



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

PLENARY SESSION

15-20 July 2015
Kona, Hawaii
United States of America

TABLE OF CONTENTS

| | | |
|-----------|---|-----------|
| 1 | INTRODUCTION AND OPENING OF THE MEETING | 12 |
| 1.1 | INTRODUCTION | 12 |
| 1.2 | OPENING OF THE MEETING | 12 |
| 2 | ADOPTION OF AGENDA | 13 |
| 3 | DELEGATION REPORTS ON FISHERY MONITORING, DATA COLLECTION AND RESEARCH | 13 |
| 3.1 | CANADA | 13 |
| 3.2 | CHINESE-TAIPEI | 14 |
| 3.3 | JAPAN | 15 |
| 3.4 | KOREA..... | 16 |
| 3.5 | MEXICO | 17 |
| 3.6 | U.S.A. | 18 |
| 4 | REPORT OF CHAIRMAN | 19 |
| 5 | INTERACTIONS WITH REGIONAL ORGANIZATIONS..... | 20 |
| 5.1 | WCPFC..... | 20 |
| 5.2 | PICES | 21 |
| 6 | REPORT OF WORKING GROUPS AND REVIEW OF ASSIGNMENTS..... | 22 |
| 6.1 | ALBACORE | 22 |
| 6.2 | PACIFIC BLUEFIN TUNA..... | 23 |
| 6.3 | BILLFISH..... | 25 |
| 6.4 | SHARK..... | 26 |
| 6.5 | MANAGEMENT STRATEGY EVALUATION (MSE) WORKSHOP | 28 |
| 7 | STOCK STATUS AND CONSERVATION ADVICE | 29 |
| 7.1 | ALBACORE | 29 |
| 7.2 | PACIFIC BLUEFIN TUNA..... | 33 |
| 7.3 | BLUE MARLIN | 35 |
| 7.5 | STRIPED MARLIN | 36 |
| 7.6 | SWORDFISH | 46 |
| 7.7 | BLUE SHARK..... | 52 |
| 7.8 | SHORTFIN MAKO SHARK | 53 |
| 8 | REVIEW OF STOCK STATUS OF SECONDARY STOCKS | 56 |
| 8.1 | EPO BIGEYE, YELLOWFIN, SKIPJACK TUNAS..... | 56 |
| 8.2 | WPO BIGEYE, SKIPJACK, YELLOWFIN TUNAS..... | 57 |
| 9 | REVIEW OF STATISTICS AND DATA BASE ISSUES | 58 |
| 9.1 | REPORT OF THE STATWG | 58 |
| 9.2 | DATA SUBMISSION REPORT CARD..... | 59 |
| 9.3 | TOTAL CATCH TABLES | 60 |
| 10 | REPORT OF THE SEMINAR..... | 61 |
| 11 | REVIEW OF MEETING SCHEDULE | 61 |

ISC15, July 15-20, 2015

| | | |
|-----------|---|-----------|
| 11.1 | TIME AND PLACE OF ISC16 | 61 |
| 11.2 | TIME AND PLACE OF WORKING GROUP INTERSESSIONAL MEETINGS | 62 |
| 12 | ADMINISTRATIVE MATTERS | 62 |
| 12.1 | FORMALIZATION OF ISC | 62 |
| 12.2 | PEER REVIEW OF FUNCTION AND PROCESS AND STOCK ASSESSMENTS | 63 |
| 12.3 | UPCOMING ELECTION OF THE ISC CHAIR | 63 |
| 12.4 | ORGANIZATIONAL CHART AND CONTACT PERSONS | 65 |
| 12.5 | PROCESS FOR HANDLING REQUESTS FROM OTHER ORGANIZATIONS | 65 |
| 12.6 | OTHER BUSINESS | 65 |
| 13 | ADOPTION OF REPORT | 66 |
| 14 | CLOSE OF MEETING | 66 |
| 15 | CATCH TABLES | 67 |

LIST OF TABLES

Table 7-1. Reported catch (mt), population biomass (mt), spawning stock biomass (mt), relative spawning biomass (SSB/SSB_{MSY}), recruitment (thousands), fishing mortality (average of ages 3 and older), relative fishing mortality (F/F_{MSY}), exploitation rate, and spawning potential ratio of WCNPO striped marlin.....38

Table 7-2. Decision table of projected percentiles of relative spawning stock biomass in 2020 relative to 2015 (SSB_{2020}/SSB_{2015}) for alternative states of nature (columns) and harvest scenarios (rows). Fishing intensity ($F_{x\%}$) alternatives are based on 10% (average 2001-2003), 12% (average 2010-2012 defined as current), 18% (MSY level), 20%, 30%, and 100% (no fishing). Catch alternatives are based on the 70%, 80%, and 90% of average catches during 2010-2012 (2,216; 2,533; and 2,849 mt), and 80% of average catches during 2000-2003 (3,490 mt). Red blocks indicate the declining trend of SSB in 2020 from 2015 where SSB_{2020}/SSB_{2015} is less than one.....40

Table 7-3. Projected trajectory of catch (mt) for alternative states of nature (columns) and harvest scenarios (rows). Fishing intensity ($F_{x\%}$) alternatives are based on 10% (average 2001-2003), 12% (average 2010-2012 defined as current), 18% (MSY level), 20%, 30%, and 100% (no fishing). Catch alternatives are based on the 70%, 80%, and 90% of average catches during 2010-2012 (2,216; 2,533; and 2,849 mt), and 80% of average catches during 2000-2003 (3,490 mt).....41

Table 7-4. Projected trajectory of median spawning stock biomass (SSB in mt) for alternative states of nature (columns) and harvest scenarios (rows). Fishing intensity ($F_{x\%}$) alternatives are based on 10% (average 2001-2003), 12% (average 2010-2012 defined as current), 18% (MSY level), 20%, 30%, and 100% (no fishing). Catch alternatives are based on the 70%, 80%, and 90% of average catches during 2010-2012 (2,216; 2,533; and 2,849 mt), and 80% of average catches during 2000-2003 (3,490 mt). Green blocks indicate the projected SSB is greater than MSY level ($SSB_{MSY} = 2,819$ mt).....42

Table 11-1. Schedule of working group meetings.....62

| | |
|--|----|
| Table 15-1. North Pacific albacore catches (in metric tons) by fisheries, 1952-2012. “0”; Fishing effort was reported but no catch. “+”; Bellow 499kg catch. “-”; Unreported catch or catch information not available. *: Data from the most recent years are provisional. | 67 |
| Table 15-2. Pacific bluefin tuna catches (in metric tons) by fisheries, 1952-2012. “0”; Fishing effort was reported but no catch. “+”; Bellow 499kg catch. “-”; Unreported catch or catch information not available. *: Data from the most recent years are provisional. | 69 |
| Table 15-3. Annual catch of swordfish (<i>Xiphias gladius</i>) in metric tons for fisheries monitored by ISC for assessments of North Pacific Ocean stocks, 1951-2010. “0”; Fishing effort was reported but no catch. “+”; Bellow 499kg catch. “-”; Unreported catch or catch information not available. *: Data from the most recent years are provisional. | 71 |
| Table 15-4. Annual catch of striped marlin (<i>Kajikia audax</i>) in metric tons for fisheries monitored by ISC for assessments of North Pacific Ocean stocks, 1951-2011 “0”; Fishing effort was reported but no catch. “+”; Bellow 499kg catch. “-”; Unreported catch or catch information not available. *: Data from the most recent years are provisional. | 73 |
| Table 15-5. Retained catches (metric tons, whole weight) of ISC members of blue marlin (<i>Makaira nigricans</i>) by fishery in the North Pacific Ocean, north of the equator. “0”; Fishing effort was reported but no catch. “+”; Bellow 499kg catch. “-”; Unreported catch or catch information not available. *: Data from the most recent years are provisional. | 74 |
| Table 15-6. Retained catches (metric tons, whole weight) of ISC members of blue sharks (<i>Prionace glauca</i>) by fishery in the North Pacific Ocean, north of the equator. “0”; Fishing effort was reported but no catch. “+”; Bellow 499kg catch. “-”; Unreported catch or catch information not available. *: Data from the most recent years are provisional. | 75 |
| Table 15-7. Retained catches (metric tons, whole weight) of ISC members of shortfin mako sharks (<i>Isurus oxyrinchus</i>) by fishery in the North Pacific Ocean, north of the equator. “0”; Fishing effort was reported but no catch. “+”; Bellow 499kg catch. “-”; Unreported catch or catch information not available. *: Data from the most recent years are provisional. | 76 |

LIST OF FIGURES

| | |
|---|----|
| Figure 7-1. Estimated total age-1+ biomass (A), female spawning biomass (B), and age-0 recruitment (C) of North Pacific albacore tuna (<i>Thunnus alalunga</i>) including unfished biomass and recruitment estimates (closed circles). The open circles represent the maximum likelihood estimates of each quantity and the dashed lines in the SSB. (B) and recruitment (C) plots are the 95% asymptotic intervals of the estimates (± 2 standard deviations) in lognormal (SSB – B) and arithmetic (recruitment – C) space. Since the assessment model represents time on a quarterly basis, there are four estimates of total biomass (A) for each year, but only one annual estimate of spawning biomass (B) and recruitment (C). | 30 |
| Figure 7-2 Alternative Kobe plots showing North Pacific albacore (<i>Thunnus alalunga</i>) stock status based on $F_{2010-2012}$ relative to MSY-based reference points (top left) and MSY proxies consisting of SPR-based fishing intensity reference points ($F_{10\%-50\%}$) for the 2014 base case model. Grey dots are the terminal year (2012) of the assessment. The WCPFC established $20\%SSB_{current\ F=0}$ as a limit reference point for this stock. An F-based target reference point has not been established at present. These plots are presented for illustrative purposes. | 31 |
| Figure 7-3. Historical (left) and future trajectories of north Pacific albacore (<i>Thunnus alalunga</i>) female spawning biomass (SSB) based on to two constant harvest scenarios ($F_{2002-2004}$ - gray | |

| | |
|--|----|
| boxplot; $F_{2010-2012}$ - white boxplot) for average historical recruitment (a), low historical recruitment (b) and high historical recruitment (c) scenarios. The solid gray and red dashed lines represent median, 25% and 75% quintiles of past SSB, respectively. The solid black line is the average of 10 lowest estimated historical female SSB values, i.e., the SSB-ATHL threshold, which is no longer in use. Outlier values are not shown in these figures. | 32 |
| Figure 7-4. Kobe plot for blue marlin (<i>Makaira mazara</i>). | 35 |
| Figure 7-5 Comparison of time series of total biomass (age 1 and older) (a), spawning biomass (b), age-0 recruitment (c), and instantaneous fishing mortality (year-1) (d) for the WCNPO striped marlin between the 2011 stock assessment (red) and the 2015 update (blue). The solid line with circles represents the maximum likelihood estimates for each quantity and the shadowed area represents the 95% asymptotic intervals of the estimates (± 1.96 standard deviations). The solid horizontal lines indicated the MSY-based reference points for 2011 (red) and 2015 (blue). | 39 |
| Figure 7-6. Trend in population biomass and reported catch biomass of Western and Central North Pacific striped marlin (<i>Kajikia audax</i>) during 1975-2013 relative to unfished biomass. | 44 |
| Figure 7-7. Trends in estimates of spawning biomass of Western and Central North Pacific striped marlin (<i>Kajikia audax</i>) during 1975-2015 along with 80% confident intervals. The dashed green line is the SSB needed to produce MSY (SSB_{MSY} , 2,819 t). | 45 |
| Figure 7-8. Trends in estimates of fishing mortality of Western and Central North Pacific striped marlin (<i>Kajikia audax</i>) during 1975-2013 along with 80% confident intervals. The dashed red line is the fishing mortality (F) that produces MSY, $F_{MSY} = 0.63$ | 45 |
| Figure 7-9. Kobe plot of the trends and estimates of relative fishing mortality and relative spawning biomass of Western and Central North Pacific striped marlin (<i>Kajikia audax</i>) during 1975-2013. | 46 |
| Figure 7-10. Kobe plot showing the estimated trajectories of relative exploitable biomass (B/B_{MSY}) and relative harvest rate (H/H_{MSY}) for swordfish (<i>Xiphias gladius</i>) in the WCNPO stock area during 1951-2012. | 47 |
| Figure 7-11. Kobe plot showing the estimated trajectories of relative exploitable biomass (B/B_{MSY}) and relative harvest rate (H/H_{MSY}) for swordfish (<i>Xiphias gladius</i>) in the EPO stock area during 1951-2012. | 48 |
| Figure 7-12. Stochastic projections of expected exploitable biomass (1000 metric tons) of swordfish (<i>Xiphias gladius</i>) in the WCNPO stock area during 2013-2016 under alternative harvest rates. Upper panel (a) shows projection results of applying a harvest rate set to be 50%, 75%, 100%, 125%, and 150% of the value of estimate of H_{MSY} (25%, denoted as F_{MSY} in the Figure). Lower panel (b) shows projection results of applying a status quo harvest rate based on the 2010-2012 average estimates, a status quo catch based on the 2010-2012 average catch, and the maximum observed harvest rate in the 1951-2012 time series. Dashed line represents $B_{MSY} = 60,720$ t. | 49 |
| Figure 7-13. Stochastic projections of expected exploitable biomass (1000 metric tons) of swordfish (<i>Xiphias gladius</i>) in the EPO stock area during 2013-2016 under alternative harvest rates. Upper panel (a) shows projection results of applying a harvest rate set to be 50%, 75%, 100%, 125%, and 150% of the value of estimate of H_{MSY} (18%, denoted as F_{MSY} in the Figure). Lower panel (b) shows projection results of applying a status quo harvest rate based on the 2010-2012 average estimates, a status quo catch based on the 2010-2012 average catch, and the | |

maximum observed harvest rate in the 1951-2012 time series. Dashed line represents $B_{MSY} = 31,170$ t.50

Figure 7-14. Probabilities of experiencing overfishing ($H > H_{MSY}$, solid line), of exploitable biomass falling below B_{MSY} ($B < 0.5 * B_{MSY}$, open circles), and of being overfished relative to a reference level of $\frac{1}{2}B_{MSY}$ ($B < 0.5 * B_{MSY}$, solid squares) in 2016 for swordfish in the WCNPO stock area (a) and EPO stock area (b) based on applying a constant catch biomass (x-axis, thousand t) in the stock projections. Current catch = average catch 2011-2012.51

Figure 7-15. (A) Kobe plot showing median biomass and fishing mortality trajectories for the reference case Bayesian Surplus Production model for North Pacific blue shark (*Prionace glauca*). Solid blue circle indicates the median estimate in 1971 (initial year of the model). Solid gray circle and its horizontal and vertical bars indicate the median and 90% confidence limits in 2011. Open black circles and black arrows indicate the historical trajectory of stock status between 1971 and 2011. (B) Kobe plot showing estimated spawning biomass and fishing mortality trajectories for the reference case Stock Synthesis model for North Pacific blue shark. The circles indicate the historical trajectory from 1971-2011 colored from red (first year) to blue (terminal year).....53

Figure 7-16. Standardized indices of abundance by fishery for shortfin mako sharks. While all of the available independent information was examined to draw conclusions about the stock, these three indices were considered to have the greatest value in determining stock status.55

LIST OF ANNEXES

- Annex 1 List of Meeting Participants
- Annex 2 ISC15 Provisional Meeting Agenda
- Annex 3 List of Meeting Documents
- Annex 4 Report of the Shark WG Workshop (November 2014)
- Annex 5 Report of the Billfish WG Workshop (January 2015)
- Annex 6 Report of the Statistics Steering Committee (February 2015)
- Annex 7 Report of the Shark WG Workshop (March 2015)
- Annex 8 Report of the Albacore WG Workshop (April 2015)
- Annex 9 Report of the Pacific Bluefin Tuna WG Workshop (April 2015)
- Annex 10 Report of the Billfish WG Workshop (April 2015)
- Annex 11 Stock Assessment of Striped Marlin in the North Pacific Ocean in 2015 (2015)
- Annex 12 Stock Assessment of Shortfin Mako Shark in the North Pacific Ocean in 2015 (2015)
- Annex 13 Report of the Statistics WG Workshop (July 2015)
- Annex 14 Seminar: Close-Kin Mark Recapture as a Tool for Estimating Spawning Biomass in Pacific Bluefin Tuna

ACRONYMS AND ABBREVIATIONS**Names and FAO Codes of ISC Species of Interest in the North Pacific Ocean**

| FAO Code | Common English Name | Scientific Name |
|-------------------|----------------------------|-----------------------------------|
| TUNAS | | |
| ALB | Albacore | <i>Thunnus alalunga</i> |
| BET | Bigeye tuna | <i>Thunnus obesus</i> |
| PBF | Pacific bluefin tuna | <i>Thunnus orientalis</i> |
| SKJ | Skipjack tuna | <i>Katsuwonus pelamis</i> |
| YFT | Yellowfin tuna | <i>Thunnus albacares</i> |
| BILLFISHES | | |
| BIL | Other billfish | Family <i>Istiophoridae</i> |
| BLM | Black marlin | <i>Makaira indica</i> |
| BUM | Blue marlin | <i>Makaira nigricans</i> |
| MLS | Striped marlin | <i>Kajikia audax</i> |
| SFA | Sailfish | <i>Istiophorus platypterus</i> |
| SSP | Shortbill spearfish | <i>Tetrapturus angustirostris</i> |
| SWO | Swordfish | <i>Xiphias gladius</i> |
| SHARKS | | |
| ALV | Common thresher shark | <i>Alopias vulpinus</i> |
| BSH | Blue shark | <i>Prionace glauca</i> |
| BTH | Bigeye thresher shark | <i>Alopias superciliosus</i> |
| FAL | Silky shark | <i>Carcharhinus falciformis</i> |
| LMA | Longfin mako | <i>Isurus paucus</i> |
| LMD | Salmon shark | <i>Lamna ditropis</i> |
| OCS | Oceanic whitetip shark | <i>Carcharhinus longimanus</i> |
| PSK | Crocodile shark | <i>Pseudocarcharias kamoharui</i> |
| PTH | Pelagic thresher shark | <i>Alopias pelagicus</i> |
| SMA | Shortfin mako shark | <i>Isurus oxyrinchus</i> |
| SPN | Hammerhead spp. | <i>Sphyrna</i> spp. |

ISC Working Groups

| Acronym | Name | Chair |
|----------------|-------------------------------|-----------------------------|
| ALBWG | Albacore Working Group | John Holmes (Canada) |
| BILLWG | Billfish Working Group | Jon Brodziak (U.S.A.) |
| PBFWG | Pacific Bluefin Working Group | Hideki Nakano (Japan) |
| SHARKWG | Shark Working Group | Suzanne Kohin (U.S.A.) |
| STATWG | Statistics Working Group | Ren-Fen Wu (Chinese Taipei) |

Other Abbreviations and Acronyms Used in the Report

| | |
|-----------------|--|
| CDS | Catch documentation scheme |
| CIE | Center for Independent Experts |
| CKMR | Close-kin mark-recapture |
| CMM | Conservation and Management Measure |
| CPFV | Charter passenger fishing vessel |
| CPUE | Catch-per-unit-of-effort |
| CSIRO | Commonwealth Scientific and Industrial Research Organization |
| DWLL | Distant-water longline |
| DWPS | Distant-water purse seine |
| EEZ | Exclusive economic zone |
| EPO | Eastern Pacific Ocean |
| F | Fishing mortality rate |
| FAD | Fish aggregation device |
| FAO | Fisheries and Agriculture Organization of the United Nations |
| FL | Fork length |
| HCR | Harvest control rule |
| HMS | Highly migratory species |
| H_{MSY} | Harvest rate at MSY |
| IATTC | Inter-American Tropical Tuna Commission |
| ISC | International Scientific Committee for Tuna and Tuna-Like Species in the North Pacific Ocean |
| ISSF | International Seafood Sustainability Foundation |
| LFSR | Low fecundity spawner recruitment relationship |
| LTLL | Large-scale tuna longline |
| LRP | Limit reference point |
| MSE | Management strategy evaluation |
| MSY | Maximum sustainable yield |
| NC | Northern Committee (WCPFC) |
| NRIFSF | National Research Institute of Far Seas Fisheries (Japan) |
| OFDC | Overseas Fisheries Development Council (Chinese Taipei) |
| PICES | North Pacific Marine Science Organization |
| PIFSC | Pacific Islands Fisheries Science Center (U.S.A.) |
| SAC | Scientific Advisory Committee (IATTC) |
| SC | Scientific Committee (WCPFC) |
| SG-SCISC | Study Group on Scientific Cooperation of ISC and PICES |
| SPC-OFP | Oceanic Fisheries Programme, Secretariat of the Pacific Community |
| SPR | Spawning potential ratio, spawner per recruit |
| SSB | Spawning stock biomass |
| $SSB_{F=0}$ | Spawning stock biomass at a hypothetical unfished level |
| $SSB_{CURRENT}$ | Current spawning stock biomass |
| SSB_{MSY} | Spawning stock biomass at maximum sustainable yield |
| STLL | Small-scale tuna longline |

ISC15, July 15-20, 2015

| | |
|-------|--|
| t, mt | Metric tons, tonnes |
| WCNPO | Western Central and North Pacific Ocean |
| WCPFC | Western and Central Pacific Fisheries Commission |
| WPO | Western Pacific Ocean |
| WWF | World Wildlife Fund for Nature - Japan |
| GRT | Gross registered tons |

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Highlights of the ISC15 Plenary Meeting

The 15th ISC Plenary, held in Kona, Hawaii, U.S.A from 15-20 July 2014 was attended by members from Canada, Chinese Taipei, Japan, Korea, Mexico and the United States as well as the Western and Central Pacific Fisheries Management Commission and the North Pacific Marine Science Organization. The Plenary reviewed results, conclusions, new data and updated analyses of the Billfish, Albacore, Shark and Pacific Bluefin tuna working groups. The Plenary endorsed the findings that the Western and Central North Pacific striped marlin is experiencing overfishing and is overfished. It reviewed indicator analyses of North Pacific shortfin mako shark and concluded that better data are needed to determine the status of this stock. It re-iterated that the North Pacific albacore tuna, North Pacific blue shark, and Western Central North Pacific Ocean swordfish stocks are not overfished nor experiencing overfishing, the Pacific bluefin tuna stock is overfished and experiencing overfishing, the Pacific blue marlin stock is not overfished nor experiencing overfishing and that the Eastern Pacific Ocean swordfish stock is not overfished but likely experiencing overfishing. A special seminar on using close-kin mark recapture methods to estimate spawning stock biomass of Pacific Bluefin tuna was held and Plenary agreed to develop a sampling protocol for the method. Plenary endorsed the science objectives for ISC and PICES collaborations and discussed formalizing the ISC structure and administration and agreed to continue researching means of doing both. Over the past year, ISC further conducted a workshop on Management Strategy Evaluation (MSE), developed an MSE framework for NPALB. Plenary also noted the strides WGs had made in incorporating best available scientific information (BASI) into stock assessment work, enhanced stock assessment reports and the increased transparency in Working Group efforts. Observers from Pew Charitable Trusts, International Seafood Sustainability Foundation, World Wildlife Fund for Nature - Japan and Duke University attended. The ISC workplan for 2015-16 includes completing Pacific Bluefin tuna and blue marlin assessments, improving catch and CPUE time series and advancing biological information for shark species, conducting a workshop for managers on fishery objectives and harvest control rules for MSE, and enhancing database and website management. The Plenary revised its operating procedures and endorsed an additional one-year term for the standing Albacore Working Group Chair, John Holmes. The next Plenary will likely be held in the Japan in July 2016.

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 (U.S.A.). 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 that 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 ISC is made up of voting Members from coastal states and fishing entities of the region as well as 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 North Pacific Ocean to the Member governments and regional fisheries management organizations. Fishery organizations. Fishery data tabulated by ISC Members and peer-reviewed by the species and statistics statistics Working Groups (WGs) form the basis for research conducted by the ISC. Although some data for some data for the most recent years are incomplete and provisional, the total catch of highly migratory migratory species (HMS) by ISC Members estimated from available information is in excess of 500,000 500,000 metric tons (t) annually and dominated by the tropical tuna species. In 2014 the catch of priority priority species monitored by ISC member countries was 77,720 t of North Pacific albacore tuna (NPALB, (NPALB, *Thunnus alalunga*), 17,065 t of Pacific bluefin tuna (PBF, *T. Orientalis*), 11,951 t of North Pacific North Pacific swordfish (SWO, *Xiphias gladius*), 2,466 t of North Pacific striped marlin (MLS, *Kajikia audax*), *Kajikia audax*), 8,143 t of Pacific blue marlin (BUM, *Makaira nigicans*), 141 t of shortfin mako shark (SMA, shark (SMA, *Isurus oxyrinchus*) and 24,800 t of North Pacific blue shark (BSH, *Prionace glauca*).¹ The total *glauca*).¹ The total estimated catch of these seven species is 142,286 t, or approximately 105% from the 2013 from the 2013 total estimated catch of 136,087 t. Annual catches of priority stocks throughout their ranges their ranges are shown in Table 15-1 through

¹ FAO three-letter species codes are used throughout this report interchangeably with common names.

ISC15, July 15-20, 2015

Table 15-5. Retained catches (metric tons, whole weight) of ISC members of blue marlin (*Makaira nigricans*) by fishery in the North Pacific Ocean, north of the equator. “0”; Fishing effort was reported but no catch. “+”; Bellow 499kg catch. “-”; Unreported catch or catch information not available. *: Data from the most recent years are provisional.

| Catch disposition | Year | JPN | | KOR | | TWN | | | | | | USA | | | | | | Species Grand Total | |
|-------------------|-------|----------|-----------|----------|-----------|---------|--------------------------|---------|----------|--------|-------------|-----------|----------|----------|-------|--------|-------------|---------------------|-----------|
| | | Longline | JPN total | Longline | KOR total | Set-net | Gill-net (not specified) | Harpoon | Longline | Others | Purse seine | TWN total | Handline | Longline | Troll | Others | Purse seine | | USA total |
| Retained | 1953 | | | | | | | | - | | - | | | | | | | - | |
| | 1954 | | | | | | | | - | | - | | | | | | | - | |
| | 1955 | | | | | | | | - | | - | | | | | | | - | |
| | 1956 | | | | | | | | - | | - | | | | | | | - | |
| | 1957 | | | | | | | | - | | - | | | | | | | - | |
| | 1958 | | | | | | | | 887 | | | 887 | | | | | | 887 | |
| | 1959 | | | | | | | | 781 | | | 781 | | | | | | 781 | |
| | 1960 | | | | | | | | 948 | | | 948 | | | | | | 948 | |
| | 1961 | | | | | | | | 703 | | | 703 | | | | | | 703 | |
| | 1962 | | | | | | | | 628 | | | 628 | | | | | | 628 | |
| | 1963 | | | | | | | | 691 | | | 691 | | | | | | 691 | |
| | 1964 | | | | | | | | 934 | | | 934 | | | | | | 934 | |
| | 1965 | | | | | | | | 1,016 | | | 1,016 | | | | | | 1,016 | |
| | 1966 | | | | | | | | 957 | | | 957 | | | | | | 957 | |
| | 1967 | | | | | | - | - | 317 | 898 | 167 | 1,382 | | | | | | 1,382 | |
| | 1968 | | | | | | - | 30 | 649 | 1,433 | 120 | 2,232 | | | | | | 2,232 | |
| | 1969 | | | | | | - | 58 | 465 | 1,232 | 103 | 1,858 | | | | | | 1,858 | |
| | 1970 | | | | | | 1 | 21 | 604 | 1,385 | 70 | 2,081 | | | | | | 2,081 | |
| | 1971 | 5,461 | 5,461 | 0 | 0 | - | 13 | 473 | 1,331 | 118 | | 1,935 | | | | | | 7,396 | |
| | 1972 | 6,772 | 6,772 | 0 | 0 | - | 14 | 490 | 1,205 | 50 | | 1,759 | | | | | | 8,531 | |
| | 1973 | 6,453 | 6,453 | 0 | 0 | - | 12 | 275 | 1,650 | 265 | | 2,202 | | | | | | 8,655 | |
| | 1974 | 6,545 | 6,545 | 0 | 0 | 1 | 6 | 355 | 2,144 | 146 | | 2,652 | | | | | | 9,197 | |
| | 1975 | 4,374 | 4,374 | 0 | 0 | - | 3 | 421 | 2,638 | 207 | | 3,269 | | | | | | 7,643 | |
| | 1976 | 5,018 | 5,018 | 0 | 0 | - | 9 | 511 | 1,315 | 162 | | 1,997 | | | | | | 7,015 | |
| | 1977 | 4,780 | 4,780 | 0 | 0 | - | 11 | 391 | 1,183 | 110 | | 1,695 | | | | | | 6,475 | |
| | 1978 | 5,900 | 5,900 | 0 | 0 | 1 | 15 | 364 | 1,633 | 7 | | 2,020 | | | | | | 7,920 | |
| | 1979 | 5,949 | 5,949 | 0 | 0 | 3 | 19 | 362 | 1,646 | 164 | | 2,194 | | | | | | 8,143 | |
| | 1980 | 5,613 | 5,613 | 155 | 155 | - | 35 | 444 | 1,185 | 170 | | 1,834 | | | | | | 7,602 | |
| | 1981 | 5,518 | 5,518 | 0 | 0 | - | 35 | 313 | 1,840 | 69 | | 2,257 | | | | | | 7,775 | |
| | 1982 | 6,051 | 6,051 | 351 | 351 | - | 7 | 306 | 2,139 | 120 | | 2,572 | | | | | | 8,974 | |
| | 1983 | 4,796 | 4,796 | 82 | 82 | - | 26 | 741 | 2,122 | 127 | | 3,016 | | | | | | 7,894 | |
| | 1984 | 6,248 | 6,248 | 155 | 155 | - | 22 | 960 | 1,789 | 111 | | 2,882 | | | | | | 9,285 | |
| | 1985 | 5,164 | 5,164 | 45 | 45 | 9 | 11 | 747 | 1,187 | 43 | | 1,997 | | | | 145 | | 7,351 | |
| | 1986 | 5,922 | 5,922 | 86 | 86 | 4 | 90 | 839 | 1,723 | 107 | | 2,763 | | | | 220 | | 8,991 | |
| | 1987 | 5,370 | 5,370 | 89 | 89 | 12 | 9 | 973 | 4,627 | 1 | | 5,622 | | 51 | 261 | | | 312 | 11,393 |
| | 1988 | 5,054 | 5,054 | 133 | 133 | 20 | 8 | 658 | 2,822 | 589 | | 4,097 | | 102 | 266 | | | 368 | 9,652 |
| | 1989 | 5,117 | 5,117 | 50 | 50 | 10 | 14 | 640 | 2,691 | 9 | | 3,364 | | 356 | 326 | | | 682 | 9,213 |
| | 1990 | 4,116 | 4,116 | 44 | 44 | 3 | 24 | 427 | 1,749 | 143 | | 2,346 | | 378 | 295 | | | 673 | 7,179 |
| | 1991 | 4,094 | 4,094 | 75 | 75 | 4 | 50 | 338 | 2,288 | 152 | | 2,832 | | 297 | 346 | | | 643 | 7,644 |
| | 1992 | 3,721 | 3,721 | 60 | 60 | 25 | 40 | 432 | 3,786 | 110 | | 4,393 | | 347 | 260 | | | 607 | 8,781 |
| | 1993 | 4,600 | 4,600 | 36 | 36 | 44 | 41 | 400 | 4,135 | 82 | | 4,702 | | 339 | 311 | | | 650 | 9,988 |
| 1994 | 5,832 | 5,832 | 2 | 2 | 12 | 30 | 206 | 3,007 | 7 | | 3,262 | | 362 | 298 | | | 660 | 9,756 | |
| 1995 | 5,907 | 5,907 | 0 | 0 | 15 | 36 | 895 | 3,896 | 5 | | 4,847 | | 570 | 315 | | | 885 | 11,639 | |
| 1996 | 3,260 | 3,260 | 10 | 10 | 13 | 35 | 270 | 3,337 | 10 | - | 3,665 | | 467 | 409 | | | 876 | 7,811 | |
| 1997 | 3,697 | 3,697 | 145 | 145 | 5 | 48 | 194 | 3,683 | - | - | 3,930 | | 487 | 378 | | | 865 | 8,637 | |
| 1998 | 3,438 | 3,438 | 335 | 335 | 8 | 59 | 91 | 3,624 | 1 | - | 3,783 | | 395 | 242 | | | 637 | 8,193 | |
| 1999 | 3,751 | 3,751 | 164 | 164 | 21 | 32 | 135 | 3,417 | - | - | 3,605 | | 357 | 293 | | | 650 | 8,170 | |
| 2000 | 3,606 | 3,606 | 96 | 96 | 24 | 40 | 186 | 4,131 | 2 | - | 4,383 | | 314 | 235 | | | 549 | 8,634 | |
| 2001 | 3,594 | 3,594 | 166 | 166 | 18 | 57 | 229 | 4,733 | - | - | 5,037 | | 399 | 291 | | | 690 | 9,487 | |
| 2002 | 2,976 | 2,976 | 152 | 152 | 13 | 63 | 32 | 4,448 | 6 | - | 4,562 | | 264 | 225 | 1 | | 490 | 8,180 | |
| 2003 | 2,836 | 2,836 | 158 | 158 | 20 | 107 | 52 | 7,685 | 4 | - | 7,868 | | 363 | 210 | | | 573 | 11,435 | |
| 2004 | 2,977 | 2,977 | 226 | 226 | 14 | 93 | 36 | 6,672 | 9 | - | 6,824 | | 283 | 188 | | 5 | 476 | 10,503 | |
| 2005 | 2,506 | 2,506 | 303 | 303 | 8 | 65 | 48 | 7,630 | 16 | - | 7,767 | | 337 | 187 | | | 524 | 11,100 | |
| 2006 | 2,414 | 2,414 | 217 | 217 | 12 | 15 | 30 | 5,729 | - | - | 5,786 | | 409 | 160 | | | 569 | 8,986 | |
| 2007 | 2,016 | 2,016 | 120 | 120 | 3 | 17 | 20 | 5,117 | - | - | 5,157 | 1 | 262 | 127 | | | 390 | 7,683 | |
| 2008 | 2,096 | 2,096 | 219 | 219 | 10 | 16 | 15 | 5,477 | 1 | - | 5,519 | 1 | 349 | 198 | | | 548 | 8,382 | |
| 2009 | 1,840 | 1,840 | 224 | 224 | 9 | 12 | 9 | 4,638 | 1 | - | 4,669 | 1 | 360 | 15 | | | 376 | 7,109 | |
| 2010 | 2,457 | 2,457 | 257 | 257 | 5 | 27 | 15 | 4,959 | 1 | - | 5,007 | 2 | 306 | 148 | | | 456 | 8,177 | |
| 2011 | 2,211 | 2,211 | 684 | 684 | 3 | 18 | 17 | 4,625 | 9 | 2 | 4,674 | 2 | 373 | 199 | | | 574 | 8,143 | |
| 2012 | 1,839 | 1,839 | 587 | 587 | 6 | 13 | 16 | 4,097 | - | 12 | 4,144 | 2 | 298 | 141 | | | 441 | 7,011 | |
| 2013 | 1,985 | 1,985 | 963 | 963 | 2 | 6 | 16 | 4,607 | - | 9 | 4,640 | 3 | 406 | 137 | | | 546 | 8,134 | |
| 2014* | 1,752 | 1,752 | 801 | 801 | 2 | 6 | 16 | 4,861 | - | 7 | 4,892 | 4 | 535 | 159 | | | 698 | 8,143 | |
| Discards | 2010 | | | | | | | | | | | | | | | 1 | 1 | 1 | |
| | 2011 | | | | | | | | | | | | | | | 6 | 6 | 6 | |
| | 2013 | | | | | | | | | 5 | 5 | | | | | | | 5 | |

Table 15-6.

1.2 Opening of the Meeting

The Fifteenth Plenary session of the ISC (ISC15) was convened in Kona, Hawaii, U.S.A., at 0900 on 15 July 2015 by the ISC Chairman, G. DiNardo. A roll call confirmed the presence of delegates from Canada, Chinese Taipei, Japan, Korea, Mexico, and U.S.A. (*Annex 1*). Representatives from the Western and Central Pacific Fisheries Commission (WCPFC) and the North Pacific Marine Science Organization (PICES) were also present. The International Sustainable Seafood Foundation (ISSF), Pew Charitable Trusts, World Wildlife Fund for Nature - Japan (WWF), and Duke University were present as observers.

ISC Member China, the Secretariat of the Pacific Community (SPC), the Fisheries and Agriculture Organization of the United Nations (FAO), as well as organizations with significant interest, including the Inter-American Tropical Tuna Commission (IATTC), did not attend the Plenary.

G. DiNardo introduced Dr. Michael Seki, NMFS PIFSC Director, who gave the welcome address for the meeting:

Good morning, *aloha kakou*, and welcome to Hawaii and to the 15th Meeting of the International Scientific Committee for Tuna and Tuna-like Species in the North Pacific Ocean (ISC).

The ISC structure has evolved over the years and the quality of its science has grown with it. As a result, the ISC itself has evolved to become a respected and efficient organization. By providing the science necessary to effectively and properly manage fisheries, ISC plays a critical role in sustaining North Pacific fishery resources.

What has maintained the organization are the values of collaboration and cooperation resplendent in its culture. This collaboration and cooperation has provided the foundation for ISC operations and has enabled the ISC to produce over 30 assessments since it was established in 1995. This achievement is not bad for an organization with no money and no legally binding agreement, a situation that hopefully will change in the near future. The commitment of ISC member countries to high-quality science has maintained ISC and enabled these accomplishments.

As U.S. leadership for ISC transitions to me, I look forward to contributing to this effort and continuing the commitment, cooperation and collaboration that are the hallmarks of this essential organization.

May we have a productive meeting and enjoy this wonderful venue. Again, welcome all!

2 ADOPTION OF AGENDA

The proposed agenda for the session was considered and adopted with no changes (*Annex 2*). It was noted that observers would be given the opportunity at the end of each day to offer

comments and seek clarification on topics discussed. C. Dahl 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

3.1 Canada

J. Holmes presented a summary of Category I, II, and III data from Canadian fisheries for highly migratory species in 2014 (**ISC/15/PLENARY/04**). The Canadian fleet of 160 vessels targeted juvenile North Pacific albacore tuna (NPALB) exclusively and operated primarily in the coastal waters of Canada and the United States, with very little effort or catch outside of these areas in 2014. Preliminary estimates of catch and effort in 2014 are 4,781 t and 4,747 vessel days, respectively, which represent a 6% decrease in catch and a 27% decrease in effort relative to 2013. Catch and effort were split primarily between Canadian waters (55% of the catch and 62% of the effort) and U.S. waters (44% of the catch and 37% of the effort). More than 85% of the catch was made in sea surface temperature band of 16-18 °C. The pattern of seasonal change in nominal CPUE peaked well above average in July and then was below average through August and September. The fishery stopped by October 10, which is about three weeks earlier than in recent years. Fifty-seven (57) vessels participated in the size sampling program and measured 11,208 fish for a sampling rate of 1.6% of the reported catch. These measurements were dominated by fish between 65-71 cm fork length (FL) corresponding to 2-year old fish, and a significant number of fish between 76-81 cm FL, which are 3-years old. The Canadian fishery was highly coastal in 2014 and shifted north to Haida Gwaii (bordering southeast Alaska) in late August and September, consistent with reports (unverified) of NPALB in the waters of southeast Alaska. The anomalously warm water in the northeast Pacific Ocean may have influenced this northward distribution of albacore tuna. Research in 2014 was focused on modelling climatic effects on albacore stock productivity and distribution and abundance in the EPO.

Discussion

The long-term shift of fishing effort from offshore to inshore areas is primarily due to increases in fuel prices and an increase in NPALB abundance in coastal waters. The more recent increase in catch in the Canadian EEZ is due to changes in the fishing regime pursuant to the Canada-U.S. Albacore Treaty, although the availability of NPALB in Canadian waters obviously contributes to sustained catch levels. The size distribution is similar in both Canadian and U.S. waters, with two modes representing age-2 and age-3 fish. It should be noted that some discarding of small fish, for market reasons, was observed in 2014. Discard mortality is thought to be low because of a requirement to use barbless hooks.

PBF catch by Canadian albacore troll vessels normally occurs when they fish in U.S. waters off of California or adjacent high seas south of 40°N latitude. However, PBF are occasionally caught in Canadian waters. These catches were reported to the NC.

Research into the use of remote sensing is not yet at the point where it could be used to develop a survey index, because an appropriate habitat-based model has not been developed. This could be developed through future collaboration between ISC and PICES.

3.2 Chinese-Taipei

W.-J. Wang presented the Chinese-Taipei national report (**ISC/15/PLENARY/05**). There are two principal tuna fisheries of Chinese-Taipei operating in the North Pacific Ocean, the tuna longline fishery and the distant water purse seine fishery; other offshore and coastal fisheries include the harpoon, set net, and gill net fisheries, which account for a small proportion of overall tuna and tuna-like species catch. The catches of longline and purse seine fisheries account for 99% of the total tuna and tuna-like species catches in the North Pacific Ocean by Chinese-Taipei. Longline fisheries comprise the large-scale tuna longline (LTLL, vessels larger than or equal to 100 GRT) and small-scale tuna longline (STLL, vessels less than 100 GRT) fleets. The total catch of tunas and billfish (including SWO, MLS, BUM, BLM, and SFA) for the longline fishery (LTLL and STLL) in the North Pacific Ocean was 23,190 t in 2014. There were 73 active LTLL vessels of operating in the Pacific Ocean in 2014 and 1,275 active STLL vessels. Thirty-four purse seine vessels caught a total catch of 237,120 t in the Pacific Ocean in 2014.

For the LTLL fishery, Category I data sources include weekly catch reports and commercial data from individual fishing vessels. Categories II and III data are from logbook data. Fishermen are required to measure the length of the first 30 fish caught in each set. For the STLL fishery, Category I data sources include landings and auction records of local fish markets, reports of market sales, and monthly catch reports from individual fishing vessels. For the purse seine fishery, Category I and Category II data are obtained from logbooks.

In March 2010, a catch documentation scheme (CDS) was established and implemented for vessels fishing for PBF. When PBF are caught, fishermen are required to attach a tag and to measure length and weight of each PBF.

An observer program on the LTLL fleet in the Pacific Ocean was implemented in 2002. The program was gradually expanded in later years and hence the number of observers increased. The program was further expanded to the STLL fleet in 2012. In 2014, 13 observers were deployed on LTLL vessels and 11 observers on STLL vessels.

Discussion

The LTLL fleet targets NPALB in more northerly waters and BET near the Equator. The STLL fleet targets YFT and bycatches billfish.

With respect to observer coverage, approximately 5% of fishing effort is observed in the LTLL fishery while the level in the STLL fishery is lower. Observers are part of the Regional Program under the WCPFC and they are Taiwanese nationals.

The decline in participation in LTLL and STLL fisheries in the Pacific Ocean in 2014 was mainly due to a decline in fish prices, exacerbated by depreciation of the Japanese yen. In 2012 and 2013, some vessels shifted operations to the Indian Ocean.

It was explained that in the purse seine fishery fishermen are required to provide length-frequency data, pursuant to requirements from the WCPFC.

3.3 Japan

H. Shimada presented the Japan National Report (**ISC/15/PLENARY/6**). Japanese tuna fisheries consist of the three major fisheries (longline, purse seine, and pole-and-line) and other miscellaneous fisheries like troll, drift-net, and set-net fisheries. The National Report describes the recent trend of Japanese tuna fisheries in the North Pacific Ocean and updates the statistics given in the previous National Report for ISC14. The total catch of tunas (excluding skipjack) caught by Japanese fisheries in the North Pacific Ocean was 100,142 t in 2013 and 113,380 t in 2014. The total catch of tunas (including skipjack) caught by Japanese fisheries in the North Pacific Ocean was 294,311 t in 2013 and 277,251 t in 2014. The total catch of swordfish and striped marlin was 6,903 t in 2013 and 7,754 t in 2014. In addition to describing fisheries, the Report briefly describes Japanese research activities on tuna and tuna-like species in the Pacific Ocean in 2014 and the NPALB MSE.

Discussion

The increase in PBF catch in the purse seine fishery in 2014 was explained by increased recruitment in 2013 and abundance of age-1 fish, which is the target of this fishery. However, no increase in age-0 PBF (recruitment) in the troll fishery was observed. Preliminary catch estimates indicate that catches of PBF less than 30 kg in 2014 were 85% of the 2002-2004 baseline.

The recruitment survey is a preliminary effort to develop a recruitment index, while at the same time serving as an early warning system on the condition of the stock. For example, in 2014 data from July to September was used as an early indicator of the recent recruitment trend even though the survey occurs throughout the year.

The Japanese PBF tagging program for both juveniles and adults is ongoing. One significant result to date is tracking of an adult to the spawning grounds. So far a tag return came from as far away as the EPO, reported by IATTC and NOAA staffs. It was noted that to be effective significantly more tags following a statistical design would need to be deployed, and other nations should be aware of tagging efforts.

Research is also ongoing about the location of spawning grounds. It appears that spawning areas are associated with oceanic eddies. Furthermore, the larval survey data are being correlated with oceanographic information to understand their effect on year class strength.

3.4 Korea

Y. Kwon presented the Korea National Report (**ISC/15/PLENARY/7**) including information on fisheries, statistics and research in the North Pacific Ocean for the year 2014. There were 113 active longline vessels in the tropical areas between 20°N and 20°S in both the WCPFC and the IATTC areas of competence, which caught 13,208 t of tuna and tuna-like species in the North Pacific Ocean. Overall catch composition was 58.6% BET, 15.9% YFT, 6.3% SWO, 6.1% BUM, 0.9% ALB, 0.6% MLS, and 0.2% BLM. There were 28 active purse seine vessels in the tropical area between 10°N and 15°S within the WCPFC area of competence, which caught 52,298 t of tuna and tuna-like species the North Pacific Ocean. Overall catch composition for this fleet was 77.8% SKJ, 21.7 % YFT and 0.5% BET. The distribution of purse seine fishing

ISC15, July 15-20, 2015

effort had a slightly more easterly distribution in 2014 compared to 2013. Longline fishing effort was relatively higher in the eastern area.

In 2014, coastal fisheries in the Korean EEZ caught 1,311 t of PBF, of which 1,305 t were caught by the offshore large purse seine and 6 t by set net and offshore trawl. The catch occurred in the South Sea around Jeju Island throughout the year with the highest catches in March to July and less than 10 t in August to November. The fork length frequency distribution of PBF differed by quarter. In the first quarter there were three modes of 50 cm, 80 cm, and 150 cm. In the second quarter there were more than three modes of fish sizes ranging from 45 cm to 215 cm. In the third and fourth quarters there was a single mode in the 30-50 cm range. Larval surveys have been carried out since 2011 to determine the potential for PBF spawning in Korean waters but no larva have been found. Korea suggested a tagging survey as the future direction.

Discussion

It was noted that tagging programs need to be carried out over a long period of time and collaboration with other nations is important to obtain sufficient data.

Larval surveys by Japan found more larvae around Okinawa compared to the Japan Sea. Korea could benefit by coordinating future surveys with the Japanese efforts and may be able to catch older, larger larval PBF in surveys in their waters.

It was noted that data on PBF catches in the offshore trawl fishery were not previously reported and are derived from archival sources, which are essentially market sales slips.

Korea has increased the logbook reporting frequency for the distant water fisheries from monthly to weekly. A full-fledged e-logbook program is slated for implementation in 2016.

Based on the discussion, it became apparent that a portion of reported BLM catch may in fact be BUM. Korea agreed to review its data submissions so the catch information in the ISC database can be corrected accordingly for 2016.

3.5 Mexico

M. Dreyfus presented the report from Mexico (**ISC/15/PLENARY/8**). The Pacific shark fishery has traditionally reported catch in two groups (big and small shark individuals). Starting in 2007 a new logbook system was implemented requiring fishermen to provide species composition of the catch. The fleet is composed of medium size longliners with VMS and an artisanal fishery. As a conservation measure, in 2012 Mexico implemented a 3-month closure covering the reproduction period for many of the shark species found in Mexican waters. Beginning in 2007, observer programs were implemented in both longline and artisanal fleets. Mexican scientists are participating in shark research within the IATTC, ISC and the WCPFC and for the first time Mexico hosted a meeting of the ISC SHARKWG.

Of the stocks assessed by the ISC, Mexico caught about 700 t of shortfin mako and approximately 5,000 t of blue shark in 2014.

ISC15, July 15-20, 2015

The longline fleet in northwest Mexico catches SWO (about 3% of the total catch) in addition to sharks.

In relation to tunas, the Mexican purse seine fleet primarily targets YFT and complements this catch with SKJ. All vessels above 400 cubic meters capacity have a scientific observer on board from IATTC or the Mexican national observer program resulting in 100% coverage. Some of those vessels also participate each year in the PBF fishery. Nowadays this catch is transferred to the net pen farms in northwest Baja California. A quota was established for the PBF commercial fishery in 2012. For that reason, in 2014 Mexico's catch was 4,862 t (which was below the quota for 2014). For 2015 a lower quota was established for the EPO, and Mexico in the recent IATTC annual meeting announced a voluntary extra reduction for 2016 due to its concern about the status of the stock and to encourage the rest of the PBF fishing nations to take further efforts to reduce fishing mortality on this stock.

Mexico also noted that a stock rebuilding plan for PBF was proposed by the U.S. at the 2015 IATTC meeting and all PBF fishing nations participated in discussions to adopt a rebuilding plan. During these discussions Mexico emphasized the need to link rebuilding efforts in both the IATTC and WCPFC to arrive at a proposal with consistent biological reference points and rebuilding targets in the respective commissions' conservation measures. Unfortunately one member country could not join consensus so a measure was not adopted.

Mexico also mentioned that its fishermen reported unusually high abundance of large-sized PBF and believes this is probably due to the fishery closures implemented in the EPO. However, Mexico is concerned that the benefits of EPO conservation measures might not be realized without comparable limits on catches of PBF above 30kg in the WCPO.

Discussion

It was noted that U.S. fishermen also saw large-sized PBF in waters off of California in 2014-2015, which were likely to begin their westward migration. Similar high abundance was also observed in Japanese waters in 2015. This has generated skepticism among fishermen about the veracity of the stock assessment. The ISC will need to look at these recent patterns in age/size distribution and abundance in the next stock assessment.

The spatial distribution of PBF catches off Baja California was discussed. Effort and catch moved north in 2014-2015 relative to previous years but no link with changes in environmental conditions has been found in Mexican fisheries.

A potential collaboration between the U.S.A. and Mexico on PBF tagging projects was noted.

It was noted that the main metrics used to monitor the benefits of the closed fishing season implemented in the shark fishery are catch/effort data and the results of future stock assessments. Mexico clarified that the closed fishing season is intended to encompass spawning/pupping grounds. Also, Mexico mentioned that most of these shark stocks are shared with other nations so that potential benefits might be less than expected.

It was pointed out that these management measures would be amenable to MSE, although the data available for sharks are sparse so MSE is not likely to be possible for those species until more data are compiled.

The utility of genetic tagging for sharks was mentioned. This could be a topic for a future ISC Seminar.

3.6 U.S.A.

C. Werner presented the United States National Report to the Plenary (**ISC/15/PLENARY/9**) covering fishery data submissions and relevant research by its Pacific Islands and Southwest Fisheries Science Centers related to its purse seine, albacore troll, and longline fisheries in the North Pacific in 2014. Research highlights were provided on socioeconomics of the Hawaiian seafood retail monitoring program, and the impact of the 2010 closure of the bigeye longline fishery (as measured by the shift of fishing effort to the EPO). Research results were also presented on the modeled response of the central North Pacific ecosystem and particularly the possible impact of climate change to pelagic species' catch, tagging studies of SMA, development of a genetic sex marker for NPALB, a length-conditional approach to estimate growth in NPALB, and the distribution of NPALB in relation to the presence of sea surface temperature fronts. Capacity building efforts by CAPAM (the Center for the Advancement of Population Assessment Methodology) were mentioned, including completed workshops on Selectivity (March 2013) and Growth (November 2014), and an upcoming Data Weighting (October 2015) workshop. A brief description of the unusually warm oceanic conditions in the eastern regions of the North Pacific (from the Bering Sea to Baja California) was provided including mention of anecdotal data and observations on the distribution and abundance of pelagic species, including PBF in the Southern California Bight.

Discussion

None.

4 REPORT OF CHAIRMAN

G. Dinardo, ISC Chair presented the following report to the Plenary.

The ISC had another busy year since the ISC Plenary met in Taipei, Taiwan, in July 2014. The year was spent completing a stock assessment update for North Pacific striped marlin, an analysis to assess the status of shortfin mako shark using indicators, as well as preparations for benchmark assessments on Pacific bluefin tuna in 2016. Progress was made by improving best practices and scientific reporting procedures, compiling a catalogue and inventory of the ISC database, and advancing development of the website and data enterprise system. Seven intercessional workshops were held to facilitate collaboration among Member scientists in implementing ISC work plans and coordinating research on the stocks. In addition, the ISC conducted international workshops on *Management Strategy Evaluations* in Yokohama, Japan and *Dynamics of Pelagic Fish in the North Pacific under Climate Change* at the PICES-2014 Annual Meeting in Yeosu, Korea, and made progress towards the development of a collaborative scientific research program with PICES. We continue to address recommendations stemming

from the 2013 peer review of the ISC function, and Hideki Nakano was elected as Chair of the ISC Pacific Bluefin Tuna Working Group.

Managing ISC activities continued to be a challenge during the past year. As before, the challenge is an inherent consequence of the ISC framework adopted by the Members. That is, ISC relies on in-kind contributions from its Members rather than monetary contributions to support a “secretariat” to oversee day-to-day operations of the organization. Given this framework, the Office of the Chair takes on the role of a secretariat, but not a full-service one at that, owing to uncertain support from the Chairman’s funding source. Likewise, the working groups depend on in-kind contributions from Members who elect to participate in specific working groups. This support is uneven among the Members, and Members with insufficient support cannot participate actively and hence, can delay progress of a working group in completing assignments. To date, the support for administration of ISC activities has been provided solely by the U.S. for day-to-day operations of the Office of the Chair, and by Japan for operating and maintaining the ISC website and database. Member countries with scientists serving as chairpersons of the working groups have contributed to supporting administrative services of the working groups. All of the support is appreciated and acknowledged.

I close this report by thanking all my colleagues who have worked on ISC tasks and who have provided the support to ISC and the Office of the Chair in advancing the objectives and purpose of the organization. The service of Chi-lu Sun, ISC Vice Chairman, for support and insightful advice is acknowledged. A special thanks and appreciation is owed to the Chairs of the Working Groups, namely Ren-Fen Wu, Jon Brodziak, John Holmes, Ziro Suzuki, and Suzanne Kohin, who provided unselfish leadership in guiding the work of the Working Groups. In addition, the leadership role of Hideki Nakano with respect to the Data Administrator, Izumi Yamasaki, and Webmaster, Yumi Okochi, is appreciated. Finally, I acknowledge the professional assistance and dedicated service of Sarah Shoffler to the ISC in completing tasks assigned to the Chairman. In that capacity, she served as point of contact for the Office of the Chair, led in organizing the facilities for annual meetings, led in writing and assembling technical information required for agenda items of meetings and for responding to inquiries, and served as advisor to me on all aspects of ISC operations. Thanks to all of you for contributing to another successful year for ISC and for the support and service provided.

5 INTERACTIONS WITH REGIONAL ORGANIZATIONS

5.1 WCPFC

T. Beeching reviewed interactions between WCPFC and ISC over the last year, highlighting the WCPFC SC responses to the ISC North Pacific blue shark and North Pacific albacore assessments. SC10 had recommended that ISC should continue to work towards developing limit reference points (LRPs) that were compatible with those accepted by WCPFC. The NC has already identified a 20% LRP for NPALB. Plenary was informed of the relevant outcomes from WCPFC11.

Discussion

The focus of the next WCPFC Management Objectives Workshop (MOW 4) was discussed. A preparatory meeting is yet to be convened but it is expected that one focus will be the development of a conservation measure for South Pacific albacore tuna (SPALB). Input from the SC and NC will help determine what other harvest strategies will be considered at the workshop. Australia is proposing a work plan to develop a harvest strategy for BET, YFT, SKJ and SPALB. It was noted that the Parties to the Nauru Agreement (PNA) is promoting a target reference point of $F_{SSB50\%}$, which is likely to be a topic of discussion.

The FAO is also funding a separate workshop on management objectives to be conducted by World-Wildlife Fund for Nature (WWF). At this point it is unclear how that workshop will complement the WCPFC MOW process.

The role of the ISC with respect to establishing biological reference points was discussed. While the ISC's role needs further clarification there was agreement that the ISC should provide scientific support to assist the WCPFC and IATTC with identifying an appropriate suite of biological reference points for northern stocks.

5.2 PICES

G. DiNardo reported on the results of the 13-14 July 2015 joint ISC-PICES Study Group meeting convened in Kona, Hawaii, U.S.A. The joint Study Group on Scientific Cooperation of ISC and PICES (SG-SCISC) was established in April 2015 to review each organization's scientific needs and identify where similar key questions or scientific issues might be explored jointly by both organizations. Membership of the SG-SCISC includes:

- Co-Chairperson: Gerard DiNardo (ISC, U.S.A.),
- Co-Chairperson: Jacquelynne King (PICES, Canada),
- Harold Batchelder (PICES Secretariat),
- Steven Bograd (PICES, U.S.A.),
- John Holmes (ISC, Canada),
- Zang Geun Kim (ISC, Korea),
- Jaebong Lee (PICES, Korea),
- Elizabeth Logerwell (PICES, U.S.A.),
- Hideki Nakano (ISC, Japan),
- Sei-Ichi Saitoh (PICES, Japan),
- Chi-lu Sun (ISC, Chinese-Taipei),
- Thomas Theriault (PICES, Science Board), and
- Cisco Werner (ISC, U.S.A.).

At the meeting, the SG-SCISC developed a draft framework of enhanced collaboration between the two organizations to achieve a greater understanding of pelagic ecosystem structure and variability, and its effect on the dynamics and production of Pacific pelagic fish populations. Improvements in our understanding of these factors will advance population modeling and stock assessment research, allowing for development of the next generation of stock assessment models that explicitly account for spatial structure and processes governing population regulation,

allowing ISC and PICES scientists to add value to their science, provide synergies on regional and global issues, and enhance the visibility of both organizations. Three overarching research themes were identified by the SG-SCISC including:

1. Understanding the influence of oceanographic conditions on the distribution and production of commercial pelagic fish species in the North Pacific Ocean;
2. Linking oceanographic conditions to fleet and fisher behavior (ecosystem stressors) to improve understanding of fishery indices used in assessing stock status; and
3. Understanding climate change effects on North Pacific marine ecosystems and impacts on pelagic fish dynamics.

Joint activities under each research theme and the rationale for each, including the benefits to each organization from the joint activity, were identified by the study group, as well as processes for implementing the joint activities and mechanisms to periodically review and update the activities. The Co-Chairpersons will finalize the framework and submit the document to PICES for consideration at the 2015 PICES Annual Meeting in October 2015.

Discussion

None.

6 REPORT OF WORKING GROUPS AND REVIEW OF ASSIGNMENTS

6.1 Albacore

J. Holmes reported on the activities of the ALBWG over the past year (*Annex 8*). The ALBWG originally did not schedule any activities between ISC14 and ISC15, however, WCPFC NC10 tasked the WG with developing an MSE process to evaluate the performance of target reference points. The ISC and the Japan Fisheries Research Agency sponsored a workshop on MSE for tuna manager/stakeholders in Yokohama, Japan, 16-17 April 2015 which was attended by many members of the ALBWG (see Section 6.5). Immediately afterward (18-20 April), the ALBWG held a mini-workshop at NRIFS in Shimizu to begin the process of developing an MSE process for NPALB. Work plans were developed for the next year for review and approval by ISC15. The April 2015 ALBWG workshop identified some principles for the MSE development and identified several areas in which managers/stakeholders will need to be engaged in the process. As a consequence, the ALBWG is proposing an MSE workshop on fishery objectives and harvest control rules for managers in April 2016 followed by a working group workshop to review the 2014 assessment model and new assessment-related research.

Based on the first workshop on MSE, the ALBWG makes the following observations:

- MSE is an ongoing process, not a one-time-only event that produces an “answer” and is complete;
- MSE can be used to address scientific and management issues;
- ALBWG members have identified the delivery of the next assessment in 2017 as their first priority;

ISC15, July 15-20, 2015

- Therefore, an external MSE analyst is needed to deliver on the MSE process, given existing resources and commitments of WG scientists.

Accomplishments of the ALBWG over the past year include:

1. Initiating an MSE process for NPALB;
2. Developing work plans to implement the process (both optimistic and pessimistic)
3. Reviewing recommendations on stock status and conservation in light of 2014 data;
4. Reviewing the ALBWG catch table and identifying a data issues with non-member countries requiring clarification; and
5. Conducting an election for a new Chair; no candidates were identified and the WG voted to keep the standing Chair in place until ISC16, pending Plenary's approval.

The ALBWG proposes the following work plan and schedule for 2015/16:

1. Sept 2015 - J. Holmes will present the ALBWG MSE proposal to the WCPFC NC11 meeting;
2. April 2016 – Workshop for managers on fishery objectives and harvest control rules for MSE in Japan;
3. April 2016 – Intersessional workshop to review 2014 assessment model and new research to approve the stock assessment in Japan at a different location than the proposed workshop above; and
4. No time is requested for an update meeting in advance of ISC16.

The ALBWG identified the following issues for consideration by the ISC Plenary:

1. The ALBWG Chair has asked the STATWG Chair to seek clarification on two issues: (1) the latitudinal band in which catches were made by Vanuatu and reported to the ISC as FAO Area 87 since there is concern these catches may not be NPALB; and (2) whether non-ISC countries are reporting total NPALB catches (eastern and western and central Pacific) to the WCPFC and are published in the yearbook; and
2. The ALBWG is seeking advice on engaging with IATTC managers on the MSE process to get input on fishery objectives and harvest control rules.

The ALBWG Chair did not discuss the MSE proposal developed by the ALBWG but noted that it was included in *Annex 8* as Attachment 4.

Discussion

The ALBWG's plan for a workshop on the NPALB MSE was discussed. The ALBWG proposed an April 2016 meeting with two segments. In the first portion the ALBWG would meet with managers to discuss MSE and gain their input; the second portion will focus on technical issues related to model development for the 2017 stock assessment. No other meetings in advance of the 2016 Plenary are contemplated.

The ISC Chair agreed to discuss the need for input from IATTC managers with IATTC's Executive Director. The STATWG Chair was charged with providing an answer to the ALBWG Chair regarding reported catch statistics.

6.2 Pacific Bluefin Tuna

Z. Suzuki, PBFWG Chair, summarized the activities of the PBFWG (*Annex 9*). PBF catch statistics provided by ISC members for the period from 1952 to 2014 by calendar year were updated. The preliminary PBF catch estimate for 2014 is 17,065 t, which is higher than the 2013 catch of 11,324 t. Each member country also provided information on their fisheries and research activities including catch and effort trends and operational changes. The updated Japanese CPUE time series for longline (adult fish) and troll (juvenile) series were presented.

The PBFWG met twice after ISC14, 20-24 April 2015 in Shimizu, Japan, for model and data improvements and 13 July 2015 in Kona, Hawaii, U.S.A., prior to the ISC15 Plenary. The April WG meeting was the first opportunity to discuss model and data improvements in preparation for the next full assessment; those discussions covered the CIE Review of the 2014 stock assessment and review of fishery data, biological parameters, and model and model structure improvements (see *Annex 9* for the report of WG meeting).

Z. Suzuki summarized the discussion on the impact of possible low recruitment in 2014, which was suggested by the 2014 troll survey targeting recruits. While the utility of this survey to provide reliable measures of PBF recruitment is still being assessed, the WG conducted a projection using the lowest estimated recruitment in the past (1958) as the recruitment for 2014, followed by a low recruitment phase throughout the projection period which is consistent with the 2014 ISC stock assessment projection scenario 6. The result showed that the stock is still able to achieve the interim management objective adopted by the WCPFC (to recover to SSB_{MED} by 2024 with more than 60% probability) with 72% probability compared to 89% in the 2014 ISC stock assessment Scenario 6. As before, the realization of benefits requires full implementation and strict compliance of current management measures. The risk of SSB declining below the historically lowest level observed at least one time within 10 years was about 34%, while it was about 24% in 2014 ISC stock assessment using projection scenario 6. Therefore, even if recruitment is low, the present results show that it is not likely to impede stock recovery. The WG agreed that it is not necessary to change the past conservation advice. The next full stock assessment scheduled for early 2016 will assess the utility of the recruitment survey and even the 2014 estimate.

The work plan for completing the next full assessment in early 2016 includes the following activities. The first WG workshop focused on model and data improvements and was held in Japan during 20-24 April 2015. The second WG workshop will be on data finalization for the full assessment 18-25 November 2015 in Kaohsiung, Taiwan. The third WG workshop will be held from 29 February to 11 March 2016 in La Jolla, California, U.S.A. to complete the full assessment.

Z. Suzuki stepped down as PBFWG Chair and H. Nakano from Japan was elected.

Discussion

The ISC Chair thanked Z. Suzuki for serving as Chair of the PBFWG over the past two years.

There was a question about the difference in the confidence intervals in SSB projections under Scenario 6 and the updated scenario just conducted by the WG. This could be due to a wider

range in recruitment values in the new scenario compared to Scenario 6 presented in the last stock assessment. The use of the lowest observed historical recruitment value (the 1958 year class) could contribute to this larger confidence interval.

Clarification was sought on the difference between the troll CPUE time series and the recruitment index. The CPUE time series uses the data from the winter-season fishery versus the index that uses survey data from the summer fishery.

It was noted that the catch in 2014 was higher than 2013 by about 6,000 t even though conservation measures have been implemented in this time period. This was mainly due to increased Japanese and Mexican catches even though both countries complied with current conservation measures in 2014. For Mexico, catches fell in 2013 due to the biennial catch limit, and this management measure is thought to have contributed to the apparent increase in 2014. The Korean catch in 2014 increased significantly.

It is uncertain if oceanographic conditions can be taken into account in the next stock assessment (scheduled for 2016). Results from the collaboration between ISC and PICES on this issue are unlikely to be available that soon, although the PBFWG could independently consider methods to integrate environmental conditions into the next stock assessment.

Some concern was expressed about the increased probability that SSB will fall below SSB_{LOSS} by 2024. This scenario will be updated as more information about recruitment trends becomes available.

With respect to the WG work plan, it was asked whether a better estimate of the steepness parameter in the stock-recruitment relationship will be attempted, recognizing that this was one of the recommendations of the external review. Methods that rely on existing data to produce a more plausible estimate have been discussed and will be explored in the next assessment. Alternatively, steepness could be estimated based on life history parameters. It was also pointed out that U.S. and Japanese scientists presented the possible range of steepness based on life history information in the last stock assessment and concluded steepness is likely very high.

There was concern about how the observed declines in recruitment in the troll boat survey will be taken into account in the conservation advice. It was noted that the new SSB projection scenario employed a worst case scenario.

6.3 Billfish

J. Brodziak, Chair of the BILLWG, provided the ISC15 Plenary with an overview of the work assignments and tasks completed by the BILLWG since ISC14 (*Annexes 5, 10, 11*). This included a list of future work expected to be conducted by the BILLWG following ISC15.

One work assignment was to hold an intersessional BILLWG workshop in January 2015 in Honolulu, Hawaii, U.S.A. to prepare data for the Western and Central North Pacific Ocean (WCNPO) striped marlin (MLS) stock assessment. This meeting included participants from Chinese Taipei, the IATTC, Japan, and the U.S.A. Twelve working papers were reviewed, revised, and accepted at this meeting by the BILLWG as providing the best available scientific

ISC15, July 15-20, 2015

information for striped marlin stock assessment. The meeting produced one ISC15 Plenary document, *Annex 5* Report of the Billfish WG Workshop (January 2015).

Assessment tasks completed during the January 2015 BILLWG workshop were to prepare fishery data for the stock assessment of WCNPO MLS in 2015 including catch by quarter data, CPUE standardization, size frequency data, tagging data, and life history parameters. Assessment tasks completed subsequent to the workshop were: (i) to submit all catch, standardized CPUE, and size composition data in electronic format to the data coordinator Darryl Tagami by 1 February 2015 and (ii) to submit final versions of working papers submitted during January 2015 workshop to Jon Brodziak by 10 February 2015.

Another work assignment was to hold an intersessional BILLWG workshop in April 2015 in Yokohama, Japan, for the purpose of conducting the stock assessment modeling for the WCNPO MLS stock assessment. This meeting included participants from Chinese Taipei, Japan, and the U.S.A. Three working papers were reviewed, revised, and accepted at this meeting by the BILLWG as providing the best available scientific information for the MLS stock assessment. The meeting produced two ISC15 Plenary documents. These were: *Annex 10* Report of the Billfish WG Workshop (April 2015) and *Annex 11* Stock Assessment of Striped Marlin in the North Pacific Ocean in 2015.

Tasks completed subsequent to the April 2015 workshop were: (i) to submit finalized copies of all working papers presented at this meeting to the BILLWG Chair, Jon Brodziak, by 20 May, 2015 and set up files of projections, (ii) to run the stock projection scenarios as agreed upon and distribute results to BILLWG by 29 May, 2015; and (iii) to draft the stock assessment report for submission to the ISC15 Plenary meeting.

The future work plan of the BILLWG for 2015-2016 included one primary work assignment, which is to conduct a Pacific blue marlin stock assessment update. This is the first priority task and is to be led by scientists from Japan and U.S.A. To accomplish this work, the BILLWG plans to hold two intersessional workshops: a data preparation workshop to be hosted in Honolulu, Hawaii, U.S.A. by the Pacific Islands Fishery Science Center (PIFSC) in December 2015 and an assessment modeling meeting to be hosted at a site to be determined in March 2016. Two second priority tasks are: (i) to conduct research on billfish life history parameters in a comparative study by scientists from Chinese Taipei, Japanese, and U.S.A. and (ii) for scientists from U.S.A., Chinese Taipei, Japan, Korea, and Chinese to conduct research on spatial and temporal variation in striped marlin size composition.

Discussion

None.

6.4 Shark

S. Kohin, SHARKWG Chair, provided a summary of SHARKWG activities over the past year (*Annexes 4, 7, 12*). The focus of the SHARKWG was on shortfin mako shark (SMA) with the working group developing data time series and a fishery indicator analysis of North Pacific SMA. Meetings of the SHARKWG since ISC 14 were held in Puerto Vallarta, Mexico, Shizuoka, Japan and Kona, Hawaii, U.S.A. The SHARKWG also held a webinar between meetings to

ISC15, July 15-20, 2015

provide an opportunity to review data updates and plan for the SMA fishery indicator analyses. Chinese Taipei, Japan, Mexico, U.S.A., and the WCPFC all actively participated in at least one intersessional SHARKWG meeting. Although blue shark (BSH) was not the focus of the working group over the past year, some information on BSH fishery data and biology was discussed over the past year.

Highlights of the two intersessional SHARKWG meetings, webinar, and one-day meeting held in advance of ISC15 were briefly presented; *Annexes 4 and 7* contain the full reports of the Working Group meetings. The SHARKWG Chair expressed appreciation to Mexico for hosting the SMA data preparatory meeting. The meeting was the first ISC meeting hosted by Mexico and was particularly valuable in enabling greater participation by Mexico in the SHARKWG. Hopefully more meetings in Mexico will follow. The webinar was considered a success, as it provided an opportunity for work group members to provide updates on ongoing work and for the SHARKWG Chair to reiterate assignments and plan for the assessment meeting, but it was not without challenges due to the difference of 11 hours between members in Mexico City and Taipei. The SHARKWG plans to hold other webinars in the future to progress work intersessionally.

The principal accomplishment of the SHARKWG since ISC14 was completion of the indicator-based analysis of North Pacific shortfin mako shark; *Annex 12* contains the full indicator analysis report. The indicator-analysis was conducted cooperatively by working group members.

The SHARKWG proposed a work plan for the coming year and an assessment schedule for providing stock status information on North Pacific BSH and SMA to the ISC Plenary in 2017 and 2018, respectively. The SHARKWG recognizes the difficulty in estimating shark catch and discards and the challenges presented by spatial segregation of pelagic sharks by size and sex. In addition, life history parameters for pelagic sharks are still rather uncertain. Work leading up to ISC16 will focus on improving catch and CPUE time series for both BSH and SMA and advancing research on biological and modeling studies. In the spring of 2017, the SHARKWG plans to conduct a benchmark assessment of BSH in the North Pacific using a Bayesian Surplus Production model.

The SHARKWG and ISC Chair discussed the request of the WCPFC NC to provide information to the WCPFC SC for their work on conducting analyses aimed at determining whether North Pacific BSH should be considered a northern stock. An information paper that will contain a list of relevant documents produced by the ISC SHARKWG is being prepared to forward to the WCPFC SC11 meeting.

Discussion

The proposed schedule of workshops for the next BSH assessment was discussed. Face-to-face meetings are an effective forum for resolving data uncertainties but are more costly both in terms of travel and time commitment. Given these tradeoffs it was recommended that the SHARKWG conduct one of the two proposed data preparation workshops as a webinar. This would respond to Members' concern about the number of meetings national scientists are expected to attend. The planned meeting schedule is listed in Table 11-1.

With respect to data and other assessment inputs, the SHARKWG places highest priority on improving the time series of catches, the CPUE index, and identifying a plausible stock-recruit relationship.

In the last assessment cycle the age structured model (Stock Synthesis) and the Bayesian surplus production model produced similar results and were endorsed by the WCPFC SC, suggesting that the simpler approach can produce reasonable results. Given the paucity of BSH data the Plenary decided that the SHARKWG should perform the next assessment using the Bayesian surplus production model. This model requires less data that are either readily available or estimable.

Focusing on a single assessment model platform would provide more time to resolve some of the current data and parameter issues. In particular, progress could be made on developing a plausible stock-recruitment relationship for low fecundity species and resolving uncertainties in the SMA catch and CPUE data sets. These efforts would support the production of a more sophisticated age-structured assessment in the future.

The Plenary endorsed the SHARKWG recommendation to convene a workshop with tuna RFMOs on the use of stock fishery indicators as an alternative to full assessments. Procedures to translate indicator results into management advice are needed. The ISC Chair will work with tuna RFMO Executive Directors to plan a workshop on this topic in 2016 or early 2017. It was noted that such a workshop would not solely focus on indicators for sharks.

At the WCPFC NC the ISC Chair will emphasize the need for member countries to submit working papers on methods to disaggregate grouped catch data for sharks into individual species. He will also emphasize that participation and preparation for WG activities is critical to the success of any science organization including the ISC. In many instances ISC WG participants have not completed tasks, delaying activities of the WG. Members need to support scientists both in terms of funding travel and allocating the time for them to do the work.

An annotated bibliography will be provided to the WCPFC SC to support its task of determining whether BSH is a northern stock. It was noted that the SHARKWG has not analyzed data to address this question.

6.5 Management Strategy Evaluation (MSE) Workshop

The following report on the MSE workshop was submitted by the ISC Chair.

The ISC convened a Management Strategy Evaluation Workshop in Yokohama, Japan, from 16-17 April 2015. The purpose of the workshop was to review the objectives, benefits, and requirements to implement an MSE, as well as recent progress made by tuna RFMOs towards adopting and implementing the MSE process. Discussions were aimed at defining the roles of managers, stakeholders and scientists in the MSE process, particularly as they relate to facilitating the completion of MSEs in the ISC. In attendance were 71 participants, including fishery managers, stakeholders and scientists. Keynote presentations defined the role of MSEs, including implementation strategies under fluctuating stock conditions. Application case studies of MSEs in the Pacific Ocean were presented, and the status of MSE development and implementation in the Western Central Pacific Fisheries Commission and Inter-American

Tropical Tuna Commission were discussed. An Expert Panel was convened during the workshop to stimulate further discussion among participants.

While the presentations were well received and informative, there was general agreement among participants that regular workshops on MSE would be beneficial. Managers are still unclear as to purpose and role of MSEs, despite the lengthy discussions during the workshop. While similar discussions on MSEs are occurring at other tuna RFMOs, implementation in the Pacific Ocean has been slow and limited to southern bluefin tuna in the Commission for the Conservation of Southern Bluefin Tuna.

Discussion

None.

7 STOCK STATUS AND CONSERVATION ADVICE

7.1 Albacore

J. Holmes, ALBWG Chair, summarized recommendations on stock status and conservation advice for NPALB. He noted that the last assessment was conducted in 2014 and that these recommendations were based on a qualitative review of 2014 fishery data from ISC member countries. This review showed that estimated total catch in 2014 (83,462 t) remains above but is declining toward the long-term mean (72,128 t), that catches by the major gear (troll, pole-and-line, longline) are around long-term means for each gear type, and that nominal effort (number of participating vessels) for each major gear type is either declining or has stabilized.

Discussion

It was noted that annual recruitment cannot be estimated in the short term between assessments, because there are no data sources for abundance prior to their initial recruitment to fisheries at age 2.

Long-term variation in the catch time series is evident; while this may be due to regime shifts, the ALBWG has not been able to establish a plausible link between abundance and environmental conditions.

China and non-ISC-member nations (principally Vanuatu) have not reported their WCPO NPALB catches but this probably doesn't substantially affect estimates of stock status, at least to date. Unreported catch is believed to be approximately 5,000 t annually in recent years.

Stock Status and Conservation Advice

Although the review of 2014 data did not include full catch data from China and non-ISC member countries, the ALBWG noted that these data were unlikely to change its view on stock status and conservation advice.

Stock Status

Because the calculated F_s for 2010-2012 relative to most candidate reference points, except F_{MED} and $F_{50\%}$ (which the ALBWG considers to be poor choices as reference points for this stock), are below 1.0, NPALB is not experiencing overfishing. The 2014 assessment estimated that spawning biomass in 2012 (110,101 t) was more than two times greater than the $20\%SSB_{CURRENT\ F=0}$ limit reference point established by the WCPFC, which means that the stock is not in an overfished state. Thus, the ISC concludes that overfishing is not occurring and that the stock is not in an overfished state (Figure 7-1, Figure 7-2, Figure 7-3).

Conservation Advice

The ISC concludes that the North Pacific albacore stock is healthy ($SSB_{2012} \gg 20\%SSB_{current\ F=0}$) and that current productivity (SSB_{2012}) is sufficient to sustain recent exploitation ($F_{2010-2012}$), assuming average historical recruitment (about 42.8 million fish annually) continues.

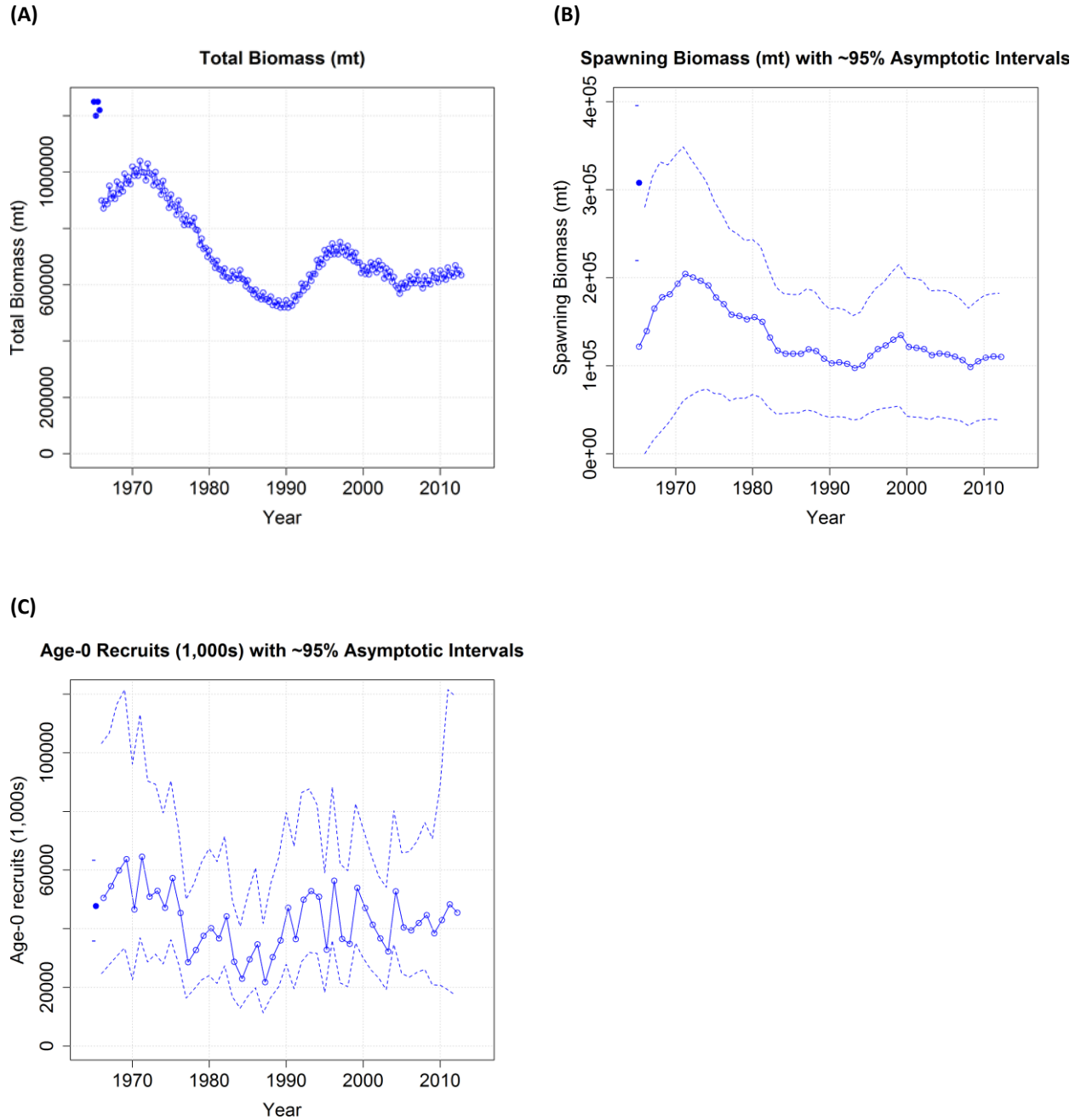


Figure 7-1. Estimated total age-1+ biomass (A), female spawning biomass (B), and age-0 recruitment (C) of North Pacific albacore tuna (*Thunnus alalunga*) including unfished biomass and recruitment estimates (closed circles). The open circles represent the maximum likelihood estimates of each quantity and the dashed lines in the SSB. (B) and recruitment (C) plots are the 95% asymptotic intervals of the estimates (± 2 standard deviations) in lognormal (SSB – B) and arithmetic (recruitment – C) space. Since the assessment model represents time on a quarterly basis, there are four estimates of total biomass (A) for each year, but only one annual estimate of spawning biomass (B) and recruitment (C).

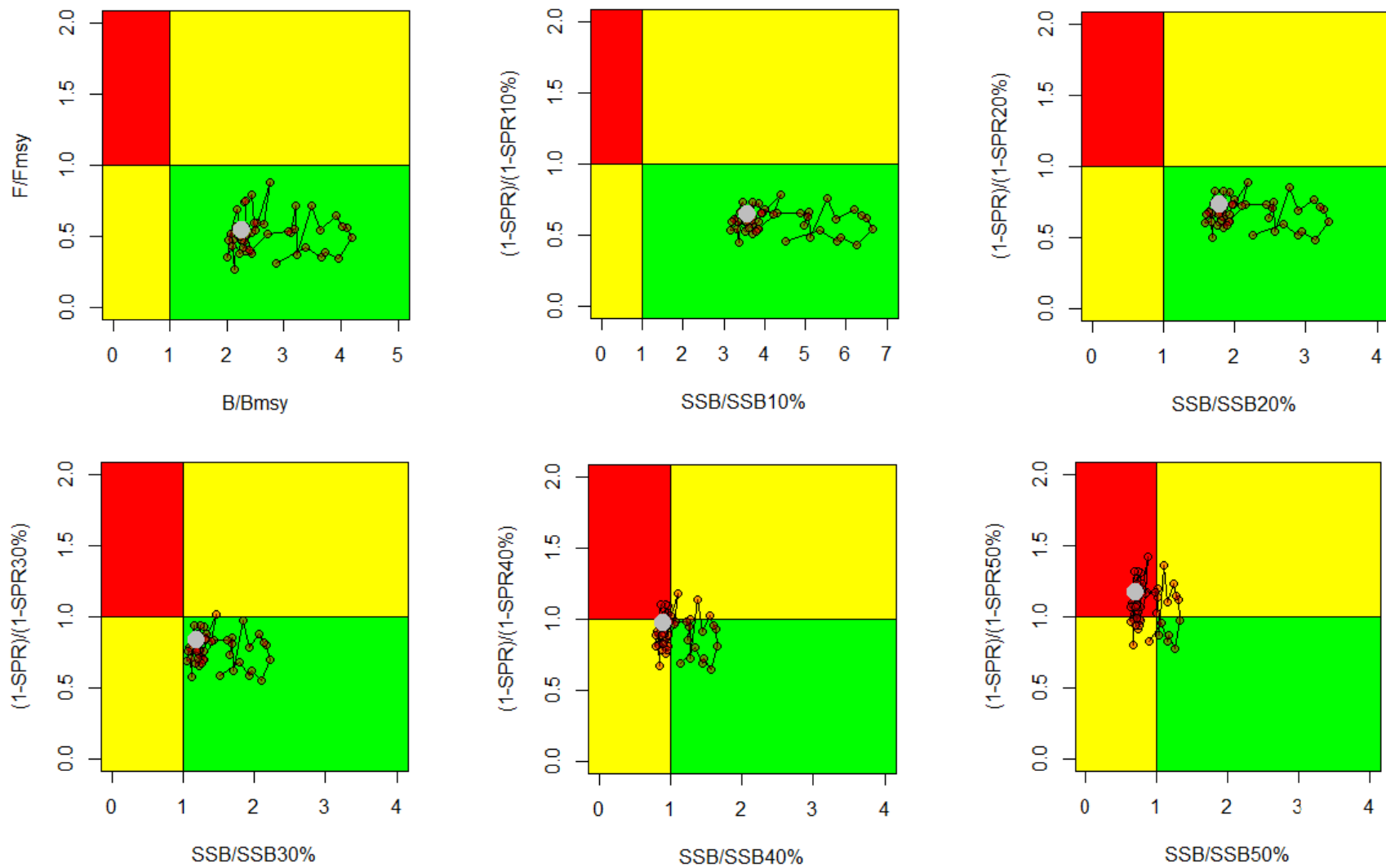


Figure 7-2 Alternative Kobe plots showing North Pacific albacore (*Thunnus alalunga*) stock status based on $F_{2010-2012}$ relative to MSY-based reference points (top left) and MSY proxies consisting of SPR-based fishing intensity reference points ($F_{10\%-50\%}$) for the 2014 base case model. Grey dots are the terminal year (2012) of the assessment. The WCPFC established 20%SSB_{current F=0} as a limit reference point for this stock. An F-based target reference point has not been established at present. These plots are presented for illustrative purposes.

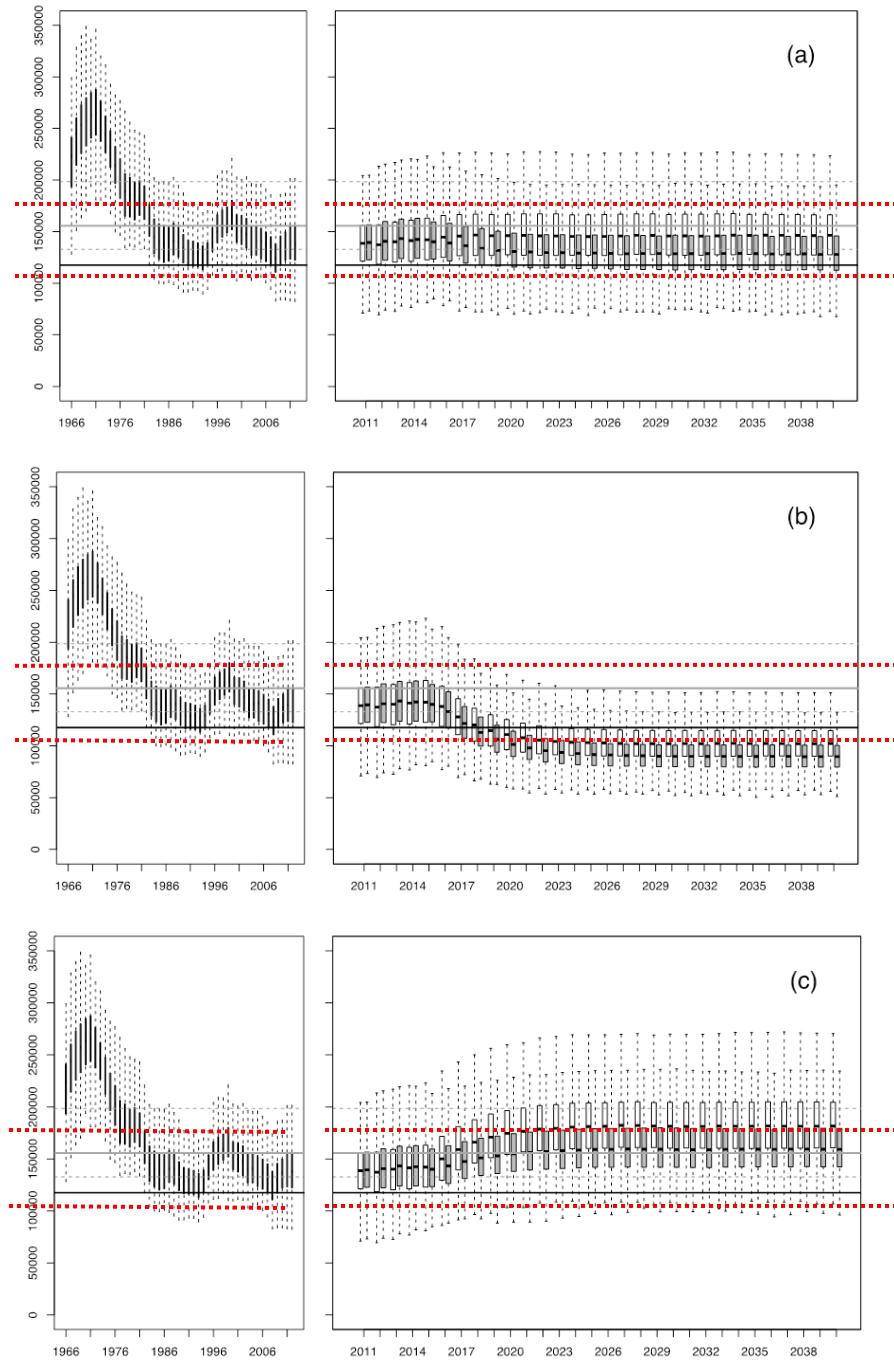


Figure 7-3. Historical (left) and future trajectories of north Pacific albacore (*Thunnus alalunga*) female spawning biomass (SSB) based on two constant harvest scenarios ($F_{2002-2004}$ - gray boxplot; $F_{2010-2012}$ - white boxplot) for average historical recruitment (a), low historical recruitment (b) and high historical recruitment (c) scenarios. The solid gray and red dashed lines represent median, 25% and 75% quintiles of past SSB, respectively. The solid black line is the average of 10 lowest estimated historical female SSB values, i.e., the SSB-ATHL threshold, which is no longer in use. Outlier values are not shown in these figures.

7.2 Pacific Bluefin Tuna

Z. Suzuki, PBFWG Chair, reported that no new assessment was conducted by the PBFWG in 2015. The ISC conducted a full stock assessment in 2014. Based on the assessment results at ISC14, which concluded that “the current (2012) PBF biomass level is near historically low levels and experiencing high exploitation rates above all biological reference points except for F_{LOSS} ,” and the projection results of various scenarios the ISC in 2014 advised that “further substantial reductions in fishing mortality and juvenile catch over the whole range of juvenile ages should be considered to reduce the risk of SSB falling below its historically lowest level”.

Regarding fishing operations in 2015: in both the eastern and western Pacific Ocean, fishermen in general are reporting an increased catch rate and size of fish in the catch (in the case of Mexico) in 2015, while preliminary results from the Japanese recruitment survey index suggested low recruitment in 2014.

The PBFWG in April 2015 discussed the impact of possible low recruitment in 2014. The PBFWG noted that the recruitment information for 2014 is preliminary and uncertain and agreed that it is not necessary to change the past conservation advice.

The PBFWG plans to address comments from the 2012 external review as part of the next stock assessment.

Discussion

The implications of preliminary evidence of poor recruitment in 2014 and increased catch for most age classes compared to 2013 were discussed extensively in relation to drafting conservation advice for this stock.

It was noted that the WCPFC and IATTC strengthened their conservation measures to be applied in 2015 in response to the 2014 ISC Conservation Advice.

It was noted that the NC may request additional projection scenarios to be evaluated and the ISC may also formulate and analyze scenarios it deems useful to managers.

Stock Status and Conservation Advice

ISC did not conduct a new stock assessment in 2015 and provides advice based on the assessment conducted in 2014.

Stock Status

Although no target or limit reference points have been established for the PBF stock under the auspices of the WCPFC and IATTC, the current F average over 2009-2011 exceeds all target and limit biological reference points (BRPs) commonly used by fisheries managers except for F_{LOSS} , and the ratio of SSB in 2012 relative to unfished SSB (depletion ratio) is

less than 6%. In summary, based on candidate reference point ratios, overfishing is occurring and the stock is overfished.

Projections associated with the 2014 stock assessment examined a suite of recruitment hypotheses, including a low recruitment scenario which is consistent with the preliminary estimate of PBF recruitment in the WPO in 2014. Even with the low recruitment value resampled from the past low recruitment period, the projection results presented to the Plenary showed that the initial rebuilding goal adopted by WCPFC to recover to SSB_{MED} by 2024 with a >60% probability can be achieved.

The catch in 2014 (17,076 t) was similar to that in 2011 (17,107 t), and increased from the 2012-2013 level (13,109 t in average), in most size classes on both sides of the Pacific Ocean. However, there was no indication of a significant increase in fishing effort, which may suggest an increase in the availability or catchability of fish. Although the catch in 2014 was consistent with the conservation measures adopted by RFMOs, the increase could affect the recovery. The impact of these increases is yet to be analyzed and will be assessed by the PBFWG in the next assessment.

Based on the above observations, the ISC provides the following conservation advice.

Conservation Advice

In relation to the projections requested by NC9, only Scenario 6,² the strictest one, resulted in an increase in SSB even under a low recruitment scenario.

If the low recruitment of recent years continues, the risk of SSB falling below its historically lowest level observed would increase. This risk can be reduced with implementation of more conservative management measures.

If the specifications of the harvest control rules used in the projections were modified to include a definition of juveniles that is more consistent with the maturity ogive³ used in the stock assessment, projection results could be different; for example, rebuilding may be faster. The various harvest scenario projections defined “juvenile” based on weight, which is inconsistent with what the WG used (age). Any proposed reductions in juvenile catch should consider all non-mature individuals.

² For the WCPO, a 50% reduction of juvenile catches from the 2002-2004 average level and F no greater than F_{2002} . For the EPO, a 50% reduction of catches from 5,500 t. From the scientific point of view, juvenile catches were not completely represented in the reductions modeled under Scenario 6 for some fisheries although these reductions comply with the definition applied by NC9.

³ 20% at age 3; 50% at age 4; 100% at age 5 and older in the assessment versus <30 kg in the projections.

Given the low level of SSB, uncertainty in future recruitment, and importance of recruitment in influencing stock biomass, monitoring of recruitment and SSB should be strengthened to allow the trend of recruitment and SSB to be understood in a timely manner.

7.3 Blue Marlin

The most recent stock assessment was completed in 2013. J. Brodziak reported that no new stock assessment for Pacific blue marlin was conducted by the BILLWG in 2015.

ISC did not conduct a new assessment in 2015 and provides stock status and conservation advice adopted in 2013 with modifications to provide more specificity.

Stock Status and Conservation Advice

Stock Status

The Kobe plots from the 2013 stock assessment indicate that the Pacific blue marlin spawning stock biomass decreased to slightly above the BMSY level (19,437 t) by about 2005, and increased slightly from 2010-2011. The base case assessment model indicates that the Pacific blue marlin stock was not overfished and was not subject to overfishing relative to MSY-based reference points (see Figure 7-4).

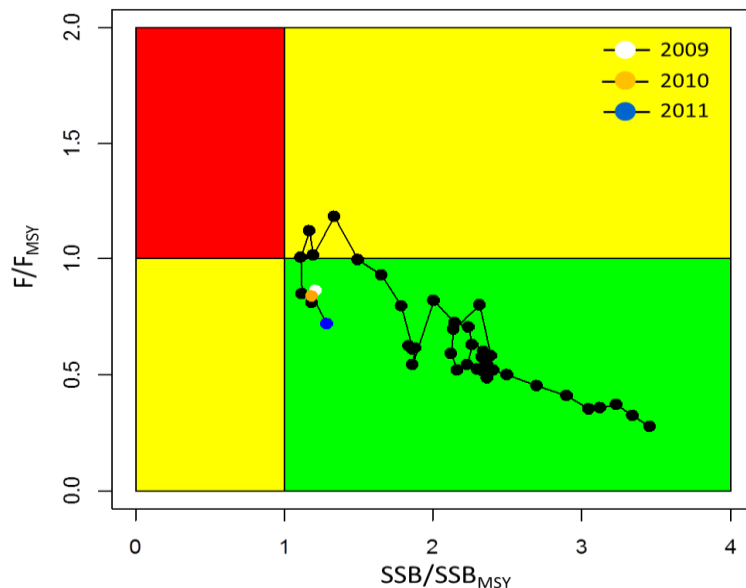


Figure 7-4. Kobe plot for blue marlin (*Makaira mazara*).

Conservation advice

Based on the 2013 stock assessment, the Pacific blue marlin stock was not overfished and was not experiencing overfishing. The stock is nearly fully exploited. Stock biomass has

declined since the 1970s, was stable from about 2005 to 2010, and then increased slightly through 2011. The fishing mortality rate should not be increased from the 2009-2011 level to avoid overfishing.

7.5 Striped marlin

The most recent stock assessment was completed in 2011. J. Brodziak reported that a stock assessment update for WCNPO striped marlin (MLS) was conducted by the BILLWG in 2015 (*Annexes 5, 10, 11*).

Stock Identification and Distribution: The WCNPO MLS stock is separated from the Eastern North Pacific stock based on results of population genetic studies and empirical patterns in the spatial distribution of fishery catch-per-unit effort. The boundary of the Western and Central North Pacific stock is defined to be the waters of the Pacific Ocean west of 140°W and north of the equator.

Catches: Catches of WCNPO MLS have exhibited a long-term decline since the 1970s. Annual catches averaged roughly 8,173 mt during 1975-1979 and declined by 59% to an average of 3,385 mt per year during 2004-2013. Reported catches in 2013 (the last year in the assessment update) totaled 2,984 mt, which was the third lowest reported catch since 1975 (Table 7-1).

Data and Assessment: Catch data was collected from all ISC countries and from countries reporting catches to the WCPFC (Table 7-1). The growth curve was re-estimated using newly developed ageing data and the values of steepness and natural mortality were also re-estimated using available biological information. Standardized CPUE data used to measure trends in relative abundance were provided by Japan, U.S.A., and Chinese Taipei. The stock assessment was conducted using the Stock Synthesis assessment model. The assessment model was fitted to relative abundance indices and size composition data in a likelihood-based statistical framework. Maximum likelihood estimates of model parameters, derived outputs, and their variances were used to characterize stock status and to develop stock projections (Figure 7-5).

Biological Reference Points: Reference points based on MSY were estimated in the Stock Synthesis assessment model. The point estimate of maximum sustainable yield (± 1 standard error) was $MSY = 5,657 \text{ mt} \pm 176$. The point estimate of the spawning stock biomass to produce MSY was $SSB_{MSY} = 2,819 \text{ mt} \pm 85$. The point estimate of F_{MSY} , the fishing mortality rate to produce MSY (average fishing mortality on ages 3 and older) was $F_{MSY} = 0.63 \pm 0.01$ and the corresponding equilibrium value of spawning potential ratio at MSY was $SPR_{MSY} = 18.1\% \pm 0.1\%$.

Projections: Stock projections for future spawning biomass and catch biomasses of WCNPO MLS during 2013 to 2020 account for uncertainty in future stock size and recruitment. Three states of nature for future recruitment were assumed for the projections. These were: **Recent Recruitment** in which the recent low recruitment pattern (2007-2011) was randomly resampled; **Medium-Term Recruitment** in which the moderate recruitment pattern since 1994 (1994-2011) was randomly resampled; and **Stock-Recruitment Curve** in which the residuals from the estimated stock-recruitment curve (1975-2011) were randomly resampled and added to expected

recruitment. Projections were run using a pooled-sex, age-structured simulation model, included estimation uncertainty for the initial population size at age, and used life history and fishery parameters from the base case stock assessment model.

Ten projected harvest scenarios (**Table 7-1** through

Table 7-4) were analyzed; there were six fishing mortality rate scenarios and four constant catch biomass scenarios. The six annual fishing mortality scenarios were: (1) constant fishing mortality equal to the 2001-2003 average ($F_{2001-2003} = F_{10\%}$); (2) constant fishing mortality equal to the current F ($F_{\text{current}} = F_{12\%}$), the 2010-2012 average; (3) constant fishing mortality equal to F_{MSY} ($F_{\text{MSY}} = F_{18\%}$); (4) constant fishing mortality to produce a spawning potential ratio (SPR) of 0.2 ($F_{20\%}$); (5) constant fishing mortality to produce an SPR of 0.3 ($F_{30\%}$); and (6) no fishing ($F_{100\%}$). The four annual catch biomass scenarios were: 70% of the average catch during 2010-2012 ($C_{70\%} = 2,216$ mt); 80% of the average catch during 2010-2012 ($C_{80\%} = 2,533$ mt); 90% of the average catch during 2010-2012 ($C_{90\%} = 2,849$ mt); and 80% of highest catch by country during 2000-2003 as described in the WCPFC CMM 2010-01 ($C_{\text{CMM 2010-01}} = 3,490$ mt). Spawning stock biomass (SSB) in the last projection year (2020) relative to 2015 was the performance measure used to describe the future stock impacts while projected median annual catches during 2015-2020 measured the productivity of the fishery.

When the current status quo harvest rate is maintained ($F_{12\%}$), the stock is projected to have a 75% probability that $\text{SSB}_{2020} < \text{SSB}_{2015}$ under the recent recruitment hypothesis. The risk that $\text{SSB}_{2020} < \text{SSB}_{2015}$ is reduced to 25% and 5% under the medium-term recruitment and stock-recruitment curve hypotheses, respectively (Table 7-2). In contrast, if harvest rates were to increase to 2001-2003 levels ($F_{10\%}$), then the probabilities that $\text{SSB}_{2020} < \text{SSB}_{2015}$ increase for all three recruitment hypotheses, ranging from 50% to 95%. Conversely, if fishing mortality was reduced to the MSY level ($F_{18\%}$) the stock has a 0% probability that $\text{SSB}_{2020} < \text{SSB}_{2015}$ under the medium-term recruitment and stock-recruitment curve hypotheses, but a 5% probability that $\text{SSB}_{2020} < \text{SSB}_{2015}$ under the low recruitment hypothesis. Under all recruitment hypotheses, fishing at the F_{MSY} level provides a safe level of harvest if a less than a 50% probability of declining SSB ($\text{SSB}_{2020} < \text{SSB}_{2015}$) is used as a threshold. Also, fishing at the F_{MSY} level under the medium-term recruitment and stock-recruitment curve hypotheses would likely produce larger increases in catches from 2015 to 2020 compared to the recent recruitment hypothesis (Table 7-3).

If fishing intensity were reduced to $F_{30\%}$, then $\text{SSB}_{2020} > \text{SSB}_{2015}$ is estimated under all recruitment hypotheses and there would be a 50% probability of rebuilding the stock to SSB_{MSY} by 2019 and 2018 under the medium-term recruitment and stock-recruitment curve hypotheses, respectively (

Table 7-4). Last, if there was a cessation of fishing mortality after 2015, spawning stock biomass would have a 50% probability of rebuilding to the SSB_{MSY} level by 2017 under all recruitment hypotheses.

When catch is reduced 30% from the current level (2010-2012 level to 2,216 t), spawning stock biomass is projected to have a 5% probability of falling below the 2015 level for the recent recruitment hypothesis, but 0% probability under the medium-term recruitment and stock-recruitment curve hypotheses.

If catches were increased to 3,490 t (about 80% of highest catches during 2000-2003; the highest catch scenario, WCPFC CMM 2010-01), the stock would be projected to have a 25% probability that $SSB_{2020} < SSB_{2015}$ under the recent recruitment hypothesis, and a 0% probability that $SSB_{2020} < SSB_{2015}$ under the medium-term recruitment and stock-recruitment curve hypotheses.

Under the recent recruitment hypothesis, none of the constant catch scenarios result in a 50% probability that the stock rebuilds to SSB_{MSY} level within the projection period (2015-2020) (

Table 7-4). Under the medium-term recruitment and stock-recruitment curve hypotheses, most of the constant catches scenarios allow the population to rebuild to the SSB_{MSY} level within 2015-2020, except for constant catches of 3,500 t (

Table 7-4).

Under all recruitment hypotheses, constant catches at levels less than or equal to 2,850 t appear sustainable assuming a 50% probability of declining SSB is used as a threshold. Although constant catches at levels less than or equal to 3,500 t also has less than a 50% probability that $SSB_{2020} < SSB_{2015}$, constant catches at levels less than or equal to 2,850 mt would likely produce more stable catches over time under the three recruitment hypotheses (Table 7-3).

Table 7-1. Reported catch (mt), population biomass (mt), spawning stock biomass (mt), relative spawning biomass (SSB/SSB_{MSY}), recruitment (thousands), fishing mortality (average of ages 3 and older), relative fishing mortality (F/F_{MSY}), exploitation rate, and spawning potential ratio of WCNPO striped marlin.

| Year | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | Mean ¹ | Min ¹ | Max ¹ |
|----------------------------|------|------|------|------|------|------|------|-------------------|------------------|------------------|
| Reported Catch | 3084 | 3503 | 2468 | 2852 | 3125 | 3521 | 2984 | 5822 | 2468 | 10594 |
| Population Biomass | 6915 | 6773 | 6409 | 5156 | 7823 | 7349 | 6819 | 12758 | 5156 | 28440 |
| Spawning Stock Biomass | 1192 | 1171 | 970 | 984 | 873 | 1013 | 1094 | 2025 | 815 | 6946 |
| Relative Spawning Biomass | 0.42 | 0.42 | 0.34 | 0.35 | 0.31 | 0.36 | 0.39 | 0.75 | 0.29 | 2.46 |
| Recruitment (age 0) | 240 | 242 | 63 | 496 | 155 | 224 | 352 | 410 | 63 | 1369 |
| Fishing Mortality | 0.82 | 0.99 | 0.80 | 0.96 | 0.89 | 0.97 | 0.76 | 0.95 | 0.47 | 1.54 |
| Relative Fishing Mortality | 1.29 | 1.57 | 1.27 | 1.51 | 1.41 | 1.53 | 1.20 | 1.50 | 0.74 | 2.44 |
| Exploitation Rate | 45% | 52% | 39% | 55% | 40% | 48% | 44% | 48% | 32% | 65% |
| Spawning Potential Ratio | 15% | 12% | 16% | 13% | 12% | 12% | 14% | 13% | 7% | 24% |

¹ During 1975-2013

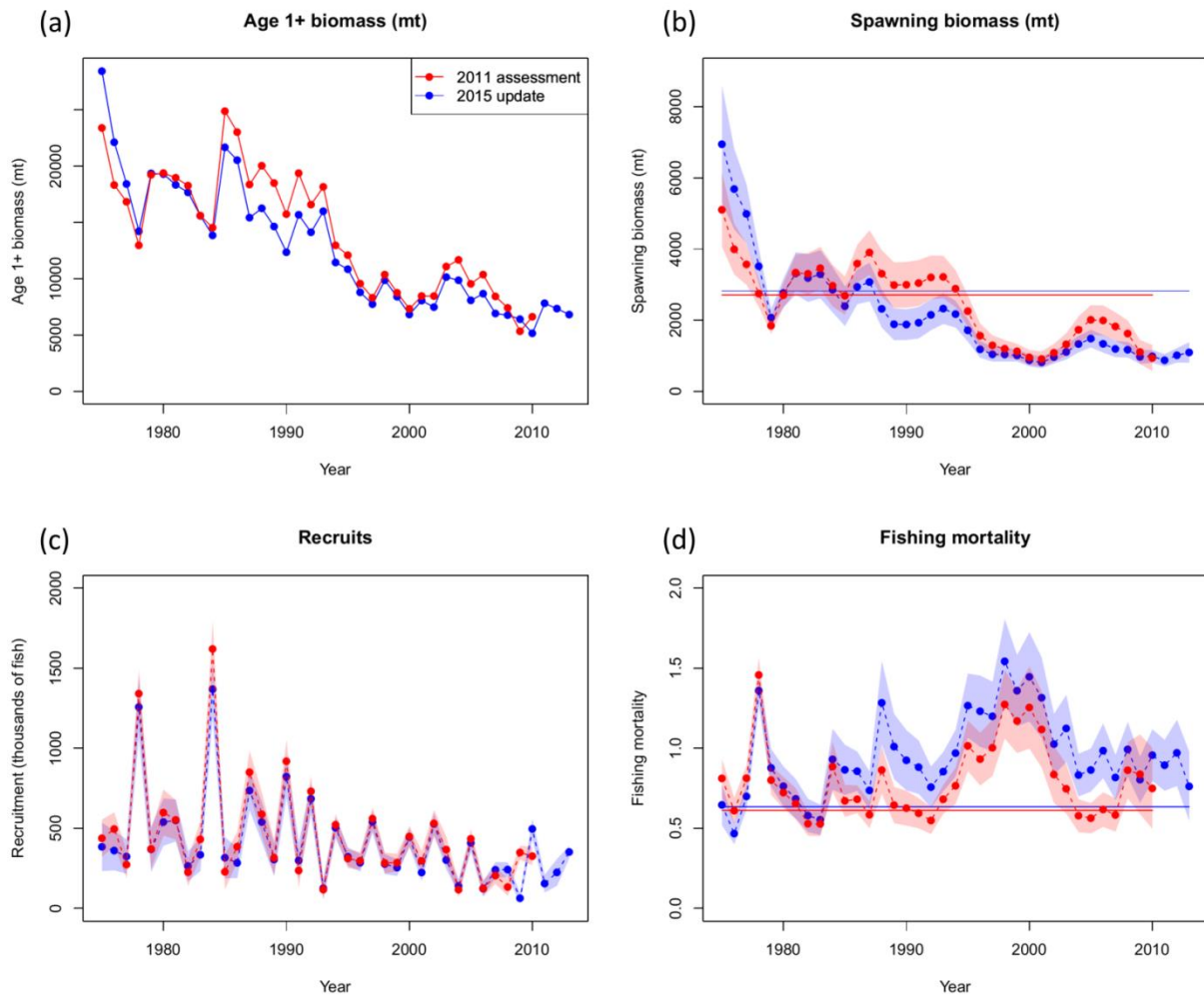


Figure 7-5 Comparison of time series of total biomass (age 1 and older) (a), spawning biomass (b), age-0 recruitment (c), and instantaneous fishing mortality (year-1) (d) for the WCNP striped marlin between the 2011 stock assessment (red) and the 2015 update (blue). The solid line with circles represents the maximum likelihood estimates for each quantity and the shadowed area represents the 95% asymptotic intervals of the estimates (± 1.96 standard deviations). The solid horizontal lines indicated the MSY-based reference points for 2011 (red) and 2015 (blue).

ISC15, July 15-20, 2015

Table 7-2. Decision table of projected percentiles of relative spawning stock biomass in 2020 relative to 2015 (SSB_{2020}/SSB_{2015}) for alternative states of nature (columns) and harvest scenarios (rows). Fishing intensity ($F_{x\%}$) alternatives are based on 10% (average 2001-2003), 12% (average 2010-2012 defined as current), 18% (MSY level), 20%, 30%, and 100% (no fishing). Catch alternatives are based on the 70%, 80%, and 90% of average catches during 2010-2012 (2,216; 2,533; and 2,849 mt), and 80% of average catches during 2000-2003 (3,490 mt). Red blocks indicate the declining trend of SSB in 2020 from 2015 where SSB_{2020}/SSB_{2015} is less than one.

| Run | Harvest scenario | Recent Recruitment | | | | | Medium-Term Recruitment | | | | | Stock-Recruitment Curve | | | | |
|-----|--------------------------------|--------------------|------|------|------|------|-------------------------|------|------|------|------|-------------------------|------|------|------|------|
| | | 5th | 25th | 50th | 75th | 95th | 5th | 25th | 50th | 75th | 95th | 5th | 25th | 50th | 75th | 95th |
| 1 | $F_{2001-2003} = F_{10\%}$ | 0.46 | 0.58 | 0.68 | 0.80 | 0.92 | 0.63 | 0.78 | 0.86 | 0.94 | 1.02 | 0.59 | 0.76 | 0.91 | 1.08 | 1.32 |
| 2 | $F_{2010-2012} = F_{12\%}$ | 0.57 | 0.71 | 0.82 | 0.94 | 1.08 | 0.78 | 0.94 | 1.04 | 1.12 | 1.21 | 0.79 | 1.00 | 1.18 | 1.37 | 1.65 |
| 3 | $F_{MSY} = F_{18\%}$ | 0.92 | 1.10 | 1.25 | 1.40 | 1.56 | 1.26 | 1.44 | 1.55 | 1.66 | 1.78 | 1.42 | 1.71 | 1.95 | 2.22 | 2.59 |
| 4 | $F_{20\%}$ | 1.02 | 1.22 | 1.38 | 1.53 | 1.72 | 1.41 | 1.59 | 1.71 | 1.82 | 1.94 | 1.60 | 1.92 | 2.18 | 2.46 | 2.86 |
| 5 | $F_{30\%}$ | 1.56 | 1.83 | 2.05 | 2.22 | 2.45 | 2.12 | 2.36 | 2.49 | 2.62 | 2.78 | 2.51 | 2.91 | 3.25 | 3.62 | 4.13 |
| 6 | $F_{100\%}$ | 4.26 | 4.77 | 5.23 | 5.55 | 5.93 | 5.45 | 5.91 | 6.17 | 6.37 | 6.66 | 6.43 | 7.09 | 7.78 | 8.46 | 9.31 |
| 7 | $C_{70\%} = 2216.2$ mt | 0.92 | 1.21 | 1.67 | 2.06 | 2.53 | 1.58 | 2.19 | 2.56 | 2.87 | 3.16 | 2.04 | 2.99 | 3.70 | 4.52 | 5.58 |
| 8 | $C_{80\%} = 2532.7$ mt | 0.90 | 1.05 | 1.39 | 1.74 | 2.24 | 1.32 | 1.82 | 2.21 | 2.54 | 2.86 | 1.67 | 2.54 | 3.29 | 4.13 | 5.27 |
| 9 | $C_{90\%} = 2849.4$ mt | 0.88 | 1.01 | 1.19 | 1.48 | 1.96 | 1.25 | 1.53 | 1.89 | 2.22 | 2.58 | 1.46 | 2.17 | 2.91 | 3.76 | 4.95 |
| 10 | $C_{CMM\ 2010-01} = 3490.1$ mt | 0.87 | 0.97 | 1.09 | 1.19 | 1.54 | 1.19 | 1.31 | 1.44 | 1.70 | 2.06 | 1.39 | 1.71 | 2.31 | 3.13 | 4.40 |

ISC15, July 15-20, 2015

Table 7-3. Projected trajectory of catch (mt) for alternative states of nature (columns) and harvest scenarios (rows). Fishing intensity ($F_{x\%}$) alternatives are based on 10% (average 2001-2003), 12% (average 2010-2012 defined as current), 18% (MSY level), 20%, 30%, and 100% (no fishing). Catch alternatives are based on the 70%, 80%, and 90% of average catches during 2010-2012 (2,216; 2,533; and 2,849 mt), and 80% of average catches during 2000-2003 (3,490 mt).

| Run | Harvest scenario | Recent Recruitment | | | | | | Medium-Term Recruitment | | | | | | Stock-Recruitment Curve | | | | | |
|-----|--------------------------------|--------------------|------|------|------|------|------|-------------------------|------|------|------|------|------|-------------------------|------|------|------|------|------|
| | | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 |
| 1 | $F_{2001-2003} = F_{10\%}$ | 3858 | 3289 | 2943 | 2843 | 2861 | 2850 | 4229 | 3995 | 3882 | 3820 | 3811 | 3836 | 4270 | 4167 | 4101 | 4051 | 3985 | 3986 |
| 2 | $F_{2010-2012} = F_{12\%}$ | 3391 | 3124 | 2838 | 2768 | 2760 | 2775 | 3707 | 3775 | 3757 | 3715 | 3710 | 3725 | 3744 | 3928 | 4031 | 4133 | 4166 | 4232 |
| 3 | $F_{MSY} = F_{18\%}$ | 2458 | 2622 | 2646 | 2607 | 2590 | 2591 | 2674 | 3130 | 3335 | 3372 | 3381 | 3405 | 2697 | 3254 | 3632 | 3971 | 4213 | 4393 |
| 4 | $F_{20\%}$ | 2254 | 2478 | 2559 | 2517 | 2528 | 2530 | 2451 | 2953 | 3201 | 3265 | 3290 | 3315 | 2472 | 3070 | 3494 | 3872 | 4141 | 4363 |
| 5 | $F_{30\%}$ | 1525 | 1861 | 2068 | 2136 | 2178 | 2194 | 1652 | 2198 | 2558 | 2712 | 2791 | 2846 | 1665 | 2284 | 2797 | 3250 | 3624 | 3907 |
| 6 | $F_{100\%}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 7 | $C_{70\%} = 2216.2$ mt | 2216 | 2216 | 2216 | 2216 | 2216 | 2216 | 2216 | 2216 | 2216 | 2216 | 2216 | 2216 | 2216 | 2216 | 2216 | 2216 | 2216 | 2216 |
| 8 | $C_{80\%} = 2532.7$ mt | 2533 | 2533 | 2533 | 2533 | 2533 | 2533 | 2533 | 2533 | 2533 | 2533 | 2533 | 2533 | 2533 | 2533 | 2533 | 2533 | 2533 | 2533 |
| 9 | $C_{90\%} = 2849.4$ mt | 2802 | 2792 | 2782 | 2813 | 2847 | 2849 | 2849 | 2849 | 2849 | 2849 | 2849 | 2849 | 2849 | 2849 | 2849 | 2849 | 2849 | 2849 |
| 10 | $C_{CMM\ 2010-01} = 3490.1$ mt | 2802 | 2760 | 2718 | 2653 | 2641 | 2644 | 3034 | 3310 | 3476 | 3490 | 3490 | 3490 | 3012 | 3447 | 3490 | 3490 | 3490 | 3490 |

ISC15, July 15-20, 2015

Table 7-4. Projected trajectory of median spawning stock biomass (SSB in mt) for alternative states of nature (columns) and harvest scenarios (rows). Fishing intensity ($F_{x\%}$) alternatives are based on 10% (average 2001-2003), 12% (average 2010-2012 defined as current), 18% (MSY level), 20%, 30%, and 100% (no fishing). Catch alternatives are based on the 70%, 80%, and 90% of average catches during 2010-2012 (2,216; 2,533; and 2,849 mt), and 80% of average catches during 2000-2003 (3,490 mt). Green blocks indicate the projected SSB is greater than MSY level ($SSB_{MSY} = 2,819$ mt).

| Run | Harvest scenario | Recent Recruitment | | | | | | Medium-Term Recruitment | | | | | | Stock-Recruitment Curve | | | | | |
|-----|--------------------------------|--------------------|------|------|------|------|------|-------------------------|------|------|------|------|------|-------------------------|------|------|------|------|------|
| | | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 |
| 1 | $F_{2001-2003} = F_{10\%}$ | 1127 | 937 | 821 | 774 | 766 | 765 | 1182 | 1093 | 1051 | 1020 | 1014 | 1017 | 1185 | 1130 | 1111 | 1096 | 1085 | 1084 |
| 2 | $F_{2010-2012} = F_{12\%}$ | 1127 | 1058 | 985 | 940 | 927 | 927 | 1182 | 1225 | 1241 | 1227 | 1220 | 1225 | 1185 | 1264 | 1314 | 1346 | 1383 | 1402 |
| 3 | $F_{MSY} = F_{18\%}$ | 1127 | 1316 | 1393 | 1412 | 1420 | 1414 | 1182 | 1496 | 1709 | 1794 | 1825 | 1837 | 1185 | 1540 | 1812 | 2019 | 2198 | 2316 |
| 4 | $F_{20\%}$ | 1127 | 1373 | 1495 | 1541 | 1559 | 1559 | 1182 | 1557 | 1830 | 1951 | 2001 | 2024 | 1185 | 1601 | 1936 | 2200 | 2425 | 2583 |
| 5 | $F_{30\%}$ | 1127 | 1581 | 1924 | 2142 | 2264 | 2313 | 1182 | 1780 | 2310 | 2647 | 2850 | 2949 | 1185 | 1824 | 2447 | 2986 | 3473 | 3856 |
| 6 | $F_{100\%}$ | 1127 | 2045 | 3109 | 4168 | 5105 | 5894 | 1182 | 2266 | 3611 | 5020 | 6270 | 7290 | 1185 | 2307 | 3797 | 5521 | 7380 | 9222 |
| 7 | $C_{70\%} = 2216.2$ mt | 1324 | 1639 | 1829 | 1981 | 2100 | 2207 | 1378 | 1883 | 2368 | 2837 | 3217 | 3533 | 1391 | 1910 | 2556 | 3333 | 4190 | 5153 |
| 8 | $C_{80\%} = 2532.7$ mt | 1324 | 1545 | 1639 | 1720 | 1774 | 1837 | 1378 | 1791 | 2168 | 2526 | 2807 | 3048 | 1391 | 1820 | 2356 | 3010 | 3745 | 4576 |
| 9 | $C_{90\%} = 2849.4$ mt | 1324 | 1478 | 1494 | 1519 | 1556 | 1572 | 1378 | 1702 | 1997 | 2254 | 2443 | 2604 | 1391 | 1738 | 2170 | 2708 | 3360 | 4049 |
| 10 | $C_{CMM\ 2010-01} = 3490.1$ mt | 1324 | 1466 | 1463 | 1456 | 1448 | 1438 | 1378 | 1648 | 1798 | 1886 | 1946 | 1978 | 1391 | 1683 | 1945 | 2281 | 2743 | 3211 |

Discussion

It was noted that fish smaller than 120 cm (eye to fork length) are caught in commercial fisheries although all sizes 120 cm and below are cumulated in a single bin in the assessment model. Recruitment pulses are detectable in fisheries catching age-0 fish; for example in the Hawaii longline fishery.

The next assessment is scheduled for 2018 and will be a benchmark assessment so many of the CPUE indices considered in this update will be scrutinized more closely at that time. Ideally future assessments could be spatially explicit rather than using fisheries as proxies.

Stock Status and Conservation Advice

Stock Status

Estimates of population biomass of the WCNPO striped marlin stock (*Kajikia audax*) exhibit a long-term decline (Table 7-1 and Figure 7-5). Population biomass (age-1 and older) averaged roughly 20,513 t, or 46% of unfished biomass during 1975-1979, the first 5 years of the assessment time frame, and declined to 6,819 t, or 15% of unfished biomass in 2013. Spawning stock biomass is estimated to be 1,094 t in 2013 (39% of SSB_{MSY} , the spawning stock biomass to produce MSY, Figure 7-7). Fishing mortality on the stock (average F on ages 3 and older) is currently high (Figure 7-8) and averaged roughly $F = 0.94$ during 2010-2012, or 49% above F_{MSY} . The predicted value of the spawning potential ratio (SPR, the predicted spawning output at current F as a fraction of unfished spawning output) is currently $SPR_{2010-2012} = 12\%$, which is 33% below the level of SPR required to produce MSY. Recruitment averaged about 308,000 recruits during 1994-2011, which was 25% below the 1975-2013 average. No target or limit reference points have been established for the WCNPO striped marlin stock under the auspices of the WCPFC.

The WCNPO striped marlin stock is expected to be highly productive due to its rapid growth and high resilience to reductions in spawning potential. The status of the stock is highly dependent on the magnitude of recruitment, which has been below its long-term average since 2007, with the exception of 2010 (Table 7-1). Changes in recent size composition data in comparison to the previous assessment resulted in changes in fishery selectivity estimates and also affected recruitment estimates. This, in turn, affected the scaling of biomass and fishing mortality to reference levels. See Figure 7-5.

When the status of striped marlin is evaluated relative to MSY-based reference points, the 2013 spawning stock biomass is 61% below SSB_{MSY} (2819 t) and the 2010-2012 fishing mortality exceeds F_{MSY} by 49% (Figure 7-9). Therefore, overfishing is occurring relative to MSY-based reference points and the WCNPO striped marlin stock is overfished.

Conservation Advice

The stock has been in an overfished condition since 1977, with the exception of 1982 and 1983, and fishing appears to be impeding rebuilding especially if recent (2007-2011) low recruitment levels persist. Projection results show that fishing at F_{MSY} could lead to median

spawning biomass increases of 25%, 55%, and 95% from 2015 to 2020 under the recent recruitment, medium-term recruitment, and stock recruitment-curve scenarios. Fishing at a constant catch of 2,850 t could lead to potential increases in spawning biomass of 19% to over 191% by 2020, depending upon the recruitment scenario. In comparison, fishing at the 2010-2012 fishing mortality rate, which is 49% above F_{MSY} , could lead to changes in spawning stock biomass of -18% to +18% by 2020, while fishing at the average 2001-2003 fishing mortality rate ($F_{2001-2003}=1.15$), which is 82% above F_{MSY} , could lead to spawning stock biomass decreases of -32% to -9% by 2020, depending upon the recruitment scenario.

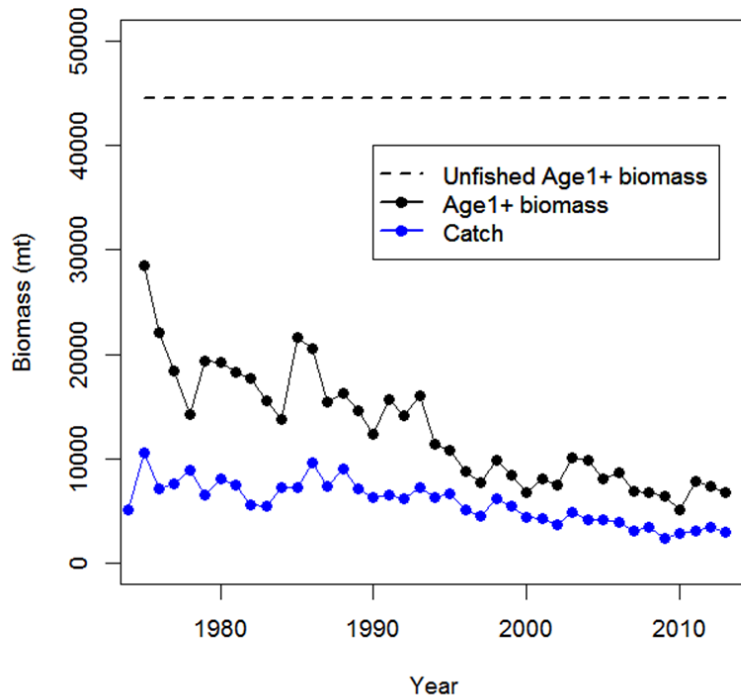


Figure 7-6. Trend in population biomass and reported catch biomass of Western and Central North Pacific striped marlin (*Kajikia audax*) during 1975-2013 relative to unfished biomass.

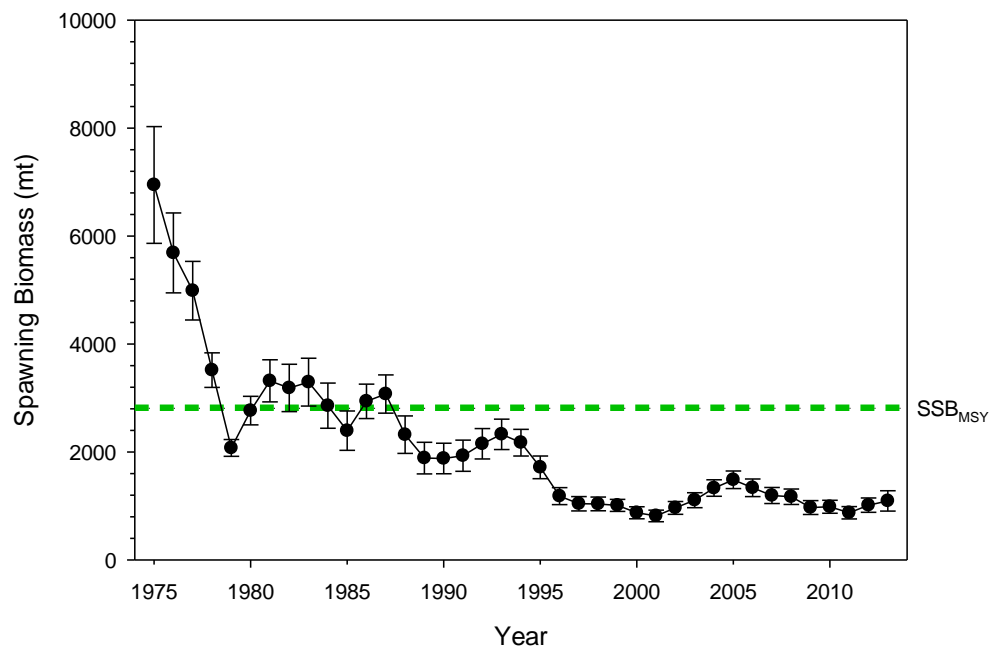


Figure 7-7. Trends in estimates of spawning biomass of Western and Central North Pacific striped marlin (*Kajikia audax*) during 1975-2015 along with 80% confident intervals. The dashed green line is the SSB needed to produce MSY (SSB_{MSY} , 2,819 t).

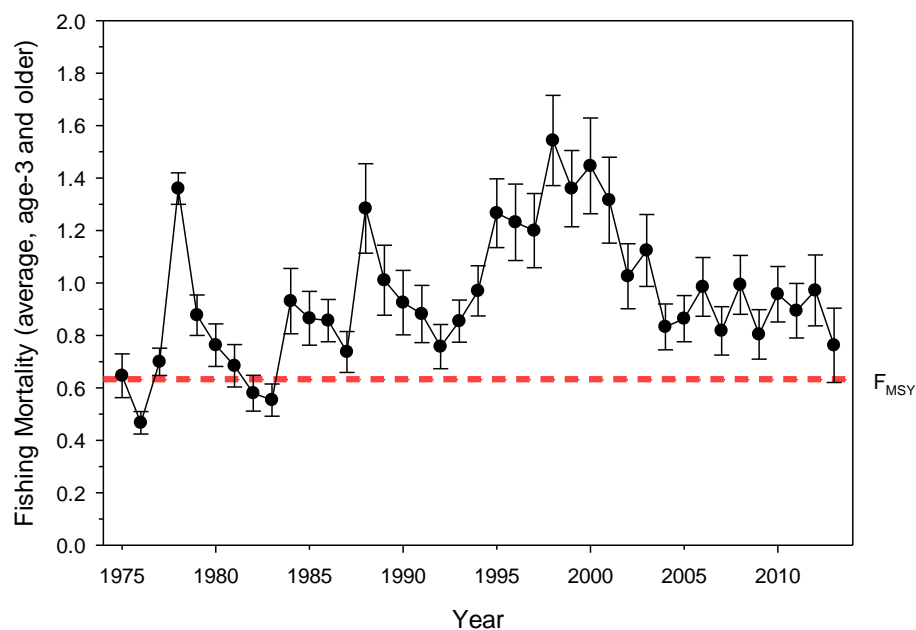


Figure 7-8. Trends in estimates of fishing mortality of Western and Central North Pacific striped marlin (*Kajikia audax*) during 1975-2013 along with 80% confident intervals. The dashed red line is the fishing mortality (F) that produces MSY, $F_{MSY} = 0.63$.

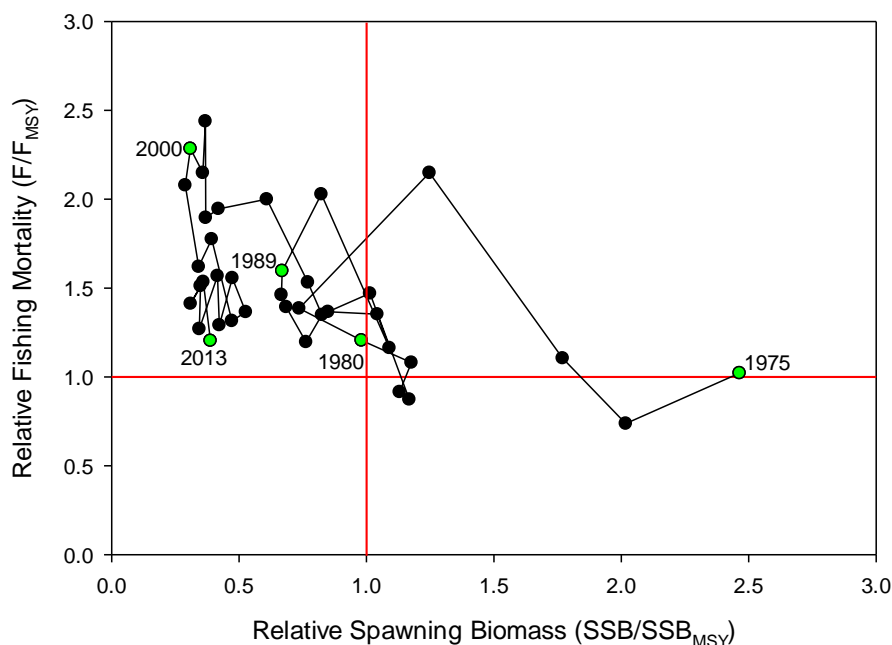


Figure 7-9. Kobe plot of the trends and estimates of relative fishing mortality and relative spawning biomass of Western and Central North Pacific striped marlin (*Kajikia audax*) during 1975-2013.

7.6 Swordfish

J. Brodziak reported that no new stock assessment for North Pacific swordfish was conducted by the BILLWG in 2015. The most recent stock assessment was completed in 2014 and defined two stocks in the North Pacific: the Western and Central North Pacific Ocean (WCNPO) stock and the Eastern Pacific Ocean (EPO) stock.

ISC did not conduct a new stock assessment in 2015 and provides the stock status and conservation advice adopted in 2014 with modifications to provide more specificity.

Stock Status and Conservation Advice

Stock Status

WCNPO: Catches and harvest rates of WCNPO swordfish had a declining trend from 2007-2011, with exploitable biomass fluctuating around 70,000 t. The Kobe plot shows that the WCNPO swordfish stock did not appear to have been overfished or to have experienced overfishing throughout most of the assessment time horizon of 1951-2012 (Figure 7-10).

Results indicated it was unlikely that the WCNPO swordfish population biomass was below B_{MSY} in 2012 ($\Pr(B_{2012} < B_{MSY})=14\%$). Similarly, it was extremely unlikely that the swordfish population was being fished in excess of H_{MSY} in 2012 ($\Pr(H_{2012} > H_{MSY}) < 1\%$).

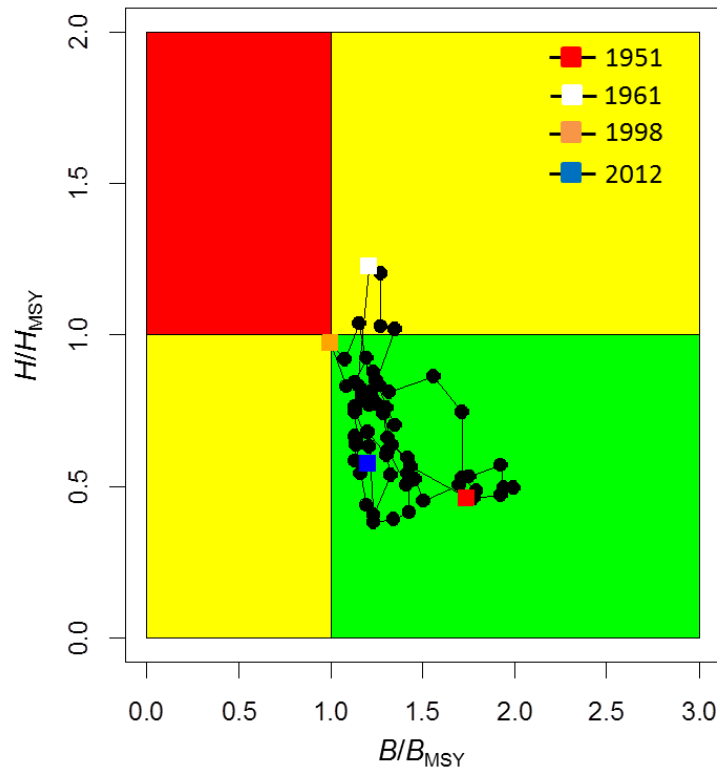


Figure 7-10. Kobe plot showing the estimated trajectories of relative exploitable biomass (B/B_{MSY}) and relative harvest rate (H/H_{MSY}) for swordfish (*Xiphias gladius*) in the WCNPO stock area during 1951-2012.

EPO SWO: For the EPO stock, exploitable biomass had a declining trend during 1969-1995 and increased from 31,000 t in 1995 to over 60,000 t in 2010, generally remaining above B_{MSY} . Harvest rates were initially low, have had a long-term increasing trend, and likely exceeded H_{MSY} in 1998, 2002, 2003, as well as in 2012, the terminal year of the stock assessment.

The Kobe plot shows that overfishing likely occurred in only a few years, but may have occurred from 2010 to 2012 (Figure 7-11). There was a 55% probability that overfishing occurred in 2012, but there was a less than 1% probability that the stock was overfished.

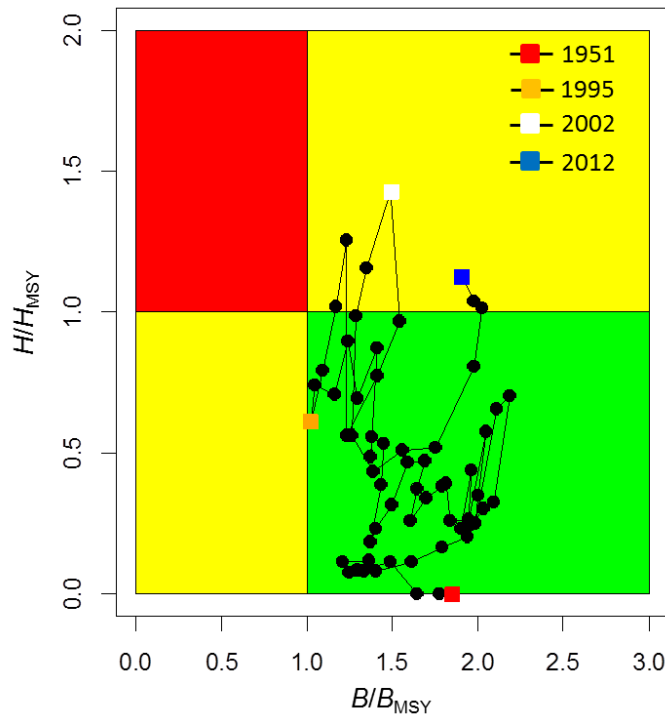


Figure 7-11. Kobe plot showing the estimated trajectories of relative exploitable biomass (B/B_{MSY}) and relative harvest rate (H/H_{MSY}) for swordfish (*Xiphias gladius*) in the EPO stock area during 1951-2012.

Conservation Advice

Stochastic projections for the WCNPO stock were conducted using eight harvest scenarios through 2016 (Figure 7-12 and Figure 7-13). Results relative to MSY-based reference points indicated that exploitable biomass would likely remain above $60,720$ t (B_{MSY}) through 2016 under the status quo catch or status quo harvest rate scenarios (Figure 7-12). For the high harvest rate scenarios (i.e., maximum observed harvest rate, 150% of H_{MSY} , 125% of H_{MSY}), exploitable biomass was projected to decline below B_{MSY} by 2016 (Figure 7-12) with harvest rates exceeding H_{MSY} . In comparison, the stock would not be expected to experience any overfishing during 2014-2016 under the status quo catch and status quo harvest rate scenarios (Figure 7-12).

Stochastic projections for the EPO stock show that exploitable biomass will likely have a decreasing trajectory during 2014-2016 under the eight harvest scenarios examined (Figure 7-13). Under the high harvest rate scenarios (status quo catch, maximum observed harvest rate, 150% of H_{MSY}), exploitable biomass was projected to decline to $31,170$ t (B_{MSY}) by 2016 (Figure 7-13) with corresponding harvest rates above H_{MSY} . In comparison, under the status quo harvest rate scenario, exploitable biomass was projected to decline to only $40,000$ t by 2016, well above the B_{MSY} level (Figure 7-13). Overall, the projections showed that if recent high catch levels ($9,700$ t) persist, exploitable biomass will decrease and a moderate risk (50%) of overfishing will continue to occur.

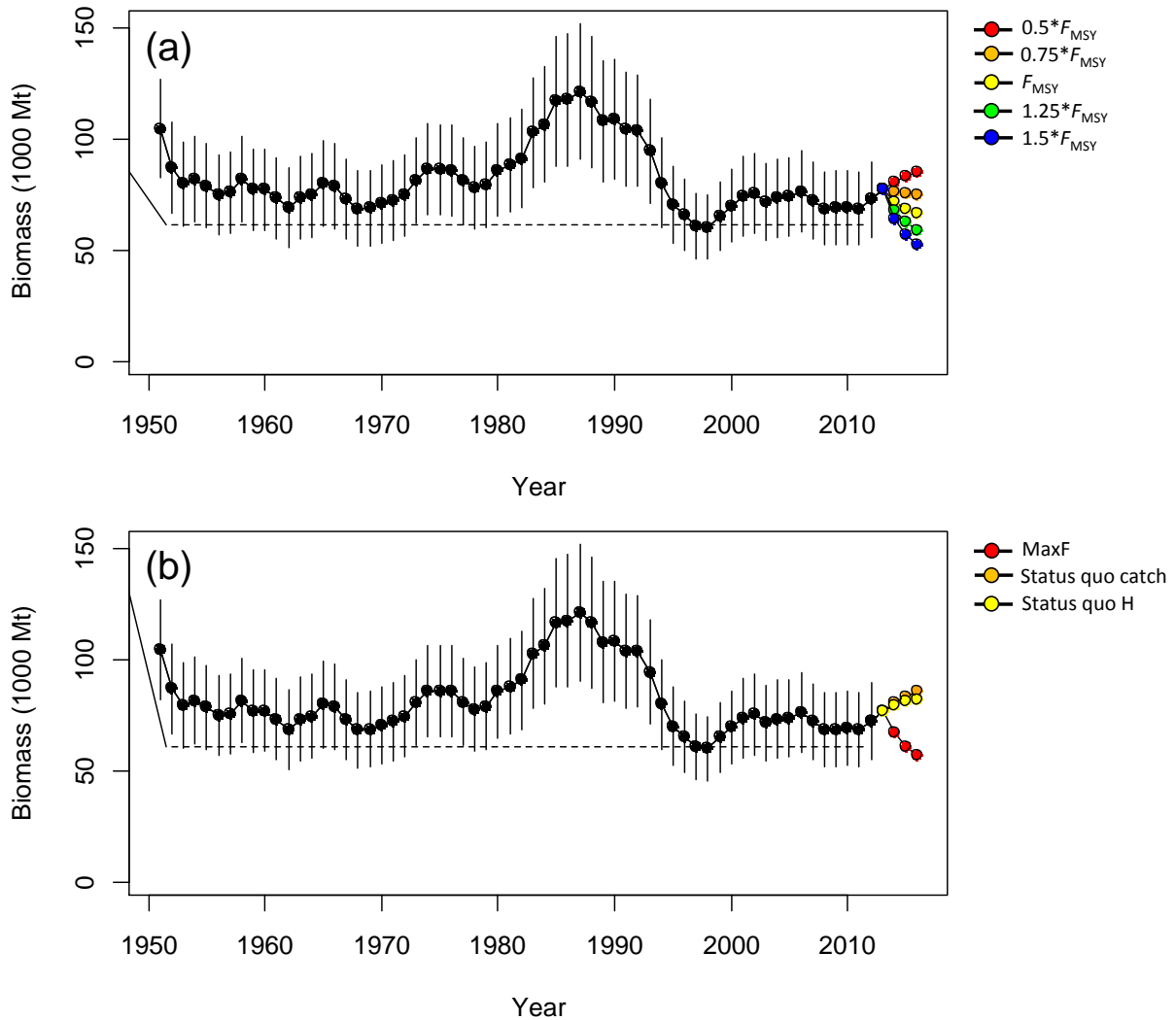


Figure 7-12. Stochastic projections of expected exploitable biomass (1000 metric tons) of swordfish (*Xiphias gladius*) in the WCNPO stock area during 2013-2016 under alternative harvest rates. Upper panel (a) shows projection results of applying a harvest rate set to be 50%, 75%, 100%, 125%, and 150% of the value of estimate of H_{MSY} (25%, denoted as F_{MSY} in the Figure). Lower panel (b) shows projection results of applying a status quo harvest rate based on the 2010-2012 average estimates, a status quo catch based on the 2010-2012 average catch, and the maximum observed harvest rate in the 1951-2012 time series. Dashed line represents $BMSY = 60,720$ t.

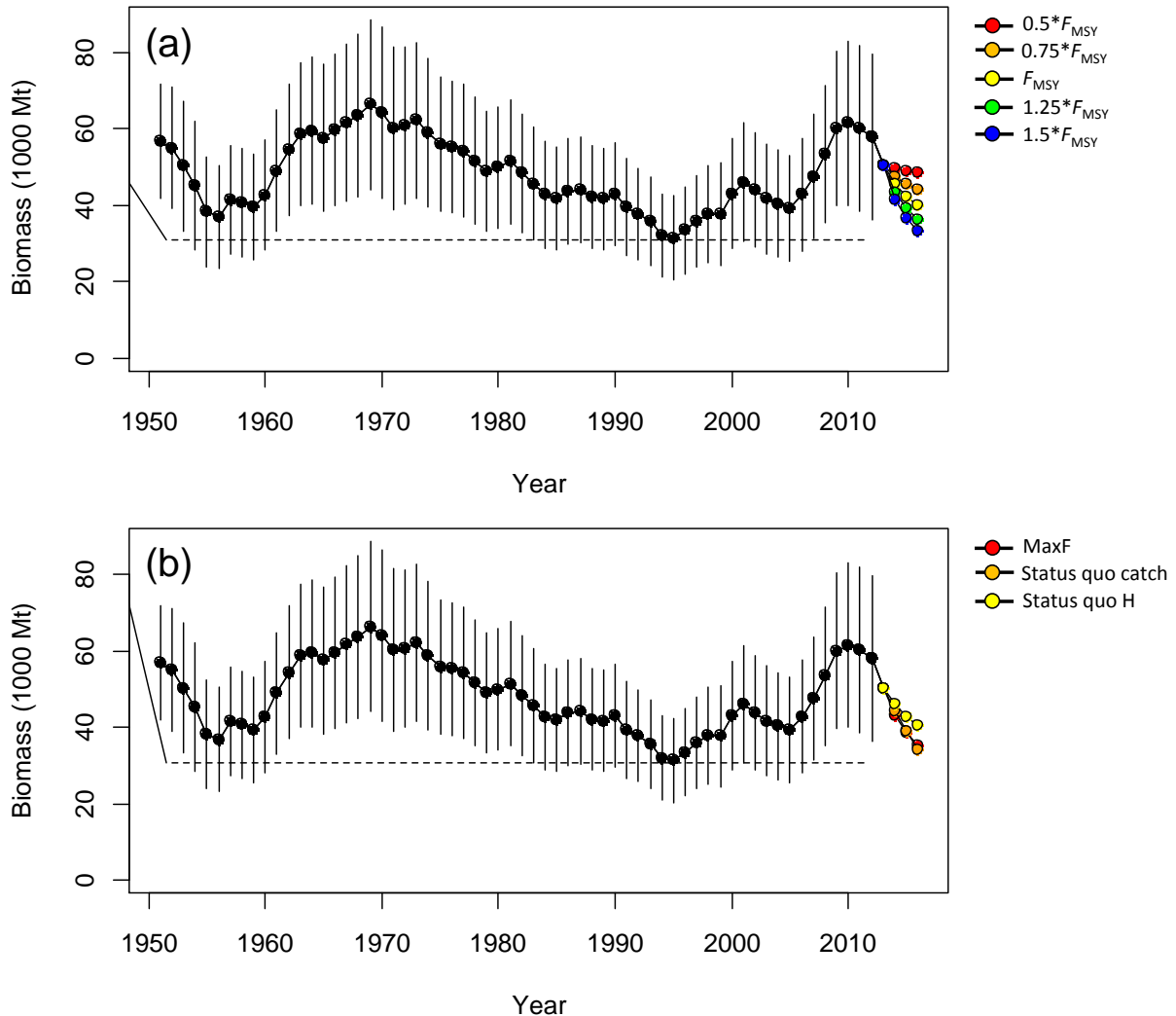


Figure 7-13. Stochastic projections of expected exploitable biomass (1000 metric tons) of swordfish (*Xiphias gladius*) in the EPO stock area during 2013-2016 under alternative harvest rates. Upper panel (a) shows projection results of applying a harvest rate set to be 50%, 75%, 100%, 125%, and 150% of the value of estimate of H_{MSY} (18%, denoted as F_{MSY} in the Figure). Lower panel (b) shows projection results of applying a status quo harvest rate based on the 2010-2012 average estimates, a status quo catch based on the 2010-2012 average catch, and the maximum observed harvest rate in the 1951-2012 time series. Dashed line represents $B_{MSY} = 31,170$ t.

The risk analyses of harvesting a constant annual catch of WCNPO swordfish during 2014-2016 showed that there would be less than 1% probability of the stock being overfished or experiencing overfishing in 2016 (Figure 7-14) if current annual catches (2011-2012) of about 10,000 t were maintained.

The risk analyses for harvesting a constant catch of EPO swordfish during 2014-2016 showed that the probabilities of overfishing and becoming overfished increased as projected catch increased in the future (Figure 7-14). Maintaining the current (2010-2012) catch of EPO swordfish of approximately 9,700 t would lead to a 50% probability of overfishing in 2016 and a less than 1% probability of the stock being overfished in 2016 (see Figure 7-15, panel (b)).

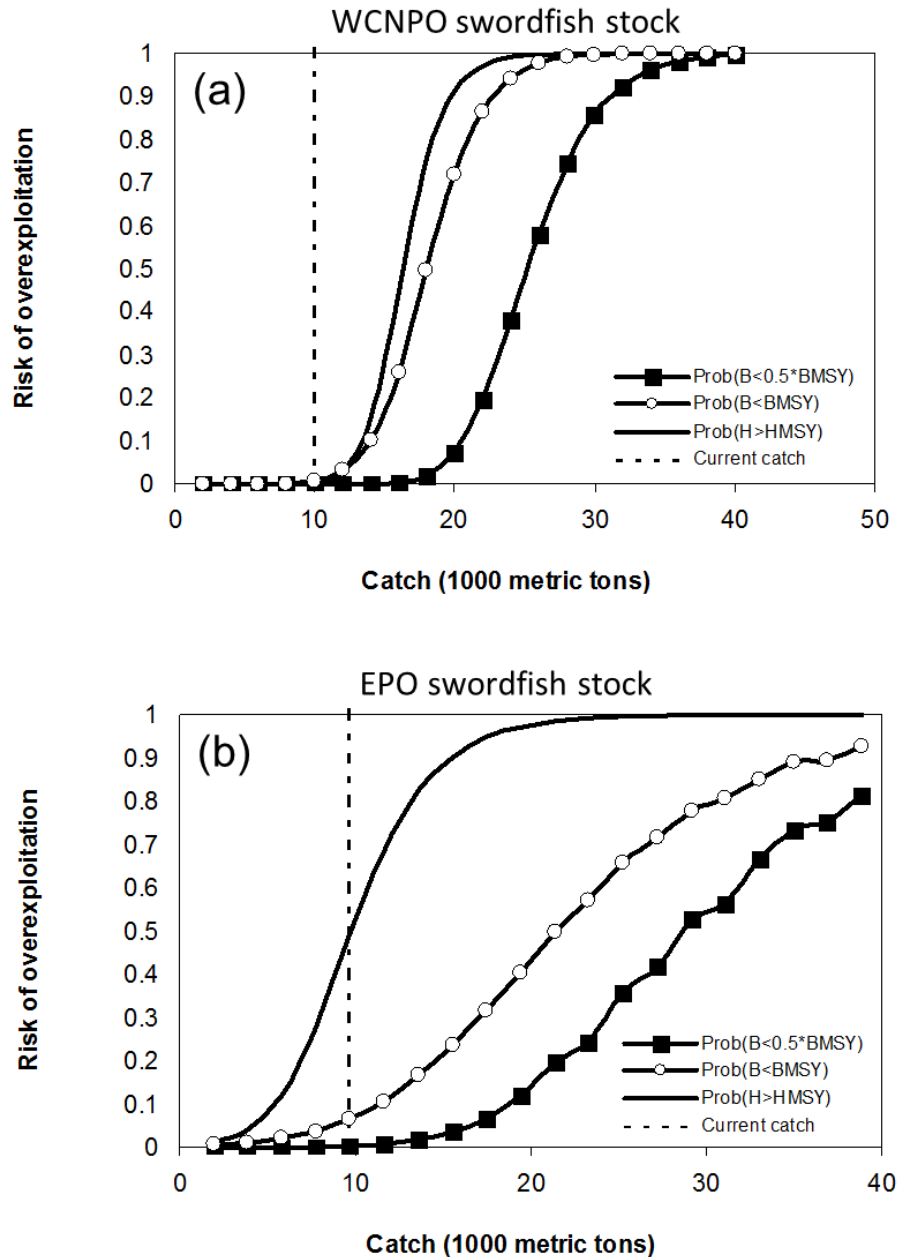


Figure 7-14. Probabilities of experiencing overfishing ($H > H_{MSY}$, solid line), of exploitable biomass falling below B_{MSY} ($B < 0.5 \cdot B_{MSY}$, open circles), and of being overfished relative to a reference level of $\frac{1}{2}B_{MSY}$ ($B < 0.5 \cdot B_{MSY}$, solid squares) in 2016 for swordfish in the WCNPO stock area (a) and EPO stock area (b) based on applying a constant catch biomass (x-axis, thousand t) in the stock projections. Current catch = average catch 2011-2012.

The WCPO swordfish stock is healthy ($B_{2010-2012} > B_{msy}$) and is above the level required to sustain recent harvest rates ($H_{2010-2012} < H_{msy}$).

For the EPO swordfish stock, overfishing may have occurred from 2010 to 2012, and the average yield of roughly 10,000 t in those years, or almost two times higher than the estimated MSY, is not likely to be sustainable in the long term. While biomass of the EPO

stock appears to be nearly twice B_{MSY} , any increases in catch above recent (3-year average 2010-2012) levels should consider the uncertainty in stock structure and unreported catch.

7.7 Blue shark

S. Kohin, SHARKWG Chair, reported that no new stock assessment for blue shark was conducted by the SHARKWG in 2015. The most recent stock assessment was completed in 2014.

Discussion

Characterization of the different model runs and their relationship to the reference cases was discussed. The reasons for using the term “reference case” versus “base case” were explained in relation to the range of plausible model outcomes. Representation of the different model runs in Kobe plots was also discussed.

Stock Status and Conservation Advice

Stock Status

Median stock biomass of blue shark in 2011 (B_{2011}) was estimated to be 622,000 t using a Bayesian surplus production (BSP) model and median annual fishing mortality in 2011 (F_{2011}) was approximately 32% of F_{MSY} (Figure 7-15). Female spawning stock biomass of blue shark in 2011 (SSB_{2011}) was estimated to be 449,930 t using a Stock Synthesis (SS) model and the estimate of F_{2011} was approximately 34% of F_{MSY} . Target and limit reference points have not yet been established for pelagic sharks in the Pacific.

Relative to MSY , the majority of BSP and SS models run with input parameter values considered more probable based on the biology of blue sharks, support the conclusion that the North Pacific blue shark stock is not overfished and overfishing is not occurring. Kobe plots showing the trajectories for the reference runs are shown in Figure 7-15.

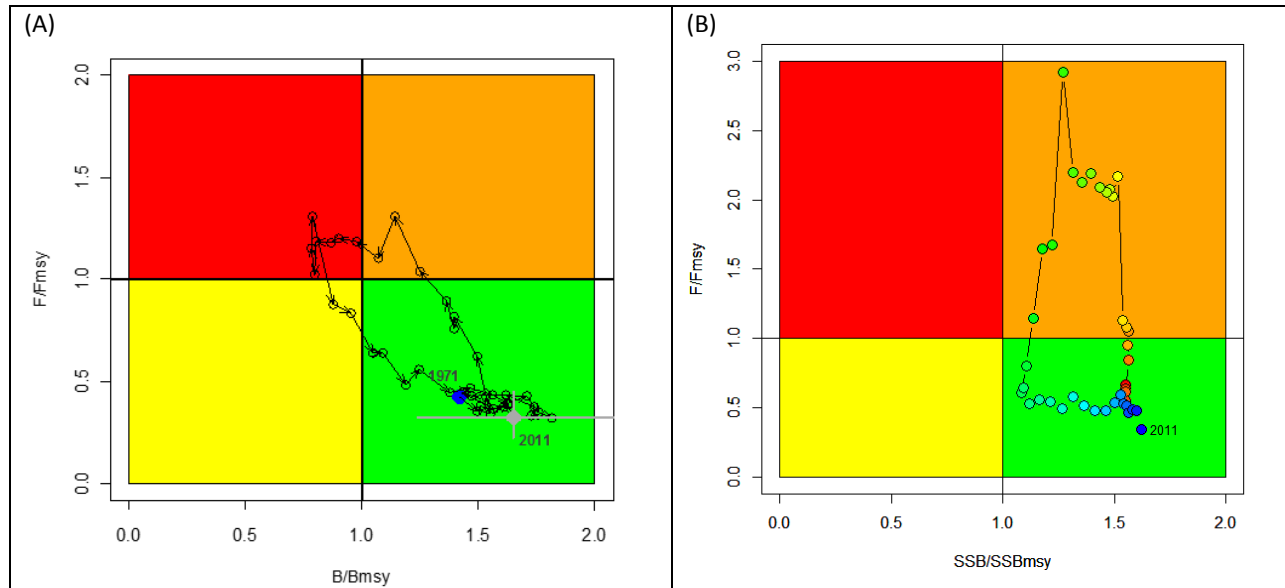


Figure 7-15. (A) Kobe plot showing median biomass and fishing mortality trajectories for the reference case Bayesian Surplus Production model for North Pacific blue shark (*Prionace glauca*). Solid blue circle indicates the median estimate in 1971 (initial year of the model). Solid gray circle and its horizontal and vertical bars indicate the median and 90% confidence limits in 2011. Open black circles and black arrows indicate the historical trajectory of stock status between 1971 and 2011. (B) Kobe plot showing estimated spawning biomass and fishing mortality trajectories for the reference case Stock Synthesis model for North Pacific blue shark. The circles indicate the historical trajectory from 1971-2011 colored from red (first year) to blue (terminal year).

While the results of the sensitivity runs varied depending upon the input assumptions, a few parameters were most influential on the results, including the CPUE series selected as well as the shape parameters for the BSP models, and the equilibrium initial catch and form of the LFSR relationship for the SS models.

Conservation Advice

Future projections of the reference case models show that median blue shark biomass in the North Pacific will remain above B_{MSY} and SSB_{MSY} under the catch harvest policies examined (status quo, +20%, -20%). Similarly, future projections under different fishing mortality (F) harvest policies (status quo, +20%, -20%) show that median blue shark biomass in the North Pacific will likely remain above B_{MSY} and SSB_{MSY} .

Given uncertainties regarding the estimated catch and choice of input parameters for the assessment, the catch of and fishing effort on blue shark should be carefully monitored. Carefully designed observer programs and logbooks that record sharks by species as well as continued research into the fisheries, biology, and ecology of blue shark in the North Pacific are recommended to make improvements prior to the next assessment which is scheduled for 2017.

7.8 Shortfin mako shark

S. Kohin, SHARKWG Chair, presented results of the indicator analysis for North Pacific shortfin mako shark in 2015 (*Annex 12*).

Stock Identification and Distribution

SMA are distributed throughout the pelagic, temperate North Pacific Ocean. Nursery areas are found along the continental margins in both the western and eastern Pacific, and larger subadults and adults are observed in greater proportions in the Central Pacific. A single stock of shortfin mako sharks is assumed in the North Pacific Ocean based on evidence from genetics, tagging studies, and lower catch rates of SMA near the equator than in temperate areas. However, within the North Pacific some regional substructure is apparent as the majority of tagged makos have been recaptured within the same region where they were originally tagged, and examination of catch records by size and sex demonstrates some regional and seasonal segregation across the North Pacific.

Catch

Catch was estimated for many fleets and nations based on the best available information. Catch estimates for each fishery were made based on effort, knowledge of the species composition of catch, estimated catch per effort, and scientific knowledge of the operations and catch history. These time series provide an idea of recent catch history for many of the main fleets, but estimates of total catch for SMA in the North Pacific are incomplete. Data are lacking for several significant fishing nations (e.g., Korea and China) and fleets (e.g., Taiwan small-scale longline, Japan deep-set longline, and Japan training vessel fleets). Estimates are difficult to derive, because discards are often not recorded and retained catch data are available with low quality. Given that trends in catch cannot be derived from the incomplete catch information provided, the catch time series were not considered for the purposes of providing stock status information.

Indicator Data and Analysis

Simulation analyses were conducted to examine the effects of CPUE time series of varying lengths and precision, of CPUE time series from predominately adult versus juvenile areas, and of the contribution of trends in mean size versus CPUE in determining stock status. Results from the simulations showed that time series of mean size are less informative regarding the current stock condition (B_{CUR}/B_{MSY}) than CPUE indices. Simulation results also showed that CPUE indices that are derived from predominately adult areas provide better information on current stock status than CPUE indices from recruitment areas.

Four types of indicators were developed for the North Pacific shortfin mako shark: proportion of positive sets, abundance (CPUE) indices, sex-ratio, and size compositions.

The proportion of positive sets, defined as set/trip where at least one SMA is caught, is calculated for major fisheries. The trends for proportion of positive sets varied across fisheries with the Japanese shallow-set longline fishery having the highest proportion of positive catch sets (approximately 75% in 2013, with the rate nearly tripling over the time series). This indicator should be interpreted with caution, because it may be confounded with catchability and selectivity and is a component in some of the fishery abundance index standardizations.

Indices of SMA relative abundance were developed from eight fisheries or surveys ranging from 1985 to 2014 and covering different areas across most of the North Pacific. All indices were reviewed by the SHARKWG; and three were selected as the most plausible indicators of abundance based on their spatial and temporal coverage, size of sharks, data quality, and model diagnostics (Figure 7-16). The Japanese shallow-set longline index was considered to be the best abundance indicator candidate. The standardized index showed a flat or slightly increasing trend from 1994 to 2004, before a substantial increase from 2005 to 2013. Abundance indices developed from the Hawaii-based deep-set and shallow-set longline fisheries were also both considered to be plausible indicators of stock abundance. Trends in abundance showed some variability for the two fishery sectors between 2004 and 2012. The standardized CPUE trends moved in opposite directions, with the trend for the shallow-set sector showing a slight decrease, while the trend for the deep-set sector increased overtime.

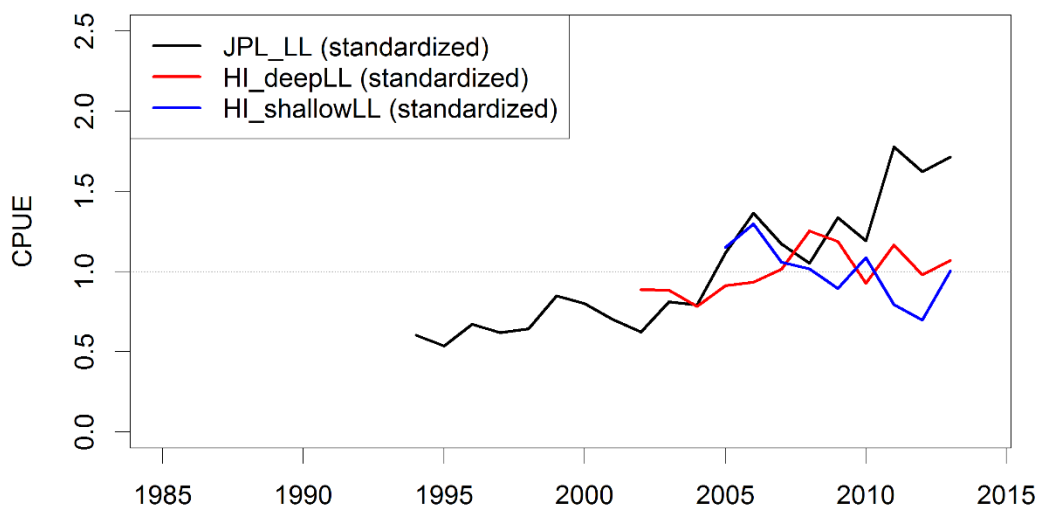


Figure 7-16. Standardized indices of abundance by fishery for shortfin mako sharks. While all of the available independent information was examined to draw conclusions about the stock, these three indices were considered to have the greatest value in determining stock status.

Overall, no trends in sex-ratio are apparent through time across fisheries, although sample sizes are generally low. It would probably be difficult to interpret any trends in sex-ratio because there is not a good understanding of population movement by size and sex through time. Thus, the SHARKWG considered sex-ratios to be of little value as indicators in this analysis of stock status.

The annual median and quartile percentiles of catch at size for SMA caught by the various fleets were examined. In general, sizes remained relatively stable for all fleets. Larger sizes were recorded for the deep-set sector of the Hawaiian fleet and the Japan research and training longline vessels, while smaller individuals were more common in the U.S. juvenile longline survey, U.S. drift gillnet, and Japan longline survey.

Recommendations

Given the plan to produce a full assessment of shortfin mako in 2018, the following priorities were identified.

- Improve data filtering and standardization for all CPUE indices. Improvements could help explain some of the implausible rates of change in currently accepted series. Other important series (notably the Taiwanese distant-water longline) could be valuable for an assessment with better statistical treatment of the data.
- Full accounting of all catch and discard mortality.
- Full accounting of size data by fishery.
- Work on spatial structure/fishery definitions.
- Continue to improve knowledge of life history (e.g., age and growth, spawner-recruit relationship, etc.) to move towards an age-structured assessment model.

Discussion

Discussion focused on the importance of alerting fishery managers to the fact that this is a data poor stock. Conservation advice should include the need to improve data gathering along with better characterization of existing data.

Because a full stock assessment could not be conducted it is not possible to determine the current status of the stock with respect to benchmarks.

Stock Status and Conservation Advice

Shortfin mako is a data poor species. Recognizing that information on important fisheries is missing, the untested validity of indicators for determining stock status, and conflicts in the available data, stock status (overfishing and overfished) could not be determined. Managers should consider the undetermined stock status of shortfin mako shark in the North Pacific when developing and implementing management measures.

The SHARKWG reviewed a suite of information to determine the stock status of shortfin mako shark in the North Pacific. Of the three indices considered to have the greatest value in providing stock status information, abundance trends in two of the series appear to be stable or increasing, while the abundance trend in the third series appears to be declining.

It is recommended that data for missing fleets be developed for use in the next stock assessment scheduled for 2018 and that available catch and CPUE data be monitored for changes in trends. It is further recommended that data collection programs be implemented or improved to provide species-specific shark catch data for fisheries in the North Pacific Ocean.

8 REVIEW OF STOCK STATUS OF SECONDARY STOCKS

8.1 EPO bigeye, yellowfin, skipjack tunas

M. Dreyfus provided an update on catches and status of secondary stocks in the IATTC Convention Area (**INFO DOCS 4, 6, 8, 10**). Catches of YFT are above 200,000 t, after record catches in 2002-2003 that were associated with very high recruitment. Most of the catch is taken by the purse seine fishery, especially in sets associated with dolphins. Nevertheless, the impact is more evenly distributed within the three types of sets in the purse seine fishery (dolphin

associated, free swimming schools, and FAD/log sets), because of the size composition of the catch. FAD sets catch smaller individuals.

In the case of BET, the catch is around 80,000 t. Currently, most of the catch comes from the purse seine FAD fishery, although before 1993 it was basically a longline fishery. The FAD fishery has by far the biggest impact on this stock.

IATTC conducts full assessments for YFT and BET; in the recent past *SSB* estimates for these stocks have been close to the level that produces *MSY*. SKJ stock condition is analyzed with relative reference points, noting that there are no extraordinary values that would suggest overexploitation.

For those reasons, IATTC staff and Scientific Advisory Committee advised the IATTC to continue the already-agreed conservation measures for 2016.

Discussion

Although catch has declined since the early 2000s, no major shift of purse seine vessels from the EPO to the WCPO occurred in the past decade. In fact, overall capacity has increased during that period.

The measures applicable to EPO tropical tuna fisheries were discussed. The current conservation measure allows purse seine vessels to choose between two closure periods. Because individual vessels may choose which closure period to abide by, this measure may be less effective than if it was applied uniformly. The net result is that vessels fishing during one of the closure periods face less competition. There is an additional one-month area closure, the “corralito” west of the Galapagos Islands, which applies to all purse seine vessels. Longline vessels are subject to catch limits imposed on national fleets.

8.2 WPO bigeye, skipjack, yellowfin tunas

T. Beeching gave an overview of tuna production by gear and species in the WCPO, as well as the stock status of YFT, SKJ and BET, and the associated recommendations and management advice from WCPFC SC10 (INFO DOCS 5, 7, 9). It was noted that the 2014 catch was the highest on record. Attention was drawn to the need to reduce catches of BET, because the stock is thought to have exceeded its overfished LRP ($0.2SB_{F=0}$).

Discussion

With respect to measures in place to reduce BET catch, CMM 2014-01 has two main elements to control fishing on FADs, a major source of juvenile BET catch. Members may choose between a FAD closure and limits on FAD catches.

Clarification was provided that the current LRP ($0.2SB_{F=0}$) is based on a dynamic estimate of SB_0 (i.e., $SB_{F=0}$ 2002-2011).

Three WCPFC management objective workshops have been conducted and they were all educational and informative, recognizing that many participants at the WCPFC Regular Sessions

ISC15, July 15-20, 2015

are not conversant with fishery management concepts. The Workshops have also addressed pertinent issues, which prepares participants for the Annual Meeting.

Clarification was provided that the request for SPC-OFP to conduct a Pacific-wide BET assessment in 2015 was not completed.

Range contraction of SKJ in the WCPO was discussed. This is a particular concern for Japan, because availability has declined in northern areas. Japan reported on the results of recent tagging research. It appears that SKJ follow regular migration routes between the tropics and northern areas, which are associated with undersea features such as seamounts. Oceanographic phenomena, such as cold water masses, also affect migration routes.

9 REVIEW OF STATISTICS AND DATA BASE ISSUES

9.1 Report of the STATWG

R.-F. Wu, the STATWG Chair, provided a summary of STATWG activities since ISC14 (*Annex 6*). The STATWG Steering Group held one inter-sessional meeting in Honolulu, Hawaii, U.S.A., 9-10 February 2015. A meeting of the entire STATWG was held in Kona, Hawaii, U.S.A., on 9-10 July 2015, prior to ISC15; two information papers and four working papers were submitted for this meeting.

The membership and purpose of the STATWG was presented. Major responsibilities included: overseeing the tasks of data collection, data archival, data dissemination, and data awareness through the ISC website. Other primary duties included development and maintenance of the ISC database; development and maintenance of the ISC website, including the Member's portal; exchange of ISC data inventories with RFMOs; providing training and support to Member Data Correspondents; and providing data support for the species Working Groups.

It was reported that major accomplishments for the ISC have been achieved by the STATWG since 2011. These included:

1. Online data submission for CAT I, II, and III: 2013-2015
2. Sharing ISC data inventories with WCPFC (since 2011) and IATTC (since 2013)
3. Archiving species WGs' stock assessment files: 2013
4. Development and maintenance of Member metadata: 2012
5. Resolving data sharing issues with WCPFC: 2012
6. Publishing catch graphs on the ISC website generated from the ISC database: 2011-2012
7. Ability to download CAT I data from the ISC website: 2012
8. General upgrading the ISC website: meetings, reports, species profiles, stock status: 2011-2013
9. Procedures for revising historical data in the ISC database: 2014
10. Requesting data from RFMOs for species Working Groups: 2014-2015
11. Generating the official ISC Plenary catch tales: 2015

ISC15, July 15-20, 2015

The 2015 work plan for the STATWG was presented, as well as recommendations to the ISC15 Plenary.

The recommendations were:

1. Each Species Working Group should have a Data Manager who will attend meetings of the STATWG and may participate in intersessional activities of the STATWG.
2. Due to continued failure to submit data to the ISC, the ISC Chair needs to follow-up with China.
3. In order to improve data sharing between the ISC and the WCPFC and IATTC, it is recommended that the ISC Chair communicate with the heads of these RFMOs. [Elaborate on Chairman's task]

The current list of data correspondents for the STATWG was also provided (*Annex 13*).

The STATWG Steering Group will schedule their next meeting in January, 2016, and will request the scheduling of a 2-day meeting prior to the ISC16 Plenary.

Discussion

The flow of data both among ISC working groups and dissemination to member countries and the public was discussed at length. Views differed on what types of data should be made broadly available. While Category I data are currently available on the ISC website, some members expressed concern about providing Category II and III data publicly. It was pointed out that other RFMOs provide these types of data publicly in formats that do not compromise rules about data confidentiality.

With respect to the provision of WCPFC and IATTC data for exchanges with the ISC, formal agreements exist to facilitate this flow but further clarification is required. The ISC Chair will work with the Executive Directors of these two RFMOs in this regard. It was agreed that the Chair will discuss data rules and procedures with the WCPFC data manager on the margins of the upcoming WCPFC SC meeting in order to harmonize ISC processes with those of the WCPFC. Overall, the objective is to make data sharing and provision consistent and routine.

It was agreed that the species WG data managers be members of the STATWG. Their participation in STATWG meetings could be by webinar in order to make it manageable and cost effective.

No stock assessment data files prior to 2014, and none for billfish assessments have been submitted to the ISC STATWG for archiving. Species WG chairs were reminded of their responsibility to provide data and executable files for assessments prior to 2014.

9.2 Data Submission Report Card

I. Yamasaki, the Database Administrator, presented the Member data submission report card for 2015.

ISC15, July 15-20, 2015

| Member | CAT Ic | CAT Ie | CAT II | CAT III |
|--------|--------|--------|--------|---------|
| CAN | | | | |
| CHN | | | | |
| JPN | | | | |
| KOR | | | | |
| MEX | | | | |
| TWN | | | | |
| U.S.A. | | | | |

| | |
|--|--|
| | On time and complete |
| | Submitted late and incomplete and/or not in ISC format |
| | Not provided |

Discussion

Mexico noted that its data submission was late due to personnel changes. However, data were provided to species WGs when requested.

9.3 Total Catch Tables

I. Yamasaki, the Database Administrator, presented the catch tables for ISC Member countries for 2013-2014, as well as the historical catch. The catch tables include the following ISC species of interest: albacore, blue shark, Pacific bluefin tuna, striped marlin, swordfish, blue marlin, and shortfin mako shark. The catch tables were generated from the ISC database, and are based on Category I data submitted by Data Correspondents for the major fisheries in the North Pacific Ocean of the Member Countries.

Discussion

The new ISC catch table review process was discussed. This prompted a discussion of the data review process.

1. DA will generate catch tables for each species from the official National submissions to the database.
2. DA will provide these catch tables to the National data correspondents for their review
3. Once reviewed by National Data Correspondents, the DA will provide tables to Office of the Chair for inclusion in the Plenary report. These constitute the official catch tables for that year.
4. DA will also provide the tables to the species working groups for their reference. WGs will not make changes to the tables; but DA will work with WGs, data correspondents and data managers to resolve any discrepancies.
5. WGs will only publish catch tables in their stock assessments to show the data they used.

This process will allow ISC to provide to the public one complete set of catch tables per year and should simplify things for the WGs, DA, STATWG and those looking for ISC data. It was agreed that the catch tables should be distributed earlier for review by the species WGs.

It was also emphasized that the most recent year's data (2014) are considered provisional. Members will have the opportunity to correct/update these data by the next year's data submission date, at which point the data will no longer be flagged as provisional.

10 REPORT OF THE SEMINAR

C. Werner reviewed the outcomes of the Seminar, *Close-Kin Mark Recapture (CKMR) as a Tool for Estimating Spawning Biomass in Pacific Bluefin Tuna (Annex 14)*. Three presentations were made:

- Operationalizing the estimation of absolute spawning stock abundance for southern Bluefin tuna using close-kin genetics (R. Hillary)
- Progress in a Japanese Close-kin project in 2014-2015 (N. Suzuki)
- Close-kin Mark Recapture as a Tool for Estimation of Spawning Biomass in Pacific Bluefin Tuna (PBF): Outcomes from a Workshop on Developing CKMR techniques for Pacific Bluefin Tuna (R. Vetter)

It was agreed that the ISC should take a leading role in CKMR-PBF, especially in providing the samples for the work. The ISC Chair proposed to establish a small advisory group on CKMR in the next two to three months to develop a sampling program and sampling protocols and to inform the WCPFC NC and IATTC in 2015 about the developments on CKMR. The Plenary thanked the Chair and supported his proposals to move forward.

The Plenary recommended that mechanisms for moving forward on the genetics and modeling portions of CKMR be developed at the ISC. Future discussions should involve the PBFWG, because much of the expertise is already in the PBFWG, and it is important to include modelers throughout the project. It was recognized that there is substantial expertise on CKMR genetics methods within the ISC, and it was noted that Japan has already begun developing markers for the work. However, it is important that genetic markers used will be fully shared.

If possible, the sampling of adults and juveniles should begin in the spring (April-May) of 2016.

The Bluefin Futures Symposium, scheduled for 18-20 January 2016 in Monterey, California, U.S.A., would be an opportunity for ISC members to informally check in on progress. An overview of the project could also be a presentation at the Symposium.

The ISC Chair concluded by reiterating his thanks to the Plenary for their support and thanked U.S.A for an informative seminar.

11 REVIEW OF MEETING SCHEDULE

11.1 Time and Place of ISC16

Tentatively, ISC16 will be held in Japan at a location to be determined, July 13-18, 2016.

11.2 Time and Place of Working Group Intersessional Meetings

A draft schedule of proposed intersessional meetings was reviewed and amended, see Table 11-1.

Table 11-1. Schedule of working group meetings.

| Date | Meeting | Contact |
|-----------------|--|--|
| 2015 | | |
| Nov 18-25 | PBFWG Data prep – Taiwan | H. Nakano hnakano@affrc.go.jp |
| Dec | BILLWG BUM data prep – Hawaii | J. Brodziak Jon.Brodziak@noaa.gov |
| 2016 | | |
| Jan | STATWG TBD + webinar | R.-F. Wu fan@ofdc.org.tw |
| Feb 29 – Mar 11 | PBFWG Assmt – La Jolla, U.S.A. | H. Nakano hnakano@affrc.go.jp |
| Mar | BILLWG BUM assmt – Korea | J. Brodziak Jon.Brodziak@noaa.gov |
| Spring | SHARKWG SMA & BSH data and research – TBD | S. Kohin Suzanne.Kohin@noaa.gov |
| Apr | ALBWG MSE/A LB – J pan | J. Holmes John.Holmes@dfo-mpo.gc.ca |
| Jul 10 | PBFWG (Meeting) – TBD | H. Nakano hnakano@affrc.go.jp |
| Jul 11 | BILLWG (Meeting) – TBD | J. Brodziak Jon.Brodziak@noaa.gov |
| Jul 8-9 | STATWG (Meeting) – TBD | R.-F. Wu fan@ofdc.org.tw |
| Jul 13-18 | ISC16 (Plenary) – Japan | G. DiNardo Gerard.DiNardo@noaa.gov |
| Fall | SHARKWG | S. Kohin Suzanne.Kohin@noaa.gov |
| Nov | ALBWG Data prep – Nanaimo | J. Holmes John.Holmes@dfo-mpo.gc.ca |
| 2017 | | |
| Spring | SHARKWG BSH assm't – TBD | S. Kohin Suzanne.Kohin@noaa.gov |
| Apr | ALBWG Assmt – La Jolla U.S.A. | J. Holmes John.Holmes@dfo-mpo.gc.ca |

12 ADMINISTRATIVE MATTERS

12.1 Formalization of ISC

The ISC Chair described recent consultations with the U.S. Department of State (DOS) on formalizing the ISC. The DOS contact thought formalization would take 5-7 years and will likely require Members to sign an MOU. Members need to identify the point of contact within their governments for this process and determine if an MOU would be the appropriate path forward. This information could be provided to the ISC Chair by October 1. This could facilitate the

process for formalizing the ISC. DOS also views the developing relationship between ISC and PICES positively and would benefit the formalization of ISC.

It was noted that an MOU between the U.S. and Japan had been considered in the past. However, Members were not in a position to sign the MOU at that time. This previous MOU should be reviewed as a starting point for future negotiations. DOS also noted it will be important for Members to signal their willingness to move toward formalization early in the process so effort is not wasted.

12.2 Peer Review of Function and Process and Stock Assessments

S. Shoffler discussed the peer review process. A review of ISC's function is required every five years according to ISC operational procedures. Since the last one was completed in 2012-2013, it is necessary to begin planning for the next review, which would begin in 2017. The focus of the review and related budget will need to be resolved at ISC16.

The next peer review could focus on a particular aspect of ISC operations. Since the preparation of stock assessments is a central function of the organization, the next peer review could focus on external review of stock assessments. INFO DOCS 13 and 14 describe the ICCAT peer review process and issues learned from CIE reviews.

The recommendations from the last review of function are in ISC13 Plenary Document 10. The ISC Chair will review the list of recommendations from the last peer review, identify those that still need to be addressed and prioritize them and circulate that list to Members in preparation for ISC16.

12.3 Upcoming Election of the ISC Chair

The Plenary agreed to amend the Operations Manual to conform to a proposal from the ALBWG on the term of the WG Chair. Pending approval by Plenary of changes to the Operations Manual, the ALBWG elected J. Holmes to serve for another year and up to two years pending review after year one.

Revisions to the Operations Manual were presented to cover extension of the term of WG chairs and the ISC Chair, and the appointment of vice chairs for WGs. The Plenary adopted the following changes/additions to the Operations Manual (text in underline is new text for the Operations Manual):

1. WG Chairperson Term Extension

W2. Chairperson.

A Chairperson with appropriate expertise and knowledge is chosen or elected by Members of each Working Group.

The Working Group Chairperson is responsible for chairing meetings of the Working Group, facilitating the development of multi-year work plans and coordinating work plan assignments, organizing meetings, including advanced preparation of agendas,

scheduling of presenters, appointing of rapporteurs, providing assignments for reports, and ensuring that Committee assignments are completed as required. The Chairperson also facilitates the meetings, to ensure that participants with differing views get an opportunity to be heard.

He/She strives for consensus of all members in reporting of Working Group findings, conclusions and decisions to the Committee. The Chairperson serves a three-year term and may be reappointed for an additional three-year term, but not for more than two consecutive terms. In the unusual event that no member is able to serve as Chairperson, a standing Chairperson may serve an additional two consecutive years beyond the two terms provided that (1) the standing Chairperson is willing to stand for re-appointment and (2) the Working Group re-elects the standing Chairperson. The Chairperson will be elected for a one-year term, and if a new Chairperson is still not identified the Working Group can re-elect the standing Chairperson for a second one-year term. A Chairperson cannot be re-elected beyond this additional two-year period.

2. Addition of WG Vice Chair

W3. Vice Chair

Members of the Working Group shall elect a Vice Chair. In the absence of the Chair, the Vice Chair assumes all duties and responsibilities of the Chair. This position will also serve to build capacity for future Chairs.

The Vice Chair serves for a term of one-to-three years, at the discretion of the Working Group, and is eligible for reelection for additional terms.

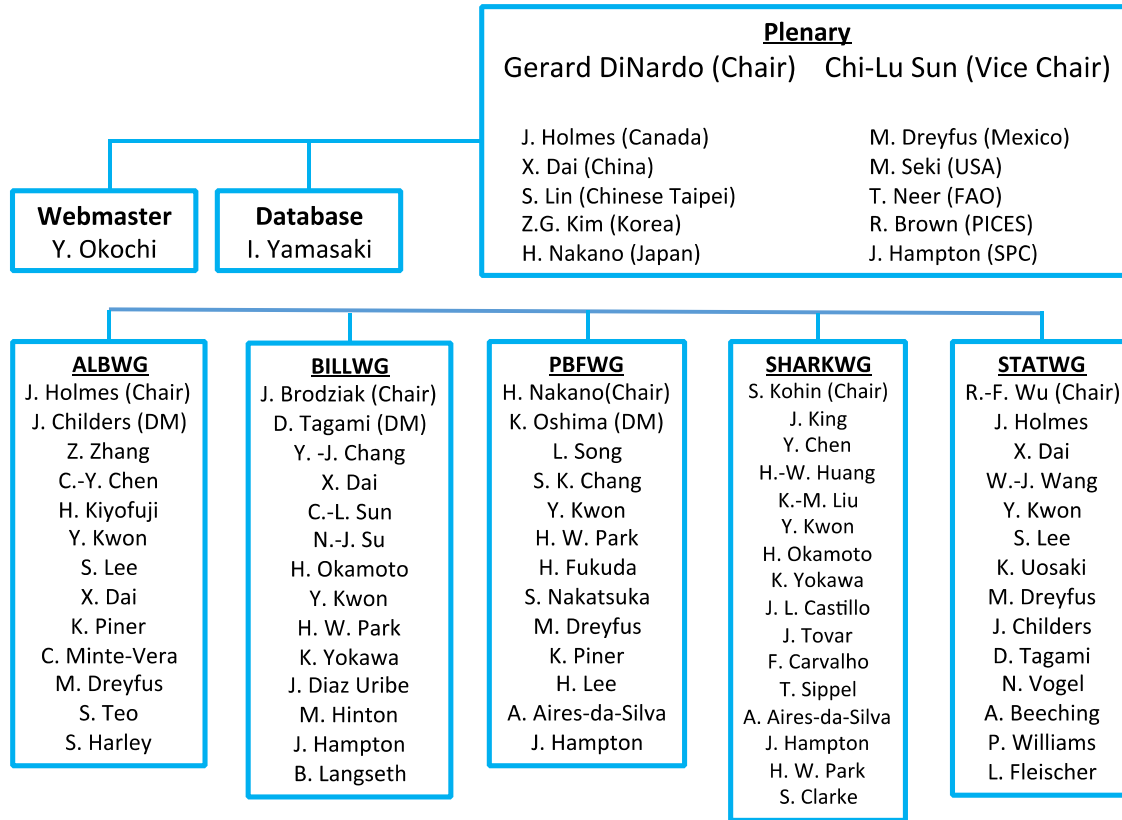
3. ISC Chairperson Term Extension

From C2 ISC Chairperson

The Chairperson serves for a term of three years and is eligible for re-election for one additional three-year term. In the unusual event that no member is able to serve as Chairperson, a standing Chairperson may serve an additional two consecutive years beyond the two terms provided that (1) the standing Chairperson is willing to stand for re-appointment and (2) the Committee re-elects the standing Chairperson. The Chairperson will be elected for a one-year term, and if a new Chairperson is still not identified the Committee can re-elect the standing Chairperson for a second one-year term. A Chairperson cannot be re-elected beyond this additional two-year period.

12.4 Organizational Chart and Contact Persons

ISC Organizational Chart (July 2015)



12.5 Process for handling requests from Other Organizations

The ISC Chair noted that there is only one case where the ISC has received a formal request in writing in the form of a letter to the Office of the Chair. More often, requests are noted in the minutes of RFMO and subsidiary body meetings. This requires the Office of the Chair to carefully review minutes and meeting reports and poses the risk that a request will be missed.

The ISC Chair will notify other organizations that they need to document requests to the ISC separately in a letter to the Office of the Chair. This will be specified in a future revision of the Operations Manual.

12.6 Other Business

The Chair and Vice Chair were tasked with developing a template for WGs to present information on stock status and conservation advice by 1 March 2016. This would produce greater consistency and facilitate Plenary deliberations.

It was agreed that meeting documents, and especially species WG reports and stock assessments, need more timely distribution. For this reason, an annual deadline of June 1 was agreed to for the distribution of all Plenary documents. The Office of the Chair will produce a schedule of document submission deadlines consistent with this objective for dissemination by March 1, 2015. Furthermore, best practices or terms of reference for stock assessment documents will be included in the Operations Manual.

13 ADOPTION OF REPORT

The Report of the Meeting was adopted.

14 CLOSE OF MEETING

G. DiNardo thanked NOAA Fisheries for hosting the meeting and the Southwest Fisheries Science Center for their support and commitment. He also expressed his appreciation to the Office of the Chair, namely Sarah Shoffler, Dawn Graham, Emily Gardner, Su-Zan Yeh, and Chi-Lu Sun, for their outstanding support. He thanked Kit Dahl for taking on the rapporteur duties.

The meeting was closed at 12:45PM 20 July 2015

ISC15, July 15-20, 2015

15 CATCH TABLES

Table 15-1. North Pacific albacore catches (in metric tons) by fisheries, 1952-2012. “0”; Fishing effort was reported but no catch. “+”; Bellow 499kg catch. “-”; Unreported catch or catch information not available. *:
Data from the most recent years are provisional.

| Catch disposition | Year | CAN | | JPN | | | | | | | JPN total | KOR | | MEX | | |
|-------------------|-------|--------|-----------|---------|----------------|----------|---------------|-------|--------|-------------|-----------|----------|-----------|-------------|--------|-----------|
| | | Troll | CAN total | Set-net | Drift gill-net | Longline | Pole-and-line | Troll | Others | Purse seine | | Longline | KOR total | Purse seine | Others | MEX total |
| Retained | 1936 | | | | | | | | | | | | | | | |
| | 1937 | | | | | | | | | | | | | | | |
| | 1938 | | | | | | | | | | | | | | | |
| | 1939 | 1,290 | 1,290 | | | | | | | | | | | | | |
| | 1940 | 20 | 20 | | | | | | | | | | | | | |
| | 1941 | 350 | 350 | | | | | | | | | | | | | |
| | 1942 | | | | | | | | | | | | | | | |
| | 1943 | 130 | 130 | | | | | | | | | | | | | |
| | 1944 | 2,100 | 2,100 | | | | | | | | | | | | | |
| | 1945 | 6,480 | 6,480 | | | | | | | | | | | | | |
| | 1946 | 1,960 | 1,960 | | | | | | | | | | | | | |
| | 1947 | 360 | 360 | | | | | | | | | | | | | |
| | 1948 | 9,840 | 9,840 | | | | | | | | | | | | | |
| | 1949 | 10,120 | 10,120 | | | | | | | | | | | | | |
| | 1950 | 9,610 | 9,610 | | | | | | | | | | | | | |
| | 1951 | 860 | 860 | | | | | | | | | | | | | |
| | 1952 | 710 | 710 | 55 | - | 26,687 | 65,645 | - | 237 | 154 | 92,778 | | | - | - | - |
| | 1953 | 50 | 50 | 88 | - | 27,777 | 74,412 | - | 132 | 38 | 102,447 | | | - | - | - |
| | 1954 | | | 6 | - | 20,958 | 28,069 | - | 38 | 23 | 49,094 | | | - | - | - |
| | 1955 | | | 28 | - | 16,277 | 24,236 | - | 136 | 8 | 40,685 | | | - | - | - |
| | 1956 | 170 | 170 | 23 | - | 14,341 | 42,810 | - | 57 | - | 57,231 | | | - | - | - |
| | 1957 | 80 | 80 | 13 | - | 21,053 | 49,500 | - | 151 | 83 | 70,800 | | | - | - | - |
| | 1958 | 740 | 740 | 38 | - | 18,432 | 22,175 | - | 124 | 8 | 40,777 | | | - | - | - |
| | 1959 | 2,120 | 2,120 | 48 | - | 15,802 | 14,252 | - | 67 | - | 30,169 | | | - | - | - |
| | 1960 | 50 | 50 | 23 | - | 17,369 | 25,156 | - | 76 | - | 42,624 | | | - | - | - |
| | 1961 | 40 | 40 | 111 | - | 17,437 | 18,639 | - | 268 | 7 | 36,462 | | | 2 | 39 | 41 |
| | 1962 | 10 | 10 | 20 | - | 15,764 | 8,729 | - | 191 | 53 | 24,757 | | | 0 | 0 | 0 |
| | 1963 | 50 | 50 | 4 | - | 13,464 | 26,420 | - | 218 | 59 | 40,165 | | | 31 | 0 | 31 |
| | 1964 | 30 | 30 | 50 | - | 15,458 | 23,858 | - | 319 | 128 | 39,813 | | | 0 | - | - |
| | 1965 | 150 | 150 | 70 | - | 13,701 | 41,491 | - | 121 | 11 | 55,394 | | | 0 | - | - |
| | 1966 | 440 | 440 | 64 | - | 25,050 | 22,830 | - | 585 | 111 | 48,640 | | | 0 | - | - |
| | 1967 | 1,610 | 1,610 | 43 | - | 28,869 | 30,481 | - | 520 | 89 | 60,002 | | | - | - | - |
| | 1968 | 10,280 | 10,280 | 58 | - | 23,961 | 16,597 | - | 1,109 | 267 | 41,992 | | | - | - | - |
| | 1969 | 13,650 | 13,650 | 34 | - | 18,006 | 31,912 | - | 925 | 521 | 51,398 | | | 0 | - | - |
| | 1970 | 3,900 | 3,900 | 19 | - | 16,222 | 24,263 | - | 498 | 317 | 41,319 | | | 0 | - | - |
| | 1971 | 17,460 | 17,460 | 5 | - | 11,473 | 52,957 | - | 354 | 902 | 65,691 | 0 | 0 | 0 | - | - |
| | 1972 | 39,210 | 39,210 | 6 | 1 | 13,022 | 60,569 | - | 638 | 277 | 74,513 | 0 | 0 | 100 | 0 | 100 |
| | 1973 | 14,000 | 14,000 | 44 | 39 | 16,760 | 68,767 | - | 486 | 1,353 | 87,449 | 4 | 4 | 0 | - | - |
| | 1974 | 13,310 | 13,310 | 13 | 224 | 13,384 | 73,564 | - | 891 | 161 | 88,237 | 91 | 91 | 1 | 0 | 1 |
| | 1975 | 1,110 | 1,110 | 13 | 166 | 10,303 | 52,152 | - | 230 | 159 | 63,023 | 7,050 | 7,050 | 1 | 0 | 1 |
| | 1976 | 2,780 | 2,780 | 15 | 1,070 | 15,812 | 85,336 | - | 270 | 1,109 | 103,612 | 2,212 | 2,212 | 36 | 5 | 41 |
| | 1977 | 530 | 530 | 5 | 688 | 15,681 | 31,934 | - | 365 | 669 | 49,342 | 500 | 500 | 3 | 0 | 3 |
| | 1978 | 230 | 230 | 21 | 4,029 | 13,007 | 59,877 | - | 2,073 | 1,115 | 80,122 | 669 | 669 | 1 | 0 | 1 |
| | 1979 | 5,210 | 5,210 | 16 | 2,856 | 14,186 | 44,662 | - | 1,139 | 125 | 62,984 | 0 | 0 | 1 | 0 | 1 |
| | 1980 | 2,120 | 2,120 | 10 | 2,986 | 14,681 | 46,742 | - | 1,177 | 329 | 65,925 | 592 | 592 | 31 | 0 | 31 |
| | 1981 | 2,000 | 2,000 | 8 | 10,348 | 17,878 | 27,426 | - | 699 | 252 | 56,611 | 0 | 0 | 8 | 0 | 8 |
| | 1982 | 1,040 | 1,040 | 11 | 12,511 | 16,714 | 29,614 | - | 482 | 561 | 59,893 | 4,874 | 4,874 | 0 | 0 | 0 |
| | 1983 | 2,250 | 2,250 | 22 | 6,852 | 15,094 | 21,098 | - | 99 | 350 | 43,515 | 366 | 366 | 0 | 0 | 0 |
| | 1984 | 500 | 500 | 24 | 8,988 | 15,053 | 26,013 | - | 494 | 3,380 | 53,952 | 1,925 | 1,925 | 107 | 6 | 113 |
| | 1985 | 560 | 560 | 68 | 11,204 | 14,249 | 20,714 | - | 339 | 1,533 | 48,107 | 2,789 | 2,789 | 14 | 35 | 49 |
| | 1986 | 300 | 300 | 15 | 7,813 | 12,899 | 16,096 | - | 640 | 1,542 | 39,005 | 3,833 | 3,833 | 3 | 0 | 3 |
| | 1987 | 1,040 | 1,040 | 16 | 6,698 | 14,668 | 19,082 | - | 173 | 1,205 | 41,842 | 1,624 | 1,624 | 7 | 0 | 7 |
| | 1988 | 1,550 | 1,550 | 7 | 9,074 | 14,688 | 6,216 | - | 170 | 1,208 | 31,363 | 799 | 799 | 15 | 0 | 15 |
| | 1989 | 1,400 | 1,400 | 33 | 7,437 | 13,031 | 8,629 | - | 433 | 2,521 | 32,084 | 561 | 561 | 2 | 0 | 2 |
| | 1990 | 3,020 | 3,020 | 5 | 6,064 | 15,785 | 8,532 | - | 248 | 1,995 | 32,629 | 29 | 29 | 2 | 0 | 2 |
| | 1991 | 1,390 | 1,390 | 4 | 3,401 | 17,039 | 7,103 | - | 395 | 2,652 | 30,594 | 4 | 4 | 2 | 0 | 2 |
| | 1992 | 3,630 | 3,630 | 12 | 2,721 | 19,042 | 13,888 | - | 1,522 | 4,104 | 41,289 | 1 | 1 | 10 | 0 | 10 |
| | 1993 | 4,940 | 4,940 | 3 | 287 | 29,933 | 12,797 | - | 897 | 2,889 | 46,806 | 2 | 2 | 11 | 0 | 11 |
| | 1994 | 1,998 | 1,998 | 11 | 263 | 29,565 | 26,389 | - | 823 | 2,026 | 59,077 | 2 | 2 | 6 | 0 | 6 |
| | 1995 | 1,761 | 1,761 | 28 | 282 | 29,050 | 20,981 | 856 | 78 | 1,177 | 52,452 | 13 | 13 | 5 | 0 | 5 |
| | 1996 | 3,321 | 3,321 | 43 | 116 | 32,440 | 20,272 | 815 | 127 | 581 | 54,394 | 157 | 157 | 21 | 0 | 21 |
| | 1997 | 2,166 | 2,166 | 40 | 359 | 38,899 | 32,238 | 1,585 | 135 | 1,068 | 74,324 | 404 | 404 | 53 | 0 | 53 |
| | 1998 | 4,177 | 4,177 | 41 | 206 | 35,755 | 22,926 | 1,190 | 104 | 1,554 | 61,776 | 225 | 225 | 8 | 0 | 8 |
| | 1999 | 2,734 | 2,734 | 90 | 289 | 33,339 | 50,369 | 891 | 62 | 6,872 | 91,912 | 98 | 98 | 0 | 57 | 57 |
| | 2000 | 4,531 | 4,531 | 136 | 67 | 29,995 | 21,550 | 645 | 86 | 2,408 | 54,887 | 15 | 15 | 70 | 33 | 103 |
| | 2001 | 5,248 | 5,248 | 78 | 117 | 28,801 | 29,430 | 416 | 35 | 974 | 59,851 | 63 | 63 | 0 | 18 | 18 |
| | 2002 | 5,379 | 5,379 | 109 | 332 | 23,585 | 48,454 | 787 | 85 | 3,303 | 76,655 | 111 | 111 | 28 | 0 | 28 |
| | 2003 | 6,847 | 6,847 | 69 | 126 | 20,907 | 36,114 | 922 | 85 | 627 | 58,850 | 146 | 146 | 29 | 0 | 29 |
| | 2004 | 7,857 | 7,857 | 30 | 61 | 17,341 | 32,255 | 772 | 54 | 7,200 | 57,713 | 77 | 77 | 104 | 0 | 104 |
| | 2005 | 4,829 | 4,829 | 97 | 154 | 20,465 | 16,133 | 665 | 234 | 850 | 38,598 | 419 | 419 | 0 | 0 | 0 |
| | 2006 | 5,833 | 5,833 | 55 | 221 | 21,168 | 15,400 | 460 | 42 | 364 | 37,710 | 134 | 134 | 109 | 0 | 109 |
| | 2007 | 6,040 | 6,040 | 30 | 226 | 22,381 | 37,768 | 519 | 44 | 5,682 | 66,650 | 136 | 136 | 40 | 0 | 40 |
| | 2008 | 5,464 | 5,464 | 101 | 1,531 | 19,092 | 19,060 | 549 | 34 | 825 | 41,192 | 400 | 400 | 10 | - | 10 |
| | 2009 | 5,693 | 5,693 | 33 | 149 | 21,995 | 31,172 | 410 | 43 | 2,076 | 55,878 | 95 | 95 | 17 | - | 17 |
| | 2010 | 6,527 | 6,527 | 42 | 24 | 21,167 | 19,561 | 588 | 37 | 330 | 41,749 | 107 | 107 | 25 | - | 25 |
| | 2011 | 5,415 | 5,415 | 50 | 12 | 20,956 | 25,704 | 443 | 78 | 480 | 47,723 | 78 | 78 | 0 | - | - |
| | 2012 | 2,497 | 2,497 | 48 | 26 | 22,828 | 33,742 | 610 | 129 | 4,193 | 61,576 | 156 | 156 | 0 | - | - |
| | 2013 | 5,088 | 5,088 | 36 | 14 | 19,839 | 33,568 | 302 | 211 | 1,988 | 55,958 | 173 | 173 | 0 | - | 0 |
| | 2014* | 4,781 | 4,781 | 36 | 14 | 19,355 | 33,576 | 302 | 211 | 1,988 | 55,482 | 116 | 116 | 0 | - | 0 |
| Discards | 2013 | 1 | 1 | | | | | | | | | | | | | |
| | 2014 | 7 | 7 | | | | | | | | | | | | | |

ISC15, July 15-20, 2015

Table 15-1. Continued

| Set-net | TWN | | | | TWN total | USA | | | | | | | | USA total | Species Grand Total |
|---------|--------------------------|----------|-------------|--------|-----------|----------------|-----------|----------|---------------|--------|--------|-------------|-------|-----------|---------------------|
| | Gill-net (not specified) | Longline | Purse seine | Others | | Drift gill-net | Hand line | Longline | Pole-and-line | Troll | Others | Purse seine | Sport | | |
| | | | | | | | | | | 442 | | | | 442 | 442 |
| | | | | | | | | | | 1,681 | | | | 1,681 | 1,681 |
| | | | | | | | | | | 8,594 | | | | 8,594 | 8,594 |
| | | | | | | | | | | 8,586 | | | | 8,586 | 9,876 |
| | | | | | | | | | | 6,603 | | | | 6,603 | 6,623 |
| | | | | | | | | | | 5,412 | | | | 5,412 | 5,762 |
| | | | | | | | | | | 10,678 | | | | 10,678 | 10,678 |
| | | | | | | | | | | 17,071 | | | | 17,071 | 17,201 |
| | | | | | | | | | | 23,957 | | | | 23,957 | 26,057 |
| | | | | | | | | | | 17,886 | | | | 17,886 | 24,366 |
| | | | | | | | | | | 10,955 | | | | 10,955 | 12,915 |
| | | | | | | | | | | 12,235 | | | | 12,235 | 12,595 |
| | | | | | | | | 45 | | 22,457 | | | | 22,502 | 32,342 |
| | | | | | | | | 33 | | 24,901 | | | | 24,934 | 35,054 |
| | | | | | | | | 27 | | 32,746 | | | | 32,773 | 42,383 |
| | | | | | | | | 24 | | 15,629 | | | | 15,653 | 16,513 |
| | | | | | | | | 46 | | 23,843 | | | 1,373 | 25,262 | 118,750 |
| | | | | | | | | 23 | | 15,740 | | | 171 | 15,934 | 118,431 |
| | | | | | | | | 13 | | 12,246 | | | 147 | 12,406 | 61,500 |
| | | | | | | | | 9 | | 13,264 | | | 577 | 13,850 | 54,535 |
| | | | | | | | | 6 | | 18,751 | | | 482 | 19,239 | 76,640 |
| | | | | | | | | 4 | | 21,165 | | | 304 | 21,473 | 92,353 |
| | | | | | | | | 7 | | 14,855 | | | 48 | 14,910 | 56,427 |
| | | | | | | | | 5 | | 20,990 | | | + | 20,995 | 53,284 |
| | | | | | | | | 4 | | 20,100 | | | 557 | 20,661 | 63,335 |
| | | | | | | | | 5 | 2,837 | 12,055 | 1 | | 1,355 | 16,253 | 52,796 |
| | | | | | | | | 7 | 1,085 | 19,752 | 1 | | 1,681 | 22,526 | 47,293 |
| | | | | | | | | 7 | 2,432 | 25,140 | | | 1,161 | 28,740 | 68,986 |
| | | | | | | | | 4 | 3,411 | 18,388 | | | 824 | 22,627 | 62,470 |
| | | | | | | | | 3 | 417 | 16,542 | 1 | | 731 | 17,694 | 73,238 |
| | | | | | | | | 8 | 1,600 | 15,333 | | | 588 | 17,529 | 66,609 |
| | | | | | | | | 12 | 4,113 | 17,814 | | | 707 | 22,646 | 84,777 |
| - | - | 330 | | 189 | 519 | | | 11 | 4,906 | 20,434 | | | 951 | 26,302 | 79,073 |
| - | - | 216 | | 283 | 499 | | | 14 | 2,996 | 18,827 | | | 358 | 22,195 | 87,731 |
| - | - | 65 | | 423 | 488 | | | 9 | 4,416 | 21,032 | | | 822 | 26,279 | 71,591 |
| - | - | 34 | | 59 | 93 | | | 11 | 2,071 | 20,526 | | | 1,175 | 23,783 | 107,006 |
| - | - | 20 | | 52 | 72 | | | 8 | 3,750 | 23,600 | | | 637 | 27,995 | 142,005 |
| - | - | 187 | | - | 187 | | | 14 | 2,236 | 15,653 | | | 84 | 17,987 | 119,440 |
| - | - | - | | - | - | | | 9 | 4,777 | 20,178 | | | 94 | 25,058 | 127,183 |
| - | - | 486 | | - | 486 | | | 33 | 3,243 | 18,932 | 10 | | 640 | 22,858 | 95,282 |
| - | - | 1,240 | | - | 1,240 | | | 23 | 2,700 | 15,905 | 4 | | 713 | 19,345 | 128,676 |
| - | - | 686 | | - | 686 | | | 37 | 1,497 | 9,969 | | | 537 | 12,040 | 62,987 |
| - | - | 572 | | - | 572 | | | 54 | 950 | 16,613 | 15 | | 810 | 18,442 | 99,470 |
| - | - | 6 | | - | 6 | | | | 303 | 6,781 | | | 74 | 7,158 | 75,434 |
| - | - | 81 | | - | 81 | | | | 382 | 7,556 | | | 168 | 8,106 | 77,044 |
| - | 1 | 249 | | 20 | 270 | | | 25 | 748 | 12,637 | | | 195 | 13,605 | 72,380 |
| - | - | 143 | | 12 | 156 | | | 105 | 425 | 6,609 | 21 | | 257 | 7,417 | 73,271 |
| - | - | 38 | | 9 | 47 | | | 6 | 607 | 9,359 | | | 87 | 10,059 | 56,199 |
| - | - | 8 | | 1 | 9 | | | 2 | 1,030 | 9,304 | | 3,728 | 1,427 | 15,491 | 71,982 |
| - | 1 | - | | - | 1 | | | | | 6,422 | 118 | 26 | 1,176 | 7,744 | 59,252 |
| - | - | - | | - | - | | | 3 | | 4,713 | 66 | 47 | 196 | 5,025 | 48,166 |
| 2 | 2,514 | - | | - | 2,516 | | | 5 | 150 | 2,772 | 139 | 1 | 74 | 3,141 | 50,170 |
| 6 | 7,389 | - | | - | 7,395 | | | 15 | 307 | 4,221 | 76 | 17 | 64 | 4,700 | 45,822 |
| - | 8,350 | 40 | | - | 8,390 | | | 4 | 248 | 1,896 | 10 | 1 | 160 | 2,319 | 44,756 |
| - | 16,701 | 4 | | 39 | 16,744 | | | 29 | 177 | 2,733 | 20 | 71 | 24 | 3,054 | 55,478 |
| - | 3,398 | 12 | | - | 3,410 | | | 17 | 312 | 1,917 | 20 | | 6 | 2,272 | 37,672 |
| - | 7,866 | - | | - | 7,866 | | | | 334 | 4,626 | 40 | | 2 | 5,002 | 57,798 |
| - | - | 5 | | - | 5 | | | | 438 | 6,325 | 194 | | 25 | 6,982 | 58,746 |
| - | - | 83 | | - | 83 | | | 38 | 544 | 11,068 | 66 | | 106 | 11,822 | 72,988 |
| - | - | 4,280 | | - | 4,280 | | | 52 | 882 | 8,302 | 4 | | 102 | 9,342 | 67,853 |
| - | - | 7,596 | | - | 7,596 | | | 83 | 1,185 | 17,150 | 10 | 11 | 88 | 18,527 | 84,016 |
| - | - | 9,456 | | - | 9,456 | | | 60 | 1,653 | 14,458 | 12 | 2 | 1,018 | 17,203 | 103,606 |
| - | - | 8,810 | | - | 8,810 | | | 80 | 1,120 | 14,577 | 15 | 33 | 1,208 | 17,033 | 92,029 |
| - | - | 8,393 | | - | 8,393 | | | 149 | 1,542 | 10,451 | 61 | 48 | 3,621 | 15,872 | 119,066 |
| - | - | 8,842 | | - | 8,842 | | | 55 | 940 | 9,834 | 24 | 4 | 1,798 | 12,655 | 81,033 |
| - | 1 | 8,684 | | - | 8,685 | | | 94 | 1,295 | 11,543 | 39 | 51 | 1,635 | 14,657 | 88,522 |
| - | - | 7,965 | | - | 7,965 | | | 30 | 525 | 11,003 | 13 | 4 | 2,357 | 13,932 | 104,070 |
| - | - | 7,166 | | - | 7,166 | | | 16 | 524 | 14,246 | 8 | 44 | 2,214 | 17,052 | 90,090 |
| - | - | 4,988 | | - | 4,988 | | | 12 | 361 | 13,630 | 3 | 1 | 1,506 | 15,513 | 86,252 |
| - | - | 4,472 | | - | 4,472 | | | 20 | 296 | 8,654 | 1 | | 1,719 | 10,690 | 59,008 |
| - | - | 4,317 | | - | 4,317 | | | 3 | 270 | 12,642 | + | | 385 | 13,300 | 61,403 |
| - | - | 2,916 | | - | 2,916 | | | 4 | 94 | 11,911 | + | 77 | 461 | 12,797 | 88,579 |
| - | - | 3,069 | | - | 3,069 | | | 1 | 28 | 11,762 | + | | 418 | 12,563 | 62,698 |
| - | - | 2,378 | | - | 2,378 | | | 4 | 97 | 12,343 | + | 31 | 944 | 13,622 | 77,683 |
| + | - | 2,818 | | - | 2,818 | | | 5 | 53 | 11,691 | 0 | | 862 | 13,032 | 64,258 |
| + | 1 | 3,434 | 0 | 2 | 3,437 | | | 5 | 84 | 10,147 | 0 | | 421 | 11,365 | 68,018 |
| 2 | 2 | 2,643 | | - | 2,647 | | | 8 | 253 | 14,152 | 2 | 5 | 1,212 | 16,292 | 83,168 |
| 1 | - | 4,427 | | - | 4,428 | | | 5 | 46 | 12,312 | 0 | | 839 | 13,519 | 79,166 |
| 1 | - | 2,617 | | - | 2,618 | | | 0 | 49 | 209 | | | 1,048 | 14,723 | 77,720 |
| | | | | | | | | | | | | | | | 1 |
| | | | | | | | | | | | | | | | 7 |

ISC15, July 15-20, 2015

Table 15-2. Pacific bluefin tuna catches (in metric tons) by fisheries, 1952-2012. “0”; Fishing effort was reported but no catch. “+”; Bellow 499kg catch. “-”; Unreported catch or catch information not available. *: Data from the most recent years are provisional.

| Catch disposition | Year | JPN | | | | | | | KOR | | | | | MEX | | |
|-------------------|------|---------|----------|---------------|-------|--------|-------------|-----------|---------|----------|-------------|---------|-----------|--------|-------------|-----------|
| | | Set-net | Longline | Pole-and-line | Troll | Others | Purse seine | JPN total | Set-net | Longline | Purse seine | Trawl I | KOR total | Others | Purse seine | MEX total |
| Retained | 1952 | 2,145 | 2,694 | 2,198 | 667 | 1,700 | 7,680 | 17,084 | | | | | | - | - | - |
| | 1953 | 2,335 | 3,040 | 3,052 | 1,472 | 160 | 5,570 | 15,629 | | | | | | - | - | - |
| | 1954 | 5,579 | 3,088 | 3,044 | 1,656 | 266 | 5,366 | 18,999 | | | | | | - | - | - |
| | 1955 | 3,256 | 2,951 | 2,841 | 1,507 | 1,151 | 14,016 | 25,722 | | | | | | - | - | - |
| | 1956 | 4,170 | 2,672 | 4,060 | 1,763 | 385 | 20,979 | 34,029 | | | | | | - | - | - |
| | 1957 | 2,822 | 1,685 | 1,795 | 2,392 | 414 | 18,147 | 27,255 | | | | | | - | - | - |
| | 1958 | 1,187 | 818 | 2,337 | 1,497 | 215 | 8,586 | 14,640 | | | | | | - | - | - |
| | 1959 | 1,575 | 3,136 | 586 | 736 | 167 | 9,996 | 16,196 | | | | | | 32 | 171 | 203 |
| | 1960 | 2,032 | 5,910 | 600 | 1,885 | 369 | 10,541 | 21,337 | | | | | | - | - | - |
| | 1961 | 2,710 | 6,364 | 662 | 3,193 | 599 | 9,124 | 22,652 | | | | | | - | 130 | 130 |
| | 1962 | 2,545 | 5,769 | 747 | 1,683 | 293 | 10,657 | 21,694 | | | | | | - | 294 | 294 |
| | 1963 | 2,797 | 6,077 | 1,256 | 2,542 | 294 | 9,786 | 22,752 | | | | | | - | 412 | 412 |
| | 1964 | 1,475 | 3,140 | 1,037 | 2,784 | 1,884 | 8,973 | 19,293 | | | | | | - | 131 | 131 |
| | 1965 | 2,121 | 2,569 | 831 | 1,963 | 1,106 | 11,496 | 20,086 | | | | | | - | 289 | 289 |
| | 1966 | 1,261 | 1,370 | 613 | 1,614 | 129 | 10,082 | 15,069 | | | | | | - | 435 | 435 |
| | 1967 | 2,603 | 878 | 1,210 | 3,273 | 302 | 6,462 | 14,728 | | | | | | - | 371 | 371 |
| | 1968 | 3,058 | 500 | 983 | 1,568 | 217 | 9,268 | 15,594 | | | | | | - | 195 | 195 |
| | 1969 | 2,187 | 878 | 721 | 2,219 | 195 | 3,236 | 9,436 | | | | | | - | 260 | 260 |
| | 1970 | 1,779 | 607 | 723 | 1,198 | 224 | 2,907 | 7,438 | | | | | | - | 92 | 92 |
| | 1971 | 1,555 | 697 | 938 | 1,492 | 317 | 3,721 | 8,720 | | 0 | | | 0 | - | 555 | 555 |
| | 1972 | 1,107 | 512 | 944 | 842 | 197 | 4,212 | 7,814 | | 0 | | | 0 | - | 1,646 | 1,646 |
| | 1973 | 2,351 | 838 | 526 | 2,108 | 636 | 2,266 | 8,725 | | 0 | | | 0 | - | 1,084 | 1,084 |
| | 1974 | 6,019 | 1,177 | 1,192 | 1,656 | 754 | 4,106 | 14,904 | | 0 | | | 0 | - | 344 | 344 |
| | 1975 | 2,433 | 1,061 | 1,401 | 1,031 | 808 | 4,491 | 11,225 | | 3 | | | 3 | - | 2,145 | 2,145 |
| | 1976 | 2,996 | 320 | 1,082 | 830 | 1,237 | 2,148 | 8,613 | | 5 | | | 5 | - | 1,968 | 1,968 |
| | 1977 | 2,257 | 338 | 2,256 | 2,166 | 1,052 | 5,110 | 13,179 | | 0 | | | 0 | - | 2,186 | 2,186 |
| | 1978 | 2,546 | 648 | 1,154 | 4,517 | 2,276 | 10,427 | 21,568 | | 3 | | | 3 | - | 545 | 545 |
| | 1979 | 4,558 | 729 | 1,250 | 2,655 | 2,429 | 13,881 | 25,502 | | 0 | | | 0 | - | 213 | 213 |
| | 1980 | 2,521 | 811 | 1,392 | 1,531 | 1,953 | 11,327 | 19,535 | | 0 | | | 0 | - | 582 | 582 |
| | 1981 | 2,129 | 590 | 754 | 1,777 | 2,653 | 25,422 | 33,325 | | 0 | | | 0 | - | 218 | 218 |
| | 1982 | 1,667 | 718 | 1,777 | 864 | 1,709 | 19,234 | 25,969 | | 0 | 31 | | 31 | - | 506 | 506 |
| | 1983 | 972 | 217 | 356 | 2,028 | 1,117 | 14,774 | 19,464 | | 0 | 13 | | 13 | - | 214 | 214 |
| | 1984 | 2,234 | 142 | 587 | 1,874 | 868 | 4,433 | 10,138 | | 1 | 4 | | 5 | - | 166 | 166 |
| | 1985 | 2,562 | 105 | 1,817 | 1,850 | 1,175 | 4,154 | 11,663 | | 0 | 1 | | 1 | - | 676 | 676 |
| | 1986 | 2,914 | 102 | 1,086 | 1,467 | 719 | 7,412 | 13,700 | | 0 | 344 | | 344 | - | 189 | 189 |
| | 1987 | 2,198 | 211 | 1,565 | 880 | 445 | 8,653 | 13,952 | | 13 | 89 | | 102 | - | 119 | 119 |
| | 1988 | 843 | 157 | 907 | 1,124 | 498 | 3,605 | 7,134 | | 0 | 32 | | 32 | 1 | 447 | 448 |
| | 1989 | 748 | 209 | 754 | 903 | 283 | 6,190 | 9,087 | | 0 | 71 | | 71 | - | 57 | 57 |
| | 1990 | 716 | 309 | 536 | 1,250 | 455 | 2,989 | 6,255 | | 0 | 132 | | 132 | - | 50 | 50 |
| | 1991 | 1,485 | 218 | 286 | 2,069 | 650 | 9,808 | 14,516 | | 0 | 265 | | 265 | - | 9 | 9 |
| | 1992 | 1,208 | 513 | 166 | 915 | 1,081 | 7,162 | 11,045 | | 0 | 288 | | 288 | - | 0 | - |
| | 1993 | 848 | 812 | 129 | 546 | 365 | 6,600 | 9,300 | | 0 | 40 | | 40 | - | - | - |
| | 1994 | 1,158 | 1,206 | 162 | 4,111 | 398 | 8,131 | 15,166 | | 0 | 50 | | 50 | 2 | 63 | 65 |
| | 1995 | 1,859 | 678 | 270 | 4,778 | 586 | 18,909 | 27,080 | | 0 | 821 | | 821 | - | 11 | 11 |
| | 1996 | 1,149 | 901 | 94 | 3,640 | 570 | 7,644 | 13,998 | | 0 | 102 | | 102 | - | 3,700 | 3,700 |
| | 1997 | 803 | 1,300 | 34 | 2,740 | 811 | 13,152 | 18,840 | | 0 | 1,054 | | 1,054 | - | 367 | 367 |
| | 1998 | 874 | 1,255 | 85 | 2,876 | 700 | 5,391 | 11,181 | | 0 | 188 | | 188 | 0 | 1 | 1 |
| | 1999 | 1,097 | 1,157 | 35 | 3,440 | 709 | 16,173 | 22,611 | | 0 | 256 | | 256 | 35 | 2,369 | 2,404 |
| | 2000 | 1,125 | 953 | 102 | 5,217 | 689 | 16,486 | 24,572 | | 0 | 2,401 | 0 | 2,401 | 99 | 3,019 | 3,118 |
| | 2001 | 1,366 | 791 | 180 | 3,466 | 782 | 7,620 | 14,205 | | 0 | 1,176 | 10 | 1,176 | - | 863 | 863 |
| | 2002 | 1,100 | 841 | 99 | 2,607 | 631 | 8,903 | 14,181 | | 0 | 932 | 1 | 932 | 2 | 1,708 | 1,710 |
| | 2003 | 839 | 1,237 | 44 | 2,060 | 446 | 5,768 | 10,394 | | 0 | 2,601 | 0 | 2,601 | 43 | 3,211 | 3,254 |
| | 2004 | 896 | 1,847 | 132 | 2,445 | 514 | 8,257 | 14,091 | | 0 | 773 | 0 | 773 | 14 | 8,880 | 8,894 |
| | 2005 | 2,182 | 1,925 | 549 | 3,633 | 548 | 12,817 | 21,654 | | 0 | 1,318 | 9 | 1,318 | - | 4,542 | 4,542 |
| | 2006 | 1,421 | 1,121 | 108 | 1,860 | 777 | 8,880 | 14,167 | | 0 | 1,012 | 3 | 1,012 | - | 9,927 | 9,927 |
| | 2007 | 1,503 | 1,762 | 236 | 2,823 | 657 | 6,840 | 13,821 | | 0 | 1,281 | 4 | 1,281 | - | 4,147 | 4,147 |
| | 2008 | 2,358 | 1,390 | 64 | 2,377 | 770 | 10,221 | 17,180 | | 0 | 1,866 | 10 | 1,866 | 15 | 4,392 | 4,407 |
| | 2009 | 2,236 | 1,080 | 50 | 2,003 | 575 | 8,077 | 14,021 | | 0 | 936 | 4 | 936 | - | 3,019 | 3,019 |
| | 2010 | 1,603 | 890 | 83 | 1,583 | 495 | 3,742 | 8,396 | | 0 | 1,196 | 16 | 1,196 | - | 7,746 | 7,746 |
| | 2011 | 1,651 | 837 | 63 | 1,820 | 283 | 8,340 | 12,994 | | 0 | 670 | 14 | 670 | 1 | 2,730 | 2,731 |
| | 2012 | 1,932 | 673 | 113 | 570 | 343 | 2,462 | 6,093 | | 0 | 1,421 | 2 | 1,421 | 1 | 6,667 | 6,668 |
| | 2013 | 1,415 | 784 | 8 | 904 | 529 | 2,771 | 6,411 | 1 | - | 604 | 0 | 604 | | 3,154 | 3,154 |
| | 2014 | 1,907 | 715 | 5 | 1,023 | 499 | 5,456 | 9,605 | 6 | - | 1,305 | - | 1,311 | | 4,862 | 4,862 |

1) Japanese coastal longline and other catch data from 2007 to 2013 were revised as a result of deleting double counting and changing the data source (ISC15/STATWG/WP-4).

2) Japanese troll catch since 1998 includes catch for farming.

3) Korea's catch statistics are derived from Japanese Import statistics for 1982-1999.

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

5) Set-net catches in 2013 were updated based on the Japanese official statistics of annual catch.

6) The catch of Japanese coastal longline in 2014 is provisional and includes catch of the distant water and offshore longline.

ISC15, July 15-20, 2015

Table 15-2. Continued

| TWN | | | | | | TWN total | USA | | | | | | | | USA total | Species |
|---------|--------------------------------|-----------------------|--------------|--------|----------------|-----------|--------------------|--------------|-----------------------|-------|--------|----------------|-------|----------------|-----------|---------|
| Set-net | Gill-net (not specified) | Drift gill- net | Long line | Others | Purse seine | | Drift gill- net | Long line | Pole- and- line | Troll | Others | Purse seine | Sport | Grand Total | | |
| | | | | | | | | | | | | 2,076 | 2 | 2,078 | 19,162 | |
| | | | | | | | | | | | | 4,433 | 48 | 4,481 | 20,110 | |
| | | | | | | | | | | | | 9,537 | 11 | 9,548 | 28,547 | |
| | | | | | | | | | | | | 6,173 | 93 | 6,266 | 31,988 | |
| | | | | | | | | | | | | 5,727 | 388 | 6,115 | 40,144 | |
| | | | | | | | | | | | | 9,215 | 73 | 9,288 | 36,543 | |
| | | | | | | | | | | | | 13,934 | 10 | 13,944 | 28,584 | |
| | | | | | | | | 56 | | | | 3,506 | 13 | 3,575 | 19,974 | |
| | | | | | | | | + | | | | 4,547 | 1 | 4,548 | 25,885 | |
| | | | | | | | | 16 | | | | 7,989 | 23 | 8,028 | 30,810 | |
| | | | | | | | | + | | | | 10,769 | 25 | 10,794 | 32,782 | |
| | | | | | | | | 28 | | | | 11,832 | 7 | 11,867 | 35,031 | |
| | | | | | | | | 39 | | | | 9,047 | 7 | 9,093 | 28,517 | |
| | | | 54 | | | 54 | | 11 | + | 66 | | 6,523 | 1 | 6,601 | 27,030 | |
| | | | - | | | - | | 12 | | | | 15,450 | 20 | 15,482 | 30,986 | |
| | | | 53 | | | 53 | | + | | | | 5,517 | 32 | 5,549 | 20,701 | |
| | | | 33 | | | 33 | | 8 | | | | 5,773 | 12 | 5,793 | 21,615 | |
| | | | 23 | | | 23 | | 9 | | | | 6,657 | 15 | 6,681 | 16,400 | |
| | | | - | | | - | | + | | | | 3,873 | 19 | 3,892 | 11,422 | |
| | | | 1 | | | 1 | | + | | | | 7,804 | 8 | 7,812 | 17,088 | |
| | | | 14 | | | 14 | | 3 | | | 42 | 11,656 | 15 | 11,716 | 21,190 | |
| | | | 33 | | | 33 | | 5 | | + | 20 | 9,639 | 54 | 9,718 | 19,560 | |
| | | | 47 | 15 | | 62 | | + | + | 30 | | 5,243 | 58 | 5,331 | 20,641 | |
| | | | 61 | 5 | | 66 | | 83 | | | 1 | 7,353 | 34 | 7,471 | 20,910 | |
| | | | 17 | 2 | | 19 | | 22 | + | 3 | | 8,652 | 21 | 8,698 | 19,303 | |
| | | | 131 | 2 | | 133 | | 10 | | 3 | | 3,259 | 19 | 3,291 | 18,789 | |
| | | | 66 | 2 | | 68 | | 4 | | 2 | | 4,663 | 5 | 4,674 | 26,858 | |
| | | | 58 | - | | 58 | | 5 | | 1 | | 5,889 | 11 | 5,906 | 31,679 | |
| | | | 114 | 5 | | 119 | | + | | 24 | | 2,327 | 7 | 2,358 | 22,594 | |
| | | | 179 | - | | 179 | 4 | + | | + | | 867 | 9 | 890 | 34,612 | |
| | 2 | | 207 | - | | 209 | 9 | 1 | | + | | 2,639 | 11 | 2,660 | 29,375 | |
| | 2 | | 175 | - | 9 | 186 | 31 | 59 | | 2 | | 629 | 33 | 754 | 20,631 | |
| | - | | 477 | 8 | 5 | 490 | 6 | 1 | 5 | | 18 | 673 | 49 | 752 | 11,551 | |
| | 11 | | 210 | - | 80 | 301 | 8 | | | 20 | | 3,320 | 89 | 3,437 | 16,078 | |
| | 13 | | 70 | - | 16 | 99 | 16 | | | 41 | | 4,851 | 12 | 4,920 | 19,252 | |
| | 14 | | 365 | - | 21 | 400 | 2 | | | 18 | | 861 | 34 | 915 | 15,488 | |
| | 37 | | 108 | 25 | 197 | 367 | 4 | | | 46 | | 923 | 6 | 979 | 8,960 | |
| | 51 | | 205 | 3 | 259 | 518 | 3 | | | 18 | | 1,046 | 112 | 1,179 | 10,912 | |
| | 299 | | 189 | 16 | 149 | 653 | 11 | | | 81 | | 1,380 | 65 | 1,537 | 8,627 | |
| | 107 | | 342 | 12 | - | 461 | 4 | 2 | | + | | 410 | 92 | 508 | 15,759 | |
| | 3 | | 464 | 5 | 73 | 545 | 9 | 38 | | 14 | | 1,928 | 110 | 2,099 | 13,977 | |
| | | | 471 | 3 | 1 | 475 | 32 | 42 | | 29 | | 580 | 283 | 966 | 10,781 | |
| | | | 559 | - | | 559 | 28 | 30 | | 1 | | 906 | 86 | 1,051 | 16,891 | |
| | | | 335 | 2 | | 337 | 20 | 29 | | + | | 657 | 245 | 951 | 29,200 | |
| - | - | | 956 | - | - | 956 | 43 | 25 | | 2 | + | 4,639 | 40 | 4,749 | 23,505 | |
| - | - | | 1,814 | - | - | 1,814 | 58 | 26 | | 1 | 48 | 2,240 | 131 | 2,504 | 24,579 | |
| - | - | | 1,910 | - | - | 1,910 | 40 | 54 | | 128 | 59 | 1,771 | 422 | 2,474 | 15,754 | |
| - | - | | 3,089 | - | - | 3,089 | 22 | 54 | | 20 | 88 | 184 | 408 | 776 | 29,136 | |
| - | 1 | | 2,780 | 1 | - | 2,782 | 30 | 19 | | 1 | 11 | 693 | 319 | 1,073 | 33,946 | |
| - | 2 | | 1,839 | 2 | - | 1,843 | 35 | 6 | | 6 | 1 | 292 | 344 | 684 | 18,781 | |
| - | 3 | | 1,523 | 1 | - | 1,527 | 7 | 2 | | 1 | 2 | 50 | 613 | 675 | 19,026 | |
| - | 10 | | 1,863 | 11 | - | 1,884 | 14 | 1 | | | 3 | 22 | 355 | 395 | 18,528 | |
| - | 1 | | 1,714 | 2 | - | 1,717 | 10 | 1 | | | + | | 50 | 61 | 25,536 | |
| 1 | - | | 1,368 | 1 | - | 1,370 | 5 | 1 | | | 1 | 201 | 73 | 281 | 29,174 | |
| 1 | - | | 1,149 | - | - | 1,150 | 1 | 1 | | | + | | 94 | 96 | 26,355 | |
| 2 | 8 | | 1,401 | - | - | 1,411 | 2 | + | | | + | 42 | 12 | 56 | 20,720 | |
| 1 | 1 | | 979 | - | - | 981 | 1 | + | | | + | | 63 | 64 | 24,508 | |
| 1 | 10 | | 877 | - | - | 888 | 3 | 1 | | 0 | 2 | 410 | 156 | 572 | 19,440 | |
| 29 | 7 | | 373 | - | - | 409 | 1 | 0 | | | 0 | | 88 | 89 | 17,852 | |
| 16 | 7 | | 292 | 1 | 0 | 316 | 18 | 0 | | 0 | 100 | | 225 | 343 | 17,068 | |
| 2 | - | | 210 | 2 | - | 214 | 4 | 0 | | 0 | 38 | | 400 | 442 | 14,840 | |
| 2 | 1 | | 332 | - | - | 335 | 7 | 1 | | 0 | 3 | | 809 | 820 | 11,325 | |
| 2 | 1 | | 480 | - | - | 483 | 4 | 0 | | 0 | 1 | 401 | 398 | 804 | 17,065 | |

ISC15, July 15-20, 2015

Table 15-3. Annual catch of swordfish (*Xiphias gladius*) in metric tons for fisheries monitored by ISC for assessments of North Pacific Ocean stocks, 1951-2010. “0”; Fishing effort was reported but no catch. “+”; Bellow 499kg catch. “-”; Unreported catch or catch information not available. *: Data from the most recent years are provisional.

| Catch disposition | Year | JPN | | | | | KOR | | MEX | |
|-------------------|-------|---------|----------------|----------|--------|-----------|----------|-----------|--------|-----------|
| | | Set-net | Drift gill-net | Longline | Others | JPN total | Longline | KOR total | Others | MEX total |
| Retained | 1951 | 78 | 10 | 7,246 | 4,344 | 11,678 | | | | |
| | 1952 | 68 | - | 8,890 | 2,733 | 11,691 | | | | |
| | 1953 | 21 | - | 10,796 | 1,591 | 12,408 | | | | |
| | 1954 | 18 | - | 12,563 | 1,030 | 13,611 | | | | |
| | 1955 | 37 | - | 13,064 | 1,010 | 14,111 | | | | |
| | 1956 | 31 | - | 14,596 | 859 | 15,486 | | | | |
| | 1957 | 18 | - | 14,268 | 965 | 15,251 | | | | |
| | 1958 | 31 | - | 18,525 | 1,178 | 19,734 | | | | |
| | 1959 | 31 | - | 17,236 | 1,000 | 18,267 | | | | |
| | 1960 | 67 | 1 | 20,058 | 1,273 | 21,399 | | | | |
| | 1961 | 15 | 2 | 19,715 | 1,416 | 21,148 | | | | |
| | 1962 | 15 | - | 10,607 | 1,493 | 12,115 | | | | |
| | 1963 | 17 | - | 10,322 | 904 | 11,243 | | | | |
| | 1964 | 16 | 4 | 7,669 | 1,163 | 8,852 | | | | |
| | 1965 | 14 | 0 | 8,742 | 2,235 | 10,991 | | | | |
| | 1966 | 11 | 0 | 9,866 | 1,886 | 11,763 | | | | |
| | 1967 | 12 | 0 | 10,883 | 1,113 | 12,008 | | | | |
| | 1968 | 14 | 0 | 9,810 | 1,825 | 11,649 | | | | |
| | 1969 | 11 | 0 | 9,702 | 1,623 | 11,336 | | | | |
| | 1970 | 9 | 0 | 7,715 | 1,823 | 9,547 | | | | |
| | 1971 | 37 | 1 | 7,369 | 539 | 7,946 | 0 | 0 | | |
| | 1972 | 1 | 55 | 7,316 | 315 | 7,687 | 0 | 0 | | |
| | 1973 | 23 | 720 | 7,564 | 160 | 8,467 | 0 | 0 | | |
| | 1974 | 16 | 1,304 | 6,523 | 365 | 8,208 | 0 | 0 | | |
| | 1975 | 18 | 2,672 | 7,659 | 283 | 10,632 | 0 | 0 | | |
| | 1976 | 14 | 3,488 | 8,786 | 554 | 12,842 | 0 | 0 | | |
| | 1977 | 7 | 2,344 | 9,255 | 320 | 11,926 | 0 | 0 | | |
| | 1978 | 22 | 2,475 | 9,022 | 288 | 11,807 | 0 | 0 | | |
| | 1979 | 15 | 983 | 9,627 | 275 | 10,900 | 0 | 0 | | |
| | 1980 | 15 | 1,746 | 6,873 | 453 | 9,087 | 135 | 135 | | |
| | 1981 | 9 | 1,848 | 7,789 | 242 | 9,888 | 0 | 0 | | |
| | 1982 | 7 | 1,257 | 6,963 | 289 | 8,516 | 166 | 166 | | |
| | 1983 | 9 | 1,033 | 8,708 | 242 | 9,992 | 47 | 47 | | |
| | 1984 | 13 | 1,053 | 8,375 | 251 | 9,692 | 27 | 27 | | |
| | 1985 | 10 | 1,133 | 10,368 | 279 | 11,790 | 12 | 12 | | |
| | 1986 | 9 | 1,264 | 9,738 | 247 | 11,258 | 18 | 18 | | |
| | 1987 | 11 | 1,051 | 10,370 | 173 | 11,605 | 50 | 50 | | |
| | 1988 | 8 | 1,234 | 9,304 | 205 | 10,751 | 27 | 27 | | |
| | 1989 | 10 | 1,596 | 7,482 | 393 | 9,481 | 7 | 7 | | |
| | 1990 | 4 | 1,074 | 6,595 | 144 | 7,817 | 46 | 46 | | - |
| | 1991 | 5 | 498 | 5,682 | 181 | 6,366 | 37 | 37 | | - |
| | 1992 | 6 | 887 | 8,497 | 405 | 9,795 | 32 | 32 | | - |
| | 1993 | 4 | 292 | 9,777 | 353 | 10,426 | 27 | 27 | | - |
| | 1994 | 4 | 421 | 8,723 | 345 | 9,493 | 4 | 4 | | - |
| | 1995 | 7 | 561 | 7,808 | 458 | 8,834 | 9 | 9 | | - |
| | 1996 | 4 | 428 | 7,979 | 646 | 9,057 | 15 | 15 | | - |
| | 1997 | 5 | 365 | 8,215 | 409 | 8,994 | 99 | 99 | | - |
| | 1998 | 2 | 471 | 7,419 | 548 | 8,440 | 153 | 153 | | - |
| | 1999 | 5 | 724 | 6,604 | 465 | 7,798 | 131 | 131 | | - |
| | 2000 | 5 | 808 | 7,292 | 555 | 8,660 | 202 | 202 | 602 | 602 |
| | 2001 | 15 | 732 | 7,831 | 269 | 8,847 | 438 | 438 | 516 | 516 |
| | 2002 | 11 | 1,164 | 7,185 | 240 | 8,600 | 438 | 438 | 215 | 215 |
| | 2003 | 4 | 1,198 | 6,434 | 182 | 7,818 | 380 | 380 | 237 | 237 |
| | 2004 | 4 | 1,062 | 6,900 | 263 | 8,229 | 410 | 410 | 268 | 268 |
| | 2005 | 3 | 956 | 6,647 | 530 | 8,136 | 403 | 403 | 234 | 234 |
| | 2006 | 5 | 796 | 7,687 | 590 | 9,078 | 465 | 465 | 328 | 328 |
| | 2007 | 2 | 829 | 8,123 | 492 | 9,446 | 453 | 453 | 172 | 172 |
| | 2008 | 3 | 648 | 6,187 | 524 | 7,362 | 794 | 794 | 242 | 242 |
| | 2009 | 3 | 682 | 6,006 | 489 | 7,180 | 993 | 993 | 394 | 394 |
| | 2010 | 8 | 494 | 5,398 | 342 | 6,242 | 662 | 662 | 222 | 222 |
| | 2011 | 2 | 193 | 4,019 | 245 | 4,459 | 962 | 962 | - | - |
| | 2012 | 8 | 371 | 4,026 | 351 | 4,756 | 856 | 856 | - | - |
| | 2013 | 13 | 290 | 4,230 | 459 | 4,992 | 1,071 | 1,071 | - | - |
| | 2014* | 13 | 290 | 5,407 | 459 | 6,169 | 829 | 829 | - | - |
| Discards | 2010 | | | | | | | | | |
| | 2011 | | | | | | | | | |

ISC15, July 15-20, 2015

Table 15-3. Continued.

| TWN | | | | | | TWN total | USA | | | | | | | | USA total | Species Grand Total |
|---------|------------------|---------|----------|--------|----------------|-----------|--------------------|---------|----------|----------|-------------------|-------|--------|----------------|-----------|---------------------------|
| Set-net | Gill-net (not | Harpoon | Longline | Others | Purse seine | | Drift gill- net | Harpoon | Handline | Longline | Pole-and- line | Troll | Others | Purse seine | | |
| | | | | | | | | | | | | | | | | 11,678 |
| | | | | | | | | | | | | | | | | 11,691 |
| | | | | | | | | | | | | | | | | 12,408 |
| | | | | | | | | | | | | | | | | 13,611 |
| | | | | | | | | | | | | | | | | 14,111 |
| | | | | | | | | | | | | | | | | 15,486 |
| | | | | | | | | | | | | | | | | 15,251 |
| | | | | | | | | | | | | | | | | 19,734 |
| | | | | | | | | | | | | | | | | 18,694 |
| | | | | | | | | | | | | | | | | 21,919 |
| | | | | | | | | | | | | | | | | 21,466 |
| | | | | | | | | | | | | | | | | 12,609 |
| | | | | | | | | | | | | | | | | 11,586 |
| | | | | | | | | | | | | | | | | 9,210 |
| | | | | | | | | | | | | | | | | 11,322 |
| | | | | | | | | | | | | | | | | 12,252 |
| | | | | | | | | | | | | | | | | 12,689 |
| | | | | | | | | | | | | | | | | 12,424 |
| | | | | | | | | | | | | | | | | 12,186 |
| | | | | | | | | | | | | | | | | 11,074 |
| | | | | | | | | | | | | | | | | 9,041 |
| | | | | | | | | | | | | | | | | 8,732 |
| | | | | | | | | | | | | | | | | 9,845 |
| | | | | | | | | | | | | | | | | 9,631 |
| | | | | | | | | | | | | | | | | 12,270 |
| | | | | | | | | | | | | | | | | 13,714 |
| | | | | | | | | | | | | | | | | 12,980 |
| | | | | | | | | | | | | | | | | 14,074 |
| | | | | | | | | | | | | | | | | 11,937 |
| | | | | | | | | | | | | | | | | 10,643 |
| | | | | | | | | | | | | | | | | 11,320 |
| | | | | | | | | | | | | | | | | 10,703 |
| | | | | | | | | | | | | | | | | 12,752 |
| | | | | | | | | | | | | | | | | 13,600 |
| | | | | | | | | | | | | | | | | 16,032 |
| | | | | | | | | | | | | | | | | 14,418 |
| | | | | | | | | | | | | | | | | 14,999 |
| | | | | | | | | | | | | | | | | 13,487 |
| | | | | | | | | | | | | | | | | 12,716 |
| | | | | | | | | | | | | | | | | 13,207 |
| | | | | | | | | | | | | | | | | 13,649 |
| | | | | | | | | | | | | | | | | 18,895 |
| | | | | | | | | | | | | | | | | 19,672 |
| | | | | | | | | | | | | | | | | 15,671 |
| | | | | | | | | | | | | | | | | 14,137 |
| | | | | | | | | | | | | | | | | 13,524 |
| | | | | | | | | | | | | | | | | 14,730 |
| | | | | | | | | | | | | | | | | 14,518 |
| | | | | | | | | | | | | | | | | 14,497 |
| | | | | | | | | | | | | | | | | 18,871 |
| | | | | | | | | | | | | | | | | 17,159 |
| | | | | | | | | | | | | | | | | 16,598 |
| | | | | | | | | | | | | | | | | 15,519 |
| | | | | | | | | | | | | | | | | 14,658 |
| | | | | | | | | | | | | | | | | 14,692 |
| | | | | | | | | | | | | | | | | 16,048 |
| | | | | | | | | | | | | | | | | 16,486 |
| | | | | | | | | | | | | | | | | 14,683 |
| | | | | | | | | | | | | | | | | 14,363 |
| | | | | | | | | | | | | | | | | 11,818 |
| | | | | | | | | | | | | | | | | 10,937 |
| | | | | | | | | | | | | | | | | 10,932 |
| | | | | | | | | | | | | | | | | 10,305 |
| | | | | | | | | | | | | | | | | 11,951 |
| | | | | | | | | | | | | | | | | 0 |
| | | | | | | | | | | | | | | | | 0 |

ISC15, July 15-20, 2015

Table 15-4. Annual catch of striped marlin (*Kajikia audax*) in metric tons for fisheries monitored by ISC for assessments of North Pacific Ocean stocks, 1951-2011 “0”; Fishing effort was reported but no catch. “+”; Bellow 499kg catch. “-”; Unreported catch or catch information not available. *: Data from the most recent years are provisional.

| Catch disposition | Year | JPN | | | | JPN total | KOR | | MEX | | TWN | | | | | TWN total | USA | | | | | Species Grand Total | | | |
|-------------------|------|---------|----------------|----------|--------|-----------|----------|-----------|-------|-----------|---------|----------------|---------|----------|--------|-----------|-------------|-----------|----------|-------|-------------|---------------------|--------|-----------|-------|
| | | Set-net | Drift gill-net | Longline | Others | | Longline | KOR total | Sport | MEX total | Set-net | Gill-net (not) | Harpoon | Longline | Others | | Purse seine | Han dline | Longline | Troll | Purse seine | | Sport | USA total | |
| Retained | 1951 | 92 | - | 2,494 | 1,861 | 4,447 | | | | | | | | | | | | | | | | | | 4,447 | |
| | 1952 | 203 | - | 2,901 | 2,083 | 5,187 | | | | | | | | | | | | | | | 23 | 23 | 5,210 | | |
| | 1953 | 126 | - | 2,138 | 876 | 3,140 | | | | | | | | | | | | | | | 5 | 5 | 3,145 | | |
| | 1954 | 82 | - | 3,068 | 1,057 | 4,207 | | | | | | | | | | | | | | | 16 | 16 | 4,223 | | |
| | 1955 | 106 | - | 3,082 | 960 | 4,148 | | | | | | | | | | | | | | | 5 | 5 | 4,153 | | |
| | 1956 | 133 | - | 3,729 | 1,922 | 5,784 | | | | | | | | | | | | | | | 34 | 34 | 5,818 | | |
| | 1957 | 71 | - | 3,189 | 2,507 | 5,767 | | | | | | | | | | | | | | | 42 | 42 | 5,809 | | |
| | 1958 | 82 | 3 | 4,106 | 3,108 | 7,299 | | | | | | | 543 | 387 | | 930 | | | | | 59 | 59 | 8,288 | | |
| | 1959 | 87 | 2 | 4,152 | 3,261 | 7,502 | | | | | | | 391 | 354 | | 745 | | | | | 65 | 65 | 8,312 | | |
| | 1960 | 161 | 4 | 3,862 | 1,877 | 5,904 | | | | | | | 398 | 350 | | 748 | | | | | 30 | 30 | 6,682 | | |
| | 1961 | 161 | 2 | 4,420 | 1,805 | 6,388 | | | | | | | 306 | 342 | | 648 | | | | | 24 | 24 | 7,060 | | |
| | 1962 | 197 | 8 | 5,739 | 1,825 | 7,769 | | | | | | | 332 | 211 | | 543 | | | | | 5 | 5 | 8,317 | | |
| | 1963 | 92 | 17 | 6,135 | 1,882 | 8,126 | | | | | | | 560 | 199 | | 759 | | | | | 68 | 68 | 8,953 | | |
| | 1964 | 81 | 2 | 14,304 | 2,305 | 16,692 | | | | | | | 392 | 175 | | 567 | | | | | 58 | 58 | 17,317 | | |
| | 1965 | 81 | 1 | 11,602 | 2,732 | 14,416 | | | | | | | 355 | 157 | | 512 | | | | | 23 | 23 | 14,951 | | |
| | 1966 | 226 | 2 | 8,419 | 1,456 | 10,103 | | | | | | | 370 | 180 | | 550 | | | | | 36 | 36 | 10,689 | | |
| | 1967 | 82 | 3 | 11,698 | 1,596 | 13,379 | | | | | | | 387 | 63 | | 591 | | | | | 49 | 49 | 14,019 | | |
| | 1968 | 71 | 0 | 15,913 | 1,202 | 17,186 | | | | | | | 40 | 134 | 333 | 541 | | | | | 51 | 51 | 17,778 | | |
| | 1969 | 71 | 3 | 9,144 | 2,600 | 11,818 | | | | | | | 5 | 159 | 573 | 28 | 765 | | | | 30 | 30 | 12,613 | | |
| | 1970 | 55 | 3 | 13,686 | 1,158 | 14,902 | | | | | | | 8 | 175 | 495 | 6 | 684 | | | | 18 | 18 | 15,604 | | |
| | 1971 | 61 | 10 | 11,632 | 2,240 | 13,943 | 0 | 0 | | | | | 16 | 101 | 449 | 18 | 584 | | | | 17 | 17 | 14,544 | | |
| | 1972 | 72 | 243 | 7,843 | 1,066 | 9,224 | 0 | 0 | | | | | 1 | 124 | 389 | 1 | 515 | | | | 21 | 21 | 9,760 | | |
| | 1973 | 80 | 3,265 | 6,989 | 740 | 11,074 | 0 | 0 | | | | | 4 | 115 | 569 | 20 | 708 | | | | 9 | 9 | 11,791 | | |
| | 1974 | 90 | 3,112 | 7,027 | 734 | 10,963 | 0 | 0 | | | | | 7 | 53 | 674 | 58 | 792 | | | | 55 | 55 | 11,810 | | |
| | 1975 | 105 | 6,534 | 5,567 | 619 | 12,825 | 0 | 0 | | | | | 7 | 86 | 796 | 3 | 892 | | | | 27 | 27 | 13,744 | | |
| | 1976 | 37 | 3,561 | 5,380 | 582 | 9,560 | 0 | 0 | | | | | 9 | 61 | 379 | 70 | 519 | | | | 31 | 31 | 10,110 | | |
| | 1977 | 103 | 4,424 | 3,275 | 459 | 8,261 | 0 | 0 | | | | | 9 | 207 | 541 | 3 | 760 | | | | 41 | 41 | 9,062 | | |
| | 1978 | 93 | 5,593 | 4,200 | 480 | 10,366 | 0 | 0 | | | | | 7 | 70 | 618 | 1 | 696 | | | | 37 | 37 | 11,099 | | |
| | 1979 | 66 | 2,532 | 5,927 | 481 | 9,006 | 0 | 0 | | | | | 2 | 18 | 104 | 458 | - | 582 | | | 36 | 36 | 9,624 | | |
| | 1980 | 80 | 3,467 | 6,985 | 461 | 10,993 | 73 | 73 | | | | | 39 | 92 | 284 | 1 | 416 | | | | 33 | 33 | 11,515 | | |
| | 1981 | 88 | 3,866 | 4,365 | 466 | 8,785 | 0 | 0 | | | | | 25 | 70 | 508 | - | 603 | | | | 60 | 60 | 9,448 | | |
| | 1982 | 52 | 2,351 | 5,653 | 617 | 8,673 | 102 | 102 | | | | | 26 | 112 | 404 | - | 542 | | | | 41 | 41 | 9,358 | | |
| | 1983 | 124 | 1,867 | 4,042 | 713 | 6,746 | 49 | 49 | | | | | 31 | 144 | 555 | 39 | 769 | | | | 39 | 39 | 7,663 | | |
| | 1984 | 144 | 2,333 | 3,892 | 584 | 6,953 | 39 | 39 | | | | | 16 | 314 | 965 | - | 1,295 | | | | 36 | 36 | 8,323 | | |
| | 1985 | 81 | 2,363 | 4,608 | 676 | 7,728 | 13 | 13 | | | | | 1 | 6 | 152 | 513 | 23 | 695 | | | 18 | 42 | 60 | 8,496 | |
| | 1986 | 131 | 3,584 | 7,303 | 479 | 11,497 | 14 | 14 | | | | | 13 | 119 | 179 | 16 | 327 | | | | 19 | 38 | 19 | 11,876 | |
| | 1987 | 102 | 1,888 | 8,725 | 417 | 11,132 | 15 | 15 | | | | | 2 | 132 | 414 | 16 | 565 | 1 | 272 | 29 | 28 | 330 | 12,042 | | |
| | 1988 | 63 | 2,211 | 7,023 | 612 | 9,909 | 16 | 16 | | | | | 7 | 12 | 70 | 464 | 80 | 633 | | | 54 | 30 | 588 | 11,146 | |
| | 1989 | 47 | 1,664 | 5,821 | 503 | 8,035 | 24 | 24 | | | | | 23 | 124 | 192 | 10 | 349 | + | 612 | 24 | 52 | 688 | 9,096 | | |
| | 1990 | 65 | 1,945 | 3,493 | 483 | 5,986 | 1 | 1 | | | | | 12 | 16 | 207 | 139 | 21 | 395 | + | 538 | 27 | 23 | 588 | 6,970 | |
| | 1991 | 56 | 1,329 | 4,042 | 454 | 5,881 | 7 | 7 | - | | | | 81 | 173 | 290 | 32 | 576 | + | 663 | 41 | 12 | 716 | 7,180 | | |
| | 1992 | 71 | 1,204 | 4,202 | 242 | 5,719 | 53 | 53 | - | | | | 11 | 163 | 220 | 24 | 418 | 1 | 459 | 37 | 25 | 522 | 6,712 | | |
| | 1993 | 27 | 828 | 5,199 | 682 | 6,736 | 568 | 568 | - | | | | 3 | 7 | 132 | 226 | - | 368 | 1 | 471 | 67 | 11 | 550 | 8,222 | |
| | 1994 | 73 | 1,443 | 4,195 | 311 | 6,022 | 556 | 556 | - | | | | 4 | 5 | 176 | 138 | 11 | 334 | + | 326 | 35 | 17 | 378 | 7,290 | |
| | 1995 | 58 | 970 | 5,334 | 228 | 6,590 | 307 | 307 | - | | | | 4 | 5 | 67 | 110 | 6 | 192 | + | 543 | 52 | 14 | 609 | 7,698 | |
| | 1996 | 39 | 703 | 3,787 | 117 | 4,466 | 429 | 429 | - | | | | 3 | 8 | 30 | 188 | 6 | 235 | 1 | 418 | 53 | 20 | 492 | 5,802 | |
| | 1997 | 34 | 813 | 3,520 | 132 | 4,499 | 1,017 | 1,017 | - | | | | 3 | 9 | 33 | 351 | - | 396 | 1 | 352 | 37 | 21 | 411 | 6,323 | |
| | 1998 | 34 | 1,092 | 3,759 | 272 | 5,157 | 635 | 635 | - | | | | 6 | 16 | 19 | 304 | - | 345 | + | 378 | 26 | 23 | 427 | 6,564 | |
| | 1999 | 28 | 1,126 | 3,159 | 160 | 4,473 | 433 | 433 | - | | | | 5 | 8 | 26 | 197 | - | 236 | 1 | 364 | 27 | 12 | 404 | 5,546 | |
| | 2000 | 41 | 1,062 | 2,261 | 264 | 3,628 | 536 | 536 | - | | | | 6 | 18 | 29 | 315 | 1 | 369 | | | 200 | 15 | 10 | 225 | 4,758 |
| | 2001 | 51 | 1,077 | 2,311 | 197 | 3,636 | 253 | 253 | - | | | | 5 | 16 | 30 | 250 | - | 301 | | | 351 | 44 | + | 395 | 4,585 |
| | 2002 | 80 | 1,264 | 1,560 | 215 | 3,119 | 187 | 187 | - | | | | 8 | 15 | 6 | 477 | - | 506 | + | | 226 | 30 | + | 256 | 4,068 |
| | 2003 | 41 | 1,064 | 1,855 | 165 | 3,125 | 205 | 205 | - | | | | 5 | 27 | 11 | 922 | + | 965 | + | | 538 | 29 | + | 567 | 4,862 |
| | 2004 | 23 | 1,339 | 1,699 | 69 | 3,130 | 75 | 75 | - | | | | 5 | 10 | 7 | 522 | 2 | 546 | 2 | | 376 | 31 | + | 409 | 4,160 |
| 2005 | 28 | 1,214 | 1,230 | 71 | 2,543 | 136 | 136 | - | | | | 9 | 9 | 5 | 783 | 9 | 815 | + | | 511 | 20 | + | 531 | 4,025 | |
| 2006 | 30 | 1,190 | 1,161 | 66 | 2,447 | 55 | 55 | - | | | | 2 | 30 | 117 | 74 | - | 888 | + | | 611 | 21 | + | 632 | 4,022 | |
| 2007 | 21 | 970 | 1,166 | 63 | 2,220 | 46 | 46 | - | | | | 2 | 29 | 141 | 301 | - | 471 | | | 276 | 13 | + | 289 | 3,026 | |
| 2008 | 26 | 1,302 | 999 | 81 | 2,408 | 29 | 29 | - | | | | 2 | 43 | 168 | 270 | 2 | 483 | | | 427 | 14 | | 441 | 3,361 | |
| 2009 | 17 | 821 | 788 | 94 | 1,720 | 22 | 22 | - | | | | 2 | 46 | 92 | 262 | - | 400 | | | 258 | 10 | | 268 | 2,410 | |
| 2010 | 20 | 913 | 1,019 | 104 | 2,056 | 18 | 18 | - | | | | 2 | 42 | 131 | 253 | 3 | 429 | | | 165 | 19 | | 184 | 2,687 | |
| 2011 | 30 | 347 | 1,251 | 113 | 1,741 | 48 | 48 | - | | | | 1 | 27 | 95 | 343 | 4 | 0 | 470 | | | 362 | 16 | | 378 | 2,637 |
| 2012 | 52 | 597 | 1,306 | 96 | 2,051 | 33 | 33 | - | | | | + | 34 | 114 | 443 | 1 | + | 592 | | | 282 | 11 | | 293 | 2,969 |
| 2013 | 39 | 336 | 1,450 | 86 | 1,911 | 65 | 65 | - | | | | + | 24 | 197 | 372 | - | + | 593 | | | 398 | 8 | | 406 | 2,975 |
| 2014 | 39 | 336 | 1,124 | 86 | 1,585 | 82 | 82 | - | | | | + | 24 | 197 | 139 | - | 1 | 361 | | | 426 | 12 | | 438 | 2,466 |
| Discards | 2010 | | | | | | | | | | | | | | | | | | | | 1 | | 1 | 1 | |
| | 2011 | | | | | | | | | | | | | | | | | | | | 0 | | 0 | 0 | |

ISC15, July 15-20, 2015

Table 15-5. Retained catches (metric tons, whole weight) of ISC members of blue marlin (*Makaira nigricans*) by fishery in the North Pacific Ocean, north of the equator. “0”; Fishing effort was reported but no catch. “+”; Bellow 499kg catch. “-”; Unreported catch or catch information not available. *: Data from the most recent years are provisional.

| Catch disposition | Year | JPN | | KOR | | TWN | | | | | | TWN total | USA | | | | | USA total | Species Grand Total |
|-------------------|-------|----------|-----------|----------|-----------|---------|--------------------------|---------|----------|--------|-------------|-----------|----------|----------|-------|--------|-------------|-----------|---------------------|
| | | Longline | JPN total | Longline | KOR total | Set-net | Gill-net (not specified) | Harpoon | Longline | Others | Purse seine | | Handline | Longline | Troll | Others | Purse seine | | |
| Retained | 1953 | | | | | | | | - | | - | | | | | | | - | |
| | 1954 | | | | | | | | - | | - | | | | | | | - | |
| | 1955 | | | | | | | | - | | - | | | | | | | - | |
| | 1956 | | | | | | | | - | | - | | | | | | | - | |
| | 1957 | | | | | | | | - | | - | | | | | | | - | |
| | 1958 | | | | | | | | 887 | | 887 | | | | | | | 887 | |
| | 1959 | | | | | | | | 781 | | 781 | | | | | | | 781 | |
| | 1960 | | | | | | | | 948 | | 948 | | | | | | | 948 | |
| | 1961 | | | | | | | | 703 | | 703 | | | | | | | 703 | |
| | 1962 | | | | | | | | 628 | | 628 | | | | | | | 628 | |
| | 1963 | | | | | | | | 691 | | 691 | | | | | | | 691 | |
| | 1964 | | | | | | | | 934 | | 934 | | | | | | | 934 | |
| | 1965 | | | | | | | | 1,016 | | 1,016 | | | | | | | 1,016 | |
| | 1966 | | | | | | | | 957 | | 957 | | | | | | | 957 | |
| | 1967 | | | | | | - | - | 317 | 898 | 167 | 1,382 | | | | | | 1,382 | |
| | 1968 | | | | | | - | 30 | 649 | 1,433 | 120 | 2,232 | | | | | | 2,232 | |
| | 1969 | | | | | | - | 58 | 465 | 1,232 | 103 | 1,858 | | | | | | 1,858 | |
| | 1970 | | | | | | 1 | 21 | 604 | 1,385 | 70 | 2,081 | | | | | | 2,081 | |
| | 1971 | 5,461 | 5,461 | 0 | 0 | - | 13 | 473 | 1,331 | 118 | | 1,935 | | | | | | 7,396 | |
| | 1972 | 6,772 | 6,772 | 0 | 0 | - | 14 | 490 | 1,205 | 50 | | 1,759 | | | | | | 8,531 | |
| | 1973 | 6,453 | 6,453 | 0 | 0 | - | 12 | 275 | 1,650 | 265 | | 2,202 | | | | | | 8,655 | |
| | 1974 | 6,545 | 6,545 | 0 | 0 | 1 | 6 | 355 | 2,144 | 146 | | 2,652 | | | | | | 9,197 | |
| | 1975 | 4,374 | 4,374 | 0 | 0 | - | 3 | 421 | 2,638 | 207 | | 3,269 | | | | | | 7,643 | |
| | 1976 | 5,018 | 5,018 | 0 | 0 | - | 9 | 511 | 1,315 | 162 | | 1,997 | | | | | | 7,015 | |
| | 1977 | 4,780 | 4,780 | 0 | 0 | - | 11 | 391 | 1,183 | 110 | | 1,695 | | | | | | 6,475 | |
| | 1978 | 5,900 | 5,900 | 0 | 0 | 1 | 15 | 364 | 1,633 | 7 | | 2,020 | | | | | | 7,920 | |
| | 1979 | 5,949 | 5,949 | 0 | 0 | 3 | 19 | 362 | 1,646 | 164 | | 2,194 | | | | | | 8,143 | |
| | 1980 | 5,613 | 5,613 | 155 | 155 | - | 35 | 444 | 1,185 | 170 | | 1,834 | | | | | | 7,602 | |
| | 1981 | 5,518 | 5,518 | 0 | 0 | - | 35 | 313 | 1,840 | 69 | | 2,257 | | | | | | 7,775 | |
| | 1982 | 6,051 | 6,051 | 351 | 351 | - | 7 | 306 | 2,139 | 120 | | 2,572 | | | | | | 8,974 | |
| | 1983 | 4,796 | 4,796 | 82 | 82 | - | 26 | 741 | 2,122 | 127 | | 3,016 | | | | | | 7,894 | |
| | 1984 | 6,248 | 6,248 | 155 | 155 | - | 22 | 960 | 1,789 | 111 | | 2,882 | | | | | | 9,285 | |
| | 1985 | 5,164 | 5,164 | 45 | 45 | 9 | 11 | 747 | 1,187 | 43 | | 1,997 | | | 145 | | 145 | 7,351 | |
| | 1986 | 5,922 | 5,922 | 86 | 86 | 4 | 90 | 839 | 1,723 | 107 | | 2,763 | | | 220 | | 220 | 8,991 | |
| | 1987 | 5,370 | 5,370 | 89 | 89 | 12 | 9 | 973 | 4,627 | 1 | | 5,622 | | 51 | 261 | | 312 | 11,393 | |
| | 1988 | 5,054 | 5,054 | 133 | 133 | 20 | 8 | 658 | 2,822 | 589 | | 4,097 | | 102 | 266 | | 368 | 9,652 | |
| | 1989 | 5,117 | 5,117 | 50 | 50 | 10 | 14 | 640 | 2,691 | 9 | | 3,364 | | 356 | 326 | | 682 | 9,213 | |
| | 1990 | 4,116 | 4,116 | 44 | 44 | 3 | 24 | 427 | 1,749 | 143 | | 2,346 | | 378 | 295 | | 673 | 7,179 | |
| | 1991 | 4,094 | 4,094 | 75 | 75 | 4 | 50 | 338 | 2,288 | 152 | | 2,832 | | 297 | 346 | | 643 | 7,644 | |
| | 1992 | 3,721 | 3,721 | 60 | 60 | 25 | 40 | 432 | 3,786 | 110 | | 4,393 | | 347 | 260 | | 607 | 8,781 | |
| | 1993 | 4,600 | 4,600 | 36 | 36 | 44 | 41 | 400 | 4,135 | 82 | | 4,702 | | 339 | 311 | | 650 | 9,988 | |
| | 1994 | 5,832 | 5,832 | 2 | 2 | 12 | 30 | 206 | 3,007 | 7 | | 3,262 | | 362 | 298 | | 660 | 9,756 | |
| 1995 | 5,907 | 5,907 | 0 | 0 | 15 | 36 | 895 | 3,896 | 5 | | 4,847 | | 570 | 315 | | 885 | 11,639 | | |
| 1996 | 3,260 | 3,260 | 10 | 10 | 13 | 35 | 270 | 3,337 | 10 | - | 3,665 | | 467 | 409 | | 876 | 7,811 | | |
| 1997 | 3,697 | 3,697 | 145 | 145 | 5 | 48 | 194 | 3,683 | - | - | 3,930 | | 487 | 378 | | 865 | 8,637 | | |
| 1998 | 3,438 | 3,438 | 335 | 335 | 8 | 59 | 91 | 3,624 | 1 | - | 3,783 | | 395 | 242 | | 637 | 8,193 | | |
| 1999 | 3,751 | 3,751 | 164 | 164 | 21 | 32 | 135 | 3,417 | - | - | 3,605 | | 357 | 293 | | 650 | 8,170 | | |
| 2000 | 3,606 | 3,606 | 96 | 96 | 24 | 40 | 186 | 4,131 | 2 | - | 4,383 | | 314 | 235 | | 549 | 8,634 | | |
| 2001 | 3,594 | 3,594 | 166 | 166 | 18 | 57 | 229 | 4,733 | - | - | 5,037 | | 399 | 291 | | 690 | 9,487 | | |
| 2002 | 2,976 | 2,976 | 152 | 152 | 13 | 63 | 32 | 4,448 | 6 | - | 4,562 | | 264 | 225 | 1 | 490 | 8,180 | | |
| 2003 | 2,836 | 2,836 | 158 | 158 | 20 | 107 | 52 | 7,685 | 4 | - | 7,868 | | 363 | 210 | | 573 | 11,435 | | |
| 2004 | 2,977 | 2,977 | 226 | 226 | 14 | 93 | 36 | 6,672 | 9 | - | 6,824 | | 283 | 188 | 5 | 476 | 10,503 | | |
| 2005 | 2,506 | 2,506 | 303 | 303 | 8 | 65 | 48 | 7,630 | 16 | - | 7,767 | | 337 | 187 | | 524 | 11,100 | | |
| 2006 | 2,414 | 2,414 | 217 | 217 | 12 | 15 | 30 | 5,729 | - | - | 5,786 | | 409 | 160 | | 569 | 8,986 | | |
| 2007 | 2,016 | 2,016 | 120 | 120 | 3 | 17 | 20 | 5,117 | - | - | 5,157 | | 1 | 262 | 127 | | 390 | 7,683 | |
| 2008 | 2,096 | 2,096 | 219 | 219 | 10 | 16 | 15 | 5,477 | 1 | - | 5,519 | | 1 | 349 | 198 | | 548 | 8,382 | |
| 2009 | 1,840 | 1,840 | 224 | 224 | 9 | 12 | 9 | 4,638 | 1 | - | 4,669 | | 1 | 360 | 15 | | 376 | 7,109 | |
| 2010 | 2,457 | 2,457 | 257 | 257 | 5 | 27 | 15 | 4,959 | 1 | - | 5,007 | | 2 | 306 | 148 | | 456 | 8,177 | |
| 2011 | 2,211 | 2,211 | 684 | 684 | 3 | 18 | 17 | 4,625 | 9 | 2 | 4,674 | | 2 | 373 | 199 | | 574 | 8,143 | |
| 2012 | 1,839 | 1,839 | 587 | 587 | 6 | 13 | 16 | 4,097 | - | 12 | 4,144 | | 2 | 298 | 141 | | 441 | 7,011 | |
| 2013 | 1,985 | 1,985 | 963 | 963 | 2 | 6 | 16 | 4,607 | - | 9 | 4,640 | | 3 | 406 | 137 | | 546 | 8,134 | |
| 2014* | 1,752 | 1,752 | 801 | 801 | 2 | 6 | 16 | 4,861 | - | 7 | 4,892 | | 4 | 535 | 159 | | 698 | 8,143 | |
| Discards | 2010 | | | | | | | | | | | | | | | | 1 | 1 | |
| | 2011 | | | | | | | | | | | | | | | | 6 | 6 | |
| | 2013 | | | | | | | | | 5 | 5 | | | | | | | 5 | |

ISC15, July 15-20, 2015

Table 15-6. Retained catches (metric tons, whole weight) of ISC members of blue sharks (*Prionace glauca*) by fishery in the North Pacific Ocean, north of the equator. “0”; Fishing effort was reported but no catch. “+”; Bellow 499kg catch. “-”; Unreported catch or catch information not available. *: Data from the most recent years are provisional.

| Catch disposition | Year | JPN | | KOR | | MEX | | TWN | | USA | | | | | Species Grand Total |
|-------------------|-------|----------|-----------|----------|-----------|--------|-----------|----------|-----------|----------------|----------|-------|--------|-----------|---------------------|
| | | Longline | JPN total | Longline | KOR total | Others | MEX total | Longline | TWN total | Drift gill-net | Longline | Troll | Others | USA total | |
| Retained | 1985 | | | | | | | | | + | | | 1 | 1 | 1 |
| | 1986 | | | | | | | | | 1 | | | 1 | 2 | 2 |
| | 1987 | | | | | | | | | 1 | | | 1 | 2 | 2 |
| | 1988 | | | | | | | | | + | | | 3 | 3 | 3 |
| | 1989 | | | | | | | | | | | | 6 | 6 | 6 |
| | 1990 | | | | | | | | | + | | | 20 | 20 | 20 |
| | 1991 | | | | | | | | | + | | | 1 | 1 | 1 |
| | 1992 | | | | | | | | | 1 | | | 1 | 2 | 2 |
| | 1993 | | | | | | | | | + | | | + | + | + |
| | 1994 | 20,062 | 20,062 | | | | | | | + | | | 12 | 12 | 20,074 |
| | 1995 | 18,427 | 18,427 | | | | | | | + | | | 5 | 5 | 18,432 |
| | 1996 | 21,251 | 21,251 | | | | | | | + | | | + | + | 21,251 |
| | 1997 | 26,105 | 26,105 | | | | | | | + | | | + | + | 26,105 |
| | 1998 | 23,988 | 23,988 | | | | | | | + | | | 1 | 1 | 23,989 |
| | 1999 | 26,541 | 26,541 | | | | | | | + | | | + | + | 26,541 |
| | 2000 | 27,511 | 27,511 | | | | | | | + | | | + | + | 27,511 |
| | 2001 | 28,126 | 28,126 | | | - | - | | | | | | + | + | 28,126 |
| | 2002 | 26,345 | 26,345 | | | - | - | | | | | | + | + | 26,345 |
| | 2003 | 26,278 | 26,278 | | | - | - | | | + | | | + | + | 26,278 |
| | 2004 | 22,470 | 22,470 | | | - | - | | | | | | + | + | 22,470 |
| | 2005 | 21,887 | 21,887 | | | - | - | | | | | | + | + | 21,887 |
| | 2006 | 19,063 | 19,063 | | | - | - | | | | | | + | + | 19,063 |
| | 2007 | 15,190 | 15,190 | | | 2,073 | 2,073 | | | 9 | 8 | | + | 17 | 17,280 |
| | 2008 | 21,773 | 21,773 | | | 3,530 | 3,530 | | | | 7 | | | 7 | 25,310 |
| | 2009 | 13,721 | 13,721 | | | 3,260 | 3,260 | 11,541 | 11,541 | 1 | 9 | | 1 | 11 | 28,533 |
| | 2010 | 13,084 | 13,084 | | | 3,700 | 3,700 | 7,670 | 7,670 | + | 7 | | 0 | 7 | 24,461 |
| | 2011 | 6,916 | 6,916 | | | 3,365 | 3,365 | 13,117 | 13,117 | | 13 | | 0 | 13 | 23,411 |
| | 2012 | 11,137 | 11,137 | | | 4,107 | 4,107 | 10,606 | 10,606 | | 16 | | 0 | 16 | 25,866 |
| | 2013 | 12,438 | 12,438 | 75 | 75 | 4,494 | 4,494 | 6,321 | 6,321 | | 1 | 0 | 0 | 1 | 23,329 |
| | 2014* | 11,037 | 11,037 | 100 | 100 | 5,513 | 5,513 | 8,150 | 8,150 | | 0 | | 0 | 0 | 24,800 |

1) Shark catch is all retained, and no discard data.

ISC15, July 15-20, 2015

Table 15-7. Retained catches (metric tons, whole weight) of ISC members of shortfin mako sharks (*Isurus oxyrinchus*) by fishery in the North Pacific Ocean, north of the equator. “0”; Fishing effort was reported but no catch. “+”; Bellow 499kg catch. “-”; Unreported catch or catch information not available. *: Data from the most recent years are provisional.

| Catch disposition | Year | KOR | | MEX | | TWN | | USA | | | | | Species Grand Total | |
|-------------------|------|----------|-----------|--------|-----------|----------|-----------|---------------|----------------|---------|-------|--------|---------------------|-----------|
| | | Longline | KOR total | Others | MEX total | Longline | TWN total | Gill-net (not | Drift gill-net | Harpoon | Troll | Others | | USA total |
| Retained | 1985 | | | 43 | 43 | | | | 129 | 1 | | 19 | 149 | 192 |
| | 1986 | | | 84 | 84 | | | | 250 | 1 | | 59 | 310 | 394 |
| | 1987 | | | 197 | 197 | | | | 208 | 3 | | 188 | 399 | 596 |
| | 1988 | | | 248 | 248 | | | | 106 | 3 | | 214 | 323 | 571 |
| | 1989 | | | 135 | 135 | | | | 117 | 1 | | 137 | 255 | 390 |
| | 1990 | | | 288 | 288 | | | | 229 | 3 | | 141 | 373 | 661 |
| | 1991 | | | 228 | 228 | | | | 125 | 1 | | 91 | 217 | 445 |
| | 1992 | | | 376 | 376 | | | | 118 | 3 | | 19 | 140 | 516 |
| | 1993 | | | 442 | 442 | | | | 87 | 1 | | 32 | 120 | 562 |
| | 1994 | | | 336 | 336 | | | | 80 | 1 | | 46 | 127 | 463 |
| | 1995 | | | 333 | 333 | | | | 79 | 1 | | 14 | 94 | 427 |
| | 1996 | | | 413 | 413 | | | | 85 | 1 | | 9 | 95 | 508 |
| | 1997 | | | 401 | 401 | | | | 118 | 3 | | 11 | 132 | 533 |
| | 1998 | | | 386 | 386 | | | | 85 | 1 | | 12 | 98 | 484 |
| | 1999 | | | 439 | 439 | | | | 52 | + | | 9 | 61 | 500 |
| | 2000 | | | 539 | 539 | | | | 64 | + | | 12 | 76 | 615 |
| | 2001 | | | 491 | 491 | | | | 30 | 1 | | 10 | 41 | 532 |
| | 2002 | | | 488 | 488 | | | | 69 | + | | 12 | 81 | 569 |
| | 2003 | | | 471 | 471 | | | | 57 | + | | 9 | 66 | 537 |
| | 2004 | | | 865 | 865 | | | | 38 | 1 | | 13 | 52 | 917 |
| | 2005 | | | 609 | 609 | | | | 25 | 1 | | 8 | 34 | 643 |
| | 2006 | | | 641 | 641 | | | | 38 | + | | 7 | 45 | 686 |
| | 2007 | | | 689 | 689 | | | | 37 | + | | 6 | 43 | 732 |
| | 2008 | - | - | 609 | 609 | | | | 27 | 1 | | 5 | 33 | 642 |
| | 2009 | - | - | 653 | 653 | 78 | 78 | 21 | | 1 | 0 | 7 | 29 | 760 |
| | 2010 | - | - | 760 | 760 | 54 | 54 | 10 | | 0 | | 10 | 20 | 834 |
| 2011 | - | - | 758 | 758 | 208 | 208 | 8 | | 0 | | 8 | 16 | 982 | |
| 2012 | - | - | 715 | 715 | 74 | 74 | 9 | | 0 | 0 | 11 | 20 | 809 | |
| 2013 | 8 | 8 | 711 | 711 | 107 | 107 | 16 | | 0 | | 12 | 28 | 854 | |
| 2014* | 8 | 8 | - | - | 119 | 119 | 5 | | 0 | | 9 | 14 | 141 | |

1) Shark catch is all retained, and no discard data.