



OPERATIONS MANUAL

(July 2022)

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OPERATIONS MANUAL FOR THE INTERNATIONAL SCIENTIFIC COMMITTEE FOR TUNA AND TUNA-LIKE SPECIES IN THE NORTH PACIFIC (ISC)

Introduction

<https://isc.fra.go.jp>

The ISC was established in 1995 through an intergovernmental agreement between the governments of Japan and the United States of America. This event was recorded with a press release (see p. 10). Since its establishment and first meeting in 1996, the ISC has undergone a number of changes to its charter and name and has adopted guidelines for its operations. This manual is a compilation of documents that established the ISC and that guide its operations. All documents are amended versions of the originals and reflect changes adopted (as of July 2010) by the members: Canada, China, Chinese-Taipei, Korea, Japan, Mexico, and the U.S.A. and the U.N. Food and Agricultural Organization (FAO), Inter-American Tropical Tuna Commission (IATTC), North Pacific Marine Science Organization (PICES), and the Secretariat for the Pacific Community (SPC).

The following is a chronology of events related to the documents in this manual:

- 1994 Governments of Japan and the United States officially agree to establish the **Interim Scientific Committee** for Tuna and Tuna-like Species in the North Pacific Ocean.
- 1995 (Jan) The agreement with “Guidelines” is announced and made available to the public. A Press Release is issued to mark the event.
- 1996 (May) First meeting of the ISC is held in Tokyo, Japan.
- 2002 (Jan) Guidelines are revised to expand membership and participation by “fishing entities,” allowing Chinese-Taipei full status as a member.
- 2004 (Feb) Rules and Procedures for Conduct of the Committee and Subsidiary Bodies are adopted along with rules for Data Reporting and Exchange Requirements (Data Protocol).
- 2005 (Mar) Name of the organization is changed to **International Scientific Committee** for Tuna and Tuna-Like Species in the North Pacific Ocean. The North Pacific Albacore Workshop (established in 1974) joins the ISC and is integrated as a Working Group.
- 2005 (Dec) A Memorandum of Understanding (MOU) to guide the relationship between the ISC and the Western-Central Pacific

Fisheries Commission is completed. Gary Sakagawa signing for the ISC and Glen Hurry, for the WCPFC.

- 2007 (Jul) Swordfish Working Group and Marlin Working Group merged into a new Billfish Working Group (BILLWG). Guidelines revised to allow for two categories of membership, voting and non-voting.
- 2010 (Jul) A Memorandum of Cooperation (MOC) to guide the relationship between the ISC and the Inter-American Tropical Tuna Commission (IATTC) is completed. Gary Sakagawa signing for the ISC and Guillermo Compean for IATTC.
- 2010 (Jul) The Operations Manual is updated with new Rules and Procedures for Species Working Group reports incorporated, the ISC-IATTC MOC, and other minor updates.
- 2010 (Jul) The Bycatch Working Group is disbanded and a new Shark Working Group established.
- 2016 (Feb) Memorandum of Cooperation (MOC) with IATTC revised and signed. Gerard DiNardo signing for ISC and Guillermo Compean for IATTC.
- 2022 (Jul) The Operations Manual is updated with a new function for the ISC and Rules and Procedures for that function and Observer participation, and other minor updates.

Map



International Scientific Committee for Tuna and Tuna-Like Species in the North Pacific

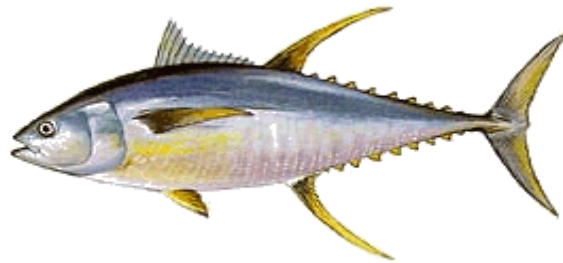
NAMES AND CODES OF COMMON HMS SPECIES OF THE NORTH PACIFIC OCEAN

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

Principal Species of interest to ISC
(pictures are not to scale)



Albacore Tuna (ALB)
Thunnus alalunga



Yellowfin Tuna (YFT)
Thunnus albacares



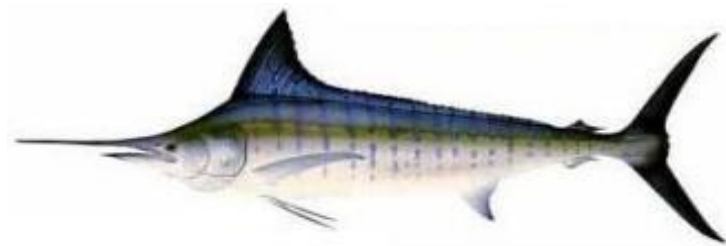
Bigeye Tuna (BET)
Thunnus obesus



Skipjack Tuna (SKJ)
Katsuwonus pelamis



Pacific Bluefin Tuna (PBF)
Thunnus orientalis



Striped Marlin (MLS)
Kajikia audax



Broadbill Swordfish (SWO)
Xiphias gladius



Blue Shark (BSH)
Prionace glauca



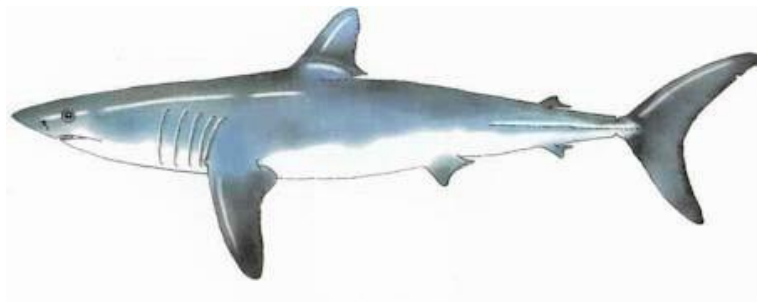
Common Thresher Shark (ALV)
Alopias vulpinus



Pelagic Thresher Shark (PTH)
Alopias pelagicus



Bigeye Thresher Shark (BTH)
Alopias superciliosus



Shortfin Mako Shark (SMA)
Isurus oxyrinchus

PRESS RELEASE

(January 1995)

The Government of the United States and the Government of Japan announced today the formation of an Interim Scientific Committee to study the tuna and tuna-like species of the North Pacific Ocean. They announced as well that all countries of the region, and states with vessels fishing in the region could participate as Members of the Committee. They indicated that the Committee would cooperate closely with relevant fisheries and scientific organizations, and other entities with vessels fishing in the region.

In forming the Committee, the Government of the United States and the Government of Japan noted the need to develop better information on stocks of tuna and tuna-like species in the North Pacific Ocean, in cooperation with relevant fisheries organizations, to enhance scientific knowledge throughout the entire migratory range of these species.

They described the purposes of the Committee to be:

- 1. To enhance scientific research and cooperation for conservation and rational utilization of the species of tuna and tuna-like fishes which inhabit the North Pacific Ocean during part or all of their life cycle; and,*
- 2. To establish the scientific groundwork, if at some point in the future, it is decided to create a multilateral regime for the conservation and rational utilization of these species in this region.*

It was announced that the Government of Japan intends to host the first meeting of the Committee in 1995, that working groups plan to be formed on specific matters, and that these working groups are expected to report to the second meeting of the Committee which would occur in 1997 in the United States.

In establishing the Committee, the Governments of the United States and Japan indicated that it was their intention that the procedures and functions of the Committee be kept as simple and informal as possible in order to facilitate the full exchange of scientific information. In this regard, they developed a short statement of purposes, procedures and functions to guide the Committee in its work.

GUIDELINES FOR THE INTERNATIONAL SCIENTIFIC COMMITTEE FOR TUNA AND TUNA-LIKE SPECIES IN THE NORTH PACIFIC OCEAN

(Amended at the third Plenary Meeting on January 29, 2002 and at the seventh Plenary Meeting, July 25-30, 2007)

A. PURPOSES

1. To enhance scientific research and cooperation for conservation and rational utilization of the species of tuna and tuna-like fishes which inhabit the North Pacific Ocean during a part or all of their life cycle:
2. To establish the scientific groundwork for the conservation and rational utilization of these species in this region.

B. MEMBERSHIP

1. Members:
 - a. Coastal states/fishing entities of the region;
 - b. States/fishing entities with vessels fishing for these species in the region.
2. Non-voting Members:
 - a. Relevant intergovernmental fishery organizations;
 - b. Relevant intergovernmental marine science organizations;

C. PROCEDURES

1. The Committee will be composed of representatives with suitable scientific and fisheries qualification from Members and Non-voting Members.
2. Observer Participants should participate in the Committee in a manner decided by the Members and Non-voting Members.
3. Other scientific and fisheries experts may be invited to participate in the work of the Committee by consensus of the Members.
4. The Committee is expected to meet during 1995 in Japan and thereafter annually or as otherwise as may be agreed.
5. The Committee may establish subsidiary bodies which may meet in the interim between Committee meetings with a view to reporting to the Committee.
6. In carrying out its functions, the Committee will take into account the work of other relevant technical and scientific organizations.
7. The Committee will establish by consensus further procedures for its activities.

D. FUNCTIONS

The Committee will:

1. Regularly assess and analyze fishery and other relevant information concerning the species covered;
2. Prepare a report on its findings or conclusions on the status of such species such as trends in population abundance of such species, developments in fisheries, and conservation information;
3. When requested and depending on resource availability, conduct decision-support and strategic analyses (e.g., Management Strategy Evaluation) and prepare reports on the outcomes or conclusions and trade-offs identified by these analyses;
4. Strive to adopt reports and findings by consensus of all Members and Non-voting Members; however, it is not necessary that consensus be achieved on all matters, and reports and findings may reflect options and differing views when a consensus has not been achieved;
5. Formulate proposals for conduct of and, to the extent possible, coordinate international and national programs of research addressing such species; and
6. Consider any other matters, as appropriate, at the request of one of the members.

RULES AND PROCEDURES FOR CONDUCT OF THE ISC AND SUBSIDIARY BODIES

(Adopted at the fourth Plenary Meeting on February 4, 2004; amended March 30, 2005 (fifth Plenary Meeting), July 25-30, 2007 (seventh Plenary Meeting), July 20-25, 2011 (eleventh Plenary Meeting), July 15-20, 2015 (fifteenth Plenary Meeting) and July 12-18, 2022 (twenty-second Plenary Meeting).

Background

The International Scientific Committee for Tuna and Tuna-like Species in the North Pacific Ocean (ISC) was established in 1995 for the purpose of enhancing scientific research and cooperation for conservation and rational utilization of tuna and tuna-like species (HMS) of the North Pacific Ocean, and to establish the scientific groundwork for the conservation and rational utilization of the HMS in the North Pacific Ocean.

The Committee

The Committee is made up of Members from coastal states and fishing entities of the region and coastal states and fishing entities with vessels fishing for HMS in the region, and Non-voting Members from relevant intergovernmental fishery and marine science organizations, recognized by all members. Its functions are to regularly assess and analyze fishery and other relevant information concerning the species covered; prepare reports of its findings or conclusions on the status of the species covered, including trends in population abundance, developments in fisheries, and conservation needs. It promotes research cooperation and collaboration among members by developing proposals for conduct of and, to the extent possible, coordinates international and national programs of research addressing the species covered. Furthermore, it uses the best available science and takes into account the work and findings of other relevant technical and scientific organizations in execution of its functions. English is the working language of the organization.

- C1. *Membership.*** The Committee consists of representatives with suitable scientific and fisheries qualifications. Current Members shall review the eligibility of prospective Members and Non-voting Members before admission. Each Member and Non-voting Member shall have the right to appoint one representative (Leader), an alternate, if desired, and to be accompanied by experts or advisors with suitable scientific and fisheries qualifications to participate on the Committee. The Leaders are the main source of contact for ISC communications.
- C2. *Chairperson.*** A Chairperson shall be elected by Members of the Committee. The Chairperson serves as the leader of the Committee and is responsible for advancing the objectives of the ISC in a cost-effective and efficient manner. Responsibilities include chairing meetings of the Committee and supervising the work of subsidiary bodies, organizing meetings of the Committee, ensuring that ISC assignments and

commitments are completed in a timely, efficient manner, and coordinates activities with the Chairpersons of subsidiary bodies. Additional duties with respect to preparations for Plenary meetings include: (1) distribute a draft meeting agenda 90 days in advance and soliciting comments, (2) coordinate arrangements, (3) ensure that reports of subsidiary bodies and results of assignments are available on a timely basis, (4) appoint and distribute a list of proposed invited experts for approval by Members in advance of the meeting (see C6), (5) appoint rapporteurs, and (6) perform other matters that are required for smooth preparation and functioning of a meeting. In conducting meetings, the Chairperson shall strive for consensus of all Members and Non-voting Members in Committee decisions, conclusions and findings.

- Nominees for Chairperson are from Members attending the meeting.
- The Chairperson is elected by secret ballot, one vote per Member and by majority vote of Members attending the meeting. The first round of an election will consist of each voting Member having the opportunity to submit one nominee's name on a secret ballot. If the same name appears on a majority of ballots submitted, that candidate shall be declared the elected Chairperson. If no majority of nominee appears on the ballots, the two nominees receiving the most votes would be the candidates for the second round. Members would vote for one of the candidates in the second round and the candidate receiving the majority of votes submitted shall be declared the elected Chairperson. If a tie vote results, a third round of voting between the two nominees shall be held in order to secure a candidate with majority votes.
- 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.

C3. Vice Chairperson. A Vice Chairperson shall be elected by Members of the Committee. In the absence of the Chairperson, the Vice Chairperson assumes all duties and responsibilities of the Chairperson.

- The runner-up candidate in the second or third round of the election for Chairperson shall be declared the elected Vice Chairperson. If only one nominee results from the first round of the election for Chairperson, the Chairperson election process shall be applied to elect a Vice Chairperson.
- The Vice Chairperson serves for a term of three years and is eligible for reelection for an additional three-year term.

- C4. *Observers.*** An Observer is a representative from relevant non-governmental organizations (NGO), including environmental organizations (eNGO) and fishing industry organizations, with an interest in scientific matters pertaining to the ISC. Observers will have access to all documents that are part of the Plenary meeting record, but documents from Observers will not be distributed at the ISC Plenary, associated workshops, or posted on the ISC websites. The ISC Chairperson will allocate time in the agenda at the end of each Plenary day for Observer technical questions and comments on ISC assessments and procedures. Written comments from Observers will be captured in the Plenary meeting report will be solicited by the ISC Chairperson. Observers should indicate their intention to attend the Plenary meeting to the ISC Chair no later than 30 days prior to the commencement of the meeting. This notification can be accomplished by registering on the Plenary meeting registration site.
- C5. *Reports.*** Reports of findings, decisions and conclusions are prepared by the Committee for the record and for distribution. The contents, amount of detail and requirement for clarity will be in accordance to guidelines established by the Committee. In adopting a report, the Committee strives for consensus of all Members and Non-voting Members; however, if reasonable efforts fail to reach a consensus, reports and findings may reflect opinions and the differing views. Most reports, findings and conclusions are considered confidential and should not be shared by ISC members or Observers until approved by the ISC Plenary and posting to the ISC website (see **W11** for the procedure on exceptions).
- C6. *Exchange of fisheries and biological data.*** Timely exchange of complete and accurate fisheries and biological data are primary obligations of participants of the ISC. Each Member and Non-voting Member of the Committee shall appoint a Data Correspondent, who shall be responsible for meeting all requirements for timely submission of complete and accurate data as specified by the Data Protocol of the ISC.
- C7. *Invited experts.*** Scientific and fisheries experts, who are neither Members nor Non-voting Members of the Committee, may be invited to participate in the deliberations or work of the Committee. Decision on inviting experts, nominated by Members, shall be made by consensus of Members of the Committee. The Chairperson will be responsible for preparing the list of nominees, nominated by Members no later than 90 days before the event, and immediately distribute to Members for approval. If no objections are received by 45 days of the event, the Chairperson shall issue invitations to approved nominees. The manner of invited experts' participation shall be decided by the Members. Invited experts are not eligible to vote on ISC matters.
- C8. *Subsidiary bodies.*** The Committee may establish subsidiary bodies, including Working Groups, which may meet in the interim between Committee meetings, or more frequently, and report to the Committee.
- C9. *Frequency of meetings.*** The Committee shall meet annually or more frequently if required and agreed to by the Members. The time and place of meetings shall be decided by the Members. The working language of all meetings will be English,

with formal interpretation into Japanese, as may be decided, for the plenary sessions of Committee meetings only.

- C10.** *Peer review of function.* Every five years, or more frequently as may be decided, the Committee shall organize a team of three recognized peers with no Committee affiliation, to review the function of the Committee and subsidiary bodies and to offer recommendations for improvement.
- C11.** *Requests from Other Organizations.* Formal requests for Science information and advice on stocks of highly migratory species in the north Pacific Ocean from Regional Fisheries Management Organizations should be documented in a letter to the Office of the Chair or meeting summary report of the requesting organization. The ISC Chair will interact with the requesting organization to clarify the language and other details of the request in a timely fashion.
- C12.** *Decision-Support and Strategic Analyses* – These kinds of analyses are secondary to the primary stock assessment mission of the ISC. When a formal request is made for the ISC to provide this kind of analysis and advice for HMS species of concern, the ISC Chair and the responsible Working Group Chair/Vice Chair will engage with the requestor to determine the achievability of the request based on capacity and other resources available to the ISC and jointly develop a draft *Terms of Reference* with the requestor. The *Terms of Reference* will identify the goals of the analysis, roles and responsibilities of the scientists, managers and stakeholders, timeline for completion, expected outcomes, the Working Group work plans, including scheduling of stock assessments, and importantly, the source of additional resources needed to complete the analysis. The *Terms of Reference* will be brought to the next Plenary meeting for discussion and approval by ISC Members. If the TOR are approved, then the Working Group is expected to provide a report on progress, challenges, and outcomes annually during Plenary Meetings.
- C13.** *Other procedures.* The Committee will establish by consensus other procedures as required for conduct of activities. They can be dissolved by consensus of Members.

Working Groups

In 1996, the ISC established three species Working Groups (Bigeye Tuna Working Group, Pacific Bluefin Tuna Working Group, and Swordfish Working Group) and a Statistics Working Group. A fourth species Working Group, the Marlin Working Group, was created in 1999. In 2004, the Bigeye Tuna Working Group was dissolved and a Bycatch Working Group was created. In 2005, the North Pacific Albacore Workshop was merged into the ISC and renamed the Albacore Working Group. In 2007, the Swordfish Working Group and the Marlin Working Group were merged into a Billfish Working Group. In 2010, the Bycatch Working Group was dissolved and a Shark Working Group was established.

These Working Groups are subsidiary bodies of the Committee and report to the Committee. Each provide a forum for cooperation/collaboration in research by Member and Non-voting Member scientists as well as for focused consideration of technical matters assigned by the Committee. The species Working Groups' primarily focus is on

understanding the dynamics and ecology of the HMS and associated-species populations in order to accurately assess stock condition and status. The Statistical Working Group focuses on collection, exchange and archiving of fishery, biological and other data needed for stock assessments and for monitoring fishery developments, statistics and bycatch. The work of these Working Groups is guided by multi-year work plans and demands by the Committee.

- W1. *Membership.*** Working Groups shall consist of scientists with appropriate credentials and experience. They are appointed by Members and Non-voting Members of the Committee.
- W2. *Chairperson.*** A Chairperson with appropriate expertise and knowledge is 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. The Chairperson 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.

- 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.

- W4. *Frequency of meetings.*** Time and place of Working Group meetings are decided in consultation with the Committee. In general, Working Groups meet between Committee meetings, or more frequently as needed to complete assignments and with a view to reporting findings and results to the Committee in a timely manner.
- W5. *Invited experts.*** Occasionally, a Working Group may have need for special expertise to assist in assignments or may receive requests for participation from experts. On such occasions, the Working Group Chairperson is responsible for following Rule C7 and consulting with the Committee Chairperson.

W6. *Format for species Working Group reports.* The focus of species Working Groups is largely to understand the population dynamics of the concerned species and to conduct stock assessments (benchmark and updates) using the best scientific information available. Sufficient understanding for conducting a stock assessment may not accumulate on a regular, predictable schedule for conducting a stock assessment on a regular basis. Species Working Group findings, therefore, may be progress reports for stretches of time before a "current" stock assessment is available. To maintain consistency among reports of species Working Groups, particularly for stock assessment reports, the following is a recommended outline for Working Group reports intended to provide sufficient data, information and explanation of analyses and analytical decisions of the Group's interpretation of findings (see W7 for more guidance). The following are examples of topics for typical Working Group reports:

- Introduction
- Review of Recent Fisheries (Description of recent developments and issues of fisheries.)
- Fishery Statistics (Presentation of fishing area by gear, time series of landings or catches, catch-effort or CPUE trends, size composition and other biological statistics, e.g., sex ratio and by-catch.)
- Review of Biological Studies (Research results from biological working papers and summary of comments by participants.)
- Stock Assessment Model, Parameter Estimates and Runs (Selections used in the stock assessment)
- Current Stock Status (Stock assessment findings, conclusions from comparison with typically used biological reference points, uncertainties and conservation considerations.)
- Special Assignments. (Additional research needs to address uncertainties and work plan for next assessment.)
- Research Recommendations and Updated Work Plan (Recommendations should be reported by category, statistics, biological studies and stock assessment and focused for advancing understanding of the resource, particularly for more accurate stock assessments.)
- Administrative Matters (A catch-all section for time and place for next meeting, acknowledgments, and discussion of other administrative matters.)

Findings, conclusions, and decisions of Working Groups are to be agreed by consensus; however, if reasonable efforts are made and fail to yield consensus, reports and findings may reflect opinions and the differing views and provide suggestions for resolving or a research plan that would resolve or clarify the different views might also be proposed.

W7. *Purpose and Goals of ISC Stock Assessments and Format of Assessment Reports:* Stock assessment science has two primary goals. The first is to provide scientific advice to resource managers on the current status and future trends in abundance and productivity of exploited marine resources. The second is to provide the technical

basis for establishing fishery management measures that achieve optimum yield from the fishery while avoiding overfishing and ecosystem harm.

To achieve these goals, stock assessments should be based on best available scientific information (BSIA) on (1) fishery catch, effort and operational characteristics, (2) fishery performance statistics (i.e., CPUE) and (3) biological parameters. The stock assessment model should be chosen based on complexity, resolution and quality of BSIA. Stock status determinations should be provided relative to common biological reference points. To assist resource managers with their decision making, stock projections and harvest policy analyses should be conducted.

The frequency and level of stock assessments (benchmark and update) will be determined by the Working Group for consideration by the Committee.

The following are guidelines for developing BSIA for ISC stock assessments and should be incorporated into all ISC stock assessments where possible:

For developing BSIA on fishery catch:

- Accurate Species Identification
- Spatiotemporal Estimates of Catch, Fishing Effort and Size or Age compositions by Fishing Fleet and Gear
- Characterization of Uncertainty in Catch Reporting Including Bycatch and Discards

For developing BSIA on fishery CPUE standardizations:

- Fishery Descriptions Including History of Fishery Development and Changes
- Describe Data Selection, CPUE Standardization Model, and CPUE Estimates
- Provide Model Diagnostics and Goodness of Model Fit Criteria Relative to Alternative Model Configurations
- Compare Nominal and Standardized CPUE
- Characterize Uncertainty in Estimates of Standardized CPUE

For Developing BSIA on fishery stock assessment:

- Description of Model Structure and Assumptions
- Document Statistical Formulation
- Provide Diagnostics of Model Fit to Data
- Describe Model Results Including Stock Status Relative to Biological Reference Points
- Characterize Uncertainty in Model Results Including Sensitivity Analyses for Key Parameters
- Provide Projections of Management Actions

W8. Format for Species Stock Assessment Reports:

Components of a structured ISC stock assessment document.

1. Executive Summary
2. Introduction
3. Background on Biology, Fisheries, and Previous Assessment
4. Data Used for Assessment (describe any of the following used)
 - Spatial Stratification
 - Temporal Stratification
 - Catch Data
 - Abundance Data, e.g. CPUE
 - Tagging Data
5. Assessment Model (describe any of the following available/used)
 1. Population Dynamics
 - Cohort Dynamics
 - Recruitment
 - Initial Population Size
 - Growth
 - Sexual Maturity and Fecundity
 - Natural Mortality
 - Stock-Recruitment Resilience
 - Movement
 2. Fishery Dynamics
 - Fishery Selectivity
 - Catchability for Abundance Indices
 - Tagging Dynamics
 3. Likelihood Components
 - Observation Error Model
 - Process Error Model
 4. Prior Distributions or Parameter Constraints
 - Model Parameters
 - Process Dynamics
 5. Model Results
 - Model Convergence Diagnostics
 - Fit of Model Predictions to Observed Data
 - Model Parameter Estimates
 - Biomass and Fishing Mortality Estimates
 - Biological Reference Points
 6. Stock Status Assessment Results Determination Relative to BRPs
6. Projections and Harvest Policy Analysis (include if developed for stock)

1. Kobe Status Plot
2. Retrospective Analysis
3. Harvest Projections
 1. Assumptions
 2. Fishery Performance Indicators
 1. Average Yield and Variability
 2. Probability of Overfishing and Overfished Status
 3. Probability of Exceeding Threshold and Target Biomass
4. Kobe II Strategy Matrix

Guidelines for the Executive Summary of a stock assessment conducted by the ISC.

1. Status of Stock Assessment results relative to BRPs
2. Management Conservation Advice
3. Three-Year Forecast Table
4. Landings and Status Table
 1. Landings by Fleet
 2. Spawning Biomass
 3. Recruitment
 4. Fishing Mortality
 5. Exploitation Rate
5. Stock Identification and Distribution
6. Catches
7. Data and Assessment
 - Biological Reference Points
 - Special Comments

W9. *Format for the Statistical Working Group report.* The main focus of the Statistical Working Group is to facilitate the collection of accurate fishery statistics, biological and other data in support of stock assessment research, and to coordinate timely exchange and reporting of those data. As such, Data Correspondents should serve on this Working Group. Examples of topics to be reviewed and reported on by the Statistics Working Group:

- Review of Data Requirements for Stock Assessment and Fishery Monitoring
- Review of Data Collected and performances by Participants
- Updating of Data Inventory and Depository
- Review of Data Reporting Protocol (reporting schedule, data access and availability, data correspondence)
- Conclusions, Recommendations and Updated Work Plan
- Administrative Matters

W10. *Style Guidelines for Working Group Reports*

A. Report Preparation

Page 1 of each report should include **Annex number** (to be provided by Chairman), **working group name, date and location** of the meeting. **Text** must be typed single-spaced in 12 point Times New Roman font throughout. All reports should have the Working Group abbreviation on the top right of each page. These are as follows: Albacore Working Group (ALBWG), Billfish Working Group (BILLWG), Pacific Bluefin Tuna Working Group (PBFWG), Shark Working Group (SHARKWG), and Statistics Working Group (STATWG).

B. Content

The entire text should be well written and free of grammar errors, therefore someone whose primary language is English should contribute to reviewing and editing the report before it is submitted to the Chairman. A brief **INTRODUCTION** should include which working group met and when, the objectives of the meeting, and participating members (countries). The remainder of the Report sections will depend on the agenda but each report should include the following, if available:

- WG schedule - Date and place of future meetings.
- Work plan including names of responsible parties.
- Adjournment
- References
- Attachment 1: List of Participants with contact information.
- Attachment ? : List of Working Papers with contact information.
- Attachment ? : Agenda
- Attachment ? : Report (special session or analysis conducted at meeting)

Headings within each section must be short, reflect a logical sequence, and follow the rules of multiple subdivision (i.e. there should be no subdivision without at least two items). **Each section with a Discussion should include issues raised by the paper(s), arguments and conclusion.**

Working Papers: If working papers are presented, the title, author and WG paper number should be listed in the WG report. If the document will be made available on the ISC website, include only conclusions and elements referenced in the **Discussion**. Otherwise, a summary of the document should appear before the Discussion. In addition, the title and authors name(s) should appear in the List of Working Papers along with authors' contact information for acquiring the document, if appropriate. Working papers should be numbered systematically and include the WG abbreviation, e.g. ISC/08/BILLWG-1/01.

C. General

Spell out all acronyms and abbreviations the first time they are mentioned. The scientific names of species must be written out the first time they are mentioned; subsequent mention of scientific names may be abbreviated. Dates should be written as follows: 11 November 2008. Measurements should be expressed in metric units, e.g., metric tons as (t); if other units of measurement are used, please make this fact explicit. Write out

numbers zero through nine unless measurements (e.g., nine fish vs. 9mm). Because WG reports are considered drafts until accepted by the ISC at the annual meeting, include a **DRAFT watermark** on all reports.

D. Tables and Figures

- Cite in numerical order in the text.
- Each should have a caption that clearly explains the content and allows table or figure to be intelligible on its own.
- All axes should be labeled.
- Capitalize the first letter of the first word in the axes labels.
- Zeros should precede all decimal points for values less than one.
- Sample size, *n*, should be italicized.
- Do not use overly large font sizes in figures.
- Use Times New Roman 12 point font in tables.
- Maps should have a North arrow and/or latitude-longitude lines.
- Indicate direction (east-west, north-south) of degrees longitude and latitude on maps (e.g. 170°E)
- Table headings should be short.
- Explain all unusual symbols in the captions.

E. Timeline

After a WG Workshop or major meeting, the Working Group should concentrate on cleaning-up its report in order to provide a clean report to the ISC Chairman within four (4) weeks after the Workshop. If the Workshop ends less than four weeks before the start of the ISC annual Plenary meeting, a clean Workshop report needs to be provided no later than two (2) days before the start of the Plenary meeting. The Working Group and the ISC Chairman will work with an editor to revise each report to ensure that the writing is grammatically correct and understandable to outside audiences.

W11. Exceptions to Sharing Results/Conclusions Prior to ISC Plenary Approval — In order to address a delay of about one year between ISC Plenary approval of stock status advice and conservation information by the ISC and its entry into the IATTC management decision-making cycle, the following procedure should be followed. The Chair/Vice Chair of Working Groups that complete a stock assessment and wish to provide stock assessment results and science advice to the IATTC SAC meeting forward the Executive Summary (see **W8** for guidance) of their assessment as a stand-alone document to the ISC Chair for review no later than one (1) month prior to the SAC meeting. The ISC Chair will forward the draft Executive Summary to the Heads of Delegation and will provide comments back to the Working Chair/Vice Chair as soon as possible. Once the ISC Chair and the WG Chair/Vice Chair agree on the revised text, the ISC Chair will provide approval and the Executive Summary will be forwarded to the IATTC. This approval will be given no later than two weeks prior to the meeting to allow time for posting. Only the Executive Summary will be forwarded and it will be clearly marked as “Draft, Subject to Change by the ISC Plenary” in the header on

each page. This procedure will be followed for both update and benchmark stock assessments presented to the SAC Meeting.

There may be other occasions when this procedure needs to be followed. These occasions will be evaluated on a case-by-case basis at the discretion of the ISC Chairperson.

Steering Group

The Steering Group is an ad hoc body consisting of the ISC Chairperson and Vice Chairperson, Chairpersons of the Working Groups and one to three experienced Committee scientists invited to serve by the ISC Chairperson. This Group is responsible for assisting the ISC Chairperson in planning, organizing and coordinating activities and meetings of the Committee and for providing advice to the ISC Chairperson on administrative matters that arise during the intercession period.

Data Protocol -- Data Reporting and Exchange Requirements

The ISC's minimum fishery data reporting and exchange requirements for its members are similar to those of other highly migratory species RFMOs and are designed for advancing the ISC objectives of fishery monitoring and resource assessment. The Committee, however, recognizes that members have the capability and the appreciation for collecting and maintaining a much broader suite and finer detail of data than required. Members are encouraged to continue and expand their efforts in this regard and to regularly review the adequacy of their data collection requirements. Members are also encouraged to archive their holdings in electronic files for easy access. This latter point is important because ISC stock assessments and other analyses frequently require input of detailed data or results from analyses of detailed data that must undergo efficient scrutiny by ISC working groups. Furthermore, the ISC may decide in the future to require Members to submit the detailed fishery data for the ISC database.

Data Reporting and Exchange

The minimum data members are required to report to and exchange with ISC fall into three categories:

- Category I: total annual catch (round weight by species) and total annual fishing effort (active vessels by fishery);
- Category II: catch-effort (summary of logbook data);
- Category III: biological data, (size composition, length or weight frequencies, sex information).

CATEGORY I (Total annual catch and total annual fishing effort):

Total annual (calendar year) catch (including bycatch species) in metric tons (round weight) should be reported by gear, species and country for fisheries in the North Pacific Ocean (north of the equator). When established, data should be reported by subarea. If round weight is estimated from processed weight, the conversion procedure is to be noted. If other conversion methods are used, they should be reported. For some bycatch species when tonnage is unavailable or difficult to estimate, number of animals may be reported.

Total nominal effort in numbers of active vessels fishing should be reported by fishery, gear and vessel size category for fisheries in the North Pacific Ocean. As with catch, effort should be reported by subarea of the North Pacific Ocean. However, if effort cannot be reported by subarea or even for the North Pacific Ocean as a whole, effort should be reported for the smallest area available and the size of area noted. Vessel size categories to be used in reporting effort are:

<u>Vessel/Gear</u>	<u>Vessel Category</u>
Longline	1. Distant-water and 2. offshore (e.g., Chinese Taipei) 1. Distant-water, 2. offshore, and 3. coastal (e.g., Japan)
Purse seine	1. large (>260 m ³ carrying capacity; >~300 mt 2. small (<260 m ³ carrying capacity; <~300 mt 1. distant-water, and 2. offshore (e.g., Japan)
Harpoon Troll, gill net, etc.	aggregated by type of gear

CATEGORY II (Catch-effort):

Catch and effort (from logbooks) data should be reported by country, gear, and month. For each fleet, the unit of effort, and temporal and spatial resolution, that are required are as follows:

<u>Gear</u>	<u>By</u> <u>Month</u> <u>and area</u>	<u>Catch</u>	<u>Effort</u>	<u>Region</u>
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Longline	5x5 deg.	.no. or wt.	hooks (directed at all species)	entire Pacific
Purse seine	1x1 deg.*	wt.	days fishing (include searching)	entire Pacific
Troll	1x1 deg.	no.	days fishing (include searching)	North Pacific
Gill net	1x1 deg.	no.	tans or net-days	North Pacific
Harpoon	1x1 deg.	no.	days fishing	North Pacific
Handline	1x1 deg.	no.	Number of lines	North Pacific
Pole-and- line	1x1 deg.	no.	Number of poles/successful days	North Pacific
Other	1x1 deg.	no.	or wt. as needed	North Pacific

*5x5 degree data if 1x1 degree data are not practicable

CATEGORY III (Biological data):

Size composition (length or weight frequencies) and sex data (for swordfish, striped and blue marlins) should be reported for the same strata as required for Category II data. However, coarser spatial and temporal resolution may be substituted if the finer resolution cannot be applied. Reporting of length-frequencies should be with intervals (bins) of 1 or 2 cm. Standard measurements are round weight for individual fish weighed fork length for tuna and shark and eye-fork length for billfish. If standard measurements are not used, actual sampling measurement units should be reported.

All size composition data should include notes on collection method, e.g. port sampled, observer sampled, fisherman sampled, etc. Accuracy of measurement should also be reported (e.g. to the nearest cm, next larger cm, nearest kg, etc.).

Data Access and Availability

Data provided for use and held by the ISC in whatever form remains the property of the individual contributors¹. Release of these data to the general public is governed by the policies of the contributor.

Data in ISC databases that do not contain proprietary information should be made available to the general public in summary form. For example, Category I data or in aggregated form for the entire North Pacific will be considered public domain (PD) data and can be released to the public.

Category II and Category III data contain proprietary information and therefore, shall be made available to contributors and members of ISC working groups for use in the work of the Working Groups only. They are not to be retained or shared with non-members of the Working Groups.

Japan will be responsible for managing the central data depository and will designate a Data Administrator for implementing the ISC data access and availability guidelines. When a request for non-PD data is received from a member of the general public or an unauthorized person, the Data Administrator will obtain approval and conditions for release from the contributors of the specific data requested prior to release. A record of all requests received from the general public and the disposition of the request will be maintained and made available at each meeting of the ISC Plenary.

Requests for non-PD data by contributors for purposes other than ISC activities will be handled by the Data Administrator, following the same procedures delineated in the previous paragraph.

Besides the Data Administrator's role in maintaining proprietary data, each species Working Group may designate a data manager to assist in collecting and maintaining

¹ As used here and throughout this report, "Contributors" are all ISC participants who have provided data to ISC for inclusion in its database.

detailed data from Working Group participants and making these data available to Working Group member's for special studies. The ISC rules for handling of these data will apply, (i.e., ownership rights, assess for specific purposes only, and honoring security procedures.)

While there is consensus among all contributors regarding the data access rules outlined above, there is concern that these rules may be changed at some point in the future without the consent of all contributors. It was recommended that the rules not be changed without consensus of all contributors.

Data Reporting Schedule

Data correspondents will submit Category I, Category II, and Category III data to the ISC annually on or **before June 1st and metadata are due by July 1st**. Data are to be submitted electronically to the Data Administrator. Further updates submitted to Working Groups will be on as-needed bases; Working Group Data Managers will notify the DA to expect these changes with the next July 1st submission. These annual data submissions will have two components:

- (1) preliminary estimates of all available statistics from the previous year (Category I, Category II and Category III); and
- (2) all available updates of Category I, Category II, and Category III data from all earlier years.

Category II, longline fisheries contain catches of many species and each species is of interest to a different species Working Group. Standardization and validation of the data, especially fishing effort, should be performed once rather than by each species Working Group independently. The STATWG will coordinate this task with involvement of experts from the species Working Groups.

RESPONSIBILITIES OF THE ISC DATABASE ADMINISTRATOR

(July 2010)

The ISC Database Administrator (DA) is a full-time position identified within the ISC organization and residing in the Office of the Chair (OoC). The DA is responsible for managing all data and information needs for the smooth functioning of the ISC technical Working Groups (WGs) and the OoC. Because the OoC may be located in a different location as the duty station of the DA, the position and responsibilities have been modified to correspond to existing circumstances and requirements. The position is currently part-time and supervised by the Japan Fisheries Research and Education Agency, Fisheries Resources Institute, Yokohama,, Japan.

Before 2007, the DA was responsible for maintaining, exchanging and making available summarized information to researchers from fishery data (ISC Categories I through III) that are collected and submitted by ISC members. This role was modified in 2007 because it duplicates the role performed by the IATTC and WCPFC of maintaining and exchanging similar fishery data from their sources and making the data available to the public. Furthermore, the stock assessment work of the ISC typically requires more detailed and possibly confidential data than the summarized data designated as public domain data. The ISC, therefore, revised the responsibilities of the DA to focus on the objectives of managing a database for archiving documents and information used or produced by ISC, supporting a WG portal system and maintaining selective fishery statistics for monitoring the fisheries and for use in ISC general purpose reports. To achieve these objectives, the responsibilities of the DA include:

1. Receive and manage end-products produced by the ISC WGs , such as catch tables, geographic maps showing locations of fisheries by types of data collected, and reports,
2. Receive and manage catch data for all HMS of interest to ISC from the North Pacific Ocean, including species not covered by the WGs. This may require research of Pacific HMS catch statistics from non-member sources in order to produce a full picture of total North Pacific HMS catches from all sources.
3. Provide support for preparing summary tables and figures of fishery data for use on the ISC website and for use by the WGs.

Archive end-products from Working Groups.

The WGs will each have access to an ISC computer portal (i.e., access to a part of the central database containing detailed data generated by each WG) for maintaining data and information files for its members only. For example, a WG would maintain a portal (or portion of the central database), containing detailed fishery data, metadata; catch-at-age matrices, specifications for stock assessment runs, etc. The portal could be used to archive proprietary working and reference papers used by the WG.

The WGs annually submit Category I data (including updates to previous years' data) to the DA. WGs also submit summarized data for geographic maps, size frequency distributions and other information as may be required for the web site. After each WG meeting, the WG submits for archiving the final meeting report and all working papers used in the meeting to the DA for archiving.

Monitor total HMS catch and bycatch from the North Pacific Ocean HMS Fisheries

The DA will collect and maintain catch statistics on all HMS of concern to the ISC and catch statistics on key non-HMS species that interact with the fisheries. For HMS catches, the statistics will be used to monitor the overall production of HMS from the North Pacific Ocean. For key non-HMS catches (e.g., turtles and seabirds), the statistics will be used to monitor levels of fishery interactions with these species.

ISC Members will annually submit catch statistics for all HMS caught in the North Pacific Ocean and catch statistics for key non-HMS species that are caught in HMS fishing operations to the DA. The DA will obtain additional HMS catch statistics from non-member sources through professional contacts and from research of available sources. This activity is to ensure accurate, "best available" estimation of total annual HMS catches in the North Pacific Ocean by the DA.

The DA will also collect from ISC Members and archive metadata to ensure that descriptions of the catch statistics and others required, such as information on how the data were collected, the quality of the data and how the data were manipulated for submission to the ISC are maintained.

Manage a portal system

The DA will manage the portals created for the WGs. The DA will provide instructions for authorized access by the WG Data Managers and Chairs and will assist the WG Data Managers as needed.

RESPONSIBILITIES OF THE WEBMASTER

The ISC Webmaster (WM) is a position identified within the ISC Office of the Chairperson (OoC) with responsibilities for coordinating all aspects of the ISC website including maintaining the site and all data portals in a flexible and agile manner so that website content is easily created, posted, and maintained by content contributors, ensuring that information can be quickly searched and navigated, and that the pages have a graphically pleasing and coordinated design. Because of funding and the ISC objective of sharing of responsibilities and costs among members, this position is currently supervised by the Japan Fisheries Research and Education Agency, Fisheries Resources Institute, Yokohama, Japan.

Web site Contents.

In 2009, a revised ISC webpage was completed by a professional vendor and made available for maintenance and expansion of contents by the WM. The WM's responsibilities for expansion of contents involve: (1) providing advice and support for all content contributors to develop their respective web content sections based on best practices and ISC guidelines; (2) using relevant software tools to raise the level of development and quality of relevant and meaningful contents; (3) developing and maintaining user documentation that clearly defines requirements and standards as needed for the WM and contributors.

Web Site Maintenance

The WM's responsibilities for maintenance are guided by a Content Management System (CMS) which specifies the WM as the CMS administrator who: (1) creates user accounts, and supervises roles, permissions, and work flows; (2) ensures required software is installed correctly and updates as needed; (3) manages CMS capabilities including content expiration dates, menu structures, calendar/upcoming events, content privatization, system performance and optimization; (4) enables new and modified CMS features as required; (5) maintains the ISC's web site integrity by periodic review for valid links and timely content; (6) review broken link reports and provide user with information to ensure corrections; (7) reviews web site analytics and reports on usage trends for user trends and for service improvements; (8) assists working groups, data correspondents, the DA and the ISC Chair in the development of data access applications.

Collaboration with Stakeholders

The WM is required to work with the OoC, working groups, data correspondents the Data Administrator, and the ISC leaders, in a synergistic fashion to ensure that the web site is meeting requirements of the ISC and the delivery is accurate, professionally done and on time. He/she is required to communicate with these stakeholders when: (1) executing updates and expanding aspects of the website such as media galleries, reports and working documents, graphs, fishery data, maps, etc.; (2) reviewing web pages for inefficient technical or manual processes and procedures and before implementing improvements; (3) every five years, performing system analysis and design evaluation to gather and document web site design specifications and requirements for upgrading.

DELEGATION REPORTS GUIDELINES

Report on Fishery Monitoring and Research.

Each ISC voting member prepares and submits an annual report on its activities for the past year in fishery monitoring and research on North Pacific highly migratory species (HMS). Reporting on fishery monitoring should include a brief description of principal North Pacific HMS fisheries that were monitored and any new developments that might have affected the operations and catch of the fisheries. Fisheries data collected (e.g., logbooks, landings, number of fishing vessels, size composition of catches,

biological samples, etc.) should be noted, including a description of how they were collected (e.g., observers, port sampling, research vessel, etc.). The data should be summarized, e.g., annual catch (in tonnes) by species and gear, number of vessels by gear and size category, and average size of fish caught by species and fishery for the entire North Pacific Ocean, north of the equator. Catches of HMS species caught by all monitored fisheries, for the most recent year and back ten years or since the start of the fishery, are to be reported in a table by species, gear and year. Of particular interest for ISC stock assessments are catches of Pacific bluefin tuna, *Thunnus orientalis*, swordfish, *Xiphias gladius*, albacore, *T. alalunga*, striped marlin, *Tetrapturus audax*, and blue marlin, *Makaira nigricans*, and for general fisheries performance, catches of yellowfin tuna, *T. albacares*, bigeye tuna, *T. obesus*, and skipjack tuna, *Katsuwonus pelamis*. Catches of bycatch species should also be reported, particularly black marlin, *M. indica*, sailfish, *Istiophorus platypterus*, shortbill spearfish, *Tetrapterus angustirostris*, blue shark, *Prionace glauca*, pelagic thresher shark, *Alopias pelagicus*, bigeye thresher shark, *A. supervillosus*, shortfin mako shark, *Isurus oxyrinchus*, sea turtles and sea birds.

For reporting on research activities, a brief summary of activities undertaken during the past year and their results should be provided. Of particular interest are activities and results that contribute to improving the collection of fishery statistics (e.g., coverage rate and size composition sampling), improving understanding of biological parameters, or discoveries of fish behavior, migration and stock assessment methods.

Report deadline: National Reports due annually to the ISC Chairperson by June 1.

**MEMORANDUM OF UNDERSTANDING BETWEEN
THE COMMISSION FOR THE CONSERVATION AND MANAGEMENT OF HIGHLY
MIGRATORY FISH STOCKS IN THE WESTERN AND CENTRAL PACIFIC OCEAN
AND
THE INTERNATIONAL SCIENTIFIC COMMITTEE FOR TUNA AND TUNA-LIKE
SPECIES
IN THE NORTH PACIFIC OCEAN**

Recognizing that, *inter alia*, the Commission for the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean (hereinafter referred to as “the WCPF Commission”):

- Adopts measures to ensure long-term sustainability of highly migratory fish stocks in the Convention Area and promote the objective of their optimum utilization;
- Ensures that such measures are based on the best scientific evidence available and are designed to maintain or restore stocks at levels capable of producing maximum sustainable yield, as qualified by relevant environmental and economic factors, including the special requirements of developing States in the Convention Area, particularly small island developing States, and taking into account fishing patterns, the interdependence of stocks and any generally recommended international minimum standards, whether sub regional, regional, or global;
- Assesses the impacts of fishing, other human activities and environmental factors on target stocks, non-target species, and species belonging to the same ecosystem or dependent upon or associated with the target stocks;
- Collects and shares, in a timely manner, complete and accurate data concerning fishing activities on, *inter alia*, vessel position, catch of target and non-target species and fishing effort, as well as information from national and international research programs;
- Establishes a committee, which shall be called the Northern Committee, to make recommendations on the implementation of such conservation and management measures as may be adopted by the Commission for the area north of the 20 parallel of north latitude and on the formulation of such measures in respect of stocks which occur mostly in this area;
- Enters into administrative and financial arrangements as required to utilize scientific services for the purpose of providing information and advice on the fishery resources covered by its Convention and related matters that may be relevant to the conservation and management of those resources and, in order to carry out its functions in a cost-effective manner, shall, to the greatest extent possible, utilize the services of existing regional organizations and shall consult, as appropriate, with any other fisheries management, technical or scientific organization with expertise in matters related to the work of the Commission; and
- Establishes a committee (the Scientific Committee) to ensure that the Commission obtains for its consideration the best scientific information available through review of research results, encouraging and promoting cooperation in scientific research and assessing status of target or non-target stocks of interest.

Recognizing that the International Scientific Committee for Tuna and Tuna-like Species in the North Pacific (hereinafter referred to as “the ISC”):

- Enhances scientific research and cooperation for conservation and rational utilization of the species of tuna and tuna-like fishes which inhabit the North Pacific Ocean during a part or all of their life cycle;
- Creates the scientific groundwork, if at some point in the future, it is decided to create a multilateral regime for the conservation and rational utilization of these species in this region;
- Establishes a central database to support the scientific research of the ISC and continues to consider establishing a permanent Secretariat;
- Establishes subsidiary Working Groups to perform the significant scientific work of the ISC.

The Commission of the WCPFC and the ISC, the participants to this Memorandum of Understanding (“MOU”), have therefore reached the following understanding.

Part I: Provision of Scientific Advice

- The Northern Committee may request from the ISC scientific information and advice regarding fish stocks (generally those stocks occurring mostly north of the 20° parallel of north latitude; see Annex 1) for response prior to each meeting of the Northern Committee. This formal request will be transmitted expeditiously to the ISC. The Commission will, if requested, provide data necessary for the scientific analysis to be conducted by the ISC.
- The ISC will provide requested scientific information and advice in accordance with this MOU one (1) month before the annual meetings of the Northern Committee. ISC will also provide the requested scientific information and advice to the Commission and the Scientific Committee. This scientific information and advice will follow the standard presented in Annex 2 for standard (recurring) requests or as mutually agreed upon for special requests (see also Part III below).
- The ISC will provide its normal Committees and Working Group reports, prepared under the Rules and Procedures for the Conduct of the ISC Committee and Subsidiary Bodies, including relevant background reports, directly to the Northern Committee, the Commission, and the Scientific Committee.
- ISC scientific information and advice will be presented at the annual meeting of the Northern Committee and the Scientific Committee, and may be presented to the Commission by the Chair of the ISC, or a designate, and advisors from the ISC Working Groups, as appropriate. The participation costs of the ISC Chair, or designate, and advisors from the ISC Working Groups will be borne by the Member Governments of the ISC Chair and Working Group advisors.

Part II: Framework for Mutual Cooperation

Participants to this MOU will:

- Encourage reciprocal consultations and regular contacts on matters of common interest regarding scientific research on highly migratory tuna and tuna-like resources;
- Regularly exchange relevant meeting reports, information, project plans, documents, and publications regarding matters of mutual interest; and
- Routinely exchange fishery data, in accordance with the rules and procedures for data confidentiality adopted by each organization, to minimize duplicative data collection efforts and enhance fishery monitoring and stock assessment through the use of common data sources.

The Executive Director of the Commission, or designate, including the Chair of the Northern Committee and Chair of the Scientific Committee, will be invited to observe the plenary meetings of the ISC and its Working Groups. The Chair of the ISC, or designate, will be invited to observe the annual meetings of the Commission and meetings of the Northern Committee and Scientific Committee, as well as other subsidiary bodies, as appropriate. The costs of participation will be borne by each Organization respectively.

Part III: Finance

- ISC will provide its normal reports and the reports of its Working Groups, as well as standard (recurring) scientific information and advice, without cost to the Commission.
- The Commission will pay, as mutually decided, costs for special scientific advice requested by the Commission.


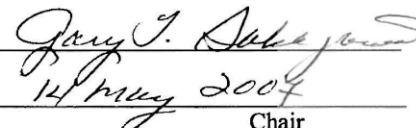
Part IV: General Administrative Arrangements

- This MOU becomes effective upon the date of signature of the responsible representatives in both the Commission and ISC.
- This MOU may be modified by written consent of both Commission and ISC and signed by the responsible representative in each organization. The modified MOU becomes effective upon the date of signature of both the responsible representatives of the Commission and ISC.
- If any dispute should arise between the Commission and ISC on the operation of this MOU, both will make every effort to resolve the dispute themselves, or if necessary, by utilizing a mutually decided arbiter.
- Either Commission or ISC may terminate this MOU by providing 30 days written notice to the other of its intention to withdraw from this MOU. Upon termination of the MOU, any funds provided for special, typically non-recurring, scientific advice shall be refunded to the Commission (see Part III above).
- A full review of the terms and operation of the MOU and its Annexes will be conducted as soon as practicable after the first full 12 months of operation following its signature by the Commission and the ISC and subsequently every three years.

Part V: Signature

Signed on behalf of the Commission for the Conservation and Management of Highly Migratory

Fish Stocks in the Western and Central Pacific Ocean and the International Scientific Committee for Tuna and Tuna-like Species in the North Pacific Ocean:

Signed: 	Signed: 
Date: 28/10/07	Date: 14 May 2007
Chair	Chair
Commission for the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean	International Scientific Committee for Tuna and Tuna like Species in the North Pacific Ocean

ANNEX 1

Provisional list of species and/or stocks in the North Pacific Ocean for which the Northern Committee may request standard (recurring) advice from the ISC:

- North Pacific Albacore
- Pacific bluefin tuna
- Swordfish and other billfishes
- By-catch (fish and non-fish) species

Other species may be added to the list with the mutual written concurrence of the Participants to this MOU.

ANNEX 2

Standard (recurring) advice required from ISC by the Northern Committee:

For tuna and tuna-like species that occur primarily in the North Pacific, the ISC will report annually to the Northern Committee of the WCPFC on:

1. Performance of the monitored fisheries
2. Progress in stock assessment research and future needs
3. Status of stocks
4. Advice on conservation measures
 - a. Management measures needed
 - b. Evaluation of the effectiveness of exiting measures

Any additional ISC tasks needed to support WCPFC will be delineated in annual service agreements established at the outset of each year and in accordance with Part III.

**Memorandum of Cooperation between
The Inter-American Tropical Tuna Commission and
The International Scientific Committee for Tuna and Tuna-like Species
in the North Pacific Ocean**

The Inter-American Tropical Tuna Commission (IATTC) and the International Scientific Committee for Tuna and Tuna-like Species in the North Pacific Ocean (ISC),

Recognizing the functions that the Inter-American Tropical Tuna Commission (IATTC) performs pursuant to the 2003 Convention for the Strengthening of the Inter-American Tropical Tuna Commission established by the 1949 Convention between the United States of America and the Republic of Costa Rica, (Antigua Convention), in particular the following:

- Promote, carry out and coordinate scientific research concerning the abundance, biology and biometry in the Convention Area of fish stocks covered by the Convention and, as necessary, of associated or dependent species, and the effects of natural factors and human activities on the populations of these stocks and species;
- Establish a comprehensive program for data collection and monitoring which will include such elements as the Commission determines necessary;

Also recognizing that the IATTC has maintained an active research program in the eastern Pacific Ocean since 1950;

Further recognizing that the International Scientific Committee for Tuna and Tuna-like Species in the North Pacific Ocean (ISC)

- Was established in 1995 to enhance scientific research and cooperation for conservation and rational utilization of the species of tuna and tuna-like fishes which inhabit the North Pacific Ocean during a part or all of their life cycle;
- Was established to provide the scientific basis for the conservation and rational utilization of these species in this region;
- Maintains a central database to support the scientific research of the Committee;

Reaffirming the importance and relevance of cooperation between both organizations, the IATTC and ISC have agreed to the following:

Part I: Framework for Mutual Cooperation

The IATTC and ISC will:

- Encourage reciprocal consultations and regular contacts on matters of common interest regarding scientific research on tuna and tuna-like species;
- Regularly exchange meeting reports, information, project plans, documents, and publications regarding matters of common interest;
- Cooperate in research and assessment of stocks that occur in the northeastern Pacific Ocean during part or all of their life cycle, as appropriate.
- Routinely exchange fishery data (Category I, II, and III) from the northeastern Pacific Ocean, in accordance with the rules and procedures for data confidentiality adopted by each organization, to minimize duplicative data collection efforts and enhance fishery monitoring and stock assessment; and
- Strive to develop compatible data codes and data standards to facilitate data exchange, to the extent practicable.

The Director of the IATTC and his designated staff will be invited to participate as observers at the ISC plenary and to participate as full members at the ISC Working Groups.

The Chairman of the ISC will be invited to observe the annual meetings of the IATTC and the Director of the IATTC will recommend that the Chairman of the ISC be invited to participate in the work of the IATTC Scientific Advisory Committee and its working groups.

Part II: Administrative Arrangements

- This MOC will become effective upon the date of signature by the Director of the IATTC and the Chairman of the ISC, on behalf of each Party
- This MOC may be modified by written consent of both IATTC and ISC and the amended MOC will become effective upon the date of signature by the Director of the IATTC and the Chairman of the ISC on behalf of each Party.
- Each Party may terminate this MOC by providing 30 days written notice to the other of its intention to withdraw from this MOC.
- A full review of the terms and operation of the MOC will be conducted by the Parties as soon as practicable after three years from the date of its signature by the

Director of the IATTC and the Chairman of the ISC, and subsequently every three years.

Part III: Signature

Signed on behalf of the IATTC and the ISC:

Signed: 
Director

Date: 02-01-2016

Inter-American Tropical
Commission

Signed: 
Chairman

Date: Jan. 26, 2016

International Scientific Committee for Tuna
Tuna and Tuna-Like Species in the North
Pacific Ocean

GLOSSARY OF FISHERY TERMS

This Glossary of terms is largely a compilation from similar documents prepared by the International Commission for the Conservation of Atlantic Tunas, and the U.S. Pacific Fisheries Management Council. It is a general guide for definition of terms or acronyms commonly used in ISC documents.

July 2009

A

Abundance Index

A quantitative measure of fish density or abundance, usually as a time series. An abundance index can be specific to an area or to a segment of the population (e.g., large fish), or it can refer to abundance stock-wide; the index can reflect abundance in numbers or in weight (biomass). Most abundance indices currently used by the SCRS are based on standardized CPUE data, although fishery-independent abundance indices based on scientific surveys have also been used. Typically, abundance indices are in relative units (as opposed to measuring absolute abundance), and simply indicate relative changes in abundance over time.

ADAPT

A stock assessment computer model based on VPA and tuning of abundance indices. The underlying population model is age-structured. (

Age of Maturity

The age when 50% of the fish of a given sex are considered to be reproductively mature.

Age of Recruitment

The age when fish are considered to be recruited to the fishery. In stock assessments, this is usually the youngest age group considered in the analyses, typically age 0 or 1.

ASPIC

A stock assessment computer model based on Schaefer's form of the production model, with non-equilibrium tuning of biomass-based abundance indices. The underlying population model is aggregated biomass

Asymptotic Length (L_{∞})

The maximum size that fish of a given species could reach on average if they lived forever. Sometimes it is mistaken as representing the largest observed size for the species.

B

B_x%

Threshold biomass (B) levels used to determine stock status. x% refers to the level of available biomass above the unfished biomass (size of fish stock without fishing).

B₀

Unfished biomass; the estimated size of a fish stock in the absence of fishing. (see Virgin Biomass)

Biological Reference Point (BRP)

A benchmark against which the abundance of the stock or the fishing mortality rate can be measured in order to determine its status. These reference points can be Limits or Targets, depending on their intended usage.

Biomass (B)

Refers to the abundance of the stock in units of weight. Sometimes, “biomass” refers to only one part of the stock (spawning biomass, exploitable biomass) but this distinction is not always made.

Biomass at MSY (B_{MSY})

A biological reference point. This is the long-term average biomass value expected if fishing is at F_{MSY}

By-catch

Catch of species other than the intended target species in a fishing operation. Bycatch can either be discarded or landed.

C
Catch (C)

The total number of fish caught by fishing operations (sometimes “catch” is used to denote the weight of fish caught). Catch should pertain to all fish killed by the act of fishing, not just those fish that are landed.

Catch-at- Age

The estimated number of fish caught, tabulated by fish age and year of capture (and by other strata such as gear or nation). Catch at age is typically estimated for tunas and billfishes using age-length keys or cohort slicing.

Catch-at-Size

The estimated number of fish caught, tabulated by size class and by other strata such as gear, nation and quarter. Catch at size is typically estimated for tunas and billfishes using size composition samples from catches.

Catchability (q)

The fraction of the stock which is caught by a standardized (effective) unit of effort. It is also used as the constant of proportionality that relates effective effort to fishing mortality ($q \times f = F$) or as the constant of proportionality that relates an index of abundance to absolute stock size ($I = q \times N$). Catchability is affected by fish availability. Thus, specific climatic conditions may result in increased or decreased availability of the fish. This would lead to increased availability of the fish affecting catchability and, thus, increased (decreased) fishing mortality rate with the same fishing effort.

Catch per Unit Effort (CPUE)

The amount of catch that is taken per unit of fishing effort (e.g., number of fish per longline hook-month). Nominal CPUE is often used as a measure of the economic efficiency of a type of gear. Standardized CPUE is normally used as an abundance index for “tuning” or fitting assessment models. Sometimes referred to as **catch rate**.

Catch Rate

See **Catch per Unit Effort**.

Cohort

Fish born in the same time period, usually a year. For instance, the 1987 cohort would refer to fish that are age 0 in 1987, age 1 in 1988, and so on.

E

Effective Effort

Measures of fishing effort such as hooks per day of fishing that have been standardized so that the measure is proportional to the fishing mortality rate that the gear (s) impose on the stock of fish. Controls purported to limit effective effort imply that the fishing mortality rate is to be limited.

Effort (Fishing Effort, f)

A measure of the intensity of fishing operations. How fishing effort is defined depends on the type of fishery (gear) and often on the type of information available. For longline fisheries, effort is usually defined in units of number of hooks or in hook-hours. For purse-seine fisheries, effort is often defined as days fished (time fishing plus search time)

Exploitable Biomass

Refers to that portion of a stock’s biomass that is available to the fishing gear.

Exploitation pattern

The distribution of fishing mortality over the age composition of the fish, determined by the type of fishing gear and spatial and seasonal distribution of fishing, and by the growth and migration of the fish. In other words, it is the combined effect of gear selectivity and fish availability. The pattern can be changed by modifications to fishing gear: for example, by increasing mesh or hook size or by changing the ratio of harvest by gears exploiting the fish (e.g., gill net, trawl, hook and line). The pattern can

also change due to changes in fishing practices such as avoidance of areas where juveniles reside.

Exploitation Rate

The proportion of a stock at the beginning of a given time period that is caught during that time period (usually expressed on a yearly basis). For example, if 220,000 fish were caught during the year from a stock of 1 million fish alive at the beginning of the year, the annual exploitation rate would be 0.22.

F

$F_{0.1}$

A biological reference point. This is the fishing mortality rate at which the increase in equilibrium yield per recruit in weight for an increase in a unit of effort is 10% of the yield per recruit produced by the first unit of effort on the unexploited stock (i.e., the slope of the yield per recruit curve for the $F_{0.1}$ rate is only 1/10th of the slope of the yield per recruit curve at its origin). Originally, $F_{0.1}$ was intended as an economic reference point, measuring where additional investment into effective fishing effort would produce a 10% marginal gain in yield per recruit. It later evolved into a conservative reference point for yield optimization because $F_{0.1}$ results in almost as much yield per recruit as F_{Max} does, but at lower levels of fishing mortality.

$F=0$

Fishing mortality equals zero (no fishing).

F_{MAX}

A biological reference point. This is the fishing mortality rate that maximizes equilibrium yield per recruit. F_{MAX} is the fishing mortality rate that defines growth overfishing. In general, F_{MAX} is different than F_{MSY} (F that maximizes sustainable yield), and is usually higher than F_{MSY} , depending on the stock-recruitment relationship. By definition, F_{MAX} is always higher than $F_{0.1}$.

F_{med}

A biological reference point. This is the fishing mortality rate corresponding to an equilibrium SPR equal to the inverse of the median observed survival ration (ratio of recruits to parental spawning biomass). That is, a stock exploited indefinitely at F_{med} should be able to replace itself with an abundance close to the observed historical median.

F_{MSY}

A biological reference point. This is the fishing mortality rate which, if applied constantly, would result in Maximum Sustainable Yield (MSY). F_{MSY} can be estimated in two ways: (1) From simple (biomass-aggregated) production models (e.g., ASPIC, PROFIT) and (2) from age-structured models that include a stock-recruitment relationship (e.g., ASPM).

f_{pt} (f_{MSY})

A biological reference point. This is the effective fishing effort corresponding to F_{MSY} . F_{opt} is often reported as one of the main outputs of production models.

F_{x%} (F_{x%spr})

A family of biological reference points. $F_{x\%}$ denotes the fishing mortality that will reduce the equilibrium spawning potential per recruit to x% of what it would be without any fishing (or, equivalently, it is the F that results in x% equilibrium spawning potential ratio). Reference points of this kind are often used as proxies to other biological reference points that require more information about the relationship between stock and recruitment. For example, based on simulation studies for ground fish stocks, $F_{20\%}$ has been recommended as a default proxy for recruitment overfishing and $F_{35\%}$ as a proxy for F_{MSY} .

Fecundity

The number of eggs produced on average by a female of a given size/age. Fecundity information is often used to compute spawning potential.

Fish Aggregating Device (FAD)

Artificial or natural objects placed on the surface that attract several species underneath, thus increasing their catchability.

Fishing Mortality Rate (F)

Portion of the total mortality rate that is due to fishing. Fishing mortality is usually expressed as an instantaneous rate, as discussed under Mortality Rate, and can range from 0 per year (for no fishing) to high values such as 1.0 or more per year. Fishing mortality should reflect all deaths in the stock that are due to fishing, not just those fish that are actually landed. It is common practice to refer to F as a scalar value but it would be more appropriate to refer to it as a vector. That is, it is important to consider how F is distributed among age groups (i.e. what the exploitation pattern is). For instance, an F value of 0.5 for a stock exploited by purse seines that target small fish would have very different consequences than an $F=0.5$ for the same stock exploited by longlines targeting large fish. Sometimes referred to in “shorthand” as **Fishing Mortality**.

Fishing Pattern

See Exploitation Pattern. Sometimes this term is also used in reference to the way in which fishing operations are conducted.

Fishing Power

Refers to the efficiency of a fishing unit, usually a vessel, in capturing fish. The fishing power of individual fishing units can change over time (typically increasing) in response to technological developments in fishing gear, engines or sonar equipment, and adjustments to fishing practices.

Fish Stock

This term usually is used to imply that the particular stock is more or less isolated from other stocks of the same species, and hence, self-sustaining and from which catches are taken in a fishery.

Fork length (FL)

A fish size measurement. Projected straight distance measurement from the tip of the fish's snout to the fork of the tail.

Fully Exploited

This term is usually used to indicate that the stock is not being over-exploited nor underexploited. This can be interpreted in an equilibrium yield sense as fishing at F_{MSY} , or in a yield-per recruit sense as fishing at F_{MAX} .

I

Incidental catch (or species)

Catch or species caught when fishing for the primary purpose of catching a different species.

L

Limit Reference Point

A benchmark that should not be exceeded with any significant probability according to a given set of management objectives. According to the UNIA, F_{MSY} should be a limit reference point.

M

Maturity

Refers to the ability, on average, of fish of a given age/size to reproduce. Maturity information, in the form of percent mature by age/size, is often used to compute spawning potential.

Maximum Sustainable Yield (MSY)

The largest average yield (catch) that can be taken in the long-term from a stock and corresponds to the yield expected when fishing at F_{MSY} .

Minimum Size

A fishery management control measure intended to minimize the catches of small fish. Such a measure is often based on yield-per-recruit considerations such as avoiding

growth overfishing, and aimed at altering the exploitation pattern so that young fish are given a better chance to grow before becoming vulnerable to fishing.

Mortality Rate (instantaneous)

Fraction (e.g. 0.3 or 30%) of fish dying in a year from different causes, such as fishing or natural factors. Because fishing and natural mortality happen continuously throughout the year, it is not straightforward to use these fractions in an additive way. Expressing these processes as instantaneous rates (i.e. as the fractions that die in infinitesimal periods of time) facilitates the stock assessment analysis computations on an annual basis, even when the catches take place daily. Instantaneous mortality rates of 0.1, 0.5 and 1.0 are equivalent to 10%, 39% and 63% mortality.

MULTIFAN-CL

A stock assessment computer model with length-based separable models and tuning of abundance indices. The population model is length/age-structured.

N

Natural Mortality Rate (M)

That portion of the total mortality rate that is due to causes other than fishing (e.g., predation, disease, cannibalism, and perhaps increasingly, environmental degradation such as pollution). These causes of death are usually lumped together for convenience, because they are difficult to separate quantitatively. Sometimes natural mortality is confounded with losses of fish owing to emigration.

Nominal

Refers to quantities as they are reported, before any analyses are performed to transform/standardize them. Nominal catch is the sum of catches that have been reported as round weight or, equivalent, the landings (nominal catches do not include such measures as unreported dead discards). Nominal effort pertains to measures of fishing effort or vessel carrying capacity that have not been standardized. When catchability changes, e.g., through changes in gear technology or operations, trends in nominal effort can give a misleading picture of trends in exploitation.

Numbers at age (N)

The number of fish in each age class in the stock at a particular point in time. Age-structured assessment models aim at estimating these quantities.

O

Overfished

Overfished means that the abundance of the stock is “too low,” and whose size is sufficiently small to warrant rebuilding. This term is used for a condition in which the

estimated stock biomass is below a limit biological reference point that is used as the signpost for declaring an ‘overfished condition’.

Overfishing

This term generally means that the fishing mortality being exerted on the stock is “too high,” and jeopardizing the capacity of the stock to produce a level of sustainable catch, e.g., MSY. This term is typically used when estimated F is above a limit biological reference point that is used as the signpost that defines “overfishing”. Usage of the term is not limited to “growth overfishing” situations: it can also be used when there is recruitment overfishing or other types of overfishing.

P

Population

A group of fish of one species which shares common ecological and genetic features. The stocks defined for the purposes of stock assessment and management do not necessarily coincide with self-contained populations.

Production Model

A population model with simple mathematical functions that depict how the population biomass changes from year to year (or, how biomass changes in equilibrium as a function of fishing mortality). The simplest production model aggregates all of the biological characteristics of growth, natural mortality and reproduction into a simple, deterministic function using three or four parameters. Production models are primarily used in simple data situations, where total catch and effort data are available but age-structured information are either unavailable or deemed to be less reliable (although some versions of production models allow the use of age structured data).)

R

Recruitment

The amount of fish that first become vulnerable to the fishery each year due to growth and/or migration into the fishing area.

Replacement Yield

The amount of yield in weight that can be removed from a population of fish and have that stock neither increase nor decrease in biomass. When the population productivity is high under proper exploitation, then replacement yield will also be high. Conversely, when the population productivity is low, replacement yields will be low. In either case, if the actual yield removed is equal to the replacement yield, then the biomass will not change from one year to the next.

S

Selectivity

The relative vulnerability of different age or size classes to the fishing gear. Selectivity and exploitation pattern are often used interchangeably.

Spawning Potential Ratio (SPR)

The ratio of spawning potential per recruit under a given fishing regime relative to the spawning potential per recruit with no fishing (or %MSP for Maximum spawning Potential). SPR's require information on natural mortality, growth, spawning potential at age and the relative vulnerability by age to fishing. If possible, spawning potential per recruit, but often spawning stock biomass per recruit (SSB/R see below) is an appropriate substitute. SPR and SSB/R are simple extensions to yield per recruit (see below) in that there are two ways in which recruitment can be evaluated. If recruits are caught, they become part of the yield (yield per recruit). If they are not caught and survive, they are part of the SPR, SSB/R. SPR is expressed as a ratio of a fished condition to an unfished condition, thus the ratio varies from 0 to 1. Additionally, empirical studies have shown that from some populations SPR's in the order of 20% to 30% may run the risk of recruitment declines, thus there is a basis of comparison between populations. Therefore, $F \times \%SPR$ fishing mortality rates are sometimes used as biological reference points

Spawning Stock Biomass (SSB)

The total weight of sexually mature fish in the population (usually males and females combined, but sometimes refers to only females). This quantity depends on the abundance of year classes, the exploitation pattern, the rate of growth, both fishing and natural mortality rates, the onset of sexual maturity, and environmental conditions.

Spawning stock biomass per recruit (SSB/R)

The expected lifetime contribution to the spawning stock biomass of an average recruit to the fishery. For a given exploitation pattern, rate of growth, maturity schedule and natural mortality, and equilibrium value of SSB/R can be calculated for any level of F . SSB/R decreases monotonically with increasing F .

Stock

The term has different meanings. In general, a stock is a biological unit of one species forming a group of similar ecological characteristics and, as a unit, is the subject of assessment and management. However, there are many uncertainties in defining spatial and temporal geographical boundaries for such biological units that are 100% compatible with established data collection and geopolitical systems. For this reason, the term stock is often synonym with assessment/management unit, even if there is migration (mixing) of the same species to and from adjacent areas.

Spawner-Recruit Relationship (S-R relation)

A function that describes how recruitment varies with changes in the reproductive output (or biomass) of the parental stock. Two common forms are the Beverton-Holt and the Ricker relationships. The spawner-recruit relationship is particularly important for

understanding sustainability of a stock with alternative harvesting regimes. Some stock assessment models incorporate a spawner-recruit relationship directly into the model, either explicitly (e.g. some age-structured assessments) or implicitly (most stock production models).

Stock Structure

Refers to the geographical boundaries of the stocks assumed for assessment and management purposes (e.g., EPO and WPO stocks), or to boundaries that define self-contained populations in a genetic sense.

T

Target Fishing

Fishing for the primary purpose of catching a particular species or species group (the target species).

Terminal F

Refers to fishing mortality values in the last year for which data are available in a stock assessment.

Total mortality rate (Z)

The sum of natural and fishing mortality rates.

V

Virgin

Refers to an unfished condition of the stock in an equilibrium sense. For instance, Virgin Biomass is equivalent to the stock's carrying capacity.

Virgin biomass (B_0)

A biological reference point. This is the long-term average biomass value expected in the absence of fishing mortality. In production models, B_0 is also known as carrying capacity.

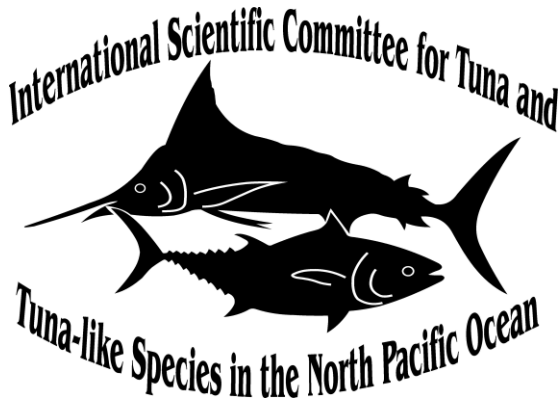
Virtual Population Analysis (VPA)

A stock assessment model with functions for computing historical fishing mortality rates and stock sizes by age, conditioned on catches, natural mortality, and certain assumptions about mortality for the last year and last age group. A VPA essentially reconstructs the history of each cohort, assuming that the observed catches are exact and known without error.

Y

Yield per Recruit (Y/R)

The expected lifetime yield for the average recruit. For a given exploitation pattern, rate of growth, natural mortality rate, and equilibrium condition, Y/R can be calculated for each level of F.



ISC Plenary Meetings

First Meeting, May 7-10, 1996, Tokyo, Japan

Second Meeting, January 20-23, 1999, Honolulu, Hawaii, USA

Third Meeting, January 28-30, 2002, Nagasaki, Japan

Fourth Meeting, February 2-4, 2004, Honolulu, Hawaii, USA

Fifth Meeting, March 28-30, 2005, Tokyo, Japan

Sixth Meeting, March 23-27, 2006, La Jolla, California, USA

Seventh Meeting, July 25-30, 2007, Busan, Korea

Eighth Meeting, July 22-27, 2008, Takamatsu, Japan

Ninth Meeting, July 15-20, 2009, Kaohsiung, Taiwan

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

Eleventh Meeting, July 20-26, 2011, San Francisco, CA, USA

Twelfth Meeting, July 18-23, 2012, Sapporo, Japan

Thirteenth Meeting, July 17-22, 2013, Busan Korea

Fourteenth Meeting, July 16-21, 2014, Taipei, Chinese Taipei

Fifteenth Meeting, July 15-20, 2015, Kona, Hawaii

Sixteenth Meeting, July 13-18, 2016, Sapporo, Japan

Seventeenth Meeting, 12-17 July 2017, Vancouver, B.C., Canada

Eighteenth Meeting, July 11-16, 2018, Yeosu, Korea

Nineteenth Meeting, July 11-15, 2019, Taipei, Chinese Taipei

Twentieth Meeting, July 15-20, 2020 EPO/July 16-21, 2020
WPO, Virtual Meeting

Twenty-First Meeting, July 12-15, 19, 2021 EPO/July 13-16, 20,
2021 WPO, Virtual Meeting

Twenty-Second Meeting, July 12-18, 2022, Kona, Hawaii