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 11 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：技士　林晏如
派赴國家：美國　舊金山
出國期間：100 年 7 月 19 日至 7 月 27 日
報告日期：100 年 9 月 15 日

摘要

本次北太平洋鮪類及類鮪類國際科學委員會（ISC）第 11 屆年會會議於本（2011）年 7 月 20 日至 25 日在美國舊金山舉行，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：資源評估結果顯示並無過漁之現象，長鰭鮪資源處於健康狀態 (healthy)，工作小組建議維持目前管理措施即可。

(二) 太平洋黑鮪：原訂本年完成黑鮪資源評估工作，但因資料尚未蒐集完備，故將延至 2012 年完成資源評估。

(三) 旗魚工作小組：

1. 紅肉旗魚：本 (2011) 年底方能完成評估工作，故暫時維持目前管理措施。
2. 劍旗魚: 去年評估結果顯示資源處於健康狀態 (healthy)，無管理建言。

二、ISC 功能評鑑：由我方、韓國、日本、美國、墨西哥各推派一員協助大會進行功能評鑑工作項目之檢視；規劃每 5 年進行 1 次 ISC 功能評鑑，預定本 (2011) 年 10 月前正式形成功能評鑑小組，並於明 (2012) 年 ISC 12 全席會議提出評鑑報告初稿。

三、統計工作小組主席：由美方代表提名我國對外漁協資訊組於仁汾組長擔任統計工作小組主席並當選；此外由美籍 Darryl Tagami 擔任副主席亦獲通過。

四、全席大會副主席選舉：美國團長提名我方團長孫志陸教授，經各國投票結果，由我方之孫志陸教授當選 ISC 副主席，任期 3 年，自 2011 年至 2014 年。

五、明年度會議：明年年會預訂於 2012 年 7 月 18 至 23 日由日本主辦。此外，ISC 將於 ISC 12 前完成太平洋黑鮪及紅肉旗魚資源評估，並將進行黑皮旗魚、水鯊及短鰭馬加鯊之資源評估準備工作。

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 11 屆年會會議於本 (2011) 年 7 月 20 日至 25 日在美國舊金山舉行。本次會議針對我國在北太平洋主要之對象魚種－北太平洋長鰭鮪，提出完整之資源評估報告；另亦討論我國重要漁獲之太平洋黑鮪預計明 (2012) 年完成資源評估，以及預訂在今 (2011) 年底前完成之紅肉旗魚資源評估之進程。

由於 ISC 自去（2010）年 ISC 10 年會決定解散原有之混獲工作小組，並同時成立鯊魚工作小組，以因應國際上日益重視的鯊魚議題，並開始進行鯊魚資源評估工作；因此，在本會議針對 ISC 運作手冊 (Operational Manual) 的討論部分，將依照鯊魚工作小組成立及其資源評估之需求，進行調整與更新。

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 11 屆年會前，在 2011 年 7 月 14 日至 19 日先召開各工作小組會議及團長會議，我國由國立臺灣大學海洋研究所孫志陸教授擔任團長並全程參與，並由中華民國對外漁業合作發展協會於仁汾組長及陳忠佑助理參與統計工作小組會議，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、長鰭鮪工作小組（7 月 14 日 (星期四)及 7 月 15 日 (星期五)）：由小組主席加拿大籍 John Holmes 博士召集會議，小組會議主要協助主席完成相關研究確認，以及檢視向全席會議報告的本工作小組研究（評估）內容、管理建議及以後研究內容。

二、旗魚工作小組（7 月 16 日 (星期六)）：由小組新任主席美籍 Jon Brodziak 博士召集會議，小組會議主要是確認預定於今年 12 月進行紅肉旗魚資源評估所需之基本資料，以及向全席會議報告的內容及管理建議等。

三、太平洋黑鮪工作小組（7 月 16 日 (星期六)）：由小組主席日籍 Takeuchi 博士召集會議，全席會議之小組報告將以 1 月份會議結論爲主，因此會議重點將放在會員國統計資料檢視以及下年度工作計畫；因本年黑鮪並無完成資源評估，小組將在 2012 年完成黑鮪資源評估工作，全席會議上不會提出新的管理建議。

四、統計工作小組（7 月 17 日 (星期日)～7 月 19 日 (星期二)）：

(一) 因原任統計工作小組主席之我方張水鍇老師請辭，故會議一開始由 ISC 主席 Gerard DiNardo 主持，隨後由美方代表提名我國對外漁協資訊組於仁汾組長擔任統計工作小組主席並當選，新任主席提議由美籍 Darryl Tagami 擔任副主席亦獲通過。

(二) 小組會議主要討論議題如次：

1. 各國家報告、統計工作小組以及各魚種小組間資料差異 (discrepancy) 問題。
2. 有關 ISC 及 WCPFC 之間所持有資料的差異問題。
3. 未來擬在 ISC 網站上公開 Category I data 之資訊議題。
4. 進行各國統計系統及採樣計畫執行狀況更新議題。
5. 進行會員資料提供表現檢視，討論目前的資料提交報告卡 (reporting card) 之問題。
6. 檢視資源評估及監控漁業活動所需之資料。
7. 資料提交協定 (data reporting protocol) 的討論。
8. ISC 網站更新的進度報告。
9. ISC 主席 Gerard 表示統計工作小組下將成立一特別小組 (steering group)，成員爲部分關鍵成員，目的在解決現行資料庫的技術層面問題，第一次會議預計本年 8 月在台北舉行。
10. 未來工作規劃之討論。

五、團長會議（7 月 19 日 (星期二)）：

本會議由 ISC 新任主席 Gerard DiNardo 召開，我國由團長台灣大學孫志陸教授與會，除各國團長參與外另開放 2 人參加（我方亦有對外漁協於仁汾組長與會），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，主席對於中國並未派員參加此次大會表達不滿，隨後要求各國發表對參加 ISC 活動的態度。我方團長孫教授表示：我國漁業署全力支持 ISC 所有活動，包括派專家學者參加所有工作小組會議，並配合 ISC 要求辦理工作小組會議，例如今年分別在 4、5 月間在台灣辦理鯊魚及旗魚工作小組會議等，顯示我方對於 ISC 之重視與高度參與之意願。

六、其他報告事項：

(一) ISC 新任主席 Gerard DiNardo 私下向我方團長孫志陸教授表示，由於現任副主席墨西哥籍 Michel Jules Dreyfus-Leon 博士即將卸任，渠徵詢孫志陸教授出任的意願，以便提名，請我方表示意見；孫教授暫以需向本署長官請示獲肯後，方可回覆是否接受提名並參與競選。

(二) 今年將新增 ISC 功能之同儕評鑑 (peer review of ISC function) 之議題，希望納入此次年會間進行討論，期望此次能先架構起 ISC 功能檢視之各項指標、評鑑項目及評鑑方法，以期 ISC 能夠像其他組織一樣定期檢視 (如 WCPFC)，確認 ISC 之功能符合運作之所需。

(三) 今年北太平洋海洋科學組織 (PICES) 致函給 ISC 主席，渠邀請 ISC 各國成員能出席該組織在本年 10 月在俄羅斯舉辦之 PICES-2011；ISC 主席私下表示希望能邀請我方孫志陸教授，代表 ISC 共同出席 PICES-2011。

全席會議

7 月 20 日 (星期三)

一、全席大會由 ISC 新任主席 Gerard DiNardo 開場後，由各國團長介紹參加團員，之後由地主國 Sam Pooley 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。我國由台灣大學孫志陸老師率團，另有本 (漁業) 署遠洋組林晏如技士及對外漁協資訊組於仁汾組長、陳忠佑助理參加。

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。我國由對外漁協陳忠佑進行簡報，各國對我國所提問題，謹摘要如次：

(一) 日本代表提問有關近年台灣黑鮪漁獲量減少的狀況，我方回應黑鮪原本就是季節性的漁獲種類，目前尚無漁獲量減少的明確原因，此問題應由黑鮪工作小組回應；但初步回應可能是和近年捕黑鮪漁船改變作業區域有關。

(二) 長鰭鮪小組主席提問有關我國家報告中 2010 年大釣長鰭鮪漁獲量與其長鰭鮪工作小組中所得的的漁獲量相異，我方回覆國家報告中為正確值 (工作小組係屬當時之初估值)，長鰭鮪小組將更新之。

(三) 另美國代表提問有關 2008、2009 年大釣船數減少的情形原因為何？我方回應該兩年間因油價高，部分漁船無作業，2010 年後油價下降，故船數回升。

(四) 小釣船報表回收率至今已超過 20%，超過 20GRT 的漁船須安裝 VMS，且小於 20GRT 之漁船已有部份裝設 VDR，相關資訊對黑鮪工作小組之資料建立將非常有幫助。

(五) ISC 主席提問有關 2010 北太平洋大釣船觀察員的涵蓋率，我方答覆約 5.5%。

(六) 我國簡報中再次說明我國為加強黑鮪資源保育及管理已於 2010 開始實施 CDS 制度，除此之外亦報告自 2011 年起所進行的黑鮪耳石採樣工作。

四、隨後進行 ISC 與其他資之間的交流簡報，包含與 IATTC、PICES 及 WCPFC 間的交流現況；針對 PICES 部份，主席於席間正式表示希望能邀請我方孫志陸教授出席預定 10 月在俄羅斯召開之 PICES-2011，但我方隨即表示，由於 PICES 屬於純科學之議題探討，如無獲得 PICES 或 ISC 出資邀請出席，將不會主動參加。

五、ISC 各工作小組主席報告 ISC10 至今各小組的工作狀況及成果。

六、ISC 功能之同儕評鑑 (peer review of ISC function) 係屬新增之議題，主席希望各國均

能推派一個成員利用非正式會議時間先共同協助大會檢視初擬的草案，以期能在 7 月 23 日的正式會議中進行討論並定案，另亦尋求各會員國成爲評鑑團隊之贊助者；由於此一議題各國多未有準備，因此主席請各國隔日給予回音。

7 月 21 日 (星期四)

一、繼續昨日 ISC 功能之同儕評鑑之各國推派成員及贊助者之議程，我方、韓國、日本、美國、墨西哥均推派一員確定參加會期間協助檢視之工作，我方由團長孫志陸教授指派本署林晏如技士參與；另外美國、韓國及日本均願意成爲評鑑工作之贊助者。

二、各魚種小組之資源現況及管理建議：

(一) 長鰭鮪小組目前進行資源評估，初步顯示並無過漁之現象，長鰭鮪資源處於健康狀態 (healthy)，工作小組建議維持目前的管理措施即可。

(二) 本年黑鮪無資源評估，小組將在 2012 年完成黑鮪資源評估工作。

(三) 紅肉旗魚由於年底才完成評估工作, 所以暫時維持目前管理措施。

(四) 劍旗魚去年評估結果顯示資源處於健康狀態 (healthy)，無管理建言。

三、ISC 主席提醒，接下來長鰭鮪工作小組現任主席 John Holmes 任期將屆，未來將會重新進行改選。

四、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；其中我方因於仁汾組長剛當選統計工作小組主席，因此將統計工作小組聯絡人更換爲對外漁協之統計人員陳忠佑先生，其餘各工作小組我方並無更動，名單如次：

(一) 太平洋黑鮪：台大許建宗教授及南華大學葉裕民助理教授。

(二) 旗魚工作小組：台大孫志陸教授及海大王勝平副教授。

(三) 長鰭鮪工作小組：台大葉顯樞教授及高雄海洋科技大學陳志遠副教授。

(四) 鯊魚工作小組：海大劉光明教授。

(五) 統計工作小組：主席爲對外漁協於仁汾組長、我方聯絡人員爲陳忠佑先生。

(六) 我團團長：本署遠洋漁業組林琇玲簡任技正。

7 月 22 日 (星期五)

一、研討會：本研討會係由美方邀請目前擔任旗魚工作小組主席 Jon Brodziak 主講，探討如何將最佳化的科學訊息應用於 ISC 的資源評估項目上，分爲資源評估所需的資訊、最佳化的科學訊息、以最少的元素架構資源評估之文件及管理建議的最佳化等 4 大項目，並提出各項目之指導方針；席間獲得各國科學家廣大的迴響，期望未來能透過該等方式，以較具共通性的方式進行 ISC 各魚種的資源評估。

二、統計工作小組由新任主席我國於仁汾組長進行報告，提出 4 點建議如次：

(一) 和 WCPFC 及 IATTC 建立資料交換的協議，以獲得資源評估所需之 ISC 非會員國資料。

(二) 請會員提交鯊魚歷史 Category Ⅰ,Ⅱ,Ⅲ資料給 ISC 鯊魚小組。

(三) 請會員提交觀察員資料給各魚種小組。

(四) 修改資料提送協定爲會員提送 Category Ⅰ,Ⅱ時須提供鯊魚漁獲及丟棄資料，提交 Category Ⅲ時提供鯊魚性別資料。

三、ISC 資料庫建置與管理現況，由資料庫管理員 (DA) Izumi Yamasaki 進行報告，並初步匯總各國資料漁獲量資訊；並針對現行資料提交報告卡 (reporting card) 建議未來採用如 IOTC 之版本，詳細方式與內容將留待預定於本 (2011) 年 8 月底在台北舉行之特別小組 (steering group) 時進一步討論。

7 月 23 日 (星期六)

一、ISC 12 將由日本主辦，全席會議預定於 2012 年 7 月 18 日至 23 日在日本札幌舉行。ISC 12 前各會議時間和地點如次：

(一) 長鰭鮪工作小組：ISC 12 全席會議前於 2012 年 7 月 14 日至 15 日 (日本札幌)。

(二) 太平洋黑鮪工作小組：

1. 資料準備：2012 年 1 月 31 日至 2 月 7 日 (美國 La Jolla)。

2. 資源評估：2012 年 5 月 (日本)。

3. ISC 12 全席會議前：2012 年 7 月 16 日至 17 日 (日本札幌)。

(三) 旗魚工作小組：

1. 紅肉旗魚資源評估：2011 年 12 月 6 日至 16 日 (美國夏威夷)。

2. 黑皮旗魚資料準備：2012 年 4 月 (待定)。

3. ISC 12 全席會議前：2012 年 7 月 16 日至 17 日 (日本札幌)。

(四) 鯊魚工作小組：

1. 資源準備：2011 年 11 月 30 日至 12 月 8 日 (美國夏威夷)。

2. 資料準備：2012 年 4 月 (待定)。

3. ISC 12 全席會議前：2012 年 7 月 13 日 (日本札幌)。

(五) 統計工作小組：

1. 特別小組會議：2011 年 8 月 30 日至 9 月 1 日 (臺灣臺北)，其他定期會議在 8 月會議後決定。

2. ISC 12 全席會議前：2012 年 7 月 11 日至 12 日 (日本札幌)。

二、ISC 網站：

(一) 去年原任網站管理員 (Web master) 在這一年間並未有明顯的作爲，因此日方後來聘一新管理員 Yumi Okochi，近日已陸續進行更新網站之作業。

(二) 由網站管理員 Yumi Okochi 進行網站現況及未來規劃之簡報，除展現目前網站更新進度外，亦請各國能提供各會議之照片，以使網站能夠呈現新風貌。

(三) 將來各魚種小組頁面上將會呈現各國的歷史漁獲量 (historical catch) 以及目前該魚種資源評估的狀況等資訊，目前僅太平洋黑鮪小組部份已經建置，故希望各魚種小組可盡快更新相關資訊。

(四) 加拿大提到目前網站上所展示的北太平洋各魚種的〝total catch〞應該要修改用字，因爲並未包括非會員國之漁獲量 (non-member catch)。

(五) 日本團長 Nakano 表示 ISC 網站已逐漸上軌道，希望各會員、各工作小組主席合作協助更新 ISC website 內容。

三、ISC 操作手冊 (operations manual) 之修正與更新：

(一) 關於操作手冊之更新檢視，爲配合鯊魚工作小組之成立及未來蒐集相關資料漁

獲性別資料欄位 (即 Category Ⅲ 除原有的旗魚類已有性別資料欄位外，亦新增鯊魚類性別欄位)，並將 Category Ⅰ, Ⅱ 漁獲量資料改分爲「留艙 (retained)」 及「丟棄 (discards)」兩欄，因此酌予修正手冊中相關文字。

(二) 日本針對未來修改 Category 中漁獲量「留艙 (retained)」欄位是否單指港口卸魚 (landing) 或該如何定義，而加拿大也呼應表示應該也將轉載量納入，主席則表示應爲包含港邊丟棄等之全部漁獲量 (all catch)。

(三) 有關漁獲量的定義，主席表示將留待預定於本 (2011) 年 8 月在台北舉行之特別小組 (steering group) 時進一步討論，由統計小組主席蒐集目前國際組織對 catch 與 discard 定義並在該次會議報告，之後將於 ISC 12 時檢視並修正手冊內容文字。

四、ISC 功能評鑑：

(一) 在此次會議期間，由我方、韓國、日本、美國、墨西哥各推派一員協助大會進行功能評鑑工作項目之檢視。

(二) 決定規劃每 5 年進行 1 次 ISC 功能評鑑，預定在本 (2011)年 10 月前正式形成功能評鑑小組，並於明 (2012) 年 ISC 12 全席會議提出評鑑報告初稿。

五、全席大會副主席選舉：

(一) 美國團長首先發言對現任 ISC 副主席墨西哥籍 Michel Jules Dreyfus-Leon 博士的付出與貢獻表示肯定及感謝，並提名我方團長孫志陸教授。

(二) 在確認無提出其他人選後，由主席宣佈進行同意 (Yes/No) 之不記名投票。

(三) 經各國投票結果，由我方之孫志陸教授當選 ISC 副主席，任期 3 年，自 2011 年至 2014 年。

六、主席表示去年全席會議上，美國及我方希望能提前在會議前閱讀各種會議文件，因此決定未來各會員國提交國家報告期間，提前至與資料提交時間相同於每年 7 月 1 日前，而各工作小組召開之小組會議則需在會議結束後 30 天內提交。

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：資源評估結果顯示並無過漁之現象，長鰭鮪資源處於健康狀態 (healthy)，工作小組建議維持目前管理措施即可。
2. 太平洋黑鮪工作小組：原訂本年完成黑鮪資源評估工作，但因資料尚未蒐集完備，故將延至 2012 年完成資源評估。
3. 旗魚工作小組：
   (1) 紅肉旗魚：本 (2011) 年底方能完成評估工作，故暫時維持目前管理措施。
   (2) 劍旗魚: 去年評估結果顯示資源處於健康狀態 (healthy)，無管理建言。

(二) ISC 功能評鑑：

1. 由我方、韓國、日本、美國、墨西哥各推派一員協助大會進行功能評鑑工作項目之檢視。
2. 規劃每 5 年進行 1 次 ISC 功能評鑑，預定本 (2011)年 10 月前正式形成功能評鑑小組，並於明 (2012) 年 ISC 12 全席會議提出評鑑報告初稿。

(三) 統計工作小組：原任小組主席之張水鍇博士請辭，故由 ISC 主席 Gerard DiNardo 主持，隨後由美方代表提名我國對外漁協資訊組於仁汾組長擔任統計工作小組主席並當選；此外由美籍 Darryl Tagami 擔任副主席亦獲通過。

(四) ISC 資料庫現已初步匯總各國資料漁獲量資訊，並針對現行資料提交報告卡 (reporting card) 建議未來採用 IOTC 之版本，並預定於本 (2011) 年 8 月底在台北舉行之小組會議進一步討論。

(五) ISC 運作手冊（Operational Manual）更新：爲配合鯊魚工作小組之成立及未來蒐集相

關資料漁獲性別資料欄位 (即 Category Ⅲ 除原有的旗魚類已有性別資料欄位外，亦新增鯊魚類性別欄位)，並將 Category I, Ⅱ 漁獲量資料改分爲「留艙 (retained)」及「丟棄 (discards)」兩欄，因此酌予修正手冊中相關文字。

(六) 全席大會副主席選舉：美國團長提名我方團長孫志陸教授，經各國投票結果，由我方之孫志陸教授當選 ISC 副主席，任期 3 年，自 2011 年至 2014 年。

(七) 明年度會議：明年年會預訂於 2012 年 7 月 18 至 23 日由日本主辦。此外，ISC 將於 ISC 12 前完成太平洋黑鮪及紅肉旗魚資源評估，並將進行黑皮旗魚、水鯊及短鰭馬加鯊之資源評估準備工作。

二、本次會議後續應注意事項爲統計小組將定期召開工作會議，主席於仁汾組長將定期與會並參與相關議題策劃；另因各魚種小組未來擬蒐集觀察員相關資料，以增加資源評估所需資料來源，因此統計小組將配合推動有關會員國漁業及觀察員資料提送程序及內容規範擬定，未來將會是重要議題，將持續關注相關進度並適時回應。

三、ISC 將於未來一年間完成太平洋黑鮪及紅肉旗魚資源評估工作，另將進行黑皮旗魚、水鯊及短鰭馬加鯊之資源評估準備工作，我國需派員積極參與。

四、因 ISC 原副主席任期屆滿，由於我國台灣大學海洋研究所孫志陸教授長期代表我國出席 ISC 各項會議，所作之研究成果亦獲 ISC 重視，並爲 ISC 旗魚工作小組主要成員；鑒於孫教授對於 ISC 之貢獻，於會中受推舉競選副主席，並獲全場代表無異議通過，成爲我國目前在國際漁業科學委員會任副主席之第一人，顯示我國參與國際漁業科學事務已深獲國際肯定。

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，而我國同爲 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 11 我國提報之國家報告

11th Meeting of the ISC
July 20-25, 2011
San Francisco, California, USA

ISC/11/Plenary/09

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

Fisheries Agency, Council of Agriculture, Taipei, Taiwan

July 2011

[1] Working paper is prepared for the 11th annual meeting of the International Scientific Committee for Tuna and Tuna-like Species in the North Pacific Ocean (ISC) held in San Francisco, California, USA on 20-25 July 2011. 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, ≧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 32,104 mt (metric ton) in 2010. The active vessels of LTLL operating in the Pacific Ocean in 2010 were 90 and STLL were 1,124. For purse seine fishery, the total catch was 198,851 mt caught by 34 vessels in the Pacific Ocean in 2010. 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 2010. 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. Thereafter, due to high fuel price and low fish price, the number of active LTLL vessels continuously declined. In 2008, the active vessels were 84, and in 2009, it further reduced to 75. Due to the frequently pirate attacking events, some vessels operated in India Ocean transferred their fishing area to south Pacific Ocean, the active LTLL vessels increased to 90 in 2010.

Table 2 shows catch and effort of Taiwanese LTLL vessels operated in North Pacific Ocean during 1997-2010. 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 32 in 2006, 24 in 2007, 18 in 2008, to 14 in 2009, but increased to 20 in 2010.

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 2008 and 2009 was estimated as 2,490 mt and 1,866 mt respectively. The catch in 2010 was preliminarily estimated as 2,281 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 531 mt in 2010.

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 2008 to 2010 was 42,625, 25,376 and 9,849. The predominant size range for albacore caught by LTLL from 2008-2010 were 78-92cm, 86-98cm and 86-98cm in fork length. The length measurement for swordfish is measured from low jaw fork length and the amount of length measurement from 2008-2010 was 2,852, 3,018 and 3,045 separately. The dominant size range for swordfish caught by LTLL from 2008-2010 was 135-175cm, 135-185cm and 140-180cm.

The distribution of fishing efforts of Taiwanese LTLL vessels operating in the Pacific Ocean during 2008-2010 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 2010, the distribution of fishing effort for Taiwanese LTLL operated in the North Pacific Ocean concentrate on the west of 165° W compared with 2008 and 2009.

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 3 shows catch of STLL vessels operated in the North Pacific by species from 1997 to 2010. 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 2010 was 537 mt. The catch of swordfish stayed stable from 1,200 mt to 1,700 mt from 1997 to 2002, but since 2003, it increased remarkably and then remained stable from about 3,400 mt to 4,000 mt from 2003 to 2009. The catch of swordfish in 2010 was preliminary estimated as 2,313 mt. As for Pacific bluefin tuna, in 2007, the catch was 1,401 mt, but in 2008 and 2009 it declined to 979 and 877 mt. The preliminary estimated catch in 2010 was 373 mt.

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 2008-2010 were 369, 724 and 601. The dominant size range for albacore caught by STLL from 2008-2010 was 90-106cm, 84-100cm 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 2008-2010 was 661, 1,497 and 813. The dominant size range for swordfish caught by STLL from 2008-2010 was 105-160cm, 95-165cm and 90-165cm, separately. The amount of size measurements for Pacific bluefin tuna from 2008-2010 were 1,530, 2,845 and 1,335. The dominant size range for Pacific bluefin tuna caught by STLL from 2008-2010 was 210-245cm, 210-240cm and 215-240cm.

The distribution of fishing efforts for STLL vessels based at domestic ports from 2008 to 2010 is shown in Figure 5. The fishing area mainly distributed between north of equator and south of 40 ^{o}N and between eastern of 100 ^{o}E and western of 155 ^{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 2010, 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 2010 was 198,851 mt (Table 4), which was 3.5% higher than the catch of 192,075 mt in 2009.

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. The total catch of tunas and tuna-like species of these fisheries was estimated about 1,872mt consisted of harpoon of 610 mt, set net of 717 mt and gill net of 545 mt in 2010. Among them, the catch of tunas and billfish is about 979 mt and skipjack is about 893mt.

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 26% in 2010.

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. In addition, the staffs of Fisheries Agency started to collect the otolith samples since 2011, the coverage rate was expected to reach around 20%.

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 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 5 shows the number of observational trips in each year during 2002-2010. 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 25 in 2010.

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

2.4 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 and blue marlin.
4. Studies on age and growth, reproduction of striped marlin.
5. Research on CPUE of bigeye and yellow fin tuna.
6. Billfish tagging program.
7. Estimation of historical catches and standardization of CPUEs for dominant sharks.
8. Estimation on the ratio between fins and body weight, and growth parameters for shark by-catch species in Pacific Ocean.

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

1. Standardized CPUE trend and age composition of North Pacific albacore exploited by Taiwanese longline fisheries, 1995-2008.
2. A review of Taiwan's billfish fisheries in the North Pacific,1997-2009. (ISC/11/BILLWG-1/01)
3. Standardized catch-rates for striped marlin (*Kajikia audax*)for Taiwanese distant-water longline fishery in the North Pacific Ocean for 1967-2009. (ISC/11/BILLWG-1/07)
4. Age and growth of striped marlin (*Kajikia audax*) in waters off Taiwan. (ISC/11/BILLWG-1/09)
5. Reproductive biology of female striped marlin (*Kajikia audax*) in the waters off Taiwan (preliminary) (ISC/11/BILLWG-1/11)
6. Catch and life history parameters of pelagic sharks in the Northwestern Pacific. (ISC/11/SHARKWG/06)
7. Age and growth of striped marlin (*Kajikia audax*) in the waters off Taiwan: A revision. (ISC/11/BILLWG-2/07)
8. Reproductive biology of male striped marlin, *Kajikia audax*, in the waters off Taiwan. (ISC/11/BILLWG-2/09)
9. Recent Aspects of Taiwanese Albacore-targeting Longline Fisheries in the North Pacific Ocean, 2011. (ISC/11/ALBWG/07)

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

Year \ Fishery	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	1,124	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	12,182,492	1,866	-	2,302	303	373	37	225	0	8	175	5,289
*2010	25,172,831	2,281	-	3,139	467	531	53	409	32	4	44	6,960

* Species -- Pacific bluefin tuna (PBF), albacore (ALB), bigeye tuna (BET), yellowfin tuna (YFT), swordfish (SWO), striped marlin (MLS), blue marlin (BUM), black marlin (BLM), sailfish (SFA), skipjack tuna (SKJ)
* Data of 2010 is still preliminary

Table 3. Catch by species for Taiwanese STLL operated in the North Pacific Ocean

Unit: MT

Year	ALB	PBF	BET	YFT	SWO	MLS	BUM	BLM	SFA	SKJ	TOTAL
1997	337	1,814	3,506	9,419	1,358	290	3,625	611	527	59	21,546
1998	193	1,910	3,520	8,955	1,178	205	3,603	469	868	32	20,933
1999	207	3,089	2,578	8,961	1,385	128	3,362	563	402	27	20,702
2000	802	2,780	2,041	7,848	1,531	161	4,056	453	499	31	20,202
2001	747	1,839	1,898	8,166	1,691	129	4,524	428	640	26	20,088
2002	910	1,523	2,150	9,145	1,557	226	4,310	173	504	67	20,565
2003	712	1,863	6,136	15,689	3,687	681	7,467	1110	2079	14	39,438
2004	927	1,714	4,067	12,617	3,364	261	6,300	1506	2081	32	32,869
2005	482	1,368	5,314	12,181	3,572	584	7,254	1144	1333	33	33,265
2006	469	1,148	6,204	13,116	3,944	537	5,366	961	488	24	32,257
2007	451	1,401	5,075	11,885	3,754	199	4,842	259	1059	17	28,942
2008	579	979	6,055	12,567	3,407	192	5,222	249	918	15	30,183
2009	512	877	3,807	13,122	3,177	225	4,413	298	372	66	26,869
*2010	537	373	1,967	13,692	2,313	200	4,550	383	960	169	25,144

* Species -- Pacific bluefin tuna (PBF), albacore (ALB), bigeye tuna (BET), yellowfin tuna (YFT), swordfish (SWO), striped marlin (MLS), blue marlin (BUM), black marlin (BLM), sailfish (SFA), skipjack tuna (SKJ)
* Data of 2010 is still preliminary

Table 4. Fishing effort and catch for Taiwanese DWPS operated in the Pacific Ocean

Year	Effort	Species			
					Unit: MT
	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

DWPS: distant water purse seiner
* Species -- skipjack tuna (SKJ), yellowfin tuna (YFT), bigeye tuna (BET)
* Data of 2010 is still preliminary

Table 5. Observational trips of observer program in Pacific Ocean during 2002-2010

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

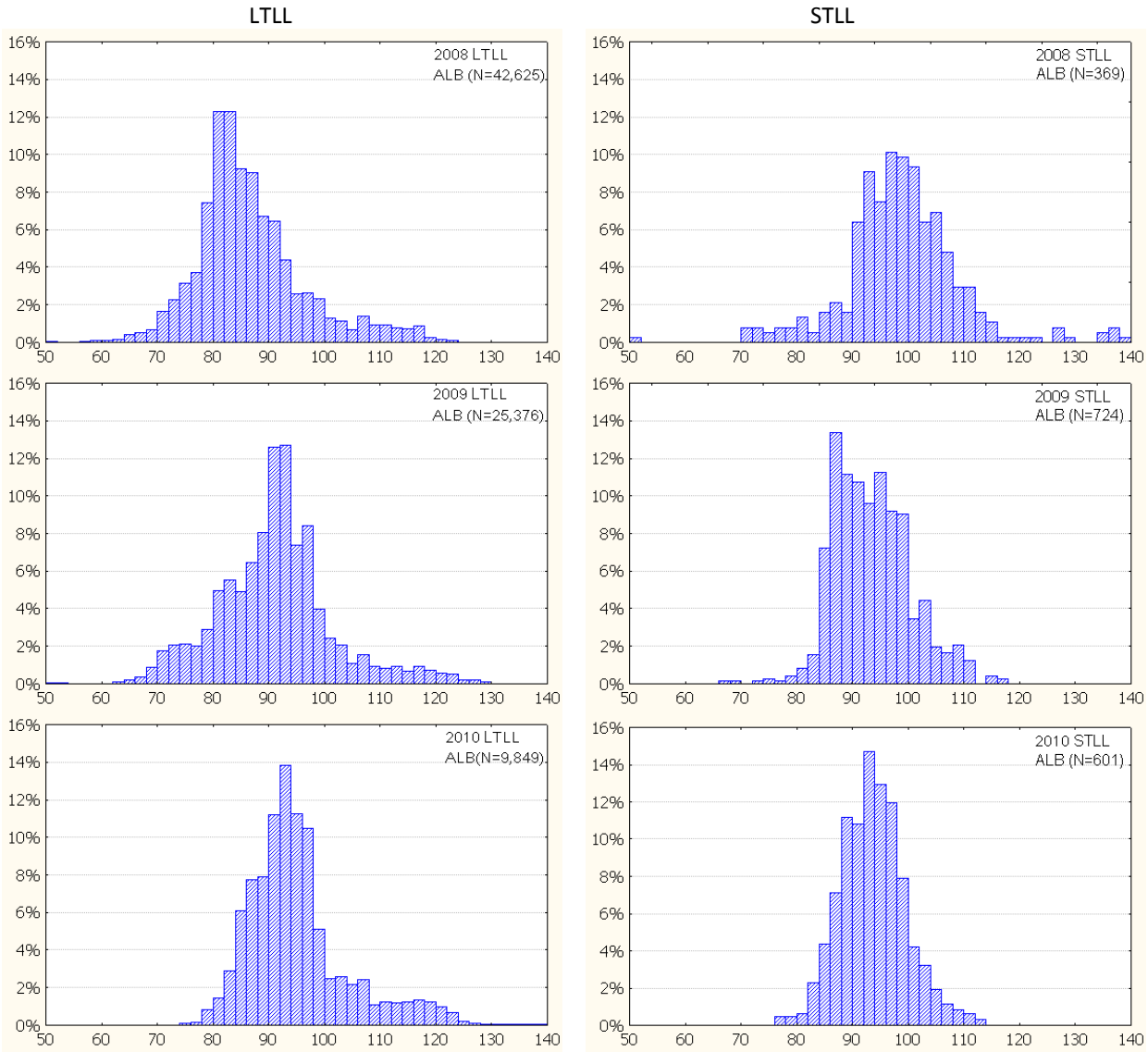


Figure 1. Length frequency distribution of albacore caught by Taiwanese LTLL and STLL vessels in the North Pacific Ocean during 2008-2010.

LTLL STLL

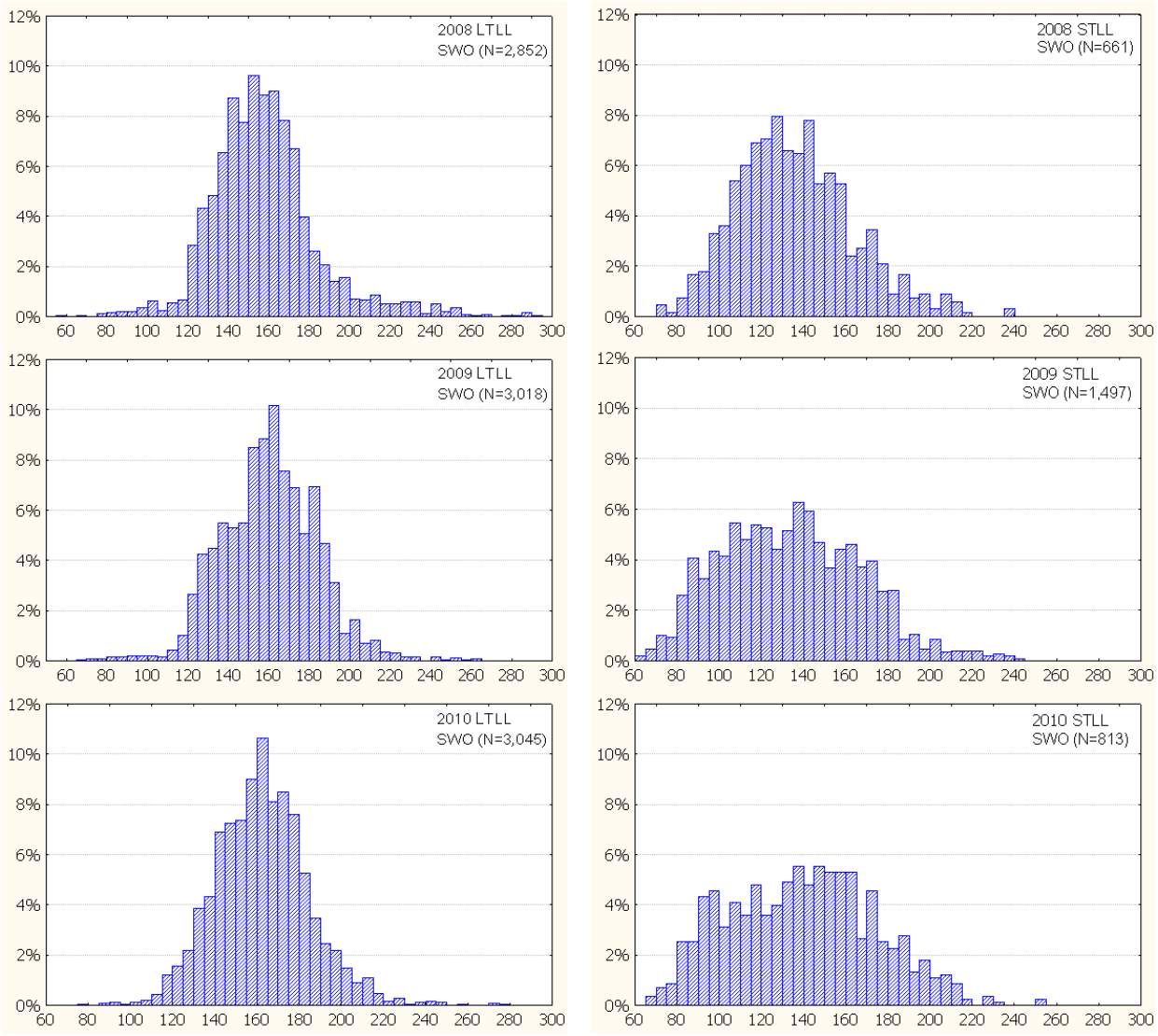
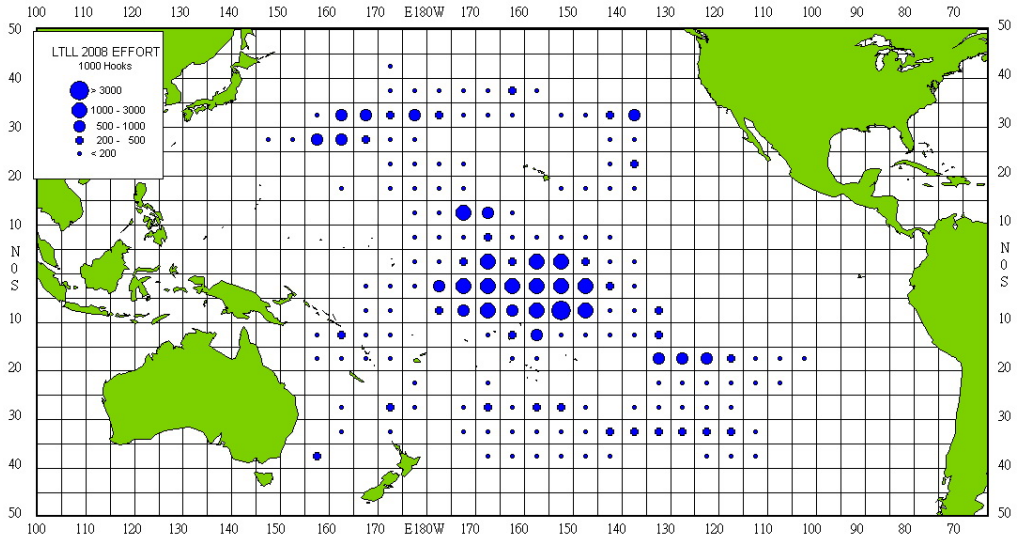


Figure 2. Length frequency distribution of swordfish caught by Taiwanese LTLL and STLL vessels in the North Pacific Ocean during 2008-2010.



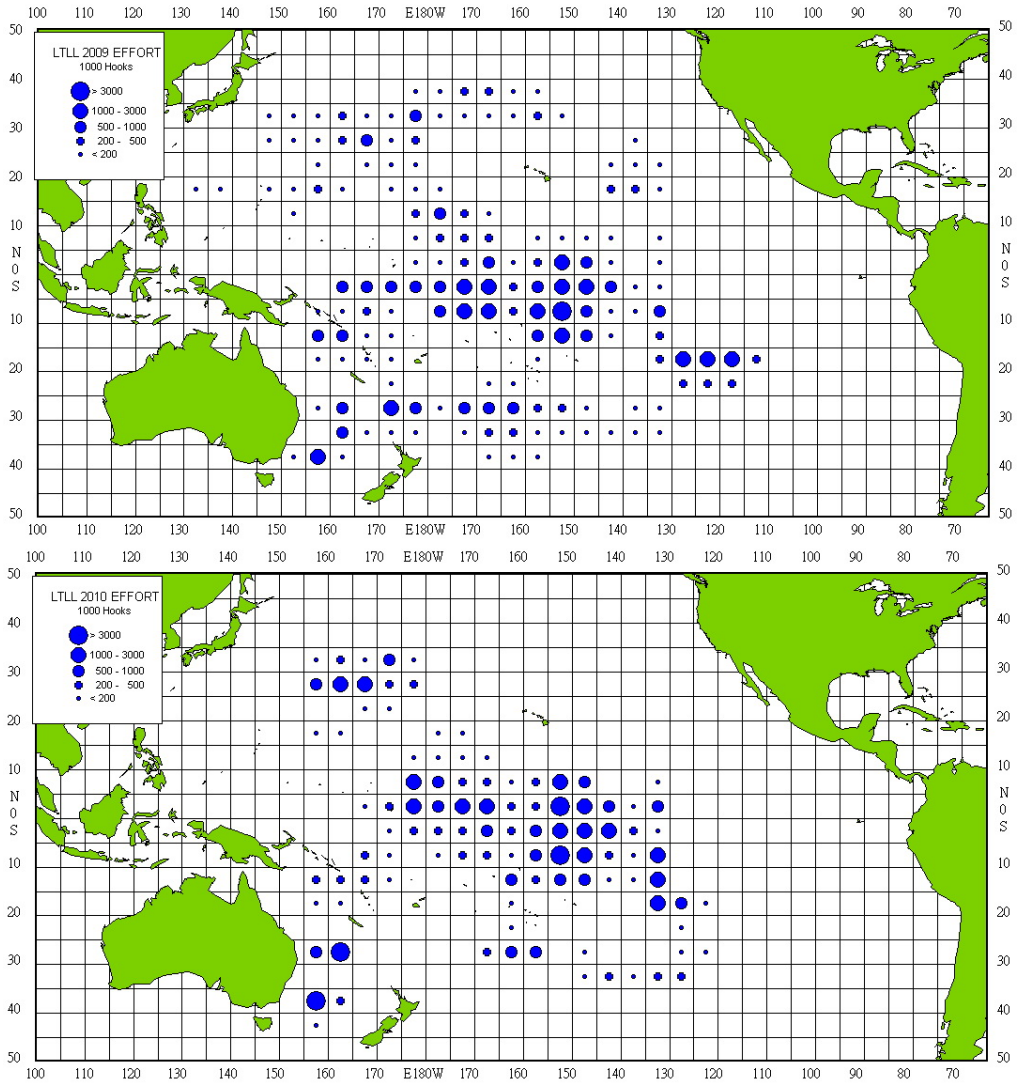


Figure 3. Distribution of fishing effort for Taiwanese LTLL vessels operated in the Pacific Ocean during 2008-2010 (Note: Map of 2009 and 2010 is still preliminary and will be revised shortly.)

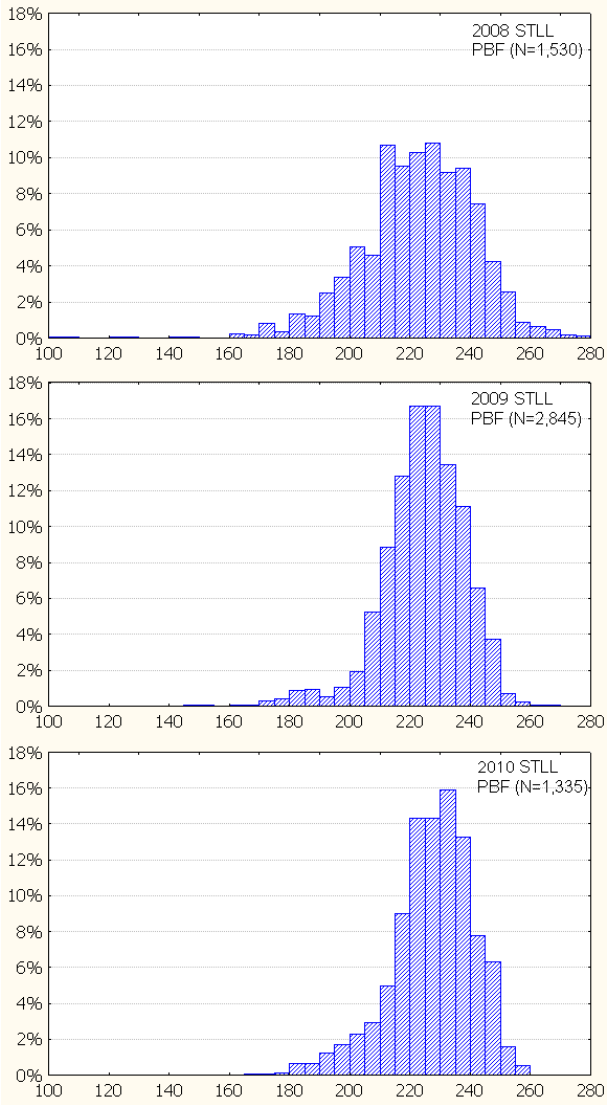
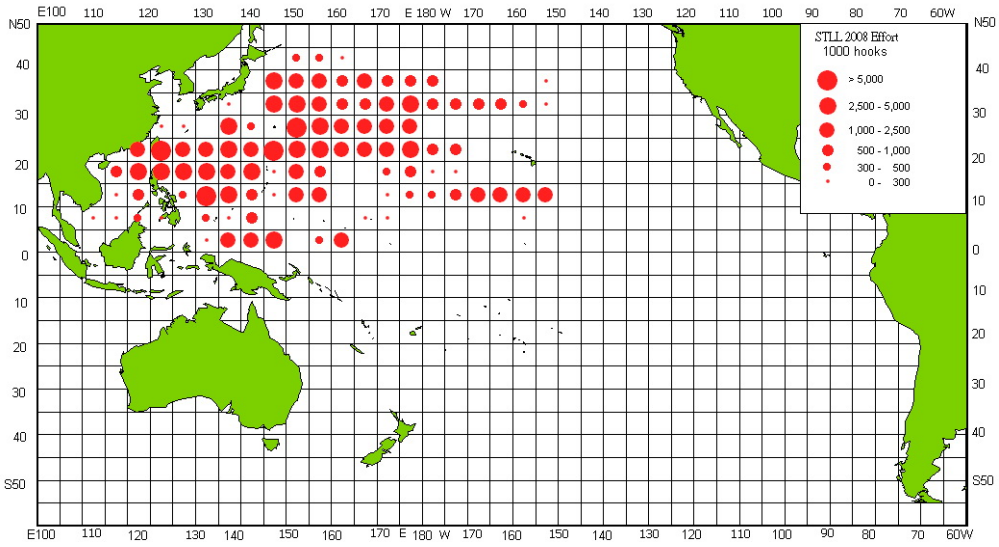


Figure 4. Length frequency distribution of Pacific bluefin tuna caught by Taiwanese STLL vessels in the North Pacific Ocean during 2008-2010.



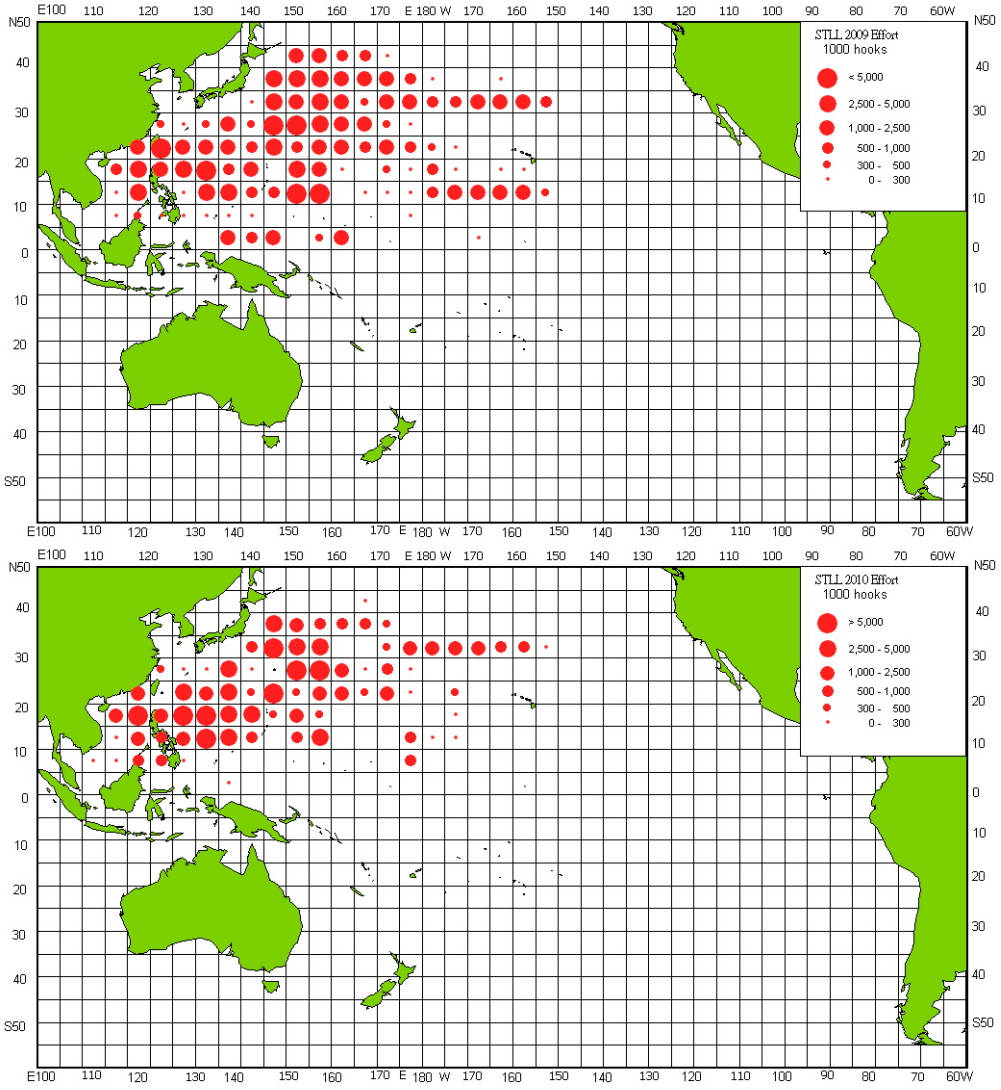
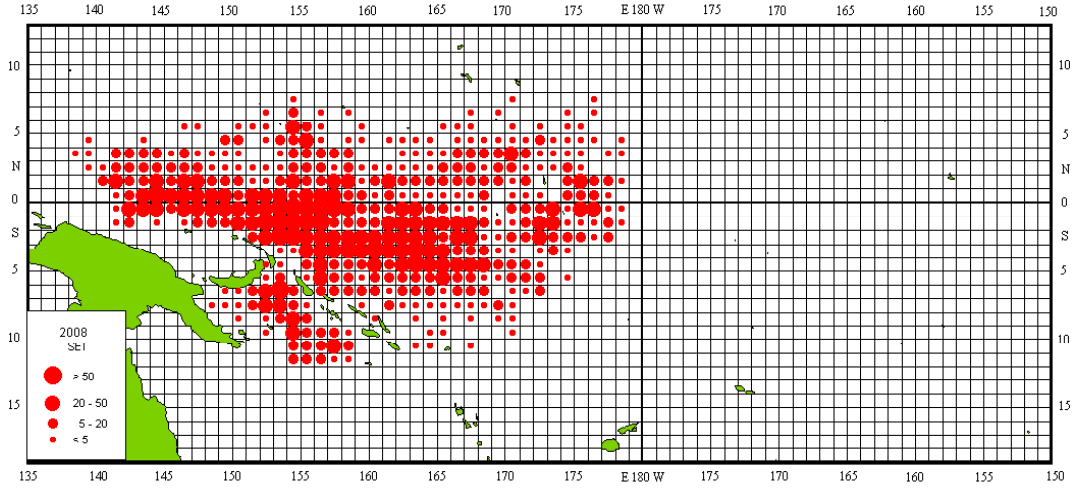


Figure 5. Distribution of fishing effort for Taiwanese STLL vessels based at domestic fishing ports during 2008-2010. (Note: Map of 2009 and 2010 is still preliminary and will be revised shortly.)



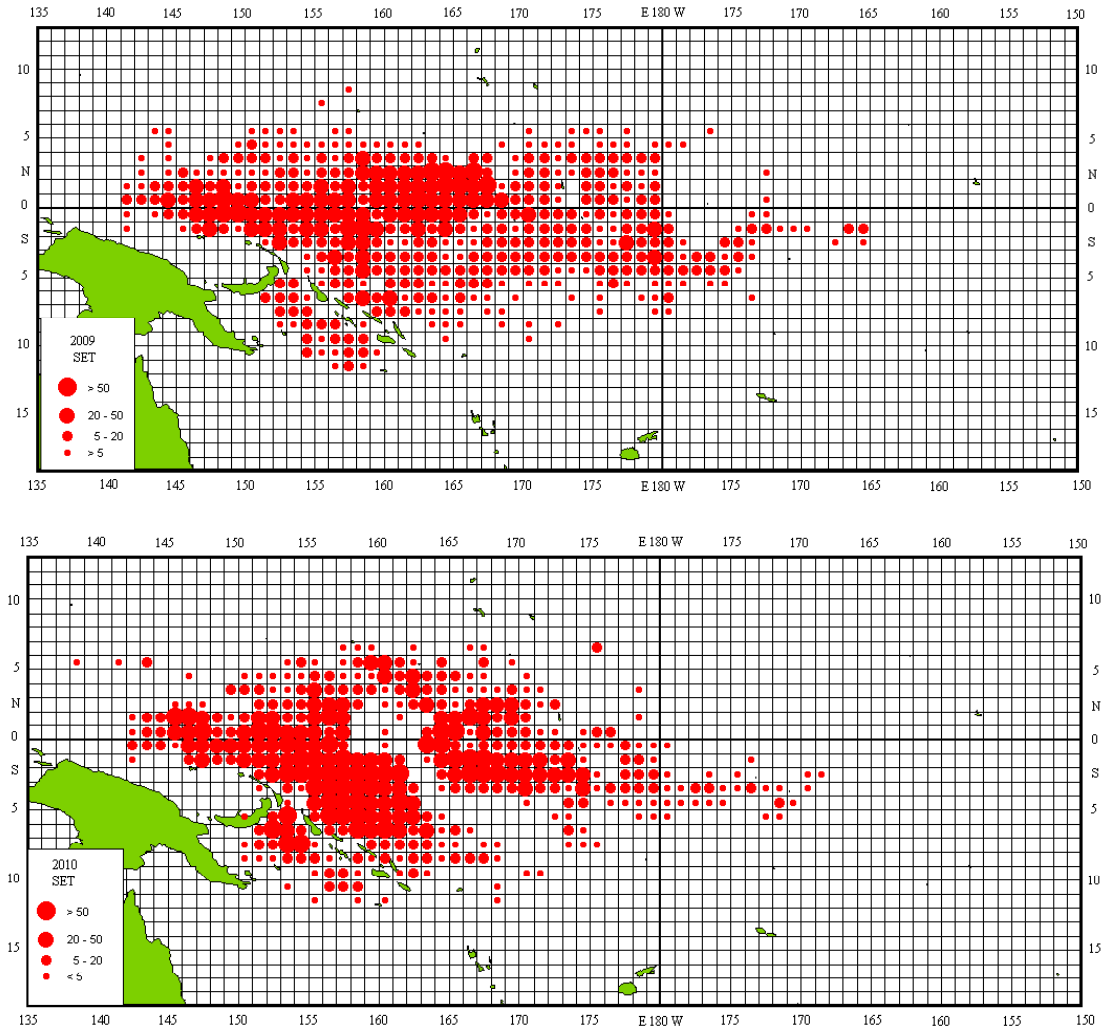


Figure 6. Distribution of fishing effort for Taiwanese distant water purse seine vessels operated in Pacific Ocean during 2008-2010.

附件二、ISC 11 會議報告

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

PLENARY SESSION

20-25 July 2011
San Francisco, California
U.S.A

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ANNEXES

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

PLENARY SESSION

20-25 July 2011
San Francisco, CA
U.S.A.

Highlights of the ISC10 Plenary Meeting

The 11th ISC Plenary, held in San Francisco from 20-25 July 2011 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 albacore tuna, billfish and Pacific bluefin tuna working groups. The Plenary endorsed the findings that the albacore stock was not experiencing overfishing and that stock is likely not in an overfished condition. It further recommended that the fishing mortality rate on albacore tuna not be increased. Regarding Pacific bluefin tuna, striped marlin and North Pacific stocks of swordfish, the Plenary maintained the conservation advice of ISC10 with minor changes for clarification. The Plenary endorsed the work plan of the shark working group and the prioritized list of ISC shark species of interest, blue and shortfin mako sharks, were ranked high priority. A special seminar on Best Available Scientific Information was held – concepts from which ISC will incorporate into its Operations Manual. The ISC workplan for 2011-2012 includes completing a new stock assessment for striped marlin and Pacific bluefin tuna by ISC12, continuing preparation for a Pacific blue marlin stock assessment in 2012, preparations for an updated blue shark stock assessment in 2012/2013, implementing improved database and website management, and conducting a peer review of its structure. After three years serving as Vice Chairman of ISC, Michel Dreyfus stepped down. The Plenary elected Chi-Lu Sun to serve as Vice Chairman for 2011-2014. The next Plenary will be held in Japan in July 2012.

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 which inhabit the North Pacific Ocean during a part or all of their life cycle; and (2) to establish the scientific groundwork for the conservation and rational utilization of these species in this region. The Committee is made up of voting Members from coastal states and fishing entities of the region 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 form the basis for research conducted by the ISC. Although some data for the most recent years are incomplete and provisional, the total amount by ISC Members estimated from available data and information is in excess of 500,000 metric tons (t) annually and dominated by the tropical tuna species. In 2009 the catch of priority species monitored by the ISC was 79,413 t of North Pacific albacore tuna (ALB, *Thunnus alalunga*), 19,928 t of Pacific bluefin tuna (PBF, *T. Orientalis*), 13,930 t of swordfish (SWO, *Xiphias gladius*), and 2,254 t of striped marlin (MLS, *Kajikia audax*). The total estimated catch of these four species is 115,525 t, or an increase of approximately 1.1 % from the 2008 total estimate (estimated to be 100,835 t). Annual catches of priority stocks throughout their ranges are shown in Tables 1-4.

1.2 Opening of the Meeting

The Eleventh Plenary session of the ISC (ISC11) was convened in San Francisco, CA, US at 0900 on 20 July 2011 by the ISC Chairman, G. DiNardo. A role call confirmed the presence of delegates from Canada, Chinese Taipei, Japan, Korea, Mexico and the USA (*Annex* 1). Representatives of the Western and Central Pacific Fisheries Commission (WCPFC) attended as observers. ISC Members China, the Secretariat of the Pacific Community (SPC), the Fisheries and Agriculture Organization of the United Nations (FAO), and the North Pacific Marine Science Organization (PICES), as well as organizations with significant interest including the Inter-American Tropical Tuna Commission (IATTC), did not attend the Plenary.

Dr. Samuel Pooley, Science Center Director, National Marine Fisheries Service, Pacific Islands Fisheries Science Center, delivered the opening address. He welcomed delegates to the Plenary session on behalf of the USA, Dr. Eric Schwaab, Assistant Administrator of National Marine Fisheries Service, and the USA delegation. He affirmed that the USA is committed to ensuring that the management of highly migratory species is based on the best scientific advice, and

consistent with recent recommendations from the July 2011 Kobe 3 meeting in La Jolla, CA, USA. Dr. Pooley wished the delegates a successful and productive meeting.

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 2010 (*ISC/11/PLENARY/08*). The Canadian fleet of 157 vessels operated primarily within the coastal waters of the United States and Canada and in adjacent high seas areas east of 150 °W. Preliminary estimates of North Pacific albacore tuna catch and effort in 2010 are 6,497 t and 7,532 vessel days (v-d), respectively. These figures represent 15% increases in catch and effort relative to 2009. Approximately 51% of the catch and 53% of the effort occurred in the US EEZ, well below the average for 2000-2009 of 79% and 78%, respectively. In contrast, 36% of the catch and 39% of the effort occurred in Canadian waters and 14% of the catch and 8% of the effort occurred in adjacent highseas waters; in both areas 2010 catch and effort were at least double the long-term (2000-2009) averages. Nominal CPUEs in the majority of 1° x 1° spatial blocks north of 48 °N and in offshore waters were above average in 2010, while CPUEs further south in the US EEZ were mostly below average relative to the 2000-2009 period.

Bycatch of other tuna or billfish species, sharks, sea turtles, and sea birds was negligible and they were released alive. In 2009 more than 4,000 skipjack tuna were reported as bycatch. An investigation concluded that these fish were small albacore that were misidentified as skipjack tuna and identification sheets for common tuna, tuna-like species, and pelagic sharks were developed and distributed to the Canadian fleet to prevent reoccurrence.

Thirty-four vessels recorded size frequency data in 2010 and turned in 9,772 fork length measurements, ranging in size from 51 cm (2.65 kg) to 90 cm (15.25 kg). Two modes are present in these data, 64-66 cm and 74-76 cm, corresponding to 2- and 3-yr old fish, respectively. The above average catch rates of North Pacific albacore tuna in northern waters during 2010 (see *ISC/11/PLENARY/11*, Figure 4), changed in the contribution of different areas to total catch, and the equal dominance of 2- and 3-year old fish in the catch (see *ISC/11/PLENARY/*11, Figure 6) point to a northward shift of the albacore population along the west coast of North America in 2010.

Discussion

Several delegations asked if there was information suggesting that the north and westward shift in fishery effort and catch in 2010 could be explained by environmental factors. While there was no definitive explanation it was suggested that a northward bulge in the frontal zone during July and August 2010, along which albacore aggregated, may have contributed to the shift. Canadian scientists are beginning to look at the influence of environmental factors on distribution and impacts on CPUE. It was also noted that fishermen recorded higher catches in cooler waters than in previous years; SSTs were 14-16°C in 2010 compared to 18-19°C in previous years. While many albacore troll vessels also participate in salmon fisheries, and 2010 was a record year for Frasier River salmon runs, the geographic shift in effort observed in the albacore troll fishery was probably not due to economic reasons or declining revenues in the salmon fisheries.

3.2 Chinese Taipei

The delegation report for Chinese Taipei was presented by Z.-Y. Chen (*ISC/11/PLENARY/09*). There are two principal tuna fisheries of Chinese Taipei operating in the North Pacific Ocean, namely tuna longline fisheries and distant water purse seine fisheries; other offshore and coastal fisheries include the harpoon, set net and gill net fisheries, and 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 longline fishery (both LTLL and STLL) in the North Pacific Ocean was 32,104 t in 2010. The number of active vessels operating in 2010 was 90 and 1,124 for LTLL and STLL respectively. The total Pacific Ocean (North and South combined) catch of tuna and tuna-like species in the 2010 purse seine fishery was 198,851 t caught by 34 vessels. The tuna and tuna-like species catch by other offshore and coastal fisheries was estimated at 1,872t (harpoon: 610 t, set net: 717 t, gill net: 545 t) in 2010.

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. For the purse seine fishery, Category I and Category II data are obtained from logbooks.

In March 2010 a catch documentation scheme 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 Pacific bluefin tuna sampling program was initiated. Length and weight measurements and otolith samples from Pacific bluefin tuna are collected at landing markets by OFDC samplers. Ovaries from Pacific bluefin tuna were also collected. All Pacific bluefin tuna caught in the small-scale longline fishery are measured for length and weight and otoliths are collected from approximately 20% of the fish.

An observer program has been conducted in the Pacific Ocean since 2002. In accordance with the government's policy in establishing an observer program and availability of budgets to support the increase of observers, the observed trips has gradually increased year by year. The number of observed trips was 25 in 2010.

To advance stock assessments of tuna and tuna-like species in the North Pacific Ocean, Chinese Taipei is conducting the following research:

1. Research on the catch at size/age and CPUE standardization of ALB.
2. Research on CPUE standardization of PBF.
3. Studies on CPUE standardization and stock assessment of SWO and blue marlin.
4. Studies on age and growth, reproduction of striped marlin.
5. Research on CPUE of bigeye tuna (BET) and yellowfin tuna (YFT).
6. Cooperative Billfish tagging program.
7. Estimation of historical catches and standardization of CPUEs for dominant sharks.
8. Estimation on the ratio between fins and body weight, and growth parameters for shark bycatch species in Pacific Ocean.

Discussion

A question was raised about the sharp decrease in PBF catch in the STLL fishery. It was noted that this fishery targets YFT with only seasonal targeting of PBF so no clear explanation can be derived. It was pointed out that a similar decline in PBF catch in Taiwan waters has also been observed. For this reason the question was deferred to the PBFWG.

Chinese Taipei elaborated on the geographic shift in fishing effort by the STLL fleet observed in 2010 (displayed in Figure 5, *ISC/11/PLENARY/09*), noting that some of these vessels used to operate in the south-eastern area waters. While the exact reason for the shift is unknown, there was a decrease in total fishing effort in 2010 which likely contributed to the observed shift. Most STLL vessels operate in the North Pacific and land catches in Taiwan ports.

The Chair of the ALBWG noted a discrepancy between catch in the LTLL reported in the National Report and the Working Group catch table. Chinese Taipei verified that the figures in the National Report are correct and should be added to the ALBWG catch tables. It was also noted that effort in this fishery declined in 2008 and 2009 due to high fuel prices but increased slightly in 2010.

Monitoring and management measures for the STLL fishery were discussed. The logbook recovery rate has increased to over 20% in recent years and vessels larger than 20 GRT must carry a vessel monitoring system (VMS). Some smaller vessels also carry a vessel data recorder but it is not mandatory. It was pointed out that the 25 observed LTLL trips in 2010 (Table 5, *ISC/11/PLENARY/09*) represent about 5.5% of the total number of fishing trips in that year.

Chinese Taipei described their PBF otolith collection program, established in 2011, which has a target coverage level of 20% of the total number of fish tagged in the CDS program; currently more than 170 samples have been taken.

3.3 Japan

H. Nakano presented the delegation report for Japan (*ISC/11/PLENARY/10*). Japanese tuna fisheries consist of the three major fisheries, longline, purse seine, and pole-and-line, as well as other miscellaneous fisheries including troll, drift net, and set net fisheries. The total landings of tunas (excluding skipjack) caught by Japanese fisheries in the North Pacific Ocean in 2009 was 115,482 t and 70,060 t in 2010, which was 61% of the 2009 catch. The total landings of billfish (swordfish and marlins) was 10,323 t in 2009 and 8,132 t in 2010, which was 78% of the 2009 catch. Skipjack tuna landings were 172,961 t in 2009 and 177,549 t in 2010, which represents a 3% increase compared to the 2009 catch.

The Fisheries Agency of Japan has been implementing domestic management actions directed at Pacific bluefin tuna which are consistent with announcements in May 2010 by the Ministry of Agriculture, Forestry and Fisheries (MAFF) on actions toward effective conservation and management for Pacific bluefin tuna, as well as conservation and management measures for Pacific bluefin tuna adopted by the Western and Central Pacific Fisheries Commission (WCPFC) in December 2010.

The nationwide port-sampling project for PBF has collected catch, effort, and size data at the major landing ports since the early 1990s. In addition, there are cooperative projects with prefectural fisheries, experimental stations and universities. Several cooperative studies are also ongoing with foreign countries for the same purpose.

Several research cruises were conducted in 2010: (1) Two research cruises in the Nansei islands (Okinawa) and the Sea of Japan were conducted in 2010 for ecological study of larval PBF; (2) one longline research cruise was conducted in October 2010 for SWO and blue shark in the Kuroshio frontal area mainly to investigate catch relating to environmental factors; (3) To explore safe and effective designs of tori-line in the north Pacific, three types of tori-line were compared in a research study. Other research includes tagging studies using conventional, archival, and popup tags for tuna and tuna-like species, including Pacific bluefin, bigeye, yellowfin, and skipjack tunas, as well as sharks, to investigate migration patterns, swimming behavior, population structure, fishing mortality, and life history parameters. In addition, a troll survey on age-0 PBF was conducted in Tosa Bay, Japan, to develop techniques for timely monitoring of recruitment. There also have been several studies of biological parameters of PBF such as reproduction, growth of age-0 fish, sex-specific growth curves, and the diet of young fish.

Following the mega-earthquake on March 11, 2011, a tsunami hit the east coast of Japan, destroying a number of major fishing ports including Kesen-numa, Ishi-nomaki, and Ofunato. Countless fishermen were killed and their boats and fishing gear were also damaged or lost. It is believed that more than 30,000 fishing boats were lost in the tsunami. Most of the set nets in that area, which frequently catch PBF from summer to autumn (approximately 25% of the annual catch by set net), were destroyed. In addition, fishing facilities and processing factories were also heavily damaged. The loss of vessels and gear, as well as damage to the infrastructure is having a

significant negative impact on the tuna fisheries in the North Pacific Ocean. It is expected that fishing effort and catch in that area will remain low for years to come.

Discussion

There was discussion and clarification of the research programs described in the National Report. It was clarified that the 2,000 t catch limit for adult Pacific bluefin tuna caught in the purse seine fishery is based on the average recent years' catch in the Sea of Japan. In the Sea of Japan there is a Pacific bluefin tuna catch limit of 4,500 t for fish weighing less than 30 kg and a catch limit of 2,000 t for fish weighing more than 30 kg during the spawning season. It was noted that the SKJ catch has fallen in coastal waters in the western part of Japan, prompting tagging studies to investigate the phenomenon.

The effects of the 2011 earthquake and tsunami on future fishing effort were discussed. While many of the larger vessels were at sea and escaped damage, the loss of shoreside infrastructure and other factors have lead to the bankrupting of many fishing-related companies, which will likely result in a prolonged decline in fishing effort in the northeast region of Japan.

3.4 Korea

J. Lee presented the Korean delegation report (*ISC/11/PLENARY/11*). Two Korean fisheries, distant-water tuna longline and purse seine, engage in fishing for tuna and tuna-like species in the North Pacific Ocean. In the north and south, the number of active longline fishing vessels was 184 in 2002, 122 in 2007, 108 in 2008, 111 in 2009, and 122 in 2010, while the number of active purse seine fishing vessels was 39 in 1990, 28 in 2007, 28 in 2008, 27 in 2009, and 29 in 2010. The main target species of the longliners were bigeye, and yellowfin tunas, and for purse seiners skipjack and yellowfin tunas. The annual catches of bigeye tuna by longline has increased since the 1980s, ranging from 5,411 t in 1982 to 15,425 t in 1998. While the catch of yellowfin tuna by longline was steady at around 4,000 t since the mid 1970s, yellowfin tuna catch gradually decreased after a peak in 1995 at 7,107 t. The average longline catch of North Pacific albacore during the past 5 years was 169 t, and for billfishes in the 2000s catch was 1,633 t. The annual catch of skipjack tuna by purse seiners has steadily increased to reach the peak of 88,654 t in 2003, and then sharply decreased with large fluctuations in recent years. Yellowfin tuna catches by purse seiners showed a steady increase until 1993, but thereafter had a decreasing trend. The main fishing grounds of longliners was between 20°N and 20°S latitude and west of 150°W longitude, and purse seiners operated in the tropical area of the Western and Central Pacific between 10°S and 10°N latitude and between 140°E and 160°W longitude. The annual catch of Pacific bluefin tuna by the Korean domestic purse seiners after 1994 tended to increase with large annual fluctuations, peaking at 2,141 t in 2003. In contrast, the number of offshore purse seiners has gradually decreased to 25 in 2010. More data were collected in order to enhance information on Pacific bluefin tuna catch by domestic purse seiners, for example the number of boxes used in the auction of Pacific bluefin tuna, the actual weight of catch per box, the number of Pacific bluefin tuna by size, detailed data from daily sales slips, etc. Korea revised the purse seine historical Pacific bluefin tuna catch for 2005-2010. The fishing grounds for Pacific bluefin tuna in 2009 and 2010 were mainly around Jeju Island in the spring. The catch level of Pacific bluefin tuna by set net was below 1 t in 2010.

Discussion

The ALBWG Chair noted that North Pacific albacore catch statistics in Table 1 (*ISC/11/PLENARY/11*) for 2006-2009 differ from the ALBWG Report catch table. It was verified that the data in the National Report is the most accurate. It was noted that the apparent reduction in fishing effort in 2010 may be an artefact of the provisional nature of the data.

3.5 Mexico

M. Dreyfus presented the delegation report for Mexico (*ISC/11/PLENARY/12*). The Mexican purse seine fishery is the most important HMS fishery in Mexico. The major development in this fishery that affected catch was the implementation of the EEZ in the late 1970s. Most of the catch is yellowfin tuna, which in 2010 was 100,000 t out the total of 120,000 t of tunas caught in Mexican fisheries (yellowfin, bigeye, skipjack, Pacific bluefin tunas, and others). Onboard observers are required on all purse seiners greater than 363 tons carrying capacity. For smaller vessels (purse seiners and bait boats) monitoring is achieved through logbooks.

Most purse seine sets target yellowfin tuna associated with dolphins. Sets on free-swimming schools of tuna in coastal areas are second in importance; these include Pacific bluefin tuna sets in northern Baja California.

Pacific bluefin tuna started to become a main target for the Mexican fleet with the development of the tuna farming industry in northern Baja California. Catches in the EPO have a long history with record catches in the 1960s by the USA fleet, mainly in the present Mexican EEZ. Mexico had three record catches of PBF, 2004, 2006 and 2010, the latest being 7,745 t. Other catches of Pacific bluefin tuna as well as North Pacific albacore tuna involve the US sport fishery that fishes mainly in Mexican waters under permit. In commercial fisheries North Pacific albacore is considered an opportunistic catch by vessels targeting Pacific bluefin tuna and remains low.

There are 34 vessels located along the Baja California peninsula that catch swordfish; at present all except one vessel uses longline. Almost all of the catch is within the Mexican EEZ and most of the catch (61% of total catch in 2010) is blue shark; swordfish is secondary in importance (13% of the 2010 catch).

With the exception of swordfish, all billfishes are reserved for catch and release by the sport fishery (mainly in La Paz and Los Cabos, Baja California Sur, and Mazatlan, Sinaloa).

Discussion

There was discussion of the status of the tuna-dolphin fishery. The decline in exports to the USA due to the dolphin-safe issue has actually produced some benefits for Mexico. First, a healthy domestic market for tuna has developed. Second the establishment of the International Agreement for Dolphin Conservation Program (IADCP) has resulted in a decline in dolphin mortality related to tuna fisheries to insignificant levels.

3.6 United States

S. Pooley presented the delegation report for the USA (*ISC/11/PLENARY/13*). The two major US fisheries are of interest to the ISC – the Hawaii longline fishery and the albacore troll fishery – were stable in 2010. The longline fishery consists of 125 vessels targeting bigeye tuna (5,242 t in 2010) and swordfish (1,654 t in 2010) both with significant incidental catches of marlins and other pelagic species, and a significant bycatch of sharks. The albacore trolling fishery consists of 653 vessels with a catch primarily of North Pacific albacore tuna (10,130 t in 2010).

The longline fisheries in the US are regulated in terms of landings of some target species, such as bigeye tuna under the Western and Central Pacific Fisheries Convention, and in terms of bycatch of protected species such as loggerhead and leatherback turtles. The Hawaii longline fishery for swordfish has closed several times in the past ten years for exceeding its allowed take of turtles, while the Hawaii longline fishery for bigeye tuna west of 150° W longitude was closed in November 2010 for reaching the WCPFC imposed limit on bigeye tuna. In the latter case, some fishing effort moved to the east of 150° W longitude but some effort was lost and the fresh seafood markets were substantially disrupted. The US is in the midst of considering new regulations on these longline fisheries to reduce the likelihood of interactions with marine mammals, particularly false killer whales.

A variety of pelagic research projects were conducted in the past year which span pelagic research in the areas of fishery monitoring, abundance surveys, socio-economics, life history studies, oceanography, and bycatch mitigation. Most of the USA stock assessment research on pelagic species is conducted in conjunction with the ISC or the IATTC and is thus reported elsewhere. Over 50 manuscripts were published in the past year on studies related to ISC objectives, including studies on CPUE of shark species in the Hawaii longline fishery, North Pacific albacore tuna age and growth and population structure, striped marlin age and growth, and an effort to integrate studies of swordfish and leatherback sea turtles to inform management and conservation efforts, as well as cooperative studies with both the Japan and the USA albacore industry.

Discussion

The Chair of the ALBWG pointed out a discrepancy between the 2009 and 2010 catch data in the National Report and the ALBWG report. It was pointed out that the ALBWG catch table was finalized June 8, 2011 and the National Report catch table finalized the week of July 11, 2011, and that this difference in reporting dates likely attributed to the observed difference. The longline catch of North Pacific albacore in 2010 was 201 t as reported in the US National Report.

A discrepancy in the 2009 and 2010 Pacific bluefin tuna catch data was also identified. It was noted that Pacific bluefin tuna sport catch was updated at the PBFWG meeting, but the update was inadvertently omitted from the National Report. The updated values are 177 t (176 t recreational catch and 1 t “other”) for 2009 and 117 t for 2010. Also, the US will not report sport catch estimates for skipjack, yellowfin, and bigeye tunas, as well as billfish, until the best data sources can be determined. It should also be noted that the catch table in the National Report combines some gears (e.g., sport and “other”) that are disaggregated in the PBFWG report catch tables.

Responding to queries on bycatch regulations on the longline fishery in the US, it was noted that state and Federal restrictions on the landing and sale of sharks and shark fins and current regulations related to seabird mitigation on domestic longline vessels are currently in place.

4 REPORT OF THE ISC CHAIRMAN

G. DiNardo presented the ISC Chairman's report. The ISC had another busy year since the ISC Plenary met in Victoria, B.C., Canada in July 2010. The year was spent completing a benchmark assessment for North Pacific albacore tuna and working on preparations for new stock assessments for striped marlin and Pacific bluefin tuna in 2012. Preparatory work consisted of collecting fishery and biological data, compiling and analyzing data, testing of 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 striped marlin stock structure issues, compiling a catalogue and inventory of the ISC database, advancing development of the website, and database structure and administration. Three new Working Group Chairs were also elected, Jon Brodziak for Billfish, Suzanne Kohin for Shark, and Ren-fen Wu for Statistics. In addition, the framework for a peer review of the ISC function was developed, which is a requirement of the organization. Six intercessional workshops were held to facilitate collaboration among Member scientists in implementing ISC work plans and coordinating research on the stocks.

At the conclusion of this 11th meeting of the ISC, I will have completed my first year of service as Chairman. While the task on occasion is consuming, your support and patience is appreciated and acknowledged. Achieving the objectives stated in the charter and contributing relevant science-based information for shaping policies that allow for conservation, sustainable fisheries and healthy HMS stocks is paramount to the ISC. Continuation of this direction and especially maintaining relevance, however, will require continued vigilance to avoid diluting the scientific information and interpretation with fishery policy considerations and arguments. Furthermore, all aspects of the organization, especially the operating framework need to be reviewed from time to time and adjustments adopted to promote efficiency and effectiveness in the operations and continued relevance of ISC's advice.

I close this report by thanking all my colleagues who have worked on ISC tasks and who have provided the support to ISC and me in advancing the objectives and purpose of the organization. The service of Michel Dreyfus, Vice Chairman, for support and insightful advice is acknowledged. A special thanks and appreciation is owed to the Chairs of the Working Groups, namely Shui-Kai Chang, Jon Brodziak, John Holmes, Yukio Takeuchi, Ren-fen Wu , and Suzy 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 and Webmaster is appreciated. The Chairman extends special thanks and appreciation to Chinese Taipei for hosting the ISC Shark Working Group Workshop in April 2011. Initially scheduled for March 2011 in Japan, the workshop was cancelled due to the devastating earthquake and tsunami on 11 March 2011. The Chairman reached out to Chinese Taipei as an alternate host, and without hesitation they graciously accepted. Finally, I acknowledge the professional assistance of Roszella (Rose) Sanford, Sarah Shoffler, and Lyn Wagatsuma 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 to me on aspects of ISC operations. Thanks to all of you for contributing to another successful year for ISC and for the support and service provided.

5 INTERACTION WITH REGIONAL ORGANIZATIONS

5.1 IATTC-ISC Memorandum of Cooperation (MOC)

In introducing this item, the ISC Chairman pointed out that the signed MOC between ISC and IATTC (*ISC/11/Plenary/02*) was circulated to all Members shortly after ISC10. The MOC provides a mechanism to allow IATTC to participate in all of the ISC meetings without having to apply for observer status on a case-by-case basis. Given the IATTC's important role in managing stocks in the North Pacific Ocean the MOC provides a framework for mutual cooperation. In particular the ISC and IATTC will:

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

It was noted that these collaborations routinely occur, particularly in the ISC species Working Groups.

5.2 PICES

5.2.1 Report from the Executive Secretary of PICES

S. Shoffler provided an oral summary of the PICES Report to ISC (*ISC/11/PLENARY/14*) on behalf of Dr. Alexander Bychkov, Executive Director 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. The PICES Rules of Procedure would allow ISC scientists to participate in PICES Technical Committees and subsidiary bodies as ex-officio members and PICES encourages this form of participation. PICES invited the ISC to send an observer to the 2011 Annual Meeting to address PICES on collaborative issues. In addition, Dr. Bychkov invited ISC to co-sponsor a session at the 2nd PICES/ICES/IOC Symposium on Effects of Climate Change on the World's Oceans scheduled for May 14-18, 2012 in Yeosu, Korea. Finally, Dr. Bychkov suggested ISC and PICES explore convening joint topic sessions at future PICES Annual Meetings.

5.2.2 Report of the 2010 PICES meeting

J. Lee reported on the proceedings of the nineteenth annual meeting of PICES (PICES-2010) convened from 22-31 October 2010 in Portland, USA. The theme for PICES-2010 was "North Pacific ecosystems today and challenges in understanding and forecasting change."

J. Lee attended the meeting as an observer on behalf of ISC and prepared a presentation on ISC activities for the meeting. Lee highlighted PICES research activities that might be of interest to ISC, including characterizing changes in oceanographic conditions and understanding causal mechanisms, development of environmental time series, and development of bioeconomic reference points.

Discussion

It was agreed that the ISC should participate in the 2012 PICES/ICES/IOC Symposium and the other forums described in the PICES Report. 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 work with PICES to explore greater collaboration as outlined in their Report.

5.2.3 Invitation to 2011 PICES meeting

The ISC Chairman noted receipt of an invitation for ISC to participate in the annual meeting of PICES to be held in Khabarovsk, Russia in 14-23 October 2011. In response to the request, the ISC Chairman appointed C.-L. Sun to represent ISC at the 2011 PICES meeting. This nomination was accepted by the Plenary. Sun will attend and report any noteworthy information and opportunities for collaboration back to the Plenary at the ISC12 meeting.

5.3 WCPFC

T. Beeching presented a report on WCPFC activities. From a science perspective a priority is to update the current 5 year Strategic Research Plan, which expires this year, and an increased focus on shark issues will be reflected in the new plan. SPC is conducting stock assessments for yellowfin, bigeye, and skipjack tunas in the WCPO, as well as South Pacific Ocean albacore tuna, and it is anticipated that they will be completed by mid-July. The stock assessors will meet in Pohnpei in early August prior to the SC meeting to agree and finalise presentations to the SC, for approval and comments, and formulate advice for the Commission meeting in Palau in December.

The Commission is proceeding with a peer review of the bigeye tuna stock assessment, bigeye tuna being the only managed tuna species in the WCPFC region that is considered to be experiencing overfishing at this time. Reflecting concerns for the status of bigeye tuna, the West Pacific East Asia Oceanic Fisheries Management Project is delivering technical assistance in stock assessment and gathering of associated data for tuna fisheries in Indonesia, the Philippines, and Vietnam. The project ends in 2012.

In response to relatively high catches of juvenile yellowfin and bigeye tunas on FADs, the purse seine fishery on the permitted high seas areas, and in the EEZs of the WCPFC Convention area bounded by 20ºN and 20ºS latitude, shall be closed to fishing on FADs between 0000 (GMT/UTC) hours from 1 July to 30 September 2011. CMM 2008-01 provides that during this period, a vessel may only engage in fishing operations if the vessel carries an observer from the Regional Observer Programme on board to monitor that at no time does the vessel deploy or service any FAD or associated electronic devices or fish on schools in association with FADs. In December 2010 management and conservation measures were adopted for application to fishing vessels operating in the Eastern High Seas Pocket Special Management Area (SMA). Vessels are required to report fish on board when entering and leaving the SMA, and their movements are tracked with satellite technology.

WCPFC now has a formal agreement with IATTC to exchange data so both organizations will have Pacific-wide databases (http://www.wcpfc.int/node/2684).

GEOEYE (http://www.geoeye.com/CorpSite/) has conducted trials (at no cost to the Commission) for real time observer data entry at sea, with potential benefits including: 1) a panic button for observers, 2) real time data reporting, and c) transmission of GPS position (to enhance scientific data collection and observer safety). Noting that core data is currently verified ashore, a potential result of close-to-real time verification of data is a faster turnaround of observers and real time dialogue to correct observer reporting issues.

Discussion

The recent Center for Independent Experts (CIE) external review of the WCPFC yellowfin tuna assessment was discussed. Because it was a desktop review a number of problems emerged in relation to its timing and the provision of conservation advice. In sum, by the time the results of such a review are available the assessment results are already in use by managers. An interactive review would be superior but it would be costly.

Clarification was provided regarding the external review process for the North Pacific albacore stock assessment. It was pointed out that a table top review of the assessment will be conducted by the CIE shortly after ISC11. Staff at NOAA Fisheries, PIFSC, are working with the ALBWG Chair to develop Terms of Reference for the review.

6 REPORTS OF WORKING GROUPS AND REVIEW OF ASSIGNMENTS

6.1 Albacore

J. Holmes reported on the activities of the ALBWG over the past year (*ISC/11/ANNEX/04*, *ISC/11/ANNEX/09*). The ALBWG was tasked with completing a full assessment of the current

status and future trends of ALB and developing recommendations for conservation. The Working Group met at a data preparation workshop, 11-19 October 2010 in La Jolla, California, USA, and for the stock assessment workshop, 28 May-11 June 2011 in Shimizu, Japan to achieve these objectives. The October 2010 meeting focused on completing fishery spatial/temporal definition work for the upcoming assessment; reviewed input data series (catch, size composition, CPUE) for consistency with the new fishery definitions and conflicts in primary data sources; explored the Stock Synthesis III (SS3) model to assess the impact and develop solutions to parameterization issues; and determined the role of the VPA model in the assessment. The stock assessment workshop developed the base-case model; conducted sensitivity analyses; and developed advice on stock status, future trends, and conservation measures as well as partially updated national fisheries data for 2010.

Accomplishments of the ALBWG over the past year include:

1. The Working Group completed the transition from an age-structured VPA to length-based SS3 assessment model;
2. Developed a consensus base-case assessment model for SS3, which includes new age and growth data;
3. Assessed the current status and future trends in the albacore stock and developed recommendations on status and conservation advice;
4. Updated national fishery statistics through 2010 for member countries attending the stock assessment workshop;
5. Decided to submit the assessment to external desktop review of the methodology, results, interpretation, and conservation advice; and
6. Developed and prioritized a list of research needs to improve future assessments.

The successful completion of this assessment is the result of substantial ongoing collaboration and cooperation among WG members to understand and develop solutions to problems as they arose during the model transition period. Simon Hoyle (SPC) and Alexandre Aires-da-Silva (IATTC) made important contributions to the assessment. The cooperation and hard work of all WG members ensured that the assessment was completed on-time.

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

- The need to develop efficient protocols 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, where they are archived, etc.;
- How the need for external review of assessments can be accomplished; and
- The absence of data submissions directly from China, although ALB catches are minor.

Discussion

The difficulties caused by the lack of 2010 data submission by China were discussed. This is not only a problem for the completion of ALBWG tasks, but for other WGs as well. It was noted that the BILLWG resorted to obtaining catch data from the WCPFC because of the lack of data submission from China. The ISC Chair needs to work with China to encourage full participation in ISC activities, especially in relation to the provision of catch data.

There was discussion of peer review of ISC assessments. It is both expensive and time consuming so that, as noted earlier, the results lag behind the provision of conservation advice. This is a difficult issue and there are no clear solutions right now. However, if peer review results are only considered advisory, and are used to improve future stock assessments this timing problem becomes less of an issue.

The ISC Chairman thanked J. Holmes for his thorough presentation.

6.2 Pacific bluefin tuna

Y. Takeuchi, Chairman of the PBFWG, presented the summary of the activities of the group since ISC10 (*ISC/10/ANNEX/07*). The PBFWG met on 6-9 January 2011 in Shimizu, Japan. At this workshop, 13 working papers and seven oral presentations were made with the participation of 37 scientists from Chinese Taipei, Japan, Korea, USA, and the IATTC. The PBFWG reviewed fishery data for its stock assessment at this meeting. The PBFWG also tested new ideas for its stock assessment model, such as a new stock recruitment relationship and hybrid VPA-SS model.

The PBFWG also met 16 July 2011 in San Francisco, California to update the catch table. Korea revised their historical purse seine Pacific bluefin tuna catch from 2005 to 2010, which was supported by a working paper explaining the rationale for the revisions. The PBFWG reviewed the proposed revision and recognized that the working paper was useful so that it was registered as one of official working paper of January workshop. The USA updated and presented the estimated USA catches of Pacific bluefin tuna for 2009 and 2010 respectively. The USA recreational catches for 2009 and 2010 were estimated to be 176 and 117 mt respectively. Total USA commercial catches for 2009 and 2010 were estimated to be 415 and <1 mt respectively. USA catches of Pacific bluefin tuna in 2009 and 2010 are considered to be provisional. Japan also revised their purse seine catch time series since 2002 because of change to its logbook data. Japan also updated recent Pacific bluefin tuna catch of the other gears. Chinese Taipei and Mexico also presented their recent catch updates.

The PBFWG work plan for 2011 and 2012 was reviewed, including the schedule of the next full stock assessment. The WG plans to hold two workshops in January 2012 and May-June 2012. The objective of the first workshop is to finalize stock assessment input data. The second workshop will conduct a full stock assessment of the stock. The WG may also meet in July 2012 in conjunction with ISC12 Plenary if necessary.

Discussion

The ISC Chairman thanked Y. Takeuchi for his insightful presentation.

6.3 Billfish

J. Brodziak, Chairman of the BILLWG presented the Billfish Working Group report (*ISC/11/ANNEX/07, ISC/11/ANNEX/08*). The report provided current information on the status of WG assignments, recent work on billfish fishery and life history research, and the preparation and finalization of data for conducting the WCPO striped marlin stock assessment. The report also described the future work plan for the WG.

Activities of the January 2011 workshop in Honolulu, Hawaii, USA described in detail in Annex 7. The meeting included a review and update of billfish fishery data for the following member countries: Chinese Taipei, Korea, Japan, and the US. The WG also reviewed CPUE standardization analyses for striped marlin conducted by Chinese Taipei, the US, and Japan. The WG agreed to accept CPUE standardizations conducted by Chinese Taipei and the US for use in the WCPO striped marlin stock assessment. The WG also reviewed new research on MLS life history parameters. This included studies of the natural mortality rate (US), the growth rate and expected size at age (Chinese Taipei), the sexual maturity at age (Chinese Taipei), and the weight-specific fecundity (Chinese Taipei) of North Pacific striped marlin (MLS). Overall, the WG adopted the new research on life history parameters as the best available scientific information available for the WCPO striped marlin stock assessment.

The meeting was also attended by a representative of the SPC who provided valuable information on striped marlin catch data submitted to the WCPFC. This was a positive outcome and helped ensure that the WG would have access to the best available catch data of non-ISC countries for the WCPO striped marlin stock assessment.

The WG also considered some recent socioeconomic research on the estimation of the maximum economic yield reference level ofthe Japanese coastal longline fishery for swordfish and received a presentation on the IATTC efforts to assess the Eastern North Pacific striped marlin stock (east of 145° W longitude and north of 5° S latitude). The WG also planned a collaborative review of the IATTC assessment model.

The BILLWG held a meeting in May 2011 in Chinese Taipei. The activities of this meeting are described in detail in Annex 8. The work plan leading up to this meeting included the finalizing of working papers from the January 2011 meeting. The work plan also called for the submission of the late striped marlin data by 15 February 2011, the finalization of data tables for the WCPO striped marlin stock assessment by 28 February 2011, and the updating of the most recent striped marlin data by 15 May 2011. The WG members also continued to submit Category I Data for all billfish to the WG Chair.

The WG accomplishments from the May 2011 meeting included the acquisition of new data for billfishes. In particular, the WG was able to incorporate the non-ISC member countries catch data of striped marlin into the stock assessment data set. The WG also received some new biological information on striped marlin catches from China and updated information on UScatches of billfishes in North Pacific including striped marlin and swordfish. Some striped marlin stock assessment data that were expected to be ready for the May 2011 meeting were not provided on time. As a result, the deadline for the submission of standardized CPUE and quarterly catch and size composition data was rescheduled to be 30 June 2011.

The WG also conducted and reviewed several CPUE standardization analyses for Japanese striped marlin fisheries. These included standardizations for offshore and long-distance longline, coastal large-mesh drift net, high seas large-mesh drift net, and coastal longline fisheries.

The WG also considered some additional life history research for the WCPO striped marlin stock assessment. In particular, the WG reviewed a revised growth study and a natural mortality rate study that used the revised growth information. The WG also considered new research to

estimate stock-recruitment steepness of North Pacific striped marlin based on reproductive ecology. The WG adopted the new life history research for use in the WCPO striped marlin stock assessment.

The WG received a presentation on the progress of a multinational Pacific billfish tagging program and reviewed a report on the ISC Billfish WG and IATTC collaboration on sensitivity analyses for the EPO striped marlin stock assessment.

The WG meeting was attended by a representative of the SPC. This representative provided valuable insights and helped the WG review the best available scientific information for the assessment of the WCPO striped marlin stock.

Following the May 2011 meeting, the WG continued work on the compilation of the striped marlin stock assessment data. All late stock assessment data and working papers were received by the WG Chairman by the 30 June 2011 deadline. As a result, the review and completion of the WCPO striped marlin stock assessment was rescheduled for December 2011.

The WG Chairman discussed the issue of data availability for BILLWG stock assessments. In particular, the following problems for recent ISC Billfish WG stock assessments were noted: (1) ISC member countries not providing catch data; (2) data provided late and after the agreed-upon deadline including catch, standardized CPUE, and size composition data; and (3) member countries not participating in WG meetings. It was emphasized that the lack of current data decreases the relevance of stock assessments.

The future work plan of the Billfish WG included two major tasks. These were:

1. Completion of the draft stock assessment of North Pacific WCPO striped marlin by December 2011 for review and adoption at ISC12
2. Preparation of data for the upcoming Pacific blue marlin stock assessment.

Discussion

The BILLWG Chair stressed the need to provide data in a timely fashion. The delay in the provision of data, which delayed completion of the current striped marlin stock assessment, negatively affects the ISC's credibility and relationship with scientific and management organizations. The USA noted that postponing any assessment affects domestic management requirements, as well.

The ISC Chairman thanked J. Brodziak for his comprehensive presentation.

6.4 Shark

S. Kohin, Chairperson of the Shark Working Group presented the SHARKWG report (*ISC/11/ANNEX/06*). At ISC10, the SHARKWG was formed to conduct stock assessments on species of interest as required, similar to the responsibilities of the other existing species WGs of the ISC. The SHARKWG will focus on monitoring shark fisheries particularly for blue, shortfin mako, bigeye thresher, pelagic thresher, silky, oceanic whitetip, hammerhead, and any other shark species for which stock assessments may be needed. The first meeting of the SHARKWG

was held 19-21 April 2011 in Keelung, Taiwan. Highlights from the meeting include: (1) reviewing nine working group and ten background documents on shark fisheries and life history studies; (2) development of a work plan for assessing blue and shortfin makos in 2012 and 2013, respectively; and (3) election of Suzanne Kohin as SHARKWG Chair.

The work plan is presented in Annex 6, *Report of the Shark Working Group Workshop* and includes four topics of focus for future work: (1) Fisheries Statistics; (2) Biological Research; (3) Ecological Research; and (4) Shark Stock Assessments. With respect to shark stock assessments, the SHARKWG will first conduct a stock assessment on blue sharks in the North Pacific Ocean. The work will build upon data and modelling efforts from the last blue shark stock assessment in the North Pacific conducted collaboratively by US and Japan scientists, as well as other interested scientists (Kleiber et al., 2009). A data meeting is planned for November 30 - December 6, 2011, in Honolulu, HI USA and the SHARKWG Chair will soon put out a request for National Category I, II and III data for blue and shortfin mako sharks. It is expected that another intercessional meeting in mid-2012 and a final meeting near the end of 2012 will be needed to complete the blue shark assessment. Work on the other species of interest will be conducted collaboratively with other RFMO shark working groups or within the ISC SHARKWG as deemed necessary.

Discussion

It was noted that there is elevated concern among all RFMOs on the status of sharks so the proposed assessments are timely. While timely completion is important, the data need to be reviewed carefully because sharks are a bycatch species and the collection of pertinent data have been treated differently over time. Other organizations are planning to assess sharks so ISC needs to avoid duplication of effort, which was highlighted at the 2010 Shark Task Force meeting and subsequent discussion with SPC and IATTC staff.

In relation to the data issue, Mexico noted that historically their catch data grouped all shark species together, partly because they were caught in artisanal fisheries. Since 2007 there is a regulation requiring the report of catches by species. While this means recent data are more accurate, the shortcomings of historical data will have to be addressed. Given similar issues in other countries a practical comprise on the treatment of historical data will have to be found.

The ISC Chairman thanked S. Kohin for the insightful presentation.

6.5 Seminar

J. Brodziak presented a brief overview of the seminar on the use of the best available scientific information, held during a break in the Plenary on 22 July 2011 (*ISC/10/ANNEX/11*). The seminar covered four topic areas: 1) Information needs for stock assessments; 2) Best available scientific information; 3) Minimal components for a structured stock assessment; and 5) Best practices for management advice. The results of the seminar are captured in five tables included in Annex 11. In particular, Tables 4 and 5 provide guidance to ISC WGs on the components of stock assessment reports and executive summaries for such reports intended to crystallize information on stock status for consideration by managers.

Discussion

The overall objective of this exercise is to encourage a basic level of consistency across ISC documents so as to make them easier to review and be understood by fishery managers. It was clarified that the tables (specifically Tables 4 and 5) are for guidance and not meant to be prescriptive, for example by specifying particular methodologies that should be used. It was noted that the production of reports documenting fisheries exploiting fish stock of interest would be very useful (per Table 2, item 1). There was discussion of the process for incorporating the workshop results into the ISC Operations Manual. It was agreed that the intent of tables in Annex 11 will be incorporated into a revised draft of the ISC Operations Plan, which will be circulated as a formal recommendation for ISC Members to review. The goal is to adopt these additions to the Operations Plan at ISC12.

The topic of "best practices for management advice" (*Annex 11*, Section 4) was discussed at length in light of the ISC's mission to provide scientific information on which management advice may be based, but not making management recommendations per se. This directly relates to Table 5, which lists the proposed contents for stock assessment executive summaries. It was emphasized that ISC would not be making management recommendations in executive summaries; rather, the executive summary should clearly and concisely describe the status of the stock—the basic facts resulting from the stock assessment—for fishery managers to use when developing management proposals. It was agreed that in consultation with the WG Chairs the terminology describing this task would be modified to clarify that ISC's role is to provide scientific information in support of fishery management decision making. At the same time, it was emphasized that the executive summaries are a WG product and should summarize stock status in relation to biological reference points.

A separate issue raised in this discussion was the possibility that the ISC could in the future conduct management strategy evaluations. These exercises evaluate the effectiveness of management measures in light of science-based policy objectives. While dealing with management measures, such exercises would not place ISC in a policy-making role and should be undertaken.

The Chair thanked J. Brodziak for the thorough and insightful presentation.

7 STOCK STATUS AND CONSERVATION ADVICE

7.1 Albacore

J. Holmes presented the recently completed North Pacific albacore stock assessment (*ISC/11/ANNEX/09*). The assessment was completed in June 2011 using fishery data through 2009. The assessment was conducted using a seasonal, length-based, age-structured, forward-simulation population model developed within the Stock Synthesis modelling platform (Version 3.11b) and was based on the assumption that there is a single well-mixed stock of albacore in the north Pacific Ocean (base-case model). The model used quarterly catch-at-length data; 16 age-aggregated fisheries defined by gear, location, season, and catch units (weight or number); a new growth curve estimated within the model; and use of conditional age-at-length (otoliths) data not previously available.

Analyses were carried out to assess the sensitivity of the results to assumptions including data-weighting (both between data types and relative weightings of different sources within a data type), biology (stock-recruitment relationship, natural mortality, growth), and fishery selectivity patterns. Stochastic future projections of the stock were conducted to estimate the probability that future spawning stock biomass (SSB) will fall below the average of the ten historically lowest estimated SSBs (SSB-ATHL) in at least one year of a 25-yr (2010-2035) projection period. The base-case scenario for projections assumed average recruitment and constant F (at the current F level, $F_{2006\text{-}2008}$), but sensitivity of the results to alternative harvest scenarios (constant catch and constant $F_{2002\text{-}2004}$), two recruitment scenarios (high and low levels), and alternative structural assumptions (down-weighting of the length composition data, stock-recruitment relationship, growth) was investigated. Retrospective analyses were conducted to assess the level of bias and uncertainty in terminal year estimates of biomass, recruitment, and fishing mortality. A reference run of the VPA model configured as in the 2006 assessment, but with updated catch-at-age and age-aggregated CPUE indices, was conducted to compare important estimated quantities for model-related changes.

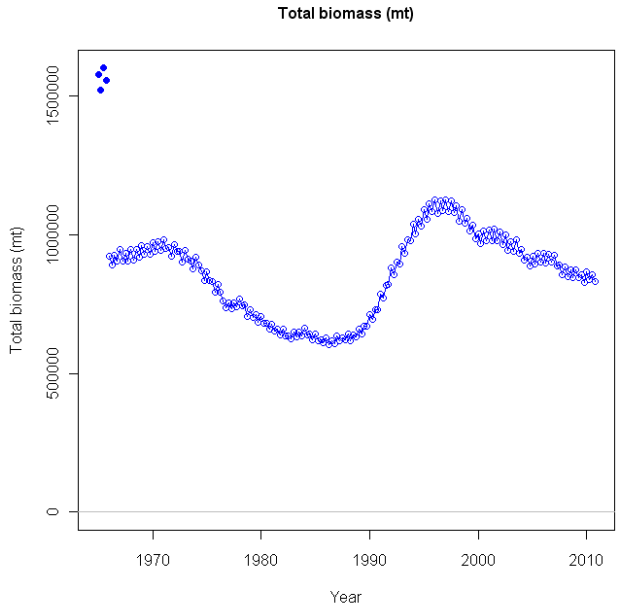
The base-case model estimated that SSB likely fluctuated between 300,000 and 500,000 mt between 1966 and 2009 and that recruitment averaged 48 million fish annually during this period (Figure 7-1C). The pattern of F-at-age showed fishing mortality increasing to its highest level on 3-yr old fish and then declining to a much lower and stable level in mature fish (Figure 7-2). Current F (geometric mean of 2006 to 2008, $F_{2006\text{-}2008}$) is lower than $F_{2002\text{-}2004}$ (current F in the 2006 assessment). Future SSB is expected to fluctuate around the historical median SSB (~400,000 t) assuming F remains constant at $F_{2006\text{-}2008}$ and average historical recruitment levels persist (Figure 7-3A). $F_{2006\text{-}2008}$ is approximately 30% below $F_{SSB\text{-}ATHL\ 50\%}$ and there is about a 1 % risk that future SSB will fall below the SSB-ATHL threshold in at least one year in the projection period assuming average historical recruitment and constant $F_{2006\text{-}2008}$, i.e., current F is well below the 50% probability level. However, if recruitment is about 25% lower than the historical average and F remains constant at $F_{2006\text{-}2008}$, then the risk of future SSB falling below the threshold by the end of the projection period increases to as high as 54%.

Sensitivity and retrospective analyses evaluated the impact of alternative assumptions on the assessment results. These analyses revealed scaling differences in estimated biomass (total and SSB) and, to a lesser extent, recruitment, but few differences in overall trends. Relative F-at-age patterns were not affected by different assumptions, except when the growth curve parameters from the 2006 assessment were used, and $F_{2006\text{-}2008}$ was consistently lower than $F_{2002\text{-}2004}$. Although there was considerable uncertainty in absolute estimates of biomass and fishing mortality, the estimated trends in both quantities were robust and advice based on F_{SSB} was not affected by this uncertainty. Terminal year estimates of biomass and recruitment show no bias, but there was a high level of uncertainty in the most recent recruitment estimates. Given these findings, the WG believes that the current parameterization of the base-case model is appropriate.

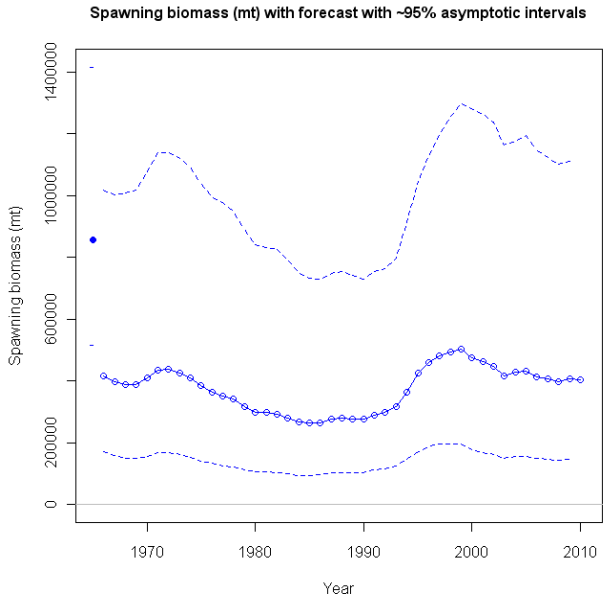
Both the SS3 base-case model and the VPA reference run estimated similar historical trends in SSB and recruitment, but with different scaling for biomass. The scaling difference was largely attributable to the different growth curves used in SS3 base-case model and the VPA reference run. A sensitivity run of the base-case model in which growth parameters were fixed to those used in the VPA, reduced the scaling of biomass to the level of the VPA reference run. Sensitivity analyses of future projections showed that stock status and conservation advice is

relatively insensitive to these scaling differences (Figure 7-3B). The WG concluded that the growth curve used in the 2006 assessment was not representative of growth in North Pacific albacore. The WG also concluded the SS3 model will replace the VPA as the principal model in future North Pacific albacore assessments.

A.



B.



C.

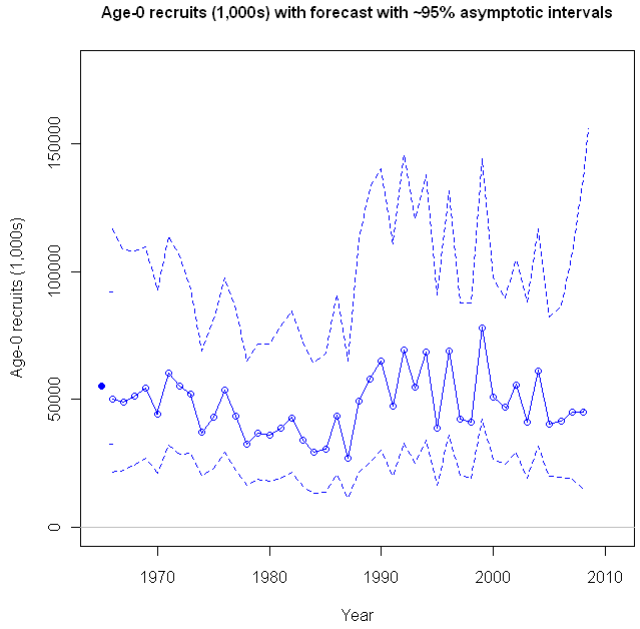


Figure 7-1. Estimated total biomass (A), spawning biomass (B), and age-0 recruitment (C) of albacore tuna in the north Pacific Ocean. The open circles represent the maximum likelihood estimates of each quantity and the dashed lines in the SSB (B) and recruitment (C) plots are the 95% asymptotic intervals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

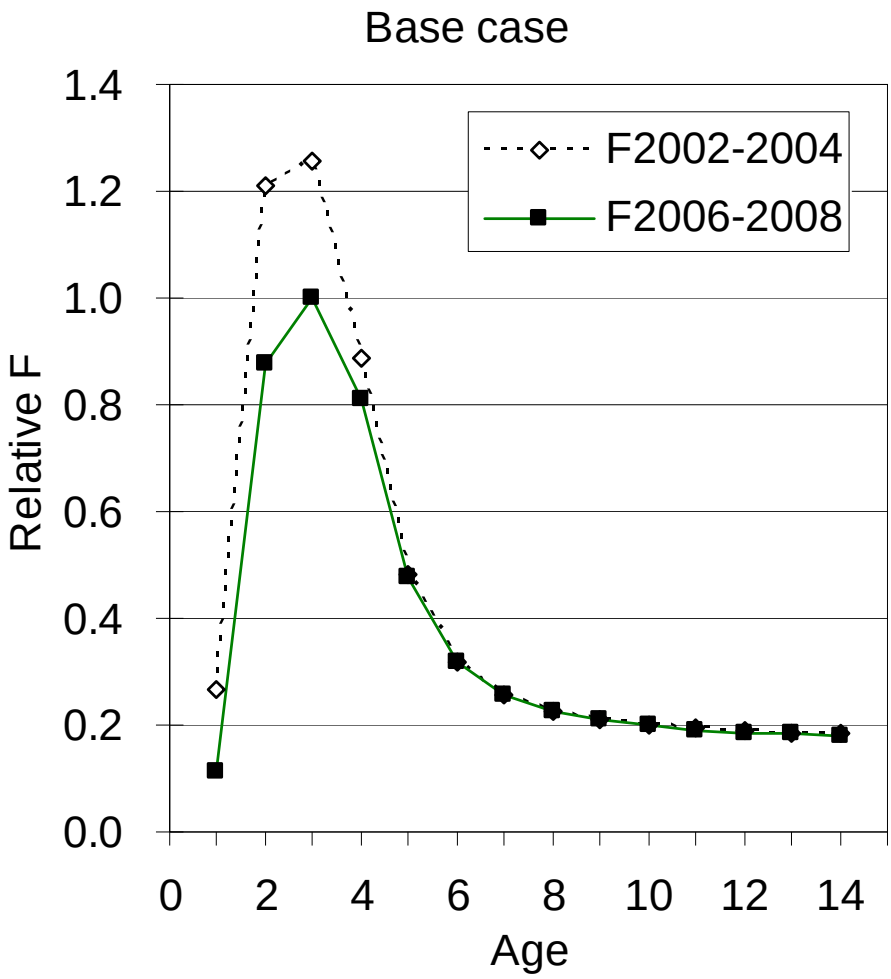


Figure 7-2. Estimated fishing mortality-at-age for the base-case scenario ($F_{2006-2008}$) and $F_{2002-2004}$ (current F in the 2006 assessment). Results are scaled to the highest F-at-age in the $F_{2006-2008}$ series at age-3 (0.16 yr^{-1}).

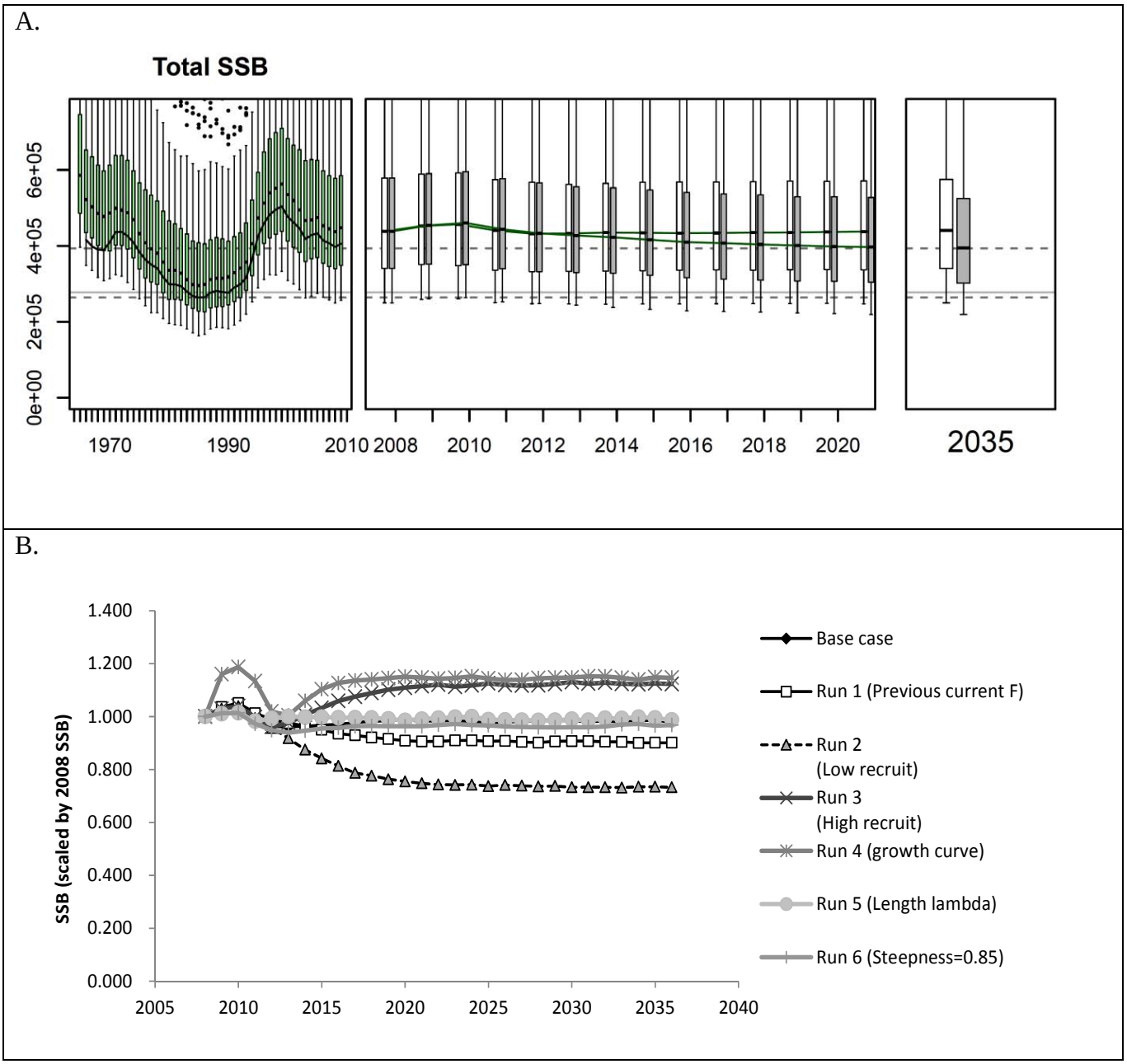


Figure 7-3. A. - **Past (left) and future (right) trajectories of SSB estimated with two harvesting scenarios, base-case ($F_{2006-2008}$) and $F_{2002-2004}$. The lines from the boxes represent 90% confidence intervals, and lower and upper end of boxes represent 25th and 75th percentiles. Open circles are extreme values.** B. - **Comparison of SSB trajectories of among 7 future projection runs testing harvesting and recruitment scenarios and assessing structural sensitivities. Results are scaled to SSB_{2008}, which is approximately the long-term median SSB during the modeled period, 1966-2009.**

Working Group Conclusions on Stock Status

Although there is uncertainty in the absolute estimates of biomass (total and SSB) and fishing mortality, the stock status and conservation advice based on the $F_{SSB-ATHL}$ reference point are

relatively insensitive to these uncertainties as trends in SSB and recruitment are robust to the different plausible assumptions tested by the WG (Figure 7-3B). Estimates of $F_{2006\text{-}2008}$ (current F) expressed as a ratio relative to several potential F-based reference points (F_{MAX}, $F_{0.1}$, F_{MED}, $F_{20\text{-}50\%}$) are less than 1.0 (Table 7-1) and SSB is currently around the long-term median of the stock and is expected to fluctuate around the historical median SSB in the future assuming constant $F_{2006\text{-}2008}$ and average historical recruitment. The ratio $F_{2006\text{-}2008}/F_{SSB\text{-}ATHL}$ is 0.71, which means current F is well below the fishing mortality that would lead SSB to fall below the SSB-ATHL threshold. The WG concludes that overfishing is not occurring and that the stock likely is not in an overfished condition, (e.g., $F_{20\text{-}50\%} < 1.0$), although biomass-based reference points have not been established for this stock.

Table 7-1. . Potential reference points and estimated F-ratio using Fcurrent ($F_{2006\text{-}2008}$), associated spawning biomass and equilibrium yield. $F_{SSB\text{-}ATHL}$ is not an equilibrium concept so SSB and yield are given as median levels.

Reference Point	$F_{2006\text{-}2008}/F_{RP}$	SSB (t)	Equilibrium Yield (t)
$F_{SSB\text{-}ATHL}$	0.71	346,382	101,426
F_{MAX}	0.14	11,186	185,913
$F_{0.1}$	0.29	107,130	170,334
F_{MED}	0.99	452,897	94,080
$F_{20\%}$	0.38	171,427	156,922
$F_{30\%}$	0.52	257,140	138,248
$F_{40\%}$	0.68	342,854	119,094
$F_{50\%}$	0.91	428,567	99,643

Working Group Recommendation on Conservation Advice

The North Pacific albacore stock is considered to be healthy at the average historical recruitment and current fishing mortality ($F_{2006\text{-}2008}$). The sustainability of the stock is not threatened by overfishing as current $F_{2006\text{-}2008}$ 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. However, recruitment is a key driver of the dynamics in this stock and a more pessimistic recruitment scenario (25% below average historical recruitment) increases the probability that the stock will not achieve the management objective of remaining above SSB-ATHL threshold in the 25-year projection period to 54%. The impact of $F_{2006\text{-}2008}$ on the stock is unlikely to be sustainable with this lower recruitment. Therefore, the WG recommends maintaining the present management measure (no increase in effort beyond "current" levels (2002-2004).

Discussion

There was a discussion of the reasons for the difference between the previous (2006) assessment, which used a VPA approach, and the current (2011) assessment. Key factors are the replacement of the Suda growth curve, which the WG concluded was not representative of growth in this stock, with a relationship generated by the model based on fishery size composition data and otolith derived conditional age-at-length estimates; and the VPA reference run aggregated fisheries into fewer categories than used in the 2006 assessment. An additional concern is that the use of h=1 in the stock-recruit relationship is implausible. Improving the estimate is a subject for future work.

There was a discussion of the selectivity curves used for various fisheries. It was noted that the size composition of the Chinese Taipei longline fishery was made up mostly of smaller fish (a dome shaped selectivity pattern rather than logistic as assumed in the 2006 assessment).

The ALBWG Chair pointed out that the albacore assessment will be presented at WCPFC-SC7 by Dr. S. Teo. The presentation is being done as a courtesy and does not constitute a review. An independent review of the assessment is scheduled to occur in late 2011 using the CIE process.

Stock Status and Conservation Advice

Concern was raised that the last point in the ALBWG's list of proposed conservation recommendations strayed too closely into management advice, which is not in the competence of ISC, rather than being strictly science-based conservation advice. It was noted that $F_{2006\text{-}2008}$ is significantly below $F_{2002\text{-}2004}$. The ISC accepts the WG recommendation with a modification to bullet 5 as shown 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 FSSB-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 2006-2008 F 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.**

Research Needs

The ALBWG identified the following research priorities:

1. Age and growth modelling – need sampling of small (<60 cm) and large fish (>120 cm) to advance growth modelling

2. Spatial Pattern Analyses – movement patterns; spatial size patterns to support appropriate selectivity pattern choices
3. CPUE Analyses – investigate discrepancies among indices
4. Maturity – develop length-based maturity schedule
5. Data Issues – size comp anomalies, socio-economic factors affecting fisheries, national sampling programs
6. Model Improvements – weighting of info sources, stock-recruitment relationship, explicit spatial structure, environmental covariates

All of these are considered of high priority but the WG Chair stressed that not all of these projects can be completed in time to be incorporated in the next stock assessment. The discussion in the WG Report includes a prioritization and an indication of which projects will be completed for the next assessment. This represents a *de facto* work plan.

It was noted that the forward projection to estimate the probability of exceeding SSB-ATHL over the next 25 years assumes constant recruitment while historical data show that recruitment for this stock is quite variable. For this reason, developing a better understanding of environmental factors affecting recruitment should also be a research topic. The ISC Chairman noted this would be a fruitful topic for PICES collaboration.

7.2 Pacific Bluefin Tuna

Y. Takeuchi summarized the recent stock assessment work of the PBFWG on Pacific bluefin tuna stock status (*ISC/11/ANNEX/07*). Since ISC10, there was no new stock assessment. The latest stock assessment was conducted in July 2010 (2010 Update). The current conservation advice was adopted at ISC10 based on the 2010 Update.

A summary of latest stock assessment (2010 update) is as follows

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

Because no new stock assessment was conducted after ISC10 and also because the next full stock assessment is scheduled in 2012, the PBFWG recommended maintaining the ISC10 conservation advice until ISC12 with necessary editorial changes.

Discussion

The challenge presented by the PBFWG's commitment to use data through June 2011 for the 2012 assessment was noted.

Conservation Advice

ISC11 agreed to maintain the conservation advice from ISC10:

> **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

J. Brodziak presented the status of striped marlin stocks in the North Pacific and associated conservation advice (*ISC/11/ANNEX/08*). Since there is no new assessment for this species the WG recommends that the stock status and conservation advice from ISC10 be adopted for ISC11. A draft North Pacific striped marlin stock assessment is scheduled to be completed in late 2011and reviewed at ISC12 at which time stock status and conservation advice will be provided.

Discussion

It was reiterated that the striped marlin assessment remains in draft form until review and adoption at ISC12.

Conservation Advice

After reviewing the conservation advice recommended at ISC10 the Plenary adopted modifications to the ISC10 advice to increase clarity, and agreed to the following:

> **A striped marlin stock assessment is scheduled for completion in 2012. Until this time the fishing mortality rate should not be increased above the current reference years (2001-2003) as specified in the latest assessment.**

7.4 Swordfish

J. Brodziak presented the status of the Western and Central North Pacific (WCPO) and Eastern North Pacific (EPO) swordfish stocks as estimated in the 2009 stock assessment and the 2010 stock assessment update. The exploitable biomass of the WCPO stock was estimated to be about 75,000 mt in 2006, roughly 30% above BMSY. The exploitation rate on the WCPO stock in 2006 was estimated to be 14% with a total catch of roughly 9,900 mt or roughly 69% of MSY (MSY=14,400 mt). There was very high probability that B_{2006} was above B_{MSY}, a 93% chance,

and there was a 0% chance that the exploitation rate in 2006 exceeded the rate to produce MSY. Stochastic projections of stock status at the recent average fishing mortality rate indicated that the WCPO stock would be projected to be above B_{MSY} in 2010.

Based on the 2010 stock assessment update results for the EPO stock only, the exploitable biomass of the EPO stock was estimated to be about 69,000 t in 2006, over 200% above B_{MSY}. Exploitation rate on the EPO stock in 2006 was estimated to be 6% with a total catch of roughly 3,900 t or roughly 78% of MSY (MSY=5,000 t). There was very high probability that B_{2006} was above B_{MSY}, a 99% chance, and there was a 2% chance that the exploitation rate in 2006 exceeded the rate to produce MSY. Stochastic projections of stock status at the recent average fishing mortality rate indicated that the EPO stock would be projected to be above B_{MSY} in 2010.

Given the projection information, the relative magnitude of recent reported catches (*ISC/11/ANNEX/08*), and the probable decline in WCPO swordfish harvest by Japan, the WG recommends that the conservation advice for swordfish from ISC10 be adopted for ISC11.

Discussion

The involvement of IATTC in the assessment process was discussed and it was pointed out that scientists from IATTC were fully engaged in the swordfish stock assessment process.

Conservation Advice

The conservation advice adopted at ISC10 was reviewed. It was agreed that the advice from ISC10 be adopted for ISC 11.

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 – Yellowfin, Bigeye and Skipjack Tunas

M. Dreyfus presented summaries of stock status for yellowfin, bigeye, and skipjack tunas in the EPO. The EPO fishery for yellowfin, skipjack, and bigeye tunas is dominated by the purse seine fleets that achieved a maximum fleet capacity in 2007, decreasing slightly afterward. In contrast, the longline fishery has seen decreasing effort (in number of hooks) from a record level in 2002. The most important species component of catch in the EPO in weight is yellowfin and skipjack tunas. For yellowfin tuna, sets associated with dolphins produce the highest catch. For bigeye tuna, the FAD fishery has eclipsed longline as the main gear in terms of catch since 1994. For skipjack tuna both floating objects and unassociated sets in the purse seine fishery account for the majority of the catch.

EPO catches for yellowfin tuna in 2010 in the EPO increased from the average in 2005-2009 (205,000 t) to 251,000 t for purse seiners, and at the same time, skipjack tuna catches decreased to 147,000 t and bigeye tuna to 58,000 t. The total number of purse seine sets is between 25 to 30 thousand in recent years.

IATTC recruitment estimates indicate that yellowfin tuna had a period of high recruitment from 1984 to 2002 and after that, recruitment may have declined to a average levels since 1975. SSB is below the level to obtain MSY and fishing mortality is also below F_{MSY}. Projections assuming the current F indicate that SSB will increase.

Recent recruitment estimates for bigeye tuna are above average, SSB is above SSB_{MSY}, and fishing mortality is also above F_{MSY}. While current F projections into the future show a decrease in SSB levels, the decrease is attenuated by the recent above average recruitment. The highest impact to the resource is produced by the floating object fishery.

The skipjack assessment is based on relative reference points; although several of those variables are at high levels there is no concern for this stock at present.

Discussion

The ISC Chairman thanked M. Dreyfus for the presentation.

8.2 Western and Central Pacific Ocean –Bigeye and Skipjack Tunas

H. Nakano on behalf of N. Miyabe, Chairman of the WCPFC Science Committee (SC) Chairman, presented summaries of tuna stock status in the WCPO based on the 2010 tuna stock assessments for bigeye and skipjack tunas in the WCPO. No assessments for other species were conducted in 2010. The WCPFC relies on the SPC for conducting the stock assessments for these stocks.

Bigeye Tuna Stock Assessment

The 2009 bigeye tuna stock assessment was conducted using Multifan-CL and presented at WCPFC-SC6. This assessment was updated from the 2008 assessment. Stock status estimates for the base case model concluded that overfishing is occurring (with 100% probability), but the stock is not in an overfished state, and that fishing mortality has increased substantially since 2001-2004.

Based on these results, it was concluded by the WCPFC that current levels of catch are unlikely to be sustainable in the long term, even at the recent (high) levels of recruitment estimated for the last decade.

Skipjack Tuna Stock Assessment

The 2010 assessment of skipjack tuna in the WCPO relies on Multifan-CL as the modelling platform and is age (16 quarterly age-classes) and spatially structured. Catch, effort, size composition, and tagging data used in the model are grouped into 17 fisheries (a change from 24 fisheries used in the 2008 assessment) and quarterly time periods from 1952 through 2009. Overall, the main assessment results and conclusions are as follows.

As with other tropical tunas, estimates of natural mortality are strongly age-specific, with higher rates estimated for younger skipjack tuna.

Based on estimates from the base-case model and associated sensitivity grid, it was concluded by the WCPFC that overfishing of skipjack tuna is not occurring in the WCPO, nor is the stock in an overfished state.

Discussion

The content of the current conservation measure (CMM 2008-01) in relation to conservation of bigeye and yellowfin tunas was discussed. It was noted that under this measure longline fisheries are managed by catch limits while purse seine fisheries are principally managed by time-area closures and other effort-based methods, with the objective of reducing F by 30% for 2009-2011. This objective has not been met in part because of various exemptions included in the measure.

The current skipjack tuna assessment incorporated a CPUE index for northern fisheries, which contributed to the declining biomass estimate. This decline is consistent with the low skipjack tuna catches experienced by the Japanese pole-and-line fishery.

9 REVIEW OF STATISTICS AND DATA BASE ISSUES

9.1 STATWG Report

R. Wu reported on the STATWG meeting held 17-19 July 2011 in San Francisco, USA *(ISC/11/ANNEX/12)*. The issues discussed included: (1) Data inventory and metadata; (2) Review of data reporting protocol and member performance; (3) Review of data requirements for stock assessment and fishery monitoring; (4) Review of ISC data management functions and STATWG performance; (5) future work plan; and (6) Recommendations to the Plenary.

The Data Administrator (DA) compared annual catch tables in National Reports, Plenary Reports, and Species Working Group Reports, and identified discrepancies. WG Chairs agreed to address the discrepancies, and together with Member Data Correspondents, assist the DA to resolve catch tables discrepancies by 1 January 2012.

The DA will complete the ISC data inventory and forward it to the WCPFC Secretariat by 31 July 2011. It was recommended that the STATWG do a data inventory exchange with IATTC.

ISC Category I data are staged in the public domain and can be accessed online on the ISC website. It was reiterated that non-ISC member catch data would not be maintained in the ISC database and would not be available on the ISC website. ISC public domain data will consist of ISC member data in the North Pacific only; currently data are posted for Pacific bluefin and albacore tunas, striped marlin, and swordfish.

Data correspondents and species WGs Chairs were requested to provide missing metadata, complete the metadata tables, and submit them to the DA by 31 October 2011.

At the STATWG meeting Chinese Taipei gave a presentation on their PBF otolith sampling program conducted in 2011 and all the members provided updates on the usage of electronic logbook information.

At ISC10, it was recommended that the STATWG revise the data report card to provide information on the completeness and timeliness of members' data submissions. The STATWG Chairman presented the data report card used by the IOTC, which assigns grades for timeliness and completeness for Category I, II, and III data, and recommended incorporating similar matrices into the ISC report card.

Chairpersons of the ALBWG, PBFWG, BILLWG, and SHARKWG were given the opportunity to address specific data needs and concerns, and describe how the STATWG could support their WG. The chairpersons of species WGs expressed concern that China is not providing data according to their obligation as an ISC member.

The STATWG tabled 13 future plans that need to be finished before ISC12 and proposed four recommendations to the Plenary.

Discussion

The STATWG requests to the Plenary were reviewed. With respect to the request for formal arrangements to acquire non-ISC members' catch data from WCPFC and IATTC for stock assessment purposes, it was pointed out that data exchange agreements between the ISC and both the WCPFC and IATTC already exist precluding the need for formal arrangements. When non-ISC members catch data are acquired, it was agreed that these data would not be housed in the ISC database. Species WG chairs will communicate their data requests to the STATWG Chair who will consolidate them into a single request to the appropriate RFMO. This may be an iterative process to ensure the consolidated request is properly formulated. The WGs would then work with the data received. It was suggested that this request be elaborated to include requests for data from ISC members that have not submitted data directly.

With respect to the request for Members to provide Category I, II, and III data for shark species, there was a discussion of prioritizing species for which to request enhanced data reporting. Initially blue shark and shortfin mako are the highest priority, because the SHRKWG is planning stock assessments for these species in the short term. The SHARKWG meeting will be held in December 2011 and will prioritize other species for which enhanced data should be requested in the future. It was emphasized, however, that the initial data request should focus on the two identified high priority species.

With respect to the request for Members to provide observer data to species WGs for scientific purposes, the STATWG Chair noted that there is very little information about sharks in the ISC database so it was thought that observer programs could be a source of additional data. The issue of national data confidentiality requirements was discussed. It was agreed that in cases where confidentiality requirements prohibit the provision of disaggregated data the WGs should work with their members to develop reports or analyses that result in sufficient data summarization while providing results of use to the WG. If additional data analyses are needed, the WGs could work with the data provider to accomplish them. An important step in obtaining observer data would be to document national observer data holdings. This would facilitate appropriately targeted data requests.

With respect to amending the data reporting protocol for discard data it was agreed that the recommendation should be revised to read "Amend the data reporting protocol to add discard data in Category I and II data provision, and if available, include the shark sex information in Category III data, if available." It was noted that the provision of shark sex information was premised on the relative ease of sex determination for these species, but in cases where the fish are immediately discarded fulfilling such a request may be difficult. A poll of members indicated that some discard data may be available from logbook or observer programs.

The future work plan was reviewed. It is viewed as an ambitious set of objectives but the STATWG believes they are achievable.

9.2 Data Administrator and Performance

H. Nakano reported on the performance of the DA, Izumi Yamasaki, for the past year, including data management accomplishments and challenges. It was reported that the activities of the DA from July 2010 – July 2011 were commendable and that all assignments were completed.

Discussion

The Plenary acknowledged the DA's efforts and accomplishments over the past year. It was noted that the WGs need to assist the DA to address inconsistencies in data holdings. The ISC Chairman recommended forming a small Ad hoc Committee that includes the DA, Webmaster, STATWG Chairman, and other key individuals to meet regularly to ensure successfully accomplishing ISC data management objectives. The Plenary agreed this was a sound idea and endorsed the formation of the Ad hoc Committee.

9.3 Data Submission Report Card

R. Wu presented the current data submission report card. He noted that a new report card format is being developed based on what is in use at the IOTC. The new report card format will be discussed further at the first meeting of the STATWG Ad hoc Committee in August 2011.

Discussion

The current data submission report card was adopted as presented. The STATWG Chair suggested reporting on each fishery rather each member in the report card system. There was no agreement on this matter at this time.

9.4 Total Catch Tables

I. Yamasaki, DA, reviewed the current catch tables noting revisions from last year's tables and that there are many years classified as provisional other then 2010. These years will need to be finalized as soon as practical.

Discussion

It was noted that it would be very useful to cross-check reported catch data for ISC species in the ISC database with ISC member countries' catch reported to the WCPFC. To accomplish this task requires use of Category II and III data. The DA verified that the task has already accomplished.

Discrepancies in 2009 catch data between that presented in the ISC10 Plenary Report and the current Report were noted and ascribed to the provisional status of 2009 catch data.

The catch tables lack data from China due to non-reporting. The ISC Chairman was tasked with corresponding with China to resoluve this issue.

9.5 North Pacific-wide catch and bycatch

The Chair noted that with the dissolution of the ISC BYCATCHWG and formation of the SHARKWG there is a question of whether the ISC still considers other, non-shark bycatch within its competence and whether such data should be incorporated into the ISC database. ISC has previously agreed that non-fish bycatch (e.g., sea turtles, seabirds) would not be within its competence since the RFMOs are addressing this issue, but it is not clear whether non-shark finfish bycatch should still be addressed. It was noted that as scientists and managers direct more attention to the ecosystem-related effects of fishing, bycatch becomes an important consideration. While in the short term the ISC may put less emphasis on non-shark finfish it may require more attention in the future. For that reason it was agreed for the time being to focus data acquisitions on the principal species of interest (as indicated by the current species WGs). In the future, once the remaining improvements to the ISC database are completed, attention could be turned to incorporating data on other non-shark finfish species.

9.6 Rescue of historical data

Data have been obtained from WCPFC to fill historical gaps, principally for catches by China. It was noted that a single Mexico flagged vessel historically fished in the Western Pacific and catch data for it can be obtained from WCPFC since they are not reported to Mexico. It was also noted that several South Pacific Island States catch ISC species in the North Pacific and their 2010 catches can be obtained from WCPFC.

10 REVIEW OF MEETING SCHEDULE

10.1 Time and Place of ISC12

Provisional dates and location for the 12th ISC meeting are 18-23 July 2012 in Sapporo, Japan.

10.2 Working Group Intercessional Meetings

The Plenary discussed schedules for WG intercessional meetings and agreed on the tentative schedule presented in Table 10-1

Table 10-1. Tentative schedule of ISC meetings for 2010-2012

Date	Meeting	Contact
2011		
30 Nov – 8 Dec	SHARKWG – Honolulu, HI (Data prep and 2-day ageing workshop)	S. Kohin Suzanne.Kohin@noaa.gov
6 – 16 Dec	BILLWG – Honolulu, HI (Striped marlin assessment)	J. Brodziak Jon.Brodziak@noaa.gov
2012		
31 Jan – 7 Feb	PBFWG – La Jolla, CA (Data prep)	Y. Takeuchi Yukiot@fra.affrc.go.jp
Apr	BILLWG Workshop– TBD (Blue marlin data preparation)	J. Brodziak
Apr	SHARKWG Workshop – TBD (Data preparation)	S. Kohin
May	PBFWG Workshop– Japan (Full stock assessment)	Y. Takeuchi
11 – 12 Jul	STATWG – Sapporo, Japan (Workshop)	R.-F. Wu
13 Jul	SHARKWG – Sapporo, Japan	S. Kohin
14 – 15 Jul	ALBWG Workshop – Sapporo, Japan (Review)	J. Holmes John.Holmes@dfo-mpo.gc.ca
16 – 17 Jul	BILLWG – Sapporo (Results prep workshop)	J. Brodziak
16 – 17 Jul	PBFWG – Sapporo (Results prep workshop)	Y.Takeuchi
18 – 23 Jul	ISC12 – Sapporo (Plenary)	G. DiNardo Gerard.Dinardo@noaa.gov
Nov/Dec	SHARKWG workshop – TBD (Blue shark assessment)	S. Kohin

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

11 ADMINISTRATIVE MATTERS

11.1 Peer review of function and process

The ISC Rules and Procedures require peer review of ISC function and process every 5 years. Based on the outcome of ISC10, a task team composed of ISC Members drafted a framework for the peer review process (*ISC/11/PLENARY/04*). The Framework calls for three members to act as

sponsors by nominating candidates for the Peer Review Team and to cover the costs for participation by their selected team member. According to the proposed schedule the Peer Review Team would be formed by October 2011 and the first draft of their report is to be reviewed at ISC12.

To meet this goal, the Plenary needs to (1) review, modify (if necessary), and adopt the framework, (2) idenify three Members to act as sponsors, and (3) develop Terms of Reference (TOR) for the Peer Review. To expedite development of the TOR while at Plenary an ad hoc working group was formed consisting of Yen-Ju Lin (Chinese Taipei), Peter Miyake (Japan), Jae-Bong Lee (Korea), Michel Dreyfus (Mexico), and Cisco Werner (USA).

Discussion

The framework was reviewed and adopted as presented [Plenary document expanding on this section].

Japan, Korea, and the USA agreed to be peer-review sponsors.

Draft TOR were developed by the working group and presented. The discussion focused on the need for the peer reviewers to consider the ISC's relationship with other international organizations outside the scope of those specified in the Operations Manual. It was agreed that consideration of these relationships would be added to the TOR.

11.2 Status of the NC Research Proposals

The ISC Chairman submitted four funding proposals to WCPFC NC5 in September 2009 for: (1) a biological sampling research program, (2) North Pacific albacore sampling program, (3) database administration, and (4) website administration. During ISC10, S.K. Soh (WCPFC) circulated a Commission Circular (2009/16) regarding a "draft administrative arrangement" developed by WCPFC Secretariat to secure financial contributions from NC Members. The document was adopted at WCPFC 6, thus allowing voluntary contributions from NC Members. At this point no voluntary contributions have occurred and the proposals remain unfunded.

11.3 Organizational chart and contact persons

The ISC Organization Chart was considered and updated through discussion with members (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.

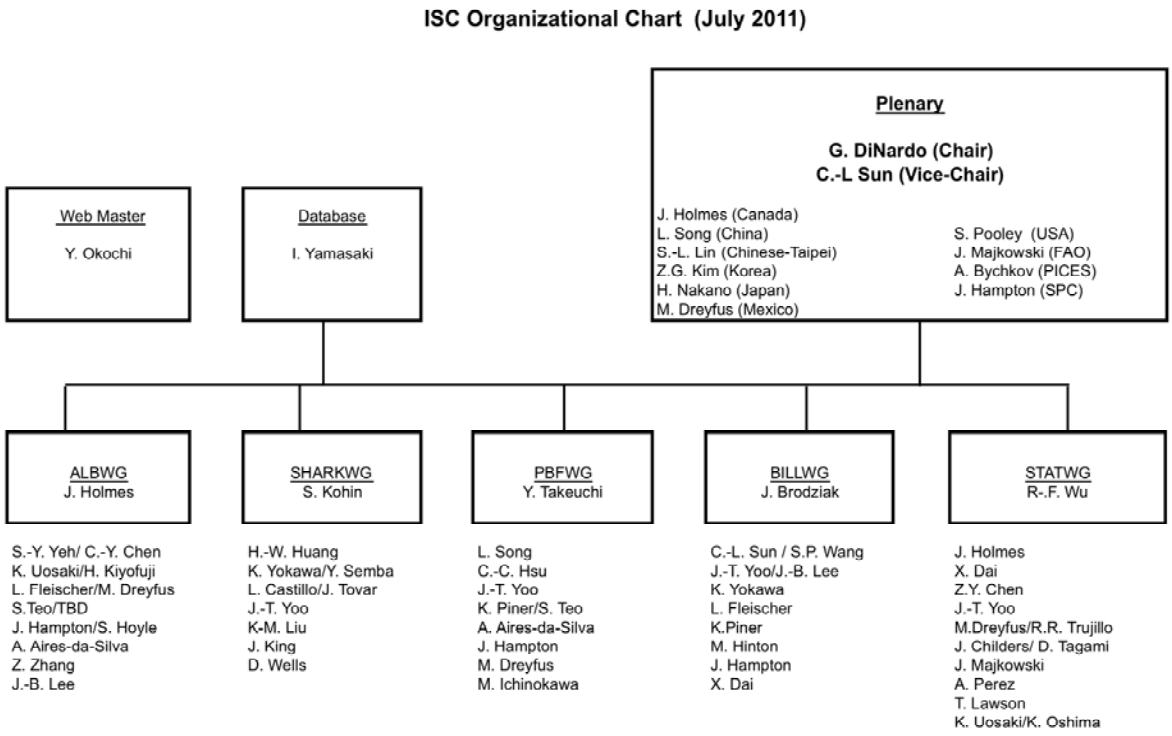


Figure 11-1. ISC Organizational Chart (July 2011).

11.4 Website

Y. Okochi, ISC Webmaster, reviewed recent improvements to the ISC website. These include pages for the public to access WG and Plenary Reports, a fishery statistics page featuring public domain catch data, and a page showing recommendations from past Plenary meetings. She has worked with the Chair of the PBFWG to develop an example template of pages for each of the WGs. The species WGs chairpersons were asked to provide feedback on the WGs' page structure and to provide fish profile and research information for species in which the WG is interested. These pages display the WG's mission statement; stock assessment schedule; information on species' biology distribution, catch, fisheries, etc.; current research topics; and a link to WG reports.

The work plan for the coming year includes a variety of updates to the website based on new information from the plenary, updating public domain catch data, and completing the WG pages.

11.4.1 Webmaster and Performance

H. Nakano reported on the performance of the Webmaster, Y. Okuchi, for the past year, including accomplishments and challenges. It was reported that the activities of the Webmaster from July 2010 – July 2011 were commendable and that all assignments were completed, including access to public domain catch data.

Discussion

The Chair thanked the Webmaster for the substantial progress made over the past year. The ISC has been criticized for its lack of transparency; making reports and other information sources available through the website improves public accessibility to the workings of the organization. It was noted that the fisheries statistics page should make clear that only catch by ISC countries will be available.

11.5 Update of Operations Manual

The ISC Chairman reported that proposed changes to the Operations Manual at ISC10 have been incorporated. Additional changes to the Operations Manuel stemming from the ISC11 seminar on Best Available Scientific Information were proposed. The ISC Chairman will develop potential changes to the manual for review and adoption at ISC12.

R. Wu, STATWG Chair, reviewed proposed revisions to the description of data categoriesin the Operations Manual. Category I and II data would include both retained catch and discards (including bycatch species) to estimate total catch. The description of Category III data would additionally include collection of sex data from shark species.

Discussion

The meaning of "catch" in relation to retained catch and landings was discussed. In addition to landed catch and discards, catch may include transhipments, direct sales, personal consumption, etc. Discard mortality should be recorded or estimated. As part of fishing mortality estimation WGs may come up with a conversion factor for total discards to account for discard mortality. "Catch" should refer to total catch, which is equivalent to fishing mortality but usage should be consistent with definitions used by other organizations and RFMOs. The different meanings of the term "bycatch" were also discussed (e.g., retained non-target catch, discarded catch). It was agreed that the statistics Steering Committee will take up the question of the proper definition of these terms, consistent with their use by other organizations.

It was agreed that the proposed modification of the definition of Category III data should be revised so that the collection of sex data would refer to "billfish and sharks" rather than enumerating only striped and blue marlin and a general category for sharks. However, the SHARKWG should compile a list of species of interest to supplement this description of Category III data. It was recognized that the WCPFC NC (the principal ISC client) has just North Pacific albacore, Pacific bluefin tuna, and swordfish within its competence but that does not mean that ISC is restricted to considering only these species.

After further discussion it was agreed that the Operations Manual would be revised to remove references to the collection of data on sea turtles and seabirds, consistent with previous Plenary discussion, and references to bycatch or discards would be narrowed to finfish species.

11.6 Vice Chair Election

M. Dreyfus indicated he would not run for reelection as ISC Vice Chairman after serving 3 years. An election was held according to ISC rules and procedures (Operations manual pages 12 and 13) and Chi-Lu Sun was elected to a 3-year term, 2012-2014. Sun will assume the role of ISC Vice Chairman after this ISC11 session. The ISC Chair welcomed C. Sun and thanked M. Dreyfus for his service as outgoing Vice Chair.

11.7 Other Administrative Matters

The ISC Chairman stressed the need for timely submission of documents and proposed a July 1 deadline for the submission of National Reports and other documents to be presented at the Plenary. This allows sufficient time for advance distribution via the ISC Website. It was noted that currently the Operations Manual specifies that Workshop Reports and other intercessional documents must be submitted within 30 days of the end of the workshop, and in most cases these reports would be available by July 1.

12 ADOPTION OF REPORT

A draft Report of the Eleventh 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 ISC11 Plenary, subject to editorial corrections to be made by the ISC Chairman.

13 CLOSE OF MEETING

G. DiNardo thanked NOAA National Marine Fisheries Service for hosting the meeting, especially Roszella Sanford, who has served on the Office of the Chair for 6 years and has informed ISC this will be her last. He wishes her luck in the future. He thanked Michel Dreyfus for his excellent service to ISC and support and advice to the Chairs. He thanked sponsors, including the Monterey Bay Aquarium for hosting receptions and welcomed the new Vice-chair elect, Chi-Lu Sun. G. DiNardo closed the successful 11th meeting of the ISC on 25 July 2011.

14 CATCH TABLES

Table 14-1. [1]**Annual catch of North Pacific albacore (*Thunnus alalunga*) in metric tons for fisheries monitored by ISC for assessments of North Pacific Ocean stocks, 1952-2010.**
Blank indicates no effort. - indicates data not available. 0 indicates less than 1 metric t

Year	Japan							Korea		Chinese-Taipei		
	Purse Seine	Gill Net	Set Net	Pole and Line	Troll	Longline	Other	Gill Net	Longline	Gill Net	Distant Water Longline	Offshore Longline
1952	154		55	41,787	--	26,687	182					
1953	38		88	32,921	--	27,777	44					
1954	23		6	28,069	--	20,958	32					
1955	8		28	24,236	--	16,277	108					
1956			23	42,810	--	14,341	34					
1957	83		13	49,500	--	21,053	138					
1958	8		38	22,175	--	18,432	86					
1959			48	14,252	--	15,802	19					
1960			23	25,156	--	17,369	53					
1961	7		111	18,639	--	17,437	157					
1962	53		20	8,729	--	15,764	171					
1963	59		4	26,420	--	13,464	214					
1964	128		50	23,858	--	15,458	269					
1965	11		70	41,491	--	13,701	51					
1966	111		64	22,830	--	25,050	521					
1967	89		43	30,481	--	28,869	477				330	
1968	267		58	16,597	--	23,961	1,051				216	
1969	521		34	31,912	--	18,006	925				65	
1970	317		19	24,263	--	16,222	498				34	
1971	902		5	52,957	--	11,473	354		0		20	
1972	277	1	6	60,569	--	13,022	638		0		187	
1973	1,353	39	44	68,767	--	16,760	486		3		--	
1974	161	224	13	73,564	--	13,384	891		114		486	
1975	159	166	13	52,152	--	10,303	230		9,575		1,240	
1976	1,109	1,070	15	85,336	--	15,812	270		2,576		686	
1977	669	688	5	31,934	--	15,681	365		459		572	
1978	1,115	4,029	21	59,877	--	13,007	2,073		1,006		6	
1979	125	2,856	16	44,662	--	14,186	1,139	0			81	
1980	329	2,986	10	46,742	--	14,681	1,177	6	402	--	249	
1981	252	10,348	8	27,426	--	17,878	699	16		--	143	
1982	561	12,511	11	29,614	--	16,714	482	113	5,462	--	38	
1983	350	6,852	22	21,098	--	15,094	99	233	911	--	8	
1984	3,380	8,988	24	26,013	--	15,053	494	516	2,490	--	--	
1985	1,533	11,204	68	20,714	--	14,249	339	576	1,188	--	--	
1986	1,542	7,813	15	16,096	--	12,899	640	726	923	--	--	
1987	1,205	6,698	16	19,082	--	14,668	173	817	607	2,514	--	
1988	1,208	9,074	7	6,216	--	14,688	170	1,016	175	7,389	--	
1989	2,521	7,437	33	8,629	--	13,031	433	1,023	27	8,350	40	
1990	1,995	6,064	5	8,532	--	15,785	248	1,016	1	16,701	4	
1991	2,652	3,401	4	7,103	--	17,039	395	852	0	3,398	12	
1992	4,104	2,721	12	13,888	--	19,042	1,522	271	1	7,866	--	
1993	2,889	287	3	12,797	--	29,933	897		21		5	
1994	2,026	263	11	26,389	--	29,565	823		54		83	
1995	1,177	282	28	20,981	856	29,050	78		14		4,280	
1996	581	116	43	20,272	815	32,440	127		158		7,596	
1997	1,068	359	40	32,238	1,585	38,899	135		404		9,119	337
1998	1,554	206	41	22,926	1,190	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	483
2006	364	221	55	15,400	460	21,027	42		135		3,848	469
2007	5,682	226	30	37,768	519	22,336	44		93		2,465	451
2008	825	1,531	101	19,060	549	19,092	15		394		2,490	579
2009	2,076	149	33	31,172	410	21,995	43		102		1,866	512
2010	(308)	(149)	(33)	(21,757)	(410)	(22,434)	(43)		(122)		(2,281)	(537)

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

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

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

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

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

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

* Catch of other gears are included in Sport

Blue cell indicate the updated from last year (e.g new data and corrected value)

Table 14-1 (continued)

Year	United States								Mexico		Canada	Other		Grand Total
	Purse Seine	Gill Net	Pole and Line [2]	Albacore Troll [3]	Tropical Troll & Handline	Sport	Longline	Other	Purse Seine	Pole and Line [4]	Troll	Troll [5]	Longline [6]	
1952				23,843		1,373	46				71			94,198
1953				15,740		171	23				5			76,807
1954				12,246		147	13							61,494
1955				13,264		577	9							54,507
1956				18,751		482	6				17			76,464
1957				21,165		304	4				8			92,268
1958				14,855		48	7				74			55,723
1959				20,990		0	5				212			51,328
1960				20,100		557	4				141			63,403
1961			2,837	12,055		1,355	5	1	2	39	4			52,649
1962			1,085	19,752		1,681	7	1	0	0	1			47,264
1963			2,432	25,140		1,161	7		31	0	5			68,937
1964			3,411	18,388		824	4		0		3			62,393
1965			417	16,542		731	3	1	0		15			73,033
1966			1,600	15,333		588	8		0		44			66,149
1967			4,113	17,814		707	12				161			83,096
1968			4,906	20,434		951	11				1,028			69,480
1969			2,996	18,827		358	14		0		1,365			75,023
1970			4,416	21,032		822	9		0		390			68,022
1971			2,071	20,526		1,175	11		0		1,746			91,240
1972			3,750	23,600		637	8		100	0	3,921			106,716
1973			2,236	15,653		84	14		0		1,400			106,839
1974			4,777	20,178		94	9		1	0	1,331			115,227
1975			3,243	18,932		640	33	10	1	0	111			96,808
1976			2,700	15,905		713	23	4	36	5	278			126,538
1977			1,497	9,969		537	37		3	0	53			62,469
1978			950	16,613		810	54	15	1	0	23			99,600
1979			303	6,781		74	--		1	0	521			70,745
1980			382	7,556		168	--		31	0	212			74,931
1981			748	12,637		195	25		8	0	200			70,583
1982			425	6,609		257	105	21	0	0	104			73,027
1983			607	9,359		87	6		0	0	225			54,951
1984	3,728		1,030	9,304		1,427	2		107	6	50			72,612
1985	26	2	1,498	6,415	7	1,176	0		14	35	56			59,100
1986	47	3	432	4,708	5	196			3	0	30			46,078
1987	1	5	158	2,766	6	74	150		7	0	104			49,051
1988	17	15	598	4,212	9	64	307	10	15	0	155			45,345
1989	1	4	54	1,860	36	160	248	23	2	0	140			44,052
1990	71	29	115	2,603	15	24	177	4	2	0	302			53,693
1991	0	17	0	1,845	72	6	312	71	2	0	139			37,320
1992	0	0	0	4,572	54	2	334	72	10	0	363			54,833
1993		0	0	6,254	71	25	438		11	0	494			54,125
1994		38	0	10,978	90	106	544	213	6	0	1,998	158		73,345
1995		52	80	8,045	177	102	882	1	5	0	1,763	94		67,947
1996	11	83	24	16,938	188	88	1,185		21	0	3,316	469	1,735	86,207
1997	2	60	73	14,252	133	1,018	1,653	1	53	0	2,168	336	2,824	106,756
1998	33	80	79	14,410	88	1,208	1,120	2	8	0	4,177	341	5,871	98,229
1999	48	149	60	10,060	331	3,621	1,542	1	0	57	2,734	228	6,307	125,542
2000	4	55	69	9,645	120	1,798	940	3	70	33	4,531	386	3,654	85,052
2001	51	94	139	11,210	194	1,635	1,295		5	18	5,248	230	1,471	90,189
2002	4	30	381	10,387	235	2,357	525		28	0	5,379	466	700	105,224
2003	44	16	59	14,102	85	2,214	524		28	0	6,861	378	(2,400)	92,804
2004	1	12	127	13,346	157	1,506	361		104	0	7,856	--	4,096	90,316
2005		20	66	8,413	175	1,719	296		0	0	4,845	--	4,315	63,199
2006		3	23	12,524	95	385	270		109	0	5,832	--	5,136	66,343
2007		4	21	11,887	98	1,225	250		40	0	6,075	--	3,539	92,753
2008	0	1	1,472	10,289	29	415	353	0	10		5,446		2,812	65,463
2009	39	3	2,218	10,575	100	678	201	0	17		5,643		1,581	79,413
2010	(18)	(3)	(1,874)	(10,130)	(25)	(689)	(409)	(2)	(25)		(6,497)		(1,581)	69,327

Table 14-2. Annual catch of Pacific bluefin tuna (*Thunnus orientalis*) in metric tons for fisheries monitored by ISC for assessments of North Pacific Ocean stocks, 1952-2010.
Blank indicates no effort. - indicates data not available. 0 indicates less than 1 metric t

Year	Japan [1]									Korea [3]	
	Purse Seine		Pole and Line	Set Net	Troll [2]	Distant Water & Offshore Longline		Coastal	Others	Purse Seine	Trawl
	Tuna PS	Small PS				NP	SP	Longline			
1952	7,680		2,198	2,145	667	2,694	9		1,700		
1953	5,570		3,052	2,335	1,472	3,040	8		160		
1954	5,366		3,044	5,579	1,656	3,088	28		266		
1955	14,016		2,841	3,256	1,507	2,951	17		1,151		
1956	20,979		4,060	4,170	1,763	2,672	238		385		
1957	18,147		1,795	2,822	2,392	1,685	48		414		
1958	8,586		2,337	1,187	1,497	818	25		215		
1959	9,996		586	1,575	736	3,136	565		167		
1960	10,541		600	2,032	1,885	5,910	193		369		
1961	9,124		662	2,710	3,193	6,364	427		599		
1962	10,657		747	2,545	1,683	5,769	413		293		
1963	9,786		1,256	2,797	2,542	6,077	449		294		
1964	8,973		1,037	1,475	2,784	3,140	114		1,884		
1965	11,496		831	2,121	1,963	2,569	194		1,106		
1966	10,082		613	1,261	1,614	1,370	174		129		
1967	6,462		1,210	2,603	3,273	878	44		302		
1968	9,268		983	3,058	1,568	500	7		217		
1969	3,236		721	2,187	2,219	313	20	565	195		
1970	2,907		723	1,779	1,198	181	11	426	224		
1971	3,721		938	1,555	1,492	280	51	417	317		
1972	4,212		944	1,107	842	107	27	405	197		
1973	2,266		526	2,351	2,108	110	63	728	636		
1974	4,106		1,192	6,019	1,656	108	43	1,069	754		
1975	4,491		1,401	2,433	1,031	215	41	846	808		
1976	2,148		1,082	2,996	830	87	83	233	1,237		
1977	5,110		2,256	2,257	2,166	155	23	183	1,052		
1978	10,427		1,154	2,546	4,517	444	7	204	2,276		
1979	13,881		1,250	4,558	2,655	220	35	509	2,429		
1980	11,327		1,392	2,521	1,531	140	40	671	1,953		
1981	25,422		754	2,129	1,777	313	29	277	2,653		
1982	19,234		1,777	1,667	864	206	20	512	1,709	31	
1983	14,774		356	972	2,028	87	8	130	1,117	13	
1984	4,433		587	2,234	1,874	57	22	85	868	4	
1985	4,154		1,817	2,562	1,850	38	9	67	1,175	1	
1986	7,412		1,086	2,914	1,467	30	14	72	719	344	
1987	8,653		1,565	2,198	880	30	33	181	445	89	
1988	3,583	22	907	843	1,124	51	30	106	498	32	
1989	6,077	113	754	748	903	37	32	172	283	71	
1990	2,834	155	536	716	1,250	42	27	267	455	132	
1991	4,336	5,472	286	1,485	2,069	48	20	170	650	265	
1992	4,255	2,907	166	1,208	915	85	16	428	1,081	288	
1993	5,156	1,444	129	848	546	145	10	667	365	40	
1994	7,345	786	162	1,158	4,111	238	20	968	398	50	
1995	5,334	13,575	270	1,859	4,778	107	10	571	586	821	
1996	5,540	2,104	94	1,149	3,640	123	9	778	570	102	
1997	6,137	7,015	34	803	2,740	142	12	1,158	811	1,054	
1998	2,715	2,676	85	874	2,865	169	10	1,086	700	188	
1999	11,619	4,554	35	1,097	3,387	127	17	1,030	709	256	
2000	8,193	8,293	102	1,125	5,121	121	7	832	689	1,976	0
2001	3,139	4,481	180	1,366	3,329	63	6	728	782	968	10
2002	3,922	4,981	99	1,100	2,427	47	5	794	631	767	1
2003	956	4,812	44	839	1,839	85	12	1,152	446	2,141	0
2004	4,934	3,323	132	896	2,182	231	9	1,616	514	636	0
2005	4,061	8,783	549	2,182	3,406	107	14	1,818	548	1,318	
2006	3,644	5,236	108	1,421	1,544	63	11	1,058	777	1,012	
2007	2,965	3,875	236	1,503	2,385	83	8	2,004	1,209	1,281	
2008	3,029	7,192	64	2,358	2,074	19	8	1,476	1,192	1,866	
2009	2,127	5,950	50	2,236	1,875	8	7	1,304	913	936	
2010	1,122	2,620	83	1,047	1,301	(-) [7]	(-) [7]	(806)	918	1,196	

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 Catches by NZ are derived from the Ministry of Fisheries, Science Group (Compilers) 2006: Report from the Fishery Assessment Plenary, May 2006: stock assessments and yield estimates. 875 p. (Unpublished report held
6 Other countries include AUS, Cooks, Palau and so on. Catches derived from Japanese Imort Statistics as minimum estimates.
7 The catch for Japanese coastal longline in 2008 includes that of the distant water and offshore longliners.
8 Catches in New Zealand and Other countries since 2007 are carry-over of that in 2005
Blue cell indicate the updated from last year (e.g new data and corrected value)

Table 14-2 (continued)

Year	Chinese-Taipei				United States [4]			Mexico		non-ISC members		Grand Total
	Purse Seine	Distant Driftnet	Longline	Others	Purse Seine	Sport	Others	Purse Seine	Others	New Zealand [5]	Others [6]	
1952					2,076	2						19,172
1953					4,433	48						20,117
1954					9,537	11						28,575
1955					6,173	93						32,005
1956					5,727	388						40,383
1957					9,215	73						36,590
1958					13,934	10						28,610
1959					3,506	13	56	171	32			20,539
1960					4,547	1	0					26,079
1961					7,989	23	16	130				31,236
1962					10,769	25	0	294				33,195
1963					11,832	7	28	412				35,481
1964					9,047	7	39	131				28,631
1965			54		6,523	1	77	289				27,224
1966					15,450	20	12	435				31,161
1967			53		5,517	32	0	371				20,745
1968			33		5,773	12	8	195				21,623
1969			23		6,657	15	9	260				16,419
1970					3,873	19	0	92				11,432
1971			1		7,804	8	0	555				17,140
1972			14		11,656	15	45	1,646				21,216
1973			33		9,639	54	21	1,084				19,619
1974			47	15	5,243	58	30	344				20,685
1975			61	5	7,353	34	84	2,145				20,948
1976			17	2	8,652	21	25	1,968				19,381
1977			131	2	3,259	19	13	2,186				18,811
1978			66	2	4,663	5	6	545				26,863
1979			58		5,889	11	6	213				31,715
1980			114	5	2,327	7	24	582				22,634
1981			179		867	9	14	218				34,641
1982		2	207		2,639	11	2	506				29,387
1983	9	2	175		629	33	11	214				20,557
1984	5		477	8	673	49	29	166				11,573
1985	80	11	210		3,320	89	28	676				16,089
1986	16	13	70		4,851	12	57	189				19,266
1987	21	14	365		861	34	20	119				15,507
1988	197	37	108	25	923	6	50	447	1			8,989
1989	259	51	205	3	1,046	112	21	57				10,943
1990	149	299	189	16	1,380	65	92	50				8,653
1991		107	342	12	410	92	6	9		2		15,781
1992	73	3	464	5	1,928	110	61	0		0		13,995
1993	1		471	3	580	298	103			6		10,811
1994			559		906	89	59	63	2	2		16,916
1995			335	2	657	258	49	11		2		29,225
1996			956		4,639	40	70	3,700		4		23,519
1997			1,814		2,240	156	133	367		14		24,632
1998			1,910		1,771	413	281	1	0	20		15,763
1999			3,089		184	441	184	2,369	35	21		29,153
2000			2,780	2	693	342	61	3,019	99	21		33,475
2001			1,839	4	292	356	48	863		50		18,504
2002			1,523	4	50	654	12	1,708	2	55	10	18,794
2003			1,863	21	22	394	18	3,211	43	41	19	17,958
2004			1,714	3		49	11	8,880	14	67	10	25,221
2005			1,368	2	201	79	7	4,542		20	7	29,013
2006			1,149	1		96	2	9,806		21	3	25,952
2007			1,401	10	42	14	2	4,147		(21) [8]	(3) [8]	(21,189)
2008			979	2		93	1	4,392	15	(21) [8]	(3) [8]	(24,784)
2009			877	11	(410)	(176)	(5)	3,019		(21) [8]	(3) [8]	(19,928)
2010			(373)			(117)	(0)	(7,745)		(21) [8]	(3) [8]	(17,352)

Table 14-3. **Annual catch of Swordfish (*Xiphias gladius*) in metric tons for fisheries monitored by ISC for assessments of North Pacific Ocean stocks, 1951-2010. Blank indicates no effort. - indicates data not available. 0 indicates less than 1 metric ton. Provisional**

Year	Japan							Chinese Taipei									
	Distant Water& Offshore Longline [2]	Coastal Longline	Driftnet	Harpoon [3]	Other Bait fishing	Trapnet	Other [4]	Distant Water Longline	Offshore [5] Longline	Offshore Gillnet	Offshore Others	Coastal Harpoon	Coastal Setnet	Coastal Gillnet & Other net	Coastal Longline	Coastal Others	Other
1951	7,246	115	10	4,131	88	78	10	-	-								-
1952	8,890	152	0	2,569	6	68	6	-	-								-
1953	10,796	77	0	1,407	20	21	87	-	-								-
1954	12,563	96	0	813	104	18	17	-	-								-
1955	13,064	29	0	821	119	37	41	-	-								-
1956	14,596	10	0	775	66	31	7	-	-								-
1957	14,268	37	0	858	59	18	11	-	-								-
1958	18,525	42	0	1,069	46	31	21	-	-								-
1959	17,236	66	0	891	34	31	10	-	427								91
1960	20,058	51	1	1,191	23	67	7	-	520								127
1961	19,715	51	2	1,335	19	15	11	-	318								73
1962	10,607	78	0	1,371	26	15	18	-	494								62
1963	10,322	98	0	747	43	17	16	-	343								18
1964	7,669	91	4	1,006	40	16	26	-	358								10
1965	8,742	119	0	1,908	26	14	182	-	331								27
1966	9,866	113	0	1,728	41	11	4	-	489								31
1967	10,883	184	0	891	33	12	5	-	646								35
1968	9,810	236	0	1,539	41	14	9	-	763								12
1969	9,416	296	0	1,557	42	11	14	0	843								7
1970	7,324	427	0	1,748	36	9	3	-	904								5
1971	7,037	350	1	473	17	37	31	-	992								3
1972	6,796	531	55	282	20	1	2	-	862								11
1973	7,123	414	720	121	27	23	2	-	860								119
1974	5,983	654	1,304	190	27	16	2	1	880								136
1975	7,031	620	2,672	205	58	18	2	29	899								153
1976	8,054	750	3,488	313	170	14	12	23	613								194
1977	8,383	880	2,344	201	71	7	2	36	542								141
1978	8,001	1,031	2,475	130	110	22	1	-	546								12
1979	8,602	1,038	983	161	45	15	4	7	661								33
1980	6,005	849	1,746	398	29	15	1	10	603								76
1981	7,039	727	1,848	129	58	9	3	2	656								25
1982	6,064	874	1,257	195	58	7	1	1	855								49
1983	7,692	999	1,033	166	30	9	2	0	783								166
1984	7,177	1,177	1,053	117	98	13	0	-	733								264
1985	9,335	999	1,133	191	69	10	0	-	566								259
1986	8,721	1,037	1,264	123	47	9	0	-	456								211
1987	9,495	860	1,051	87	45	11	0	3	1,328								190
1988	8,574	678	1,234	173	19	8	0	-	777								263
1989	6,690	752	1,596	362	21	10	0	50	1,491								38
1990	5,833	690	1,074	128	13	4	0	143	1,309								154
1991	4,809	807	498	153	20	5	0	40	1,390								180
1992	7,234	1,181	887	381	16	6	0	21	1,473								243
1993	8,298	1,394	292	309	43	4	1	54	1,174								310
1994	7,366	1,357	421	308	37	4	0	-	1,155								219
1995	6,422	1,387	561	423	34	7	0	50	1,135								225
1996	6,916	1,067	428	597	45	4	0	9	701	2	-	19	10	-	-	-	
1997	7,002	1,214	365	346	62	5	0	15	1,358	1	1	27	8	-	24	-	
1998	6,233	1,190	471	476	68	2	0	20	1,178	8	-	17	15	1	-	-	
1999	5,557	1,049	724	416	47	5	0	70	1,385	4	-	51	5	1	-	-	
2000	6,180	1,121	808	497	49	5	0	325	1,531	5	-	74	5	1	1	-	
2001	6,932	908	732	230	30	15	0	1,039	1,691	17	-	64	8	1	1	-	
2002	6,230	965	1,164	201	29	11	0	1,633	1,557	7	1	1	16	1	1	-	
2003	5,376	1,063	1,198	149	28	4	0	1,084	2,196	3	-	-	8	-	-	-	
2004	5,395	1,509	1,062	229	30	4	0	884	1,828	5	-	-	7	1	-	3	
2005	5,359	1,295	956	187	337	3	0	437	1,813	1	-	-	5	2	-	18	
2006	6,181	1,507	796	244	342	5	1	*438*	*3,944*	-	-	-	-	-	-	-	-
2007	6,109	2,016	829	122	367	2	1	*345*	*3,754*	-	-	-	-	-	-	-	-
2008	4402 [1]	1780 [1]	648 [1]	173 [1]	349 [1]	3 [1]	0 [1]	*338*	*3,407*	-	-	-	-	-	-	-	-
2009	4400 [1]	1548 [1]	682 [1]	239 [1]	249 [1]	3 [1]	0 [1]	*373*	*3,177*	-	-	-	-	-	-	-	-
2010	-	-	-	-	-	-	-	*(531)*	*(2,313)*	-	-	-	-	-	-	-	-

[1] Catch data a Philippin and some other countries catching swordfish in the North Pacific.

[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 in purse sei troll and tro half ring and unspecified gears.

* Only one vessel fished so combined with Hawaii lonline

Blue cell indicate the updated from last year (e.g new data and corrected value)

ITALIC There is no data for working group. The value was retlieved from ISC11 national report.

Table 14-3 (continued)

Year	Korea		Mexico	United States					Grand Total
	Longline	Hi-seas Driftnet	All Gears	Hawaii Longline	California Longline	California Gill Net	California Harpoon	California Unknown [7]	
1951	-	-		-	-	-	-	-	11,678
1952	-	-	-	-	-	-	-	-	11,691
1953	-	-	-	-	-	-	-	-	12,408
1954	-	-	-	-	-	-	-	-	13,610
1955	-	-	-	-	-	-	-	-	14,111
1956	-	-	-	-	-	-	-	-	15,486
1957	-	-	-	-	-	-	-	-	15,251
1958	-	-	-	-	-	-	-	-	19,734
1959	-	-	-	-	-	-	-	-	18,785
1960	-	-	-	-	-	-	-	-	22,047
1961	-	-	-	-	-	-	-	-	21,538
1962	-	-	-	-	-	-	-	-	12,671
1963	-	-	-	-	-	-	-	-	11,605
1964	-	-	-	-	-	-	-	-	9,220
1965	-	-	-	-	-	-	-	-	11,349
1966	-	-	-	-	-	-	-	-	12,283
1967	-	-	-	-	-	-	-	-	12,689
1968	-	-	-	-	-	-	-	-	12,424
1969	-	-	-	-	-	-	-	-	12,186
1970	-	-	-	5	-	-	612	10	11,083
1971	0	-	-	1	-	-	99	3	9,044
1972	0	-	2	0	-	-	171	4	8,737
1973	0	-	4	0	-	-	399	4	9,816
1974	0	-	6	0	-	-	406	22	9,627
1975	0	-	-	0	-	-	557	13	12,257
1976	0	-	-	0	-	-	42	13	13,686
1977	219	-	-	17	-	-	318	19	13,180
1978	68	-	-	9	-	-	1,699	13	14,117
1979	-	-	7	7	-	-	329	57	11,949
1980	64	-	380	5	-	160	566	62	10,969
1981	-	-	1,575	3	0	473	271	2	12,820
1982	48	-	1,365	5	0	945	156	10	11,890
1983	11	-	120	5	0	1,693	58	7	12,774
1984	48	-	47	3	12	2,647	104	75	13,568
1985	24	-	18	2	0	2,990	305	104	16,005
1986	9	-	422	2	0	2,069	291	109	14,770
1987	44	-	550	24	0	1,529	235	31	15,483
1988	27	-	613	24	0	1,376	198	64	14,028
1989	40	-	690	218	0	1,243	62	56	13,319
1990	61	-	2,650	2,436	0	1,131	64	43	15,733
1991	5	-	861	4,508	27	944	20	44	14,311
1992	8	-	1,160	5,700	62	1,356	75	47	19,850
1993	15	-	812	5,909	27	1,412	168	161	20,383
1994	66	-	581	3,176	631	792	157	24	16,294
1995	10	-	437	2,713	268	771	97	29	14,569
1996	15	-	439	2,502	346	761	81	15	13,957
1997	100	-	2,365	2,881	512	708	84	11	17,089
1998	153	-	3,603	3,263	418	931	48	19	18,114
1999	132	-	1,136	3,100	1,229	606	81	27	15,625
2000	202	-	2,216	2,949	1,885	646	90	9	18,599
2001	438	-	780	220	1,749	375	52	5	15,287
2002	439	-	465	204	1,320	302	90	3	14,640
2003	381	-	671	147	1,812	216	107	0	14,443
2004	410	-	270	213	898	169	62	37	13,016
2005	434	-	235	1,622	*	220	76	0	13,000
2006	477	-	347	1,211	*	444	71	2	16,010
2007	452	-	383	1,735	*	484	58	0	(12,267)
2008	*(773)*	-	84	1,980	*	280	33	1	(7,441)
2009	*(989)*	-	*250*	1,813	*	172 [1]	34 [1]	1 [1]	(13,930)
2010	*(704)*	-	*(150)*	1,654	*	33 [1]	22 [1]	4 [1]	

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

Year	Japan						Chinese Taipei										
	Distant Water & Offshore Longline	Coastal Longline	Other Longline	Gill Net Small Mesh	Gill Net Large Mesh	Other [2]	Distant Water Longline	High-sea DriftGillne	Offshore Longline	Offshore Gillnet	Offshore Others	Coastal Harpoon	Coastal Setnet	Coastal Gillnet & Other net	Coastal Longline	Coastal Others	Other
1951	2,494	-	673	-	0	1,281											
1952	2,901	-	722	-	0	1,564											
1953	2,138	-	47	-	0	954											
1954	3,068	-	52	-	0	1,088											
1955	3,082	-	28	-	0	1,038											
1956	3,729	-	59	-	0	1,996											
1957	3,189	-	119	-	0	2,459											
1958	4,106	-	277	-	3	2,914			543								387
1959	4,152	-	156	-	2	3,191			391								354
1960	3,862	-	101	-	4	1,937			398								350
1961	4,420	-	169	-	2	1,797			306								342
1962	5,739	-	110	-	8	1,912			332								211
1963	6,135	-	62	-	17	1,910			560								199
1964	14,304	-	42	-	2	2,344			392								175
1965	11,602	-	19	0	1	2,794			355								157
1966	8,419	-	112	0	2	1,570			370								180
1967	11,698	-	127	0	3	1,551	2		385								204
1968	15,913	-	230	0	0	1,043	1		332								208
1969	8,544	600	3	0	3	2,668	2		571								192
1970	12,996	690	181	0	3	1,032	0		495								189
1971	10,965	667	259	0	10	2,042	0		449								135
1972	7,006	837	145	0	243	993	9		380								126
1973	6,357	632	118	0	3,265	702	1		568								139
1974	6,700	327	49	0	3,112	775	24		650								118
1975	5,281	286	38	0	6,534	686	64		732								96
1976	5,136	244	34	0	3,561	585	32		347								140
1977	3,019	256	15	0	4,424	547	17		524								219
1978	3,957	243	27	0	5,593	546	0		618								78
1979	5,561	366	21	0	2,532	526	26		432								122
1980	6,378	607	5	0	3,467	536	61		223								132
1981	4,106	259	12	0	3,866	542	17		491								95
1982	5,383	270	13	0	2,351	656	7		397								138
1983	3,722	320	10	22	1,845	827	0		555								214
1984	3,506	386	9	76	2,257	719	0		965								330
1985	3,897	711	24	40	2,323	733	0		513								181
1986	6,402	901	33	48	3,536	577	0		179								148
1987	7,538	1,187	6	32	1,856	513	31		383								151
1988	6,271	752	7	54	2,157	668	7		457								169
1989	4,740	1,081	13	102	1,562	537	8		184								157
1990	2,368	1,125	3	19	1,926	545	2		137								256
1991	2,845	1,197	3	27	1,302	507	36		254								286
1992	2,955	1,247	10	35	1,169	303	1		219								197
1993	3,476	1,723	1	-	828	708	5		221								142
1994	2,911	1,284	1	-	1,443	383	1		137								196
1995	3,494	1,840	3	-	970	283	27		83								82
1996	1,951	1,836	4	-	703	152	26		162	8	6	30	3	-	-	-	
1997	2,120	1,400	3	-	813	163	59		290	9	-	33	3	-	2	-	
1998	1,784	1,975	2	-	1,092	304	90		205	15	-	19	6	1	9	-	
1999	1,608	1,551	4	-	1,126	184	66		128	7	-	26	5	1	3	-	
2000	1,152	1,109	8	-	1,062	297	153		161	17	1	29	6	1	1	-	
2001	985	1,326	11	-	1,077	237	121		129	16	-	30	5	-	-	-	
2002	764	796	5	-	1,264	290	251		226	14	-	6	8	1	-	-	
2003	1,013	842	3	-	1,064	203	241		91	26	-	11	5	1	-	-	
2004	699	1,000	2	-	1,339	92	261		95	8	1	7	5	2	-	1	
2005	562	668	1	0	1,214	98	176		76	1	-	5	9	9	-	8	
2006	623	539	1	0	1,190	95	*204*	-	*537*	-	-	-	-	-	-	-	-
2007	306	860	5	-	970	79	*102*	-	*199*	-	-	-	-	-	-	-	-
2008	(390)	(609)	(10)	(-)	(1,302)	(97)	*78*	-	*192*	-	-	-	-	-	-	-	-
2009	(166)	(606)	(21)	-	(821)	(90)	*37*	-	*225*	-	-	-	-	-	-	-	-
2010	-	-	-	-	-	-	*(53)*	-	*(200)*	-	-	-	-	-	-	-	-

[1] Estimated from catch in number of fish

[2] Contrains bait fishing, net fishing, tarpnet, trolling, harpoon, etc

Blue cell indicate the updated from last year (e.g new data and corrected value)

ITALIC The value was retlieved from ISC11 national report. No data for working group.

Table 14-4 (continued)

Year	Costa Rica	Korea		Mexico		United States				Grand Total
	Sport [1]	Longline	Hi-seas DriftGillnet	Longline	Sport [1]	Longline	Troll	Handline	Sport [1]	
1951			-							4,448
1952		-	-						23	5,210
1953		-	-						5	3,144
1954		-	-						16	4,223
1955		-	-						5	4,153
1956		-	-						34	5,819
1957		-	-						42	5,809
1958		-	-						59	8,289
1959		-	-						65	8,311
1960		-	-						30	6,682
1961		-	-						24	7,060
1962		-	-						5	8,317
1963		-	-						68	8,951
1964		-	-						58	17,317
1965		-	-						23	14,951
1966		-	-						36	10,689
1967		-	-						49	14,019
1968		-	-						51	17,778
1969		-	-						30	12,613
1970		-	-						18	15,604
1971		0	-						17	14,544
1972		0	-						21	9,760
1973		0	-						9	11,791
1974		0	-						55	11,810
1975		0	-						27	13,744
1976		0	-						31	10,110
1977		43	-						41	9,105
1978		28	-						37	11,127
1979		-	-						36	9,622
1980		37	-						33	11,479
1981		-	-						60	9,448
1982		39	-						41	9,295
1983		19	-						39	7,573
1984		23	-						36	8,307
1985		16	-				18		42	8,498
1986		61	-	-			19		19	11,923
1987		1	-	-		272	30	1	28	12,029
1988		11	-	-		504	54		30	11,141
1989		26	-	-		612	24	0	52	9,098
1990		315	-	-	181	538	27	0	23	7,465
1991	106	141	-	-	75	663	41	0	12	7,495
1992	281	318	-	-	142	459	38	1	25	7,400
1993	438	388	-	-	159	471	68	1	11	8,640
1994	521	1,045	-	-	179	326	35	0	17	8,479
1995	153	307	-	-	190	543	52	0	14	8,041
1996	122	429	-	-	237	418	54	1	20	6,162
1997	138	1,017	-	-	193	352	38	1	21	6,655
1998	144	635	-	-	345	378	26	0	23	7,053
1999	166	433	-	-	266	364	28	1	12	5,979
2000	97	537	-	-	312	200	14	1	10	5,168
2001	151	254	-	-	237	351	42	2		4,974
2002	76	188	-	-	305	226	30	0		4,450
2003	79	206	-	-	322	552	29	0		4,687
2004	(19)	75	-	-	0	376	34	1		4,017
2005	(-)	141	-	-	0	511	20	0		(3,499)
2006	-	56	-	-	-	611	21	0		(3,877)
2007	-	28	-	-	-	276	13	0		(2,838)
2008	-	*(29)*	-	-	-	426	14	0		(3,147)
2009	-	*(22)*	-	-	-	(256)	(10)	(0)	-	(2,254)
2010	-	*(18)*	-	-	-	(158)	(5)	(0)	-	(434)