



**REPORT OF THE TENTH MEETING OF THE  
INTERNATIONAL SCIENTIFIC COMMITTEE FOR  
TUNA AND TUNA-LIKE SPECIES IN  
THE NORTH PACIFIC OCEAN**

PLENARY SESSION

21-26 July 2010  
Victoria, B.C.  
Canada

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# REPORT OF THE TENTH MEETING OF THE INTERNATIONAL SCIENTIFIC COMMITTEE FOR TUNA AND TUNA-LIKE SPECIES IN THE NORTH PACIFIC OCEAN

## PLENARY SESSION

21-26 July 2010  
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### *Highlights of the ISC10 Plenary Meeting*

The 10<sup>th</sup> ISC Plenary, held in Victoria, B.C., Canada from 21-26 July 2010 was attended by members from Canada, Chinese Taipei, Japan, Korea, Mexico and the United States and the North Pacific Marine Science Organization (PICES). The Plenary reviewed results and conclusions, which were based on new data and updated analyses, of the billfish and Pacific bluefin tuna working groups. The Plenary endorsed the findings that the eastern Pacific stock of swordfish is healthy and in good condition and that the fishing mortality rate of Pacific bluefin tuna, particularly juveniles, needs to be decreased. Regarding albacore, striped marlin and the western and central North Pacific stock of swordfish, the Plenary maintained the conservation advice of ISC9 with minor changes for clarification. A special seminar on oceanographic and low trophic-level habitat in the North Pacific Ocean was held. The Plenary agreed to dissolve its bycatch working group and create a shark working group in order to implement the recommendations of its shark task force. The recommendation of the billfish working group to postpone convening a world blue marlin symposium was also endorsed. The Albacore, Pacific bluefin, and Billfish Working Groups provided information on candidate biological reference points for northern stocks of highly migratory species in the North Pacific Ocean which the Plenary endorsed. These will be forwarded for consideration at the 6th regular session of the Northern Committee of the Western and Central Pacific Fisheries Commission in September 2010. The ISC workplan for 2010-2011 includes completing a new stock assessment for albacore and striped marlin by ISC11, continuing preparations for a Pacific bluefin tuna and blue marlin stock assessments in 2012, implementing improved database and website management, and updating and clarifying ISC operations procedures. After five years serving as Chairman of ISC, Gary Sakagawa stepped down. The Plenary elected Gerard DiNardo to serve as Chairman for 2010-2013. The next Plenary will be held in the United States in July 2011.

## **1 INTRODUCTION AND OPENING OF THE MEETING**

### **1.1 Introduction**

The ISC was established in 1995 through an intergovernmental agreement between Japan and the United States (US). Since its establishment and first meeting in 1996, the ISC has undergone a

number of changes to its charter and name (from the Interim Scientific Committee to the International Scientific Committee) and has adopted a number of guidelines for its operations. The two main goals of the ISC are (1) to enhance scientific research and cooperation for conservation and rational utilization of the species of tuna and tuna-like fishes which inhabit the North Pacific Ocean during a part or all of their life cycle; and (2) to establish the scientific groundwork for the conservation and rational utilization of these species in this region. The Committee is made up of voting Members from coastal states and fishing entities of the region and coastal states and fishing entities with vessels fishing for highly migratory species in the region, and non-voting members from relevant intergovernmental fishery and marine science organizations, recognized by all voting Members.

The ISC provides scientific advice on the stocks and fisheries of tuna and tuna-like species in the North Pacific Ocean to the Member governments and regional fisheries management organizations. Fishery data tabulated by ISC members and peer-reviewed by the species and statistics Working Groups form the basis for research conducted by the ISC. Although some data for the most recent years are incomplete and provisional, the total landed amount estimated from available data and information is in excess of 500,000 metric tons (t) annually and dominated by the tropical tuna species. In 2008, the estimated catch of priority species monitored by the ISC was 68,500 metric tons (t) of albacore tuna (ALB, *Thunnus alalunga*), 24,200 t of Pacific bluefin tuna (PBF, *T. Orientalis*), 9,400 t of swordfish (SWO, *Xiphias gladius*), and 3,300 t of striped marlin (MLS, *Kajikia audax*). The total estimated catch for these four species is 105,400 t, or a decrease of about 19% from the 2007 total catch (estimated 130,100 t). This decrease was largely the result of a sharp reduction in albacore catch from 92,700 t in 2007. Catches of priority stocks throughout their ranges are shown in Tables 1-4.

## **1.2 Opening of the Meeting**

The Tenth Plenary session of the ISC (ISC10) was convened in Victoria, B.C., Canada at 0830 on 21 July 2010 by the ISC Chairman, G. Sakagawa. A role call confirmed the presence of delegates from Canada, Chinese Taipei, Japan, Korea, Mexico, the USA, and the North Pacific Marine Science Organization (PICES) (*Annex 1*). Representatives of the Western and Central Pacific Fisheries Commission (WCPFC) attended as Observers. ISC members China, the Secretariat for the Pacific Community (SPC), and the Food and Agriculture Organization (FAO), as well as organizations with significant interest including the Inter-American Tropical Tuna Commission (IATTC), did not attend the Plenary.

Dr. Laura Richards, Regional Director Science, Pacific Region, Fisheries and Oceans Canada, delivered the opening address. She welcomed delegates to the Plenary session on behalf of Canada and the Canadian delegation, and noted that this is first ISC Plenary meeting held in Canada. Hosting the meeting in Canada demonstrates Canada's commitment to the ISC and to the scientific process it supports. She affirmed that Canada is committed to ensuring that the management of highly migratory species is based on the best scientific advice and follows the precautionary approach. Dr. Richards wished the delegates a successful and productive meeting.

## **2 ADOPTION OF AGENDA**

The agenda for the session was considered (*Annex 2*). Minor changes were made and the agenda was adopted. M. Stocker was assigned lead rapporteur duties. A list of meeting documents is contained in *Annex 3*.

### **3 DELEGATION REPORTS ON FISHERY MONITORING, DATA COLLECTION AND RESEARCH**

The ISC Chairman noted that delegation reports were submitted by Canada, Chinese Taipei, Japan, Korea, Mexico and the United States.

#### **3.1 Canada**

J. Holmes presented a summary of Category I, II, and III data from the Canadian North Pacific albacore troll fishery in 2009 (*ISC/10/PLENARY/10*). The Canadian fleet of 135 vessels operated primarily within the coastal waters of the United States and Canada and in adjacent high seas areas; all catch and effort occurred east of 150°W. Preliminary estimates of North Pacific albacore catch and effort in 2009 are 5,685 t and 6,631 vessel days (v-d), respectively. These figures represent 4% and 13% increases in catch and effort relative to 2008, with approximately 92% of the catch occurring within the US EEZ, 7% in the Canadian EEZ, and 1% on the high seas. Bycatch of other tuna or billfish species, sharks, sea turtles and sea birds was negligible. Albacore in the Canadian catch ranged from 50 cm (2.63 kg) to 90 cm (15.25 kg) in fork length (FL, N = 11,717). Only one mode at 64-66 cm FL (5.50-5.75 kg) was present in the length frequency data corresponding to 3-yr old fish, although there was a broad shoulder to the right consisting of 4-yr old fish. Canadian scientists are collaborating with colleagues from the U.S. in a pilot project aging juvenile albacore with otoliths and dorsal fin rays and are undertaking research to develop tools to forecast albacore availability in temperate waters based on sea surface temperature and ocean productivity.

#### **3.2 Chinese Taipei**

The delegation report for Chinese Taipei was presented by S.L. Lin (*ISC/10/PLENARY/11*). Taiwanese tuna fisheries are comprised of two major fisheries, longline, and purse seine fisheries, and other small-scale fisheries, such as harpoon, set net, and gill net in the North Pacific Ocean (North of the equator). Longline and purse seine fisheries produce around 99% of the total tuna and billfish catch of Taiwanese fisheries.

The total catch of tunas and billfish (including swordfish, striped marlin, blue marlin (*Makaira mazara*), black marlin (*M. indica*), and sailfish (*Istiophorus* spp.)) for the longline fishery in the North Pacific Ocean was 31,983 t in 2009. For the purse seine fishery, the total catch was 192,075 t caught by 33 vessels in the Pacific Ocean in 2009. In addition, other small-scale fisheries, such as harpoon, set net and gill net may also catch tunas and tuna-like species in the Taiwanese coastal and offshore waters. The total catch of tunas and tuna-like species of these fisheries was estimated to be about 1,523 t, consisting of harpoon (437 t), set net (630 t) and gill net (456 t) in 2009.

For sustainable use of fishery resources, Chinese Taipei imposed a fleet size reduction program

on its large-scale tuna longline (LTLL) vessels from 2005 to 2007. Through this program, 32 large-scale tuna longline vessels were reduced in the Pacific Ocean during 2005 - 2007. Thereafter, due to high fuel price and low fish prices, the number of active LTLL vessels declined continuously. In 2008, the active vessels were 84, and in 2009, the number further reduced to 75.

For LTLL, Category I data are estimated from weekly report and commercial data. Several sources of commercial information were available including traders, Taiwan Tuna Association, certified weight reports provided by the Organization for the Promotion of Responsible Tuna Fisheries and others. Categories II and III data were all compiled based on logbook data. Fishers are required to measure the length of the first 30 fish caught each day. For the small-scale tuna longline (STLL) fleet, Category I data were based on landings and auction records from local fishing markets. For those vessels stationed at foreign ports, the total catches were estimated from fishing vessel activity reports and import statistics for Japanese markets. Since 1997, logbooks of STLL have been collected, and port sampling at domestic fish markets has been conducted. To improve the recovery rate of logbooks, the (Taiwan) Fisheries Agency launched in April 2007 a data improving program, dispatching staff to collect logbooks, to interview fishers in order to obtain fisheries information, and to conduct a size sampling program at main domestic fishing ports. Through this program, the logbook recovery rate was improved to 23% in 2009. For the purse seine fishery, Category I and Category II data were obtained from logbooks.

For improving stock assessment of species in the North Pacific Ocean, Chinese Taipei has conducted the following research:

- Age and growth study for albacore;
- Research on the catch at size/age and CPUE standardization of North Pacific albacore;
- Research on the age and growth and stock assessment of Pacific bluefin tuna;
- Studies on population dynamics and stock assessments for swordfish, sailfish, and blue marlin;
- Studies on the age and growth, and reproductive biology of black marlin and striped marlin; and
- Billfish tagging program.

## **Discussion**

Plenary requested information on skipjack tuna catch rates by the purse-seine fishery. S.L. Lin responded that fishers have not reported unusual changes in skipjack tuna catch rates.

Members asked about differences in size distributions of albacore and swordfish catch between the LTLL fleet and the STLL fleet. Lin responded that the LTLL fleet catches smaller albacore in the northern part of the North Pacific Ocean than the STLL fleet, which mainly operates in the tropical areas and catches larger fish. For swordfish size distribution, because the lower jaw of swordfish is generally cut off on board the STLL fleet, eye-fork length was measured by port samplers. For the LTLL fleet, swordfish fork length was measured by fishers on board the vessels.

### **3.3 Japan**



H. Nakano presented the delegation report for Japan (*ISC/10/PLENARY/12*). Japanese North Pacific tuna fisheries consist of three major fisheries, i.e., longline, purse seine, and pole-and-line. In addition, there are miscellaneous fisheries such as troll, drift net, and set net (trap) fisheries. These fisheries account for around 90% of the total tuna catch of Japanese fisheries in recent years. The total landing of tunas (excluding skipjack tuna) by Japanese fisheries in the North Pacific Ocean was 98,000 t in 2008 and 109,904 t in 2009 (117% of the 2008 catch). The total landing of swordfish and billfishes (striped marlin, blue marlin and black marlin) was 12,506 t in 2008 and 10,753 t in 2009 (79% of the 2008 catch). The landing of skipjack tuna was 238,000 t in 2008 and 187,418 t in 2009 (86% of the 2008 catch). In addition to the descriptions on fisheries, a brief review was given on the Japanese research activities on tuna and tuna-like species in the Pacific Ocean in 2009.

Nakano also reported on the official announcement released on May 11, 2010 by the (Japan) Ministry of Agriculture, Forestry and Fisheries (MAFF) on actions it is preparing to take towards effective conservation and management for PBF. The announcement indicates that the MAFF will promote conservation and management of Pacific bluefin tuna by reducing the juvenile catch in order to improve future catch of bigger fish. This necessary measure will ensure that the spawning stock biomass (SSB) of Pacific bluefin tuna is maintained within the appropriate range and will prevent the SSB from dropping below the historically lowest level observed. MAFF intends to influence the direction of conservation and management by implementing actions regarding (1) domestic fisheries management, (2) international actions, and (3) research activities, beginning this fiscal year. It will also consider introducing conservation and management measures, including improved effort registration, catch reporting, a closure period, size limit, individual quota system, and management system for aquaculture, depending on the fisheries.

### 3.4 Korea

Z.G. Kim presented the delegation report for Korea (*ISC/10/PLENARY/13*). Korea has two fisheries which engage in fishing tuna and tuna-like species in the North Pacific Ocean, the distant-water tuna longline and the distant-water tuna purse seine. The number of fishing vessels operating in the Pacific Ocean was 113 longliners and 28 purse seiners in 2009. The total tuna catch in the North Pacific Ocean in 2009 was 62,370 t, of which 6,362 t was landed by the longline fishery and 46,008 t by the purse seine fishery. The catch of swordfish and billfishes (striped marlin, blue marlin, black marlin and sailfish) was 2,257 t, caught exclusively by longline.

The longline catch ranged from 60 to 34,080 t from 1972 to 2009, with bigeye tuna (*Thunnus obesus*), yellowfin tuna (*T. albacares*), swordfish and billfishes making up 66.3%, 26.5%, 18.0% and 11.2%, respectively. The bigeye tuna catch showed an increase since the 1980s, while the yellowfin tuna showed a slightly decreasing trend since the mid-1990s. Swordfish and billfish catches stayed at a low level with a slightly increasing trend.

The catch of the purse seine fleet ranged from 550 to 106,394 t from 1980 to 2009, with yellowfin tuna and skipjack tuna making up 78.1% and 21.9%, respectively. The catch of skipjack tuna and yellowfin tuna has had a decreasing trend in recent years. The sharp decline in the purse seine catch since 2006 was attributed to the shifting of fishing grounds to the south Pacific Ocean.

There are 28 different fishing gears that take tuna species as bycatch. In 2009, 96% of bycatch came from offshore purse seine gear and 0.6% came from set nets. The majority of species were bullet tuna (*Auxis rochei*) and the others are not known except PBF because of good market prices. The PBF catch was 794 t, which was half of the 2008 catch, and the number of offshore purse seine vessels has gradually decreased from 32 in 2002 to 27 in 2009. The PBF bycatch mainly occurred in southern Korean waters, especially around Jeju Island. Almost all catches of PBF were juvenile (<150 cm) and the number of larger-sized individuals has recently increased. For example, mean fork length changed from 33.6 cm in 2000 to 57.8 cm in 2009.

Fattening in holding pens of juvenile PBF has been practiced by two fishing companies in Korea since 2007. A total of 3,370 juveniles (2-50 kg per fish) have been collected from set nets for this purpose.

Since 2007, the National Fisheries Research and Development Institute (NFRDI) has been carrying out studies on pen rearing and associated research for PBF in the Southwest Sea Fisheries Research Institute and the Subtropical Fisheries Research Center. In 2010, NFRDI implemented a five-year research project on the biology and ecology of PBF in Korean waters. It monitored 16 fishing trips with nine international observers onboard the Korean distant-water fishing vessels to monitor catch of target and bycatch species. To improve data collection, observer coverage onboard distant-water fishing fleets and landing sites will be increased and a data collection strategy will be updated for landing ports and canneries and for domestic fisheries taking tuna species in Korean waters. NFRDI completed all tasks requested by ISC9 and NC5 with respect to data matters.

## **Discussion**

A number of questions were raised with regard to data reporting including:

The catches in the ALBWG and BILLWG catch tables and the delegation report differ. It was explained that the catch statistics were updated by extracting the North Pacific Ocean catch from the total for the Pacific Ocean; the changes were minor and reported to the STATWG just after the last ALB and BILL working group meetings. The catch in the national report is the same as that reported to the STATWG.

It was clarified that there are no observers on board the offshore purse-seine fleet. In Korea, domestic fisheries and distant-water fisheries are under different management and control regimes. Accordingly, the domestic offshore purse seine fishery is not monitored using an onboard observer system but by 70 observers at 118 landing sites in 2010.

A lack of catch statistics on the PBF set net fishery was noted and clarified. As described in the delegation report, the majority of tuna caught in Korean waters by coastal and offshore fisheries is bullet tuna, 0.6% of which are caught by set nets. PBF catches are minor and data are not available, especially for set nets.

Kim agreed to investigate remaining matters with regard to availability of Korean data.

### **3.5 Mexico**

M. Dreyfus presented the delegation report for Mexico (*ISC/10/PLENARY/14*). The purse seine fishery began in Baja California at the start of the 20<sup>th</sup> Century, although major development is related to the implementation of the EEZ in the late 1970s. Most of the catch is yellowfin tuna (YFT) and skipjack tuna (SKJ) is second in terms of volume. Since 1985, catches have been above 100,000 t. A decrease in catches in 2006 and 2007 due to lower YFT biomass was in part compensated with SKJ and black skipjack (*Euthynnus lineatus*). In 2009, total landings were 123,750 t. The other catch of importance is PBF directed to pen-rearing activities. Record catches above 8,000 t were recorded in 2004 and 2006; recent catches are just above 3,000 t (2009).

Mainly purse seiners are involved in tuna fishing and target mostly tropical tunas. The carrying capacity of the purse seine fleet has been quite stable for more than 20 years. In 2009, 46 active purse seine vessels were registered and only six participated in catching PBF. Catch of ALB by purse seiners is sporadic and very small, only 17 t in 2009. Most of the ALB catch is made in Mexican waters and by U.S. sport fishermen. SWO is caught off the Baja California peninsula and by a Mexican fleet that targets both sharks and SWO. A record catch of 3,601 t of SWO was recorded in 1998 by this fleet. In 2009 the catch was only 84 t. This fleet uses longline and drift gill net gears.

In Mexico, all billfishes, except for SWO, are reserved for the sport fishery and for mainly catch-and-release. There are reports 75% to more than 90% of fish caught by this fishery are released.

Information on all billfishes caught by the fishery for 2009 will be updated for the next BILLWG and Plenary meetings.

## **Discussion**

A question was raised regarding why in some years there are high catches inside the Gulf of California. The explanation by M. Dreyfus was that in 2009, for example, there were high catches of YFT and SKJ due to above average (i.e., warmer) water temperatures.

### **3.6 United States**

U. Varanasi and S. Kohin presented the United States (U.S.) delegation report on fisheries statistics and research (*ISC/10/PLENARY/15*). Various U.S. fisheries harvest tuna and tuna-like species in the North Pacific Ocean. Purse seine, troll and longline fisheries operate both in coastal waters and on the high seas. Small-scale gill net, harpoon, and pole-and-line fisheries and commercial and recreational troll and handline fisheries usually operate in coastal waters. The total catch U.S. for all highly migratory species (HMS) fisheries in the North Pacific Ocean increased from approximately 44,000 t in 2008 to approximately 70,000 t in 2009. The increase was largely due to the increase in catch of skipjack tuna in the North Pacific portion of the Western and Central Pacific Ocean purse seine fisheries from approximately 14,000 t in 2008 to 39,000 t in 2009. In the EPO purse seine fishery that operated in the U.S. EEZ, there was an increase in catch of bonito (*Sarda chiliensis*) from 603 t in 2008 to 2,132 t in 2009 and in PBF from zero tons in 2008 to 410 t in 2009. Regarding fisheries data management, improvements now enable differentiation of pole-and-line catches of ALB from troll catches.

U.S. government researchers at the NOAA National Marine Fisheries Service (NMFS) Southwest and Pacific Islands Fisheries Science Centers (in La Jolla, California and Honolulu, Hawaii, respectively) conduct research on tunas, billfishes, sharks, bycatch and HMS fisheries in the North Pacific. Topics of study include fishery monitoring, socio-economics, life history, oceanography, bycatch mitigation, fishery-independent surveys and stock assessment. Thirty manuscripts were published in the past year on studies related to ISC objectives. Highlights of research include studies of SWO stock structure using tagging, otolith microchemistry and genetics. The tagging studies reveal details of habitat utilization and movements with respect to physical oceanographic features. For ALB, the U.S. is conducting ongoing archival tagging in the northeast Pacific Ocean and has also initiated a biological sampling program for otoliths, gonads, DNA samples and stomachs. Objectives are to understand more about ALB stock structure for assessments, study age and growth, and link ALB distribution to oceanographic conditions and prey. NMFS has been building an archive of genetic samples for highly migratory species that now includes over 2000 samples from many species collected Pacific-wide. Recent genetic analyses suggest stock differentiation of shortfin mako shark (*Isurus oxyrinchus*) between the north and south Pacific Ocean as well as between the southeast and southwest Pacific Ocean. Extensive work on stock assessments continues both within and outside of the ISC forum. Significant research on bycatch includes a number of studies to estimate post-release survival of several pelagic shark species and to examine the efficacy of rare-earth metals as shark deterrents. Statistical analyses are being conducted to estimate incidental take of sea turtles, seabirds, and marine mammals in the Hawaii pelagic longline fisheries.

## **Discussion**

Several specific technical points were clarified by the U.S. in response to questions arising during the discussion.

Figure 5 of the U.S. delegation report showed some unlikely data for the sizes of skipjack tuna sampled in the Hawaii troll and handline fishery. The figure will be corrected and resubmitted.

J. Holmes asked how the diet studies are being conducted since, because in their experience, most ALB regurgitate upon capture. S. Kohin explained that the fish studied were mostly collected by rod and reel in the recreational fishery and that the incidence of regurgitation for fish caught using that gear is lower than for fish caught by trolling.

When asked about the cause of the increase in the northern WCPO skipjack tuna catch, U. Varanasi responded that it is under investigation, but that there was a small increase in the number of vessels participating in that area and fishery in 2009.

## **4 REPORT OF THE ISC CHAIRMAN**

G. Sakagawa presented the ISC Chairman's report. The past year was busy for ISC and spent working on preparations for new stock assessments for ALB and MLS in 2011, and PBF in 2012. Progress was made on action items, including:

1. Investigation of SWO stock structure issues
2. Development of advice on potential Biological Reference Points
3. Compilation of a catalogue and inventory of the ISC database
4. Development of a new user-friendly ISC website, and
5. Hiring of a Webmaster and a Database Administrator

Nine intercessional workshops were held to facilitate collaboration among Member scientists in implementing ISC work plans, completing special assignments and coordinating research on the stocks.

At the conclusion of the 10<sup>th</sup> meeting of the ISC, G. Sakagawa will have completed five years of service as Chairman and will be stepping down to allow another colleague to lead the organization. The direction of ISC is clear. That is, achieving the objectives stated in the charter and contributing relevant science-based information for shaping policies that allow for conservation, sustainable fisheries and healthy HMS stocks. Continuation in this direction and maintaining relevance, however, will require continued vigilance to avoid diluting the scientific information and interpretation with fishery policy considerations and arguments. Furthermore, all aspects of the organization, especially the operating framework, need to be reviewed from time to time and adjustments adopted to promote efficiency and effectiveness in the operations and continued relevance of ISC's advice.

The ISC Chairman thanked his colleagues who have worked on ISC tasks through the years and who have supported ISC and him in advancing the objectives and purpose of the organization.

He acknowledged the service of M. Dreyfus, Vice-Chairman, for support and insightful advice, and gave special thanks and appreciation to the Chairmen of the Working Groups, namely S.K. Chang, G. DiNardo, J. Holmes and Y. Takeuchi, who provided unselfish leadership in guiding the work of the Working Groups and provided frank advice on all aspects of ISC responsibilities. He acknowledged the professional assistance of his staff for their dedicated service to ISC and for assistance in completing tasks assigned to the ISC Chairman. He thanked all for contributing to another successful year for ISC and for the support, service and memorable and personal friendship provided during the past five years. He trusts all will continue to support the work of the ISC and the needs of the next ISC Chairperson.

## **5 INTERACTION WITH REGIONAL ORGANIZATIONS**

### **5.1 IATTC-ISC Memorandum of Cooperation (MOC)**

In introducing this item, the ISC Chairman explained that agreed-upon changes to the draft MOC have been completed and that he had signed the MOC. The document is now with the IATTC Secretariat for signing.

The MOC was drafted to address the need to identify a mechanism to allow IATTC to participate in all of the ISC meetings without having to apply for observer status on a case-by-case basis. He noted that the involvement of IATTC in ISC stock assessments is critical to ISC stock assessments given the IATTC's important role in managing stocks in the North Pacific.

### **5.2 Interactions between ISC and PICES**

#### **5.2.1 Report from the Executive Secretary of PICES**

A. Bychkov, Executive Secretary of PICES, provided a report to the Plenary. On behalf of PICES, he thanked the ISC for inviting PICES to participate at ISC10. PICES is an intergovernmental scientific organization established by the international convention in 1992 in order to promote and coordinate marine research in the North Pacific and adjacent seas. Current member countries are Canada, Japan, People's Republic of China, Republic of Korea, Russian Federation and the United States of America. Goals are to (1) advance scientific knowledge and capacity available for the member countries, including information on human activities affecting, and affected by marine ecosystems, and (2) provide a mechanism for collaboration among scientists in addressing timely and critical scientific questions. In less than 20 years since its establishment, PICES became a major forum for marine science in the North Pacific.

PICES just initiated a new ambitious integrative science program called FUTURE (Forecasting and Understanding Trends, Uncertainty and Responses of North Pacific Marine Ecosystems) to be undertaken to understand how marine ecosystems in the North Pacific respond to climate change and human activities, to forecast ecosystem status based on a contemporary understanding of how nature functions, and to communicate new insights to its members, governments, stakeholders and the public. This will be one of the highest priority activities of PICES for the next decade.

Another high priority PICES activity is developing a comprehensive overview of the status and trends of marine ecosystems in the North Pacific Ocean and its marginal seas. ISC contributed a chapter on tuna to the first North Pacific Ecosystem Status Report, and your scientists provided relevant information for the second report. PICES invites continuing involvement of ISC in this project.

In 2008, a joint PICES/ICES Working Group on *Forecasting Climate Change Impacts on Fish and Shellfish* was established to promote and coordinate research on the potential impact of climate change on marine ecosystems and to develop frameworks and methodologies for forecasting the impacts of climate change on marine ecosystems. The culmination of the Working Group's effort was a very successful international symposium convened in April 2010, in Sendai, Japan. PICES is planning a Theme Session entitled "*Climate Change Effects on Fisheries: Physics-Fish-Markets*", to be convened at the Second PICES/ICES/IOC Symposium on "*Effects of Climate Change on the World's Oceans*". This symposium will be held from 14–18 May 2012, in Yeosu (Korea), as one of the official events related to the World Ocean Expo-2012. PICES invites ISC to join the symposium as a co-sponsor for this session.

The PICES Nineteenth Annual Meeting will be held from 22–31 October 2010, in Portland, Oregon, U.S.A., under the theme "*North Pacific Ecosystems Today, and Challenges to Understanding and Forecasting Change*." A number of topic sessions and workshops in the program are directly relevant to various activities of ISC, especially such Topic Sessions as "*Impact of climate variability on marine ecosystems: Understanding functional responses to facilitate forecasting*" and "*Identifying vulnerable marine ecosystems in the North Pacific*."

## **Discussion**

A question regarding how PICES results are used by countries in practical ways was raised. A. Bychkov indicated that PICES considers requests for scientific advice from member countries, for example the U.S. requested advice on climate regime shifts on fisheries in the North Pacific Ocean. For the most part, however, PICES produces expert reports on new and ongoing issues in the North Pacific Ocean. A recent example is the report on North Pacific trends in ocean conditions.

### **5.2.2 Report of the 2009 PICES meeting**

G. DiNardo reported on the proceedings of the eighteenth annual meeting of PICES (PICES-2009) convened from 23 October - 1 November 2009 in Jeju, Republic of Korea. The theme for PICES-2009 was "*Understanding ecosystem dynamics and pursuing ecosystem approaches to management*." ISC was invited by the PICES Executive Secretary to attend the meeting as an observer. The invitation was discussed at ISC9 and G. DiNardo was identified to attend and represent the ISC. The ISC Chairman also tasked DiNardo with identifying current PICES activities that might hold benefit for ISC work.

DiNardo participated in the meeting and also prepared a poster on ISC activities for that meeting. The poster delineated the goals, objectives and operations of ISC and generated significant interest by participants. PICES activities that might be of interest to ISC include:

- Characterizing changes in oceanographic conditions and understanding causal mechanisms;
- Development of environmental time series;
- Development of bioeconomic reference points.

### 5.2.3 Invitation to 2010 PICES meeting

The ISC Chairman noted receipt of an invitation (ISC/10/PLENARY/03) for ISC to participate in the annual meeting of PICES to be held in Portland, Oregon, U.S.A. in 22-31 October 2010. In response to the request, the ISC Chairman appointed J.B. Lee to represent ISC at the 2010 PICES meeting. This nomination was accepted by the Plenary. Lee will attend and report any noteworthy information and opportunities for collaboration back to the Plenary at the ISC11 meeting.

### 5.3 Interactions between ISC and WCPFC

The ISC Chairman asked S.-K. Soh, WCPFC Observer, to report on general matters of interactions between ISC and WCPFC. Soh provided the following report on behalf of the WCPFC:

The sixth Regular Session of the WCPFC Scientific Committee will be held at Fa'onelua Convention Centre in Nuku'alofa, Tonga, from 10 (Tuesday) to 19 (Thursday) August 2010. Over 120 scientists, fishery officers and observers are expected to attend from 25 members, seven participating territories, seven cooperating non-members and various observers such as ACAP, Birdlife International, FAO, FFA, IATTC, ISC, ISSF, IUCN-OCEANIA, SPC, Greenpeace, and tuna industries and associations. Matters to be considered include: a review of the fisheries in the WCPO and EPO, a review of stock assessment of bigeye and skipjack tuna, bycatch mitigation issues, data and data gaps, a work program for 2011-2013, etc.

The WCPFC has a contract with the SPC for the provision of science services, which include: data management, statistical analyses and related services, stock assessment and related analytical services, management analyses and performance of measures, ecological risk assessment, etc.

Collection of reliable data is a priority objective of the WCPFC's science. Indonesian and Philippine waters are known to produce about 25% of the total tuna catch in the WCPFC Convention Area, but data provision from that area has been insufficient and thus identified as one of the biggest sources of uncertainty in stock assessments. In order to address this data gap, the WCPFC has been conducting the Indonesia and Philippines Data Collection Project (IPDCP) funded by Members through voluntary contributions. Following a request from the IPDCP Project Steering Committee, the Secretariat prepared a funding proposal for the Global Environment Facility (GEF) to support a long-term project to complement the IPDCP – including extending project activities to Vietnam. The project proposal was accepted by the GEF Secretariat in late 2007 with a three-year budget of around US\$1 million for three countries. The project was initiated on 6 January 2010, focusing on establishing a system to monitor, data



enhancement and fishery assessment, and enhancing policy, institutional strengthening and management of tuna fisheries of the three countries. The Secretariat is coordinating the 2<sup>nd</sup> phase of the full project now. This project is managed by the WCPFC's Science Manager.

With regard to data issues between WCPFC and ISC, the Scientific Committee at SC5 in 2009 recommended that the ISC and the WCPFC Secretariat establish a mechanism for the periodic exchange of data to address gaps in the data for North Pacific stocks. The WCPFC Secretariat proposes two options to provide such a mechanism: one through establishing a Memorandum of Cooperation on the Exchange and Release of Data between WCPFC and ISC, and the other through convening an Annual Consultation Meeting between WCPFC and ISC. These options will be considered at the up-coming SC6 and SC will seek further comments from ISC on the proposed mechanism.

## **6 REPORTS OF WORKING GROUPS AND REVIEW OF ASSIGNMENTS**

### **6.1 Albacore**

J. Holmes, Chairman of the ALBWG, reported on the activities of the ALBWG over the past year. The Working Group met twice during the past year: a regular meeting held 20-26 April 2010 in Shimizu, Japan (*Annex 6*), and an update meeting held 12-13 July 2010 in Victoria, Canada (*Annex 9*). The primary focus of the April 2010 meeting was on spatial/temporal definitions of fisheries for length-based modelling (i.e., ensuring constant length selectivity) and assessing abundance indices and size composition data for these fisheries, developing indices of SSB abundance to monitor stock status between full assessments, and work planning and assignments for the next stock assessment. The WG was also tasked by the ISC Chairman with developing and providing information on potential biological reference points for North Pacific ALB in response to a request from NC5. The Working Group completed most of these tasks at this meeting, with some carry-over of the fishery definitions to the next meeting. The meeting held in conjunction with ISC10 focused on updating fishery statistics, completing the fishery definition work, providing a qualitative update on stock status using the SSB index, and planning for the next stock assessment.

Accomplishments of the ALBWG over the past year include:

1. Holding two workshops at which 18 working papers were presented;
2. Updating national fishery statistics through 2009, including an update of North Pacific ALB catch data from south Pacific countries reported to the SPC (see Table 1 in *Annex 9*);
3. Completion of new spatial/temporal fishery definitions, resulting in the Working Group defining 12 fisheries (nation x gear combination) for the next stock assessment. Some decisions on some size composition data and CPUE indices remain for the data preparation meeting in Oct 2010;
4. Providing information on a suite of potential biological reference points for north Pacific albacore,
5. Forwarding a framework for decision-making on reference points to solicit input from managers and move the reference point process for the stock forward;
6. Development of a SSB index to monitor trends in abundance for stock status updates between stock assessments;

7. A qualitative update on stock status since the last (2006) assessment; and
8. Finalization of work plans for the next stock assessment.

Based on discussions at the ALBWG meetings in April and July 2010, the ALBWG remains on track to conduct the next stock assessment at a workshop scheduled for 22-29 March 2011 in Shimizu, Japan. The transition from an age-structured VPA to length-based SS model for the next stock assessment is nearly completed. However, the ALBWG brings forward the following issues to the ISC Plenary:

- Completion of the fishery definition work (including choosing size compositions & CPUE indices) at the April and July workshops was affected by the need to devote time and resources to the biological reference point assignment and the staffing and resource challenges occurring at many government agencies at this time;
- The ALBWG requested clarification at ISC9 from NC concerning its interpretation of  $F_{SSB-ATHL}$  : limit or target reference point; and
- The Working Group requests clarification of the policy on posting working papers on ISC website: once an author gives permission does the paper go up immediately or is Plenary clearance needed?

## **Discussion**

On the ALBWG request for clarification from NC regarding whether its interim management objective is a target or limit reference point, there was no response from NC. ISC's view is that it should not wait as a response will not affect how ISC does its job.

The ALBWG requested clarification on posting working papers on the ISC website. The ISC Chairman indicated that this can be addressed under the agenda item Website (see section **11.5**).

It was noted that the ALBWG had further discussions on the IUU issue at the April 2010 Workshop (*Annex 6: page 15*). The WG members did not have any new data on the matter. The Plenary is concerned about the lack of IUU data and the impact this may have on stock assessments. The Plenary concluded that organizations should make efforts in securing IUU information and make it publicly available.

It was noted that completing a full albacore assessment as planned is important and whether the ALBWG is on track to complete this assignment by March 2011 was asked. Holmes confirmed that the work is progressing well to reach that goal.

## **6.2 Pacific bluefin tuna**

Y. Takeuchi, Chairman of the PBFWG, presented the summary of the activities of the group since ISC9 (*Annex 7*). The PBFWG met on 6-9 July 2010 in Nanaimo, Canada. At this workshop, 11 working papers and two oral presentations were presented with participation of 21 scientists from Chinese Taipei, Japan, Korea, Mexico, USA and the IATTC. At this meeting, the PBFWG completed the assignment on Biological Reference Points, conducted updates of 2009 analysis (2010 update) and conducted a complete set of sensitivity analyses of 2010 update. Takeuchi also introduced on-going and planned Biological Research for Pacific Bluefin tuna.

Takeuchi reviewed the PBFWG work plan for 2011 and 2012 including the schedule of the next full stock assessment. The WG plans to hold one workshop in January 2011 in Shimizu, Japan. The objective of this workshop is to improve stock assessment model and assessment data to resolve underlying problems identified in the current stock assessment (e.g., very high sensitivity of stock assessment results to M). The WG also plans to meet in July 2011 in conjunction with ISC11 Plenary. As for the schedule of the next full stock assessment, the WG is on track for completing an assessment in 2012. A two intercessional meeting process is planned with a data preparatory meeting to be held in November 2011 followed by the stock assessment meeting to be held May-June 2012. Takeuchi raised the issue of increasing workloads on WG members conducting the stock assessments in recent years.

## **Discussion**

General concern was raised about the large number of WG workshops being proposed by the ISC WGs. The expected workload may be excessive particularly because many of the scientists are involved in two or more WGs and Members face difficulty in securing or allocating additional staff. Also, there may be conflict with the proposed meeting dates. The ISC Chairman noted that these issues are addressed under Review of Meeting Schedule (see section 10).

### **6.3 Billfish**

G. DiNardo, Chairman of the BILLWG, summarized the working group's efforts since the last Plenary, including a synopsis of the three BILLWG workshops held during this period (*Annexes 4, 5 and 8*). Workshop goals and accomplishments included the review and update of fishery statistics, completing an updated North Pacific SWO stock assessment, delineation of North Pacific MLS stock structure for the scheduled 2011 stock assessment, identification of potential biological reference points for billfish, and a plan to assess Pacific blue marlin. While significant progress was made to facilitate the goals, including the updating of Category I, II, and III data and standardization of CPUE time series, as well as completion of an updated North Pacific SWO stock assessment, further improvements are still needed.

Administrative matters were presented including increasing work for DiNardo (contacting sources outside of the ISC membership), the increasing workload for the BILLWG members, and the lack of WG commitment by some ISC Members. A proposed schedule for stock assessments was presented which included the completion of a MLS stock assessment in July 2011 and a Pacific-wide blue marlin stock assessment in July 2012. It was pointed out that a collaborative approach will be required to complete the blue marlin assessment and efforts are currently underway to establish the necessary collaborations. Proposed dates and venues for upcoming intercessional workshops were presented and they include 19-27 January 2010, in Hawaii, USA and 19-27 May 2010 at a location yet to be determined.

Problems impinging on the ability of the WG to complete its goals were presented, including the lack of (1) sufficient data in the ISC database and (2) continued participation at WG workshops by some Member.. In addition, the lack of understanding on the part of RFMOs and RFOs regarding the role of ISC also hampered progress. The WG also considered that convening the

proposed World Blue Marlin Symposium would detract from the adopted schedule for completing the Pacific-wide blue marlin assessment and recommended that the symposium be postponed. Possible solutions to the problems were presented and guidance from the Plenary sought. Finally, it was pointed out that many of the WG's goals were achieved and that their successful completion is linked directly to the commitment and dedication of scientists from the member countries and organizations.

## **Discussion**

The ISC Chairman noted key items resulting from the BILLWG report: 1) change in stock structure of MLS from 1 to 2 stocks (EPO and WPO); 2) the previously planned World Blue Marlin Symposium for 2011 will not be organised and held by ISC; and 3) a proposed international tagging program.

It was suggested that because there is an urgent need for a current blue marlin stock assessment that the ISC Chairman, with the assistance of the BILLWG Chairman, contact other RFMOs that might be interested in such a project and determine if there is interest in a collaborative effort.

The need for a large-scale, international billfish tagging program was discussed. The ISC Chairman noted that if such a program is to be considered by the ISC Plenary for execution, scoping of the program and a program plan are needed. The Plenary assigned the BILLWG the task of scoping out the program and to bring forth a plan if it believes that a program will be feasible and likely to contribute significant information for advancing billfish information for stock assessment.

### **6.4 Bycatch**

S. Shoffler reported the results of the ISC Bycatch Working Group (BCWG) workshop (*Annex 10*). At ISC9, the ISC Chairman was tasked with convening the BCWG in order for the group to elect a chairperson and address other matters. The group met in July 2010. Its three objectives were to: (1) Review the bycatch working group terms of reference (TOR); (2) Review the bycatch table developed by STATWG in 2009; and (3) Elect a chairperson. The group reviewed the current TOR and discussed which of the tasks the BCWG was able to address and determined that the BCWG either did not possess the expertise to fulfil its tasks, as in the case of conducting stock assessments, or that other RFMOs were conducting the work already, as in the case of assessing mitigation measures, or that the workload was too diverse for the group, as in the case of assessing species interactions with HMS fisheries. The BCWG developed and discussed four options for Plenary to consider for the future of the BCWG. Among those four, it preferred the following two:

- 3. Dissolve the BCWG and create a new working group for sharks with TOR to conduct shark stock assessments and monitor stock condition in order to best leverage limited ISC resources and address emerging concerns.*
- 4. Revise the BCWG TOR to (1) assess the condition of shark stocks and (2) review mitigation measures for all bycatch species on the fisheries. The group determined that if Plenary determined that the BCWG should persist, the group*

*should meet as soon as possible after that to elect a chairperson and establish a workplan.*

Because the group discussed dissolving the BCWG, it tabled the other two objectives (reviewing the bycatch table and electing a chairperson) until the fate of the working group was determined. The group determined that if Plenary decided to keep the BCWG, the group should meet as soon as possible after that in order to elect a chairperson and establish a work plan.

## **Discussion**

All four options outlined by the BCWG were discussed, but the Members focused on the two preferred options of the BCWG. Arguments were put forth for both options and after carefully reviewing the pros and cons, the Plenary decided to implement option 3, i.e., dissolve the BCWG and create a new working group for sharks. The rationale for this action is largely the need for ISC to focus its limited resources on work that it does best, i.e., stock assessments, and not repeat work that is being carried out by others, e.g., IATTC and WCPFC.

### **6.5 Shark Task Force**

K. Yokawa presented the Shark Task Force report (*Annex 11*). The goal of the ISC Shark Task Force Group (STFG) held on 15 July 2010 was to provide information to the ISC Plenary regarding the ISC's role in shark assessments. The STFG discussed all the data available for U.S., Japan, Korea and IATTC fisheries and noted that ISC member countries seem to have enough information for the stock assessments of key shark species in the North Pacific Ocean, especially blue and shortfin mako sharks. The STFG also noted that there was sufficient interest and expertise to conduct these assessments. Finally, STFG prepared a list of key shark species captured in the North Pacific Ocean fisheries to be assigned into four categories. In categorizing species for shark assessments, the STFG considered the WCPFC and IATTC lists of key species, the NC request to focus on blue shark and shortfin mako shark in the North Pacific Ocean, as well as other shark species that are caught in north Pacific fisheries for tuna and tuna-like species in relatively high numbers.

## **Discussion**

M. Dreyfus indicated that shark fisheries are very important in Mexico. He iterated that they would support a shark working group and provide mako and other species data. U. Varanasi indicated that the STFG produced a very detailed and informative report.

K. Yokawa indicated that the STFG had communicated with SPC and that the SC has taken on shark assessments. The ISC Chairman asked the WCPFC Observers if the SC had been tasked with prioritizing shark assessments. S.-K. Soh indicated that WCPFC is prioritizing shark assessments and SPC may provide preliminary advice on the stock status of key shark species for the WCPFC meeting in December 2010. For SC6, SPC will provide a three-year research plan, but may not provide any preliminary advice on shark stock status. The ISC Chairman pointed out that WCPFC is required to collaborate with IATTC on shark assessments. The Yokawa indicated that the STFG shared its draft report with IATTC and WCPFC colleagues for comment who confirmed that collaboration between IATTC and WCPFC is on track.

Based on Plenary's discussion and the previous decision to establish a shark working group, the ISC Chairman reiterated that a new Shark Working Group will be established by the ISC. This new WG will be responsible for conducting stock assessment and other scientific studies as required, similar to the responsibilities of existing species WGs of the ISC. Taking into account the findings of the STFG, the new working group is to focus on monitoring shark fisheries particularly blue, shortfin mako, bigeye thresher, pelagic thresher, silky, oceanic whitetip, hammerhead, and any other shark species for which stock assessments may be needed. The working group should collaborate with other RFMOs of the Pacific and initially focus on stock assessments of blue and shortfin mako shark. Members wishing to participate in the shark working group were requested to nominate up to two scientists to work with the ISC Chairman in organizing the first meeting of the working group to be held before ISC11. The agenda for the first meeting will include election of a working group chairperson and development of a work plan for blue and shortfin mako shark assessments.

## **6.6 Seminar on Oceanography**

On behalf of Z. Zhang, J. Holmes presented a summary of the seminar, "Oceanographic and low trophic-level habitat in the North Pacific Ocean," convened just prior to Plenary. Information on this seminar can be found in *Annex 13*.

## **Discussion**

The ISC Chairman expressed appreciation to Z. Zhang for organizing the seminar. He also thanked the presenters on behalf of ISC and indicated that he will send a letter of appreciation to Z. Zhang and the presenters.

## **7 STOCK STATUS AND CONSERVATION ADVICE**

The ISC Chairman referred to two special working group assignments for the past year: identifying potential biological reference points (BRPs) and reviewing the conservation advice from ISC9 for clarity.

### **7.1 Albacore**

J. Holmes, Chairman of the ALBWG, summarized the recent work of the ALBWG (*Annexes 6, 9*). The last albacore stock assessment was completed in December 2006 using fishery data through 2005. Stock status and conservation advice were provided to the ISC7 Plenary (July 2007) and to NC3 (September 2007). No formal update of stock status has been conducted since the 2006 assessment. However, at its 12-13 July 2010 meeting, the ALBWG undertook a qualitative update using available fisheries data from 2006 to 2009 and an index of spawning stock biomass (Japanese longline CPUE age 6-9+). This qualitative update found that:

- total catch in 2009 (77,939 t) was about 9,000 t higher than 2008 and near the long-term mean catch (74,900 t) for the 1952-2008 period;

- catches in most fleets (country x gear combination) have declined or been stable since the last stock assessment;
- nominal effort as measured by the number of vessels has also declined or been stable in most fleets since the last stock assessment; and
- the North Pacific Japan longline age 6-9+ SSB index has declined from previous high levels and appears to be relatively stable since the last stock assessment.

Based on these findings, the ALBWG concluded that:

1. A new stock assessment will be necessary to fully understand the implications of the new data available since the last stock assessment;
2. The 2006 stock assessment estimated that albacore spawning biomass reached an historical high in 2005 and then projected a decline thereafter. The age 6-9+ index shows that SSB has declined from previous high levels and appears to be relatively stable since the last stock assessment;
3. The WG did not focus on recruitment in its latest qualitative review and is unable to provide insight into recruitment in recent years beyond observations in previous Plenary reports; and
4. Nominal effort in most fisheries (as measured by the number of vessels) appears to have declined slightly or been stable since 2005. Although catches exhibit more interannual variability than effort, with the largest variation occurring in the Japan pole-and-line fisheries, most fisheries catches have declined or remained relatively stable over the same period. This could mean that  $F_{2009}$  is less than the  $F_{2002-2004}$  ( $0.75 \text{ yr}^{-1}$ ) used in the 2006 stock assessment projections. Alternatively,  $F_{2009}$  may be as high as the value used in the stock assessment projections since the level of recruitment after 2005 is not known.

## **Discussion**

In discussion, clarification was sought regarding the reference years for “ $F_{\text{cur}}$ ” in the ISC9 conservation advice for albacore tuna. Holmes confirmed that  $F_{\text{cur}}$  refers to the geometric mean of  $F$  for 2002-2004 and Plenary revised its advice, accordingly.

## **Conservation Advice**

After discussion of the ALBWG conclusions (*Annex 9*) and consideration of comments raised by Members, the Plenary offers no new conservation advice for North Pacific albacore above and beyond that which was provided at ISC9 in July 2009 (based on the advice of ISC7), pending the results of a new stock assessment, which is scheduled for 2011. That advice is:

***“Previous scientific advice, based on the 2004 stock assessment, recommended that current fishing mortality rate ( $F$ ) should not be increased. It was noted that management objectives for the IATTC and WCPFC are based on maintaining***

*population levels which produce maximum sustainable yield. Due to updating, and improvements and refinements in data and models used in the 2006 stock assessment, it is now recognized that  $F_{2002-2004}$  (0.75) is high relative to most of the  $F$  reference points [commonly used in fisheries management] (see Table 5a in Annex 5) [of the ISC7 Plenary Report].*

*On the other hand, the same analysis indicates that the current [2005] estimate of the SSB is the second highest in history but that keeping the current  $F$  would gradually reduce the SSB to the long-term average by the mid 2010s. Therefore, the recommendation of not increasing  $F$  from current level ( $F_{2002-2004}=0.75$ ) is still valid. However, with the projection based on the continued current high  $F$ , the fishing mortality rate will have to be reduced.”*

Based on analyses conducted by the ALBWG since ISC9, the following points are highlighted:

1. Both the ISC9 and ISC10 Plenaries note that there is increasing uncertainty concerning the status of North Pacific albacore in the absence of a new stock assessment.
2. The ISC10 Plenary notes that there is no strong positive or negative signals in the age 6-9+ SSB index since the last stock assessment.
3. The next stock assessment is expected to be completed in early 2011 and the results will be presented at ISC11.
4. The ISC9 Plenary reported that the estimated value of  $F_{SSB-ATHL}$  is  $0.75\text{yr}^{-1}$  for a 25-year projection period using fishery data through 2008. This value is similar to  $F_{2002-2004} = 0.75\text{ yr}^{-1}$ , estimated in the last stock assessment.

## 7.2 Pacific Bluefin Tuna

Y. Takeuchi, Chairman of the PBFWG, summarized the recent stock assessment work of the PBFWG on PBF stock status (*Annex 7*).

In 2008, the WG conducted a stock assessment of PBF using Stock Synthesis II with fishery data through 2005. Results of that stock assessment were accepted by the ISC8 Plenary; however, ISC8 requested that the WG investigate the causes of some of the implausible model results (e.g. large  $B_0$ , low SPR and depletion level. See ISC8 Plenary report).

In 2009, a different natural mortality schedule and Stock Synthesis III were used to reanalyze stock status using data through 2005 (the same as that used in the 2008 assessment). The WG concluded that the results of the 2009 reanalysis were more plausible and those results were presented to ISC9. In both the 2008 and 2009 analyses, the “current” fishing mortality rate was characterized by a three-year average (2002-2004) with the terminal year of the model results (2005) excluded due to unreliable estimates.

In 2010, the WG conducted an update of the 2009 analysis along with a complete set of sensitivity analyses and stock projections using data through 2007. Data used in the 2010 update were analyzed using the same methods and parameters in the stock assessment model as in 2009.



The updated “current” fishing mortality rate was calculated as a three-year average (2004-2006) with the terminal year of the model results (2007) excluded due to unreliable estimates. The WG reviewed the results of the update with the objectives of characterizing the recent relative change in fishing mortality rate and spawning biomass. It should be noted that even the most recent estimates of fishing mortality would not yet reflect any actions with regard to the fishery management decision for PBF by the 6th Regular Session of the Western and Central Pacific Fisheries Commission (CMM 2009-07, Dec. 2009).

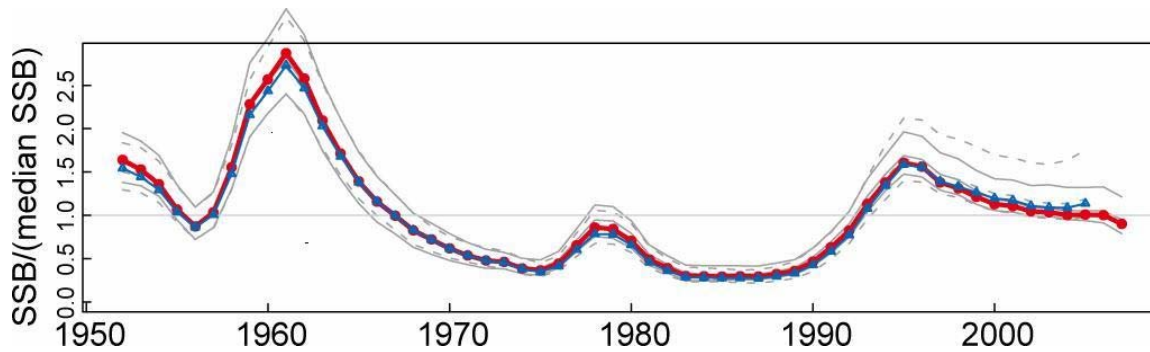
A summary of the 2010 update is as follows:

1. A number of sensitivity runs were conducted in 2010 to investigate uncertainties in biological assumptions and fishery data. Results indicate that the assumption of adult  $M$  is particularly influential to the estimate of absolute spawning biomass and fishing mortality. Although absolute estimates from the stock assessment model were sensitive to different assumptions of  $M$ , relative measures were less sensitive.
2. The estimate of spawning biomass in 2008 (at the end of the 2007 fishing year) declined from 2006 and is estimated to be in the range of the 40-60 percentile of the historically observed spawning biomasses (Fig. 1).
3. Average Fishing Mortality 2004-2006 ( $F_{2004-2006}$ ) had increased from  $F_{2002-2004}$  by 6% for age-0, approximately 30% for ages 1-4, and 6% for ages 5+.
4. 30-year projections predict that at  $F_{2004-2006}$  median spawning biomass is likely to decline to levels around the 25<sup>th</sup> percentile of historical spawning biomass with approximately 5% of the projections declining to or below the lowest previously observed spawning biomass. At  $F_{2002-2004}$  median spawning biomass is likely to decline in subsequent years but recover to levels near the median of the historically observed levels. In contrast to  $F_{2004-2006}$ ,  $F_{2002-2004}$  had no projections (0%) declining to the lowest observed spawning biomass. In both projections long-term average yield is expected to be lower than recent levels.

## **Discussion**

The Plenary reviewed in detail the four summary points (above) of the PBF stock assessment update.

In discussion on item 3, Y. Takeuchi was asked to clarify the maturity schedule of PBF. Takeuchi indicated that the following maturity schedule was used: age 3 (20%); age 4 (50%); and age 5+ (100%). He also indicated that the maximum age of reproductive activity of PBF is not known. However, he suggested that given the currently estimated total mortality ( $F+M$ ), there would be very few survivors over age 20. Under item 4 questions regarding the 30-year projection period were asked. A comment was made that the 30-year period of the future projection may be too long given uncertainty. It was requested that recruitment assumptions used in the projections be clarified. In response, it was explained that the estimates of recruitment were randomly sampled (with replacement) and this is the identical methodology used in 2008 and 2009. It was suggested that this might be an optimistic assumption at low stock size.



**Figure 1.** Relative SSB trend of Pacific bluefin tuna (*Thunnus orientalis*) scaled by the median of historical observed biomass (1952-2007). Lines with circles and triangles are point estimates from the 2010 update and the 2009 update respectively. Solid lines and dashed lines associated with point estimates are the 90% confidence interval. A value of 1.0 on the vertical axis is the median of historical SSB (1952-2007).

### **Conservation Advice**

**Given the conclusions of the July 2010 PBFWG workshop (Annex 7), the current (2004 - 2006) level of F relative to potential biological reference points, and the increasing trend of F, it is important that the level of F is decreased below the 2002-2004 levels, particularly on juvenile age classes.**

#### **7.3 Striped Marlin**

G. DiNardo, Chairman of the BILLWG, presented an update on the stock status of MLS. He noted that no new assessment has been conducted. The last assessment was conducted in 2007 and presented at ISC7. A new assessment is scheduled to be completed before ISC11. The new assessment will assume a two-stock scenario, a western central Pacific Ocean stock and an eastern Pacific Ocean stock. A qualitative review of stock status was not conducted; therefore the BILLWG proposes that the ISC Plenary maintain the existing conservation advice for this species.

### **Discussion**

Plenary discussed the previous (ISC9) conservation advice and revised the advice to clarify the term "current level (2003 or before)."

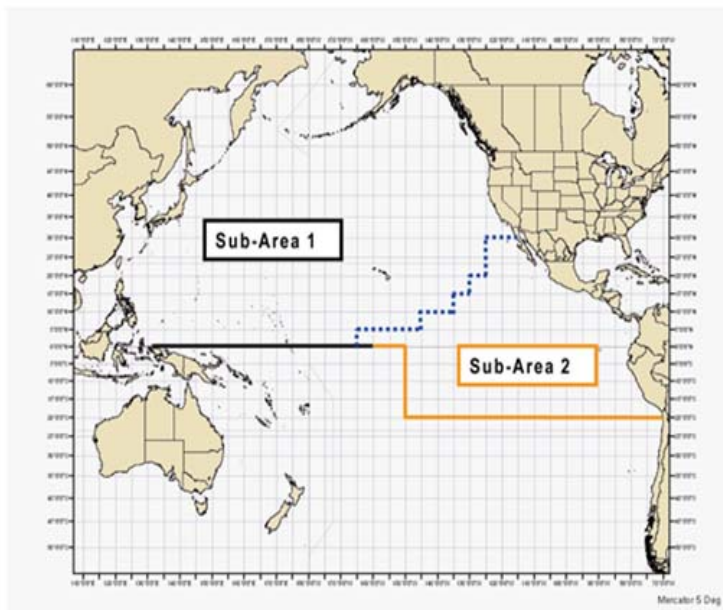
### **Conservation Advice**

**While further guidance from the management authority is necessary, including guidance on reference points and the desirable degree of reduction, the fishing mortality rate of striped marlin (which can be converted into effort or catch in management) should be reduced from the current level (2001-2003), taking into consideration various factors associated with this species and its fishery. Until appropriate measures in this regard are taken, the fishing mortality rate should not be increased.**

#### **7.4 Swordfish**

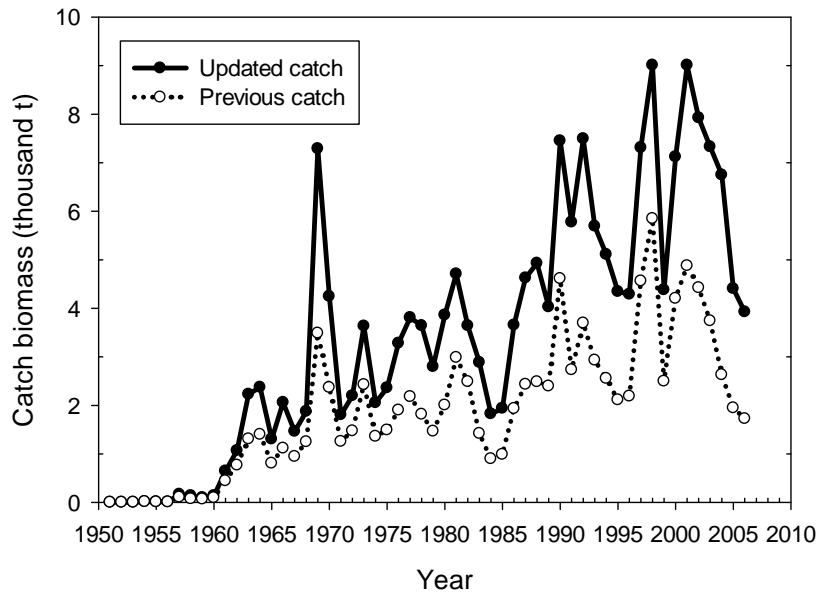
G. DiNardo, Chairman of the BILLWG, presented background information on the SWO stock assessment process and asked J. Brodziak to present the results of the updated EPO SWO stock assessment conducted in 2010.

The North Pacific WCPO and EPO SWO stocks were assessed by the ISC Billfish Working Group in 2009 (Figure 2).



**Figure 2.** Geographic areas used for the ISC Billfish stock assessment of North Pacific swordfish stocks. Sub-Area 1 corresponds to the Western and Central North Pacific (WCPO) swordfish stock which was assessed in 2009. Sub-Area 2 corresponds to the Eastern North Pacific (EPO) swordfish stock which had a stock assessment update conducted for ISC 10 in 2010.

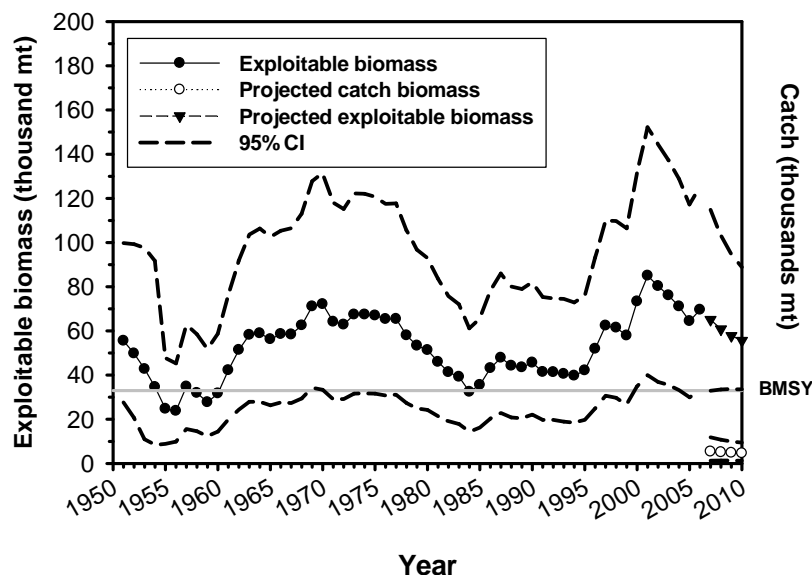
In 2010, the EPO stock assessment was updated to include missing SWO catch from the IATTC area (Figure 3). Results of the updated EPO stock assessment were consistent with the previous 2009 assessment of the EPO stock.



**Figure 3.** Total catch biomass estimates for the Eastern North Pacific (EPO) swordfish stock from 1952-2006. The updated catch biomass (solid line, filled circle) shows the catch used in the 2010 update of the EPO stock assessment reported at ISC 10. The previous catch biomass (dotted line, open circle) shows the catch used in the previous EPO stock assessment reported at ISC 9 in 2009.

Based on the 2009 stock assessment results, the exploitable biomass of the WCPO SWO stock was estimated to be about 75,000 t in 2006 ( $B_{2006}$ ), roughly 30% above  $B_{MSY}$ . The exploitation rate on the WCPO stock in 2006 was estimated to be 14% with a total catch of roughly 9,900 t or roughly 69% of MSY ( $MSY=14,400$  t). There was very high probability that  $B_{2006}$  was above  $B_{MSY}$ , a 93 out of 100 chance, and there was a 0 out of 100 chance that the exploitation rate in 2006 exceeded the rate to produce MSY.

Based on the 2010 stock assessment update results for the EPO stock only, the exploitable biomass of the EPO SWO stock was estimated to be about 69,000 t in 2006, over 200% above  $B_{MSY}$  (Figure 4).



**Figure 4.** Time series of estimates of exploitable biomass (solid line, filled circle) of eastern North Pacific swordfish during 1952-2006, with 95% credibility intervals (dashed lines), projections of exploitable biomass (solid line, filled triangle), and 95% credibility intervals (dashed lines). Stochastic projections of exploitable biomass and catch biomass during 2007-2010 are based on production model dynamics assuming that the projected exploitation rate is normally distributed with a mean equal to the average exploitation rate during 2004-2006 and an associated standard deviation.

Exploitation rate on the EPO stock in 2006 was estimated to be 6% with a total catch of roughly 3,900 t or roughly 78% of MSY ( $MSY=5,000t$ ). There was very high probability that  $B_{2006}$  was above  $B_{MSY}$ , a 99 out of 100 chance, and there was a two out of 100 chance that the exploitation rate in 2006 exceeded the rate to produce MSY.

The exploitable biomass of the WCPO SWO stock was 31% above  $B_{MSY}$  and the exploitation rate was 46% below  $F_{MSY}$  in 2006. Similarly, exploitable biomass of the EPO SWO stock was over two-fold greater than  $B_{MSY}$  and the exploitation rate was 62% below  $F_{MSY}$  in 2006. Based on results of the updated North Pacific EPO stock assessment and the 2009 North Pacific WCPO stock assessment, the BILLWG proposed that the ISC Plenary maintain the existing conservation advice for this species.

## Discussion

Plenary discussed the previous (ISC9) conservation advice and considered the term “well above” to be ambiguous and the advice was revised. The Plenary also discussed what some Members considered to be a bigger concern, that the ISC9 conservation advice reflected results instead of advice.

## Conservation Advice

**The WCPO and EPO stocks of swordfish are healthy and above the level required to sustain recent catches.**

## **8 REVIEW OF STOCK STATUS OF SECONDARY STOCKS**

The ISC has an interest in yellowfin, bigeye and skipjack tunas in the North Pacific Ocean. This interest is shared with other RFMOs that have a larger interest and conduct stock assessments on these stocks. Because IATTC and SPC actively research these stocks, they have been annually invited by Plenary to provide briefings on their research findings on stock condition and fishery impacts on these stocks.

### **8.1 Eastern Pacific – Yellowfin, Bigeye and Skipjack Tunas** *(ISC/10/PLENARY/info/04, 05, 06)*

M. Dreyfus discussed the stock assessment and status of yellowfin, bigeye and skipjack tunas in the eastern Pacific Ocean drawing on material received from the IATTC. IATTC assessments updated since 2009 have not yet been released and the information presented by Dreyfus was for the 2009 assessment and not new. This information was also presented at ISC9 Plenary in 2009. IATTC will present new assessments in late August 2010. Dreyfus mentioned that IATTC has changed the timing of its scientific meeting to comply with the rules of the new IATTC convention (Antigua Convention) that comes into force in August 2010.

Dreyfus reminded the group that the 2009 assessments for YFT and BET were conducted using Stock Synthesis III with the base case scenario of no adult-recruitment relationship. IATTC does not conduct a full assessment of SKJ because there are insufficient estimates of biological parameters for this species; instead, it uses relative indicators that are estimated to check for significant trends. At this time, there are no conservation concerns for SKJ.

### **Discussion**

The ISC Chairman expressed his appreciation for the presentation and asked to be kept informed of future updates on stock status.

### **8.2 Western Pacific Ocean – Yellowfin, Bigeye, Skipjack, and Southern Albacore** *(ISC/10/PLENARY/info/02 and 03)*

N. Miyabe, Chairman of the WCPFC-SC, presented summaries of tuna stock status in the WCPO based on the 2009 tuna stock assessments for BET, YFT and SKJ tunas in the WCPO, and ALB in the South Pacific Ocean, including management implications. The WCPFC-SC relies on the SPC for conducting the stock assessments for these stocks.

The 2009 BET assessment presented at SC5 was updated from the 2008 assessment. The BET stock status estimates for the base case model concluded that overfishing is occurring (with 100% probability), that the stock is not in an overfished state, and that fishing mortality has increased substantially since 2001-04. Given the revised estimates of F/F<sub>msy</sub>, reductions in

fishing mortality of 34-50% are needed. SPC was asked to evaluate the effectiveness of the CMM for a range of alternative scenarios.

The assessment for YFT was updated in 2009 from the previous update in 2007. Although the overall YFT status was that it is not overfished, the condition in Region 3 (western equatorial) was estimated to be fully exploited – spawning biomass is now 30% of the unfished level and this region accounts for 95% of the total catch. Due to these conditions, SC5 recommended not allowing  $F$  to increase in the western equatorial region.

For SKJ the most recent assessment was done in 2008. Two spatial model scenarios were used in the assessment: (1) the entire WCPO (stratified into 6 regions, as done for the other tuna assessments), and (2) the equatorial regions only (comprising just the two regions that make up most of the fishery). The equatorial model was adopted to assess SKJ. Biomass estimates are largely driven by trends in recruitments that are more variable in the eastern equatorial region, with peaks in recruitment, and consequently biomass, following El Niño events. In recent years SKJ biomass has been 40% above average. The assessment indicates that SKJ is moderately exploited, that the stock is not in an overfished state with  $B/B_{msy}$  greater than 1, and that overfishing is not occurring with  $F/F_{msy} = 0.26$ , substantially below 1.

The South Pacific ALB stock assessment for 2009 determined that adult fishing mortality is much lower (by 50%) than the 2008 assessment estimates. Adult fishing mortality increased steeply in recent years – but is more realistic ( $F = \sim 0.3$ ) than previous years' estimates for fully exploited fish). This stock is not in an overfished state and overfishing is not occurring.

## **Discussion**

The ISC Chairman thanked N. Miyabe for the presentation and stated that ISC looks forward to receiving future updates on stock assessments of WCPO stocks.

## **9 REVIEW OF STATISTICS AND DATA BASE ISSUES**

S.K. Chang, Chairman of the STATWG, reported on the STATWG meeting held 16-19 July 2010 in Victoria, Canada (*Annex 12*). Three important tasks were addressed this year in addition to regular agenda items: (1) Convene a metadata workshop to collect metadata from each member and unify the extent and contents of database; (2) Begin development of complete ISC data inventory; (3) Review the data reporting protocol.

A metadata workshop was held in conjunction with the STATWG. The group recognized the need and importance of having complete ISC metadata and standardized names of fishing fleets and codes for the ISC and WG databases, and so the metadata workshop focused on and created a standardized fleet names and codes, a metadata summary table by each country and fleet, and a set of unified codes for the ISC database. All the tables and codes will be further reviewed by species working groups and then adopted in STATWG 2011. It was recommended that working groups use the codes and names, members update the metadata, and the ISC Data Administrator (DA) revise the data system accordingly after 2011.

Catalogues and inventories of Categories I-III data from the ISC database were created and reviewed in the STATWG. Several issues in the ISC database were noted in the meeting and solutions were provided which include requests for members to submit missing historical data and to address the inconsistencies in fishery terms noted in the metadata workshop. Discrepancies between the ISC and WG databases were discussed and the STATWG concluded that: these were two different databases. The ISC database includes only aggregated data submitted by Members according to the ISC Data Reporting Protocol and does not include all the data the WGs use for their stock assessments.

A table comparing ISC and WCPFC database holdings was reviewed and discussed. In general, for the large-scale fisheries, WCPFC has more data than ISC and, for the small-scale fisheries, ISC has more data than WCPFC. It was noted that the ISC data catalogue is not yet complete and will need to incorporate data submitted by Members to working groups (that had not been submitted to the ISC database) and recover missing historical data from some Members.

Revisions to the Data Reporting Protocol (see *ISC/10/PLENARY/09*) were proposed, mainly to clarify the data contents of the ISC database, to clarify what is public domain data, and to streamline the data submission procedure (all data are to be submitted to the DA, instead of to working groups). Members' performance regarding data submission was reviewed in a report card adopted by ISC9. Most Members submitted their data on time in 2010. The absence of data from China was noted.

All ISC species WG Chairpersons identified the need to have a complete catch inventory of the species of their interests and noted the usefulness of comparing the ISC and WCPFC catch databases. They also noted that the Biological Sampling Plan (BSP) presented to ISC9 was important to address critical needs for updated biological and life history data.

A permanent Data Administrator (DA) began working this year. The STATWG reviewed the responsibilities of the DA to be in accordance with the revised data reporting protocol, but decided not to suggest changes until the DA is fully functioning in the job. The STATWG also agreed there was a need to retain the STATWG to monitor the changes established during the meeting, including those to the data reporting protocol and to the database, and decided to revisit the need for and structure of the STATWG in 2011.

## **Discussion**

The ISC Chairman thanked S.K. Chang and the members of the STATWG for the hard work and the considerable progress made since ISC9. U. Varanasi lauded the well organized STATWG report and thanked S.K. Chang for his excellent leadership. Z.G. Kim thanked the STATWG and indicated that Korea will continue to cooperate to provide the best data to the ISC database.

The Plenary reviewed the STATWG recommendations in order to provide guidance and/or make decisions. The Plenary's instructions for each are as follows:

1. Encourage working group data managers and member Data Correspondents to work with the DA.



2. Data Correspondents should continue updating metadata in collaboration with WGs and should provide metadata with all data submissions to the DA.
3. If Data Correspondents submit updated catch data to WGs during the year, the WG Data Managers should inform the ISC DA of the updates. Data Correspondents are responsible for providing all data updates by the July 1<sup>st</sup> due date to the DA (as specified in the data reporting protocol).
4. The metadata workshop recommendations (see *Annex 12, Attachment 5*) should be incorporated by Data Correspondents, the DA, and WG Data Managers, as appropriate, except for the recommendation for ISC to apply for membership to the Coordinated Working Party for Fisheries Statistics, which Plenary decided not to do.
5. Plenary agreed to continue seeking funding for the previously proposed Biological Sampling Program (see section on Status of NC research proposals **11.8**).
6. Regarding the recommendation by the STATWG to clarify the supervision of the DA, the Plenary discussed this under the topic Data Administrator and Performance (section **9.1**).

### **9.1 Data Administrator and Performance**

H. Nakano introduced the new DA, Izumi Yamasaki, Associate Researcher at the National Research Institute of Far Seas Fisheries and noted that she is responsible for ISC database management.

### **Discussion**

S.K. Chang indicated that the STATWG reviewed the Responsibilities of the Database Administrator (see *ISC/10/PLENARY/09*). The STATWG agreed that the responsibilities would not be revised while the DA came up to speed and a review is planned for next year. The STATWG noted some duplication of responsibilities between the STATWG and the DA and determined that the need for and function of the STATWG might change once the new ISC DA is up to speed. In the mean time, the STATWG also agreed that it should not be dissolved and continue to meet in order to monitor progress of the DA.

The ISC Chairman mentioned that when the ISC last discussed dissolving the STATWG, it was with the understanding that the DA would be fully addressing ISC's data administration needs. Given the overlapping roles among the Chairman of the STATWG, the DA, WG Data Managers, and Data Correspondents, determining the respective roles and responsibilities is critical and will involve establishing a work plan and tracking progress of the DA. In the meantime, dissolving the STATWG might complicate data management for ISC. The ISC Chairman indicated that the responsibility of getting all these parties together currently resides with H. Nakano (the DA's local supervisor) and suggested that he work with these parties and ISC leaders in order to delineate the respective roles in monitoring the DA's progress.

The ISC Chairman further clarified the existing process for tracking and monitoring progress of the ISC DA: ISC Members articulate their data management concerns in the STATWG and Plenary; H. Nakano is responsible for local tracking and monitoring progress of the DA and providing the results to the STATWG. The ISC Chairman referred the Plenary to the DA responsibilities detailed in the Operations Manual (*ISC/10/PLENARY/09*) and to his report in which he suggested a realignment of the administrative responsibilities under the ISC Chairman

(see Report of the Chairman, section 4.0). It was pointed out that the administrative functions of the ISC are classified under the Office of the Chair.

## **9.2 Data Submission Report Card**

A format for the data submission report card was developed last year. S.K. Chang presented the ISC data report card for members dated 19 July 2010 (*Annex 12*). There are three status categories in the report card for years 2008 and 2009. “Good” is assigned to countries if Category I-III data have been received before July 1. “Fair” is assigned if data have been received in July. “Poor” is assigned if data have been received after August. “NA” is assigned when data are not available.

### **Discussion**

The group discussed the report card. It was pointed out that the current report card does not reflect the quality of data submitted. The STATWG Chairman indicated that the STATWG will review the report card next year and may revise how members are rated in the report card. He also indicated that data in delegation reports do not qualify as submitted to the ISC. The official submission of data is completed when data are submitted to the DA and to the ISC database. He noted that data in the delegation report differ from those submitted to the ISC DA for the ISC database. The ISC Chairman indicated that although China recently submitted 2009 Category II data, it has not submitted a delegation report. The ISC DA should ask China to submit the remainder of the data. After each Plenary, the DA should review the delegation reports to determine if they contain information that indicate gaps in the ISC database and communicate findings to STATWG Chairperson and appropriate Data Correspondent.

## **9.3 Total Catch**

S.K. Chang presented the total catch of highly migratory species (HMS) in the ISC database and pointed out several issues with the ISC database and data management. He mentioned that the catches are for north of the equator in the North Pacific Ocean and are incomplete. He noted that the requirements for submission of catch data are for all HMS.

### **Discussion**

Plenary noted the need to monitor the production of HMS fisheries in the North Pacific Ocean. The ISC Chairman reminded Members of the requirements for providing at least Category I data for the list of species in the ISC Operations Manual (see ISC/10/PLENARY/09). These should be available in the ISC database as well as reported in the delegation reports. Plenary also agreed that the data should appear in the Plenary reports and on the ISC website.

## **9.4 North Pacific-wide Catch and Bycatch**

S.K. Chang indicated that ALB catch from non-Member countries was obtained from SPC and incorporated in the ALBWG database. No bycatch data has been submitted, and Chang asked whether a format for bycatch data should be developed.

## **Discussion**

The ISC database does not contain bycatch data. The Plenary encouraged Members to submit full data on bycatch by their respective HMS fleets, and submit data as accurate as possible for the key ISC species in delegation reports.

### **9.5 Rescue of Historical Data**

S.K. Chang reported that ISC has made some progress in rescuing historical data. PBF data has been collected back to World War II. ALB (catch metadata) has been collected for U.S. and Canadian troll fisheries. The BILLWG has obtained some data for SWO catches by Spain.

## **10 REVIEW OF MEETING SCHEDULE**

### **10.1 Time and Place of ISC11**

Provisional dates for the 11<sup>th</sup> meeting of the ISC are 20-25 July 2011. The meeting place is not yet determined. The U.S. offered to host the next meeting and will provide further details as they become available.

### **10.2 Working Group Intercessional Meetings**

The Plenary discussed schedules for WG intercessional meetings and agreed on the tentative schedule presented in Table 5.

## **11 ADMINISTRATIVE MATTERS**

### **11.1 Biological Reference Point Assignment**

At the 5<sup>th</sup> session of the Northern Committee (NC) in Nagasaki, Japan in 2009, the NC requested assistance from the ISC in identifying potential biological reference points (BRP) for the northern stocks, ALB, PBF and SWO, of the North Pacific Ocean. The ISC worked on this request during scheduled intercessional meetings in 2009 and 2010. The work plan for each of the species working groups was to compile in table form the pros and cons and any appropriate comments on the potential BRPs used in stock status evaluations of their species. Furthermore, the values of the BRPs, where available, from the most recent stock assessments should be included. The results of this assignment for the Working Groups were compiled in *ISC/10/PLENARY/04*.

### **11.2 Peer Review of Function Process**

S. Shoffler reported that the rules and procedures for conduct of the ISC and subsidiary bodies call for a review of function every five years or more frequently (*ISC/10/PLENARY/05*). ISC has not yet had a review of its function since its inception. A review of function should be conducted to promote transparency and scientific effectiveness. ISC10 is tasked with determining how to

accomplish this requirement. Shoffler suggested two options for Plenary to consider: contract out the review or organize the review itself.

## **Discussion**

Plenary discussed the pros and cons of the two options including the high cost of either option (\$50-90K USD). Plenary decided to organize a review of the ISC function itself. The first step would be to create an ISC Review Task Force (RTF) from the membership to draft terms of reference and determine timelines and costs. This option also will require ISC to solicit funding for the review from the Member countries.

It was agreed that the RTF would be organized by the ISC Chairman who indicated that each Member country should identify a Review Task Force Member by the end of the Plenary.

### **11.3 Election of Chairperson for 2011-2013**

G. Sakagawa indicated that he was stepping down as ISC Chairman after serving five years. An election was held according to ISC rules and procedures (Operations manual pages 12 and 13) and Gerard DiNardo was elected for a three-year term, 2011-2013.

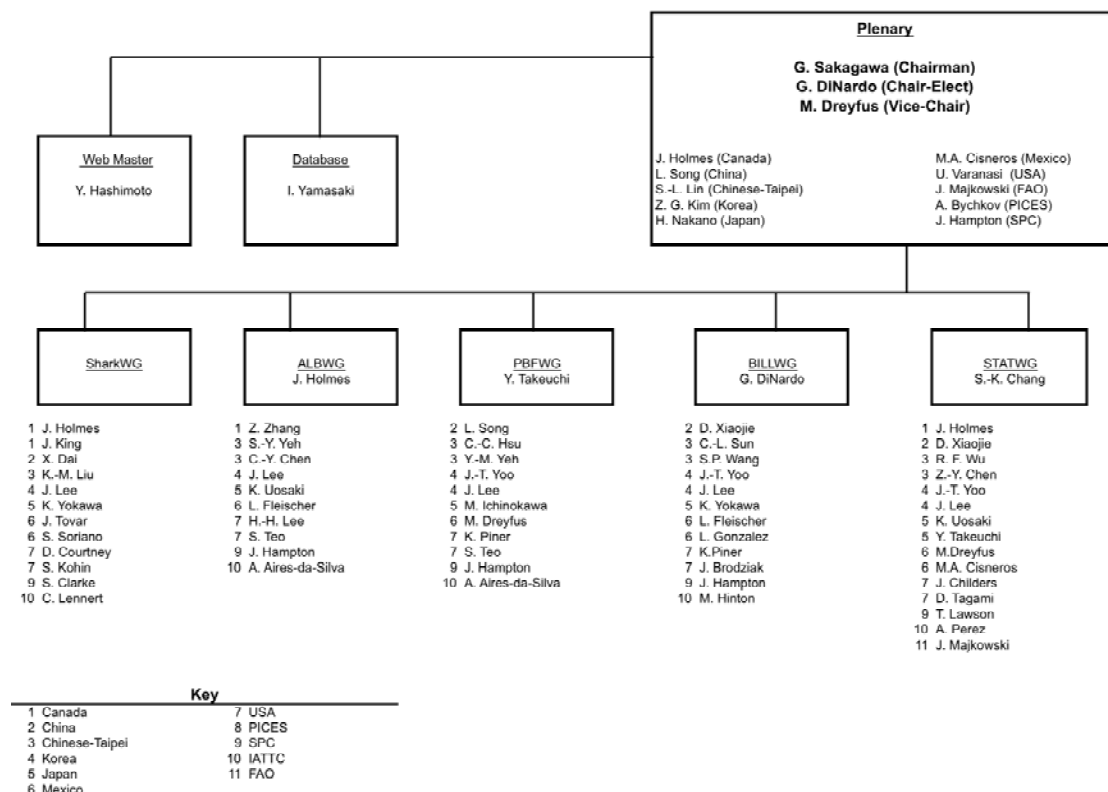
DiNardo will assume the role of ISC Chairman after this ISC10 session. DiNardo thanked the Members for the confidence they have put in him and indicated that he is looking forward to serving ISC. He also thanked G. Sakagawa for his good leadership and for successfully moving ISC forward during his time as Chairman. U. Varanasi also expressed her appreciation for Sakagawa's contribution in advancing ISC, especially considering the limited available resources.

### **11.4 Organization Chart and Contact Persons**

The ISC Organization Chart was reviewed and updated through discussion with members (**Figure 5**). The ISC Chairman noted that the participants listed on the Organization Chart serve as the points of contact for the respective WGs. They also serve as points of contact for respective Delegation Leaders in keeping abreast of WG activities and workshop results and for serving as team leaders of national scientists to intercessional WG

meetings.

Figure 5. ISC Organizational Chart (July 2010)



## 11.5 Website

H. Nakano reported recent progress made on the ISC website, and introduced the new ISC Webmaster, Y. Hashimoto. The Webmaster is a recent hire and is locally supervised by H. Nakano, National Research Institute of Far Seas Fisheries. Hashimoto has been engaged in renewing and improving the ISC website in response to requirements set out by ISC9.

Hashimoto provided a brief report on recent improvements to the ISC website including an aesthetically pleasing appearance, the addition of user-friendly functions, and improvements to the structure. Future work to fill contents of the “working group”, “recommendations”, and “statistics” pages, which will be done with the cooperation of the WG chairs, the ISC Chairman and DA, respectively, were also reported. In addition, the urgent task of uploading working papers submitted to WGs since July 2009 was noted and should be completed as soon as possible after the ISC10 Plenary. The current process for providing these papers is as follows: After authors provide permission for release, WG Chairpersons provide papers to the ISC Chairman who then sends them to the Webmaster. Hashimoto also reviewed the data submission process using the researcher’s portal site, a protected part of the ISC website which can be accessed only by Data Correspondents.

## Discussion

The ISC Chairman reminded Plenary that the website is the face of ISC and commented on the

outstanding results to date of the redesigned ISC website.

S. Shoffler introduced the draft ISC Webmaster responsibilities (*ISC/Plenary/08*). The Chairman asked Plenary to review these responsibilities and provide comments to the ISC Chairman by 2 October 2010. The Chairman will follow up with H. Nakano on changes and once the responsibilities are accepted by Delegation Leaders they will be part of the ISC Operations Manual.

Plenary asked for clarification regarding the responsibility of the Webmaster to communicate with stakeholders. The ISC Chairman indicated that the stakeholders are the ISC leadership (Delegation Leaders, WG Chairs, ISC Chairman and Vice-Chairman). The details of communicating with the leadership need to be described in the Webmaster responsibilities and in the management manual that needs to be developed by the Webmaster. Plenary also noted that the website needs a point of contact to manage any original content.

The importance of uploading WG Working Papers was discussed. The ISC Chairman emphasised that working papers submitted to WGs and approved for release by authors must be uploaded on the ISC Website as soon as possible, e.g., after ISC10. Plenary also determined that authors can retract permission for making papers publicly available up to the time they are sent by the WG Chairs to the ISC Chairman.

## **11.6 Best Practices Meeting**

H. Nakano presented a report on the Joint Tuna RFMO Meeting of Experts to Share Best Practices on the Provision of Scientific Advice held in Barcelona, Spain at May 31 to June 2, 2010. This meeting is one of four WSs following the “Kobe procedure” and was held because of the similar problems faced by tuna RFMOs. The workshop reviewed and made recommendations on future priorities for data and tuna research that would allow the RFMOs to provide more efficient and fully transparent scientific advice on their tuna stocks and pelagic ecosystems. In the meeting, five keynote speakers made presentations on the major fields of interest, i.e. 1) Routine data collected by year: catch, effort and size data, 2) Biological data, 3) Stock assessment, 4) Communication between RFMOs and the world, and 5) Enhanced cooperation among tuna RFMOs. The meeting report identifies 25 recommendations. (Tuna-org: <http://www.tuna-org.org/>)

J. Brodziak presented his observations of that meeting focusing on the recommendations regarding uncertainty in stock assessments and scientific advice. A key recommendation was the need to produce decision tables. The Kobe II Strategy Matrix provides a clear format to convey quantitative advice about uncertainty. Recommendations for communicating stressed that standardized executive summaries should be developed for consideration for use by all tuna RFMOs for summarizing stock status and management recommendations.

## **Discussion**

It was noted that the recommendations did not include using a precautionary approach. It was suggested that this is because the precautionary approach is considered a management

requirement, not a science priority.

### **11.7 Up-date of Operations Manual**

R. Sanford reviewed proposed changes and updates to the ISC Operations Manual (*ISC/10/PLENARY/09*). The ISC Chairman asked that delegates review changes to the manual and provide comments by 2 October 2010.

#### **Discussion**

The ISC Chairman noted that the STATWG had reviewed the data reporting protocol (*Attachment 2* in *ISC/10/PLENARY/09*) and its proposed changes were incorporated in the version presented to Plenary. He also pointed out the new and revised sections to the manual needing review including the Webmaster responsibilities and changes to the WG report guidelines. A number of issues needing revision, including bycatch coding, and the code for Blue Marlin, were also discussed. An electronic version of the complete revised Operations Manual will be sent to ISC Members after ISC10.

The Plenary agreed that the STATWG Chairman would circulate additional revisions of the DA responsibilities by correspondence to the WG in order to expedite inclusion of a final version in the revised manual. Suggested changes to all sections of the Operations Manual are due by 2 October 2010. The goal is to publish the revised manual by the end of 2010.

### **11.8 Status of NC Research Proposal**

The ISC Chairman submitted four funding proposals to WCPFC NC5 in September 2009 for: (1) a biological sampling research program, (2) North Pacific albacore sampling program, (3) database administration, and (4) website administration. NC5 agreed that CCMs could elect to provide voluntary contributions for the proposals. During ISC10, S.K. Soh (WCPFC) circulated a Commission Circular (2009/16) regarding a “draft administrative arrangement” developed by WCPFC Secretariat to secure financial contributions from NC Members.

S.K. Soh indicated that the WCPFC Secretariat requests that ISC10 and NC Members consider the following and review the draft administrative arrangement that will be considered by NC6: Does ISC have sufficient legal personality and the capacity to receive, administer and acquit funds from an IGO such as WCPFC?

#### **Discussion**

The ISC Chairman clarified that ISC prepared the package of proposals for NC; NC submitted the proposals to WCPFC. The proposals were constructed by principal investigators who work for agencies of WCPFC Members. The structure of the proposals is similar to the research proposals of the WCPFC SC. ISC currently does not have legal personality and therefore is not prepared to receive funding and administer funding to the principal investigators.

### **11.9 Other Administrative Matters**

A general question was raised about the availability of delegation reports in advance of the meeting for reviewing. The ISC Chairman clarified that to date it has been difficult to implement a policy of early distribution of Plenary documents because most delegation reports have been received just before the meeting and some are not ready for distribution. Nonetheless, the Office of the Chairman will try to make delegation reports available in advance of the Plenary session, at least a day before the start of Plenary.

## **12 ADOPTION OF REPORT**

A draft Report of the Tenth session of the International Scientific Committee for Tuna and Tuna-like Species in the North Pacific Ocean was prepared based on input and comment from all participants, and circulated to all participants for review. The report was reviewed in its entirety, section by section and was approved by the ISC10 Plenary, subject to editorial corrections to be made by the ISC Chairman.

## **13 CLOSE OF MEETING**

G. Sakagawa thanked the Department of Fisheries and Oceans, Canada, especially John Holmes, for the excellent organization and hosting of the meeting. He thanked sponsors, including the Canadian Highly Migratory Species Foundation and the American Fishermen's Research Foundation for hosting receptions, Judith Wilson for her volunteer help with logistics, and the participants for their contributions to a successful meeting. He wished the Chairman Elect, Gerard DiNardo, success and indicated his commitment to helping in the transition. G. Sakagawa closed the successful meeting on 26 July 2010



**Table 5.** Tentative schedule of ISC meetings for 2010-2012

[BILLWG= Billfish Working Group; PBFWG= Pacific Bluefin Tuna WG; BCWG = Bycatch WG; ALBWG = Albacore WG, STATWG = Statistics WG]

| <b>Date</b> | <b>Meeting</b>   | <b>Contact</b>                             |
|-------------|--|--|
| <b>2010</b> |  |  |
| Oct 12-26   | ALBWG Workshop– La Jolla, CA, USA<br>(8 days Data preparation) | J. Holmes<br>John.Holmes@dfo-mpo.gc.ca     |
| <b>2011</b> |  |  |
| Jan 6-13    | PBFWG Workshop – Shimizu, Japan<br>(Model improvement)         | Y. Takeuchi<br>Yukiot@fra.affrc.go.jp      |
| Jan 19-27   | BILLWG Workshop – Honolulu, HI, USA<br>(Data preparation)      | G. DiNardo<br>Gerard.DiNardo@noaa.gov      |
| Feb/Mar     | Shark WG Workshop – TBD<br>(5 day Organization meeting)        | G. DiNardo                                 |
| Mar 22-29   | ALBWG Workshop– Shimizu, Japan<br>(Full stock assessment)      | J. Holmes                                  |
| May 19-27   | BILLWG Workshop – TBD<br>(Striped marlin stock assessment)     | G. DiNardo                                 |
| Jul 14-15   | ALBWG – TBD<br>(Results preparation)                           | J. Holmes                                  |
| Jul 16      | PBFWG – TBD<br>(Review)  | Y. Takeuchi                                |
| Jul 16      | BILLWG – TBD<br>(Results preparation)                          | G. DiNardo                                 |
| Jul 17-19   | STATWG – TBD<br>(Workshop)                                     | S.-K. Chang<br>SKChang@faculty.nsyu.edu.tw |
| Jul 20-25   | ISC11 – TBD<br>(Plenary)                                       | TBD  |
| Nov         | PBFWG – TBD<br>(Data preparation)                              | Y. Takeuchi                                |
| Dec         | BILLWG -- TBD<br>(Data preparation)                            | G. DiNardo                                 |
| <b>2012</b> |  |  |
| Apr         | BILLWG Workshop– TBD<br>(Blue marlin stock assessment)         | G. DiNardo                                 |

|     |  |             |
|-----|--|-------------|
| May | PBFWG Workshop– TBD<br>(Full stock assessment) | Y. Takeuchi |
| Jul | ISC12 – TBD<br>(Plenary)                       | TBD         |

**Table 1.** <sup>1</sup>Annual catch of North Pacific albacore (*Thunnus alalunga*) in metric tons for fisheries monitored by ISC for assessments of North Pacific Ocean stocks, 1952-2009. Blank indicates no effort. - indicates data not available. 0 indicates less than 1 metric ton. Provisional estimates in ().

| Year | Japan       |          |         |               |       |          |       | Korea    |          | Chinese-Taipei |                        |                   |
|------|-------------|----------|---------|---------------|-------|----------|-------|----------|----------|----------------|------------------------|-------------------|
|      | Purse Seine | Gill Net | Set Net | Pole and Line | Troll | Longline | Other | Gill Net | Longline | Gill Net       | Distant Water Longline | Offshore Longline |
| 1952 | 154         |          | 55      | 41,787        | --    | 26,687   | 182   |          |          |                |                        |                   |
| 1953 | 38          |          | 88      | 32,921        | --    | 27,777   | 44    |          |          |                |                        |                   |
| 1954 | 23          |          | 6       | 28,069        | --    | 20,958   | 32    |          |          |                |                        |                   |
| 1955 | 8           |          | 28      | 24,236        | --    | 16,277   | 108   |          |          |                |                        |                   |
| 1956 |             |          | 23      | 42,810        | --    | 14,341   | 34    |          |          |                |                        |                   |
| 1957 | 83          |          | 13      | 49,500        | --    | 21,053   | 138   |          |          |                |                        |                   |
| 1958 | 8           |          | 38      | 22,175        | --    | 18,432   | 86    |          |          |                |                        |                   |
| 1959 |             |          | 48      | 14,252        | --    | 15,802   | 19    |          |          |                |                        |                   |
| 1960 |             |          | 23      | 25,156        | --    | 17,369   | 53    |          |          |                |                        |                   |
| 1961 | 7           |          | 111     | 18,639        | --    | 17,437   | 157   |          |          |                |                        |                   |
| 1962 | 53          |          | 20      | 8,729         | --    | 15,764   | 171   |          |          |                |                        |                   |
| 1963 | 59          |          | 4       | 26,420        | --    | 13,464   | 214   |          |          |                |                        |                   |
| 1964 | 128         |          | 50      | 23,858        | --    | 15,458   | 269   |          |          |                |                        |                   |
| 1965 | 11          |          | 70      | 41,491        | --    | 13,701   | 51    |          |          |                |                        |                   |
| 1966 | 111         |          | 64      | 22,830        | --    | 25,050   | 521   |          |          |                |                        |                   |
| 1967 | 89          |          | 43      | 30,481        | --    | 28,869   | 477   |          |          |                |                        | 330               |
| 1968 | 267         |          | 58      | 16,597        | --    | 23,961   | 1,051 |          |          |                |                        | 216               |
| 1969 | 521         |          | 34      | 31,912        | --    | 18,006   | 925   |          |          |                |                        | 65                |
| 1970 | 317         |          | 19      | 24,263        | --    | 16,222   | 498   |          |          |                |                        | 34                |
| 1971 | 902         |          | 5       | 52,957        | --    | 11,473   | 354   |          | 0        |                |                        | 20                |
| 1972 | 277         | 1        | 6       | 60,569        | --    | 13,022   | 638   |          | 0        |                |                        | 187               |
| 1973 | 1,353       | 39       | 44      | 68,767        | --    | 16,760   | 486   |          | 3        |                |                        | --                |
| 1974 | 161         | 224      | 13      | 73,564        | --    | 13,384   | 891   |          | 114      |                |                        | 486               |
| 1975 | 159         | 166      | 13      | 52,152        | --    | 10,303   | 230   |          | 9,575    |                |                        | 1,240             |
| 1976 | 1,109       | 1,070    | 15      | 85,336        | --    | 15,812   | 270   |          | 2,576    |                |                        | 686               |
| 1977 | 669         | 688      | 5       | 31,934        | --    | 15,681   | 365   |          | 459      |                |                        | 572               |
| 1978 | 1,115       | 4,029    | 21      | 59,877        | --    | 13,007   | 2,073 |          | 1,006    |                |                        | 6                 |
| 1979 | 125         | 2,856    | 16      | 44,662        | --    | 14,186   | 1,139 | 0        |          |                |                        | 81                |
| 1980 | 329         | 2,986    | 10      | 46,742        | --    | 14,681   | 1,177 | 6        | 402      | --             |                        | 249               |
| 1981 | 252         | 10,348   | 8       | 27,426        | --    | 17,878   | 699   | 16       |          | --             |                        | 143               |
| 1982 | 561         | 12,511   | 11      | 29,614        | --    | 16,714   | 482   | 113      | 5,462    | --             |                        | 38                |
| 1983 | 350         | 6,852    | 22      | 21,098        | --    | 15,094   | 99    | 233      | 911      | --             |                        | 8                 |
| 1984 | 3,380       | 8,988    | 24      | 26,013        | --    | 15,053   | 494   | 516      | 2,490    | --             |                        | --                |
| 1985 | 1,533       | 11,204   | 68      | 20,714        | --    | 14,249   | 339   | 576      | 1,188    | --             |                        | --                |
| 1986 | 1,542       | 7,813    | 15      | 16,096        | --    | 12,899   | 640   | 726      | 923      | --             |                        | --                |
| 1987 | 1,205       | 6,698    | 16      | 19,082        | --    | 14,668   | 173   | 817      | 607      | 2,514          |                        | --                |
| 1988 | 1,208       | 9,074    | 7       | 6,216         | --    | 14,688   | 170   | 1,016    | 175      | 7,389          |                        | --                |
| 1989 | 2,521       | 7,437    | 33      | 8,629         | --    | 13,031   | 433   | 1,023    | 27       | 8,350          |                        | 40                |
| 1990 | 1,995       | 6,064    | 5       | 8,532         | --    | 15,785   | 248   | 1,016    | 1        | 16,701         |                        | 4                 |
| 1991 | 2,652       | 3,401    | 4       | 7,103         | --    | 17,039   | 395   | 852      | 0        | 3,398          |                        | 12                |
| 1992 | 4,104       | 2,721    | 12      | 13,888        | --    | 19,042   | 1,522 | 271      | 1        | 7,866          |                        | --                |
| 1993 | 2,889       | 287      | 3       | 12,797        | --    | 29,933   | 897   |          | 21       |                |                        | 5                 |
| 1994 | 2,026       | 263      | 11      | 26,389        | --    | 29,565   | 823   |          | 54       |                |                        | 83                |
| 1995 | 1,177       | 282      | 28      | 20,981        | 856   | 29,050   | 78    |          | 14       |                |                        | 4,280             |
| 1996 | 581         | 116      | 43      | 20,272        | 815   | 32,440   | 127   |          | 158      |                |                        | 7,596             |
| 1997 | 1,068       | 359      | 40      | 32,238        | 1,585 | 38,899   | 135   |          | 404      |                |                        | 9,119             |
| 1998 | 1,554       | 206      | 41      | 22,926        | 1,190 | 35,755   | 104   |          | 226      |                |                        | 8,617             |
| 1999 | 6,872       | 289      | 90      | 50,369        | 891   | 33,339   | 62    |          | 99       |                |                        | 8,186             |
| 2000 | 2,408       | 67       | 136     | 21,550        | 645   | 29,995   | 86    |          | 15       |                |                        | 7,898             |
| 2001 | 974         | 117      | 78      | 29,430        | 416   | 28,801   | 35    |          | 64       |                |                        | 7,852             |
| 2002 | 3,303       | 332      | 109     | 48,454        | 787   | 23,585   | 85    |          | 112      |                |                        | 7,055             |
| 2003 | 627         | 126      | 69      | 36,114        | 922   | 20,907   | 85    |          | 146      |                |                        | 6,454             |
| 2004 | 7,200       | 61       | 30      | 32,255        | 772   | 17,341   | 54    |          | 78       |                |                        | 4,061             |
| 2005 | 850         | 154      | 97      | 16,133        | 665   | 20,420   | 234   |          | 420      |                |                        | 3,990             |
| 2006 | 364         | 221      | 55      | 15,400        | 460   | 21,027   | 42    |          | 138      |                |                        | 3,848             |
| 2007 | 5,682       | 226      | 30      | 37,768        | 519   | 22,336   | 44    |          | 56       |                |                        | 2,465             |
| 2008 | 825         | 1,531    | 101     | 19,060        | 549   | 22,386   | (15)  |          | 365      |                |                        | 2,490             |
| 2009 | (2,151)     | (1,531)  | (101)   | (32,421)      | (549) | (17,518) | (15)  |          | (365)    |                |                        | (1,866)           |

1 Data are from the ISC albacore working group July 12 2010, except as noted

2 Albacore pole-and-line catches for 2008 and 2009 are estimated from new procedures.

3 Albacore troll catches prior to 2008 contain an unknown proportion of pole and line catch.

4 Mexico Pole and line catches for 1999 and 2000 include 34 and 4 metric tons, respectively from longline.

5 Other troll catches are from vessels registered in Belize, Cook Islands, Tonga, and Ecuador.

6 Updates for Other Longline 2004-2009 from Peter Williams, pers. com.

Table 1 (continued)

| Year | United States |          |                            |                             |                           |       |          |       | Mexico      |                            | Canada  | Other              |                       | Grand Total |
|------|---------------|----------|----------------------------|-----------------------------|---------------------------|-------|----------|-------|-------------|----------------------------|---------|--------------------|-----------------------|-------------|
|      | Purse Seine   | Gill Net | Pole and Line <sup>2</sup> | Albacore Troll <sup>3</sup> | Tropical Troll & Handline | Sport | Longline | Other | Purse Seine | Pole and Line <sup>4</sup> | Troll   | Troll <sup>5</sup> | Longline <sup>6</sup> |             |
| 1952 |               |          |                            | 23,843                      |                           | 1,373 | 46       |       |             |                            | 71      |                    |                       | 94,198      |
| 1953 |               |          |                            | 15,740                      |                           | 171   | 23       |       |             |                            | 5       |                    |                       | 76,807      |
| 1954 |               |          |                            | 12,246                      |                           | 147   | 13       |       |             |                            |         |                    |                       | 61,494      |
| 1955 |               |          |                            | 13,264                      |                           | 577   | 9        |       |             |                            |         |                    |                       | 54,507      |
| 1956 |               |          |                            | 18,751                      |                           | 482   | 6        |       |             |                            | 17      |                    |                       | 76,464      |
| 1957 |               |          |                            | 21,165                      |                           | 304   | 4        |       |             |                            | 8       |                    |                       | 92,268      |
| 1958 |               |          |                            | 14,855                      |                           | 48    | 7        |       |             |                            | 74      |                    |                       | 55,723      |
| 1959 |               |          |                            | 20,990                      |                           | 0     | 5        |       |             |                            | 212     |                    |                       | 51,328      |
| 1960 |               |          |                            | 20,100                      |                           | 557   | 4        |       |             |                            | 141     |                    |                       | 63,403      |
| 1961 |               |          | 2,837                      | 12,055                      |                           | 1,355 | 5        | 1     | 2           | 39                         | 4       |                    |                       | 52,649      |
| 1962 |               |          | 1,085                      | 19,752                      |                           | 1,681 | 7        | 1     | 0           | 0                          | 1       |                    |                       | 47,264      |
| 1963 |               |          | 2,432                      | 25,140                      |                           | 1,161 | 7        |       | 31          | 0                          | 5       |                    |                       | 68,937      |
| 1964 |               |          | 3,411                      | 18,388                      |                           | 824   | 4        |       | 0           |                            | 3       |                    |                       | 62,393      |
| 1965 |               |          | 417                        | 16,542                      |                           | 731   | 3        | 1     | 0           |                            | 15      |                    |                       | 73,033      |
| 1966 |               |          | 1,600                      | 15,333                      |                           | 588   | 8        |       | 0           |                            | 44      |                    |                       | 66,149      |
| 1967 |               |          | 4,113                      | 17,814                      |                           | 707   | 12       |       |             |                            | 161     |                    |                       | 83,096      |
| 1968 |               |          | 4,906                      | 20,434                      |                           | 951   | 11       |       |             |                            | 1,028   |                    |                       | 69,480      |
| 1969 |               |          | 2,996                      | 18,827                      |                           | 358   | 14       |       | 0           |                            | 1,365   |                    |                       | 75,023      |
| 1970 |               |          | 4,416                      | 21,032                      |                           | 822   | 9        |       | 0           |                            | 390     |                    |                       | 68,022      |
| 1971 |               |          | 2,071                      | 20,526                      |                           | 1,175 | 11       |       | 0           |                            | 1,746   |                    |                       | 91,240      |
| 1972 |               |          | 3,750                      | 23,600                      |                           | 637   | 8        |       | 100         | 0                          | 3,921   |                    |                       | 106,716     |
| 1973 |               |          | 2,236                      | 15,653                      |                           | 84    | 14       |       | 0           |                            | 1,400   |                    |                       | 106,839     |
| 1974 |               |          | 4,777                      | 20,178                      |                           | 94    | 9        |       | 1           | 0                          | 1,331   |                    |                       | 115,227     |
| 1975 |               |          | 3,243                      | 18,932                      |                           | 640   | 33       | 10    | 1           | 0                          | 111     |                    |                       | 96,808      |
| 1976 |               |          | 2,700                      | 15,905                      |                           | 713   | 23       | 4     | 36          | 5                          | 278     |                    |                       | 126,538     |
| 1977 |               |          | 1,497                      | 9,969                       |                           | 537   | 37       |       | 3           | 0                          | 53      |                    |                       | 62,469      |
| 1978 |               |          | 950                        | 16,613                      |                           | 810   | 54       | 15    | 1           | 0                          | 23      |                    |                       | 99,600      |
| 1979 |               |          | 303                        | 6,781                       |                           | 74    | --       |       | 1           | 0                          | 521     |                    |                       | 70,745      |
| 1980 |               |          | 382                        | 7,556                       |                           | 168   | --       |       | 31          | 0                          | 212     |                    |                       | 74,931      |
| 1981 |               |          | 748                        | 12,637                      |                           | 195   | 25       |       | 8           | 0                          | 200     |                    |                       | 70,583      |
| 1982 |               |          | 425                        | 6,609                       |                           | 257   | 105      | 21    | 0           | 0                          | 104     |                    |                       | 73,027      |
| 1983 |               |          | 607                        | 9,359                       |                           | 87    | 6        |       | 0           | 0                          | 225     |                    |                       | 54,951      |
| 1984 | 3,728         |          | 1,030                      | 9,304                       |                           | 1,427 | 2        |       | 107         | 6                          | 50      |                    |                       | 72,612      |
| 1985 | 26            | 2        | 1,498                      | 6,415                       | 7                         | 1,176 | 0        |       | 14          | 35                         | 56      |                    |                       | 59,100      |
| 1986 | 47            | 3        | 432                        | 4,708                       | 5                         | 196   |          |       | 3           | 0                          | 30      |                    |                       | 46,078      |
| 1987 | 1             | 5        | 158                        | 2,766                       | 6                         | 74    | 150      |       | 7           | 0                          | 104     |                    |                       | 49,051      |
| 1988 | 17            | 15       | 598                        | 4,212                       | 9                         | 64    | 307      | 10    | 15          | 0                          | 155     |                    |                       | 45,345      |
| 1989 | 1             | 4        | 54                         | 1,860                       | 36                        | 160   | 248      | 23    | 2           | 0                          | 140     |                    |                       | 44,052      |
| 1990 | 71            | 29       | 115                        | 2,603                       | 15                        | 24    | 177      | 4     | 2           | 0                          | 302     |                    |                       | 53,693      |
| 1991 | 0             | 17       | 0                          | 1,845                       | 72                        | 6     | 312      | 71    | 2           | 0                          | 139     |                    |                       | 37,320      |
| 1992 | 0             | 0        | 0                          | 4,572                       | 54                        | 2     | 334      | 72    | 10          | 0                          | 363     |                    |                       | 54,833      |
| 1993 |               | 0        | 0                          | 6,254                       | 71                        | 25    | 438      |       | 11          | 0                          | 494     |                    |                       | 54,125      |
| 1994 |               | 38       | 0                          | 10,978                      | 90                        | 106   | 544      | 213   | 6           | 0                          | 1,998   | 158                |                       | 73,345      |
| 1995 |               | 52       | 80                         | 8,045                       | 177                       | 102   | 882      | 1     | 5           | 0                          | 1,763   | 94                 |                       | 67,947      |
| 1996 | 11            | 83       | 24                         | 16,938                      | 188                       | 88    | 1,185    |       | 21          | 0                          | 3,316   | 469                | 1,735                 | 86,207      |
| 1997 | 2             | 60       | 73                         | 14,252                      | 133                       | 1,018 | 1,653    | 1     | 53          | 0                          | 2,168   | 336                | 2,824                 | 106,756     |
| 1998 | 33            | 80       | 79                         | 14,410                      | 88                        | 1,208 | 1,120    | 2     | 8           | 0                          | 4,177   | 341                | 5,871                 | 98,229      |
| 1999 | 48            | 149      | 60                         | 10,060                      | 331                       | 3,621 | 1,542    | 1     | 0           | 57                         | 2,734   | 228                | 6,307                 | 125,542     |
| 2000 | 4             | 55       | 69                         | 9,645                       | 120                       | 1,798 | 940      | 3     | 70          | 33                         | 4,531   | 386                | 3,654                 | 85,052      |
| 2001 | 51            | 94       | 139                        | 11,210                      | 194                       | 1,635 | 1,295    |       | 5           | 18                         | 5,248   | 230                | 1,471                 | 90,189      |
| 2002 | 4             | 30       | 381                        | 10,387                      | 235                       | 2,357 | 525      |       | 28          | 0                          | 5,379   | 466                | 700                   | 105,224     |
| 2003 | 44            | 16       | 59                         | 14,102                      | 85                        | 2,214 | 524      |       | 28          | 0                          | 6,861   | 378                | (2,400)               | (92,804)    |
| 2004 | 1             | 12       | 127                        | 13,346                      | 157                       | 1,506 | 361      |       | 104         | 0                          | 7,856   | --                 | 4,096                 | 90,316      |
| 2005 |               | 20       | 66                         | 8,413                       | 175                       | 1,719 | 296      |       | 0           | 0                          | 4,845   | --                 | 4,168                 | 63,052      |
| 2006 |               | 3        | 23                         | 12,524                      | 95                        | 385   | 270      |       | 109         | 0                          | 5,832   | --                 | 5,039                 | 66,249      |
| 2007 |               | 4        | 21                         | 11,887                      | 98                        | 1,225 | 250      |       | 40          | 0                          | 6,075   | --                 | 3,510                 | 92,687      |
| 2008 | 0             | 1        | 1,050                      | 10,672                      | 29                        | 257   | 353      | 0     | 10          |                            | 5,478   |                    | 2,777                 | (68,528)    |
| 2009 | (39)          | (3)      | (2,084)                    | (10,686)                    | (99)                      | (541) | (203)    | (0)   | (17)        |                            | (5,685) |                    | (1,553)               | (77,939)    |

**Table 2.** Annual catch of Pacific bluefin tuna (*Thunnus orientalis*) in metric tons for fisheries monitored by ISC for assessments of North Pacific Ocean stocks, 1952-2009. Blank indicates no effort. - indicates data not available. 0 indicates less than 1 metric ton. Provisional estimates in ().

| Year | Japan <sup>1</sup> |          |               |         |                    |                                   |                  |                  |        | Korea <sup>3</sup> |       |
|------|--------------------|----------|---------------|---------|--------------------|-----------------------------------|------------------|------------------|--------|--------------------|-------|
|      | Purse Seine        |          | Pole and Line | Set Net | Troll <sup>2</sup> | Distant Water & Offshore Longline |                  | Coastal Longline | Others | Purse Seine        | Trawl |
|      | Tuna PS            | Small PS |               |         |                    | NP                                | SP               |                  |        |                    |       |
| 1952 | 7,680              |          | 2,198         | 2,145   | 667                | 2,694                             | 9                |                  | 1,700  |                    |       |
| 1953 | 5,570              |          | 3,052         | 2,335   | 1,472              | 3,040                             | 8                |                  | 160    |                    |       |
| 1954 | 5,366              |          | 3,044         | 5,579   | 1,656              | 3,088                             | 28               |                  | 266    |                    |       |
| 1955 | 14,016             |          | 2,841         | 3,256   | 1,507              | 2,951                             | 17               |                  | 1,151  |                    |       |
| 1956 | 20,979             |          | 4,060         | 4,170   | 1,763              | 2,672                             | 238              |                  | 385    |                    |       |
| 1957 | 18,147             |          | 1,795         | 2,822   | 2,392              | 1,685                             | 48               |                  | 414    |                    |       |
| 1958 | 8,586              |          | 2,337         | 1,187   | 1,497              | 818                               | 25               |                  | 215    |                    |       |
| 1959 | 9,996              |          | 586           | 1,575   | 736                | 3,136                             | 565              |                  | 167    |                    |       |
| 1960 | 10,541             |          | 600           | 2,032   | 1,885              | 5,910                             | 193              |                  | 369    |                    |       |
| 1961 | 9,124              |          | 662           | 2,710   | 3,193              | 6,364                             | 427              |                  | 599    |                    |       |
| 1962 | 10,657             |          | 747           | 2,545   | 1,683              | 5,769                             | 413              |                  | 293    |                    |       |
| 1963 | 9,786              |          | 1,256         | 2,797   | 2,542              | 6,077                             | 449              |                  | 294    |                    |       |
| 1964 | 8,973              |          | 1,037         | 1,475   | 2,784              | 3,140                             | 114              |                  | 1,884  |                    |       |
| 1965 | 11,496             |          | 831           | 2,121   | 1,963              | 2,569                             | 194              |                  | 1,106  |                    |       |
| 1966 | 10,082             |          | 613           | 1,261   | 1,614              | 1,370                             | 174              |                  | 129    |                    |       |
| 1967 | 6,462              |          | 1,210         | 2,603   | 3,273              | 878                               | 44               |                  | 302    |                    |       |
| 1968 | 9,268              |          | 983           | 3,058   | 1,568              | 500                               | 7                |                  | 217    |                    |       |
| 1969 | 3,236              |          | 721           | 2,187   | 2,219              | 313                               | 20               | 565              | 195    |                    |       |
| 1970 | 2,907              |          | 723           | 1,779   | 1,198              | 181                               | 11               | 426              | 224    |                    |       |
| 1971 | 3,721              |          | 938           | 1,555   | 1,492              | 280                               | 51               | 417              | 317    |                    |       |
| 1972 | 4,212              |          | 944           | 1,107   | 842                | 107                               | 27               | 405              | 197    |                    |       |
| 1973 | 2,266              |          | 526           | 2,351   | 2,108              | 110                               | 63               | 728              | 636    |                    |       |
| 1974 | 4,106              |          | 1,192         | 6,019   | 1,656              | 108                               | 43               | 1,069            | 754    |                    |       |
| 1975 | 4,491              |          | 1,401         | 2,433   | 1,031              | 215                               | 41               | 846              | 808    |                    |       |
| 1976 | 2,148              |          | 1,082         | 2,996   | 830                | 87                                | 83               | 233              | 1,237  |                    |       |
| 1977 | 5,110              |          | 2,256         | 2,257   | 2,166              | 155                               | 23               | 183              | 1,052  |                    |       |
| 1978 | 10,427             |          | 1,154         | 2,546   | 4,517              | 444                               | 7                | 204              | 2,276  |                    |       |
| 1979 | 13,881             |          | 1,250         | 4,558   | 2,655              | 220                               | 35               | 509              | 2,429  |                    |       |
| 1980 | 11,327             |          | 1,392         | 2,521   | 1,531              | 140                               | 40               | 671              | 1,953  |                    |       |
| 1981 | 25,422             |          | 754           | 2,129   | 1,777              | 313                               | 29               | 277              | 2,653  |                    |       |
| 1982 | 19,234             |          | 1,777         | 1,667   | 864                | 206                               | 20               | 512              | 1,709  | 31                 |       |
| 1983 | 14,774             |          | 356           | 972     | 2,028              | 87                                | 8                | 130              | 1,117  | 13                 |       |
| 1984 | 4,433              |          | 587           | 2,234   | 1,874              | 57                                | 22               | 85               | 868    | 4                  |       |
| 1985 | 4,154              |          | 1,817         | 2,562   | 1,850              | 38                                | 9                | 67               | 1,175  | 1                  |       |
| 1986 | 7,412              |          | 1,086         | 2,914   | 1,467              | 30                                | 14               | 72               | 719    | 344                |       |
| 1987 | 8,653              |          | 1,565         | 2,198   | 880                | 30                                | 33               | 181              | 445    | 89                 |       |
| 1988 | 3,583              | 22       | 907           | 843     | 1,124              | 51                                | 30               | 106              | 498    | 32                 |       |
| 1989 | 6,077              | 113      | 754           | 748     | 903                | 37                                | 32               | 172              | 283    | 71                 |       |
| 1990 | 2,834              | 155      | 536           | 716     | 1,250              | 42                                | 27               | 267              | 455    | 132                |       |
| 1991 | 4,336              | 5,472    | 286           | 1,485   | 2,069              | 48                                | 20               | 170              | 650    | 265                |       |
| 1992 | 4,255              | 2,907    | 166           | 1,208   | 915                | 85                                | 16               | 428              | 1,081  | 288                |       |
| 1993 | 5,156              | 1,444    | 129           | 848     | 546                | 145                               | 10               | 667              | 365    | 40                 |       |
| 1994 | 7,345              | 786      | 162           | 1,158   | 4,111              | 238                               | 20               | 968              | 398    | 50                 |       |
| 1995 | 5,334              | 13,575   | 270           | 1,859   | 4,778              | 107                               | 10               | 571              | 586    | 821                |       |
| 1996 | 5,540              | 2,104    | 94            | 1,149   | 3,640              | 123                               | 9                | 778              | 570    | 102                |       |
| 1997 | 6,137              | 7,015    | 34            | 803     | 2,740              | 142                               | 12               | 1,158            | 811    | 1,054              |       |
| 1998 | 2,715              | 2,676    | 85            | 874     | 2,865              | 169                               | 10               | 1,086            | 700    | 188                |       |
| 1999 | 11,619             | 4,554    | 35            | 1,097   | 3,387              | 127                               | 17               | 1,030            | 709    | 256                |       |
| 2000 | 8,193              | 8,293    | 102           | 1,125   | 5,121              | 121                               | 7                | 832              | 689    | 1,976              | 0     |
| 2001 | 3,139              | 4,481    | 180           | 1,366   | 3,329              | 63                                | 6                | 728              | 782    | 968                | 10    |
| 2002 | 4,171              | 5,102    | 99            | 1,100   | 2,427              | 47                                | 5                | 794              | 631    | 767                | 1     |
| 2003 | 1,033              | 5,399    | 44            | 839     | 1,839              | 85                                | 12               | 1,152            | 446    | 2,141              | 0     |
| 2004 | 4,844              | 2,577    | 132           | 896     | 2,182              | 231                               | 9                | 1,616            | 514    | 636                | 0     |
| 2005 | 4,061              | 7,390    | 549           | 2,182   | 3,406              | 107                               | 14               | 1,818            | 548    | 1,085              |       |
| 2006 | 3,962              | 3,272    | 108           | 1,421   | 1,544              | 63                                | 11               | 1,058            | 777    | 949                |       |
| 2007 | 3,058              | 2,841    | 236           | 1,503   | 2,385              | 83                                | 8                | 2,226            | 1,209  | 1,054              |       |
| 2008 | 2,954              | 6,299    | 64            | 2,358   | 2,767              | 19                                | 8                | 1,476            | 1,192  | 1,536              |       |
| 2009 | 2,071              | 5,353    | 50            | (1,985) | 1,897              | ( ) <sup>7</sup>                  | ( ) <sup>7</sup> | (1,052)          | 913    | 794                |       |

<sup>1</sup> Part of Japanese catch is estimated by the WG from best available source for the stock assessment use.

<sup>2</sup> The troll catch for farming estimating 10 - 20 mt since 2000, is excluded.

<sup>3</sup> Catch statistics of Korea derived from Japanese Import statistics for 1982-1999.

<sup>4</sup> US in 1952-1958 contains catch from other countries - primarily Mexico. Other includes catches from gillnet, troll, pole-and-line, and longline

<sup>5</sup> Catches by NZ are derived from the Ministry of Fisheries, Science Group (Compilers) 2006: Report from the Fishery Assessment Plenary, May 2006: stock assessments and yield estimates. 875 p. (Unpublished report held in NIWA library,

<sup>6</sup> Other countries include AUS, Cooks, Palau and so on. Catches derived from Japanese Import Statistics as minimum estimates.

<sup>7</sup> The catch for Japanese coastal longline in 2008 includes that of the distant water and offshore longliners.

<sup>8</sup> Catches in New Zealand and Other countries since 2007 are carry-over of that in 2005

Table 2 (continued)

| Year | Chinese-Taipei |                  |          |        | United States <sup>4</sup> |       |        | Mexico      |        | non-ISC members          |                     | Grand Total |
|------|----------------|------------------|----------|--------|----------------------------|-------|--------|-------------|--------|--------------------------|---------------------|-------------|
|      | Purse Seine    | Distant Driftnet | Longline | Others | Purse Seine                | Sport | Others | Purse Seine | Others | New Zealand <sup>5</sup> | Others <sup>6</sup> |             |
| 1952 |                |                  |          |        | 2,076                      | 2     |        |             |        |                          |                     | 19,172      |
| 1953 |                |                  |          |        | 4,433                      | 48    |        |             |        |                          |                     | 20,117      |
| 1954 |                |                  |          |        | 9,537                      | 11    |        |             |        |                          |                     | 28,575      |
| 1955 |                |                  |          |        | 6,173                      | 93    |        |             |        |                          |                     | 32,005      |
| 1956 |                |                  |          |        | 5,727                      | 388   |        |             |        |                          |                     | 40,383      |
| 1957 |                |                  |          |        | 9,215                      | 73    |        |             |        |                          |                     | 36,590      |
| 1958 |                |                  |          |        | 13,934                     | 10    |        |             |        |                          |                     | 28,610      |
| 1959 |                |                  |          |        | 3,506                      | 13    | 56     | 171         | 32     |                          |                     | 20,539      |
| 1960 |                |                  |          |        | 4,547                      | 1     | 0      |             |        |                          |                     | 26,079      |
| 1961 |                |                  |          |        | 7,989                      | 23    | 16     | 130         |        |                          |                     | 31,236      |
| 1962 |                |                  |          |        | 10,769                     | 25    | 0      | 294         |        |                          |                     | 33,195      |
| 1963 |                |                  |          |        | 11,832                     | 7     | 28     | 412         |        |                          |                     | 35,481      |
| 1964 |                |                  |          |        | 9,047                      | 7     | 39     | 131         |        |                          |                     | 28,631      |
| 1965 |                |                  | 54       |        | 6,523                      | 1     | 77     | 289         |        |                          |                     | 27,224      |
| 1966 |                |                  |          |        | 15,450                     | 20    | 12     | 435         |        |                          |                     | 31,161      |
| 1967 |                |                  | 53       |        | 5,517                      | 32    | 0      | 371         |        |                          |                     | 20,745      |
| 1968 |                |                  | 33       |        | 5,773                      | 12    | 8      | 195         |        |                          |                     | 21,623      |
| 1969 |                |                  | 23       |        | 6,657                      | 15    | 9      | 260         |        |                          |                     | 16,419      |
| 1970 |                |                  |          |        | 3,873                      | 19    | 0      | 92          |        |                          |                     | 11,432      |
| 1971 |                |                  | 1        |        | 7,804                      | 8     | 0      | 555         |        |                          |                     | 17,140      |
| 1972 |                |                  | 14       |        | 11,656                     | 15    | 45     | 1,646       |        |                          |                     | 21,216      |
| 1973 |                |                  | 33       |        | 9,639                      | 54    | 21     | 1,084       |        |                          |                     | 19,619      |
| 1974 |                |                  | 47       | 15     | 5,243                      | 58    | 30     | 344         |        |                          |                     | 20,685      |
| 1975 |                |                  | 61       | 5      | 7,353                      | 34    | 84     | 2,145       |        |                          |                     | 20,948      |
| 1976 |                |                  | 17       | 2      | 8,652                      | 21    | 25     | 1,968       |        |                          |                     | 19,381      |
| 1977 |                |                  | 131      | 2      | 3,259                      | 19    | 13     | 2,186       |        |                          |                     | 18,811      |
| 1978 |                |                  | 66       | 2      | 4,663                      | 5     | 6      | 545         |        |                          |                     | 26,863      |
| 1979 |                |                  | 58       |        | 5,889                      | 11    | 6      | 213         |        |                          |                     | 31,715      |
| 1980 |                |                  | 114      | 5      | 2,327                      | 7     | 24     | 582         |        |                          |                     | 22,634      |
| 1981 |                |                  | 179      |        | 867                        | 9     | 14     | 218         |        |                          |                     | 34,641      |
| 1982 |                | 2                | 207      |        | 2,639                      | 11    | 2      | 506         |        |                          |                     | 29,387      |
| 1983 | 9              | 2                | 175      |        | 629                        | 33    | 11     | 214         |        |                          |                     | 20,557      |
| 1984 | 5              |                  | 477      | 8      | 673                        | 49    | 29     | 166         |        |                          |                     | 11,573      |
| 1985 | 80             | 11               | 210      |        | 3,320                      | 89    | 28     | 676         |        |                          |                     | 16,089      |
| 1986 | 16             | 13               | 70       |        | 4,851                      | 12    | 57     | 189         |        |                          |                     | 19,266      |
| 1987 | 21             | 14               | 365      |        | 861                        | 34    | 20     | 119         |        |                          |                     | 15,507      |
| 1988 | 197            | 37               | 108      | 25     | 923                        | 6     | 50     | 447         | 1      |                          |                     | 8,989       |
| 1989 | 259            | 51               | 205      | 3      | 1,046                      | 112   | 21     | 57          |        |                          |                     | 10,943      |
| 1990 | 149            | 299              | 189      | 16     | 1,380                      | 65    | 92     | 50          |        |                          |                     | 8,653       |
| 1991 |                | 107              | 342      | 12     | 410                        | 92    | 6      | 9           |        | 2                        |                     | 15,781      |
| 1992 | 73             | 3                | 464      | 5      | 1,928                      | 110   | 61     | 0           |        | 0                        |                     | 13,995      |
| 1993 | 1              |                  | 471      | 3      | 580                        | 298   | 103    |             |        | 6                        |                     | 10,811      |
| 1994 |                |                  | 559      |        | 906                        | 89    | 59     | 63          | 2      | 2                        |                     | 16,916      |
| 1995 |                |                  | 335      | 2      | 657                        | 258   | 49     | 11          |        | 2                        |                     | 29,225      |
| 1996 |                |                  | 956      |        | 4,639                      | 40    | 70     | 3,700       |        | 4                        |                     | 23,519      |
| 1997 |                |                  | 1,814    |        | 2,240                      | 156   | 133    | 367         |        | 14                       |                     | 24,632      |
| 1998 |                |                  | 1,910    |        | 1,771                      | 413   | 281    | 1           | 0      | 20                       |                     | 15,763      |
| 1999 |                |                  | 3,089    |        | 184                        | 441   | 184    | 2,369       | 35     | 21                       |                     | 29,153      |
| 2000 |                |                  | 2,780    | 2      | 693                        | 342   | 61     | 3,019       | 99     | 21                       |                     | 33,475      |
| 2001 |                |                  | 1,839    | 4      | 292                        | 356   | 48     | 863         |        | 50                       |                     | 18,504      |
| 2002 |                |                  | 1,523    | 4      | 50                         | 654   | 12     | 1,708       | 2      | 55                       | 10                  | 19,164      |
| 2003 |                |                  | 1,863    | 21     | 22                         | 394   | 18     | 3,211       | 43     | 41                       | 19                  | 18,622      |
| 2004 |                |                  | 1,714    | 3      |                            | 49    | 11     | 8,880       | 14     | 67                       | 10                  | 24,384      |
| 2005 |                |                  | 1,368    |        | 201                        | 79    | 7      | 4,542       |        | 20                       | 7                   | 27,384      |
| 2006 |                |                  | 1,149    |        |                            | 96    | 2      | 9,806       |        | 21                       | 3                   | 24,242      |
| 2007 |                |                  | 1,401    |        | 42                         | 14    | 2      | 4,147       |        | (21) <sup>8</sup>        | (3) <sup>8</sup>    | (20,209)    |
| 2008 |                |                  | 979      |        |                            | 93    | 1      | 4,392       | 15     | (21) <sup>8</sup>        | (3) <sup>8</sup>    | (24,153)    |
| 2009 |                |                  | 892      |        | (410)                      | (151) | (5)    | 3,019       |        | (21) <sup>8</sup>        | (3) <sup>8</sup>    | (18,953)    |

**Table 3.** Annual catch of Swordfish (*Xiphias gladius*) in metric tons for fisheries monitored by ISC for assessments of North Pacific Ocean stocks, 1951-2008. Blank indicates no effort. - indicates data not available. 0 indicates less than 1 metric ton. Provisional estimates in ().

| Year | Japan  |                  |          |                      |                    |         |                    | Chinese Taipei         |                                |                  |                 |                 |                |                             |                  |                |       |
|------|--|------------------|----------|----------------------|--------------------|---------|--------------------|------------------------|--------------------------------|------------------|-----------------|-----------------|----------------|-----------------------------|------------------|----------------|-------|
|      | Distant Water & Offshore Longline <sup>2</sup> | Coastal Longline | Driftnet | Harpoon <sup>3</sup> | Other Bait fishing | Trapnet | Other <sup>4</sup> | Distant Water Longline | Offshore <sup>5</sup> Longline | Offshore Gillnet | Offshore Others | Coastal Harpoon | Coastal Setnet | Coastal Gillnet & Other net | Coastal Longline | Coastal Others | Other |
| 1951 | 7,246  | 115              | 10       | 4,131                | 88                 | 78      | 10                 | -                      | -                              |                  |                 |                 |                |                             |                  |                |       |
| 1952 | 8,890  | 152              | 0        | 2,569                | 6                  | 68      | 6                  | -                      | -                              |                  |                 |                 |                |                             |                  |                |       |
| 1953 | 10,796   | 77               | 0        | 1,407                | 20                 | 21      | 87                 | -                      | -                              |                  |                 |                 |                |                             |                  |                |       |
| 1954 | 12,563   | 96               | 0        | 813                  | 104                | 18      | 17                 | -                      | -                              |                  |                 |                 |                |                             |                  |                |       |
| 1955 | 13,064   | 29               | 0        | 821                  | 119                | 37      | 41                 | -                      | -                              |                  |                 |                 |                |                             |                  |                |       |
| 1956 | 14,596   | 10               | 0        | 775                  | 66                 | 31      | 7                  | -                      | -                              |                  |                 |                 |                |                             |                  |                |       |
| 1957 | 14,268   | 37               | 0        | 858                  | 59                 | 18      | 11                 | -                      | -                              |                  |                 |                 |                |                             |                  |                |       |
| 1958 | 18,525   | 42               | 0        | 1,069                | 46                 | 31      | 21                 | -                      | -                              |                  |                 |                 |                |                             |                  |                |       |
| 1959 | 17,236   | 66               | 0        | 891                  | 34                 | 31      | 10                 | -                      | 427                            |                  |                 |                 |                |                             |                  |                | 91    |
| 1960 | 20,058   | 51               | 1        | 1,191                | 23                 | 67      | 7                  | -                      | 520                            |                  |                 |                 |                |                             |                  |                | 127   |
| 1961 | 19,715   | 51               | 2        | 1,335                | 19                 | 15      | 11                 | -                      | 318                            |                  |                 |                 |                |                             |                  |                | 73    |
| 1962 | 10,607   | 78               | 0        | 1,371                | 26                 | 15      | 18                 | -                      | 494                            |                  |                 |                 |                |                             |                  |                | 62    |
| 1963 | 10,322   | 98               | 0        | 747                  | 43                 | 17      | 16                 | -                      | 343                            |                  |                 |                 |                |                             |                  |                | 18    |
| 1964 | 7,669  | 91               | 4        | 1,006                | 40                 | 16      | 26                 | -                      | 358                            |                  |                 |                 |                |                             |                  |                | 10    |
| 1965 | 8,742  | 119              | 0        | 1,908                | 26                 | 14      | 182                | -                      | 331                            |                  |                 |                 |                |                             |                  |                | 27    |
| 1966 | 9,866  | 113              | 0        | 1,728                | 41                 | 11      | 4                  | -                      | 489                            |                  |                 |                 |                |                             |                  |                | 31    |
| 1967 | 10,883   | 184              | 0        | 891                  | 33                 | 12      | 5                  | -                      | 646                            |                  |                 |                 |                |                             |                  |                | 35    |
| 1968 | 9,810  | 236              | 0        | 1,539                | 41                 | 14      | 9                  | -                      | 763                            |                  |                 |                 |                |                             |                  |                | 12    |
| 1969 | 9,416  | 296              | 0        | 1,557                | 42                 | 11      | 14                 | 0                      | 843                            |                  |                 |                 |                |                             |                  |                | 7     |
| 1970 | 7,324  | 427              | 0        | 1,748                | 36                 | 9       | 3                  | -                      | 904                            |                  |                 |                 |                |                             |                  |                | 5     |
| 1971 | 7,037  | 350              | 1        | 473                  | 17                 | 37      | 31                 | -                      | 992                            |                  |                 |                 |                |                             |                  |                | 3     |
| 1972 | 6,796  | 531              | 55       | 282                  | 20                 | 1       | 2                  | -                      | 862                            |                  |                 |                 |                |                             |                  |                | 11    |
| 1973 | 7,123  | 414              | 720      | 121                  | 27                 | 23      | 2                  | -                      | 860                            |                  |                 |                 |                |                             |                  |                | 119   |
| 1974 | 5,983  | 654              | 1,304    | 190                  | 27                 | 16      | 2                  | 1                      | 880                            |                  |                 |                 |                |                             |                  |                | 136   |
| 1975 | 7,031  | 620              | 2,672    | 205                  | 58                 | 18      | 2                  | 29                     | 899                            |                  |                 |                 |                |                             |                  |                | 153   |
| 1976 | 8,054  | 750              | 3,488    | 313                  | 170                | 14      | 12                 | 23                     | 613                            |                  |                 |                 |                |                             |                  |                | 194   |
| 1977 | 8,383  | 880              | 2,344    | 201                  | 71                 | 7       | 2                  | 36                     | 542                            |                  |                 |                 |                |                             |                  |                | 141   |
| 1978 | 8,001  | 1,031            | 2,475    | 130                  | 110                | 22      | 1                  | -                      | 546                            |                  |                 |                 |                |                             |                  |                | 12    |
| 1979 | 8,602  | 1,038            | 983      | 161                  | 45                 | 15      | 4                  | 7                      | 661                            |                  |                 |                 |                |                             |                  |                | 33    |
| 1980 | 6,005  | 849              | 1,746    | 398                  | 29                 | 15      | 1                  | 10                     | 603                            |                  |                 |                 |                |                             |                  |                | 76    |
| 1981 | 7,039  | 727              | 1,848    | 129                  | 58                 | 9       | 3                  | 2                      | 656                            |                  |                 |                 |                |                             |                  |                | 25    |
| 1982 | 6,064  | 874              | 1,257    | 195                  | 58                 | 7       | 1                  | 1                      | 855                            |                  |                 |                 |                |                             |                  |                | 49    |
| 1983 | 7,692  | 999              | 1,033    | 166                  | 30                 | 9       | 2                  | 0                      | 783                            |                  |                 |                 |                |                             |                  |                | 166   |
| 1984 | 7,177  | 1,177            | 1,053    | 117                  | 98                 | 13      | 0                  | -                      | 733                            |                  |                 |                 |                |                             |                  |                | 264   |
| 1985 | 9,335  | 999              | 1,133    | 191                  | 69                 | 10      | 0                  | -                      | 566                            |                  |                 |                 |                |                             |                  |                | 259   |
| 1986 | 8,721  | 1,037            | 1,264    | 123                  | 47                 | 9       | 0                  | -                      | 456                            |                  |                 |                 |                |                             |                  |                | 211   |
| 1987 | 9,495  | 860              | 1,051    | 87                   | 45                 | 11      | 0                  | 3                      | 1,328                          |                  |                 |                 |                |                             |                  |                | 190   |
| 1988 | 8,574  | 678              | 1,234    | 173                  | 19                 | 8       | 0                  | -                      | 777                            |                  |                 |                 |                |                             |                  |                | 263   |
| 1989 | 6,690  | 752              | 1,596    | 362                  | 21                 | 10      | 0                  | 50                     | 1,491                          |                  |                 |                 |                |                             |                  |                | 38    |
| 1990 | 5,833  | 690              | 1,074    | 128                  | 13                 | 4       | 0                  | 143                    | 1,309                          |                  |                 |                 |                |                             |                  |                | 154   |
| 1991 | 4,809  | 807              | 498      | 153                  | 20                 | 5       | 0                  | 40                     | 1,390                          |                  |                 |                 |                |                             |                  |                | 180   |
| 1992 | 7,234  | 1,181            | 887      | 381                  | 16                 | 6       | 0                  | 21                     | 1,473                          |                  |                 |                 |                |                             |                  |                | 243   |
| 1993 | 8,298  | 1,394            | 292      | 309                  | 43                 | 4       | 1                  | 54                     | 1,174                          |                  |                 |                 |                |                             |                  |                | 310   |
| 1994 | 7,366  | 1,357            | 421      | 308                  | 37                 | 4       | 0                  | -                      | 1,155                          |                  |                 |                 |                |                             |                  |                | 219   |
| 1995 | 6,422  | 1,387            | 561      | 423                  | 34                 | 7       | 0                  | 50                     | 1,135                          |                  |                 |                 |                |                             |                  |                | 225   |
| 1996 | 6,916  | 1,067            | 428      | 597                  | 45                 | 4       | 0                  | 9                      | 701                            | 2                | -               | 19              | 10             | -                           | -                | -              |       |
| 1997 | 7,002  | 1,214            | 365      | 346                  | 62                 | 5       | 0                  | 15                     | 1,358                          | 1                | 1               | 27              | 8              | -                           | 24               | -              |       |
| 1998 | 6,233  | 1,190            | 471      | 476                  | 68                 | 2       | 0                  | 20                     | 1,178                          | 8                | -               | 17              | 15             | 1                           | -                | -              |       |
| 1999 | 5,557  | 1,049            | 724      | 416                  | 47                 | 5       | 0                  | 70                     | 1,385                          | 4                | -               | 51              | 5              | 1                           | -                | -              |       |
| 2000 | 6,180  | 1,121            | 808      | 497                  | 49                 | 5       | 0                  | 325                    | 1,531                          | 5                | -               | 74              | 5              | 1                           | 1                | -              |       |
| 2001 | 6,932  | 908              | 732      | 230                  | 30                 | 15      | 0                  | 1,039                  | 1,691                          | 17               | -               | 64              | 8              | 1                           | 1                | -              |       |
| 2002 | 6,230  | 965              | 1,164    | 201                  | 29                 | 11      | 0                  | 1,633                  | 1,557                          | 7                | 1               | 1               | 16             | 1                           | 1                | -              |       |
| 2003 | 5,376  | 1,063            | 1,198    | 149                  | 28                 | 4       | 0                  | 1,084                  | 2,196                          | 3                | -               | -               | 8              | -                           | -                | -              |       |
| 2004 | 5,395  | 1,509            | 1,062    | 229                  | 30                 | 4       | 0                  | 884                    | 1,828                          | 5                | -               | -               | 7              | 1                           | -                | 3              |       |
| 2005 | 5,359  | 1,295            | 956      | 187                  | 337                | 3       | 0                  | 437                    | 1,813                          | 1                | -               | -               | 5              | 2                           | -                | 18             |       |
| 2006 | 6,181  | 1,508            | 796      | 244                  | 342                | 5       | 1                  |                        |                                |                  |                 |                 |                |                             |                  |                |       |
| 2007 | (6,109)  | (2,017)          | (829)    | (122)                | (367)              | (2)     | (1)                |                        |                                |                  |                 |                 |                |                             |                  |                |       |
| 2008 | (4,426)  | (1,758)          | (648)    | (173)                | (349)              | (3)     | (0)                |                        |                                |                  |                 |                 |                |                             |                  |                |       |

<sup>1</sup> Catch data are currently unavailable for Republic of Korea, Philippines, and some other countries catching swordfish in the North Pacific.

<sup>2</sup> Catches by gear for 1952-1970 were estimated roughly using FAO statistics and other data. Catches for 1971-2002 are more reliably estimated.

<sup>3</sup> Contrains trolling and harpoon but majority of catch obtained by harpoon.

<sup>4</sup> For 1952-1970 "Other" refers to catches by net fishing and various unspecified gears.

<sup>5</sup> Offshore longline category includes some catches from harpoon and other fisheries but does not include catches unloaded in foreign ports.

<sup>6</sup> Estimated round weight of retained catch. Does not include discards.

<sup>7</sup> Unknown includes pole and line, purse seine, troll and troll/handline, half ring, and unspecified gears.

Table 3 (continued)

| Year | Korea    |                  | Mexico    | United States   |                     |                     |                    |                                 | Grand Total |
|------|----------|------------------|-----------|-----------------|---------------------|---------------------|--------------------|---------------------------------|-------------|
|      | Longline | Hi-seas Driftnet | All Gears | Hawaii Longline | California Longline | California Gill Net | California Harpoon | California Unknown <sup>7</sup> |             |
| 1951 |          |                  |           |                 |                     |                     |                    |                                 | 11,678      |
| 1952 | -        |                  | -         | -               | -                   | -                   | -                  | -                               | 11,691      |
| 1953 | -        |                  | -         | -               | -                   | -                   | -                  | -                               | 12,408      |
| 1954 | -        |                  | -         | -               | -                   | -                   | -                  | -                               | 13,610      |
| 1955 | -        |                  | -         | -               | -                   | -                   | -                  | -                               | 14,111      |
| 1956 | -        |                  | -         | -               | -                   | -                   | -                  | -                               | 15,486      |
| 1957 | -        |                  | -         | -               | -                   | -                   | -                  | -                               | 15,251      |
| 1958 | -        |                  | -         | -               | -                   | -                   | -                  | -                               | 19,734      |
| 1959 | -        |                  | -         | -               | -                   | -                   | -                  | -                               | 18,785      |
| 1960 | -        |                  | -         | -               | -                   | -                   | -                  | -                               | 22,047      |
| 1961 | -        |                  | -         | -               | -                   | -                   | -                  | -                               | 21,538      |
| 1962 | -        |                  | -         | -               | -                   | -                   | -                  | -                               | 12,671      |
| 1963 | -        |                  | -         | -               | -                   | -                   | -                  | -                               | 11,605      |
| 1964 | -        |                  | -         | -               | -                   | -                   | -                  | -                               | 9,220       |
| 1965 | -        |                  | -         | -               | -                   | -                   | -                  | -                               | 11,349      |
| 1966 | -        |                  | -         | -               | -                   | -                   | -                  | -                               | 12,283      |
| 1967 | -        |                  | -         | -               | -                   | -                   | -                  | -                               | 12,689      |
| 1968 | -        |                  | -         | -               | -                   | -                   | -                  | -                               | 12,424      |
| 1969 | -        |                  | -         | -               | -                   | -                   | -                  | -                               | 12,186      |
| 1970 | -        |                  | -         | 5               | -                   | -                   | 612                | 10                              | 11,083      |
| 1971 | 0        |                  | -         | 1               | -                   | -                   | 99                 | 3                               | 9,044       |
| 1972 | 0        |                  | 2         | 0               | -                   | -                   | 171                | 4                               | 8,737       |
| 1973 | 0        |                  | 4         | 0               | -                   | -                   | 399                | 4                               | 9,816       |
| 1974 | 0        |                  | 6         | 0               | -                   | -                   | 406                | 22                              | 9,627       |
| 1975 | 0        |                  | -         | 0               | -                   | -                   | 557                | 13                              | 12,257      |
| 1976 | 0        |                  | -         | 0               | -                   | -                   | 42                 | 13                              | 13,686      |
| 1977 | 219      |                  | -         | 17              | -                   | -                   | 318                | 19                              | 13,180      |
| 1978 | 68       |                  | -         | 9               | -                   | -                   | 1,699              | 13                              | 14,117      |
| 1979 | -        |                  | 7         | 7               | -                   | -                   | 329                | 57                              | 11,949      |
| 1980 | 64       |                  | 380       | 5               | -                   | 160                 | 566                | 62                              | 10,969      |
| 1981 | -        |                  | 1,575     | 3               | 0                   | 473                 | 271                | 2                               | 12,820      |
| 1982 | 48       |                  | 1,365     | 5               | 0                   | 945                 | 156                | 10                              | 11,890      |
| 1983 | 11       |                  | 120       | 5               | 0                   | 1,693               | 58                 | 7                               | 12,774      |
| 1984 | 48       |                  | 47        | 3               | 12                  | 2,647               | 104                | 75                              | 13,568      |
| 1985 | 24       |                  | 18        | 2               | 0                   | 2,990               | 305                | 104                             | 16,005      |
| 1986 | 9        |                  | 422       | 2               | 0                   | 2,069               | 291                | 109                             | 14,770      |
| 1987 | 44       |                  | 550       | 24              | 0                   | 1,529               | 235                | 31                              | 15,483      |
| 1988 | 27       |                  | 613       | 24              | 0                   | 1,376               | 198                | 64                              | 14,028      |
| 1989 | 40       |                  | 690       | 218             | 0                   | 1,243               | 62                 | 56                              | 13,319      |
| 1990 | 61       |                  | 2,650     | 2,436           | 0                   | 1,131               | 64                 | 43                              | 15,733      |
| 1991 | 5        |                  | 861       | 4,508           | 27                  | 944                 | 20                 | 44                              | 14,311      |
| 1992 | 8        |                  | 1,160     | 5,700           | 62                  | 1,356               | 75                 | 47                              | 19,850      |
| 1993 | 15       |                  | 812       | 5,909           | 27                  | 1,412               | 168                | 161                             | 20,383      |
| 1994 | 66       |                  | 581       | 3,176           | 631                 | 792                 | 157                | 24                              | 16,294      |
| 1995 | 10       |                  | 437       | 2,713           | 268                 | 771                 | 97                 | 29                              | 14,569      |
| 1996 | 15       |                  | 439       | 2,502           | 346                 | 761                 | 81                 | 15                              | 13,957      |
| 1997 | 100      |                  | 2,365     | 2,881           | 512                 | 708                 | 84                 | 11                              | 17,089      |
| 1998 | 153      |                  | 3,603     | 3,263           | 418                 | 931                 | 48                 | 19                              | 18,114      |
| 1999 | 132      |                  | 1,136     | 3,100           | 1,229               | 606                 | 81                 | 27                              | 15,625      |
| 2000 | 202      |                  | 2,216     | 2,949           | 1,885               | 646                 | 90                 | 9                               | 18,599      |
| 2001 | 438      |                  | 780       | 220             | 1,749               | 375                 | 52                 | 5                               | 15,287      |
| 2002 | 439      |                  | 465       | 204             | 1,320               | 302                 | 90                 | 3                               | 14,640      |
| 2003 | 381      |                  | 671       | 147             | 1,812               | 216                 | 107                | 0                               | 14,443      |
| 2004 | 410      |                  | 270       | 213             | 898                 | 169                 | 62                 | 37                              | 13,016      |
| 2005 | 434      |                  | 235       | 1,475           |                     | 220                 | 76                 | 0                               | 12,853      |
| 2006 | 477      |                  | 347       | 1,175           |                     | 444                 | 71                 | 2                               | 11,593      |
| 2007 | 452      |                  | 383       | 1,444           |                     | 484                 | 58                 | 0                               | (12,267)    |
| 2008 |          |                  | (84)      |                 |                     |                     |                    |                                 | (7,441)     |



**Table 4.** Annual catch of striped marlin (*Kajikia audax*) in metric tons for fisheries monitored by ISC for assessments of North Pacific Ocean stocks, 1951-2008. Blank indicates no effort. - indicates data not available, 0 indicates less than 1 metric ton. Provisional estimates in ().

| Year | Japan                             |                  |                |                     |                     |                    | Chinese Taipei         |                        |                   |                  |                 |                 |                |                             |                  |                |       |
|------|-----------------------------------|------------------|----------------|---------------------|---------------------|--------------------|------------------------|------------------------|-------------------|------------------|-----------------|-----------------|----------------|-----------------------------|------------------|----------------|-------|
|      | Distant Water & Offshore Longline | Coastal Longline | Other Longline | Gill Net Small Mesh | Gill Net Large Mesh | Other <sup>2</sup> | Distant Water Longline | High-sea Drift Gillnet | Offshore Longline | Offshore Gillnet | Offshore Others | Coastal Harpoon | Coastal Setnet | Coastal Gillnet & Other net | Coastal Longline | Coastal Others | Other |
| 1951 | 2,494                             | -                | 673            | -                   | 0                   | 1,281              |                        |                        |                   |                  |                 |                 |                |                             |                  |                |       |
| 1952 | 2,901                             | -                | 722            | -                   | 0                   | 1,564              |                        |                        |                   |                  |                 |                 |                |                             |                  |                |       |
| 1953 | 2,138                             | -                | 47             | -                   | 0                   | 954                |                        |                        |                   |                  |                 |                 |                |                             |                  |                |       |
| 1954 | 3,068                             | -                | 52             | -                   | 0                   | 1,088              |                        |                        |                   |                  |                 |                 |                |                             |                  |                |       |
| 1955 | 3,082                             | -                | 28             | -                   | 0                   | 1,038              |                        |                        |                   |                  |                 |                 |                |                             |                  |                |       |
| 1956 | 3,729                             | -                | 59             | -                   | 0                   | 1,996              |                        |                        |                   |                  |                 |                 |                |                             |                  |                |       |
| 1957 | 3,189                             | -                | 119            | -                   | 0                   | 2,459              |                        |                        |                   |                  |                 |                 |                |                             |                  |                |       |
| 1958 | 4,106                             | -                | 277            | -                   | 3                   | 2,914              |                        |                        | 543               |                  |                 |                 |                |                             |                  |                | 387   |
| 1959 | 4,152                             | -                | 156            | -                   | 2                   | 3,191              |                        |                        | 391               |                  |                 |                 |                |                             |                  |                | 354   |
| 1960 | 3,862                             | -                | 101            | -                   | 4                   | 1,937              |                        |                        | 398               |                  |                 |                 |                |                             |                  |                | 350   |
| 1961 | 4,420                             | -                | 169            | -                   | 2                   | 1,797              |                        |                        | 306               |                  |                 |                 |                |                             |                  |                | 342   |
| 1962 | 5,739                             | -                | 110            | -                   | 8                   | 1,912              |                        |                        | 332               |                  |                 |                 |                |                             |                  |                | 211   |
| 1963 | 6,135                             | -                | 62             | -                   | 17                  | 1,910              |                        |                        | 560               |                  |                 |                 |                |                             |                  |                | 199   |
| 1964 | 14,304                            | -                | 42             | -                   | 2                   | 2,344              |                        |                        | 392               |                  |                 |                 |                |                             |                  |                | 175   |
| 1965 | 11,602                            | -                | 19             | 0                   | 1                   | 2,794              |                        |                        | 355               |                  |                 |                 |                |                             |                  |                | 157   |
| 1966 | 8,419                             | -                | 112            | 0                   | 2                   | 1,570              |                        |                        | 370               |                  |                 |                 |                |                             |                  |                | 180   |
| 1967 | 11,698                            | -                | 127            | 0                   | 3                   | 1,551              | 2                      |                        | 385               |                  |                 |                 |                |                             |                  |                | 204   |
| 1968 | 15,913                            | -                | 230            | 0                   | 0                   | 1,043              | 1                      |                        | 332               |                  |                 |                 |                |                             |                  |                | 208   |
| 1969 | 8,544                             | 600              | 3              | 0                   | 3                   | 2,668              | 2                      |                        | 571               |                  |                 |                 |                |                             |                  |                | 192   |
| 1970 | 12,996                            | 690              | 181            | 0                   | 3                   | 1,032              | 0                      |                        | 495               |                  |                 |                 |                |                             |                  |                | 189   |
| 1971 | 10,965                            | 667              | 259            | 0                   | 10                  | 2,042              | 0                      |                        | 449               |                  |                 |                 |                |                             |                  |                | 135   |
| 1972 | 7,006                             | 837              | 145            | 0                   | 243                 | 993                | 9                      |                        | 380               |                  |                 |                 |                |                             |                  |                | 126   |
| 1973 | 6,357                             | 632              | 118            | 0                   | 3,265               | 702                | 1                      |                        | 568               |                  |                 |                 |                |                             |                  |                | 139   |
| 1974 | 6,700                             | 327              | 49             | 0                   | 3,112               | 775                | 24                     |                        | 650               |                  |                 |                 |                |                             |                  |                | 118   |
| 1975 | 5,281                             | 286              | 38             | 0                   | 6,534               | 686                | 64                     |                        | 732               |                  |                 |                 |                |                             |                  |                | 96    |
| 1976 | 5,136                             | 244              | 34             | 0                   | 3,561               | 585                | 32                     |                        | 347               |                  |                 |                 |                |                             |                  |                | 140   |
| 1977 | 3,019                             | 256              | 15             | 0                   | 4,424               | 547                | 17                     |                        | 524               |                  |                 |                 |                |                             |                  |                | 219   |
| 1978 | 3,957                             | 243              | 27             | 0                   | 5,593               | 546                | 0                      |                        | 618               |                  |                 |                 |                |                             |                  |                | 78    |
| 1979 | 5,561                             | 366              | 21             | 0                   | 2,532               | 526                | 26                     |                        | 432               |                  |                 |                 |                |                             |                  |                | 122   |
| 1980 | 6,378                             | 607              | 5              | 0                   | 3,467               | 536                | 61                     |                        | 223               |                  |                 |                 |                |                             |                  |                | 132   |
| 1981 | 4,106                             | 259              | 12             | 0                   | 3,866               | 542                | 17                     |                        | 491               |                  |                 |                 |                |                             |                  |                | 95    |
| 1982 | 5,383                             | 270              | 13             | 0                   | 2,351               | 656                | 7                      |                        | 397               |                  |                 |                 |                |                             |                  |                | 138   |
| 1983 | 3,722                             | 320              | 10             | 22                  | 1,845               | 827                | 0                      |                        | 555               |                  |                 |                 |                |                             |                  |                | 214   |
| 1984 | 3,506                             | 386              | 9              | 76                  | 2,257               | 719                | 0                      |                        | 965               |                  |                 |                 |                |                             |                  |                | 330   |
| 1985 | 3,897                             | 711              | 24             | 40                  | 2,323               | 733                | 0                      |                        | 513               |                  |                 |                 |                |                             |                  |                | 181   |
| 1986 | 6,402                             | 901              | 33             | 48                  | 3,536               | 577                | 0                      |                        | 179               |                  |                 |                 |                |                             |                  |                | 148   |
| 1987 | 7,538                             | 1,187            | 6              | 32                  | 1,856               | 513                | 31                     |                        | 383               |                  |                 |                 |                |                             |                  |                | 151   |
| 1988 | 6,271                             | 752              | 7              | 54                  | 2,157               | 668                | 7                      |                        | 457               |                  |                 |                 |                |                             |                  |                | 169   |
| 1989 | 4,740                             | 1,081            | 13             | 102                 | 1,562               | 537                | 8                      |                        | 184               |                  |                 |                 |                |                             |                  |                | 157   |
| 1990 | 2,368                             | 1,125            | 3              | 19                  | 1,926               | 545                | 2                      |                        | 137               |                  |                 |                 |                |                             |                  |                | 256   |
| 1991 | 2,845                             | 1,197            | 3              | 27                  | 1,302               | 507                | 36                     |                        | 254               |                  |                 |                 |                |                             |                  |                | 286   |
| 1992 | 2,955                             | 1,247            | 10             | 35                  | 1,169               | 303                | 1                      |                        | 219               |                  |                 |                 |                |                             |                  |                | 197   |
| 1993 | 3,476                             | 1,723            | 1              | -                   | 828                 | 708                | 5                      |                        | 221               |                  |                 |                 |                |                             |                  |                | 142   |
| 1994 | 2,911                             | 1,284            | 1              | -                   | 1,443               | 383                | 1                      |                        | 137               |                  |                 |                 |                |                             |                  |                | 196   |
| 1995 | 3,494                             | 1,840            | 3              | -                   | 970                 | 283                | 27                     |                        | 83                |                  |                 |                 |                |                             |                  |                | 82    |
| 1996 | 1,951                             | 1,836            | 4              | -                   | 703                 | 152                | 26                     |                        | 162               | 8                | 6               | 30              | 3              | -                           | -                | -              |       |
| 1997 | 2,120                             | 1,400            | 3              | -                   | 813                 | 163                | 59                     |                        | 290               | 9                | -               | 33              | 3              | -                           | 2                | -              |       |
| 1998 | 1,784                             | 1,975            | 2              | -                   | 1,092               | 304                | 90                     |                        | 205               | 15               | -               | 19              | 6              | 1                           | 9                | -              |       |
| 1999 | 1,608                             | 1,551            | 4              | -                   | 1,126               | 184                | 66                     |                        | 128               | 7                | -               | 26              | 5              | 1                           | 3                | -              |       |
| 2000 | 1,152                             | 1,109            | 8              | -                   | 1,062               | 297                | 153                    |                        | 161               | 17               | 1               | 29              | 6              | 1                           | 1                | -              |       |
| 2001 | 985                               | 1,326            | 11             | -                   | 1,077               | 237                | 121                    |                        | 129               | 16               | -               | 30              | 5              | -                           | -                | -              |       |
| 2002 | 764                               | 796              | 5              | -                   | 1,264               | 290                | 251                    |                        | 226               | 14               | -               | 6               | 8              | 1                           | -                | -              |       |
| 2003 | 1,013                             | 842              | 3              | -                   | 1,064               | 203                | 241                    |                        | 91                | 26               | -               | 11              | 5              | 1                           | -                | -              |       |
| 2004 | 699                               | 1,000            | 2              | -                   | 1,339               | 92                 | 261                    |                        | 95                | 8                | 1               | 7               | 5              | 2                           | -                | 1              |       |
| 2005 | 562                               | 668              | 1              | -                   | 1,214               | 98                 | 176                    |                        | 76                | 1                | -               | 5               | 9              | 9                           | -                | 8              |       |
| 2006 | 623                               | 539              | 1              | -                   | 1,190               | 95                 |                        |                        |                   |                  |                 |                 |                |                             |                  |                |       |
| 2007 | (306)                             | (860)            | (5)            | (-)                 | (970)               | (79)               |                        |                        |                   |                  |                 |                 |                |                             |                  |                |       |
| 2008 | (394)                             | (606)            | (10)           | (-)                 | (1,302)             | (97)               |                        |                        |                   |                  |                 |                 |                |                             |                  |                |       |

<sup>1</sup> Estimated from catch in number of fish

<sup>2</sup> Contrains bait fishing, net fishing, trapnet, trolling, harpoon, etc.

Table 4 (continued)

| Year | Costa Rica         | Korea    |                       | Mexico   |                    | United States |       |          |                    | Grand Total |
|------|--------------------|----------|-----------------------|----------|--------------------|---------------|-------|----------|--------------------|-------------|
|      | Sport <sup>1</sup> | Longline | Hi-seas Drift Gillnet | Longline | Sport <sup>1</sup> | Longline      | Troll | Handline | Sport <sup>1</sup> |             |
| 1951 |                    |          |                       |          |                    |               |       |          |                    | 4,448       |
| 1952 |                    | -        |                       |          |                    |               |       |          | 23                 | 5,210       |
| 1953 |                    | -        |                       |          |                    |               |       |          | 5                  | 3,144       |
| 1954 |                    | -        |                       |          |                    |               |       |          | 16                 | 4,223       |
| 1955 |                    | -        |                       |          |                    |               |       |          | 5                  | 4,153       |
| 1956 |                    | -        |                       |          |                    |               |       |          | 34                 | 5,819       |
| 1957 |                    | -        |                       |          |                    |               |       |          | 42                 | 5,809       |
| 1958 |                    | -        |                       |          |                    |               |       |          | 59                 | 8,289       |
| 1959 |                    | -        |                       |          |                    |               |       |          | 65                 | 8,311       |
| 1960 |                    | -        |                       |          |                    |               |       |          | 30                 | 6,682       |
| 1961 |                    | -        |                       |          |                    |               |       |          | 24                 | 7,060       |
| 1962 |                    | -        |                       |          |                    |               |       |          | 5                  | 8,317       |
| 1963 |                    | -        |                       |          |                    |               |       |          | 68                 | 8,951       |
| 1964 |                    | -        |                       |          |                    |               |       |          | 58                 | 17,317      |
| 1965 |                    | -        |                       |          |                    |               |       |          | 23                 | 14,951      |
| 1966 |                    | -        |                       |          |                    |               |       |          | 36                 | 10,689      |
| 1967 |                    | -        |                       |          |                    |               |       |          | 49                 | 14,019      |
| 1968 |                    | -        |                       |          |                    |               |       |          | 51                 | 17,778      |
| 1969 |                    | -        |                       |          |                    |               |       |          | 30                 | 12,613      |
| 1970 |                    | -        |                       |          |                    |               |       |          | 18                 | 15,604      |
| 1971 |                    | 0        |                       |          |                    |               |       |          | 17                 | 14,544      |
| 1972 |                    | 0        |                       |          |                    |               |       |          | 21                 | 9,760       |
| 1973 |                    | 0        |                       |          |                    |               |       |          | 9                  | 11,791      |
| 1974 |                    | 0        |                       |          |                    |               |       |          | 55                 | 11,810      |
| 1975 |                    | 0        |                       |          |                    |               |       |          | 27                 | 13,744      |
| 1976 |                    | 0        |                       |          |                    |               |       |          | 31                 | 10,110      |
| 1977 |                    | 43       |                       |          |                    |               |       |          | 41                 | 9,105       |
| 1978 |                    | 28       |                       |          |                    |               |       |          | 37                 | 11,127      |
| 1979 |                    | -        |                       |          |                    |               |       |          | 36                 | 9,622       |
| 1980 |                    | 37       |                       |          |                    |               |       |          | 33                 | 11,479      |
| 1981 |                    | -        |                       |          |                    |               |       |          | 60                 | 9,448       |
| 1982 |                    | 39       |                       |          |                    |               |       |          | 41                 | 9,295       |
| 1983 |                    | 19       |                       |          |                    |               |       |          | 39                 | 7,573       |
| 1984 |                    | 23       |                       |          |                    |               |       |          | 36                 | 8,307       |
| 1985 |                    | 16       |                       |          |                    |               | 18    |          | 42                 | 8,498       |
| 1986 |                    | 61       |                       | -        |                    |               | 19    |          | 19                 | 11,923      |
| 1987 |                    | 1        |                       | -        |                    | 272           | 30    | 1        | 28                 | 12,029      |
| 1988 |                    | 11       |                       | -        |                    | 504           | 54    |          | 30                 | 11,141      |
| 1989 |                    | 26       |                       | -        |                    | 612           | 24    | 0        | 52                 | 9,098       |
| 1990 |                    | 315      |                       | -        | 181                | 538           | 27    | 0        | 23                 | 7,465       |
| 1991 | 106                | 141      |                       | -        | 75                 | 663           | 41    | 0        | 12                 | 7,495       |
| 1992 | 281                | 318      |                       | -        | 142                | 459           | 38    | 1        | 25                 | 7,400       |
| 1993 | 438                | 388      |                       | -        | 159                | 471           | 68    | 1        | 11                 | 8,640       |
| 1994 | 521                | 1,045    |                       | -        | 179                | 326           | 35    | 0        | 17                 | 8,479       |
| 1995 | 153                | 307      |                       | -        | 190                | 543           | 52    | 0        | 14                 | 8,041       |
| 1996 | 122                | 429      |                       | -        | 237                | 418           | 54    | 1        | 20                 | 6,162       |
| 1997 | 138                | 1,017    |                       | -        | 193                | 352           | 38    | 1        | 21                 | 6,655       |
| 1998 | 144                | 635      |                       | -        | 345                | 378           | 26    | 0        | 23                 | 7,053       |
| 1999 | 166                | 433      |                       | -        | 266                | 364           | 28    | 1        | 12                 | 5,979       |
| 2000 | 97                 | 537      |                       | -        | 312                | 200           | 14    | 1        | 10                 | 5,168       |
| 2001 | 151                | 254      |                       | -        | 237                | 351           | 42    | 2        |                    | 4,974       |
| 2002 | 76                 | 188      |                       | -        | 305                | 226           | 30    | 0        |                    | 4,450       |
| 2003 | 79                 | 206      |                       | -        | 322                | 552           | 29    | 0        |                    | 4,687       |
| 2004 | (19)               | 75       |                       | -        | -                  | 376           | 34    | 1        |                    | 4,017       |
| 2005 | -                  | 141      |                       | -        | -                  | 493           | 20    | 0        |                    | 3,481       |
| 2006 | -                  | 56       |                       | -        | -                  | 609           | 21    | 0        |                    | (3,134)     |
| 2007 | -                  | 28       |                       | -        | -                  | 265           | 13    | 0        |                    | (2,526)     |
| 2008 | -                  | -        |                       | -        | -                  | -             | -     | -        | -                  | (2409)      |