EPO tuna fisheries were adopted in June 2005. Another Resolution regarding mandatory use of seabird bycatch mitigation measures was presented at the June 2008 meeting, with no consensus reached. Additionally, the 2004 Bycatch Resolution calls for Parties and cooperating non-Parties to require their fishermen to release non-target species, such as sharks. The Resolution also calls for IATTC staff to develop techniques and equipment to facilitate the release of shark bycatch. Domestically, the Fisheries Management Plan for U.S. West Coast Fisheries for Highly Migratory Species (HMS FMP) calls for bycatch reduction in the HMS fisheries and discusses potential methods to reduce bycatch and bycatch mortality.

Research. NMFS is engaged in several research activities focused on reducing bycatch of dolphins, turtles, and fishes. One of these activities was to convene the second in a series of workshops on gear for reduction of non-dolphin bycatch jointly with the IATTC in fall 2006. This workshop is described in greater detail in the section of this report on *Results of Research Conducted Pursuant to Section 304 of the Marine Mammal Protection Act,* and a report of the workshop has also been published (Kondel and Rusin 2007). This research is responsive to mandates under MMPA Section 304 (16 U.S.C. 1414).

NMFS has also initiated several activities to address the question of whether or to what extent small purse-seine vessels (i.e., 400 short tons or less carrying capacity) set on tuna associated with dolphins. To understand this question, NMFS initiated a study of small international purse-seine vessels that will sample in-port unloadings, place at-sea observers, and record gear and other characteristics of these vessels. This work is described in greater detail in the section of this report on *Results of Research Conducted Pursuant to Section 304 of the Marine Mammal Protection Act*. Additional activities to reduce dolphin bycatch in EPO fisheries are discussed in the following section.

VI. Description of the Activities of the International Dolphin Conservation Program and the Efforts of the United States in Support of the Program's Goals and Objectives, Including the Protection of Dolphin Stocks in the Eastern Tropical Pacific Ocean, and an Assessment of the Effectiveness of the Program

The AIDCP On-Board Observer Program. The AIDCP observer program and the national observer programs of Colombia, Ecuador, Mexico, Venezuela, and the European Union constitute the Agreement's On-Board Observer Program. This program began operating in the EPO in 1971 when NMFS placed observers on U.S.-registered vessels to record information on dolphin sets and mortality. In 1979, the IATTC instituted a similar observer program on non-U.S. vessels, recording information about dolphin mortality for all Class 6 (i.e., vessels in excess of 400 st (362.8 mt) carrying capacity) purse-seine vessels in the EPO. By 1990, NMFS required 100 percent observer coverage of fishing trips by U.S. vessels. By 1995, all Class 6 purse-seine vessels fishing under the authority of Parties to IATTC were required to carry observers.

According to the Report on the IDCP for the 19th Meeting of the Parties, June 2008, observers from the On-Board Observer Program departed on 742 fishing trips, which included 6 trips by two vessels of less than 363 mt capacity that were required to carry an observer on all trips while being investigated for potential infractions. In addition, 49 vessels whose last trip of 2006 carried over into 2007 had observers aboard, bringing the total to 791 trips observed by the Program in 2007. This number includes trips made by Colombia, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Spain, the United States, Vanuatu, and Venezuela. The largest numbers of trips were made by Ecuador (248), Mexico (202), Panama (105), and Venezuela (78). Observer coverage was 100 percent for all Parties and non-Parties, of which 61 percent were covered by the IATTC Program.

In 2007, there were 8,879 sets on fish associated with dolphins, a decrease of 0.5 percent from 2006. Sets on dolphins have generally remained stable over the past few years, declining for the first half of the 1990s and then increasing in subsequent years (Figure 2). Observed dolphin mortalities per set and total mortalities have declined significantly, with total mortalities declining from 133,000 in 1986 to approximately 838 in 2007. The average mortality per set remained quite stable with 0.10 dolphins in 2006 compared to 0.09 dolphins in 2007 (Figure 2). Additionally, the number of sets in which no dolphin mortalities occurred has risen from 38 percent in 1986 to 94 percent in 2007.

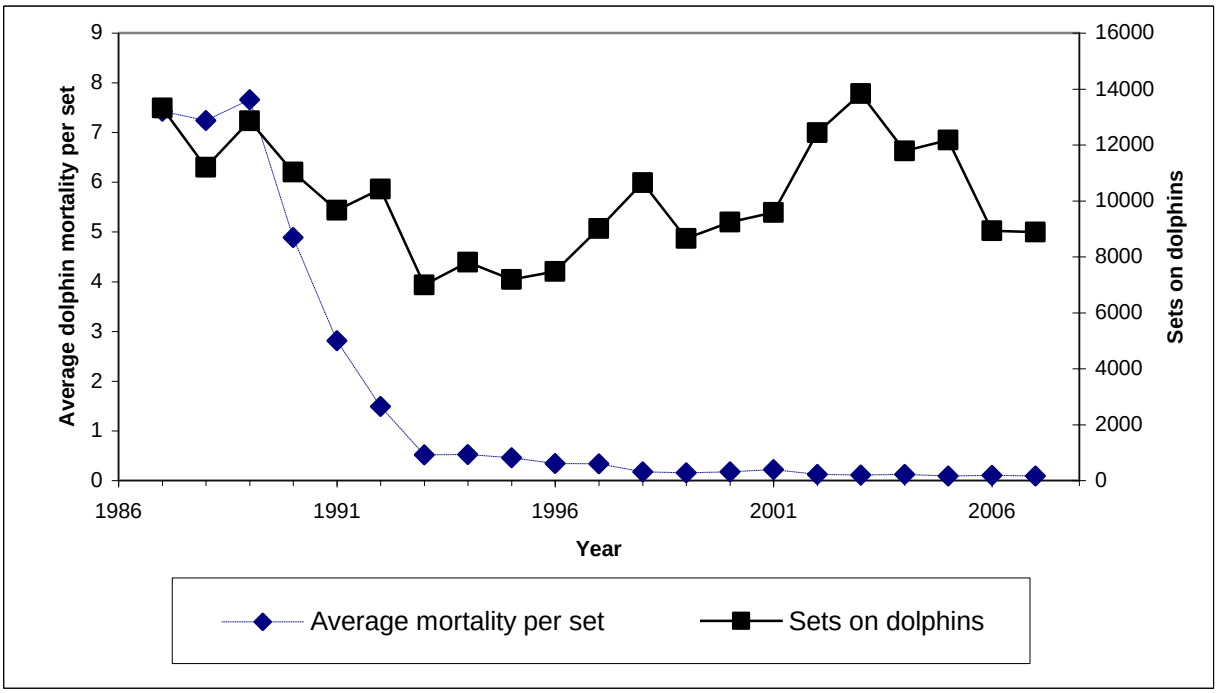

Figure 2. Number of sets on dolphins and average dolphin mortality per set, 1987–2007.

Under the provisions of the On-Board Observer Program, Parties must require their Class 6 purse-seine vessels operating in the Agreement Area to carry an observer during each fishing trip. The Agreement prohibits purse-seine vessels smaller than Class 6, which are not required to carry observers, from intentionally setting on dolphins. The Agreement further stipulates that, for Parties with national observer programs, at least 50 percent of the trips taken by vessels under the jurisdiction of any Party must be covered by AIDCP observers, with the remainder being covered by observers from the Party's national observer program.

To cover the costs of the On-Board Observer Program, the Parties have established annual vessel fees, or assessments, currently calculated on the basis of the carrying capacity of each vessel. If agreed by the Parties, other standards for calculating vessel assessments to cover the costs of the On-Board Observer Program may be specified. At the time a Party submits the list of vessels requesting individual vessel DMLs to the IATTC Secretariat, it must also submit payment for the fees established to cover the costs of the observers, specifying which vessels the payment covers. No observer is assigned to a vessel for which the required fees have not been paid, and it is a violation of the Agreement for a vessel to fish without an observer.

National Observer Programs. The Agreement outlines the provisions of the On-Board Observer Program and requires all Parties to maintain the program in accordance with those provisions, while also allowing each Party to maintain its own national observer program. National observer programs are subject to the provisions of the On-Board Observer Program. Parties are responsible for ensuring that observers from their national observer programs collect information in the same manner as is required for AIDCP observers and to provide to the IATTC Secretariat

copies of all raw data collected by observers from their national programs in a timely manner, along with summaries and reports comparable to those provided by AIDCP observers.

To date, Colombia, Ecuador, Mexico, Venezuela, the European Union, Panama, and Nicaragua have developed national observer programs. Mexico initiated its national observer program in 1991; approximately 50 percent of Mexican vessel trips are now observed through this program, with the remaining trips covered by AIDCP observers per the Agreement. In 2000, Venezuela and Ecuador began using their own national observer programs to cover a portion of their trips, with remaining trips covered by the AIDCP observer program. The European Union developed a national observer program in 2003. Colombia began its own national observer program in 2005. Panama and Nicaragua developed their own national observer programs in 2006.

Observer Requirements. All observers, whether from the AIDCP observer program or a national observer program, must complete specified technical training required by the Parties, be a national of a Party or a member of the scientific staff of the IATTC, be capable of performing the duties set forth in the Agreement, and be included in a list of observers maintained by the AIDCP (or, if part of a national observer program, by the Party maintaining the program). The duty of the observer is to gather all pertinent information on the fishing operations of the vessel to which the observer is assigned as is necessary for implementation of the Agreement. Data collected by the observer are used to determine whether or not a vessel has reached or exceeded its DML, a Party has reached or exceeded its national DML, and/or the fleet has reached or exceeded a per-stock, per-year dolphin mortality cap.

When the IATTC Secretariat determines that placing an observer from the On-Board Observer Program is not practical, a vessel subject to the jurisdiction of a Party fishing in the Agreement Area without setting on dolphins may use a trained observer from another international program to collect pertinent information, provided the other international program is approved by the Parties. Among other duties, this observer verifies the vessel does not set on dolphins. In addition, observers from the On-Board Observer Program may be assigned to vessels of non-Parties at the discretion of the IATTC Secretariat, provided the vessel and the vessel captain comply with all the applicable requirements of the Agreement.

Compliance with the observer requirement is vital to effective implementation of the Agreement. When the observer requirement has not been met, the IATTC Secretariat has taken swift steps to notify the Party (or Participating non-Party) of the requirement to carry an observer, and in some cases has worked with the appropriate nation to place AIDCP observers aboard the vessel.[4] Furthermore, data collected by observers are essential for monitoring dolphin mortality and compliance with the provisions of the Agreement. In recognition of the importance of observer data, and in response to a case in which there was a substantial discrepancy between dolphin

[4] More information on reported cases of noncompliance with the requirement to carry an on-board observer can be found in the Report on the International Dolphin Conservation Program (Appendix 1 and 2).

mortality reported by an observer and a Party, the Parties amended Annex II to the Agreement[5] to explicitly state that the observer data shall be used to determine dolphin mortality and to establish a process by which Parties seeking to challenge the observer data may do so. The process for objecting to observer data requires the objecting Party to provide to the IRP reasons for and the evidence to support such an objection. The IRP then reviews the evidence and provides a recommendation to the Meeting of the Parties for consideration. The Parties review the evidence and the recommendation of the IRP and make a decision as to the merits of the objection and whether the observer data should be modified.

Differences Between the AIDCP Observer Program and National Observer Programs. The United States considers the On-Board Observer Program the backbone of the Agreement. The observer programs themselves and the levels of observer coverage in this fishery are touted as models for success. As noted earlier, the nature of the Agreement and the detailed data collected by observers for review by the Parties allow for a complete assessment of the On-Board Observer Program, including the national observer programs.

Due to the importance of observer data in managing the tuna purse-seine fishery in the EPO and maintaining the integrity of the Agreement, the Parties were concerned about ensuring that information provided by national observer programs was comparable to information reported by the AIDCP observer program. To address this concern, the IRP requested that the IATTC Secretariat prepare a series of analyses to compare the reporting rates of each of the national observer programs with those of the AIDCP observer program. Comparisons were provided on 10 data fields: (1) spatial distribution of sets, by set type (i.e., dolphin, floating object, or unassociated school); (2) percentage of sets, by set type; (3) percentage of trips involving no sets on dolphins; (4) average number of days per trip; (5) percentage of tuna catch, by species; (6) average catch per day in metric tons; (7) percentage of intentional dolphin sets with zero mortality; (8) average mortality per dolphin set; (9) average rate of possible observer interference infractions; and (10) average rate of possible procedural infractions (e.g., use of explosives and night sets).

As previously mentioned, the IATTC Secretariat conducts an annual analysis of observer program data. Recent data indicate there is no significant statistical difference in the national observer program compared to the AIDCP observer program in the rates they report on dolphin sets, dolphin mortality per set, alleged infractions, and other data. In addition, the IATTC Secretariat has started a program to analyze AIDCP observer data to look for instances of unusual patterns of reporting by individual observers. Advanced analyses have been developed to detect observer patterns that indicate unusually low dolphin mortality when high mortality would be expected, unusual set types given other data related to the set, and unusual patterns of tuna catches. The United States continues to encourage examination of the data reported by observers to further the success of the Agreement.

[5] The annexes to the Agreement have been amended several times since the Agreement went into force in 2000. Amendments to the annexes are available online at http://www.iattc.org/IDCPENG.htm.

Reporting of Dolphin Interactions and Mortality

A major component of the AIDCP is the assignment of DMLs on a per-vessel basis and vessel reporting of dolphin interactions and mortality. DMLs were introduced in the La Jolla Agreement in 1992, and included the establishment of a per-vessel maximum limit consistent with the established overall mortality limit for the international fleet under the Agreement. The procedure for assigning DMLs to Parties for distribution to vessels under their authority is provided in Annex IV to the Agreement and is discussed below. Table 1 summarizes the assignment and use of DMLs and the reported dolphin mortality since the Agreement has been in place. As the table illustrates, the Parties use only a portion of the allowable DML and have reduced annual dolphin mortality to below 2,000 animals.

Assignment of DMLs. The assignment of DMLs for a given calendar year requires each Party to provide to the Secretariat by October 1 a list of Class 6 vessels under its jurisdiction for which it is requesting a DML. At the same time, Parties must also provide a list of other vessels under their jurisdiction likely to be operating in the Agreement Area, as well as a list of vessels that have requested a second-semester DML for the following year. DMLs may be assigned as full-year DMLs, which cover vessels that will operate in the management area at the start of the year, or second-semester DMLs, which prohibit vessels from setting on dolphins before July 1 of each year.

Table 1. Summary of DML Allocation and Use under the Agreement.*

	Overall DML	Full-Year DMLs Allocated	Full-Year DMLs Used	Average DML (ADML)	Total Mortality	Average Mortality Per Set	Overall DML Used
1998	5,000	98	81	N/A	1,877	0.18	38%
1999	5,000	125	91	N/A	1,436	0.16	29%
2000	5,000	109	89	44.55	1,636	0.17	33%
2001	5,000	82	68	59.75	2,129	0.22	43%
2002	5,000	90	77	53.85	1,514	0.12	30%
2003	5,000	91	78	53.85	1,500	0.11	30%
2004	5,000	91	83	54	1,461	0.12	29%
2005	5,000	98	93	50	1,151	0.09	23%
2006	5,000	103	97	47.57	886	0.10	18%
2007	5,000	104	96	47.12	838	0.09	17%
2008	5,000	100	N/A	49	N/A	N/A	N/A

*DMLs for 1998 and 1999 were set under the La Jolla Agreement; the AIDCP was not in effect until 2000.

In turn, the IRP provides to the Parties a list of qualified applicant vessels eligible to receive a DML by November 1 in the year prior to the year for which the DML was requested. A qualified applicant vessel must have been certified by relevant national authorities to possess all required dolphin safety gear and equipment, have a captain and crew who received approved training on dolphin release and rescue techniques, have greater than 400 short tons of carrying capacity, have a qualified captain (determined by the IRP), and not be deemed disqualified pursuant to other provisions of the Agreement. Once the list of qualified applicant vessels is provided, Parties are responsible for allocating DMLs to their qualified vessels. A Party cannot allocate to its qualified vessels a greater number of DMLs than the Party has been assigned (the assignment of DMLs to Parties is described below). Once a Party has distributed DMLs to its qualified vessels, it is required to notify the IATTC Secretariat of the allocation. This notification must be completed no later than February 1 in the year for which the DML was requested, and no vessel under the jurisdiction of that Party may begin fishing for tuna associated with dolphins until the IATTC Secretariat receives this notification. Although Parties occasionally fail to adhere to these deadlines, overall compliance is high; the Parties consider cases of noncompliance on a case-by-case basis. In 2007, 104 full-year DMLs, one second-semester DML, and two DMLs from the Reserve DML Allocation (RDA) were issued. To date, 100 full-year DMLs have been allocated in 2008.

Average DMLs and Reserve DML Allocation. The distribution of DMLs to the Parties is determined by the overall DML, the average DML per vessel, and the reserve DML. The Agreement limits the maximum allowable annual dolphin mortality in the fishery to 5,000. This total dolphin mortality cap is consistent with the provisions in the MMPA (16 U.S.C. 1412) as amended by the IDCPA in 1997. The unreserved portion of the overall mortality limit is distributed among the Parties. The remaining portion (usually 2 percent, adjustable upward by the Parties, as necessary) of the overall mortality limit for the fishery is maintained as the RDA, managed at the discretion of the IATTC Secretariat. The portion of the overall mortality limit distributed to a particular Party is calculated by dividing the unreserved portion of the overall mortality limit for the fishery by the total number of qualified vessels requesting full-year DMLs (to get an average DML per vessel), then multiplying the average DML by the number of qualified vessels requesting full-year DMLs operating under the jurisdiction of that Party.

Any Party may request that the IATTC Secretariat assign DMLs from the RDA to vessels fishing under its jurisdiction that do not normally fish for tuna in the Agreement Area but may, from time to time, desire to participate in the fishery in the Agreement Area on a limited basis, provided such vessels and their captains and crews meet operational and training requirements and other requirements set forth by the Agreement. Any accidental mortalities caused by vessels operating in the Agreement Area under the jurisdiction of any of the Parties that have not requested DMLs for their fleet must also be deducted from this RDA. For example, in 2001 the IATTC Secretariat gave an RDA to a vessel that participated in a NMFS chase–recapture study.

Utilization of DMLs. A vessel loses its DML and may not set on dolphins for the remainder of the year if (1) it is assigned a full-year DML and does not set on dolphins prior to April 1 of that year; or (2) it is assigned a second-semester DML and does not set on dolphins by October 1 of

that year; or (3) it is assigned a per-trip DML from the RDA and does not set on dolphins during that trip, unless as a result of *force majeure* or extraordinary circumstances, as agreed by the IRP.[6] A request by a Party on behalf of any of its vessels for an exemption due to extraordinary circumstances is considered to be agreed by the IRP unless a majority of the government members of the IRP supports any objection, made formally and with cause by any other Party, to any such request. All requests for exemption must be sent to the Secretariat by April 1, and any formal objections must be sent to the Secretariat by April 20. Any vessel that loses its DML on two consecutive occasions is not eligible to receive a DML for the following year.

Enforcement of DMLs. The enforcement of individual vessel DMLs ensures a high level of accountability on the part of the vessel captain and crew. If a vessel reaches or exceeds its DML, the vessel must immediately cease all fishing for tuna in association with dolphins for the remainder of the year. If a vessel exceeds its DML during a given year, it is subject to having the amount of the excess, plus an additional 50 percent of that amount, deducted from its DML over subsequent years, as prescribed by the IRP. A vessel may receive a DML in excess of the average DML (calculated using the overall DML for the fishery), but only if the vessel's performance in reducing dolphin mortalities is better than the average performance of the international fleet as a whole. A vessel's DML cannot exceed the average DML if the vessel committed any infraction during the previous year. If the total mortalities of the fleet of any Party meet or exceed the total amount of DML distributed, fishing for tuna in association with dolphins shall cease for all vessels operating under the jurisdiction of that Party for the remainder of that year.

Parties with qualified vessels fishing for tuna in association with dolphins must manage their DMLs responsibly. The Agreement states a vessel will not be considered qualified at the time it requests a DML if it is operating under the jurisdiction of a Party whose applicable laws and regulations prohibit vessels from fishing for tuna in association with dolphins; nor shall DMLs be assigned to any Party in order to provide permits for fishing in the Agreement Area to vessels flying the flag of another country whose applicable laws and regulations prohibit vessels from fishing for tuna in association with dolphins. The Agreement also requires that no DML be assigned to a vessel that has been determined by the Parties to have engaged in a pattern of violations that diminish the effectiveness of the AIDCP, as confirmed through enforcement actions taken against such vessel by the Party under whose jurisdiction it operates. The phrase "pattern of infractions"[7] was recently defined by the Parties in a resolution developed from

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[6] The Agreement's guidelines on what constitutes *force majeure*, or extraordinary circumstances, are available online at http://www.iattc.org/IDCPDocumentsENG.htm

[7] Without prejudice to other determinations made by the Parties pursuant to the provisions of Annex IV, Part I, paragraph 7, a "pattern of infractions" by a vessel shall be defined as one of the following:

a. Any three major infractions committed within two consecutive years during more than one trip, as confirmed by a Party.

b. Any two of the following major infractions committed within two consecutive years during more than one trip, as confirmed by a Party: i. Fishing without an observer; ii. Fishing on dolphins without a DML; iii. Fishing on dolphins after the vessel reaches its DML.

language initially proposed by the United States.[8] Under this Resolution, a vessel will be considered to have committed a pattern of infractions if any three major infractions are committed or if two cases of fishing without an observer, fishing on dolphins without a DML, or fishing on dolphins after the vessel reaches its DML are committed within 2 consecutive years during more than one trip. The United States is certain this Resolution will greatly enhance the ability of Parties to understand compliance by individual vessels within their fleets.

Adjustments of DMLs. Any Party may adjust upward or downward the DMLs of its qualified vessels that meet the specified criteria, subject to certain limitations. A Party making an adjustment must notify the IATTC Secretariat no later than May 20, and no adjustment will take effect until the IATTC Secretariat has been notified. Further, no vessel may have its initial DML adjusted upward by any Party if the IRP had determined, and the Party with jurisdiction over the vessel concurs, that during the current year or the previous 2 years (1) the vessel fished without an observer; (2) the vessel set on dolphins without a DML; (3) the vessel set on dolphins after reaching its DML; (4) the vessel knowingly set on a banned dolphin stock; (5) the captain, crew, or vessel owner committed any actions related to observer intimidation, harassment, bribery, or the like; (6) the vessel made a sanctionable night set; or (7) the vessel used explosives during any phase of a fishing operation involving dolphins.

As indicated earlier, no vessel will be eligible to receive an additional allocation of DML by a Party unless all required dolphin safety gear and equipment is onboard throughout the year. In addition, no upward allocation may be made for a vessel that has exceeded its initial DML prior to April 1, unless the Parties, in consultation with the IRP, agree extraordinary circumstances were a factor in excess mortality. A vessel that exceeds its DML must deduct the amount of the excess plus an additional 50 percent of the excess, unless the IRP recommends otherwise, from its assigned DML over subsequent years as prescribed by the IRP. If at any time a vessel reaches or exceeds its DML, the vessel shall immediately cease all fishing for tuna in association with dolphins.

Stock Mortality Limits. The Parties are required to ensure that, in the implementation of the DML system, individual dolphin stock mortality limits (SMLs) are not exceeded. SMLs are global per-stock, per-year mortality caps monitored using observer data. Annex III to the Agreement establishes a mechanism for calculating SMLs to ensure the most effective means for managing the impact of mortality caused by the fishery on individual dolphin stocks. Under the Agreement, the Parties have established an SML for each dolphin stock, based on the best available scientific evidence, of between 0.1 and 0.2 percent of the Minimum Estimated Abundance (N_{min}), as calculated by NMFS. Beginning in 2001, SMLs were established at 0.1 percent of $N_{min.}$. The Agreement also stipulates the total annual incidental reported dolphin mortality cannot exceed 5,000. In addition, it should be noted that the IDCPA (the U.S. legislation implementing the AIDCP) also imposes an annual dolphin mortality cap of 5,000.

[8]This and other IDCP resolutions are available online at http://www.iattc.org/ResolutionsENG.htm.

Real-Time Reporting. The Agreement requires the Parties to establish a system, based on real-time observer reporting, to ensure effective implementation and compliance with the SMLs.[9] Real-time reporting of per-stock dolphin mortality is necessary to ensure SMLs are not exceeded. In 2006, the average real-time reporting rate by the On-Board Observer Program was approximately 90 percent, up slightly from 89 percent in 2005 and down from 85 percent in 2006. Efforts must be made to continue to improve this rate of reporting if Parties are to have continued confidence that SMLs can be monitored and enforced on a near-real-time basis. In June 2003, the Resolution on At-Sea Reporting was adopted by the Parties to the Agreement. The Resolution outlined four provisions to address this issue, requiring that (1) all purse-seine vessels carrying observers from the On-Board program transmit weekly reports to the IATTC Secretariat; (2) reports prepared by observers include catch, species, and set type (e.g., on dolphins, floating objects, or unassociated schools of fish), and mortalities of dolphins by stock; (3) fishing companies owning vessels less than 400 short tons that are not required to carry observers are encouraged to cooperate with reporting requirements; and (4) all information submitted must be handled according to the Agreement's Rules of Confidentiality. Since the adoption of this Resolution, the reporting rate increased in 2004 and 2005, and has remained relatively stable since. The United States is optimistic reporting rates will continue to improve as a result of this Resolution.

International Requirements for Vessels

Operational Requirements. Annex VIII to the Agreement establishes the operational requirements for large vessels in this fishery. These requirements address dolphin safety gear and equipment, dolphin protection and release measures, and observer treatment. The Agreement requires that each Class 6 purse-seine vessel operating in the Agreement Area have a purse-seine net equipped with a specifically defined dolphin safety panel; at least three operable speedboats equipped with operable towing bridles or posts and tow lines; an operable raft suitable for the observation and rescue of dolphins; at least two operable face masks suitable for underwater observation; and an operable long-range, high-intensity floodlight with a specified minimum output. To ensure that vessels with DMLs are equipped with required dolphin safety gear, the Parties to the Agreement adopted a resolution in October 2004 requiring that these vessels be inspected twice each year. Prior to this Resolution, vessels with DMLs were required to be inspected only once per year.

Dolphin Rescue Procedures. The Agreement requires that each Class 6 purse-seine vessel operating in the Agreement Area perform the "backdown" procedure during every set in which dolphins are captured, until it is no longer possible to remove live dolphins from the net by this procedure. The backdown procedure was originally developed by U.S. fishermen for releasing captured dolphins unharmed and has proven very effective in this regard. Backdown is performed by shifting the vessel's engine(s) into reverse during net retrieval, causing the net remaining in the water to form a channel and the corkline at the apex of the channel to submerge. At least one crewman must be deployed during backdown to aid in the release of dolphins, and

[9] The Procedures for Implementing the SMLs are available online at http://www.iattc.org/IDCPENG.htm

the vessel crew must continue efforts to release any live dolphins remaining in the net after backdown so all live dolphins are released before the "sack-up" procedure begins (when the catch is concentrated near the surface for loading aboard the vessel). Sack-up must not begin and brailing (use of a hydraulic ladle-like structure to bring the catch aboard) must not occur while live dolphins remain in the net.

The vessel and its crew must also avoid injuring or killing dolphins captured in the course of fishing operations, and backdown must be completed no later than 30 minutes after sunset. Vessel crew members are prohibited from using any type of explosive during any phase of a fishing operation involving dolphins. As indicated previously, the crew must (1) cease setting on dolphins when the vessel's DML has been reached; (2) not intentionally set on dolphins if the vessel does not have a DML; and (3) perform a periodic net alignment to ensure the proper location of the dolphin safety panel during the backdown procedure, based on criteria established by the IRP. The Agreement emphasizes that none of these requirements should lead to crewmen being placed in situations presenting unnecessary risks to their personal safety. These extensive dolphin safety procedures have resulted in the lowest levels of dolphin mortality in the history of this fishery.

Treatment of Observers. As indicated previously, the Agreement benefits from a program requiring 100 percent observer coverage aboard Class 6 tuna purse-seine vessels. The Agreement requires that captains, crew, and other vessel personnel comply with their responsibilities regarding the presence of observers aboard their vessels. The responsibilities of the Parties and vessel captains regarding observers include allowing observers access to vessel personnel and to the gear and equipment onboard necessary for completing their assigned tasks. Upon request, observers must also be allowed access to equipment to carry out their duties, if present on the vessel to which they are assigned, including satellite navigation equipment; radar display viewing screens, when in use; high-powered binoculars, including during the chase and encirclement of dolphins to facilitate species identification, except when in use by vessel personnel; and electronic means of communication. Observers must have access to the vessel working deck during net and fish retrieval and to any dolphin specimen, alive or dead, brought aboard the vessel during a set to collect biological samples or as otherwise required by competent national authorities as part of a national observer program. Vessels are required to provide observers with accommodations, including lodging, food, and adequate sanitary facilities equal to those of the crew. Observers must be provided with adequate space on the bridge or pilothouse for clerical work, as well as space on deck adequate for carrying out observer duties. Finally, the Parties must ensure that captains, crew, and vessel owners do not obstruct, intimidate, interfere with, influence, bribe, or attempt to bribe an observer in the performance of his or her duties.

Although observer interference is possible in any fishery, cases reported to the IRP have been rare. Four cases of observer interference were reported in 2007. The average incidence of observer interference from 2002–2006 was 5.2 per year. This represents an improvement from the two years prior, 2000 and 2001, in which there were 13 and 12 reported incidences, respectively. The IRP takes allegations of observer interference very seriously, particularly

allegations of bribe attempts and causing or threatening bodily harm. In October 2004, the IRP asked the Agreement's Secretariat to treat allegations of these types as "Special Cases." The Secretariat provides the IRP with frequent updates on the progress of investigations into Special Cases to monitor whether a complete investigation is conducted and the outcome of each case.

Actions by Parties to Follow Up on Possible Infractions Identified by the International Review Panel

The general guidelines for compliance by Parties to the Agreement are provided in Article XVI, which stipulates each Party shall ensure, with respect to vessels under its jurisdiction, effective compliance with the measures adopted in the Agreement. In particular, each Party must ensure, through an annual certification and inspection program that vessels subject to its jurisdiction comply with the operational requirements and observer requirements established in the Agreement. It also stipulates a Party's responsibility in cases of violations to the Agreement, stating each Party must apply sanctions of sufficient gravity as to be effective in securing compliance with the provisions of the Agreement and to deprive offenders of the benefits accruing from their illegal activities, taking into consideration the recommendations of the IRP. Furthermore, for serious offenses, the Agreement requires that such sanctions must include refusal, suspension, or withdrawal of the authorization to fish. The Agreement also calls on the Parties to establish incentives for the captains and crews of vessels, with a view to enhancing compliance with the Agreement and its objectives. The Parties are further required to adopt cooperative measures to ensure compliance with this Agreement, building on decisions taken under the La Jolla Agreement; they must promptly inform the IRP of enforcement actions it has taken pursuant to this Agreement, and the results of the actions.

International Review Panel. Annex VII to the Agreement establishes the IRP to serve many functions, including compiling a list of the vessels that qualify for DMLs each year; analyzing the reports submitted to the IRP regarding all trips made by vessels covered by the Agreement; identifying possible infractions based on the list of possible infractions approved by the Meeting of the Parties; informing each Party, through the IATTC Secretariat, of possible infractions committed by vessels flying its flag or operating under its jurisdiction and receiving from that Party information on the actions taken; and maintaining an updated report on the actions taken by Parties to provide adequate training for fishing captains, as well as maintaining a list of fishing captains determined to be complying with established performance requirements, based on the information provided by each of the Parties.[10]

The IRP also recommends to the Meeting of the Parties (MOP) pertinent measures for achieving the objectives of the Agreement, in particular those related to the use of gear, equipment, and fishing techniques, considering improvements in technologies, as well as the adoption of appropriate incentives for captains and crews to meet the objectives of this Agreement. On behalf of the IRP, the IATTC Secretariat prepares and provides to the Parties an annual report on

[10] IRP meeting minutes and minutes for other meetings associated with the Agreement are available online at http://www.iattc.org/MeetingsENG.htm.

those aspects of the operation of the fleet relating to the implementation of the Agreement, including a summary of possible infractions identified and the actions taken by the Parties. The IRP recommends to the Parties ways to progressively reduce dolphin mortality incidental to the fishery in the Agreement Area and performs other functions as assigned by the Parties. The IRP can hold at least three meetings a year, but may convene additional meetings at the request of at least two of the Parties, provided a majority of the Parties supports the request. In June 2005, Parties and cooperating non-Parties agreed to a reduction in the number of AIDCP meetings on a trial basis, starting with the February 2006 meetings. During the June 2006 MOP, the Parties reviewed the impact of the reduction in the number of AIDCP meetings. No significant operational impacts were identified and no meetings occurred in February 2007 or 2008. A final review on the impact of the reduction of meetings was not conducted at the June 2007 MOP. No significant long or short term negative impacts have been identified by the Secretariat but timing of the meetings has not been finalized.

The IATTC Secretariat assists the IRP in convening and organizing its meetings; presents information required by the IRP for carrying out its functions and responsibilities, including observer IRP forms and field data forms that provide information on the activities of the vessels, dolphin mortality, and the presence, condition, and use of the dolphin safety equipment and gear; and prepares minutes of all meetings and drafts special reports and documents dealing with the activities of the IRP. The IATTC Secretariat also provides to each Party, for its consideration, recommendations and information concerning possible infractions identified by the IRP for vessels under its jurisdiction; distributes to the IRP information received from Parties on the actions taken on possible infractions identified by the IRP; and publishes the IRP Annual Report. In accordance with the instructions given by the Parties, the Secretariat presents to the members of the IRP certain types of information received from the Parties and carries out other tasks necessary for the accomplishment of the IRP's functions. The IRP is unique in its transparency and structure, and has served as a model for similar bodies established under other multilateral agreements.

Public Participation in the AIDCP and Access to Information. As part of the overall transparency of the Agreement, the IRP is made up of representatives of the Parties (governmental members), three representatives of nongovernmental environmental organizations with recognized experience in matters pertaining to this Agreement and with offices in the territory of a Party (nongovernmental members), and three representatives from the tuna industry operating under the jurisdiction of any of the Parties in the Agreement Area (nongovernmental members). The nongovernmental members are chosen through a specified nomination and election procedure described in the Agreement.

Although the IRP is a transparent body with respect to the level of information provided to its members, a portion of the information the United States and other members of the IRP receive is considered confidential per the terms of the Rules of Confidentiality developed by the Parties

and envisioned in Article XVIII of the Agreement.[11] The Rules of Confidentiality were established to ensure that meetings of the IRP consist of open discussion about Parties, vessels, captains, observers, and other details of the fishing operation and compliance with the AIDCP, while not divulging commercially sensitive information or information that might place individual members of a vessel crew or observers at risk.

Identification of Possible Infractions. The IRP follows a general procedure for reporting compliance by vessels with measures established by the AIDCP. At the conclusion of a fishing trip, the observer prepares a summary of information pertinent to dolphin mortalities and submits it to the IATTC Secretariat, who then sends it to the government having jurisdiction over the vessel. Upon review of the observer data by the IATTC Secretariat, certain types of possible infractions to provisions of the Agreement are automatically reported to the Party with jurisdiction over the vessel involved in the case. The Secretariat also submits to the IRP for review the observer data for other cases not initially identified as possible infractions. The IRP reviews the information provided at its meetings, and those cases identified by the IRP as possible infractions are likewise reported to the relevant Party.

Once the IRP refers a possible infraction to the Party with jurisdiction over the vessel, the Party has 6 months to respond to the IATTC Secretariat regarding the possible infraction (with the exception of actions related to observer intimidation, harassment, bribery, or the like, in which case the Party has 12 months to respond). If the Party does not object to the possible infraction identified within the applicable time frame, it is deemed to have concurred with that infraction. A Party is considered to have responded to a possible infraction if it notifies the Secretariat that the possible infraction is being investigated before the 6-month or 12-month time frame has expired. In cases where a Party has responded, the Party is deemed to have concurred with the infraction if it does not conclude its investigation and report the final results to the IRP within a period of 2 years from the date on which the possible infraction was originally referred to the Party, except when it is not possible for the Party to complete the investigation within this 2-year period. The Party must then provide an update to the IRP of the status of the investigation and its estimated date of completion. The Party is required to provide a report on the status of the investigation at each subsequent meeting of the IRP until the case is resolved. If a report is not made, that Party will be deemed to have concurred with the possible infraction.

The number of possible infractions identified by the IATTC Secretariat has decreased, while the number of dolphin sets has increased from 8,352 in 1999 to 8,879 in 2007. Meanwhile, the IRP has identified certain categories of infractions that should always be submitted for its review. These categories include possible infractions of observer interference, use of explosives, night sets (sets in which backdown is not completed until more than 30 minutes after sunset), setting on dolphins without a DML, setting on dolphins after the DML has been reached, and fishing without an observer.

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[11] The text of the Agreement, including the most recent version of the Annexes, is available online at http://www.iattc.org/IDCPENG.htm.

Major and Other Infractions. The IRP has defined violations of the Agreement as being either "major" infractions or "other" infractions. *Major* infractions include trips without an observer, trips with dolphin sets but with no DML assigned, trips by vessels with DMLs with a fishing captain not on the AIDCP List of Qualified Captains (a list maintained by the IATTC Secretariat of captains entitled to fish for tuna associated with dolphins), trips by vessels with DMLs without a dolphin safety panel, intentional dolphin sets made after reaching the DML, sets on banned dolphin stocks or herd types, sets without a required backdown, sets with unavoided dolphin injury or mortality, sets with dolphin sack-up or brail, and sets or chases with use of explosives. *Other* infractions include trips without a required raft, trips with less than three speedboats and/or missing towing bridles, trips without a required high-intensity floodlight, trips without required face masks, night sets, sets without required deployment of rescuer, and sets without continued dolphin rescue effort after backdown.

Vessel Compliance with the Provisions of the Agreement. Vessel compliance with the requirements of the Agreement is generally quite high. The vast majority of trips and sets by fishing vessels under the program, with its unprecedented 100 percent observer coverage, result in no reported incidents that could be considered possible infractions. The Report on the IDCP discussed during the 19th Meeting of the Parties indicates that out of 8,818 dolphin sets, 16 major possible infractions, 43 other possible infractions, and four cases of possible observer interference were reported at the 43rd and 44th meetings of the IRP. Also, as of May 28, 2008, the relevant Parties had responded to the Secretariat regarding 14 (88 percent) of the major infractions, 30 (70 percent) other infractions, and three (75 percent) instances of observer interference. These numbers show a decrease in the total number of possible infractions reported and a steady increase in the number of responses by Parties. For example, the Report on the IDCP presented at the 13th Meeting of the Parties, summarized possible infractions identified by the 36th, 37th, and 38th IRP meetings. The report showed that out of 11,733 sets on dolphins, 75 major possible infractions, 36 other possible infractions, and five cases of observer interference were reported. At the time the Report was presented at the Meeting of the Parties, relevant Parties had responded to the Secretariat regarding 37 (49.3 percent) major infractions, 25 (69.4 percent) other infractions, and one (20 percent) instance of observer interference. The Report on the IDCP discussed during the 17th Meeting of the Parties indicates that out of 9,452 dolphin sets, 29 major possible infractions, 49 other possible infractions, and six cases of possible observer interference were reported at the 41st and 42nd meetings of the IRP. Also, as of May 16, 2007, the relevant Parties had responded to the Secretariat regarding 27 (93 percent) major infractions, 40 (82 percent) other infractions, and one (17 percent) instance of observer interference. The United States is pleased to see that the number of possible infractions continues to decrease, especially with respect to major infractions.

Although compliance with the Agreement is high for vessels from most fleets, performance and compliance is not equal among all fleets. According to the Report on the International Dolphin Conservation Program presented at the 19th Meeting of the Parties, the fleets with the highest number of possible infractions include Venezuela (27), Panama (11), and Ecuador (8). All other fleets had less than seven possible infractions. The United States continues to monitor individual

fleets' compliance with the Agreement and will work with the Parties to address these compliance issues.

The IRP has also been closely following the responses by Parties to possible infractions. This topic has been the subject of discussion among members of the IRP for several years. Despite the low rate of infractions overall, Parties often do not respond to possible infractions referred to them by the IRP and, when a possible infraction is identified through investigation by the Party to be an infraction, sanctions applied in some cases may not be sufficient to deter future infractions by vessels under that Party's authority. To address these issues, a document was presented at the 41st meeting of the IRP containing information on responses by individual Parties to six specific infractions: observer interference, use of explosives, night sets, fishing without an observer, sets on dolphins after reaching the vessel's DML, and setting on dolphins without a DML. For example, a total of 21 possible infractions in these six categories were referred to all Parties by the IRP between the June 2007 and October 2007 meetings. (There were no cases of sets on dolphins after reaching the vessel's DML.) As of June 2008, in only one (5 percent) of these cases, no response has been received, and 8 (38 percent) were under investigation by the Parties (Table 2). In nine cases (43 percent), the nation decided no infraction occurred. Sanctions were imposed in 3 instances (14 percent). Reporting rates varied from fleet to fleet.

Table 2. Responses as of May 28, 2008, to six types of possible infractions identified at the 43rd and 44th meetings of the IRP from June 2007 through October 2007.

	No response	Under investigation	No infraction	Infraction: no sanction	Infraction: warning	Infraction: sanction	**Total**
Observer interference	1	1	3	0	0	0	**5**
Use of explosives	2	2	0	0	0	0	**2**
Night sets	0	5	0	0	0	3	**8**
Fishing without an observer	0	0	6	0	0	0	**6**
Fishing on dolphins without a DML	0	0	0	0	0	0	**0**
Sets on dolphins after reaching DML	0	0	0	0	0	0	**0**
Total	**3**	**8**	**9**	**0**	**0**	**3**	**21**

Parties are responsible for imposing sanctions of sufficient gravity to secure compliance with the provisions of the Agreement and to deprive offenders of the benefits accruing from their illegal activities. During a recent meeting of the IRP, Parties were asked to provide to the IATTC Secretariat information on the domestic legislation pertaining to infractions of the AIDCP, including the infractions covered and the level of sanctions associated with each type of infraction. Several of the Parties provided this information and the IATTC Secretariat later reported the results to the Parties. The United States plans to continue working within the IRP to evaluate the use and level of sanctions by Parties to ensure they are sufficient to promote compliance with the Agreement. The United States is also considering entering into bilateral discussions with Parties where necessary in an effort to improve compliance.

Although the United States is encouraged by the very low rate of infractions identified per set, and the fact that most infractions had been addressed by the Parties involved, the United States would like to ensure that countries take more stringent actions, including the application of appropriate sanctions, in cases where infractions are confirmed. To be true to both the spirit and the letter of the Agreement, the United States has encouraged the Parties to continue to dedicate themselves to improving the rate and nature of responses to infractions and to increasing their vigilance toward countries and vessels whose actions undermine the Agreement.

The United States is working with the nations participating in the Agreement through the IRP and its processes to develop mechanisms for improving compliance with the Agreement by all Parties, especially with respect to major infractions. Furthermore, the United States is prepared to propose strong actions, including amending the Agreement and its annexes if necessary, to address compliance issues. As described earlier, the United States' proposed plan for enhancing the success of the Agreement was adopted by the Parties at the June 2003 meeting. The United States continues to work with Parties to the Agreement to develop methods to address specific issues, and is encouraged by the progress on the parts of other Parties. The United States is also committed to working with the Parties to strengthen the link between compliance with conservation measures adopted under the IATTC and issuance of DMLs under the AIDCP. As previously mentioned, the Parties agreed to a protocol for publicizing the number of TTFs for tuna caught in contravention of IATTC resolutions—an important step in recognizing the importance of linking compliance between the AIDCP and IATTC.

The United States is also encouraged that the Parties to the Agreement continue to take steps to monitor compliance by captains and vessels with the Agreement. The Parties have agreed to the use of a new data screening technique to improve the evaluation of captain and vessel performance in reducing dolphin mortality. The United States also continues to monitor compliance with the Agreement through participation in the IRP.

Special Cases of Infractions Involving Small Vessels. When reviewing actions by Parties on possible infractions, the IRP also reviews special cases of possible infractions, including cases involving small vessels. Under the Agreement, small vessels (less than 400 short tons, or Class 5 or smaller) are prohibited from setting on dolphins. For many years, these vessels were not considered powerful enough to chase and set on dolphins. However, recent reports indicate that

newer small vessels, especially in Classes 4 and 5, are more powerful and may be capable of chasing and encircling dolphins. This activity remains prohibited by the Agreement. Because these vessels are not currently required to carry observers, monitoring their activity in this regard is problematic because reports of small vessels setting on dolphins are not recorded directly by observers (unless the vessels have been referred to the IRP, as discussed below).

As was discussed in previous reports on the AIDCP, at least one case of such dolphin sets by a small vessel has been relatively well documented. In May 2002, the *El Dorado*, a small purse-seine vessel flagged to Colombia, was seen (and videotaped) setting on and killing at least 25 dolphins in the Galapagos Marine Reserve in waters within Ecuadorian jurisdiction. The Government of Ecuador, a Party to the Agreement, quickly responded to this incident, initiating prosecution of the involved parties through: (1) the Naval Authority in accordance with the Maritime Policy Code, (2) the Galapagos National Park in accordance with the Law for the Conservation of the Province of Galapagos, (3) the Director General of Fisheries for violations of the Agreement, and (4) the Penal Judge for Galapagos for environmental crimes described in the Ecuadorian Legal Code. The case is still pending, but possible outcomes include confiscation of the vessel and its equipment, a maximum of 3 years in jail for the vessel captain and crew, and a permanent suspension of the vessel's fishing permit. It should be noted that Colombia does not have an affirmative finding, and yellowfin tuna harvested by purse-seine vessels in the EPO from Colombia is currently prohibited from entering the United States.

The *El Dorado* incident may reflect a larger issue of small vessel noncompliance with the Agreement. Additional anecdotal information has been raised in informal discussions between U.S. officials and individuals of other nations participating in the fishery. These discussions have included information on a growing number of small vessels belonging to or being built by Parties to the Agreement that are being sized and equipped with the capability to set on dolphins while avoiding the requirements of the Agreement. These requirements include those related to observers, dolphin release, and safety. In addition, noncompliance by small vessels has the potential to compromise the integrity of the current U.S. dolphin-safe labeling standard with respect to small vessels.[12] Mexico and Ecuador have the two largest fleets, in terms of the number of small purse-seine vessels. According to the Vessel Register (the definitive list of vessels authorized to purse-seine for tuna in the EPO), 10 Class 4 and 5 vessels are associated with the Mexican fleet, and 9 are currently active in 2008. Ecuador has 25 Class 4 and 5 vessels listed in the 2008 Register, and 24 are currently active. All other Parties have two or fewer of these class size purse-seine vessels operating in the EPO. Some of these vessels may be capable of setting nets on or encircling dolphins. It is important to note, however, that the United States is only aware of minimal anecdotal information regarding possible noncompliance by such vessels. Although some environmental organizations claim to have additional evidence of similar cases, much of this information appears to be inconclusive or speculative. The United

[12] All yellowfin tuna harvested by small vessels in compliance with the Agreement is currently considered dolphin-safe. This tuna may be imported into the United States if the small vessel is under the jurisdiction of a nation with an affirmative finding or a nation with no purse seine vessels in excess of 400 short tons carrying capacity. Nations in the latter category are not required to obtain an affirmative finding to import yellowfin tuna harvested in the ETP into the United States.

States has asked these organizations for specific information or evidence regarding these and other similar cases, but so far no such information has been provided.

Although the extent of any such activity is not known, any dolphin mortality by these smaller vessels would not be observed, and therefore not reported, by the AIDCP On-Board Observer Program. This undocumented mortality, if occurring at significant levels, could potentially exacerbate the impact of the fishery on dolphin stocks. The United States has raised this issue at recent meetings of the IRP, and has pushed strongly to encourage the Parties to the Agreement to require observers on small vessels. In October 2002, the Parties adopted a proposal to require placement of observers aboard Class 4 and 5 vessels that have been alleged to the IRP as having set on dolphins. In 2005, the first Class 1–5 purse-seine vessel that allegedly set on tuna associated with dolphins was required to carry an observer, pursuant to the Resolution's requirements. After investigation of the vessel by the Government, it was determined that the vessel had not set on dolphins, and therefore is no longer carrying an observer.

During its October 2003 meeting, the IRP considered a report prepared by the Secretariat on the different approaches for monitoring activities of small vessels operating in the EPO. The report summarized information on dolphin sets made by small vessels. Prior to the Agreement, two vessels in this category were known to have had DMLs and made intentional sets on dolphins. Both vessels carried speedboats and were equipped with dolphin safety panels. However, other safety gear was frequently missing over the period 1995–1997; one vessel did not have all required safety equipment on 12 of its 28 trips, and the other vessel failed to carry the required safety equipment on 25 of its 27 trips over that period. In total, the two vessels made two sets on dolphins in 1995, 11 in 1996, and 18 in 1997.

Although the Agreement does not require observer coverage on vessels in Class 5 or smaller, the report summarized available information on dolphin sets made by vessels in this category since adoption of the Agreement. The activities of three vessels were described. The vessels—two in Class 5 and one in Class 3—were identified as setting on dolphins in 2001 and 2002 by observers aboard large purse-seine vessels operating nearby. The report indicates that in two of the three cases no response from the flag government has been received since referral of the incidents by the IRP.

The report described six alternatives for monitoring small vessels: (1) allow small vessels to have DMLs and require them to carry observers; (2) require 100 percent observer coverage on vessels in Class 4 and larger; (3) require 33–50 percent observer coverage on vessels larger than Class 4, (4) require automated video monitoring; (5) require vessel monitoring systems (VMS); and (6) monitor catch compositions. The alternatives varied in cost and effectiveness. During its October 2003 meeting, the IRP struggled to find a balance between cost and effectiveness, as well as space constraints on many small vessels to carry observers. The Secretariat noted that annual fees assessed to vessels to fund the On-Board Observer Program vary according to each vessel's carrying capacity; small vessels are required to pay less than larger ones. However, the costs associated with placing an observer on any vessel is always approximately the same, regardless of size. The IRP discussed this issue in an effort to rationalize the additional

economic burden vessels of Parties would have to bear, especially in the face of uncertainty as to the frequency of small vessel sets on dolphins. The United States and some other Parties stressed that the extent of the problem could only be known with certainty if an effort was made to seek out instances of noncompliance. However, other Parties disagreed, indicating the cost of additional observer coverage, or another monitoring system, was not justified because there was no concrete indication that any substantial problem with small vessels setting on dolphins existed. The Parties did not resolve this issue, but committed to revisit it during future meetings and review any more recent information. In this respect, the IRP asked the Secretariat to prepare a report detailing possible thresholds in catch composition to indicate whether fish are caught in association with dolphins. Data indicate that tuna caught in association with dolphins are generally post-reproductive, in larger schools, and associated with fewer non-target species than tuna caught through other methods. This information will be used as a starting point in the Secretariat's report on guidelines for determining dolphin sets through catch composition.

Further, NMFS awarded a contract to the IATTC using funds from the Foreign Fishing Observer Fund (FFOF) to cover the costs of a catch composition study and to expand observer coverage to international Class 4 and 5 vessels. Data is currently being collected under this contract and will be analyzed to determine what information can be obtained about the activities of these vessels.

VII. Actions Taken by the Secretary under Section 101(a)(2)(B) and Section 101(d) of the Marine Mammal Protection Act

Actions Taken under Section 101(a)(2)(B)

Tuna Tracking and the Dolphin-Safe Label. To implement the dolphin-safe labeling standard, NMFS monitors all tuna caught by U.S. flag vessels or canned by U.S. processors, as well as all frozen and processed tuna and tuna products imported into the United States from other nations. This monitoring program relies on a system of written reports, onsite inspections and audits, and electronic databases to maintain the necessary checks and balances to ensure that tuna sold in the United States, when carrying a dolphin-safe label, is truly "dolphin-safe" and was caught in full compliance with internationally agreed upon conservation measures. In addition, a Fisheries Certificate of Origin (FCO; NOAA Form 370) must accompany all imports of frozen and/or processed tuna products. The FCO certifies that tuna products entering the United States as dolphin-safe were harvested in a manner consistent with dolphin-safe standards.

In August 2006, the U.S. Tuna Tracking and Verification Program launched a new website that provides information on the domestic program and the international program.[13] The website includes such items as a listing of retailers, canners, and products that have been part of spot checks and audits and regulatory information for exporters, trans-shippers, importers, processors, and wholesalers/distributors. Audits and retail market spot checks are an integral aspect of fulfilling the mandates of the IDCPA. In May 2008, an extensive retail market spot check of 25 states was made possible through a partnership with volunteers from NOAA's National Weather Service Employees (http://www.noaaworld.noaa.gov/scitech/jun2008_scitech_3.html). All

[13] The U.S. Tuna Tracking and Verification Program website can be found at http://www.DolphinSafe.gov.

samples were found to consist of tuna caught in compliance with U.S. dolphin-safe label regulations. Additionally, in June 2008, an on-site audit of tuna tracking procedures and internal documentation chains was made at two major U.S. tuna canneries located in American Samoa. Overall, for both canneries, the traceability of product from receipt to cold storage to production and finished goods is sufficient to meet domestic tuna tracking and verification regulations.

Current U.S. law requires tuna labeled as dolphin-safe to meet certain criteria. Nothing prohibits the importation into the United States of tuna that does not meet the dolphin-safe labeling requirements, provided the exporting nation meets certain requirements and has an affirmative finding. Such tuna, however, may not be labeled dolphin-safe. The U.S. tuna canners have instituted a voluntary dolphin-safe tuna campaign whereby they purchase only dolphin-safe tuna for introduction to the U.S. market.

Affirmative Finding Process. Section 101(a)(2)(B) of the MMPA specifies the requirements to export yellowfin tuna and yellowfin tuna products harvested with purse-seine nets in the EPO to the United States. NMFS is responsible for determining whether nations wishing to export yellowfin tuna and yellowfin tuna products are complying with the tuna and dolphin conservation measures of the IATTC and the Agreement, respectively. The process for monitoring and evaluating compliance of nations participating in this fishery and wishing to export to the U.S. market is a substantial one. To do this, NMFS staff spend a great deal of time discussing issues of compliance with government officials of the Parties to the Agreement, the scientific staff of the IATTC, and others with direct knowledge of country practices in implementing the Agreement. If a nation is determined to be meeting its obligations under the AIDCP and IATTC and meeting the requirements of applicable U.S. regulations, NMFS may issue an "affirmative finding" for that nation, allowing the importation of its tuna, whether it is dolphin-safe tuna or not, into the United States. If no affirmative finding is issued, importation of yellowfin tuna from these nations is prohibited until they are able to submit evidence of their full compliance and adherence to the AIDCP, IATTC, and applicable U.S. import requirements and receive an affirmative finding.

To receive an affirmative finding, a nation must provide documentary evidence to NMFS, including: (1) a statement requesting an affirmative finding; (2) evidence of membership in the IATTC; (3) evidence the nation is meeting its obligations to the IATTC, including financial obligations; (4) evidence the nation is complying with the AIDCP, including documentation of national laws and regulations implementing the Agreement, and evidence the nation is enforcing those laws and regulations; (5) evidence of a tuna tracking and verification program comparable to U.S. tracking and verification regulations; (6) evidence the national fleet DMLs were not exceeded in the previous calendar year; (7) evidence the national fleet per-stock per-year mortality limits, if they are allocated, were not exceeded in the previous calendar year; (8) authorization for the IATTC Secretariat to provide or release information, or a commitment to provide directly to the Assistant Administrator for Fisheries, complete, accurate, and timely information necessary to verify the dolphin-safe status of the exported tuna through inspection of TTFs, and observer records; and (9) authorization for the IATTC Secretariat to provide or release to NMFS information regarding whether a nation is meeting its obligations of membership to the

IATTC and whether a nation is meeting its obligations under the AIDCP, including managing (not exceeding) its national fleet DMLs or its national fleet per-stock per-year mortality limits.

When seeking an affirmative finding, a harvesting nation must submit an application directly to NMFS. If granted an affirmative finding, the government must again formally request an affirmative finding and submit the required documentary evidence every 5 years thereafter. In addition, NMFS reviews the status of the nations and their national programs' adherence to all of the necessary requirements annually. For the annual reviews, NMFS collects information determining the nation's compliance with the Agreement and standing with the IATTC, based on documentary evidence provided by the harvesting nation, the IATTC Secretariat, and DoS. NMFS may require the submission of additional supporting documentation or verification of information in connection with the request to allow importation of yellowfin tuna. An affirmative finding is valid for a 1-year period (April 1–March 31) and can be terminated at any time if NMFS determines the requirements for an affirmative finding are no longer being met, or if a nation consistently fails to take proper enforcement actions on violations that diminish the effectiveness of the AIDCP.

Under the Agreement, all Parties are required to apply their national laws and regulations, while taking into consideration the recommendations of the IRP to maintain and enforce the provisions of the IDCP. Violations of national laws and regulations are addressed by the national authorities. When considering a nation's compliance with the Agreement for an affirmative finding, NMFS monitors violations, including the severity and frequency of the violations as well as the response by the nation to the violation, through information from the IATTC, meetings of the IRP, and from the nation itself. Before issuing an affirmative finding, NMFS takes into consideration the ability of the nation to monitor and enforce its laws and regulations to uphold the Agreement.

Whether or not a nation has submitted an application for an affirmative finding, if it is harvesting yellowfin tuna in the EPO with Class 6 purse-seine vessels and has not received an affirmative finding, yellowfin tuna harvested by purse-seine in the EPO by that country is prohibited from entering the United States. For example, in 2000, the United States prohibited the importation of tuna from Belize, Bolivia, Colombia, El Salvador, Guatemala, Honduras, Nicaragua, Panama, Spain, Vanuatu, and Venezuela. At the time none of these nations had applied for an affirmative finding. Similarly, in 2002 the United States prohibited the importation of tuna from Peru because, for the first time, a Class 6 Peruvian vessel was harvesting yellowfin tuna in the EPO and Peru had not received an affirmative finding. NMFS continues to work with nations that have not received affirmative findings to assist them in understanding and addressing all obligations for obtaining an affirmative finding.

By meeting affirmative finding requirements, each nation illustrates its compliance with the Agreement, IATTC tuna conservation provisions, and U.S. import requirements. To adequately analyze all of the information submitted by the applying nation, NMFS works with applicant countries, the IATTC Secretariat, and the DoS to expedite analysis and processing of applications. NMFS also works with U.S. Customs and Border Protection to ensure that only

nations receiving affirmative findings are allowed to import yellowfin tuna harvested in the EPO with purse-seine vessels into the United States.

NMFS' affirmative finding process has been heavily scrutinized. In fact, Mexico's 2000 affirmative finding was the subject of litigation in the U.S. Court of International Trade (CIT). In that case, NMFS' analysis of Mexico's adherence to the AIDCP and the IATTC conservation regime, and the affirmative finding program, strongly prevailed. NMFS' affirmative finding process evaluates the compliance of nations wishing to import into the United States yellowfin tuna harvested by purse-seine in the EPO and holds those nations to strict criteria for compliance.

Embargo Status Update. As indicated earlier, affirmative findings must be reviewed annually. Since the affirmative finding provisions went into effect, NMFS has received affirmative finding applications from Ecuador, El Salvador, Mexico, Nicaragua, Panama, Peru, Spain, and Venezuela. In 2000, NMFS issued affirmative findings for two nations—Ecuador and Mexico—allowing them to import tuna harvested by purse-seine in the EPO into the United States. In 2000, NMFS reviewed documentation submitted by the governments of Nicaragua and Spain, and determined they had not yet met the requirements for an affirmative finding. In 2001–2002, NMFS found the same was true for the governments of El Salvador, Panama, and Venezuela and denied these nations affirmative findings. In the cases of Ecuador and Mexico, annual reviews were conducted in 2001, 2002, 2003, and 2004, and NMFS found that these nations continued to meet the requirements for an affirmative finding. El Salvador was granted an affirmative finding for the first time on December 31, 2003; NMFS obtained the necessary information to conduct subsequent annual reviews of El Salvador's affirmative finding, and issued annual renewals for 2004, 2005, 2006, and 2007. In 2008, El Salvador reapplied for a new affirmative finding which was granted on July 10, 2008. Ecuador was issued a new finding effective April 1, 2005, through March 31, 2010, subject to annual review by NMFS. Mexico was issued an affirmative finding for the same time period on June 10, 2005, and Spain was issued an affirmative finding on June 6, 2005. Annual affirmative finding renewals for Mexico, Ecuador, and Spain were issued for 2008.

Actions Taken under Section 101(d)

Good Samaritan Exemption. Section 101(d) of the MMPA provides that the disentanglement of a marine mammal from fishing gear does not violate "take" provisions of the Act, so long as reasonable care is taken to ensure the safe release of the marine mammal and prevent further injury to the animal. Takes of marine mammals that fall under this exemption must be reported to the Secretary of Commerce within 48 hours. In 2007, no known takes fell under this exemption, as none were reported to the Secretary.

VIII. Copies of Relevant Resolutions and Decisions of the Inter-American Tropical Tuna Commission, and Regulations Promulgated by the Secretary

Relevant regulations and resolutions adopted by the IATTC and the Parties to the AIDCP are included as appendices to this report.

IX. Other Information Deemed Relevant by the Secretary

Final Disposition of the Dolphin-Safe Label Litigation

As noted earlier, in 1990 Congress passed the DPCIA which established the U.S. dolphin-safe labeling standard for tuna harvested in the EPO. Under the DPCIA, as amended in 1997 by the IDCPA, tuna may be labeled "dolphin-safe" only if the tuna are harvested on a trip in which no purse-seine nets were used to encircle dolphins, and no dolphins were killed or seriously injured during the sets in which tuna is caught. The IDCPA also revised the MMPA and the DPCIA to lift the embargo on yellowfin tuna against countries whose vessels fish in association with dolphins and to lift the ban on the sale of non dolphin-safe tuna, under certain conditions.

In addition to these changes, the IDCPA also provided for the possibility that the definition of "dolphin safe" stated above could change to allow tuna caught by the chase and encirclement of dolphins to be considered dolphin-safe as long as there were no observed dolphin mortalities or serious injury, and the fishing was conducted in accordance with the multilateral Agreement on the International Dolphin Conservation Program (AIDCP). However, the change to the dolphin-safe label was contingent on the results of research into the effects of chase and encirclement on depleted dolphin stocks and the results of a finding required by the Secretary of Commerce on whether the purse-seine industry in the EPO is having a significant adverse impact on depleted dolphin populations.

On December 31, 2002, the Secretary of Commerce, on the basis of this research and other relevant information, made the determination that intentional chase and encirclement of dolphins is not having a significant adverse impact on any depleted dolphin stocks in the EPO. As a result of the finding, the definition of dolphin-safe was changed. However, subsequent to the finding a number of litigants filed a complaint in the U.S. District Court for the Northern District of California challenging the final finding and seeking to enjoin any change to the dolphin-safe labeling standard (*Earth Island Institute v. Evans*). On April 10, 2003, the District Court issued a preliminary injunction temporarily staying the change in the dolphin-safe definition and returning to the previous definition, which requires dolphin-safe tuna be caught without the chase and encirclement of dolphins in the entire trip and without killing or seriously injuring any dolphins in the set in which the tuna was caught. In an August 9, 2004, decision, the District Court determined the finding was contrary to the best available science. Therefore, the District Court set aside the final finding and declared that "dolphin-safe" may be used only on tuna products harvested by large purse-seine vessels in the EPO during trips where no tuna were caught using a purse-seine net intentionally deployed on or encircling dolphins, and where no dolphins were killed or seriously injured during the sets in which tuna were caught.

The United States Government appealed the District Court's decision to the 9th Circuit Court of Appeals. The 9th Circuit Court accepted *amici curiae* briefs filed by the Mexican government, industry associations, and the IATTC. On April 27, 2007, the 9th Circuit upheld the District Court's decision with respect to all major issues. The 9th Circuit did not remand this issue to the Secretary for further consideration. As a result, the Secretary may not revisit the Final Finding using updated scientific information. Because the United States Government did not seek rehearing before the 9th Circuit or Supreme Court review, the 9th Circuit decision remains controlling law.

Latin American nations that purse-seine for yellowfin tuna in the EPO are affected by this decision. Some of these nations were hoping for a change in the U.S. label standard to provide them greater market share to the U.S. canned tuna market, in particular those that hold an affirmative finding under the MMPA. The 9th Circuit's decision precludes that change. The prospect of increased access to the U.S. market through a change of the label standard has served as a strong incentive for the participating countries to implement this program in an effective and rigorous manner. At the 17th Meeting of the Parties to the AIDCP in June 2007, many Parties expressed frustration over the outcome of the appeal of the dolphin-safe label case to the 9th Circuit Court of Appeals (*Joint Statement of Cancun on the AIDCP*, Appendix 9). Many of the same Parties have expressed similar frustrations in the wake of the United States Government's decision against seeking Supreme Court review. In their opinion, the United States is not living up to its commitments under the Panama Declaration. Some indicated that if the U.S. dolphin-safe label standard remains different than the AIDCP label standard, then the Agreement will not survive. In their view, the viability of the Agreement is in question and they assert it cannot continue to stand on conservation benefit alone—the intended market benefits must also be realized. Other Parties expressed a view that the Agreement is still an otherwise useful and a positive instrument, and should therefore be maintained regardless of the label standard in the United States.

X. Conclusions

The AIDCP is a strong, complex, and technical treaty. In following through with the earlier success of the IDCP established by the La Jolla Agreement, the AIDCP has succeeded in reducing dolphin mortalities to a minimal level, even while fishing effort has remained high. This balance has been accomplished by reducing the dolphin mortality per set through the procedures and safeguards required under the program. Even with the continuing success of the Agreement, the United States is continuously seeking ways to improve and strengthen the Agreement to ensure the highest possible level of protection for dolphins during the course of tuna fishing operations. Indeed, the AIDCP has resulted in greatly reduced levels of dolphin mortality while raising awareness for broader ecosystem management in the EPO and the other oceans of the world.

Although the U.S. tuna fishing fleet has had a reduced presence in the EPO in recent years, the United States remains actively involved in the management of the tuna purse-seine fishery and the conservation of the living marine resources of the EPO. The United States continues to be the driver in a balanced approach to management of the EPO within the IATTC. Because fisheries in the Pacific Ocean are of a global scale, solutions to fisheries management in the Pacific Ocean must also be on a global and multilateral scale. The United States is committed to addressing the issue of overfishing of bigeye tuna and the impacts of tuna fishing on other tuna stocks such as yellowfin and skipjack. At the annual IATTC meeting in June 2007, tuna conservation measures for 2008 and beyond were not agreed upon. The issue was revisited in extra-ordinary sessions in October 2007 and March 2008, and again at the annual June 2008 meeting, and conservation measures for 2008 and beyond still have yet to be agreed upon. The parties will revisit the issue at another extra-ordinary session in October 2008. The United States remains cautiously optimistic that an agreement can be reached for conservation and management measures that will be in effect for 3 or 4 years, but it appears that the full weight of diplomatic efforts by the United States and other nations will likely be required to remove the current obstacles and free up the IATTC to move forward again.

Further, through the implementation of the dolphin-safe label for tuna sold in the United States, the affirmative finding process, participation in meetings of the AIDCP, and continued monitoring of the dolphin stocks, the United States has demonstrated a strong investment in the success of the Agreement. As noted earlier, compliance by vessels with the conservation provisions of the AIDCP is generally quite high. However, there is a need for ongoing vigilance among the nations participating in the AIDCP, and further progress in conserving dolphin populations will require a continued high level of compliance with the conservation measures of the Agreement. One of the strengths of the Agreement is that the Parties have always worked to identify areas where changes would strengthen the Agreement and, when identified, quickly moved to adopt those changes. Over the past few years the United States has moved the Parties to the AIDCP to review the consistency of the AIDCP international observer program and the national observer programs, the setting on dolphins by small vessels, and adequate follow-up to possible infractions reported to the Parties, to name a few. The United States is working with its close partners, including key stakeholders, to present to the Parties ideas for resolving these issues, some of which have come to light as a result of NMFS' recently completed research and IATTC analyses, among other sources. Although substantial progress has been made with respect to the plan of action to strengthen the Agreement, the United States will continue to prioritize these issues in the future.

The United States is anxious to move forward on these matters and realizes the majority of Parties to the Agreement share a common interest in working to ensure the strongest possible agreement. Although much has already been accomplished by the AIDCP to reduce dolphin mortalities in the EPO, the United States recognizes that more can be done. Incidental mortality of sea turtles, seabirds, and other non-target species in the tuna purse-seine fishery is an issue that the United States and the IATTC are taking proactive steps to confront. The United States will continue working with other IATTC members to address protection of these species at future meetings. Additional research will address the bycatch of juvenile tuna and finfish, methods for

capturing large yellowfin tuna not in association with dolphins, coastal spotted dolphin abundance and stock structure, and other activities to provide data with which NMFS will make future management decisions.

The United States is hopeful that latest abundance estimates for northeastern offshore spotted and eastern spinner dolphins in the ETP, which are higher than past estimates, will reassure the AIDCP Parties as to the benefits of their work and compel them to continue rigorous monitoring and management programs. While these estimates are consistent with trends we would expect to see in recovering stocks, there are uncertainties that need to be resolved before we can definitively say that these dolphin stocks are recovering and that they are, in fact, increasing. The United States needs to continue to monitor these stocks at sea through comprehensive ecosystem research cruises to better ascertain whether these ETP dolphin stocks are recovering and the degree to which the fishery and other factors affect the conservation of these stocks.

The United States remains concerned that the final disposition of the "dolphin safe" label case (*Earth Island Institute v. Evans*) may weaken the support of other governments for the AIDCP because, for the near term, they have lost the prospect of increased market share in or, in the case of countries that have not yet pursued an affirmative finding under the MMPA, access to U.S. canned tuna markets. At recent Meetings of the Parties, some nations have begun to question the need to maintain 100 percent observer coverage if the products cannot be marketed as "dolphin-safe" in the United States, and are suggesting that the costs of the program outweigh the benefits for them. It is obvious that implementation of anything less than 100 percent coverage would represent a significant step backward for the AIDCP, the fate of dolphins in the EPO, and the legitimacy of international conservation efforts as a whole. The United States believes that the viability and continued success of the AIDCP are crucial for the recovery of EPO dolphin stocks currently listed as depleted under the Marine Mammal Protection Act. Our challenge as we enter a new era for the tuna-dolphin issue is to maintain the viability of the AIDCP in light of the Ninth Circuit's decision. The United States recognizes that progress takes time in international fora, but remains committed to continuing to work within the framework of the AIDCP and IATTC to achieve even greater success at long-term dolphin conservation and recovery, tuna resource management, and ecosystem management in the EPO.

XI. Southwest Fisheries Science Center IDCPA/EPO Related Publications

Danil, K. and S. J. Chivers. 2006. Habitat-based spatial and temporal variability in life history characteristics of female common dolphins (*Delphinus delphis*) in the eastern tropical Pacific. Marine Ecology Progress Series 318:277-286.

Danil, K. and S. J. Chivers. 2007. Growth and reproduction of female short-beaked common dolphins, Delphinus delphis, in the eastern tropical Pacific. Canadian Journal of Zoology 85(1):108-121.

Edwards, E.F. 2006. Duration of unassisted swimming activity for spotted dolphin (Stenella attenuata) calves: implications for mother-calf separation during tuna purse-seine sets. Fishery Bulletin 104:125–135.

Escorza-Treviño, S., E. Archer, M. Rosales, A. Lang, and A. E. Dizon. 2005. Genetic differentiation and intraspecific structure of Eastern Tropical Pacific spotted dolphins, *Stenella attenuata*, revealed by mitochondrial and microsatellite DNA analyses. Conserv. Genet. 6:587–600

Gerrodette, T., G. Watters, W. Perryman, and L. Balance. 2008. Estimates of 2006 dolphin abundance in the Eastern Tropical Pacific, with revised estimates from 1986-2003. Technical Memorandum. NOAA-NMFS-SWFSC-TM-422. Southwest Fisheries Science Center, La Jolla, CA. 39pp. April 2008.

Kellar, N. M., M. L. Trego, C. I. Marks, and A. E. Dizon. 2006. Determining pregnancy from blubber in three species of delphinids. Marine Mammal Science 22:1-16.

Kondel, J. and J. Rusin. 2007. Report of the 2nd workshop on bycatch reduction in the EPO purse-seine fishery. NOAA-NMFS-SWFSC Administrative Report LJ-07-04. Southwest Fisheries Science Center, 8604 La Jolla Shores Drive, La Jolla, CA 92037. 60pp. May 2007.

Noren, S. R., and E. F. Edwards. 2007. Physiological and behavioral development of delphinid calves: implications for calf separation and mortality due to tuna purse-seine sets. Marine Mammal Science 23(1):15-29.

Noren, S. R., G. Biedenbach, and E. F. Edwards. 2006. Ontogeny of swim performance and mechanics in bottlenose dolphins (*Tursiops truncatus*). Journal of Experimental Biology 209: 4724-4731.

Wade, P. R., G. M. Watters, T. Gerrodette, and S. B. Reilly. 2007. Depletion of northeastern offshore spotted and eastern spinner dolphins in the eastern tropical Pacific: modeling hypotheses for their lack of recovery. Marine Ecology Progress Series 343: 1-14.

Unpublished Literature

Archer, F. I., S. L. Mesnick, A. C. Allen. (Submitted) Variation and predictors of vessel response behavior in a tropical dolphin community. Animal Behavior.

Kellar, N. M., M. L. Trego, C. I. Marks, S. Chivers, K. Danil, and F. E. Archer. Submitted. Blubber testosterone: a marker of male reproductive status for cetacean biopsy samples. Marine Mammal Science, in review.

Larese, J. P. and S. J. Chivers. 2007 (in review). Growth and reproduction of female eastern and whitebelly spinner dolphins (*Stenella longirostris*) incidentally killed in the eastern tropical Pacific tuna purse-seine fishery. Canadian Journal of Zoology.

Larese, J. P. and S. J. Chivers. 2007 (Submitted). Bias and precision in age estimation fro female eastern and whitebelly spinner dolphins (*Stenella longirostris*) incidentally killed in the eastern tropical Pacific tuna purse-seine fishery from 1973-1982. Journal of Cetacean Research and Management.

Rosales, M. 2006. Population structure of coastal spotted dolphins, *Stenella attenuata*, in the eastern tropical Pacific. M.S. Thesis, California State University, Los Angeles.

Rusin, J.D., C.E. Lennert-Cody, E.H. Everett, E.D. Largacha Delgado and P.K. Tomlinson. 2007. Feasibility of using yellowfin tuna length-frequency data to identify small purse-seine vessels that may have fished in association with dolphins. (To be submitted).

Scott, M. D., and S. J. Chivers. 2007. Movements and diving behavior of pelagic spotted dolphins. Marine Mammal Science. (To be submitted).