出國報告(出國類別：其他)

參加「北太平洋鮪類及類鮪類國際科學委員會(ISC)第 12 屆年會會議」報告

服務機關：行政院農業委員會漁業署
姓名職稱：林晏如 技士
派赴國家：日本　北海道札幌
出國期間：101 年 7 月 16 日至 7 月 24 日
報告日期：101 年 9 月 27 日

摘要

本次北太平洋鮪類及類鮪類國際科學委員會（ISC）第 12 屆年會會議於本（2012）年 7 月 18 日至 23 日在日本札幌舉行，共有 6 個會員國參加，WCPFC（中西太平洋漁業委員會）則派員以觀察員身分參加。有關本次會議結果摘要如次：

一、ISC 主要關切魚種之資源狀況及保育意見（conservation advice）：

(一) 長鰭鮪：資源狀況健康。資源評估結果確認目前的漁獲死亡率比 2006 年資源評估結果低，此與 2006 年小組所提之建議內容一致。

(二) 太平洋黑鮪：今年 5 月未完成資源評估，將於 11 月再次召開資源評估會議，管理建議沿用 ISC 10 的建言：即太平洋黑鮪總漁獲量應低於 2002-2004 年間的平均水準以下，尤其是幼齡魚群。

(三) 旗魚工作小組：

1. 紅肉旗魚：目前資源已經有過漁現象且正過漁中。根據新的資源投射分析結果，以 1994 至 2008 年爲基礎，做資源加入量抽樣估算顯示，2012 至 2017 年資源加入量有回復跡象，若維持目前 MSY，自 2012 年到 2017 年產卵群生物量將增加 45～72%。
2. 劍旗魚：資源評估資訊無更新，將維持 ISC11 的管理建議：在中西及東太平洋水域兩系群之資源量均處健康狀態。

二、統計工作小組：今年起採以資料提交報告卡（Reportcard）檢視各國資料提交之狀況，我國資料提交狀況良好。大會並接受統計工作小組主席所提之 3 項建議。

三、ISC 運作手冊（Operational Manual）更新：有大幅度的更新，主要是爲因應外部審查的建議，爲資源評估小組之科學工作及科學報告內容，訂定一套準則（guidelines），並在資料提供上增加丟棄量。後續大會會再請各國進行修訂後版本之檢視。

四、ISC 網站：經網站管理員及大會主席秘書等努力下已有多項進展，資訊已漸透明化；各國均予以肯定。

五、明年度會議：明年年會預訂於 2013 年 7 月 17 至 22 日由韓國主辦，並進行太平洋黑鮪工作小組主席及 ISC 大會主席改選事宜。此外，ISC 將於 ISC 13 前完成太平洋黑

鮪、黑皮旗魚及水鯊資源評估工作，並召開長鰭鮪小組及統計工作指導小組相關會議。

六、會期間臨時全席會議 (Intercessional Plenary Meeting)：因本年度太平洋黑鮪資源評估延至 2012 年 11 月會議時才可完成，將在 2012 年 12 月 17 日至 21 日這周間擇日進行網路視訊召集會議，以討論與確認相關文件內容，俾以實踐在 2012 年完成資源評估並提出保育管理建議之目標；同時亦進行討論 ISC 操作手冊 (Operations Manual) 的更新議題。

關鍵詞：北太平洋鮪類及類鮪類，科學委員會，鮪旗魚類，資源評估

目次

壹、目的

北太平洋鮪類及類鮪類國際科學委員會 (International Scientific Committee for Tuna and Tuna-like Species，ISC) 係於 1995 年成立，其成立目的係爲強化北太平洋鮪旗魚類的科學研究與養護與合理利用的合作。ISC 設有 5 個工作小組，分別就統計、太平洋黑鮪、旗魚、長鰭鮪及鯊魚議題交換科學資料與進行資源評估。我國於 2002 年 1 月 30 日正式成爲會員；目前該組織共有美國、日本、加拿大、墨西哥、韓國、中國大陸和我國等 7 個會員國。

本次北太平洋鮪類及類鮪類國際科學委員會 (ISC) 第 12 屆年會會議於本 (2012) 年 7 月 18 日至 23 日在日本札幌舉行。本次會議針對已完成之紅肉旗魚資源評估進行檢視，另針對我國重要漁獲之太平洋黑鮪未如預期於今 (2012) 年年會前完成資源評估，討論相關後續因應辦法，及確認北太平洋長鰭鮪、黑皮旗魚、水鯊等主要關切魚種目前資源評估狀態及未來之工作。

ISC 雖屬於科學性組織，但其資源評估結果及管理建議將送中西太平洋漁業委員會 (WCPFC) 之北方委員會 (NC) 作爲訂定漁獲配額及各項保育與管理措施之參考基礎，我國爲北太平洋主要漁業國之一，亦同時爲 WCPFC 之會員國，因此對於前揭各項議題均需審慎因應，爰派員參加本次會議。

貳、會議過程及結果

本次 ISC 第 12 屆年會前，在 2012 年 7 月 11 日至 17 日先召開各工作小組會議及團長會議，我國 7 月 11 日至 12 日統計工作小組會議、13 日鯊魚工作小組會議及 14 日長鰭鮪工作小組會議，由擔任我國任 ISC 副主席之臺灣大學孫志陸教授、我國任統計小組主席參加對外漁協資訊組於仁汾組長及對外漁協資訊組陳忠佑參加；7 月 16 日旗魚工作小組會議孫志陸教授參加；7 月 16 日至 17 日舉行之黑鮪工作小組由於仁汾組長及陳忠佑參加；7 月 17 日下午舉行代表團會議由漁業署遠洋漁業組林晏如技士（代理本團團長中山大學張水鏘副教授）、對外漁協於仁汾組長及陳忠佑出席，孫志陸教授以 ISC 副主席身份出席。依據渠等於年會前回報與年會有關之重要資訊，摘陳如次：

一、統計工作小組（7 月 11 日(星期三)及 7 月 12 日(星期四)）：

本次統計小組會議由我籍主席對外漁協於仁汾組長主持，我國由對外漁協陳忠

佑參加，其他有加拿大、美國、日本、WCPFC 代表及各魚種小組主席與會，ISC 主席 Gerard DiNardo 博士、副主席臺灣大學孫志陸教授以及負責本次統計小組會議評鑑工作之 Jerry Ault 博士列席。

(一) 7 月 11 日（星期三）

1. 由統計小組主席報告於 2011 年 8 月、2012 年 5 月所進行共兩次指導小組會議(steering group meeting)之成果並檢視 ISC 11 後小組的工作計畫執行進度，除 metadata 尚未完成外，其他工作項目皆已完成。
2. 在討論與 WCPFC 進行資料存貨交換議題時，與會者建議 ISC 應該也與 IATTC 間進行資料存貨資訊交換，ISC 秘書解釋實際上 ISC 與 IATTC 間實際上簽有資料交換 MOU，但實務上並未進行正式資料庫資料交換，目前僅有魚種小組資源評估時 IATTC 參與科學家提供所需資料，ISC 鯊魚小組主席則提及 IATTC 已曾提供 ISC 鯊魚小組資料協助，然與會者仍希望能與 IATTC 間建立正式資料存貨資訊交換，讓魚種小組科學家能了解 IATTC 還有哪些資料可以透過資源評估供作取得， 小組建議 ISC 主席與 IATTC 進行交涉，期能儘速建立正式資料存貨資訊交換以及資源評估所需研究資料交換。
3. 指導小組(steering group)將在 2012 年 10 月以前將 metadata 之架構定案後透過 email 與各國取得共識，並在 11 月前以 email 寄送給各國資料負責人。
4. 指導小組(steering group)將在 2013 年 5 月於日本清水準備線上資料提送的訓練說明並建立網路版資料提送說明，以供各國資料人員隨時查詢使用，該項工作將在下年度資料提供前完成。
5. 小組進行有關資料庫代碼的討論，我國代表表示現行資料提送格式並無 fleet code 欄位，故無法在提送 CategoryⅡ、Ⅲ時將大小釣分別提送，並說明大小釣之目標魚種及作業區域皆不同，希望可增加船隊 (fleet) 代碼欄位以利個別提送，小組接受此建議並會在將來的新資料提送格式中加入。
6. 因各國各漁業之船隊(fleet)不盡相同，故各資料負責人須在 2012 年 8 月以前繳交各國漁業及船隊的說明報告，以供小組後續發展船隊標準代碼。

7. 有關各國資料收集系統更新的討論，我國代表說明我國延繩釣之 logbook 目前鯊魚漁獲種類大釣有 11 種，小釣亦於 2012 年增加爲 8 種，小組對此表示讚揚。

(二) 7 月 12 日（星期四）

1. 小組檢視各國資料繳交情形，各國資料負責人針對今年度資料繳交狀況進行解釋，我國代表解釋因流刺網、定置網、鏢旗魚等沿近海漁業小型漁業，雖然目前可透過漁業年報收集到 Category1 資料，但目前尚未有 logbook 收集系統及採樣計畫進行，故尚無法提供該兩類資料予 ISC 統計小組，但我國已盡力繳交我們可得之所有的資料，經解釋後小組同意將我國 Category I effort、Category Ⅱ、CategoryⅢ資料的繳交情形由原本的準時繳交但未完整(黃色)修正爲準時繳交且完整(綠色)，各國資料繳交情形記錄表如下表。

Country	Cat. Ic	Cat. Ie	Cat. II	Cat. III
Canada	On time	On time	On time	On time
China	On time	NP	On time	NP
Japan	On time	On time	On time	On time
Chinese-Taipei	On time	On time	On time	On time
Mexico	Not on time	Not on time	NP	NP
Korea	On time	On time	On time	On time
U.S.A.	On time	On time	On time	On time

On time	**By July 1, 2012**
	Complete
	Incomplete
NP	Not Provided

2. 小組確認今年度各國所提交之 Category I 資料與今年所提國家報告數值是否相同，我國僅長鰭鮪量有出入，我國代表表示經確認後所提交資料與國家報告中數值應無相異，故請 DA 再行確認，隨後 DA 表示經確認後該數值相異之情形爲其計算錯誤所致並已修正之。
3. 本次統計小組會議共計提出 10 項未來工作計畫及向 ISC12 全席會議提出 3 項建議。
4. ISC 主席 Gerard DiNardo 對 ISC11 年會後之兩次 steering committee 的功效，

以及對 DA、web master 的貢獻表示感謝及讚許。

二、鯊魚工作小組（7 月 13 日(星期五)）

由美國籍主席 Suzanne Kohin 博士主持，我國有孫志陸教授、於仁汾組長及陳忠佑參加，其他會員國有加拿大、美國、日本及 WCPFC 代表與會。

主要檢視於 2012 年 5 月 28 日至 6 月 4 日在日本清水召開之小組會議報告，並規劃鋸峰齒鮫（水鯊）後續資源評估之資料提交、會議時程與工作計畫。由於尚未完成任何鯊種之資源評估，故不會提出資源管理建議。

針對於鯊魚漁獲統計部分，因小組資源評估所需資料明顯不足，另主席詢問有國我關遠洋鮪釣及沿近海小釣漁業 CPUE 標準化序列未提送之問題，我國代表回應海大劉光明教授近期取得部分重要資料，應在本次會後完成 CPUE 序列，將可提供小組。

在今年年底將召開之鯊魚工作小組會議，希望會員國與會科學家能提供至 1970 年之漁獲量資料，倘無法提供，小組將代為進行估算以補實所需之資料。

三、長鰭鮪工作小組（7 月 14 日(星期六)及 7 月 15 日(星期日)）

由小組主席加拿大籍 John Holmes 博士召集會議，我國有孫志陸教授、於仁汾組長及陳忠佑參加，其他會員國有加拿大、美國、日本、墨西哥及 WCPFC 代表與會。

進行各國漁獲量更新與檢視，並討論有關 2011 年資源評估的 CIE review 與決定其優先順序，規劃 2012 至 2014 年之工作與相關會議時程：討論向全席會議提出之保育與管理建議。

各國分別就近年長鰭鮪漁業變動進行報告說明，我國由陳忠佑在會中針對近年漁業變動進行口頭報告，說明近年漁獲量及作業船數變動。

為改善北太長鰭鮪漁獲資料，統計小組主席應魚種小組主席請求協調 SPC 取得非 ISC 會員國之產量。然而由於該漁獲量變化甚大，該小組主席對此表示希望能有進一步資訊來確認 SPC 所提供漁獲量資料正確性，因此建議統計小組主席能在 WCPFC SC 會議期間向 SPC 確認此統計數值之正確性。

本年度長鰭鮪工作小組主席任期屆滿，於此次小組會議進行改選，結果由加拿

大籍 John Holmes 連任。

因會議進行順利，原訂 7 月 15 日之議程已提前於 7 月 14 日一併完成，7 月 15 日休會一日。

四、旗魚工作小組（7 月 16 日(星期一)）

旗魚小組會議由美籍主席 Jon Brodziak 主持，我國由台灣大學孫志陸教授參加，其他會員國有美國與日本之代表參加。

檢視中西北太平洋紅肉旗魚資源評估訊息與紅肉旗魚、劍旗魚、黑皮旗魚的管理建議，並討論向全席會議進行之報告及相關物種保育與管理建議，後續小組工作時程規劃。

其中，在檢視 WCPFC 紅肉旗魚資源評估之執行摘要(executive summary)後，由代表美國之科學家 Dr. Li 提出中西北太平洋紅肉旗魚之未來投射(Future Projections of the Western and Central North Pacific Striped Marlin Stock)報告。此報告主要與今年四月在上海旗魚小組會議上所提之報告不同之處爲漁獲情境(harvest scenarios)由原本 4 個增加至 8 個，其結果顯示除了第 8 個情境(根據 CMM2010-01 所設定，即減少 2000-2003 年平均漁獲量的 20%)僅有 5%未來資源量不佳的可能性之外，其他的情境不影響投射結果，即若固定漁獲量在 3600 公噸，則資源量皆將在 2017 年恢復。Dr. Li 根據上述結果重新修改執行摘要，但我方建議勿將上述報告中所新提之 4 個情境中僅 1 個情境有 5%的資源不佳可能性列入管理建議中，以免無謂提高紅肉旗魚資源量管理的敏感性。

五、太平洋黑鮪工作小組（7 月 16 日(星期一)及 7 月 17 日(星期二)）

由小組主席日籍 Takeuchi 博士召集會議，我國由於仁汾組長及陳忠佑統計員與會，其它會員國代表有加拿大、日本、美國、韓國及墨西哥及 WCPFC 代表與會。

主席詢問各與會國是否有漁業現況之更新要在會議中提出，我國代表回應台大海研所許建宗教授已於 5 月份的會議提出 CPUE 報告及我國太平洋黑鮪漁業摘要報告，而今年的太平洋黑鮪漁業作業與往年相比並無明顯改變。

進行各國漁獲量更新與提交全席會議之報告檢視；由於今年 5 月並未如期完成

太平洋黑鮪資源評估，將於 11 月再次召開資源評估會議，俾期能在 2012 年結束前完成評估，且因目前尚未完成資源評估工作，故管理建議延用 ISC 10 的建言：即太平洋黑鮪總漁獲量應低於 2002-2004 年間的平均水準以下，尤其是幼齡魚群。

小組考量利用耳石判齡等生物學資訊對於資源評估與管理十分重要，且北太平洋長鰭鮪亦有蒐集生物學資訊之必要，故將於 ISC12 全席會議上建議合併舉行北太平洋長鰭鮪及黑鮪的年齡判定研討會。

有關本年底前再次召開之資源評估會議，由於 5 月之會議係因日方及美方對於評估模式設定未獲共識，故前曾由日方主席及水產廳代表函詢立場中立之我國是否有意願接辦小組會議，經我方考量後亦回覆表達對黑鮪資源評估重視及接辦之意願；惟此次小組會議在美方提出今年適逢該國總統大選，於 10 月份後該國政府面臨經費凍結問題，相關科學家與官員將無法使用出國經費，爰建議小組資源評估會議在美國召開，最終小組決定 11 月之資源評估會議於美國夏威夷舉行。對此，日本團長 Dr. Nakano 特別對前次函詢時我方善意回應表示感謝，也對改變會議地點未在我國舉辦一事向我方深表歉意，我方回應能夠理解並支持會議之決議。

六、團長會議（7 月 17 日 (星期二)）：

本會議由 ISC 主席 Gerard DiNardo 召開，我國由漁業署遠洋漁業組林晏如技士（代理本團團長中山大學張水鍇副教授）、對外漁協於仁汾組長及陳忠佑出席，孫志陸教授以 ISC 副主席身份出席，主要針對後續展開的年會進行議程及相關活動之確認。

其中，主席特別強調，今年 ISC 首次在會議中全面採取大會文件以電子檔提供在大會網站上，並隨時進行更新之無紙政策，僅提供各國一份完整文件的紙本參閱，期能減少用紙以愛護地球。

此外，因 ISC 11 時決定進行每 5 年 1 次之同儕評鑑（peer review），主席特別介紹參與評鑑之 3 位獨立審查員（美籍 Dr. Jerald S. Ault, 日籍 Dr. Hiroyuki Matsuda, 韓籍 Dr. Chang Ik Zhang），感謝他們對 ISC 進行評鑑作業之辛勞，並希望藉此評鑑提升 ISC 效能。

全席會議

7 月 18 日 (星期三)

一、全席大會由 ISC 主席 Gerard DiNardo 開場後，由各國團長介紹參加團員，之後由地主國日本水產總合研究所遠水研 Yuji Uozumi 博士致詞後正式開始。

二、本次會議參加國家有美國、日本、加拿大、墨西哥、韓國和我國等 6 個會員國，中國並未派員出席，WCPFC（中西太平洋漁業委員會）則派員以觀察員身分參加。我國由張水鍇副教授率林晏如技士及陳忠佑參加，孫志陸教授及於仁汾組長各以 ISC 副主席及統計小組主席身份出席。

三、上午由各國進行國家報告之簡報，簡報後由各會員國提問：

(一) 針對加拿大的國家報告內容，我國提問爲何其長鰭鮪漁業卻有長鰭鮪漁獲歸類在混獲？加拿大代表回答其爲曳繩釣漁業所捕獲的過小體型長鰭鮪，因爲市場價值不佳故歸類爲混獲。

(二) 我國由林晏如技士進行簡報，各國對我國所提問題，謹摘要如次：

1. 日本代表提問有關我國在 6 月的鯊魚工作小組會議中表示我國無鯊魚分種資料可提供，但我國國家報告中卻有分種資料，我國回應此乃因爲國家報告中的分種漁獲量資訊是在該小組會議後，依據去年 ISC 決議要求而估算完成，此爲第一次提交分種資料。

2. 加拿大代表提問有關我國小釣漁獲量在 2003 年以後大幅增加之原因，我國回答表示國外基地小釣船漁獲資料蒐集系統自 2003 年起有新改善，增加國外基地小釣漁獲量估值，故 2003 年後整體漁獲量有較大幅度的增加。

(三) 針對日本的國家報告內容，我國提問有關其 2009 年與 2010 年長鰭鮪漁獲體型差異甚大的原因，日本回答應該是 2004 至 2005 年強勢年級群加入量所致。

(四) 針對韓國國家報告，會中被問及其熱帶延繩釣之白皮旗魚漁獲量爲何比黑皮旗魚高，此與日本同漁業的漁獲趨勢相異，韓國代表回答將檢視此情形。另我國提問其國家報告 Table 4 中黑鮪的〝轉換後重〞欄位定義爲何？韓國代表回答該轉換係因該些年代之拍賣資料較不完整，因此有經由韓科學家詳細調查並進行

放大還原，而非處理重轉全重之還原。另針對我國之質疑其鮪釣船數在 2000 年代顯著下降，但漁獲量卻沒有下降現象，回應該船數下降應爲南太平洋鮪釣船。

四、主席報告表示過去一年的 ISC 相當忙碌，完成許多的工作項目，例如紅肉旗魚的資源評估、鯊魚的議題、ISC DATABASE 的建置、ISC 功能的 peer review 以及將來隨即要準備進行的黑皮旗魚資源評估，主席感謝日本主辦本次會議，並表示對 ISC 資料庫管理者、網站管理者以及各工作小組的感謝之意，以及感謝副主席孫志陸教授的協助。我團感謝主席這兩年之努力，使得 ISC 有明顯的改善，特別在統計資料及網頁上。

五、ISC 各魚種工作小組主席報告 ISC 11 至今各小組工作狀況及成果，相關管理建議等議題則在年會後續議程再行討論。

六、ISC 功能之同儕評鑑 (peer review of ISC function) 結果，由 Dr. Jerald S. Ault 進行報告。我團建議評鑑小組應透過訪談，瞭解 ISC 實務上之許多限制，另建議評鑑小組將所提出之眾多檢視及應改善項目訂定優先次序，以利 ISC 能循序落實並改善，而非僅提出一個願景。

七、會外接觸：

年會首晚由地主國日本舉辦 Ice Breaker，席間日本水產廳資源管理部首席漁業調整官 Takashi Koya 向我團長私下表示，渠等鑑於 WCPFC 因有 SPC 對南太平洋之強勢主張，長期恐對於北太平洋漁業有些不利，亦對 ISC 之組織功能造成排擠，故渠在考慮利用正在籌組中的北太平洋漁業委員會（NPFC），以修改公約方式，或可將鮪魚等高度洄游魚種納入該委員會，同時也考慮將 ISC 納入成爲其科學委員會，促使北太平洋漁業與 WCPFC 分割。渠強調現在應是適當時機，惟如何處理各 RFMOs 之關係，該國將會持續思考適當方式進行；我方表示將陳報該國此一想法。

7 月 19 日 (星期四)

一、各魚種資源狀況及保育建議分述如下：

(一) 長鰭鮪：

同 ISC11 所提，資源狀況健康，即非處過漁中(overfishing)，亦未過漁(overfished) ，惟尚未建立生物量參考點。保育建議如下：

1. 在目前(2006-2008 年)的補充量及漁獲死亡率水準下，資源量將維持健康。
2. 資源的穩定度未受到過漁的威脅，目前(2006-2008 年)漁獲死亡率約是 $F_{SSB-ATHL}$ 的 71%，且未來資源量預期達 400,000 公噸。
3. 假如未來的補充量自目前(2006-2008 年)的水準下降 25%，則 SSB 下降到比以 2006-2008 年水準爲門檻的 SSB-ATHL 低的風險將上升 54%。
4. 漁獲死亡率值提高至超過目前(2006-2008 年)水準將使資源產量無法像族群動量所預測般增加。
5. 目前的資源評估結果確認目前的漁獲死亡率比 2006 年資源評估結果低，此與 2006 年小組所提之建議內容一致。

(二) 太平洋黑鮪：

由於今年 5 月並未如期完成太平洋黑鮪資源評估，將於 11 月再次召開資源評估會議，俾期能在 2012 年結束前完成評估，且因目前尚未完成資源評估工作，故管理建議沿用 ISC 10 的建言：即太平洋黑鮪總漁獲量應低於 2002-2004 年間的平均水準以下，尤其是幼齡魚群。

(三) 紅肉旗魚（中西－北太平洋）：

目前資源已經有過漁現象(overfished)且正遭受過漁(overfishing)的狀態，根據新的資源投射分析結果顯示：

1. 若維持目前 F_{MSY}，自 2012 年到 2017 年產卵群生物量(spawning biomass) 將增加 45～72%。
2. 若維持每年總漁獲量在 2,500 公噸，則產卵群生物量將在 2017 年增加 133～223%。
3. 若維持每年總漁獲量在 3,600 公噸，則產卵群生物量將在 2017 年增加 48～120%。

4. 相較之下若維持目前漁獲量水準，則產卵群生物量將在 2017 年增加 14～29%。

5. 若維持 2001 年至 2003 年漁獲水準，則產卵群生物量將在 2017 年減少 2%。

其中小組主席報告之簡報上原本使用〝depleted〞一字表示資源之〝枯竭〞來取代〝overfished〞，但在鮪魚國際管理組織傾向使用〝overfished〞，因此我團建議使用〝overfished〞較爲適當，加拿大代表亦表示贊同我團建議，並獲大會接受。會後該小組主席對我團長表示，渠亦贊成用 overfished，當初係因其政府要求要用較嚴重的字眼來表達，才會採用 depleted。

(四) 劍旗魚：

本年度劍旗魚的資源評估資訊並無更新，將維持 ISC11 的管理建議：在 WCPO 及 EPO 水域兩系群之資源量均處健康 (healthy) 狀態。

二、回顧次要種群之資源現況：EPO 水域之黃鰭鮪、大目鮪及正鰹，WPO 水域之大目鮪及正鰹。

7 月 20 日 (星期五)

一、研討會：本研討會由地主國日本團團長 Dr. Nakano 擔任主持人，共有 4 項議題與主講人如次：

(一) 悲劇之後－311 後日本的漁業損失與恢復（Dr. Ai Kimoto）

(二) 魚類種群的恢復力模型：結合限制和開放的可能性（Dr. Jon Brodziak）

(三) 北太平洋鮪類資源制度轉移的影響（Dr. Hideki Nakano）

(四) 在氣候變遷下如何建立可持續的太平洋鮭魚適應性管理（Prof. Masahide Kaeriyama）

有關研討會中第(一)議題，顯示日本在 311 後有目標魚種轉換的現象，爰於會後私下問及海嘯後其各漁業的漁獲魚種組成是否有改變；主講人表示目前正處重建期間，也因目前災區漁業正處於重建階段，所能回收的資料相當有限，或是尚未進行更詳細的統計分析，故無足夠的漁獲分種資訊，惟目前可知目前漁港、冷凍廠等設備不足，此亦爲影響選擇漁民的作業目標魚種的原因之一 (目前日本中央政府、地

方政府以及當地漁民間對於災後復建的目標不盡相同)。

二、ISC 與 PICES 之交流：

(一) 由我國任 ISC 副主席孫志陸教授簡報去(2011) 年代表 ISC 受邀至 PICES 參加會議之情況。

(二) 由 ISC 主席轉述 PICES 邀請 ISC 出席 2012 年之會議，並討論後續是否有與 PICES 合作之議題，因 PICES 屬純科學之議題探討較無涉及資源評估。

1. 日本提出可透過邀請 PICES 學者於 ISC 年會研討會時段進行交流。
2. 我團則提出 PICES 中可能會有分析年齡成長之學者，可邀請參加 ISC 預定於 2013 年舉辦太平洋黑鮪及長鰭鮪年齡成長分析研討會，共同交流。

三、統計工作小組由小組主席於仁汾組長進行報告，簡述 2011 年至 2012 年小組工作主要成果，並以資料提交報告卡 （Reporting card）檢視各國資料提交之狀況，我國資料提交狀況良好。

（一）去年統計小組向全席會議建議會員國漁業資料採用線上系統提供，雖然今年部分會員國提送漁業資料遇到問題，但全席會議則肯定線上提送系統的功能，因此統計小組也會對於會員國所遭遇之線上資料提送問題進行改善以俾下年度歷史資料提送。

（二）ISC12 全席會議接受統計工作小組所提之以下建議：

1. 在 MOU 的前提下 ISC 主席著手與 IATTC 討論資料交換之履行機制。
2. 指示各會員國盡可能提供分種鯊魚資料，如無法提供分種資料亦須提供不分種之鯊魚漁獲量資料，並在 Category Ⅰ、Ⅱ資料繳交丟棄量資料。
3. 指示各會員國於 2013 年 7 月 1 日以前透過網路提交 ISC 關切魚種之 Category Ⅰ、Ⅱ、Ⅲ歷史資料，以修正目前資料庫中的錯誤。

（三）大會表示統計工作小組主席向 SPC 所取得有關中國與萬那杜之長鰭鮪北太平洋漁獲量資料年度間變動相當大，因此建議由統計小組主席在 WCPFC SC 會議中釐清該年間變動之漁業變化情況或該資料 SPC 計算有缺失。

7 月 23 日 (星期六)

一、ISC 13 將由韓國主辦，全席會議預定於 2013 年 7 月 17 日至 22 日在韓國釜山舉行，並預計 ISC 14 全席會議預定於 2014 年 7 月 16 日至 21 日舉行。另，爲因應今年黑鮪小組要到 11 月始能完成黑鮪資源評估及提出保育建議，而主席又希望能於 2012 年內討論確認，因此將於本年 12 月間召開一項年會會期間之臨時全席會議 (Intercessional Plenary Meeting)。

以下條列 ISC 12（2012 年 7 月）後至 2014 年間各會議時間和地點：

(一) 長鰭鮪工作小組：

1. 小組會議：2013 年 3 月 19 日至 25 日 (待定)。
2. ISC 13 全席會議前：2013 年 7 月 13 日至 14 日 (韓國釜山)。
3. 資料準備：2013 年 10 月 (待定)*。
4. 長鰭鮪與黑鮪之年齡成長會議：2013 年 11 月 (待定) *。
5. 資源評估：2014 年 4 月 14 日至 28 日 (美國加州 La Jolla)。

(二) 太平洋黑鮪工作小組：

1. 資料評估：2012 年 11 月 9 日至 16 日 (美國夏威夷)。
2. ISC 13 全席會議前：2013 年 7 月 15 日至 16 日 (韓國釜山)。
3. 長鰭鮪與黑鮪之年齡成長會議：2013 年 11 月 (待定) *。
4. 資料準備：2013 年 11 月 (待定) *。

*. 長鰭鮪及黑鮪合併舉行之年齡成長會議前後，將以同地點召開兩工作小組各自之相關會議。

(三) 旗魚工作小組：

1. 黑皮旗魚資料準備：2013 年 1 月 22 日至 29 日 (美國夏威夷)。
2. 黑皮旗魚資源評估：2013 年 5 月 21 日至 29 日 (日本)。
3. ISC 13 全席會議前：2013 年 7 月 15 日至 16 日 (韓國釜山)。
4. 劍旗魚資料準備：2013 年 12 月 (待定)。

(四) 鯊魚工作小組：

1. 水鯊資料準備：2013 年 1 月 (美國)。

2. 水鯊資源評估：2012 年 4 月 (日本清水)。

3. ISC 13 全席會議前：2013 年 7 月 12 日 (韓國釜山)。

4. 灰鯖鮫資料準備會議：2013 年 11 月 (待定)。

(五) 統計工作小組：

1. ISC 統計工作指導小組：2012 年 9 月 10 日至 12 日 (臺北)，將就統計小組所提出工作項目進行細部分工討論，9 月會議與會者亦將視相關工作進度後再決定是否需要在 3 月增開會議，原則上如無重大工作進度落後，將在明年 5 月份與旗魚小組會議合併於日本清水召開。

2. ISC 13 全席會議前：2013 年 7 月 10 日至 11 日 (韓國釜山)。

(六) 會期間臨時全席會議 (Intercessional Plenary Meeting)：因本年度太平洋黑鮪資源評估延至 2012 年 11 月會議時才可完成，將在 2012 年 12 月 17 日至 21 日這周間擇日進行網路視訊召集會議，以討論與確認相關文件內容，俾以實踐在 2012 年完成資源評估並提出保育管理建議之目標；同時亦進行討論 ISC 操作手冊 (Operations Manual) 的更新議題。

針對 ISC 每年魚種工作小組會議數多，我團發言表示 ISC 小組會議高於其他國際漁業組織，我國在預算縮減情況下，很難全數派員參與；主席表示該議題已多次被會員國提出，希望各小組主席注意會議時間的掌握與效率。此項討論亦列入會議紀錄。

二、由於各工作小組主席及成員這一年間有所變動，因此討論 ISC 組織表中各聯絡及代表人之修正；我方新增台大王慧瑜助理教授至太平洋黑鮪工作小組中，其餘並無異動，名單如次：

(一) 長鰭鮪工作小組：台大葉顯桓教授及高雄海洋科技大學陳志遠副教授。

(二) 旗魚工作小組：台大孫志陸教授及海大王勝平副教授。

(三) 太平洋黑鮪工作小組：台大許建宗教授及台大王慧瑜助理教授。

(四) 鯊魚工作小組：海大劉光明教授及海大黃向文教授。

(五) 統計工作小組：主席為對外漁協於仁汾組長、我方聯絡人員為陳忠佑先生。

(六) 大會副主席：台大孫志陸教授。

(七) 我團團長：本署遠洋漁業組林琇玲簡任技正。

三、今年度的 ISC 操作手冊 (operations manual) 有大幅度的更新，主要是爲因應外部審查的建議，爲資源評估小組之科學工作及科學報告內容，訂定一套準則（guidelines），並在資料提供上增加丟棄量。日本認爲改變幅度很大，且操作手冊算爲 ISC 之正式運作文件，因此希望給予時間與政府討論。美、韓、墨等國皆同意這些修正內容。我團則表示，原則上可以接受，但要確定「guideline」的意義不代表強制各魚種小組必須作到手冊中所新增的每一工作項目。加拿大支持。日本則表示，若能定義清楚準則不具強制性，他們就比較能同意。主席最後裁示，將此定義列入會議紀錄，以及在 12 月之會期間臨時年會再最後定案此手冊，以給予會員國一些時間考慮。爲此，ISC 主席辦公室將在 2012 年 8 月 30 日以前將修改過的版本提供給各會員國，而各國需在 2012 年 10 月 15 日以前提供意見。

四、各工作小組主席任期與選舉討論：

(一) 太平洋黑鮪小組日籍 Y. Takeuchi 目前已是第 2 任，任期將於 2013 年屆滿且依規定無法連任，屆時將需改選新任小組主席。

(二) 大會主席 Dr. Gerard DiNardo 第 1 任之任期將於 2013 年屆滿，屆時將進行改選。

五、ISC 網站：網站在 ISC 11 後經網站管理員及大會主席秘書等努力下已有多項進展，像是會議時程、工作小組的文件與報告、漁獲量統計、組織架構及提出之建議等的刊載，資訊已漸透明化；各國均予以肯定。

六、其他事項：

(一) 爲確定長鰭鮪及黑鮪之年齡成長參數之正確性，降低評估所需參數之不確定性，並在各國間進行相關生物學之資訊交流，大會同意於 2013 年 11 月間舉辦北太平洋長鰭鮪與黑鮪年齡成長工作小組會議。

(二) 孫志陸教授提出將在 2013 年 5 月 6 日至 10 日於台北舉行下一屆的國際旗魚研討會，且 ISC 在此研討會將扮演贊助者的角色，並期望各會員國能多參與及贊助。

(三) 韓國代表向主席表示目前的 ISC 組織署名文件中僅有美、日兩國，故請主席確認是否有該兩國以外署名承認 ISC 的文件證據存在，若無該文件，建議各與會國應簽署一正式的文件。主席表示 ISC 大多數的會員都有簽署中西部太平洋高度洄游性魚種資源保育公約 (MHLC 公約)，ISC 是 NC 之科學服務組織，在這樣的架構下是否隱含 ISC 之會員組成將再進一步確認。

7 月 24 日 (星期日) 休會

7 月 25 日 (星期一)

本日會議進行會議報告文字修正，經會員國充分討論以及修正後，大會通過本次會議報告。

參、心得與建議

一、本次會議主要結果謹摘要如次：

(一) ISC 主要關切魚種之資源狀況及保育意見（conservation advice）：

1. 長鰭鮪工作小組：資源狀況健康。資源評估結果確認目前的漁獲死亡率比 2006 年資源評估結果低，此與 2006 年小組所提之建議內容一致。
2. 太平洋黑鮪工作小組：今年 5 月未完成資源評估，將於 11 月再次召開資源評估會議，管理建議沿用 ISC 10 的建言：即太平洋黑鮪總漁獲量應低於 2002-2004 年間的平均水準以下，尤其是幼齡魚群。
3. 旗魚工作小組：
   (1) 紅肉旗魚：目前資源已經有過漁現象且正過漁中。根據新的資源投射分析結果，以 1994 至 2008 年爲基礎，做資源加入量抽樣估算顯示，2012 至 2017 年資源加入量有回復跡象，若維持目前 MSY，自 2012 年到 2017 年產卵群生物量將增加 45～72%。

(2) 劍旗魚：資源評估資訊無更新，將維持 ISC11 的管理建議：在中西及東太平洋水域兩系群之資源量均處健康狀態。

(二) 統計工作小組：今年起採以資料提交報告卡（Reportcard）檢視各國資料提交之狀況，我國資料提交狀況良好。大會並接受統計工作小組主席所提之 3 項建議。

(三) ISC 運作手冊（Operational Manual）更新：有大幅度的更新，主要是爲因應外部審查的建議，爲資源評估小組之科學工作及科學報告內容，訂定一套準則（guidelines），並在資料提供上增加丟棄量。後續大會會再請各國進行修訂後版本之檢視。

(四) ISC 網站：經網站管理員及大會主席秘書等努力下已有多項進展，資訊已漸透明化；各國均予以肯定。

(五) 明年度會議：明年年會預訂於 2013 年 7 月 17 至 22 日由韓國主辦，並進行太平洋黑鮪工作小組主席及 ISC 大會主席改選事宜。此外，ISC 將於 ISC 13 前完成太平洋黑鮪、黑皮旗魚及水鯊資源評估工作，並召開長鰭鮪小組及統計工作指導小組相關會議。

(六) 其他重要事項：

1. 會期間臨時全席會議 (Intercessional Plenary Meeting)：因本年度太平洋黑鮪資源評估延至 2012 年 11 月會議時才可完成，將在 2012 年 12 月 17 日至 21 日這周間擇日進行網路視訊召集會議，以討論與確認相關文件內容，俾以實踐在 2012 年完成資源評估並提出保育管理建議之目標；同時亦進行討論 ISC 操作手冊的更新議題。
2. 爲確定長鰭鮪及黑鮪之年齡成長參數之正確性，降低評估所需參數之不確定性，並在各國間進行相關生物學之資訊交流，大會同意於 2013 年 11 月間舉辦北太平洋長鰭鮪與黑鮪年齡成長工作小組會議。
3. 年會首晚由日本水產廳資源管理部首席漁業調整官 Takashi Koya 向我團長私下表示，渠在考慮利用正在籌組中的北太平洋漁業委員會（NPFC），以修改公約方式，或可將鮪魚等高度洄游魚種納入該委員會，同時也考慮將 ISC 納入成爲其科學委員會，促使北太平洋漁業與 WCPFC 分割。

二、有關 ISC13 已確認由韓國主辦，鑑於我國前於 2009 年主辦過 ISC9 後，會議已由加拿大、美國、日本與韓國等各國輪辦，可能在 ISC13 前主席會詢問我國或中國大陸接辦 ISC14 之意願，我國應留意相關發展並預擬立場。

三、近年來國際組織相當重視基礎魚類生物學研究，其中 ISC 所關切北太平洋黑鮪以及長鰭鮪將在 2013 年召開基礎耳石判讀研討會，以往相關研究在國內僅委由國內大專院校學者進行，研究能量尚有不足；未來如能結合國內試驗單位（如水產試驗研究所）的研究人員投入進行相關研究，藉由研究成果之交流，促使國內學界及試驗單位參與研究並進一步參加國際組織的相關會議，將可提升我國漁業科學研究之發展。

四、ISC 將於未來一年間完成太平洋黑鮪、黑皮旗魚及水鯊資源評估工作，另將進行長鰭鮪小組及統計工作指導小組相關會議，我國需派員積極參與。

五、鮪類及類鮪類等高度洄游魚種係依聯合國海洋法公約有關跨界及高度洄游魚類種群保育與管理協定（UNFSA）由各區域漁業組織管理，鑒於 ISC 屬 WCPFC 之 NC 的科學單位，對於北太平洋之鮪旗魚類負有資源評估及管理建議之責，而我國同為 ISC 及 WCPFC 重要成員，未來應加強資料蒐集交換及資源評估，俾提供管理建議，以利相關魚種之保育與管理。

肆、附件

附件一、ISC 12 我國提報之國家報告

12th Meeting of the ISC
July 18-23, 2012
Sapporo, Japan

ISC/12/Plenary/09

Taiwanese Tuna and Tuna-like Fisheries in the North Pacific Ocean[1]

Fisheries Agency, Council of Agriculture, Taipei, Taiwan

July 2012

[1] Working paper is prepared for the 12th annual meeting of the International Scientific Committee for Tuna and Tuna-like Species in the North Pacific Ocean (ISC) held in Sapporo, Japan on 18-23 July 2012. This paper shall not be cited without authors' permission.

Taiwanese Tuna and Tuna-like Fisheries in the North Pacific Ocean

Fisheries Agency, Council of Agriculture, Taipei, Taiwan

Introduction

Taiwanese tuna fisheries are comprised of two major fisheries, longline, and purse seine fisheries, and other small scale fisheries, such as harpoon, set net, gill net in the North Pacific Ocean (North of equator). Longline and purse seine fisheries occupy around 99% of the total tuna catch of Taiwanese fisheries. For longline fishery, it consists of large-scale tuna longline fleet (LTLL, previous named DWLL, $\geqq$100 GRT) and small-scale tuna longline fleet (STLL, previous named OSLL, $<$100 GRT). The total catch of tunas and billfish (including swordfish, striped marlin, blue marlin, black marlin, and sailfish) for longline fishery (including the catch of LTLL and STLL) in the North Pacific Ocean was 31,774 mt (metric ton) in 2011. The active vessels of LTLL operating in the Pacific Ocean in 2011 were 95 and STLL were 1,376. For purse seine fishery, the total catch was 175,935 mt caught by 34 vessels in the Pacific Ocean in 2011. This paper described the recent trend of Taiwanese tuna fishery in the North Pacific Ocean, and purse seine fishery in the Pacific Ocean.

1. Fisheries Monitoring

1.1. Tuna Longline fishery

1.1.1 Large-scale tuna longline fleet

Large-scale tuna longline (LTLL) vessels refer to those vessels larger than or equal to 100 gross register ton (GRT). Those vessels mostly operate in the high sea areas or in the EEZs of coastal countries under fisheries cooperation agreements. Table 1 shows the number of Taiwanese vessels actually engaged in fishing in the Pacific Ocean from 2005 to 2011. For the purpose of sustainable use of fishery resources, Taiwan imposed a fleet size reduction program on its large-scale tuna longline vessels from 2005 to 2007. Through this program, 32 large-scale tuna longline vessels were reduced in the Pacific Ocean during 2005 - 2007. The number of active vessels reached low level in 2008 and 2009 for high fuel price with some fishing vessels ceasing operation temporarily, and the vessel number returned to 90 in 2010 and slight increased to 95 fort some shifting from Indian Ocean for pirate issue in 2011.

Table 2 shows catch and effort of Taiwanese LTLL vessels operated in North Pacific Ocean during 1997-2011. Before mid 90s, the catch and effort of albacore in the North Pacific was very low. Thereafter, because of constraint of accessing agreements in the South Pacific, the fishing effort in the North Pacific shows increased trend from 1997 to 2004. Since 2005, due to reasons as the above mentioned, the fishing efforts reduced year by year. The active vessels targeting albacore in the North Pacific Ocean decreased from 24 in 2006, 21 in 2007, 18 in 2008, to 13 in 2009, but increased respectively to 20 and 21 in 2010 and 2011.

From 1997 to 2000, albacore is the main catch of Taiwanese LTLL in the North Pacific Ocean, occupied more than 70% of total catch, but since 2001, the catch of bigeye tuna, yellowfin tuna and swordfish increased significantly. The albacore catch in 2009 and 2010 was estimated as 1,866

mt and 2,281 mt respectively. The catch in 2011 was preliminarily estimated as 2,972 mt. For LTLL, Pacific bluefin tuna is just incidentally caught, and the amount has been very minor. Before 2000, the catch of swordfish in the North Pacific was low and less than 100 mt. Thereafter, the catch increased substantially to more than 1,000 mt from 2001 to 2003 for the increase of fishing efforts on bigeye tuna, but declined to less than 500 mt from 2005 to 2009 due to reducing efforts. The catch of swordfish increased to more than 500 mt since 2010, the catch of swordfish was 502 mt in 2011.Table 3 shows sharks catch by species for Taiwanese LTLL operated in the North Pacific Ocean during 2009-2011. The annual sharks total catch was preliminary estimated as 1,302 mt in 2011.

The length frequency of albacore, swordfish caught by LTLL in the North Pacific are shown in Figure 1 and Figure 2. For LTLL, the catch at length data is from logbook. Fishermen are requested to measure the length of the first 30 fish caught each day. The amount of length measurement for albacore from 2009 to 2011 was 25,360, 19,368 and 13,713. The predominant size range for albacore caught by LTLL from 2009-2011 were 88-98cm, 86-98cm and 82-94cm in fork length. The length measurement for swordfish is measured from low jaw fork length and the amount of length measurement from 2009-2011 was 2,705, 4,303 and 3,305 separately. The dominant size range for swordfish caught by LTLL from 2009-2011 was 152-170cm, 150-174cm and 154-172cm.

The distribution of fishing efforts of Taiwanese LTLL vessels operating in the Pacific Ocean during 2009-2011 is shown in Figure 3. These vessels fish for northern albacore seasonally from September to March of the following year, and shift to the South Pacific for southern albacore from April to August. In 2011, the distribution of fishing effort for Taiwanese LTLL operated in the North Pacific Ocean concentrate on the area 165-180° W and 0-15° N compared with 2009 and 2010.

1.1.2 Small-scale tuna longline fleet

The small-scale tuna longline (STLL) vessels generally refer to those vessels smaller than 100 GRT (mostly 50-70 GRT). Table 4 shows catch of domestic-based and foreign-based STLL vessels operated in the North Pacific by species from 1997 to 2011. The main catch of STLL vessels is yellowfin tuna rather than albacore. The catch of albacore fluctuated between 450 and 930 mt within recent ten years. A preliminary estimated catch of albacore in 2011 was 462 mt. The catch of swordfish fluctuated between 1,200 mt to 4,000 mt from 1997 to 2010. The catch of swordfish in 2011 was preliminary estimated as 3,075 mt. As for Pacific bluefin tuna, in 2008, the catch was 979 mt, but in 2009 and 2010 it declined to 877 and 373 mt. The preliminary estimated catch in 2011 was 292 mt. Table 5 shows sharks catch by species for Taiwanese STLL operated in the North Pacific Ocean during 2009-2011. The annual sharks total catch was preliminary estimated as 17,903 mt in 2011.

The length frequency of albacore, swordfish, and Pacific bluefin tuna caught by STLL vessels in the North Pacific are shown in Figure 1, Figure 2, and Figure 4 separately. For STLL , the size measurements for albacore, swordfish and Pacific bluefin tuna were sampled from domestic fishing ports. The amount of size measurements for albacore from 2009-2011 were 724, 601 and 851. The dominant size range for albacore caught by STLL from 2009-2011 was 88-102cm, 88-100cm and 86-100cm. Since the low jaw of swordfish was generally cut on board, eye-fork length was then measured instead. The amount of length measurement for swordfish from 2009-2011 was 1,491, 1,225 and 995. The dominant size range for swordfish caught by STLL from

2009-2011 was 90-180cm, 100-165cm and 95-145cm, separately. The amount of size measurements for Pacific bluefin tuna from 2009-2011 were 2,845, 1,335 and 952. The dominant size range for Pacific bluefin tuna caught by STLL from 2009-2011 was 215-245cm, 220-250cm and 225-245cm.

The distribution of fishing efforts for STLL vessels based at domestic ports from 2009 to 2011 is shown in Figure 5. The fishing area mainly distributed between north of equator and south of 40 ^{o}N and between eastern of 120 ^{o}E and western of 165 ^{o}W.

1.2. Distant water purse seine fishery

Tuna purse seine fishery was introduced into Taiwan in 1982. At the outset second-hand Japanese group purse seiners were imported and Japanese fishing masters were employed. Through years of research, the first single boat purse seiner was launched in October 1984, as the cornerstone for rapid development of this fishery in the following 10 years. In 1992 the number of purse seiners reached to the highest level of 45 boats. Due to the adjustment of business strategy of some companies, the number of fishing vessels was then reduced to 42. The fleet further reduced to 34 vessels in 2003, after 8 vessels were exported.

Fishing operations of the fleet moved along the equator under a seasonal pattern, mainly concentrating in the exclusive economic zones of Papua New Guinea, Federated States of Micronesia, Kiribati, Nauru, Marshall Islands and Solomon Islands, as well as the neighboring high seas. In the years where El Niño phenomena occur the fish tends to move eastwards and the fishing activities will follow the pattern of this movement. In contrary, in years of La Niña, fish schools tend to concentrate more in the western part of the Pacific, and likewise do the fishing activities.

In 2011, the number of active distant water purse seine vessels was 34. The fleet distribution was within the areas 5^{o}N-10^{o}S, and between 142^{o}E-168^{o}W of the western and central Pacific Ocean (Figure 6). The total catch by purse seine fishery in 2011 was 175,935 mt (Table 6), which was 11.5% lower than the catch of 198,851 mt in 2010. Fishing effort and catch by species for Taiwanese DWPS operated in the North Pacific Ocean is shown as table 7.

1.3 Other fisheries

Some other small scale fisheries, such as harpoon, set net and gill net may also catch tunas and tuna-like species in the Taiwanese coastal and offshore waters. Table 8 shows the annual catch of 2011 for Taiwanese small scale coastal and offshore fisheries in the North Pacific Ocean. The total catch of tunas and tuna-like species of these fisheries was estimated about 3,320 mt in 2011.

2. DATA COLLECTION

2.1 Tuna longline fishery

2.1.1 Large-scale tuna longline fleet

Two types of fisheries statistical data are routinely collected for LTLL: the commercial data (for estimation of total catches), and the logbook data (for stock assessment purposes). Several sources of commercial information were available including traders, Taiwan Tuna Association, certified weight reports provided by the Organization for the Promotion of Responsible Tuna Fisheries (OPRT) and so on. After cross-checking and compilation, the commercial information was used to estimate total catches of the Category I data.

The logbook data includes each set of catch in number and weight by species, effort deployment, fishing location, as well as the length measurement of the first 30 fishes caught each day. Categories II and III data were all compiled based on this data set.

2.1.2 Small-scale tuna longline fleet

Two categories of STLL are defined: one is that station and unload their catches at domestic fishing ports (domestic-based STLL), and the other is that station and unload catches at foreign ports (foreign-based STLL). For domestic-based STLL, the landing records from local fishing markets provide the best information for estimating the ISC Category I data. For foreign-based STLL, preliminary estimations of Category I data were based on fishing vessels activities, import statistics of Japanese markets and monthly catch report.

Since 1997, logbooks of STLL have been collected, and port sampling at domestic fish markets has also been strengthened by collecting size data of major tuna species (mainly bigeye tuna and yellowfin tuna). However, at the beginning, the recovery rate of logbook was about 2% - 5% which was too low to be compiled for Category II data, and insufficient for stock assessment. To improve the recovery rate of logbook, Fisheries Agency have launched a data improving program by dispatching its staffs to collect logbooks, to interview with fishermen so as to obtain fisheries information, and to conduct size sampling program at main domestic fishing ports of Tong-Kang, Suao and Sin-Kang since April 2007. Through the program, the recovery rate of logbook was improved to 18% in 2011.

For the purpose of conservation and management of Pacific bluefin tuna resource and well collection of catch data, Fisheries Agency has imposed a Catch Documentation Scheme (CDS) since March 2010. According to the regulation, all vessels fishing for Pacific bluefin tuna shall be authorized by Fisheries Agency every year and satellite based vessel monitoring system (VMS) is required to be installed on board. Once Pacific bluefin tuna was caught, fisher shall attach a tag issued by Fisheries Agency to each Pacific bluefin tuna, record the number and individual weight of Pacific bluefin tuna. The record shall be reported to Fisheries Agency on a daily basis. When the catch of Pacific bluefin tuna is landing, Fisheries Agency would dispatch its staffs to fishing ports to measure individual weight and length. In addition, Catch Documentation shall be validated by local authorities before the first sale whether the catch is for

domestic consumption or for export. Through the program, the data collection of individual weight and length of Pacific bluefin tuna has reached 100% in 2010 and 2011.

2.2 Distant water purse seine fishery

The logbook recovery rate for distant water purse seine fishery has always been satisfactory, reaching 100% since the development of the fishery.

2.3 Other fisheries

The annual catch data of small scale coastal and offshore fisheries was collected from yearbook directly. For collecting information and developing estimation system of these coastal and offshore fisheries, a new program is under construction.

2.4 Observer program

For the purposes of better understanding the fishing activities of the longline fishery, including target and non-target fish species and to be in line with the international requirement for conserving marine resources, Fisheries Agency has launched a pilot observer program since 2001 in the Indian Ocean. Table 9 shows the number of observational trips in each year during 2002-2011. The observer program has been carried out in Pacific Ocean since 2002. In accordance with the government's policy in establishing an observers program and availability of budgets to support the increase of observers, the observational trips gradually increased year by year. The number of observation trips was 19 in 2011.

The duty of observer on board is to collect catch and effort data, and biological data, such as otoliths, gonads and muscles.

2.5 VMS monitoring

Vessel monitoring system (VMS) has been installed voluntarily on some longliners prior to 2005. Since 2005, all of Taiwanese large-scale tuna vessels were required to install VMS. In addition to monitoring fishing activities, those data were also used to verify logbook data for improving data quality.

3. RESEARCH

For the purpose of improving stock assessment of species in the North Pacific, government of Taiwan has commissioned scientists to conduct a series of researches as follows：

1. Research on the catch at size/age and CPUE standardization of North Pacific albacore.
2. Research on CPUE standardization of Pacific bluefin tuna.
3. Studies on CPUE standardization and stock assessment of swordfish, blue marlin and striped marlin.
4. Environmental effects on blue marlin and striped marlin CPUE in the North Pacific.
5. Research on CPUE standardization of bigeye and yellow fin tuna.
6. Billfish and tuna tagging program.
7. Population chracteristics of longtail tuna (*Thunnus tonggol*).
8. Estimation of historical catches and standardization of CPUEs for dominant sharks.
9. Estimation on the ratio between fins and body weight, and growth parameters for shark by-catch species in Pacific Ocean.
10. Research on Incidental Catch of Ecological Related Species by Taiwanese Distant Water Tuna Longline Fisheries.

And the scientific papers presented at recent ISC meetings were as follows:

1. Reproductive biology of the blue shark, Prionace glauca, in the northwestern Pacific. (ISC/11/SHARKWG-2/12)
2. Stock assessment of striped marlin (*Kajikia audax*) in the western and central North Pacific Ocean using an age-structured model. (ISC/11/BILLWG-3/02)
3. A sensitivity study for striped marlin (*Kajikia audax*) in the western and centeral North Pacific Ocean using an age-structured model (ASPM). (ISC/11/BILLWG-3/06)
4. A review of Taiwan's blue marlin fisheries in the Pacific Ocean, 1958-2010. (ISC/12/BILLWG-1/04)
5. Standardized catch-rates of blue marlin for Taiwanese distant-water longline fishery in the Pacific Ocena for 1964-2010. (ISC/12/BILLWG-1/05)
6. A review of life history parameters for the Pacific Blue Marlin. (ISC/12/BILLWG-1/06)
7. Activities and data collection of Pacific Bluefin tuna by Taiwanese fishery. (ISC/12/PBFWG-2/13)
8. Abundance index of Pacific Bluefin tuna (*Thunnus orientalis*) by Taiwanese small-scale longline fleet in the southwestern North Pacific Ocean. (ISC/12/PBFWG-2/14)
9. The catch of shark caught by Taiwanese offshore longline fisheries in 2001-2010 (ISC/12/SHARKWG-1/10)
10. Age and growth of the blue shark, *Prionace glauca*, in the central and south Pacific (ISC/12/SHARKWG-1/16)

Table 1. Number of Taiwanese tuna fishing vessels operated in the Pacific Ocean

Fishery / Year	Longline Fishery		Purse Seine Fishery
	LTLL	STLL	
2005	133	1,420	34
2006	104	1,490	34
2007	90	1,750	34
2008	84	1,260	34
2009	75	1,220	33
2010	90	1,236	34
*2011	95	1,376	34

LTLL: large scale tuna longline vessel, STLL: small scale tuna longline vessel

Table 2. Fishing effort and catch by species for Taiwanese LTLL operated in the North Pacific Ocean

Unit: MT

Year	Hooks	ALB	PBF	BET	YFT	SWO	MLS	BUM	BLM	SFA	SKJ	TOTAL
1997	5,254,704	9,119	-	112	41	15	59	20	1	13	72	9,452
1998	9,752,453	8,617	-	156	39	20	90	21	5	34	444	9,426
1999	15,129,625	8,186	-	360	122	70	66	53	8	5	114	8,984
2000	24,950,519	7,898	-	1,450	584	325	153	75	19	49	195	10,748
2001	22,232,830	7,852	-	4,569	1,882	1,039	121	209	4	4	243	15,923
2002	32,474,088	7,055	-	7,257	2,689	1,633	251	138	5	1	16	19,045
2003	20,676,890	6,454	-	2,936	1,105	1,084	241	218	4	7	40	12,089
2004	34,997,887	4,061	-	4,939	1,230	884	261	372	2	11	191	11,951
2005	29,897,156	3,990	-	3,963	1,552	392	199	376	15	63	175	10,725
2006	22,532,898	3,848	1	2,756	1,035	438	204	363	5	11	8	8,669
2007	20,775,642	2,465	-	2,965	657	345	102	275	1	2	3	6,815
2008	17,301,213	2,490	0.16	2,840	484	338	78	255	1	20	129	6,635
2009	11,789,456	1,866	-	2,302	303	373	37	225	0	8	175	5,289
2010	16,415,997	2,281	-	3,139	467	531	53	409	32	4	44	6,960
*2011	24,739,013	2,972	-	3,318	448	502	74	675	16	40	85	8,131

Species -- Albacore (ALB), Pacific bluefin tuna (PBF), bigeye tuna (BET), yellowfin tuna (YFT), swordfish (SWO), striped marlin (MLS), blue marlin (BUM), black marlin (BLM), sailfish (SFA), skipjack tuna (SKJ)

* Data of 2011 is still preliminary

Table 3. Shark catch by species for Taiwanese LTLL operated in the North Pacific Ocean

Unit: MT

Year	BSH	FAL	SMA	OCS	THR	SPN	POR	SKX	TOTAL
2009	417	155	78	32	10	-	0	29	721
2010	238	109	54	21	9	3	0	11	445
*2011	670	289	208	54	43	9	0	29	1,302

Species -- blue shark(BSH), silky shark(FAL), shortfin mako sharks(SMA), oceanic whitetip(OCS), thresher sharks(THR), hammerhead sharks(SPN), porbeagle shark(POR), other sharks&rays(SKX).

* Data of 2011 is still preliminary

Table 4. Tuna and billfish catch by species for Taiwanese STLL operated in the North Pacific Ocean

Unit: MT

Year	PBF		ALB		BET		YFT		SKJ	
	domestic-based	foreign-based	domestic-based	foreign-based	domestic-based	foreign-based	domestic-based	foreign-based	domestic-based	foreign-based
1997	1,814	-	337	-	3,506	-	9,419	-	59	-
1998	1,910	-	193	-	3,520	-	8,955	-	32	-
1999	3,089	-	207	-	2,578	-	8,961	-	27	-
2000	2,780	-	944	-	2,041	-	7,848	-	31	-
2001	1,839	-	832	-	1,898	-	8,166	-	26	-
2002	1,523	-	910	-	2,150	-	9,145	-	67	-
2003	1,863	0	712	0	2,299	3,837	10,567	5,122	14	0
2004	1,714	0	927	0	1,340	2,727	7,756	4,861	32	0
2005	1,368	0	477	5	1,425	3,889	8,219	3,962	33	0
2006	1,148	0	453	16	887	5,317	7,027	6,089	24	0
2007	1,401	0	321	130	1,188	3,887	6,792	5,093	17	0
2008	979	0	353	226	722	5,333	7,886	4,681	15	0
2009	877	0	320	192	859	2,948	9,048	4,074	66	0
2010	373	0	401	136	427	1,540	9,950	3,742	169	0
*2011	292	0	358	104	602	2,167	8,090	3,292	235	0

Year	SWO		MLS		BUM		BLM		SFA	
	domestic-based	foreign-based	domestic-based	foreign-based	domestic-based	foreign-based	domestic-based	foreign-based	domestic-based	foreign-based
1997	1,358	-	290	-	3,625	-	611	-	527	-
1998	1,178	-	205	-	3,603	-	469	-	868	-
1999	1,385	-	128	-	3,362	-	563	-	402	-
2000	1,531	-	161	-	4,056	-	453	-	499	-
2001	1,691	-	129	-	4,524	-	428	-	640	-
2002	1,557	-	226	-	4,310	-	173	-	504	-
2003	2,196	1,491	91	590	4,289	3,178	305	805	380	1,699
2004	1,828	1,536	95	166	3,354	2,946	620	886	514	1,567
2005	1,813	1,759	76	508	3,949	3,305	636	508	709	624
2006	2,587	1,357	87	450	3,842	1,524	275	686	425	63
2007	2,907	847	133	66	3,230	1,612	215	44	527	532
2008	2,471	936	144	48	3,347	1,875	202	47	348	570
2009	2,323	854	170	55	3,210	1,203	259	39	330	42
2010	1,917	396	173	27	3,553	997	333	50	814	146
*2011	2,501	574	236	33	3,257	693	311	24	798	78

Species -- Pacific bluefin tuna (PBF), albacore (ALB), bigeye tuna (BET), yellowfin tuna (YFT), skipjack tuna (SKJ), swordfish (SWO), striped marlin (MLS), blue marlin (BUM), black marlin (BLM), sailfish (SFA).

* Data of 2011 is still preliminary

Table 5. Shark catch by species for Taiwanese STLL operated in the North Pacific Ocean

Unit: MT

Year	BSH		FAL		SMA		OCS		THR	
	domestic-based	foreign-based	domestic-based	foreign-based	domestic-based	foreign-based	domestic-based	foreign-based	domestic-based	foreign-based
2009	9,680	1,444	178	212	405	72	8	7	549	79
2010	6,720	712	132	14	562	58	6	1	452	46
*2011	11,377	1,070	160	56	890	86	2	0.22	720	68

Year	SPN		POR		SKX	
	domestic-based	foreign-based	domestic-based	foreign-based	domestic-based	foreign-based
2009	483	69	0	0	2,815	402
2010	289	31	0	0	1,731	194
*2011	354	34	0	0	2,807	280

Species -- blue shark(BSH), silky shark(FAL), shortfin mako sharks(SMA), oceanic whitetip(OCS), thresher sharks(THR), hammerhead sharks(SPN), porbeagle shark(POR), other sharks&rays(SKX).

* Data of 2011 is still preliminary

Table 6. Fishing effort and catch for Taiwanese DWPS operated in the Pacific Ocean

Unit: MT

Year	Fishing days	SKJ	YFT	BET	Total
2005	4,823	165,289	27,572	2,178	195,039
2006	4,493	189,392	19,793	978	210,163
2007	4,873	209,002	21,147	2,386	232,535
2008	4,783	165,007	35,770	3,196	203,973
2009	4,363	173,725	16,237	2,113	192,075
2010	5,129	166,211	29,203	3,437	198,851
*2011	5,359	155,641	18,143	2,151	175,935

DWPS: distant water purse seiner

Species -- skipjack tuna (SKJ), yellowfin tuna (YFT), bigeye tuna (BET).

* Data of 2011 is still preliminary

Table 7. Fishing effort and catch by species for Taiwanese DWPS operated in the North Pacific Ocean

Unit: MT

Year	Fishing days	ALB	PBF	BET	YFT	SWO	MLS	BUM	BLM	SFA	SKJ	TOTAL
2005	-	-	-	1,167	11,166	-	-	-	-	-	69,500	81,833
2006	1,873	-	-	182	7,717	-	-	-	-	-	75,442	83,341
2007	2,082	-	-	564	8,037	-	-	-	-	-	87,232	95,833
2008	1,370	-	-	1,243	9,994	-	-	-	-	-	50,587	61,824
2009	1,859	-	-	568	6,319	-	-	-	-	-	69,026	75,913
2010	1,370	-	-	121	1,215	-	-	-	-	-	42,397	43,733
*2011	1,463	-	-	724	4,037	-	-	2	3	-	42,796	47,562

DWPS: distant water purse seiner

Species -- Albacore (ALB), Pacific bluefin tuna (PBF), bigeye tuna (BET), yellowfin tuna (YFT), swordfish (SWO), striped marlin (MLS), blue marlin (BUM), black marlin (BLM), sailfish (SFA), skipjack tuna (SKJ).

* Data of 2011 is still preliminary

Table 8. The annual catch of 2011 for Taiwanese small scale coastal and offshore fisheries in the North Pacific Ocean

Unit: MT

Fosheries	PBF	ALB	BET	YFT	SKJ	SWO	MLS	BUM	BLM	SFA	SSP	SKX	TOTAL
Offshore Gillnet	0	0	0	0	2	9	0	2	0	0	-	125	138
Offshore Others	1	2	29	160	566	1	4	8	0	25	-	307	1,103
Coastal Gillnet	7	1	1	15	65	8	27	16	80	264	-	277	761
Coastal Setnet	16	0	0	9	537	8	1	3	1	60	-	11	646
Coastal Harpoon	0	0	0	0	52	95	17	124	240	0	-	1	529
Costal Longline	0	0	0	0	98	0	0	0	0	0	-	20	118
Coastal Others	0	0	0	11	-	0	0	0	0	0	-	14	25

Species -- Pacific bluefin tuna (PBF), albacore (ALB), bigeye tuna (BET), yellowfin tuna (YFT), skipjack tuna (SKJ), swordfish (SWO), striped marlin (MLS), blue marlin (BUM), black marlin (BLM), sailfish (SFA), shortbill spearfish (SSP), other sharks&rays(SKX).

Data of 2011 is still preliminary

Table 9. Observational trips of observer program in Pacific Ocean during 2002-2011

Year	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Observational trips	1	3	4	5	10	15	14	22	25	19

LTLL STLL

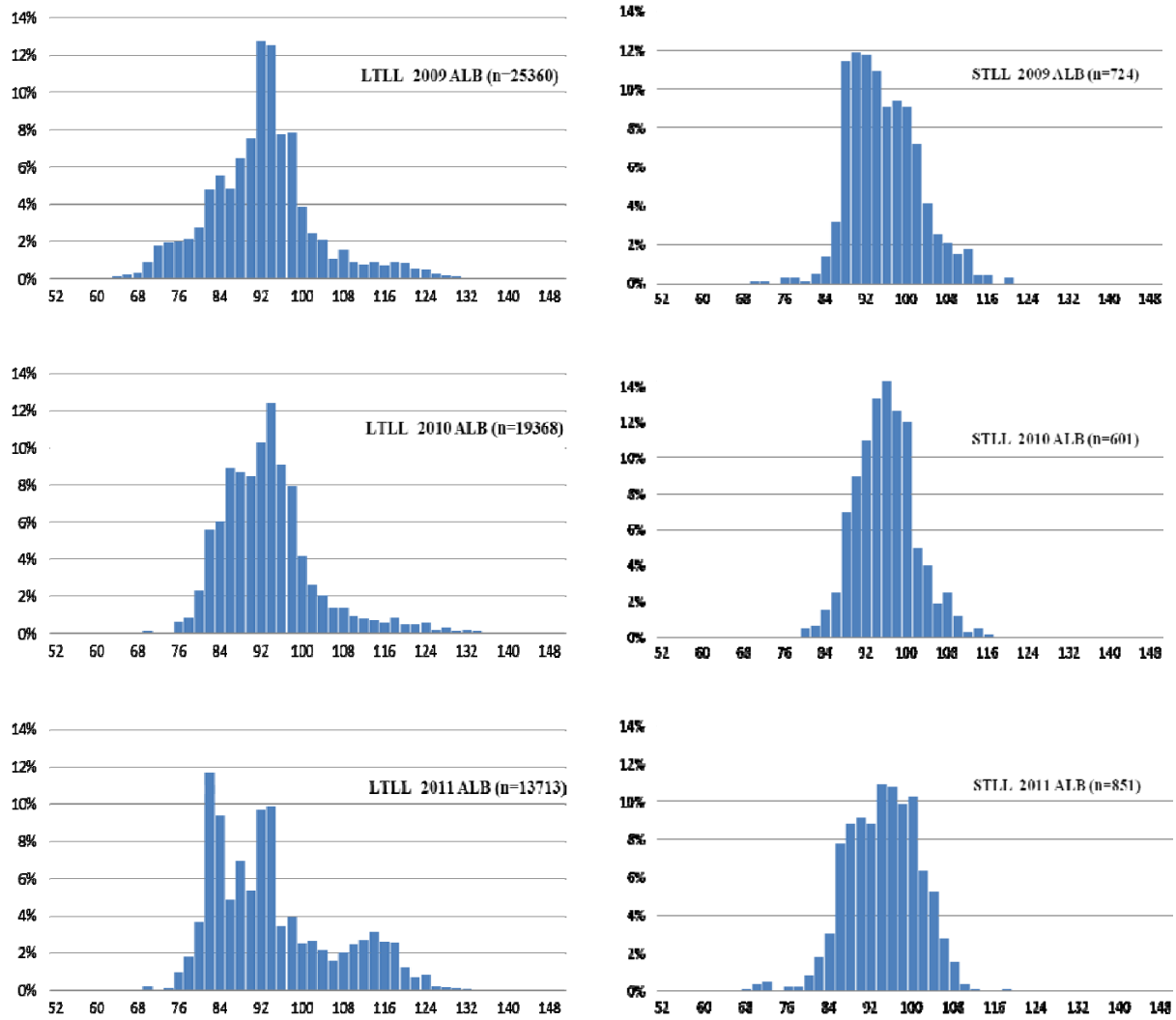


Figure 1. Length frequency distribution of albacore caught by Taiwanese LTLL and STLL vessels in the North Pacific Ocean during 2009-2011.

LTLL STLL

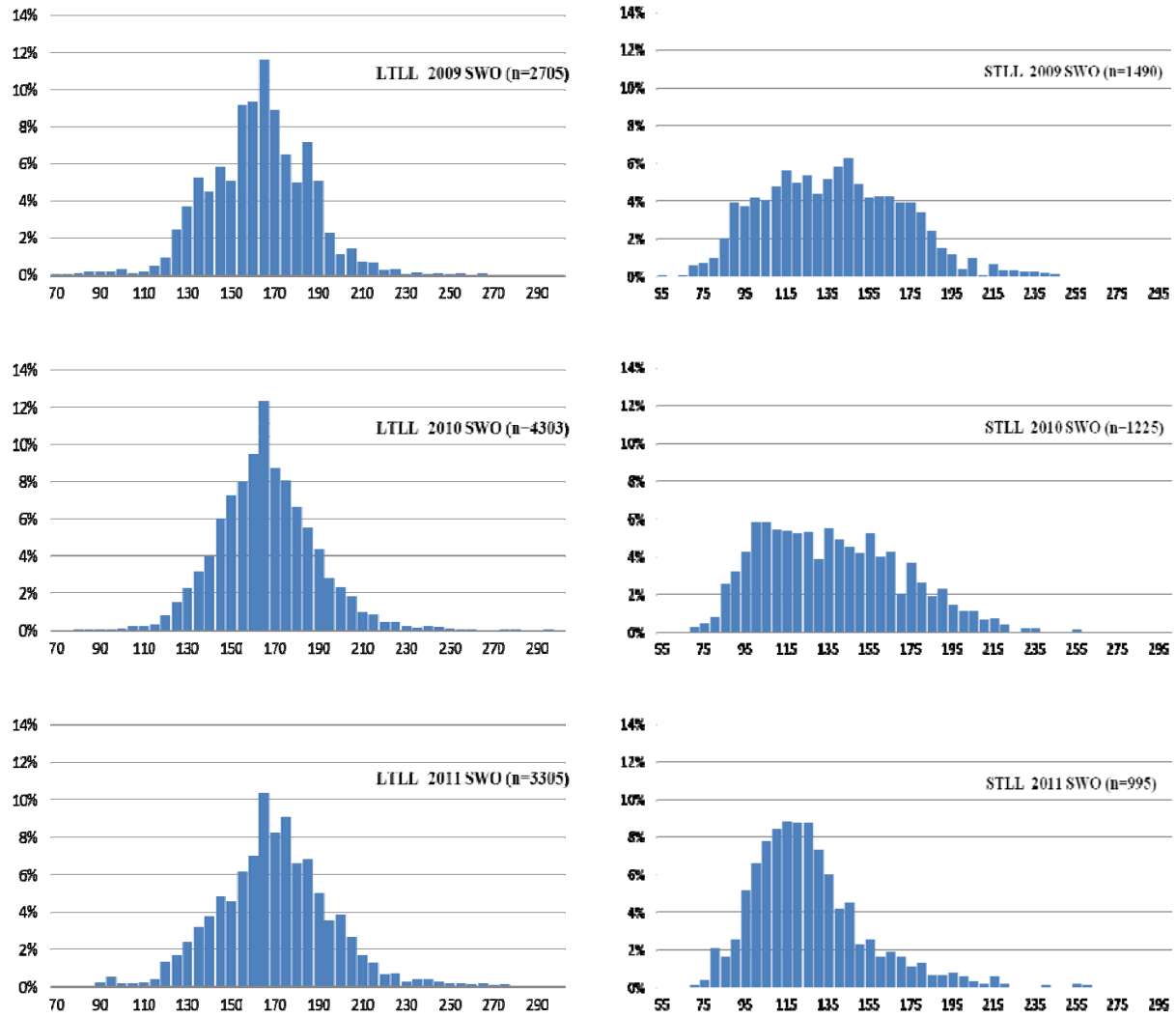
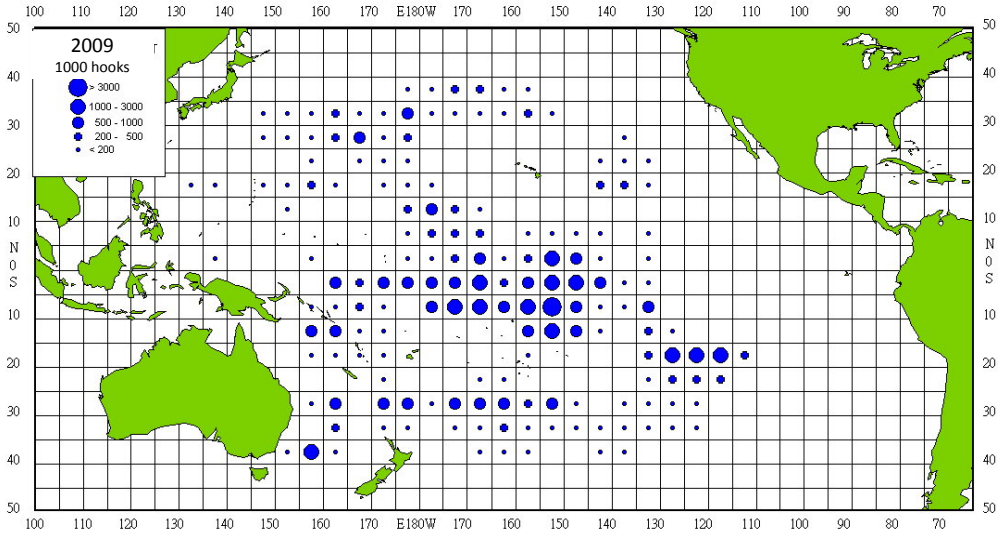


Figure 2. Length frequency distribution of swordfish caught by Taiwanese LTLL and STLL vessels in the North Pacific Ocean during 2009-2011(measurement: low jaw-fork length for LTLL, eye-fork length for STLL).



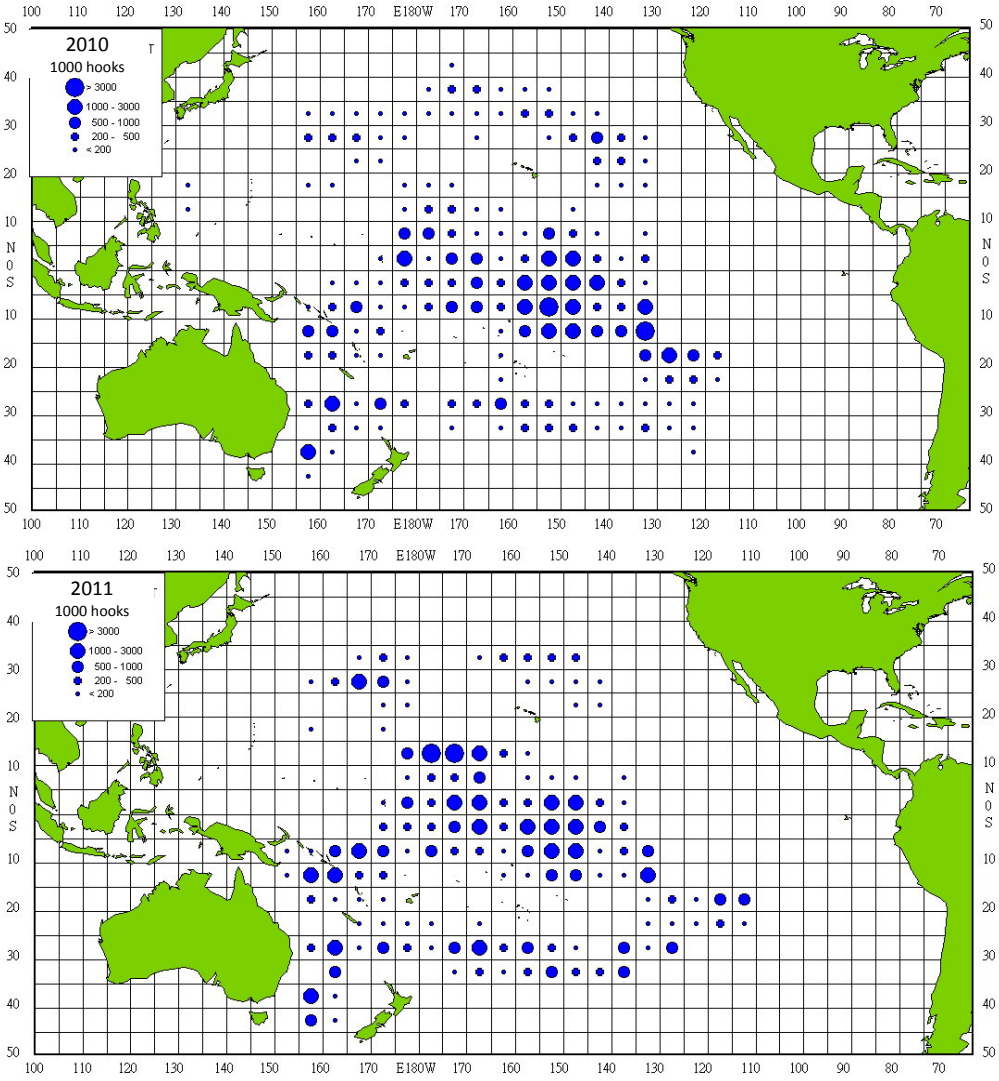


Figure 3. Distribution of fishing effort for Taiwanese LTLL vessels operated in the Pacific Ocean during2009-2011(Note: Map of 2010 and 2011 is still preliminary and will be revised shortly.)

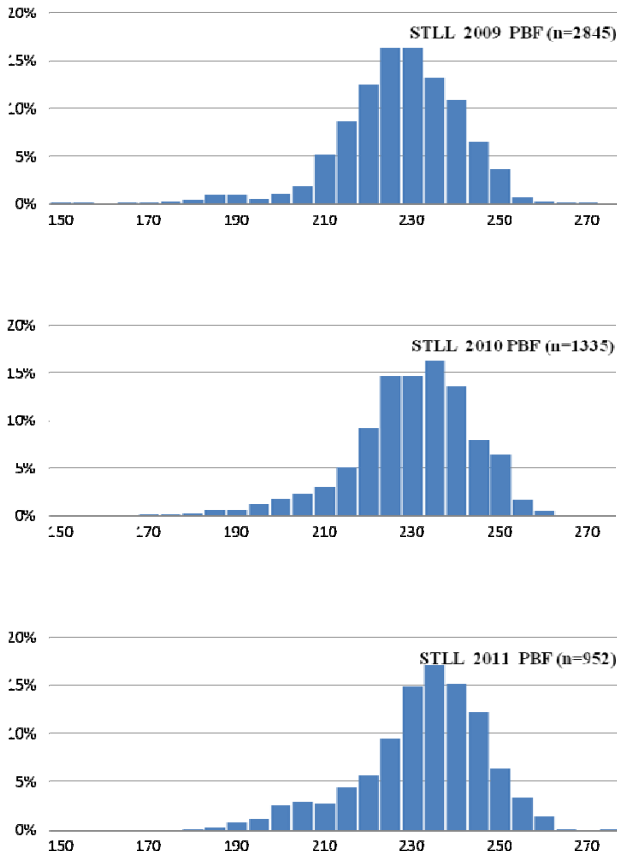
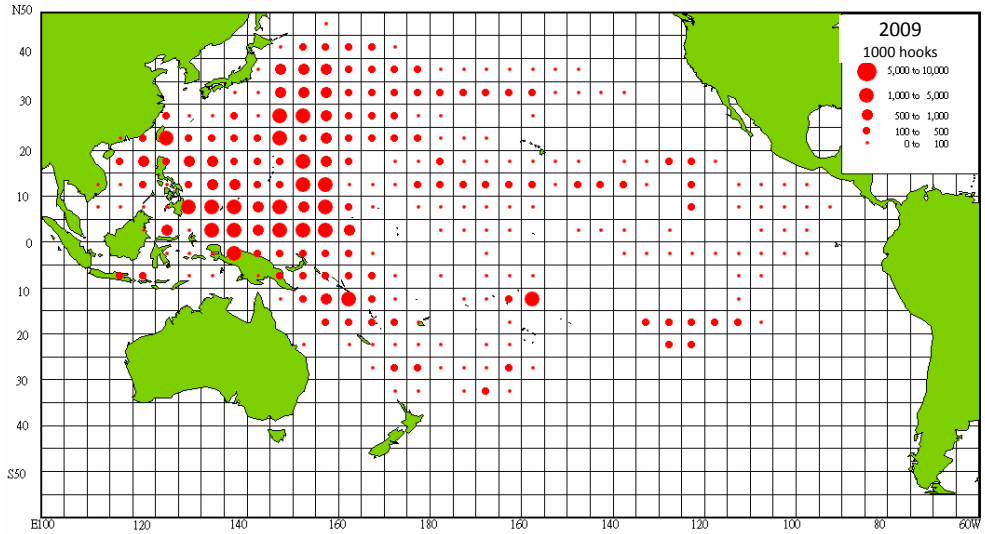


Figure 4. Length frequency distribution of Pacific bluefin tuna caught by Taiwanese STLL vessels in the North Pacific Ocean during 2009-2011.



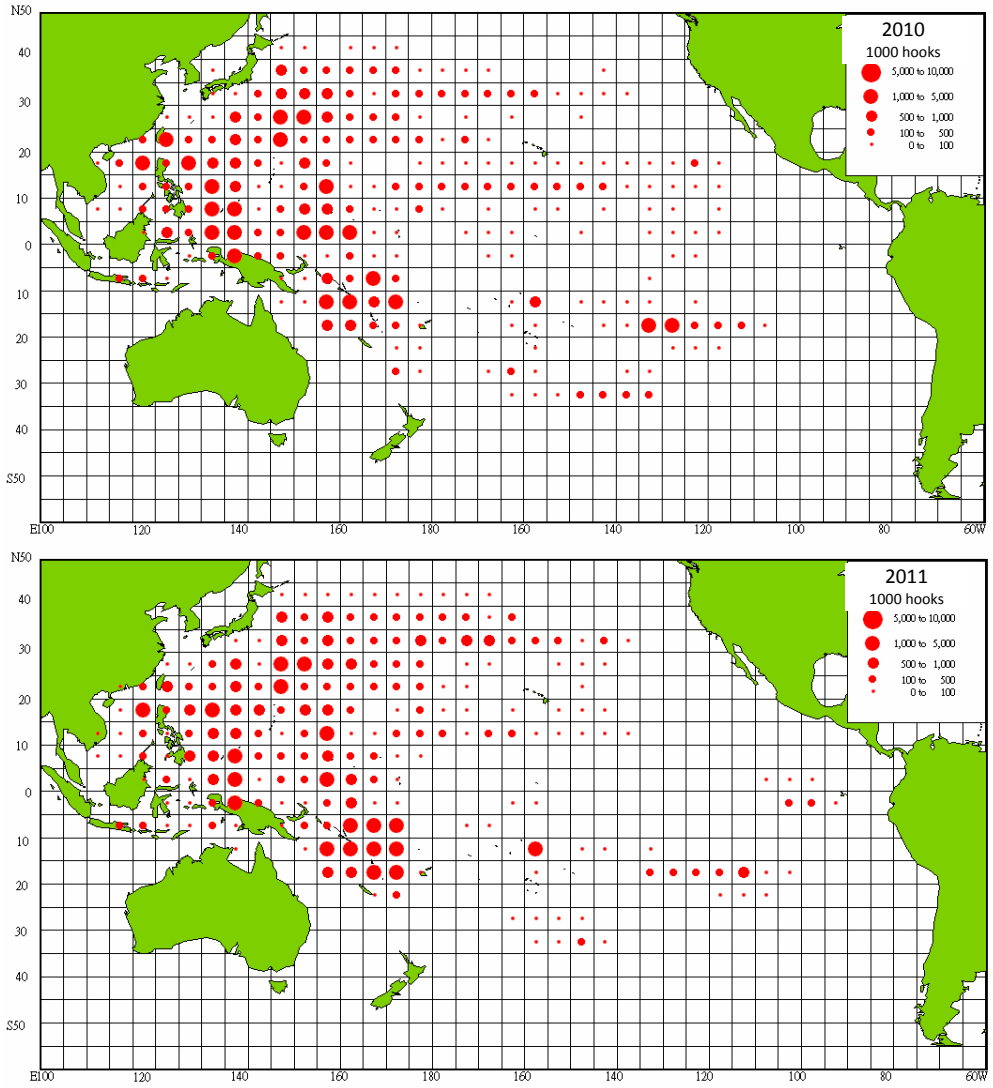
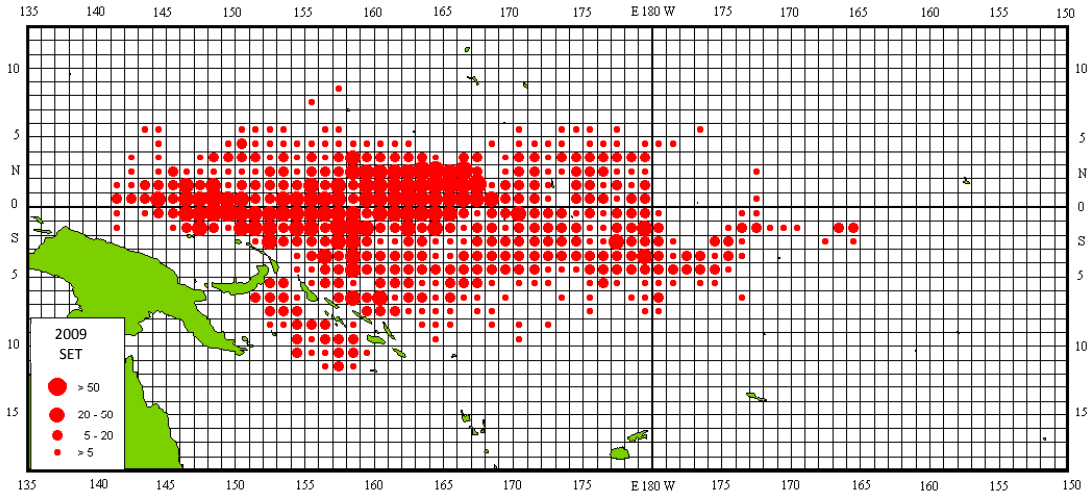


Figure 5. Distribution of fishing effort for Taiwanese STLL vessels based at domestic fishing ports during 2009-2011. (Note: Map of 2010 and 2011 is still preliminary and will be revised shortly.)



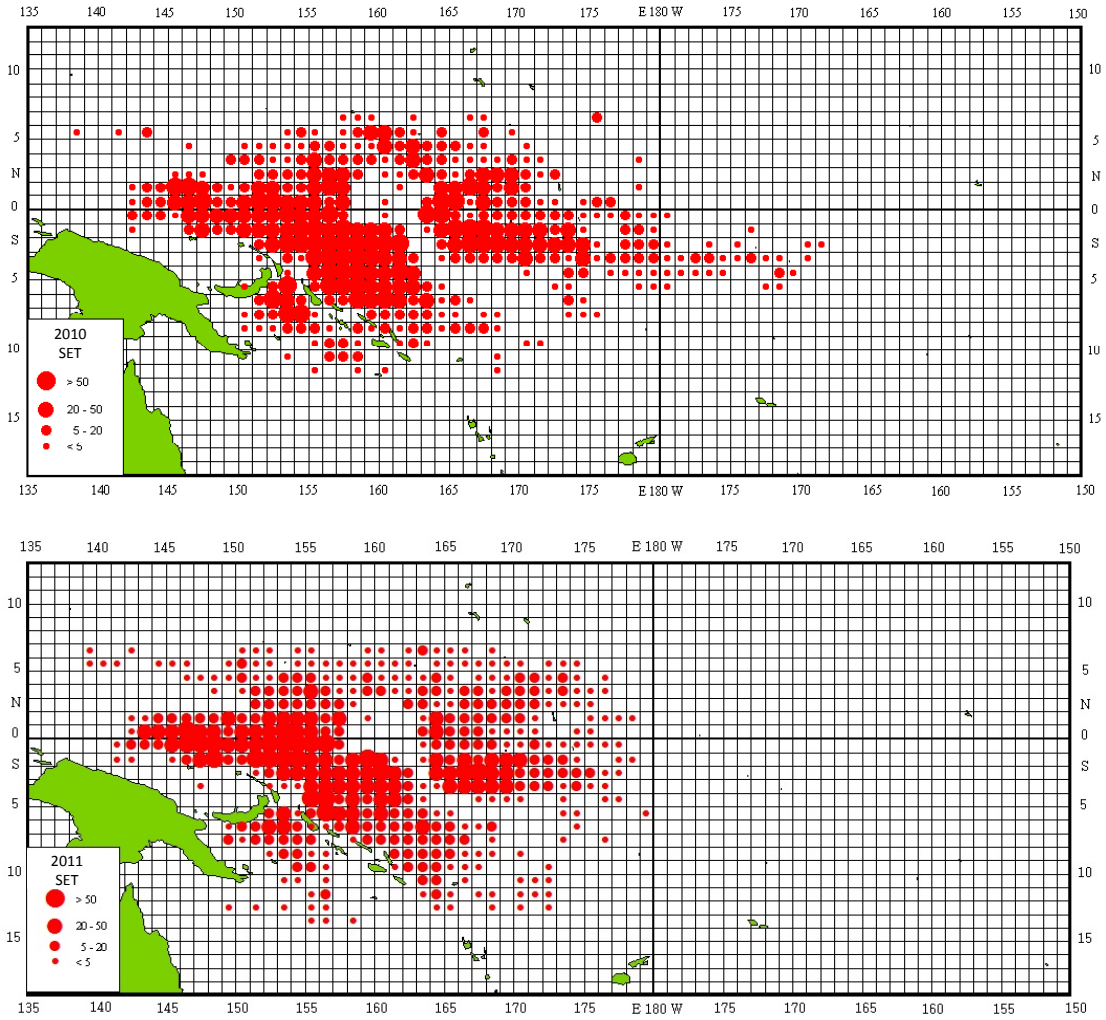


Figure 6. Distribution of fishing effort for Taiwanese distant water purse seine vessels operated in Pacific Ocean during 2009-2011.

附件二、ISC 12 會議報告

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

PLENARY SESSION

18-23 July 2012
Sapporo, Hokkaido
Japan

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ACRONYMS AND ABBERVIATIONS

Names and FAO Codes of ISC Species of Interest in the North Pacific Ocean

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

ISC Working Groups

Acronym	Name	Chair (Member Country)
ALBWG	Albacore Working Group	John Holmes (Canada)
BILLWG	Billifsh Working Group	Jon Brodziak (USA)
PBFWG	Pacific Bluefin Working Group	Yukio Takeuchi (Japan)
SHARKWG	Shark Working Group	Suzanne Kohin (USA)
STATWG	Statistics Working Group	Ren-Fen Wu (Chinese Taipei)

Other Abbreviations and Acronyms Used in the Report

CDS	Catch documentation scheme
CIE	Center for Independent Experts
CPUE	Catch-per-unit-of-effort
DWLL	Distant-water longline (Rep. of Korea
DWPS	Distant-water purse seine (Rep. of Korea)
EEZ	Exclusive economic zone
EPO	Eastern Pacific Ocean
F	Fishing mortality rate
FAD	Fish aggregation device
FAO	Fisheries and Agriculture Organization of the United Nations
FL	Fork length
HMS	Highly migratory species
IATTC	Inter-American Tropical Tuna Commission
ISC	International Scientific Committee for Tuna and Tuna-Like Species in the North Pacific Ocean
LTLL	Large-scale tuna longline (Chinese Taipei)
NC	Northern Committee (WCPFC)
NRIFSF	National Research Institute of Far Seas Fisheries of Japan
OFDC	Overseas Fisheries Development Council (Chinese Taipei)
PICES	North Pacific Marine Science Organization
SAC	Scientific Advisory Committee (IATTC)
SC	Scientific Committee (WCPFC)
SPC-OFP	Oceanic Fisheries Programme, Secretariat of the Pacific Community
SSB	Spawning stock biomass
STLL	Small-scale tuna longline (Chinese Taipei)
t	Metric tons, tonnes
WCNPO	Western Central and North Pacific Ocean
WCPFC	Western and Central Pacific Fisheries Commission

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Highlights of the ISC12 Plenary Meeting

The 12th ISC Plenary, held in Sapporo, Japan from 18-23 July 2012 was attended by members from Canada, Chinese Taipei, Japan, Korea, Mexico and the United States. The Plenary reviewed results and conclusions, which were based on new data and updated analyses, of the billfish and Pacific bluefin tuna working groups. The Plenary endorsed the findings that the striped marlin stock was overfished and experiencing overfishing. It further provided projection information for managers to consider in crafting management measures. The Plenary also reviewed progress on Pacific bluefin tuna stock assessment. Regarding albacore and North Pacific stocks of swordfish, the Plenary maintained the conservation advice of ISC11. The Plenary reviewed the progress of the shark working group and endorsed the assessment schedule of a blue shark assessment for the ISC13 to review. A special seminar on Population Resilience was held. Plenary also noted the strides WGs had made in incorporating best available scientific information (BASI) into stock assessment work. The ISC workplan for 2012-2013 includes completing a new stock assessment for Pacific Bluefin tuna by the end of 2012, assessments of blue shark and blue marlin by ISC13, continuing preparation for a mako shark stock assessment in 2013/2014, implementing improved database and website management, and completing a peer review of its structure. The Albacore Working Group re-elected John Holmes for a second term as Working Group Chair. The next Plenary will be held in Korea in July 2013.

1 INTRODUCTION AND OPENING OF THE MEETING

1.1 Introduction

The ISC was established in 1995 through an intergovernmental agreement between Japan and the United States (USA). Since its establishment and first meeting in 1996, the ISC has undergone a number of changes to its charter and name (from the Interim Scientific Committee to the International Scientific Committee) and has adopted a number of guidelines for its operations. The two main goals of the ISC are (1) to enhance scientific research and cooperation for conservation and rational utilization of the species of tuna and tuna-like fishes that inhabit the North Pacific Ocean during a part or all of their life cycle; and (2) to establish the scientific groundwork for the conservation and rational utilization of these species in this region. The Committee is made up of voting Members from coastal states and fishing entities of the region as well as coastal states and fishing entities with vessels fishing for highly migratory species in the region, and non-voting Members from relevant intergovernmental fishery and marine science organizations, recognized by all voting Members.

The ISC provides scientific advice on the stocks and fisheries of tuna and tuna-like species in the North Pacific Ocean to the Member governments and regional fisheries management organizations. Fishery data tabulated by ISC Members and peer reviewed by the species and statistics Working Groups (WGs) form the basis for research conducted by the ISC. Although some data for the most recent years are incomplete and provisional, the total catch of highly migratory species (HMS) by ISC Members estimated from available information is in excess of 500,000 metric tons (t) annually and dominated by the tropical tuna species. In 2010 the landings by ISC Members of ISC priority species were 65,075 t of North Pacific albacore tuna (ALB, *Thunnus alalunga*), 18,027 t of Pacific bluefin tuna (PBF, *T. Orientalis*), 10,671 t of swordfish (SWO, *Xiphias gladius*), and 4,642 t of striped marlin (MLS, *Kajikia audax*). The total estimated catch of these four species is 98,415 t, or approximately 87% of the 2009 total estimate (estimated to be 113,426 t). Annual landings of priority stocks throughout their ranges are shown in Tables 1-4.[1]

1.2 Opening of the Meeting

The Twelfth Plenary session of the ISC (ISC12) was convened in Sapporo Japan at 0900 on 18 July 2012 by the ISC Chairman, G. DiNardo. A roll call confirmed the presence of delegates from Canada, Chinese Taipei, Japan, Korea, Mexico, and USA (*Annex* 1). The Chair noted that the North Pacific Marine Science Organization (PICES) representative would join the Plenary later in the week. A representative of the Western and Central Pacific Fisheries Commission (WCPFC) attended as an observer. ISC Members China, the Secretariat of the Pacific Community (SPC), the Fisheries and Agriculture Organization of the United Nations (FAO), as well as organizations with significant interest including the Inter-American Tropical Tuna Commission (IATTC), did not attend the Plenary.

[1] FAO three-letter species codes are used throughout this report interchangeably with common names. See the list of acronyms and abbreviations for common and scientific names associated with these codes.

Dr. Yuji Uozumi, General Director of National Research Institute of Far Seas Fisheries of Japan (NRIFSF) gave the welcoming address.

2 ADOPTION OF AGENDA

The proposed agenda for the session was considered and adopted with no changes (*Annex 2*). C. Dahl was assigned lead rapporteur duties. A list of meeting documents is contained in *Annex 3*.

3 DELEGATION REPORTS ON FISHERY MONITORING, DATA COLLECTION AND RESEARCH

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

3.1 Canada

J. Holmes presented a summary of Category I, II, and III data from the Canadian North Pacific albacore troll fishery in 2011 (*ISC/12/PLENARY/06*). The Canadian fleet of 177 vessels operated primarily within the coastal waters of the United States and Canada and in adjacent high seas areas; all but 1 t of catch occurred east of 150°W. Preliminary estimates of North Pacific albacore catch and effort in 2011 are 5,393 t and 8,568 vessel days, respectively. These figures represent an 18% decrease in catch and 13% increase in effort relative to 2010. Approximately 86% of the catch and 76% of the effort occurred in US waters and the majority of catch occurred in slightly cooler waters (14-18°C) than in previous years (15-19°C). The seasonal pattern of catch differed from normal (nominal catch rate peaks in late July, then declines to low values by late October) in that a small peak by mid-July was followed by an increase to the highest average catch rates by the end of October, i.e., availability was highest late in the season. Forty-three vessels participated in the on-board size sampling program and measured 14,373 fork lengths for a sampling rate of 1.72% of the reported catch (N = 831,299 fish). These measurements were dominated by a single mode corresponding to 2-year old fish at 64-68 cm fork length (FL) in the highseas and US waters, but in Canadian waters a second mode corresponding to 3-year old fish at 74-78 cm was also prominent.

Canada also reported that a recent reanalysis of catch and effort data resulted in small revisions to these data prior to 2005 (± 5 t or vessel-days, ± 2 vessels in the fleet) and larger changes in data collected since 2005 (up to 590 t of catch). These revised data are shown in its National Report and were reviewed by the ALBWG, which agreed that these were the best available scientific catch data from Canada. The primary cause of revision is due to late reporting of logbooks, which has occurred over several years, and the need to reconcile preliminary estimates of catch weight based on logbook estimates with more accurate and reliable sales slip weights, which are the basis for payment between a buyer and the fisherman. Since 2005, there have been delays in obtaining sales slip data owing to the way they are processed by the Catch Statistics Unit of Fisheries and Oceans Canada. Although these delays are expected to continue in the future, they will be shorter as Canada will monitor this process more closely.

Discussion

It was explained that albacore reported as bycatch in the Canada troll fishery is composed of small fish released alive because they are unmarketable. In spite of a bounty offered to obtain small albacore to use in aging studies, none were obtained. The U.S. offered to assist in obtaining small albacore for these studies.

3.2 Chinese Taipei

Y. J. Lin presented the National Report for Chinese Taipei (*ISC/12/PLENARY/07*). There are two principal tuna fisheries of Chinese-Taipei operating in the North Pacific Ocean, namely a tuna longline fishery and a distant-water purse seine fishery; other offshore and coastal fisheries include the harpoon, set net and gillnet fisheries that account for a small proportion of overall tuna and tuna-like species catch. The catches of longline and purse seine fisheries account for 99% of the total tuna and tuna-like species catches in the North Pacific Ocean by Chinese-Taipei. Longline fisheries comprise the large-scale tuna longline (LTLL, vessels larger than 100 GRT) and small-scale tuna longline (STLL, vessels less than 100 GRT) fleets. The total catch of tunas and billfish (including swordfish, striped marlin, blue marlin,, black marlin, and sailfish) for the LTLL and STLL fisheries in the North Pacific Ocean was 31,774 t in 2011. There were 95 active LTLL vessels and 1,376 STLL vessels operating in the Pacific Ocean in 2011. The total catch in the purse-seine fishery was 175,935 t caught by 34 vessels in the Pacific Ocean in 2011. The catch of tuna and tuna-like species by other offshore and coastal fisheries was estimated at 3,320 t.

For the LTLL fishery, Category I data sources include weekly catch reports and commercial data from individual fishing vessels. Categories II and III data are all compiled from logbook data. Fishermen are required to measure the length of the first 30 fish caught in each set. For the STLL fishery, Category I data sources include landings and auction records of local fish markets, reports of market states, and monthly catch reports from individual fishing vessels. Category II data are collected from logbooks. Category III data for major species are collected from sampling. For the purse-seine fishery, Category I and Category II data are obtained from logbooks and no Category III data collected.

In March 2010 a catch documentation scheme (CDS) was established in Taiwan requiring small-scale longline fishermen to attach a tag and to take length and weight measurements of each PBF caught. Beginning in 2011 a new PBF sampling program was initiated and length and weight measurements of PBF are collected at landing markets by the Overseas Fisheries Development Council (OFDC) samplers. In both 2010 and 2011, 100% of caught PBF were sampled for length and weight.

Chinese Taipei has had an observer program in the Pacific Ocean since 2002. In accordance with the government's policy of establishing an observer program and availability of budgets to support the increase in the number of observers, the observed trips have gradually increased annually to 19 in 2011.

Taiwanese scientists are conducting biological and stock assessment research on tuna and tuna-like species in the North Pacific Ocean to promote sustainable utilization of the resource.

Discussion

It was noted that shark catch in the STLL and coastal fisheries reported in the National Report has not been provided to the SHARKWG. Chinese Taipei will do so henceforth.

It was clarified that the large increase in catch in the STLL fishery between 2002 and 2003 is due to improvements in the data collection system for foreign-based vessels. Chinese Taipei is currently trying to obtain data for earlier years through requests to relevant organizations.

3.3 Japan

H. Nakano presented the National Report for Japan *(ISC/12/PLENARY/08*). Japanese tuna fisheries consist of three major fisheries—longline, purse-seine, and pole-and-line—and other miscellaneous fisheries like troll, driftnet, setnet fisheries. In recent years longline, purse seine, pole-and-line have accounted for approximately 99% of the total tuna catch by Japanese fisheries. The National Report describes the recent trend of Japanese tuna fisheries in the North Pacific Ocean and updates the statistics given in the previous National Report for ISC11 (*ISC/11/PLENARY/10*). Total landings of tunas (excluding skipjack) caught by Japanese fisheries in the North Pacific Ocean in 2010 was 107,539 t and 107,703 t in 2011. The total landing of swordfish and billfishes was 6,395 t in 2010 and 5,795 t in 2011, which was 90.6% of the 2010 catch. Skipjack tuna landings were 189,423 t in 2010 and 147,092 t in 2011, 77.6% of the 2010 catch. In addition to the fisheries description, the Report includes a brief description of Japanese research activities on tuna and tuna-like species in the Pacific Ocean in 2011 and 2012. Current management and conservation measures for PBF were also described.

Discussion

In response to a question about the term “voluntary measure” relating to catch reduction of PBF fisheries described the National Report, Japan explained that—although it is a voluntary measure from a legal perspective—this measure is implemented by the fishing industry in accordance with guidelines set by the national government, and any violation will be subject to punitive administrative actions applied to the industry. This provides a strong incentive for effective compliance and prevents violations.

In response to a question about the distribution of PBF spawning areas, Japan suggested that spawning is continuous from the area south of Taiwan to the northern extent of the Sea of Japan with areas of higher density within this larger region. In the southern spawning area around Okinawa, 5-year old and older fish are usually caught compared to 3-5-year old fish in the Sea of Japan. Also, in the area around Okinawa spawning occurs from May to June while in the Sea of Japan it occurs from July to August. These age differences and seasonality in spawning suggest that the spatio-temporal structure of the spawning ground is complex and deserves more study.

It was explained that the apparent change in size distribution of ALB seen in the longline fishery between 2009 and 2010 cannot be ascribed to a change in the sampling scheme. Rather the

change is thought to be due to strong year classes from 2004 or 2005 entering into the fishery. Further investigation of these data is warranted.

3.4 Korea

Z. G. Kim presented the National Report for the Republic of Korea (*ISC/12/PLENARY/09*). Korean fisheries fishing for tunas and tuna-like species in the North Pacific are distant water tuna longlines (DWLL) and distant-water tuna purse seines (DWPS). Domestic fisheries—offshore large purse seine, setnet, and troll—are also involved in the catch of PBF in Korean waters.

DWLL and DWPS fleets generally fish in the North Pacific Ocean south of 20°N and are managed by the Distant Water Fisheries Development Act. Since 26 May 2011 domestic fisheries have come under management pursuant to a Ministerial Directive addressing PBF fisheries in the exclusive economic zone (EEZ).

DWLL catch was 15,254 t in 2011, representing a 23.1% decrease from the peak in 2004. DWPS catch was 23,801 t in 2011, representing a 76.4% decline from the peak in 2003. In the longline fishery the species composition of the catch in 2011was: BET 60.0%, YFT 21.0%, SWO 6.4%, BLZ 1.0%, ALB 0.6%, and MLS 0.3%. In the purse seine fishery the species composition of the catch in 2011was: SKJ 77%, YFT 22.1%, and BET 1 %. DWLL fishing effort decreased from 42,485 to 33,147 hooks and was deployed higher in the central area and the eastern area in 2011. DWPS fishing effort decreased from 2,876 sets in 2003 to 771 sets and concentrated on the western areas in 2011.

PBF catch by offshore large purse seiners declined from 1,196 t in 2010 to 670 t in 2011. This was 53.3 % of the average catch of the last five years. Catches occurred throughout the year with the highest catch of 100-140 t in May and June but catches were less than 10 t from July to November and almost all were juveniles. In accordance with the Ministerial Directive, 134 individuals (94.4 kg, 25.0-40.0 cm in length) were reported caught by the troll fishery targeting Spanish mackerel and yellowtail and all were transferred to fattening farms in 2011. Data collection, sampling, and verification of the catch were conducted at landing ports and auction markets in 2011. A PBF tagging program is scheduled in the near future.

Discussion

It was confirmed that the catch data presented in Table 2 of the National Report (ISC/12/PLENARY/09) are the most definitive data available and should be incorporated into the ISC catch tables.

Catch reports from the Korean DWLL fisheries show higher catch of black marlin versus blue marlin in the tropical longline fishery, which differs from Japanese longline fisheries where blue marlin catch is higher than black marlin. Since black marlin tends to be more abundant in coastal areas, the Korean report of catch by species may be due to errors in species identification by fishermen. Korea will review these data in light of this difference from the Japanese fishery.

It was noted that the “converted catch” column in Table 4 of the National Report that reports PBF catch, reflects changes in the estimate of the average weight of boxes of fish sold at auction.

Because counts of DWLL vessels in the report are for the entire Pacific, there is an apparent discrepancy between the decline in the number of longline vessels shown in National Report Figure 1 and stable catch in Figure 2. It was verified that the decline in vessel numbers occurred primarily in the South Pacific.

PBF catch data for the troll fishery has only been collected since 2011 under the Ministerial Directive and has not yet been submitted to the ISC database. Korea is continuing to review and correct these data and will submit them to the ISC database once this is done.

Although fisheries statistics on Korea's DWLL fisheries have been collected since the 1970s, they are incomplete through 2008. More comprehensive data have been collected in response to requirements imposed by tuna RFMOs.

The spatio-temporal distribution of catch in 2011, shown in National Report Figures 7 and 9, is representative of general patterns across years. The seasonal drop-off in catch is due to availability rather than a fishery impact.

3.5 Mexico

M. Dreyfus presented the National Report for Mexico (*ISC/12/PLENARY/09*). The Mexican purse-seine fishery is the most important HMS fishery in Mexico. Major development of this fleet is related to the implementation of the EEZ in the late 1970s. Most of the catch is YFT and the total catch for 2011 was 124,947 t of tunas (YFT, SKJ, PBF and others). Purse seiners with carrying capacities of 363 t or more have 100% onboard observer coverage. The rest of the fleet (smaller purse seiners and bait boats) are monitored with log books.

Most of the purse-seine sets are dolphin-associated sets, targeting YFT. Second in importance in terms of set type are those that set on free swimming schools in coastal areas, which include PBF sets in northern Baja California.

PBF started to become a main target for the Mexican fleet with the development of the farming industry in northern Baja California. Catches in the Eastern Pacific Ocean (EPO) have a long history with record catches in the 1960s by the US fleet mainly in the present Mexican EEZ. Mexico had three record catches of PBF in 2004, 2006, and 2010 with catch of 8,880 t, 9,928 t 7,745 t, respectively. Other catches of PBF and ALB involve the US sport fishery occurring in Mexican waters. ALB is considered an opportunistic catch by vessels targeting PBF and remains low. In 2011 there were no reported catches of this species.

In the SWO fishery, also located in Baja California peninsula, 31 longliners fish for SWO as well as sharks. In 2011, 67 t of SWO were reported, shark remaining the main component of the catch.

The seasonal abundance of diverse shark species in the coastal and oceanic waters of the Mexican Pacific, including the Gulf of California, has permitted the development of artisanal and pelagic shark fisheries along the coastal states of Mexico. Shark meat (for domestic human consumption) and fins (for international trade) have been the principal products obtained from sharks. Important regions for shark fisheries are the Gulf of California, Gulf of Tehuantepec, and the west coast of the Baja California peninsula. In 2010, total shark catch in the Pacific and Gulf of California fisheries was 24,726 t.

Discussion

Mexico further described the PBF weight estimation methodology used by the net pen industry. These data will be provided to the *Instituto Nacional de Pesca*, which will compile the data working backward from 2011. These weight estimates are made when the fish are captured and not after fattening.

For small-scale shark fisheries, data collection is through logbooks from longline vessels beginning in 2007 and through monthly data reports submitted by small-scale coastal fisheries.

3.6 United States

S. Pooley presented the National Report for the USA (*ISC/12/PLENARY/11*). US purse-seine activity in the North Pacific Ocean decreased in 2011 compared to recent years to 22 vessels (35 vessels in 2010); catch was 42,000 t (16.4% decrease from 2010) of which SKJ accounted for 35,700 t. US longline activity increased to 129 vessels (125 vessels in 2010), and landing of 10,000 t (15.7% increase from 2010) of which BET was 5,600 t. Other US fisheries were relatively stable.

NOAA Pacific Islands and Southwest Fisheries Science Centers conduct research on tunas, billfishes, sharks, and bycatch (with an emphasis on sea turtles and marine mammals). Areas of investigation include fishery monitoring; socio-economics of fisheries, markets, and fishing communities; life history studies and oceanography; bycatch mitigation (turtles, sharks, marine mammals); fishery-independent surveys, and stock assessment methodology. Forty-nine manuscripts were published last year related to ISC objectives.

Highlights of research activities include:

- Albacore: Age and growth studies of albacore were conducted using otoliths and dorsal fin spines, including analysis of otoliths provided by Japan. In addition, population structure was investigated using stable isotopes.
- Swordfish: The Swordfish and Leatherback Use of Temperate Habitat (SLUTH) project investigated migratory patterns, foraging ecology, and local stock structure of these species in the California Current Large Marine Ecosystem.
- Economic studies: These included the Hawaii longline and small boat fishery cost-earnings analysis, an investigation of Hawaii retail seafood monitoring, an *ahi* (BET) pricing analysis, and research on the spillover effects of swordfish by-catch regulation. The latter was a case study of the Hawaii shallow-set longline fishery's effort to reduce sea turtle bycatch.
- Oceanography: A variety of studies have been conducted; an example was research on climate effects on productivity. This paired a climate model with a size-based ecosystem model. Results suggest a decline in the catch of large pelagic fish in areas of the North Pacific possibly due to climate change.
- Bycatch: Research was conducted on the effect of hook size on bycatch in longline fisheries.

Discussion

It was noted that the regulatory impact on catch in the shallow-set longline fishery for swordfish was accounted for in the most recent stock assessment and will be addressed in the next stock assessment as well.

The US discussed domestic efforts to clearly segregate the provision of scientific information from the development of management measures and suggested that the ISC should consider this approach. The ISC Chair reiterated the importance of this separation and noted that this issue would be discussed later in the meeting.

4 REPORT OF THE ISC CHAIRMAN

The ISC had another busy year since the ISC Plenary met in San Francisco, California, USA in July 2011. While there were numerous accomplishments and successes that advanced the scientific integrity of ISC, there were setbacks that could erode the scientific credibility of the organization. The year was spent completing a benchmark assessment for striped marlin and working on preparations for new stock assessments for blue shark and Pacific blue marlin in 2013. Preparatory work consisted of collecting fishery and biological data, compiling and analyzing data, testing hypotheses and stock assessment model assumptions, and exploring new models or variations of standard models for use in the upcoming assessments. Progress was made with investigating shark aging issues, improving best practices and scientific reporting procedures, compiling a catalogue and inventory of the ISC database, advancing development of the website and data enterprise system, and optimizing administration. Six intercessional workshops were held to facilitate collaboration among Member scientists in implementing ISC work plans and coordinating research on the stocks. A peer review of the ISC function was initiated with support from Japan, Republic of Korea and the USA, and John Holmes was reelected as Chair of the ISC ALBWG. Plans to complete the much anticipated Pacific bluefin tuna stock assessment for ISC12 were not accomplished due to differing interpretations of input data and assessment model assumptions. The failure of ISC to complete assessments on time has far-reaching implications. At a time when the ISC is gaining scientific credibility and stature among tuna RFMOs, we cannot afford to waiver from our mission due to differences in opinion and “advocacy creep.”

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

chairpersons of the working groups have contributed to supporting administrative services of the working groups. All of the support is appreciated and acknowledged.

The Chairman closed his report by thanking all colleagues who have worked on ISC tasks and who have provided the support to ISC in advancing the objectives and purpose of the organization. The service of Chi-lu Sun, vice Chairman, for support and insightful advice is acknowledged. A special thanks and appreciation is owed to the Chairs of the Working Groups, namely Ren-Fen Wu, Jon Brodziak, John Holmes, Yukio Takeuchi, and Suzanne Kohin, who provided unselfish leadership in guiding the work of the Working Groups. In addition, the leadership role of Hideki Nakano with respect to the Data Administrator, Izumi Yamasaki, and Webmaster, Yumi Okochi, is appreciated. Finally, he acknowledged the professional assistance of Lyn Katahira and Sarah Shoffler for their dedicated service to ISC and for assistance in completing tasks assigned to the Chairman. In that capacity, they served as point of contact for the Office of the Chairman, led in organizing the facilities for annual meetings, led in writing and assembling information required for agenda items of meetings and for responding to inquires, and served as advisors on aspects of ISC operations. He thanked all for contributing to another successful year for ISC and for the support and services provided.

5 INTERACTION WITH REGIONAL ORGANIZATIONS

5.1 IATTC

The ISC Chair reported on interactions between ISC and IATTC since ISC11. J. Holmes, ALBWG Chair, attended the IATTC Scientific Advisory Committee (SAC) meeting, 15-18 May 2012 and presented the current North Pacific albacore assessment. This is the first time an ISC stock assessment has been presented to the IATTC SAC. In addition, the ISC Chair attended the 83rd Meeting of the IATTC, 25-29 June 2012 as an observer for ISC.

5.2 PICES

5.2.1 Report from the Executive Secretary of PICES

M. Kaeriyama presented an oral summary of the PICES Report to ISC on behalf of Dr. Alexander Bychkov, Executive Secretary of PICES.

PICES and ISC have very similar charters and have overlapping membership, making them natural partners. PICES has initiated a new science program called FUTURE (Forecasting and Understanding Trends, Uncertainty and Responses of North Pacific Marine Ecosystems). The purpose of this program is to understand how North Pacific ecosystems respond to climate changes and communicate this information to various constituencies. Multidisciplinary and large-scale activities of FUTURE meld well with ISC activities directed toward understanding the scientific basis for the conservation and management of tuna and tuna-like species, and both organizations would benefit from collaboration within this program.

Discussion

The ISC Chair thanked M. Kaeriyama for his presentation and PICES for their continued support of ISC.

5.2.2 Report of the 2011 PICES Meeting

C-L. Sun reported on the proceedings of the twentieth annual meeting of PICES (PICES-2011) convened from 14-23 October 2011 in Khabarovsk, Russia. The theme for PICES-2011 was "Mechanisms of the marine ecosystem reorganization in the North Pacific Ocean."

C-L. Sun attended the meeting as an observer on behalf of ISC and prepared a presentation on ISC activities for the meeting. Sun highlighted PICES research activities that might be of interest to ISC, including characterizing changes in oceanographic conditions and understanding causal mechanisms, as well as development of environmental time series.

Discussion

The ISC Chair thanked C-L. Sun for his presentation and for taking on this responsibility. It was noted that the ecology and oceanography oriented initiatives of PICES would benefit understanding of the dynamics of tuna and tuna-like species stocks. The Chair will continue to work with PICES to explore greater collaborations.

5.2.3 Invitation to 2012 PICES Meeting

The ISC Chair reviewed the invitation from PICES to attend its Twenty-First Annual Meeting in October 2012 in Hiroshima, Japan (*ISC/12/PLENARY/02*), noting that PICES invites greater participation from the ISC. The invitation requests a report on the activities of the ISC during the Science Program and a second report on potential collaborations between the two organizations. The ISC will contact the PICES Executive Director to confirm ISC involvement.

It was agreed that H. Nakano would present activities of ISC at the Science Program. F. Werner has agreed to report on potential collaborations between ISC and PICES. A draft report on potential collaborations with PICES will be circulated to Members by 30 August for review and comment.

5.2.4 Prospective PICES Collaborations

Plenary identified three potential opportunities for collaboration between ISC and PICES. These represent relatively near-term activities and Plenary recognized that deepening ties with PICES will be a longer-term process. In general, PICES's focus on environmental and ecological processes could contribute to the development of more sophisticated stock assessments (for example, by incorporating biophysical processes into CPUE standardization models) while ISC may be able to provide PICES with information about open ocean fish stock dynamics. Three potential areas for near-term collaboration were identified:

1. Presenting potential collaborative activities to the PICES Science Board such as ISC-PICES collaborations with respect to the Forecasting and Understanding Trends, Uncertainty and Responses of North Pacific Marine Ecosystems (FUTURE) program initiated by PICES in 2009.

2. Inviting PICES representatives to participate in future ISC Plenary seminars.

3. Inviting PICES representatives to the ISC *Aging and Growth Estimation of Pacific Bluefin and North Pacific Albacore* Technical Workshop planned for November-December 2013 (see Section 11.8).

5.3 WCPFC

A. Beeching of the WCPFC reported on interactions between ISC and WCPFC since ISC11. Principal interactions between WCPFC and ISC occur during their respective science meetings for which each organization sends representatives, and through cooperation and data exchange through the WCPFC science provider (Oceanic Fisheries Programme, Secretariat of the Pacific Community (SPC-OFP)). Scientists from the WCPFC science provider participated in some ISC species working group workshops, assisting with data preparation and stock assessment modeling. It was also reported that the ISC Chair participated in the WCPFC Annual Meeting in March 2012. The Seventh Scientific Committee meeting (SC7) requested ISC to complete a stock assessment for North Pacific swordfish, based on the SC7 Report. WCPFC requested additional research on potential references points for North Pacific albacore, based on a request from the WCPFC Northern Committee (NC). The status of NC research proposals was briefly discussed, upcoming WCPFC meetings were detailed, and attention was drawn to the Management Objectives Workshop scheduled immediately before WCPFC9.

Discussion

Plenary noted that the request for additional research on North Pacific albacore reference points is not part of the ISC work plan and noted that the ALBWG previously provided a suite of candidate reference points to the NC. The ISC Chair pointed out that research on albacore reference points does not appear to be an NC request. The ISC Chair will follow up on this matter.

Regarding the SC request for a North Pacific swordfish stock assessment, the ISC Chair reminded participants that requests to the ISC come through the WCPFC NC, not the WCPFC SC.

6 REPORTS OF WORKING GROUPS AND REVIEW OF ASSIGNMENTS

6.1 Albacore

J. Holmes, ALBWG Chair, reported on the activities of the ALBWG over the past year *(ISC/12/ANNEX/11*). The ALBWG did not schedule an intercessional workshop between ISC11 and ISC12 as many Members were tasked with completing other assessments for ISC12. The ALBWG scheduled a two day meeting, but only required one day (July 14, 2012) to review and update fisheries data for 2011, consider recommendations from the Center for Independent Experts (CIE) review of the 2011 stock assessment, review progress on high priority research identified in the 2011 stock assessment document, develop work plans for 2012-2014 leading into the next stock assessment, and develop recommendations for advice on stock status and conservation of north Pacific albacore tuna.

Accomplishments of the ALBWG over the past year include:

1. An independent desktop review of the 2011 stock assessment, coordinated by the CIE and sponsored by the US, was completed.
2. Recommendations for improvements to the assessment model and modeling process from the CIE reviews were incorporated into the work plans of the ALBWG.
3. Work plans for the incorporation of research and improvements to the assessment model were developed and a schedule of meetings approved for 2012-2014 period, leading up to and including the next assessment, which is anticipated in 2014;
4. National fishery statistics for countries harvesting north Pacific albacore (both ISC Member countries and non-member countries) were updated through 2011.
5. Recommendations on stock status and conservation advice were developed.
6. J. Holmes was reelected Chair of the ALBWG.
7. The work plans of the ALBWG through 2014 were reviewed. Three intercessional workshops are scheduled to complete the next stock assessment in early 2014; March 2013 (Nanaimo, Canada) to review and incorporate high priority research results; November 2013 data preparation workshop; and April 2014 stock assessment workshop.

The ALBWG offered the following recommendations concerning an independent stock assessment review process based on its experience with the CIE reviews of the 2011 assessment:

1. Improved documentation of the assessment process relative to current practice is needed, especially data review and preparation.
2. A face-to-face review would be preferable to the desktop approach that was used, despite the logistical and financial challenges this would present to the ISC.
3. There was a difference in the quality of the reviews and the ALBWG recommends that future stock assessment reviews consider the inclusion of reviewers with more knowledge of tunas and tuna stock assessment methodologies.

The ALBWG brought forward the following issues to the ISC Plenary:

1. The need to develop procedures for the archiving of assessment models and datasets used in assessments, including what should be archived (base-case models, sensitivity runs, input data, biological data, etc.), the format in which files should be archived, and where they are archived.
2. The need to verify the accuracy of the 2010 and 2011 data obtained from the WCPFC data manager because catches for some countries are much higher than historical figures for those countries.
3. The need to develop and implement an exchange of data inventories with the IATTC, as is done with the WCPFC, to ensure that species working groups have complete catch histories.

Discussion

The Chair noted that progress has been made on all Plenary issues identified in the CIE report.

A question was raised concerning the choice of reviewers by the CIE. The ISC Chair reported that scientists from the WCPFC and IATTC were excluded from the CIE review panel because the ISC wanted to ensure a fully independent review. Since many of the scientists in the IATTC and WCPFC (or SPC-OFP as science provider) are involved in ISC WGs their inclusion would not demonstrate sufficient independence.

Concern was expressed about added workload for the WGs due to new documentation procedures for stock assessments, especially without a Secretariat that can assist in this task. The ISC Chair noted that it is common practice for tuna RFMOs to produce stand alone stock assessment reports and indicated that ISC must adopt such practices to ensure scientific credibility and promote transparency. By starting with the objective of a standalone document, the amount of work involved should not be substantial.

Regarding the need for archiving data, the STATWG is developing procedures and the approach will be presented during the STATWG report. Verifying the accuracy of the 2010 and 2011 data obtained from WCPFC will be the responsibility of the STATWG. Finally, the ISC Chair will discuss the need for a regular data inventory exchange with the IATTC Director.

6.2 Pacific bluefin tuna

Y. Takeuchi, PBFWG Chair, summarized the activities of the WG (*ISC/12/ANNEX/06; ISC/12/ANNEX/08*). The WG met twice in January-February 2012 in La Jolla, California, USA, and in May-June 2012 in Shimizu, Japan. The January-February workshops focused on data preparation to finalize input data for the stock assessment. In May-June the PBFWG met to conduct the stock assessment, which was not completed due to differing interpretations of input data and assessment model assumptions. The WG proposed holding a stock assessment workshop in November 2012 in Honolulu, Hawaii, USA to complete the stock assessment and submit the Stock Assessment Report to ISC Plenary for its adoption by the end of 2012.

Discussion

Plenary discussed how outstanding issues would be resolved before the next PBFWG meeting scheduled for 9-16 November 2012, and the process for completing the stock assessment by the end of 2012. Reports from prior WG meetings will be finalized as of the ISC12 Plenary and the results adopted by the ISC. Only catch and effort data already reviewed by the WG will be used in the assessment. Outstanding issues related to fishery characterizations will be resolved before the 9-16 November 2012 WG meeting, recognizing that data issues are interrelated with issues of model structure. The modeling will occur at the 9-16 November 2012 meeting and the Stock Assessment Report will be provided to the ISC Chair no later than December 7 for distribution to Members for review. An intercessional Plenary meeting is scheduled sometime during the week of 17-20 December 2012, preferably by webinar or other electronic means, to adopt the assessment and related scientific advice. It was agreed that the November 2012 PBFWG Stock Assessment Report should follow best available scientific information (BASI) guidelines following the same format used in the 2011 North Pacific albacore and 2012 WCNPO striped marlin stock assessment.

Plenary also endorsed an age and growth workshop to be conducted jointly with the ALBWG in 2013 (see 11.8.1).

6.3 Billfish

J. Brodziak, BILLWG Chair, provided a summary of the status of BILLWG work assignments (*ISC/12/ANNEX/05; ISC/12/ANNEX/07*). The WG completed three primary assignments: the

WCNPO striped marlin (MLS) stock assessment, preparation of catch and fishery information for the Pacific blue marlin (BLZ) stock assessment, and updates to billfish fishery and life history data for striped marlin, swordfish, and blue marlin.

The future work plan of the BILLWG was reviewed. The work plan includes two intercessional meetings in order to complete the BLZ stock assessment: 22-29 January 2013 in Honolulu and 21-29 May 2013 in Shimizu. BILLWG members are expected to present completed working papers on BLZ standardized CPUE at the January 2013 intercessional BILLWG workshop. The BILLWG plans to complete data preparation for the BLZ stock assessment at the January 2013 meeting. The BILLWG is expected to conduct the BLZ stock assessment at the May 2013 meeting. The BLZ stock assessment information is expected to be reviewed by the Plenary at ISC 13.

There are two ongoing challenges for ISC BILLWG efforts to conduct and successfully complete stock assessments. First, some ISC countries are not providing catch data on a regular basis to the BILLWG. Second, some Member countries are not participating in BILLWG meetings. The lack of current data is expected to increase uncertainty about current stock status and future stock projections.

Discussion

The ISC Chair noted that the request for Category III size data highlighted by the BILLWG Chair has already been made by the STATWG Chair, consistent with ISC procedures. He also noted some of the problems in coordinating MLS assessments with the IATTC in particular past IATTC assessments have used a stock boundary inconsistent with that used by ISC. Further communication and coordination will be needed leading up to the next MLS assessment 3 years hence.

6.4 Shark

S. Kohin, SHARKWG Chair, reported on the activities of the SHARKWG over the past year (*ISC/12/ANNEX/04*, *ISC/12/ANNEX/09*). The Working Group advanced efforts to compile shark data and work toward a blue shark (BSH) stock assessment. The WG held a workshop in November 2011 followed immediately by an ISC sponsored Shark Age and Growth Workshop, in La Jolla, California, USA; the blue shark data preparatory meeting was held in May 2012 in Shizuoka, Japan; the SHARKWG met in advance of the Plenary in Sapporo, Japan for one day to finalize some unresolved work from the May meeting and to conduct work for the Plenary. Active participants to the meetings have included Canada, Chinese Taipei, Japan, Mexico, USA, IATTC and SPC. In general, the SHARKWG has made significant progress in compiling information on life history aspects of and fisheries catching blue and shortfin mako (SMA) sharks and establishing collaborations on biological and assessment research.

The first ISC Shark Age and Growth Workshop brought together age-and-growth specialists from most ISC Member nations and the IATTC. Participants exchanged information on regional studies and methodologies and established collaborations to advance the SHARKWG's efforts to reduce uncertainty in ageing pelagic sharks. The Working Group has begun to compile both retained and total estimated BSH catch from Member nations. In addition, the WG has received

cooperation from IATTC and WCPFC in identifying fisheries of non-Member nations that target billfish and tunas, and also catch shark in their respective convention areas; obtaining effort information for those fisheries is ongoing in order to estimate catch for non-Member nations.

The SHARKWG noted the challenges in conducting their work related to the lack of good shark catch and biological data collection. The SHARKWG had hoped to have at least the preliminary data for the BSH assessment ready by the Plenary meeting; however, given the challenges associated with shark data, much of the data are still incomplete. The SHARKWG Chair requested assistance from the ISC Chair to encourage Members to provide the data needed for assessments.

The SHARKWG proposed a revised work plan for completing the BSH assessment that includes another data meeting in the winter followed by the BSH assessment in spring 2013. The WG will use a production model for the base-case assessment and conduct alternative modeling in parallel. The revised work plan is provided as Attachment 5 to *ISC/12/ANNEX/09*.

Discussion

SHARKWG priorities were clarified by the Plenary. The ISC Chair noted that the SHARKWG Report included recommendations coming out of the Shark Age and Growth Workshop and also recommendations for long-term research. He wondered if the latter incorporated the former. Age and growth research is an ongoing research priority until definitive information on blue and mako shark age and growth has been compiled, but this long-term objective will be guided by the recommendations from the Shark Age and Growth Workshop.

The ISC Chair emphasized the need for Members to provide the data needed to compile the shark catch tables and reiterated that Members need to provide shark discard data for the upcoming blue and mako shark stock assessments. The difficulties in providing accurate and precise data on shark catches were noted.

Shark catch data are generally less accurate than for the major tuna target species. For this reason these data should be carefully reviewed using fishery-independent sources such as observer or research data. Plenary noted that while the SHARKWG needs species-specific data on shark catches for conducting an effective stock assessment, many countries only have data combined by species or even by different gear types. Nonetheless, these data can provide information on time periods for catch and serve as a proxy for maximum catch estimates. Combined data could be useful in some circumstances. In the absence of species-specific data, combined data should be provided by Members.

It was noted that the shark catch tables in the Plenary Report report retained (landed) catch. However, data on estimated total catch, including discards, and estimated discard mortality are also needed to complete the assessments. While Members will not submit retained catch data for sharks again before the 1 July 2013 submission, Members should submit the estimated catch data to the SHARKWG by 31 August 2012 for use in the BSH assessment.

6.5 Seminar

H. Nakano convened a seminar at ISC12 focusing on population resiliency (*ISC/12/ANNEX/12*). The presentations on resiliency spanned a range of topics including fish, fisheries, and ecosystem resiliency, as well as human resiliency. Summaries of each presentation follow.

A. Kimoto made a presentation entitled *The tragedy and thereafter: Damage and recovery of Japan's fisheries after 11 March 2011*. Damage to fisheries caused by the tsunami that occurred on 3 March 2011 included impacts to fishing effort, facilities, and processing industries. Because vessels from fleets such as distant-water longline were generally not from ports in the areas affected by the tsunami, fewer were affected compared to coastal fishing fleets. The fish processing sector appears to be the slowest to recover from tsunami damage due to the prioritization of facility reconstruction in rebuilding plans for the cities affected by the disaster.

J. Brodziak presented *Modeling resilience of fish stocks: binding limitations and open possibilities*. It was noted that steepness (a parameter of the stock-recruitment function that relates adult spawning biomass to corresponding production of young fish) is key to understanding the resilience of fish stocks to exploitation and environmental change. Meta-analysis approaches can be applied to estimate steepness and characterize uncertainty about the parameter estimate through the combination of data from many studies. Alternatively, steepness may be directly estimated using life history parameters and information about the reproductive ecology of a fish stock where data are sufficient. Early life stages are certainly important but it is not yet known which stage is the most crucial for determination of steepness. Although the environment almost certainly plays an important role in determining steepness, more work will be necessary to understand its role.

H. Nakano presented *Effect of regime shift on Northern tuna stocks*. Regime shifts, which are decadal changes, may affect Pacific Bluefin tuna, albacore, and blue sharks. Stock management options appropriate for these naturally fluctuating populations were briefly introduced. New data will need to be collected to improve our understanding of the links between ocean and ecosystem dynamics.

M. Kaeriyama presented *How to establish the sustainable adaptive management of Pacific salmon under the changing climate***.** Global warming has positively affected age-1 growth and survival of Hokkaido chum salmon. In the future, however, global warming will decrease both the carrying capacity and the distribution area of chum salmon in the North Pacific Ocean. Adaptive management and application of the precautionary principle are essential for protecting Pacific salmon in a changing climate.

It was noted that the causes of larger-scale shifts in climate and oceanic conditions varied, ranging from natural to anthropogenic in origin. The role these shifts play in influencing population resilience is an area ripe for research. A combination of groups including ISC and PICES will need to consider these factors when assessing stocks and ultimately embrace a more holistic approach within an ecosystem management framework.

Discussion

The ISC Chair thanked H. Nakano for organizing an insightful seminar and the four presenters for contributing. He also thanked the rapporteurs for their assistance in compiling the report.

7 STOCK STATUS AND CONSERVATION ADVICE

7.1 Albacore

J. Holmes presented updated recommendations for stock status and conservation information for Pacific albacore (*ISC/12/ANNEX/11*). These recommendations are based on a qualitative review of catch and nominal effort (number of vessels by major gear types) data in 2011. Estimated total catch in 2011 was 83,142 t, which is above the 30-yr average of 72,454 t (1981-2010) and 21% higher than the total reported catch for 2010 (68,932 t). There are two reasons for the increased catch in 2011: (1) target switching from skipjack tuna to albacore in the Japanese pole-and-line fleet, which led to an increase of about 9,000 t in this fleet relative to 2010, and (2) catches obtained for China and a non-ISC Member country through the WCPFC were several times higher than historical catches for these countries and need verification to ensure their accuracy. Excluding the Chinese and non-ISC Member catch data for 2011 results in a total catch estimate of 72,912 t, which is a 5.8% increase relative to 2010. Examination of catch by major gears (troll, longline, pole-and-line) shows that catches by troll gear have been relatively stable since the mid-2000s, averaging about 18,535 t since 2006, while pole-and-line catches have been quite variable due to target switching between skipjack and albacore, ranging from 15,000 to 37,000 t since 2006, and longline catches have decreased slightly over the same period, with the exception of an increase in 2011, which reflects Chinese and non-ISC Member country data. If the Chinese and non-ISC Member country data are excluded, then longline catches for ISC Member countries maintained the long-term declining trend in 2011. Nominal effort (measured as the number of vessels) of ISC Member countries were either stable (troll, pole-and-line) or declining (longline).

Discussion

The ISC Chair thanked the ALBWG Chair for his presentation and the ALBWG for their hard work. Plenary confirmed that the conservation advice adopted at ISC11 should be maintained. Plenary also agreed with the concern raised by the ALBWG Chair regarding the increased catch of North Pacific albacore by non-ISC Member countries and tasked the STATWG Chair with confirming the validity of these data with WCPFC

Stock Status and Conservation Advice

Stock Status

Given no new information, the ALBWG recommended no changes to its stock status determination in 2011, i.e., the stock is considered healthy and neither overfished nor experiencing overfishing.

Conservation Advice

The ALBWG noted that it has not received any new information since the 2011 stock assessment that would require a change to previous (2011) conservation information. Therefore, the ALBWG offers no new recommendations on conservation above, beyond that provided by ISC11 (see below):

1. **The stock is considered to be healthy at average historical recruitment levels and fishing mortality ($F_{2006\text{-}2008}$).**
2. **Sustainability is not threatened by overfishing as the $F_{2006\text{-}2008}$ level (current F) is about 71% of $F_{SSB\text{-}ATHL}$ and the stock is expected to fluctuate around the long-term median SSB (~400,000 t) in the short- and long-term future.**
3. **If future recruitment declines by about 25% below average historical recruitment levels, then the risk of SSB falling below the SSB-ATHL threshold with $F_{2006\text{-}2008}$ levels increases to 54% indicating that the impact on the stock is unlikely to be sustainable.**
4. **Increasing F beyond $F_{2006\text{-}2008}$ levels (current F) will not result in proportional increases in yield as a result of the population dynamics of this stock.**
5. **The current assessment results confirm that F has declined relative to the 2006 assessment, which is consistent with the intent of the previous (2006) WG recommendation.**

7.2 Pacific Bluefin Tuna

Y. Takeuchi summarized recent stock assessment research conducted by the PBFWG to assess stock status (*ISC/12/ANNEX/06 and ISC/12/ANNEX/08*). Fishery-associated data through the first half of 2011 were frozen for use in a length-based, age structured population dynamics models within the Stock Synthesis software (version 3.23b). A single pan-Pacific stock of PBF is assumed. The model used quarterly catch-at-length data; 13 fisheries defined by gear, location and season; and six abundance indices.

The PBFWG recognized the substantial uncertainty in input data, including fishery data and biological parameters. After considering a wide range of model configurations, including input data as well as model parameterizations, the PBFWG could not reach consensus on a base model describing the stock status due to differing interpretations of data and model structure. As a result the PBFWG could not provide a definitive determination of stock status.

Based on the exercise to develop a base-case model and the fishery-associated data (e.g., CPUE), the PBFWG notes that SSB may have continued declining since the last stock assessment (2010; Figure 7.1). Also, recruitment appears to be fluctuating annually with no specific trend (Figure 7-2b). Until new stock assessment results become available, the WG agreed to carry over its previously recommended advice on stock status on PBF, albeit with the precautionary note that the uncertainty in stock status has increased with the passage of time and that the condition of the stock may have deteriorated since the last assessment.

Given that SSB may have continued to decline since the last stock assessment and because of the increased uncertainty concerning stock status, the WG noted it is even more important to reemphasize the previous conservation advice.

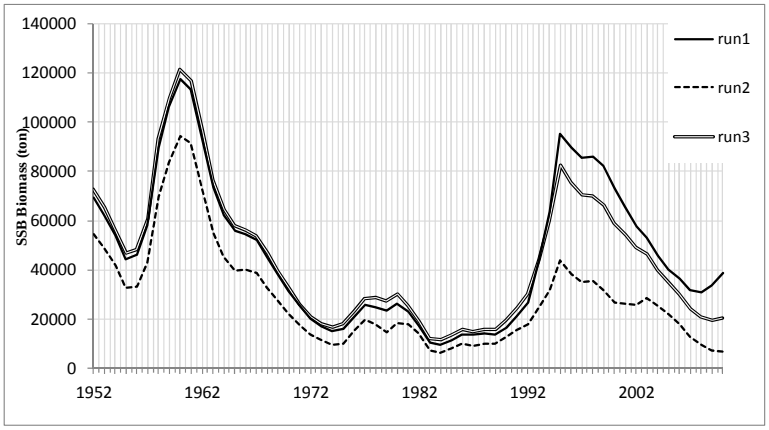

Figure 7-1.PBF spawning stock biomass estimate of three runs the WG considered.

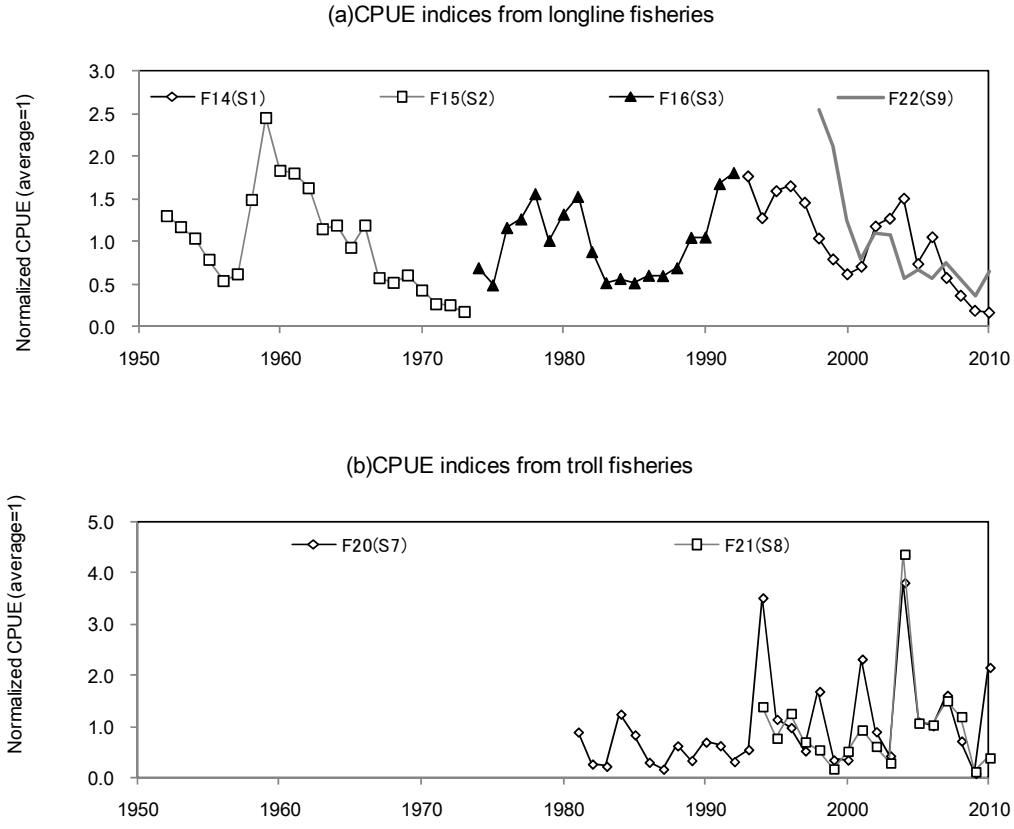

Figure 7-2. PBF CPUE time series from longline (a) and troll fisheries (b) which are agreed to be used for the base case assessment.

Discussion

The ISC Chair thanked the PBFWG Chair for his presentation and the PBFWG for their hard work.

The high steepness value used in the assessment model (h=0.999) was questioned. The PBFWG studied this issue in past workshops and concluded, based on Mangel *et al.* (2010), [2] that there is a low probability that steepness is lower than 0.999 (see *ISC/12/ANNEX/06 working paper PBF-1/15*). It was noted that the potential for a continued decline in SSB and CPUE since the last assessment is cause for concern. Managers should note this as they deliberate on the development of management measures. Plenary requests the WG clarify the steepness value at its November 2012 meeting.

Stock Status and Conservation Advice

Stock Status

ISC12 noted that since the last assessment (2010) there appears to be a continuing decline in SSB and CPUE, as was projected in the 2010 assessment.

Conservation Advice

Until a new stock assessment result becomes available, ISC12 agreed to carry over the previous advice, albeit with the precautionary note that the uncertainty in the stock status has increased through the passage of time and SSB may have declined since the last stock assessment. The advice on PBF stock status from ISC11 is:

> **Given the conclusions of the July 2010 PBFWG workshop (*ISC/10/ANNEX/07*), the current (2004 -2006) level of F relative to potential biological reference points, and the increasing trend of F, it is important that the level of F is decreased below the 2002-2004 levels, particularly on juvenile age classes.**

7.3 Striped Marlin

The BILLWG Chair presented the ISC12 conservation information for Western and Central North Pacific striped marlin (MLS) prepared by the BILLWG to the Plenary (*ISC/12/ANNEX/05 and ISC/12/ANNEX/07*). This was:

> *Reducing fishing mortality would likely increase spawning stock biomass and would improve the chances of higher recruitment. If one uses the median to measure the central tendency of the distributions of projected spawning biomass (Annex 1), then the projection results suggest that fishing at F_{MSY} would lead to spawning biomass increases of roughly 45% to 72% from 2012 to 2017. Fishing at a constant catch of 2,500 mt would*

[2] Mangel, M., Brodziak, J., and DiNardo, G. 2010. Reproductive ecology and scientific inference of steepness: a fundamental metric of population dynamics and strategic fisheries management. Fish and Fisheries 11:89-104.

lead to potential increases in spawning biomass of 133% to 223% by 2017. In comparison, fishing at the current fishing mortality rate would lead to spawning biomass increases of 14% to 29% by 2017, while fishing at the average 2001-2003 fishing mortality rate would lead to a spawning biomass decrease of 2% under recent recruitment to an increase of 6% under the stock-recruitment curve assumption by 2017 (see ISC/12/ANNEX/07 Appendix 1).

Discussion

The ISC Chair thanked the BILLWG Chair for his presentation and the BILLWG for their hard work.

The reliability of the Japanese longline CPUE index was discussed, given that MLS is not a target in the fishery. The WG Chair explained the methods used to stratify data for use in developing the index in order to address this issue. It was agreed that fishery-independent data would improve indices.

Stock Status and Conservation Advice

Given the new information, Plenary concluded the following regarding stock status and conservation advice:

Stock Status

The WCNPO stock of MLS is overfished and experiencing overfishing (Figure 7-3**). Reducing fishing mortality would likely increase spawning stock biomass and may improve the chances of higher recruitment.**

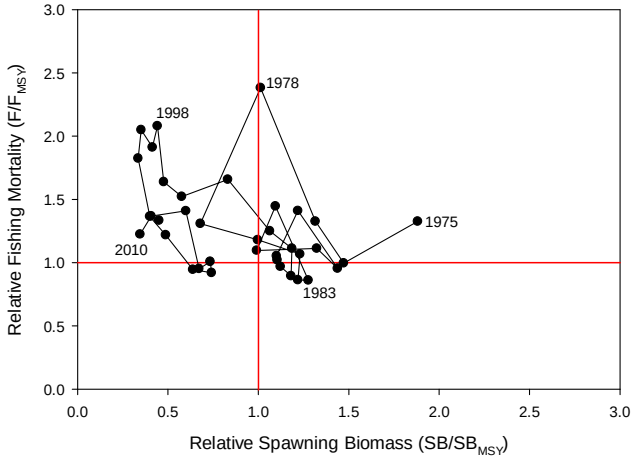

Figure 7-3. Kobe plot of the trends in estimates of relative fishing mortality and relative spawning biomass of Western and Central North Pacific striped marlin (*Kajikia audax*) during 1975-2010.

Conservation Advice

The ISC provides the following scientific information as conservation advice:

- **Fishing at F_{MSY} would lead to spawning biomass increases of roughly 45% to 72% from 2012 to 2017.**
- **Fishing at a constant catch of 2,500 mt would lead to potential increases in spawning biomass of 133% to 223% by 2017.**
- **Fishing at a constant catch of 3,600 mt would lead to potential increases in spawning biomass of 48% and 120% by 2017.**

In comparison

- **Fishing at the current fishing mortality rate would lead to spawning biomass increases of 14% to 29% by 2017,**
- **Fishing at the average 2001-2003 fishing mortality rate would lead to a spawning biomass decrease of 2% under recent recruitment to an increase of 6% under the stock-recruitment curve assumption by 2017.**

The median may be used as the measure of central tendency of the distributions of projected spawning biomass. Using the median, and based on the projection results that commence in 2010, examples of different F levels representing potential reference points are shown in Table 7-1.

Table 7-1. Percentiles of projected relative spawning stock biomass (SB_{2017}/SB_{2012}) in 2017.

	Recent Recruitment					Stock-Recruitment Curve				
Harvest Scenario	5th	25th	50th	75th	95th	5th	25th	50th	75th	95th
(1) F = $F_{current}$	0.85	1.03	1.14	1.23	1.36	0.83	1.09	1.29	1.51	1.82
(2) F = F_{MSY}	1.12	1.32	1.45	1.55	1.69	1.14	1.47	1.72	1.98	2.34
(3) F = $F_{2001\text{-}2003}$	0.72	0.87	0.98	1.06	1.18	0.66	0.88	1.06	1.25	1.52
(4) F = F20%	1.26	1.48	1.62	1.72	1.88	1.32	1.68	1.95	2.24	2.62
(5) F = F30%	1.90	2.18	2.35	2.48	2.68	2.08	2.56	2.91	3.28	3.79
(6) F = 0	4.93	5.49	5.82	6.06	6.47	5.43	6.33	7.07	7.81	8.72
(7) Catch = 2500 mt	1.41	1.97	2.33	2.67	3.1	1.63	2.49	3.23	4.03	5.28
(8) Catch = 3600 mt	0.98	1.18	1.48	1.80	2.25	1.05	1.51	2.20	3.01	4.37

Tables A1 and A2 in the *Executive Summary of the Western and Central North Pacific Striped Marlin Stock Assessment* (see Annex 1 of Appendix 1 in *ISC/12/ANNEX/07*) provide the information in response to WCPFC's request for the ISC to provide catch levels corresponding to various potential F reference points (WCPFC7 report, paragraph 114.ix.b) .

The Plenary notes that the choice of F or catch levels should be left to the discretion of fishery managers, given the ISC's science role. The purpose of the information provided here is to support informed decision making by managers.

7.4 Swordfish

The BILLWG Chair noted that there was no new assessment information for the North Pacific swordfish stock. In addition, following the March 2011 tsunami, catches of swordfish by Japanese longline vessels had declined and that the condition of both swordfish stocks was unlikely to have changed given the relatively high biomasses indicated in the 2009 stock assessment. The BILLWG Chair presented the ISC12 conservation information for Western and Central North Pacific swordfish to the Plenary and recommended that the conservation information from ISC11 be maintained.

Discussion

The ISC Chair thanked the BILLWG Chair for his report and the BILLWG for their hard work.

Plenary agreed with the BILLWG recommendation concerning conservation advice for the North Pacific swordfish stock.

Conservation Advice

Noting that the catch by Japan has decreased and there is no new stock assessement information, ISC12 agreed to maintain the advice from ISC11, namely:

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

8 REVIEW OF STOCK STATUS OF SECONDARY STOCKS

8.1 Eastern Pacific Ocean – Yellowfin, Bigeye, and Skipjack Tunas

M. Dreyfus summarized the status of yellowfin , bigeye and skipjack tuna stocks in the Eastern Pacific Ocean (EPO) (*ISC/12/PLENARY/INFO/08-10*). The EPO fishery for YFT, SKJ and BET is dominated by the purse seine fleets, which have achieved a maximum fleet capacity in recent times. In contrast, longline fishery effort (measured in number of hooks) has been decreasing from a record level in 2002. The most important species components of catch in the EPO by weight are YFT and SKJ. For YFT, sets associated with dolphins produce the highest catch. For BET, since 1994 fish aggregation device (FAD) sets have replaced longline as the main fishing method in terms of catch. For SKJ both floating objects and unassociated sets in the purse seine fishery account for the majority of the catch.

Catches of YFT in 2011 amounted to 202,000 t, equal in value to the mean catch in the EPO for the period 2006-2010. At the same time, SKJ catches increased 20% from the average 2006-2010 catch of 236,000 t and BET decreased 20% compared to the catches in the same period of time previously. The total number of purse seine sets is close to 25,000 for 2011.

IATTC recruitment estimates show that YFT had a period of high recruitment from 1984 to 2002. Recruitment might now be at the average of levels seen since 1975 but it is too early to confirm that. Spawning stock biomass (SSB) is around the level necessary to obtain MSY and fishing mortality is below F_{MSY}. Fishing mortality by each of the three types of purse seine sets has an almost equally important impact on the resource. Future projections given current F show an increase in SSB.

For BET, recent recruitment estimates are above average, SSB is above SSB_{MSY} but fishing mortality is also above F_{MSY}. Using current F, forward projections show a decrease in SSB levels but attenuated by the recent above average recruitment. The highest impact to the resource is by far produced by the floating object fishery.

The SKJ assessment is based on relative reference points and until now there is no concern for this stock.

Discussion

The ISC Chairman thanked M. Dreyfus for the presentation.

8.2 Western and Central Pacific Ocean – Bigeye, Yellowfin, Skipjack, and South Pacific Albacore Tunas

A. Beeching (WCPFC Secretariat) presented the current stock status for BET, YFT, SKJ in the WCPO and South Pacific albacore (*ISC/12/PLENARY/INFO/03-06*). The latter three tuna species are not thought to be in an overfished state nor are they experiencing overfishing. BET is considered to be experiencing overfishing and approaching an overfished state. A recent peer review of the BET 2011 stock assessment is timely and will be presented to the Eighth Scientific Committee meeting (SC8). The presentation was concluded with an outline of the 2012 stock assessments which will also be presented at SC8.

Discussion

Plenary discussed the peer review of the BET stock assessment. It was noted that the review panel met with relevant assessment scientists in April at SPC to conduct the review with three objectives in mind, evaluating the appropriateness of the models used, the assumptions behind the models, and the outputs. In response to the review the SPC is also investigating the effect of using tagging data in the assessment and will report on this at SC8. Going forward, the WCPFC is likely to conduct future peer reviews. It was noted that the final report of the review can be found on the WCPFC website.

9 REVIEW OF STATISTICS AND DATA BASE ISSUES

9.1 Report of the STATWG

R.-F. Wu, Chairman of the STATWG, presented the summary of the activities of the WG since ISC11 (*ISC/12/ANNEX/10*). The STATWG Steering Committee was established at ISC11, and conducted its first intercessional meeting in Chinese Taipei, in 31 August-1 September 2011. The second STATWG Steering Committee meeting was in Shimizu, Japan, in 29-30 May 2012; and a meeting of the entire STATWG was held in Sapporo, Japan, in 11-12 July 2012, prior to ISC12.

Accomplishments of the STATWG over the past year include:

1. Continuing with the successful exchange of data inventories with the WCPFC that was initiated in 2010.
2. Securing 2 terabytes of storage space for archiving species working group stock assessment files.
3. Development of graphs of ISC annual catch data (public domain) by Member country for major species of interest, updated annually on the ISC website.
4. Substantial improvements and updates to the ISC website, and new profiles for billfish and sharks developed on a test site, to be published in 2012. Additional details were provided by the Webmaster in her presentation (see Section 11.5).
5. Progress has also been made with metadata formats, the online data submission system, and standardizing database codes.

Performance of Member countries was discussed in the following areas:

1. Updates on Member data collection systems
2. Comparison of catch tables from the ISC database, National Reports, and Working Groups
3. Submission of 2011 data and ISC report cards

The 2012 work plan for the STATWG was presented, as well as recommendations to the 2012 Plenary. The national contacts list for the STATWG was also presented (*ISC/12/ANNEX/10*). The STATWG Steering Committee will schedule their next meeting in Chinese Taipei, in September 2012, with a follow up meeting in April or May 2013.

9.2 Annual Catch Table Update

The Database Administrator reported on the discrepancies between the annual catch data (Category Ic) from the ISC database, the National Reports, and the Species Working Groups for the last 5 years for five ISC species of interest: albacore, Pacific bluefin tuna, swordfish, striped marlin, and blue sharks. The matching status for the three data sources was classified into five categories: A) all tables completely matched; B) database and WG tables matched; C) database and National Report tables matched; D) National Report and WG tables matched; E) no tables matched. The results of the comparison of catch tables were clearly different for each species. For albacore and Pacific bluefin tuna, complete matches between the data tables were common. There appears to be more data issues for billfish and sharks. For blue sharks, catch data was primarily provided to the Working Group, but data collection for this species has only recently started. It is expected that data reporting for sharks will improve in the near future.

Discussion

The ISC Chair thanked the Chair of the STATWG and the Database Administrator for their presentations and the members of the WG for their hard work.

The Plenary endorsed three recommendations:

1. The ISC Chair, under the Memorandum of Cooperation, will initiate discussion with the IATTC Director to facilitate an annual data inventory exchange.
2. Direct ISC Members to provide shark catch data at the lowest taxonomic level possible (i.e., species), but if shark species data are unavailable to provide combined catch data, and to provide associated discard data in Category I and II.
3. In order to correct inconsistencies and errors in the ISC database, direct Members to provide their entire historical time series of Category I, II, and III data online for ISC species of interest by 1 July 2013.

Plenary noted that the data submission report card indicated continued improvement in the quality of submitted data. Some discrepancies between ISC database records and National Reports were noted, however. Submission of historical data by Members will help resolve such discrepancies.

It was noted that the STATWG Chair should follow up with the WCPFC data manager to validate reported catches of ALB by China and Vanuatu (non-Member).

10 REVIEW OF MEETING SCHEDULE

10.1 Time and Place of ISC13

The ISC Chair announced that ISC13 will be convened in the Republic of Korea and provisional dates are 17-22 July 2013. The ISC Chair thanked the Republic of Korea for their invitation and noted that prior to the Plenary Meeting the ISC WGs will likely convene administrative meetings.

10.2 Working Group Intercessional Meetings

The Plenary discussed schedules for WG intercessional meetings and agreed on the tentative scheduled presented in Table 10-1. It was noted that conflicts in dates may still exist, and that WG Chairs will resolve these issues.

Table 10-1. Tentative schedule of ISC meetings for 2012-2014.

Date	Meeting	Contact
2012		
10-12 Sep	STATWG Steering Committee - Taipei, TW (ISC Data Enterprise System)	R.-F. Wu/G.DiNardo fan@ofdc.org.tw
9-16 Nov	PBFWG - Honolulu, HI (Assessment)	Y. Takeuchi Yukiot@fra.affrc.go.jp
17-21 Dec	Plenary Meeting (Emergency)	G. DiNardo Gerard.DiNardo@noaa.gov
2013		
Jan	SHARKWG - USA (Blue shark data preparation)	S. Kohin Suzanne.Kohin@noaa.gov
22-29 Jan	BILLWG - Honolulu, HI (Blue marlin data preparation)	J. Brodziak Jon.Brodziak@noaa.gov
19-25 Mar	ALBWG (Workshop)	J. Holmes John.Holmes@dfo-mpo.gc.ca
Apr	SHARKWG - Shimizu, Japan (Blue shark assessment)	S. Kohin Suzanne.Kohin@noaa.gov
21-29 May	BILLWG - Japan (Blue marlin assessment)	J. Brodziak Jon.Brodziak@noaa.gov
10-11 Jul	STATWG (Workshop)	R.-F. Wu fan@ofdc.org.tw
12 Jul	SHARKWG	S. Kohin Suzanne.Kohin@noaa.gov
13-14 Jul	ALBWG	J. Holmes John.Holmes@dfo-mpo.gc.ca
15-16 Jul	BILLWG	J. Brodziak Jon.Brodziak.noaa.gov
15-16 Jul	PBFWG	Y. Takeuchi Yukiot@fra.affrc.go.jp
17-22 Jul	ISC13 - Republic of Korea (Plenary)	G. DiNardo Gerard.DiNardo@noaa.gov
Oct	ALBWG (Data preparation)	J. Holmes John.Holmes@dfo-mpo.gc.ca
Nov	ALBWG/PBFWG (Tuna Age and Growth Workshop)	J. Holmes/Y. Takeuchi John.Holmes@dfo-mpo.gc.ca/Yukiot@fra.affrc.go.jp
Nov	PBFWG (Data preparation)	Y. Takeuchi Yukiot@fra.affrc.go.jp
Nov	SHARKWG (Shortfin mako shark data preparation)	S. Kohin Suzanne.Kohin@noaa.gov
Dec	BILLWG (Swordfish data preparation)	J. Brodziak Jon.Brodziak.noaa.gov
2014		
14-28 Apr	ALBWG - La Jolla, CA (Assessment)	J. Holmes John.Holmes@dfo-mpo.gc.ca
16-21 Jul	ISC14 (Plenary)	G. DiNardo Gerard.DiNardo@noaa.gov

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

Concern was expressed regarding the number of working group meetings held each year. The ISC Chair urged WG Chairs to keep this in mind when scheduling meetings and to make sure time is used efficiently. It was suggested that WGs explore the use of webinar technology and similar meeting tools as alternatives to face-to-face meetings.

11 ADMINISTRATIVE MATTERS

11.1 Peer review of Function and Process

The ISC Rules and Procedures stipulate that every five years the function of the ISC committee and subsidiary bodies would be reviewed by three recognized peers. To meet this requirement, ISC11 developed a Terms of Reference for the peer review and Korea, Japan and the USA each agreed to sponsor a reviewer. Since then, reviewers were selected and the peer review team was formed. Dr. Jerry Ault was selected as the peer review team Chair. Other reviewers include C. Zhang and H. Matsuda. To date, reviewers have attended at least one WG meeting each and all attended ISC12. One reviewer will attend NC8 in September 2012. Dr. Ault presented the progress of the peer review team to date. The peer-review team noted that ISC is an especially unique science organization due to its science-driven mission and because it is operationally independent from the RFMOs it serves. ISC has built a special role that covers the gaps and helps to plan the necessary future science with a vision to support next-generation stock assessments. The peer review team also noted that their recommendations would focus on improvements to the ISC operational guidelines, managing data information systems, working group and stock assessment report format, clarification of assessment assumptions, outreach, research science, science administration and funding mechanisms of ISC. The peer review of ISC's function is expected to be completed by the end of 2012 and recommendations considered at ISC13.

Discussion

Plenary and the ISC Chair thanked the peer review team for their presentation and hard work. The ISC Chair thanked Japan, Republic of Korea and the US for each sponsoring a peer review team member.

Plenary discussed a change in the scope of ISC functions as suggested in the peer review team's progress report and agreed that priorities would have to be set. Plenary also agreed that the peer review report outlined an expansive vision for ISC. To realize this transformation ISC will have to proceed incrementally. The Plenary noted that a suggested prioritization of improvements to ISC functions would be useful in the peer review report. Plenary agreed that a draft budget would also be useful for ISC13 when it discusses the recommendation and full peer review report in July 2013.

11.2 Best practices on Science Reporting

The ISC Chair noted that this was the topic of the seminar at ISC11 and ISC11 agreed that the seminar recommendations for best practices should be incorporated into the Operations Manual for review and adoption by ISC12. These recommendations were incorporated into the draft Operations Manual and reviewed by ISC12 (see Section 11.6). These procedures will provide a

consistent structure for WG products and stock assessments. They should also help address some of the criticisms leveled by the CIE review panel that reviewed the North Pacific albacore assessment. Adopting these procedures will enhance the transparency of the ISC and is consistent with the direction in which RFMOs are moving with respect to the Kobe process. Finally, it supports improvements in ISC function that the peer review team has identified.

11.3 Working Group Chairperson Elections and Terms

The ISC Chair congratulated J. Holmes on being re-elected for his second term as the ALBWG Chair. The ISC Chair also reviewed the terms of the ALBWG, BILLWG, PBFWG, SHARKWG, and STATWG chairs, as well as the terms of the ISC Chair and Vice Chair. It was noted that the ISC Chair will be up for reelection for his second term and the PBFWG Chair will be ending his second term at ISC13.

11.4 Organizational Chart and Contact Persons

The ISC Organization Chart was considered and updated (Figure 11-1). The participants listed on the Organization Chart serve as the points of contact for the respective WGs. They also serve as points of contact for respective Delegation Leaders in keeping abreast of WG activities and workshop results, and for serving as team leaders of national scientists to intercessional WG workshops.

It was noted that Korea will be making additional changes to the Organizational Chart regarding their representatives in the WGs and will send those changes to the Secretariat. The ISC Chair encouraged the PBFWG and SHARKWG Chairs to consider identifying a data manager for their respective WGs.

ISC Organizational Chart (July 2012)

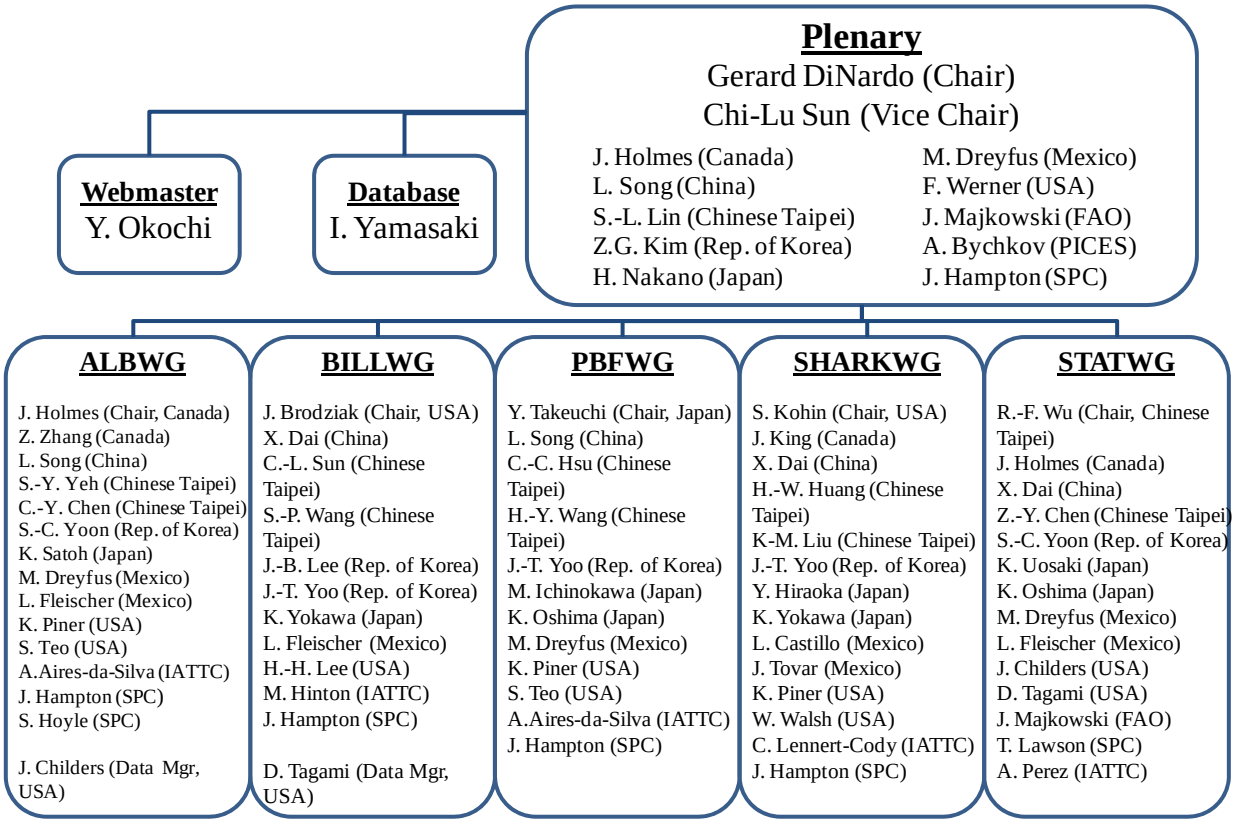

Figure 11-1. ISC Organizational Chart (July 2012).

11.5 Website

Y. Okochi, ISC Webmaster, reported on website improvements. Since ISC11 the following improvements have been implemented:

- Meeting schedules, and Working Group documents and papers are updated regularly to the website.
- The structure of the pages “Fisheries Statistics,” “Organization Chart,” and “Recommendation” has been updated and improved based on the ISC11 Plenary Report and discussion with Members.
- Test pages for species Working Group pages have been developed with substantial assistance from the WG Chairs and members. These pages will be publicly available on the website soon after the ISC12 Plenary meeting.
- The functioning of the side calendar has been improved.

In addition, the architecture of the website has been optimized, allowing for enhanced user access to ISC information and documents.

Discussion

The ISC Chair and Members thanked the Webmaster for her excellent work on website improvements. Plenary made two recommendations: (1) Replace the "@" symbol in email addresses listed on the website with the text "AT" to prevent unwanted automatic harvesting of addresses; (2) Add a new page summarizing the schedule of future stock assessments.

Concern was raised about certain geographic place names used on maps on the website. The ISC Chair will investigate the matter and report back to the Members.

11.6 Update of Operations Manual

ISC has been working to update its Operations Manual (*ISC/12/Plenary/05*) in order to clarify roles and tighten procedures. Changes over the past few years have included the addition of the Database Administrator and Webmaster position descriptions, style guidelines for Working Group reports, and the IATTC-ISC Memorandum of Cooperation. ISC11 proposed two areas of changes: (1) change the data reporting protocol to include discards (this was done) and (2) incorporate suggestions proposed by the seminar on best available scientific information (BASI), especially those related to best practices for management advice. Major changes incorporated into the Operations Manual include: Purpose and goals of stock assessments, guidelines for developing BASI, format for species stock assessment reports that are separate from WG reports, addition of executive summaries of stock assessments, and working paper style guidelines. The goals are to provide clear scientific information that managers can use and to document the scientific processes that ISC working groups use in developing assessments. Many of these changes reflect processes being adopted by the other tuna RFMOs. These changes also address concerns about the transparency and documentation of ISC assessment work and reflect general scientific reporting standards. Members were asked to consider these changes and consider adopting the revised Operations Manual (July 2012).

Discussion

The ISC Chair stressed the importance of adopting the updated Operations Manual this year so that ISC products remain scientifically creditable. The proposed changes address many of the concerns identified during the external review of the North Pacific albacore stock assessment and preliminary results of the ISC Function Review

After confirming that the proposed BASI guidelines in the Operations Manual are recommended guidance for scientists in developing assessment reports and working papers, Plenary generally endorsed the updates, but asked for more time for Members to review the changes. It was agreed that the changes would be finalized at the 17-21 December 2012 intercessional Plenary meeting. Plenary also recommended the inclusion of additional discussion about the advisory nature of the section on the incorporation of BASI into stock assessment reports, because it may not be possible to include all of the recommended components in every report. The Office of the Chair will circulate revisions to address this concern by 30 August 2012. Members will provide comments by 15 October 2012.

11.7 Peer review of assessments

Independent peer reviews of research, including stock assessments, bolster an organization's credibility. The ISC Chair discussed the need to develop a regular stock assessment peer review process that is both efficient and cost effective. The approach used for the North Pacific albacore stock assessment (a "desktop" review) does not allow review of the data underlying the assessment. Addressing data issues in a peer review process will be important. The ISC Chair will continue to work on developing terms of reference for future peer reviews. Members were encouraged to provide examples of effective processes used by other organizations.

11.8 Other Administrative Matters

11.8.1 Tuna Age and Growth Workshop

Plenary heard a presentation from O. Abe, NRIFSF, describing a proposal for ISC to sponsor a technical workshop, *Age and Growth Estimation of Pacific Bluefin and North Pacific Albacore*. Population size estimates are highly sensitive to the growth curve function parameters employed and existing uncertainty in the current growth curves should be addressed. In particular, the difficulty of accurately and consistently reading annual/daily rings requires validation and cross-checking of results. A workshop and manual are recommended to tackle these issues. The workshop would be an opportunity to share information about aging techniques among specialists and to standardize aging methods in order to establish more reliable growth curves of both species. A manual will document methods for use by other scientists.

The Workshop will be a joint collaboration between the ALBWG and PBFWG.

The Plenary endorsed the proposal as well as the tentative November-December 2013 time frame for the workshop.

11.8.2 International Billfish Symposium

C-L. Sun reported on plans for Chinese Taipei to host the next International Billfish Symposium, 6-10 May 2013. It was agreed that the ISC should play a sponsorship role in this meeting, given the organization's competence in the assessment of Pacific billfish stocks. Members were also encouraged to investigate whether their governments could participate as sponsors and participate in the Symposium as well.

11.8.3 Membership

The need for formal documentation of ISC membership by Members was raised. The ISC Chair was tasked with searching the archives for documentary evidence of membership beyond the original agreement between Japan and the United States. If documentation cannot be found it may be necessary to formalize membership by developing a signed agreement among member countries. It was pointed out that most Members are signatories to the Convention for the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean (WCPF Convention) and that the ISC is the established scientific provider to the WCPFC NC. Whether this agreement implies membership to ISC will also be explored.

12 ADOPTION OF REPORT

A draft Report of the Twelfth session of the International Scientific Committee for Tuna and Tuna-like Species in the North Pacific Ocean was prepared based on input and comment from all participants, and circulated to all participants for review. The report was reviewed in its entirety, section by section and was approved by the ISC12 Plenary, subject to editorial corrections to be made by the ISC Chair.

13 CLOSE OF MEETING

G. DiNardo thanked the National Research Institute of Far Seas Fisheries for hosting the meeting, with special thanks to Hideki Nakano, Hidetada Kiyofuji, and Yumi Okochi who did an excellent job with meeting arrangements and logistics. He also expressed his appreciation to the Office of the Chair including Sarah Shoffler, Lyn Katahira, Lynne Nakamura, and Chi-Lu Sun for their outstanding support. He also thanked Kit Dahl for taking on the rapporteuring duties and producing a well-written report, as well as sponsors including the Fisheries Research Agency for hosting receptions. G. DiNardo closed the successful 12th meeting of the ISC at 11:20am on 23 July 2012.

14 CATCH TABLES

Table 14-1. [1]North albacore landings (in metric tons by fisheries, 1952-2011. Blank indicates no effort. -- indicates data not available. 0 indicates less than 1 metric ton. Provisional estimates in ().

Year	Japan							Korea		Chinese-Taipei		
											Longline	
	Purse Seine	Gill Net	Set Net	Pole and Line	Troll	Longline	Other	Gill Net	Longline	Gill Net [2]	Distant Water	Offshore
1952	154		55	41,787	--	26,687	182					
1953	38		88	32,921	--	27,777	44					
1954	23		6	28,069	--	20,958	32					
1955	8		28	24,236	--	16,277	108					
1956			23	42,810	--	14,341	34					
1957	83		13	49,500	--	21,053	138					
1958	8		38	22,175	--	18,432	86					
1959			48	14,252	--	15,802	19					
1960			23	25,156	--	17,369	53					
1961	7		111	18,639	--	17,437	157					
1962	53		20	8,729	--	15,764	171					
1963	59		4	26,420	--	13,464	214					
1964	128		50	23,858	--	15,458	269					
1965	11		70	41,491	--	13,701	51					
1966	111		64	22,830	--	25,050	521					
1967	89		43	30,481	--	28,869	477				330	
1968	267		58	16,597	--	23,961	1,051				216	
1969	521		34	31,912	--	18,006	925				65	
1970	317		19	24,263	--	16,222	498				34	
1971	902		5	52,957	--	11,473	354		0		20	
1972	277	1	6	60,569	--	13,022	638		0		187	
1973	1,353	39	44	68,767	--	16,760	486		3		--	
1974	161	224	13	73,564	--	13,384	891		114		486	
1975	159	166	13	52,152	--	10,303	230		9,575		1,240	
1976	1,109	1,070	15	85,336	--	15,812	270		2,576		686	
1977	669	688	5	31,934	--	15,681	365		459		572	
1978	1,115	4,029	21	59,877	--	13,007	2,073		1,006		6	
1979	125	2,856	16	44,662	--	14,186	1,139	0			81	
1980	329	2,986	10	46,742	--	14,681	1,177	6	402	--	249	
1981	252	10,348	8	27,426	--	17,878	699	16		--	143	
1982	561	12,511	11	29,614	--	16,714	482	113	5,462	--	38	
1983	350	6,852	22	21,098	--	15,094	99	233	911	--	8	
1984	3,380	8,988	24	26,013	--	15,053	494	516	2,490	--	--	
1985	1,533	11,204	68	20,714	--	14,249	339	576	1,188	--	--	
1986	1,542	7,813	15	16,096	--	12,899	640	726	923	--	--	
1987	1,205	6,698	16	19,082	--	14,668	173	817	607	2,514	--	
1988	1,208	9,074	7	6,216	--	14,688	170	1,016	175	7,389	--	
1989	2,521	7,437	33	8,629	--	13,031	433	1,023	27	8,350	40	
1990	1,995	6,064	5	8,532	--	15,785	248	1,016	1	16,701	4	
1991	2,652	3,401	4	7,103	--	17,039	395	852	0	3,398	12	
1992	4,104	2,721	12	13,888	--	19,042	1,522	271	1	7,866	--	
1993	2,889	287	3	12,797	--	29,933	897		21		5	
1994	2,026	263	11	26,389	--	29,565	823		54		83	
1995	1,177	282	28	20,981	856	29,050	78		14		4,280	
1996	581	116	43	20,272	815	32,440	127		158		7,596	
1997	1,068	359	40	32,238	1,585	38,899	135		404		9,119	337
1998	1,554	206	41	22,926	1190	35,755	104		226		8,617	193
1999	6,872	289	90	50,369	891	33,339	62		99		8,186	207
2000	2,408	67	136	21,550	645	29,995	86		15		7,898	944
2001	974	117	78	29,430	416	28,801	35		64		7,852	832
2002	3,303	332	109	48,454	787	23,585	85		112		7,055	910
2003	627	126	69	36,114	922	20,907	85		146		6,454	712
2004	7,200	61	30	32,255	772	17,341	54		78		4,061	927
2005	850	154	97	16,133	665	20,420	234		420		3,990	482
2006	364	221	55	15,400	460	21,027	42		138		3,848	469
2007	5,682	226	30	37,768	519	22,336	44		56		2,465	451
2008	825	1,531	101	19,060	549	19,092	15		365		2,490	579
2009	2,076	149	33	31,172	410	21,995	43		365		1,866	512
2010	330	24	42	19,561	588	21,167	37		109		2,281	(537)
2011	(330)	(24)	(42)	(28,610)	(588)	(21,882)	(37)		(87)	(3)	(2,972)	(462)

1 Data are from the ISC Albacore Working Group,July 14, 2012 except as noted.

2 Chinese-Taipei gill net catches for 2011 include 2 t from Offshore Other gear category.

Table 14-1. (continued)

Year	United States [3]								Mexico		Canada	Grand Total
	Purse Seine	Gill Net	Pole and Line	Albacore Troll [4]	Tropical Troll & Handline	Sport	Longline	Other [5]	Purse Seine	Pole and Line [6]	Troll	
1952				23,843		1,373	46				71	94,198
1953				15,740		171	23				5	76,807
1954				12,246		147	13					61,494
1955				13,264		577	9					54,507
1956				18,751		482	6				17	76,464
1957				21,165		304	4				8	92,268
1958				14,855		48	7				74	55,723
1959				20,990		0	5				212	51,328
1960				20,100		557	4				141	63,403
1961			2,837	12,055		1,355	5	1	2	39	4	52,649
1962			1,085	19,752		1,681	7	1	0	0	1	47,264
1963			2,432	25,140		1,161	7		31	0	5	68,937
1964			3,411	18,388		824	4		0		3	62,393
1965			417	16,542		731	3	1	0		15	73,033
1966			1,600	15,333		588	8		0		44	66,149
1967			4,113	17,814		707	12				161	83,096
1968			4,906	20,434		951	11				1,028	69,480
1969			2,996	18,827		358	14		0		1,365	75,023
1970			4,416	21,032		822	9		0		390	68,022
1971			2,071	20,526		1,175	11		0		1,746	91,240
1972			3,750	23,600		637	8		100	0	3,921	106,716
1973			2,236	15,653		84	14		0		1,400	106,839
1974			4,777	20,178		94	9		1	0	1,331	115,227
1975			3,243	18,932		640	33	10	1	0	111	96,808
1976			2,700	15,905		713	23	4	36	5	278	126,538
1977			1,497	9,969		537	37		3	0	53	62,469
1978			950	16,613		810	54	15	1	0	23	99,600
1979			303	6,781		74	--		1	0	521	70,745
1980			382	7,556		168	--		31	0	212	74,931
1981			748	12,637		195	25		8	0	200	70,583
1982			425	6,609		257	105	21	0	0	104	73,027
1983			607	9,359		87	6		0	0	225	54,951
1984	3,728		1,030	9,304		1,427	2		107	6	50	72,612
1985	26	2	1,498	6,415	7	1,176	0		14	35	56	59,100
1986	47	3	432	4,708	5	196			3	0	30	46,078
1987	1	5	158	2,766	6	74	150		7	0	104	49,051
1988	17	15	598	4,212	9	64	307	10	15	0	155	45,345
1989	1	4	54	1,860	36	160	248	23	2	0	140	44,052
1990	71	29		2,718	15	24	177	4	2	0	302	53,693
1991	0	17		1,845	72	6	312	71	2	0	139	37,320
1992	0	0		4,572	54	2	334	72	10	0	363	54,833
1993		0		6,254	71	25	438		11	0	494	54,125
1994		38		10,978	90	106	544	213	6	0	1,998	73,187
1995		52		8,125	177	102	882	1	5	0	1,761	67,852
1996	11	83		16,962	188	88	1185		21	0	3,321	84,008
1997	2	60		14,325	133	1,018	1653	1	53	0	2,166	103,594
1998	33	80		14,489	88	1,208	1120	2	8	0	4,177	92,017
1999	48	149		10,120	331	3,621	1542	1	0	57	2,734	119,008
2000	4	55		9,714	120	1,798	940	3	70	33	4,531	81,012
2001	51	94		11,349	194	1,635	1295		5	18	5,248	88,488
2002	4	30		10,768	235	2,357	525		28	0	5,379	104,058
2003	44	16		14,161	85	2,214	524		28	0	6,861	90,095
2004	1	12		13,473	157	1,506	361		104	0	7,857	86,251
2005		20		8,479	175	1,719	296		0	0	4,888	59,023
2006		3		12,547	95	385	270		109	0	6,008	61,441
2007	77	4		11,908	98	461	250		40	0	6,667	89,082
2008	--	1		11,761	29	418	353	0	10		5,476	62,655
2009	39	4		12,938	100	677	201	0	17		5,690	78,287
2010	--	5		12,634	55	704	405	19	25		6,552	65,075
2011	(41)	(8)		(11,172)	(88)	(424)	(687)	(37)	(0)		(5,393)	(72,887)

3 USA estimates updated July 2012.

4 Albacore Troll estimates include catches caught with Pole-and-Line gear.

5 Other includes catches by Purse Seine.

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

Table 14-2. Annual landings of Pacific bluefin tuna (*Thunnus orientalis*) in metric tons for fisheries monitored by ISC for assessments of North Pacific Ocean stocks, 1952-2011. Blank indicates no effort. - indicates data not available. 0 indicates less than 1 metric ton. Provisional estimates in ().

Year	Japan[1]								Korea[3]	
	Purse Seine		Longline		Troll[2]	Pole and Line	Set Net	Others	Purse Seine	Trawl
	Tuna PS	Small PS	Distant & Offshore	Coastal						
1952	7,680		2,694		667	2,198	2,145	1,700		
1953	5,570		3,040		1,472	3,052	2,335	160		
1954	5,366		3,088		1,656	3,044	5,579	266		
1955	14,016		2,951		1,507	2,841	3,256	1,151		
1956	20,979		2,672		1,763	4,060	4,170	385		
1957	18,147		1,685		2,392	1,795	2,822	414		
1958	8,586		818		1,497	2,337	1,187	215		
1959	9,996		3,136		736	586	1,575	167		
1960	10,541		5,910		1,885	600	2,032	369		
1961	9,124		6,364		3,193	662	2,710	599		
1962	10,657		5,769		1,683	747	2,545	293		
1963	9,786		6,077		2,542	1,256	2,797	294		
1964	8,973		3,140		2,784	1,037	1,475	1,884		
1965	11,496		2,569		1,963	831	2,121	1,106		
1966	10,082		1,370		1,614	613	1,261	129		
1967	6,462		878		3,273	1,210	2,603	302		
1968	9,268		500		1,568	983	3,058	217		
1969	3,236		313	565	2,219	721	2,187	195		
1970	2,907		181	426	1,198	723	1,779	224		
1971	3,721		280	417	1,492	938	1,555	317		
1972	4,212		107	405	842	944	1,107	197		
1973	2,266		110	728	2,108	526	2,351	636		
1974	4,106		108	1,069	1,656	1,192	6,019	754		
1975	4,491		215	846	1,031	1,401	2,433	808		
1976	2,148		87	233	830	1,082	2,996	1,237		
1977	5,110		155	183	2,166	2,256	2,257	1,052		
1978	10,427		444	204	4,517	1,154	2,546	2,276		
1979	13,881		220	509	2,655	1,250	4,558	2,429		
1980	11,327		140	671	1,531	1,392	2,521	1,953		
1981	25,422		313	277	1,777	754	2,129	2,653		
1982	19,234		206	512	864	1,777	1,667	1,709	31	
1983	14,774		87	130	2,028	356	972	1,117	13	
1984	4,433		57	85	1,874	587	2,234	868	4	
1985	4,154		38	67	1,850	1,817	2,562	1,175	1	
1986	7,412		30	72	1,467	1,086	2,914	719	344	
1987	8,653		30	181	880	1,565	2,198	445	89	
1988	3,583	22	51	106	1,124	907	843	498	32	
1989	6,077	113	37	172	903	754	748	283	71	
1990	2,834	155	42	267	1,250	536	716	455	132	
1991	4,336	5,472	48	170	2,069	286	1,485	650	265	
1992	4,255	2,907	85	428	915	166	1,208	1,081	288	
1993	5,156	1,444	145	667	546	129	848	365	40	
1994	7,345	786	238	968	4,111	162	1,158	398	50	
1995	5,334	13,575	107	571	4,778	270	1,859	586	821	
1996	5,540	2,104	123	778	3,640	94	1,149	570	102	
1997	6,137	7,015	142	1,158	2,740	34	803	811	1,054	
1998	2,715	2,676	169	1,086	2,865	85	874	700	188	
1999	11,619	4,554	127	1,030	3,387	35	1,097	709	256	
2000	8,193	8,293	121	832	5,121	102	1,125	689	2,401	0
2001	3,139	4,481	63	728	3,329	180	1,366	782	1,176	10
2002	3,922	4,981	47	794	2,427	99	1,100	631	932	1
2003	956	4,812	85	1,152	1,839	44	839	446	2,601	0
2004	4,934	3,323	231	1,616	2,182	132	896	514	773	0
2005	4,034	8,783	107	1,818	3,406	549	2,182	548	1,318	
2006	3,644	5,236	63	1,058	1,544	108	1,421	777	1,012	
2007	2,965	3,875	83	2,004	2,385	236	1,503	1,209	1,281	
2008	3,029	7,192	19	1,476	2,074	64	2,358	1,192	1,866	
2009	2,127	5,950	8	1,304	1,875	50	2,236	913	936	
2010	1,122	2,620	4	904	1,301	83	1,603	918	1,196	
2011	2,194	6,137	-[5]	(727)	1,688	63	1,957	572	670	

1 Part of Japanese catch is estimated by the WG from best available source for the stock assessment use.
2 The troll catch for farming estimating 10 - 20 mt since 2000, is excluded.
3 Catch statistics of Korea derived from Japanese Import statistics for 1982-1999.
4 US in 1952-1958 contains catch from other countries - primarily Mexico. Other includes catches from gillnet, troll, pole-and-line, and longline.
5 The catch for Japanese coastal longline in 2011 includes that for the distant water and offshore lonliners.
6 Revision of annual catch was made for Mexican PS in 2006 due to observer information that was not considered before.

Table 14-2. (continued)

Year	Taiwan				United States[4]			Mexico		Grand Total
	Longline	Purse Seine	Distant Driftnet	Others	Purse Seine	Others	Sport	Purse Seine	Others	
1952					2,076		2			21,115
1953					4,433		48			22,062
1954					9,537		11			30,501
1955					6,173		93			33,943
1956					5,727		388			42,100
1957					9,215		73			38,499
1958					13,934		10			30,543
1959					3,506	56	13	171	32	21,933
1960					4,547	0	1			27,846
1961					7,989	16	23	130		32,771
1962					10,769	0	25	294		34,745
1963					11,832	28	7	412		36,995
1964					9,047	39	7	131		30,480
1965	54				6,523	77	1	289		28,994
1966					15,450	12	20	435		32,953
1967	53				5,517	0	32	371		22,668
1968	33				5,773	8	12	195		23,584
1969	23				6,657	9	15	260		18,368
1970					3,873	0	19	92		13,391
1971	1				7,804	0	8	555		19,060
1972	14				11,656	45	15	1,646		23,161
1973	33				9,639	21	54	1,084		21,529
1974	47			15	5,243	30	58	344		22,616
1975	61			5	7,353	84	34	2,145		22,883
1976	17			2	8,652	25	21	1,968		21,274
1977	131			2	3,259	13	19	2,186		20,766
1978	66			2	4,663	6	5	545		28,834
1979	58				5,889	6	11	213		33,659
1980	114			5	2,327	24	7	582		24,573
1981	179				867	14	9	218		36,593
1982	207		2		2,639	2	11	506		31,349
1983	175	9	2		629	11	33	214		22,532
1984	477	5		8	673	29	49	166		13,534
1985	210	80	11		3,320	28	89	676		18,064
1986	70	16	13		4,851	57	12	189		21,239
1987	365	21	14		861	20	34	119		17,461
1988	108	197	37	25	923	50	6	447	1	10,947
1989	205	259	51	3	1,046	21	112	57		12,900
1990	189	149	299	16	1,380	92	65	50		10,616
1991	342		107	12	410	6	92	9		17,750
1992	464	73	3	5	1,928	61	110	0		15,970
1993	471	1		3	580	103	298			12,788
1994	559				906	59	89	63	2	18,887
1995	335			2	657	49	258	11		31,209
1996	956				4,639	70	40	3,700		25,502
1997	1,814				2,240	133	156	367		26,602
1998	1,910				1,771	281	413	1	0	17,731
1999	3,089				184	184	441	2,369	35	31,114
2000	2,780			2	693	61	342	3,019	99	35,872
2001	1,839			4	292	48	356	863		20,657
2002	1,523			4	50	12	654	1,708	2	20,891
2003	1,863			21	22	18	394	3,211	43	20,350
2004	1,714			3		11	49	8,880	14	27,275
2005	1,368			2	201	7	79	4,542		30,950
2006	1,149			1		2	96	9,928 [6]		18,117
2007	1,401			10	42	2	14	4,147		(23,163)
2008	979			2		1	93	4,392	15	(26,760)
2009	877			11	410	5	176	3,019		(21,906)
2010	373			36		(0)	(122)	7,745		(20,037)
2011	(292)			(24)	(99)	(18)	(456)	(2,730)		(19,638)

1 Part of Japanese catch is estimated by the WG from best available source for the stock assessment use.
2 The troll catch for farming estimating 10 - 20 mt since 2000, is excluded.
3 Catch statistics of Korea derived from Japanese Import statistics for 1982-1999.
4 US in 1952-1958 contains catch from other countries - primarily Mexico. Other includes catches from gillnet, troll, pole-and-line, and longline.
5 The catch for Japanese coastal longline in 2011 includes that for the distant water and offshore lonliners.
6 Revision of annual catch was made for Mexican PS in 2006 due to observer information that was not considered before.

Table 14-3. Annual landings of Swordfish (*Xiphias gladius*) in metric tons for fisheries monitored by ISC for assessments of North Pacific Ocean stocks, 1951-2011. Blank indicates no effort. - indicates data not available. 0 indicates less than 1 metric ton. Provisional estimates in ().

Year	Japan[1]							Mexico	United States[6]				
									Hawaii	California			
	Longline		Squid Driftnet & Driftnet	Harpoon[3]	Bait Fishing	Trapnet	Other[4]	All Gears	Longline	Longline	Gill Net	Harpoon	Unknown[7]
	Distant & Offshore[2]	Coastal & Other											
1951	7,246	115	10	4,131	88	78	10	-	-	-	-	-	-
1952	8,890	152	0	2,569	6	68	6	-	-	-	-	-	-
1953	10,796	77	0	1,407	20	21	87	-	-	-	-	-	-
1954	12,563	96	0	813	104	18	17	-	-	-	-	-	-
1955	13,064	29	0	821	119	37	41	-	-	-	-	-	-
1956	14,596	10	0	775	66	31	7	-	-	-	-	-	-
1957	14,268	37	0	858	59	18	11	-	-	-	-	-	-
1958	18,525	42	0	1,069	46	31	21	-	-	-	-	-	-
1959	17,236	66	0	891	34	31	10	-	-	-	-	-	-
1960	20,058	51	1	1,191	23	67	7	-	-	-	-	-	-
1961	19,715	51	2	1,335	19	15	11	-	-	-	-	-	-
1962	10,607	78	0	1,371	26	15	18	-	-	-	-	-	-
1963	10,322	98	0	747	43	17	16	-	-	-	-	-	-
1964	7,669	91	4	1,006	40	16	26	-	-	-	-	-	-
1965	8,742	119	0	1,908	26	14	182	-	-	-	-	-	-
1966	9,866	113	0	1,728	41	11	4	-	-	-	-	-	-
1967	10,883	184	0	891	33	12	5	-	-	-	-	-	-
1968	9,810	236	0	1,539	41	14	9	-	-	-	-	-	-
1969	9,416	296	0	1,557	42	11	14	-	-	-	-	-	-
1970	7,324	427	0	1,748	36	9	3	-	5	-	-	612	10
1971	7,037	350	1	473	17	37	31	-	1	-	-	99	3
1972	6,796	531	55	282	20	1	2	2	0	-	-	171	4
1973	7,123	414	720	121	27	23	2	4	0	-	-	399	4
1974	5,983	654	1,304	190	27	16	2	6	0	-	-	406	22
1975	7,031	620	2,672	205	58	18	2	-	0	-	-	557	13
1976	8,054	750	3,488	313	170	14	12	-	0	-	-	42	13
1977	8,383	880	2,344	201	71	7	2	-	17	-	-	318	19
1978	8,001	1,031	2,475	130	110	22	1	-	9	-	-	1,699	13
1979	8,602	1,038	983	161	45	15	4	7	7	-	-	329	57
1980	6,005	849	1,746	398	29	15	1	380	5	-	160	566	62
1981	7,039	727	1,848	129	58	9	3	1,575	3	0	473	271	2
1982	6,064	874	1,257	195	58	7	1	1,365	5	0	945	156	10
1983	7,692	999	1,033	166	30	9	2	120	5	0	1,693	58	7
1984	7,177	1,177	1,053	117	98	13	0	47	3	12	2,647	104	75
1985	9,335	999	1,133	191	69	10	0	18	2	0	2,990	305	104
1986	8,721	1,037	1,264	123	47	9	0	422	2	0	2,069	291	109
1987	9,495	860	1,051	87	45	11	0	550	24	0	1,529	235	31
1988	8,574	678	1,234	173	19	8	0	613	24	0	1,376	198	64
1989	6,690	752	1,596	362	21	10	0	690	218	0	1,243	62	56
1990	5,833	690	1,074	128	13	4	0	2,650	2,436	0	1,131	64	43
1991	4,809	807	498	153	20	5	0	861	4,508	27	944	20	44
1992	7,234	1,181	887	381	16	6	0	1,160	5,700	62	1,356	75	47
1993	8,298	1,394	292	309	43	4	1	812	5,909	27	1,412	168	161
1994	7,366	1,357	421	308	37	4	0	581	3,176	631	792	157	24
1995	6,422	1,387	561	423	34	7	0	437	2,713	268	771	97	29
1996	6,916	1,067	428	597	45	4	0	439	2,502	346	761	81	15
1997	7,002	1,214	365	346	62	5	0	2,365	2,881	512	708	84	11
1998	6,233	1,190	471	476	68	2	0	3,603	3,263	418	931	48	19
1999	5,557	1,049	724	416	47	5	0	1,136	3,100	1,229	606	81	27
2000	6,180	1,121	808	497	49	5	0	2,216	2,949	1,885	646	90	9
2001	6,932	908	732	230	30	15	0	780	220	1,749	375	52	5
2002	6,230	965	1,164	201	29	11	0	465	204	1,320	302	90	3
2003	5,376	1,063	1,198	149	28	4	0	671	147	1,812	216	107	0
2004	5,395	1,509	1,062	229	30	4	0	270	213	898	169	62	37
2005	5,359	1,294	956	187	337	3	0	235	1,622		220	76	0
2006	6,181	1,507	796	244	342	5	1	347	1,211		444	71	2
2007	6,109	2,016	829	122	367	2	1	383	1,735		484	58	0
2008	(4,402)	(1,787)	(648)	(173)	(349)	(3)	(0)	84	1,980		280	33	1
2009	(4,400)	(1,602)	(682)	(239)	(249)	(3)	(0)	-	(1,813)		(172)	(34)	(1)
2010	(4,235)	(1,131)	(483)	(110)	(230)	(8)	(0)	-	(1,654)		(33)	(22)	(4)
2011	(3,182)	(785)	(200)	(0)	(200)	(0)	(0)	-	-	-	-	-	-

[1] Japan provide catch data update 2010 and 2011 data in July 2012 BILLWG meeting. These data are not inculded in 2012 BILWG April report.

[2] Catches by gear for 1952-1970 were estimated roughly using FAO statistics and other data. Catches for 1971-2002 are more reliably estimated.

[3] Contrains trolling and harpoon but majority of catch obtained by harpoon.

[4] For 1952-1970 "Other" refers to catches by net fishing and various unspecified gears.

[5] Offshore longline category includes some catches from harpoon and other fisheries but does not include catches unloaded in foreign ports.

[6] Estimated round weight of retained catch. Does not include discards.

[7] Unknown includes pole and line, purse seine, troll and troll/handline, half ring, and unspecified gears.

only one vessel fished so combined with Hawaii longline

Table 14-3. (continued)

Year	Chinese Taipei[5]										Korea		Grand Total
	Longline			Gillnet		Coastal Harpoon	Coastal Setnet	Other			Longline	High-seas Drift Gillnet	
	Distant	Offshore	Coastal	Offshore	Coastal & Other Net			Offshore Others	Coastal Others	Other			
1951											-	-	13,629
1952	-	-									-	-	13,643
1953	-	-									-	-	14,361
1954	-	-									-	-	15,564
1955	-	-									-	-	16,066
1956	-	-									-	-	17,442
1957	-	-									-	-	17,208
1958	-	-									-	-	21,692
1959	-	427								91	-	-	20,744
1960	-	520								127	-	-	24,007
1961	-	318								73	-	-	23,499
1962	-	494								62	-	-	14,633
1963	-	343								18	-	-	13,568
1964	-	358								10	-	-	11,184
1965	-	331								27	-	-	13,314
1966	-	489								31	-	-	14,249
1967	-	646								35	-	-	14,656
1968	-	763								12	-	-	14,392
1969	0	843								7	-	-	14,155
1970	-	904								5	-	-	13,053
1971	-	992								3	0	-	11,015
1972	-	862								11	0	-	10,709
1973	-	860								119	0	-	11,789
1974	1	880								136	0	-	11,601
1975	29	899								153	0	-	14,232
1976	23	613								194	0	-	15,662
1977	36	542								141	219	-	15,157
1978	-	546								12	68	-	16,095
1979	7	661								33	-	-	13,928
1980	10	603								76	64	-	12,949
1981	2	656								25	-	-	14,801
1982	1	855								49	48	-	13,872
1983	0	783								166	11	-	14,757
1984	-	733								264	48	-	15,552
1985	-	566								259	24	-	17,990
1986	-	456								211	9	-	16,756
1987	3	1,328								190	44	-	17,470
1988	-	777								263	27	-	16,016
1989	50	1,491								38	40	-	15,308
1990	143	1,309								154	61	-	17,723
1991	40	1,390								180	5	-	16,302
1992	21	1,473								243	8	-	21,842
1993	54	1,174								310	15	-	22,376
1994	-	1,155								219	66	-	18,288
1995	50	1,135								225	10	-	16,564
1996	9	701	-	2	-	19	10	-	-		15	-	15,953
1997	15	1,358	24	1	-	27	8	1	-		100	-	19,086
1998	20	1,178	-	8	1	17	15	-	-		153	-	20,112
1999	70	1,385	-	4	1	51	5	-	-		132	-	17,624
2000	325	1,531	1	5	1	74	5	-	-		202	-	20,599
2001	1,039	1,691	1	17	1	64	8	-	-		438	-	17,288
2002	1,633	1,557	1	7	1	1	16	1	-		439	-	16,642
2003	1,084	2,196	-	3	-	-	8	-	-		381	-	16,446
2004	884	1,828	-	5	1	-	7	-	3		410	-	15,020
2005	437	1,813	-	1	2	-	5	-	18		434	-	15,004
2006	-	-	-	-	-	-	-	-	-	-	477	-	13,635
2007	-	-	-	-	-	-	-	-	-	-	452	-	14,565
2008	-	-	-	-	-	-	-	-	-	-	-	-	(11,748)
2009	-	-	-	-	-	-	-	-	-	-	-	-	(11,204)
2010	-	-	-	-	-	-	-	-	-	-	-	-	(9,920)
2011	-	-	-	-	-	-	-	-	-	-	-	-	(6,378)

Table 14-4. Annual landings of striped marlin (*Kajikia audax)* in metric tons for fisheries monitored by ISC for assessments of North Pacific Ocean stocks, 1951-2011. Blank indicates no effort. - indicates data not available. 0 indicates less than 1 metric ton. Provisional estimates in ().

Year	Japan[1]						Mexico		United States			
	Longline			Gillnet		Other[3]	Longline	Sport[2]	Longline	Troll	Handline	Sport[2]
	Distant-water & Offshore	Coastal	Other	Small Mesh	Large Mesh							
1951	2,494	-	673	-	0	1,281						
1952	2,901	-	722	-	0	1,564						23
1953	2,138	-	47	-	0	954						5
1954	3,068	-	52	-	0	1,088						16
1955	3,082	-	28	-	0	1,038						5
1956	3,729	-	59	-	0	1,996						34
1957	3,189	-	119	-	0	2,459						42
1958	4,106	-	277	-	3	2,914						59
1959	4,152	-	156	-	2	3,191						65
1960	3,862	-	101	-	4	1,937						30
1961	4,420	-	169	-	2	1,797						24
1962	5,739	-	110	-	8	1,912						5
1963	6,135	-	62	-	17	1,910						68
1964	14,304	-	42	-	2	2,344						58
1965	11,602	-	19	0	1	2,794						23
1966	8,419	-	112	0	2	1,570						36
1967	11,698	-	127	0	3	1,551						49
1968	15,913	-	230	0	0	1,043						51
1969	8,544	600	3	0	3	2,668						30
1970	12,996	690	181	0	3	1,032						18
1971	10,965	667	259	0	10	2,042						17
1972	7,006	837	145	0	243	993						21
1973	6,357	632	118	0	3,265	702						9
1974	6,700	327	49	0	3,112	775						55
1975	5,281	286	38	0	6,534	686						27
1976	5,136	244	34	0	3,561	585						31
1977	3,019	256	15	0	4,424	547						41
1978	3,957	243	27	0	5,593	546						37
1979	5,561	366	21	0	2,532	526						36
1980	6,378	607	5	0	3,467	536						33
1981	4,106	259	12	0	3,866	542						60
1982	5,383	270	13	0	2,351	656						41
1983	3,722	320	10	22	1,845	827						39
1984	3,506	386	9	76	2,257	719						36
1985	3,897	711	24	40	2,323	733				18		42
1986	6,402	901	33	48	3,536	577	-			19		19
1987	7,538	1,187	6	32	1,856	513	-		272	30	1	28
1988	6,271	752	7	54	2,157	668	-		504	54		30
1989	4,740	1,081	13	102	1,562	537	-		612	24	0	52
1990	2,368	1,125	3	19	1,926	545	-	181	538	27	0	23
1991	2,845	1,197	3	27	1,302	507	-	75	663	41	0	12
1992	2,955	1,247	10	35	1,169	303	-	142	459	38	1	25
1993	3,476	1,723	1	-	828	708	-	159	471	68	1	11
1994	2,911	1,284	1	-	1,443	383	-	179	326	35	0	17
1995	3,494	1,840	3	-	970	283	-	190	543	52	0	14
1996	1,951	1,836	4	-	703	152	-	237	418	54	1	20
1997	2,120	1,400	3	-	813	163	-	193	352	38	1	21
1998	1,784	1,975	2	-	1,092	304	-	345	378	26	0	23
1999	1,608	1,551	4	-	1,126	184	-	266	364	28	1	12
2000	1,152	1,109	8	-	1,062	297	-	312	200	14	1	10
2001	985	1,326	11	-	1,077	237	-	237	351	42	2	-
2002	764	796	5	-	1,264	290	-	305	226	30	0	-
2003	1,013	842	3	-	1,064	203	-	322	552	29	0	-
2004	699	1,000	2	-	1,339	92	-	-	376	34	1	-
2005	562	668	1	0	1,214	98	-	-	511	20	0	-
2006	623	539	1	0	1,190	95	-	-	611	21	0	-
2007	306	860	5	-	970	79	-	-	276	13	0	-
2008	(390)	(609)	(10)	(0)	(1,302)	(97)	-	-	426	14	0	-
2009	(166)	(621)	(21)	(0)	(821)	(90)	-	-	(256)	(10)	(0)	-
2010	(185)	(820)	(42)	(0)	(899)	(82)	-	-	(158)	(5)	(0)	-
2011	(308)	(720)	(100)	(0)	(300)	(0)	-	-	-	-	-	-

[1] Japan provide catch data update 2010 and 2011 data in July 2012 BILLWG meeting. These data are not inculded in 2012 BILWG April report.

[2] Estimated from catch in number of fish

[3] Contains bait fishing, net fishing, trapnet, trolling, harpoon, etc.

[4] Reported to the WCPFC

Table 14-4. (continued)

Year	Chinese Taipei[2]											
	Longline			Gill net		Coastal Setnet	Gillnet & Other net	Coastal Harpoon	Others			Chinese Taipei Total
	Distant-water	Offshore	Coastal	High-seas Drift Gillnet	Offshore				Offshore	Coastal	Other	
1951												
1952												0
1953												0
1954												0
1955												0
1956												0
1957												0
1958		543									387	930
1959		391									354	745
1960		398									350	748
1961		306									342	648
1962		332									211	543
1963		560									199	759
1964		392									175	567
1965		355									157	512
1966		370									180	550
1967	2	385									204	591
1968	1	332									208	541
1969	2	571									192	765
1970	0	495									189	684
1971	0	449									135	584
1972	9	380									126	515
1973	1	568									139	708
1974	24	650									118	792
1975	64	732									96	892
1976	32	347									140	519
1977	17	524									219	760
1978	0	618									78	696
1979	26	432									122	580
1980	61	223									132	416
1981	17	491									95	603
1982	7	397									138	542
1983	0	555									214	769
1984	0	965									330	1,295
1985	0	513									181	694
1986	0	179									148	327
1987	31	383									151	565
1988	7	457									169	633
1989	8	184									157	349
1990	2	137									256	395
1991	36	254									286	576
1992	1	219									197	417
1993	5	221									142	368
1994	1	137									196	334
1995	27	83									82	192
1996	26	162	-		8	3	-	30	6	-	-	235
1997	59	290	2		9	3	-	33	-	-	-	396
1998	90	205	9		15	6	1	19	-	-	-	345
1999	66	128	3		7	5	1	26	-	-	-	236
2000	153	161	1		17	6	1	29	1	-	-	369
2001	121	129	-		16	5	-	30	-	-	-	301
2002	251	226	-		14	8	1	6	-	-	-	506
2003	241	91	-		26	5	1	11	-	-	-	375
2004	261	95	-		8	5	2	7	1	1	-	380
2005	176	76	-		1	9	9	5	-	8	-	284
2006	-	-	-	-	-	-	-	-	-	-	-	123 [5]
2007	-	-	-	-	-	-	-	-	-	-	-	260 [5]
2008	-	-	-	-	-	-	-	-	-	-	-	196 [5]
2009	-	-	-	-	-	-	-	-	-	-	-	198 [5]
2010	-	-	-	-	-	-	-	-	-	-	-	183 [5]
2011	-	-	-	-	-	-	-	-	-	-	-	-

[1] Japan provide catch data update 2010 and 2011 data in July 2012 BILLWG meeting. These data are not inculded in 2012 BILWG April report.

[2] Estimated from catch in number of fish

[3] Contains bait fishing, net fishing, trapnet, trolling, harpoon, etc.

[4] Reported to the WCPFC

Table 14-4. (continued)

Year	Korea			Grand Total
	Longline	High-seas Drift Gillnet	Korea Total	
1951		-		4,448
1952	-	-	-	5,210
1953	-	-	-	3,144
1954	-	-	-	4,223
1955	-	-	-	4,153
1956	-	-	-	5,819
1957	-	-	-	5,809
1958	-	-	-	7,746
1959	-	-	-	7,920
1960	-	-	-	6,284
1961	-	-	-	6,754
1962	-	-	-	7,985
1963	-	-	-	8,391
1964	-	-	-	16,925
1965	-	-	-	14,596
1966	-	-	-	10,319
1967	-	-	-	13,632
1968	-	-	-	17,445
1969	-	-	-	12,040
1970	-	-	-	15,109
1971	0	-	0	14,095
1972	0	-	0	9,371
1973	0	-	0	11,222
1974	0	-	0	11,136
1975	0	-	0	12,948
1976	0	-	0	9,731
1977	43	-	43	8,564
1978	28	-	28	10,509
1979	-	-	-	9,164
1980	37	-	37	11,195
1981	-	-	-	8,940
1982	39	-	39	8,891
1983	19	-	19	7,018
1984	23	-	23	7,342
1985	16	-	16	7,985
1986	61	-	61	11,744
1987	1	-	1	11,615
1988	11	-	11	10,677
1989	26	-	26	8,906
1990	315	-	315	7,326
1991	141	-	141	7,099
1992	318	-	318	6,899
1993	388	-	388	7,976
1994	1,045	-	1045	7,820
1995	307	-	307	7,778
1996	429	-	429	5,805
1997	1,017	-	1017	6,121
1998	635	-	635	6,564
1999	433	-	433	5,577
2000	537	-	537	4,702
2001	254	-	254	4,522
2002	188	-	188	3,868
2003	206	-	206	4,233
2004	75	-	75	(3618)
2005	141	-	141	(3215)
2006	56	-	56	(3136)
2007	28	-	28	(2537)
2008	-	-	56 [5]	(2904)
2009	-	-	44 [5]	(2029)
2010	-	-	30 [5]	(2221)
2011	-	-	-	1,428

[1] Japan provide catch data update 2010 and 2011 data in July 2012 BILLWG meeting. These data are not inculded in 2012 BILWG April report.

[2] Estimated from catch in number of fish

[3] Contains bait fishing, net fishing, trapnet, trolling, harpoon, etc.

[4] Reported to the WCPFC

Table 14-5. Retained catches (metric tons, whole weight) of blue sharks by fishery in the North Pacific Ocean, north of the equator. Blanks indicate no effort or data not available, zero indicates less than 0.5 mt, other values rounded up to the nearest ton. Provisional estimates in ().

Year	Japan				Korea		Chinese-Taipei		United States				Mexico		Canada	China	Grand Total
	Longline		Drift Net	Other	Drift Net	Longline	Drift Net	Longline	Drift Net	Sport	Longline	Other	Longline	Drift Net	Misc. Gears	Longline	
	Offshore and Distant-water	Coastal															
1980								9,061									9,061
1981								8,223									8,223
1982								8,694									8,694
1983								7,558									7,558
1984								6,954							1		6,955
1985								8,019	0			1					8,020
1986								6,944	1			1					6,946
1987								5,536	1			1					5,538
1988								5,557	0			3					5,560
1989								5,851				6					5,857
1990								6,422	0			20					6,442
1991								6,740	0			1					6,741
1992								5,426	1			1					5,428
1993								5,299	0			0					5,299
1994	12,305	79						4,374	0			12					16,770
1995	11,201	157						7,087	0			5					18,450
1996	12,730	176						7,689	0			0					20,595
1997	15,830	75						9,512	0			0					25,417
1998	14,231	64						8,204	0			1					22,501
1999	15,751	2						10,628	0			0					26,381
2000	16,041	11						14,829	0			0					30,882
2001	16,386	5						7,580				0					23,971
2002	15,500	14						8,805				0					24,319
2003	15,456	22						8,730	0			0					24,208
2004	13,136	42						9,775				0					22,953
2005	12,624	31						10,857				0					23,513
2006	11,093	50						11,351				0					22,494
2007	8,994	41						10,906	9		8	0					19,957
2008	7,252	227						11,026			7					(134)	(18,646)
2009	(7,943)	(163)						(9,524)	1		9	0				(298)	(17,938)
2010	(7,652)	(175)						(8,411)	0		7	0				(358)	(16,603)
2011	(3,958)	(181)						(13,117)			14	0					(17,270)

All data are considered preliminary

Notes: Japan data are from WG correspondent submission