ANNEX 4

REPORT OF THE MARLIN AND SWORDFISH WORKING GROUP JOINT WORKSHOP

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

(November 8-15, 2006, Shimizu, Japan)

1.0 INTRODUCTION

The joint intercessional workshop of the Marlin (MARWG) and Swordfish (SWOWG) Working Groups of the International Scientific Committee for Tuna and Tuna-like Species in the North Pacific Ocean (ISC) was convened in Shimizu, Japan from November 8-15, 2006. Goals of the MARWG intercessional workshop were 1) to update and complete compilation of fishery statistics, 2) review and agree on a stock structure scenario, and 3) agree on standardization approaches for CPUE time series in preparation for future use of fully integrated models to assess the status of striped marlin in the North Pacific. For the SWOWG intercessional workshop the goals were 1) review and prepare catch-effort and size data tables and 2) review approaches to standardizing CPUE data; all in preparation for future input to assess stock status of North Pacific swordfish.

Tokimasa Kobayashi, the Director of the National Research Institute of Far Seas Fisheries (NRIFSF) gave the welcoming remarks. Gerard DiNardo, Chair of the MARWG, and Robert Humphreys, Chair of the SWOWG, welcomed participants from United States of America (USA), Japan, Chinese-Taipei, and the Inter-American Tropical Tuna Commission (IATTC) (Attachment 1), and appointed rapporting duties to Bigelow, Conser, Hinton, Ichinokawa, Kanaiwa, Piner, Sun, Wagatsuma, and Yokawa. Lyn Wagatsuma was assigned lead rapporteur responsibilities. Working papers were distributed and numbered (Attachment 2), and the meeting agenda adopted (Attachment 3).

2.0 REVIEW AND FINALIZE DATA INPUT FILES – STRIPED MARLIN

As part of a general introductory discussion of striped marlin catches, the Working Group discussed the striped marlin catch from Mexico. The disposition of this catch is two fold. It is either: (1) consumed locally or (2) tagged and released. In the current ISC striped marlin assessment database, all tagged fish are taken as catch (i.e. the survival rate of tagged animals is assumed to be zero). The group questioned whether fish tagged by USA recreational fishermen while fishing in Mexican waters, are reported as catch by Mexico. The USA reported that these catches are not accounted for in the USA-reported striped marlin catch.

Kotaro Yokawa presented a review of Japanese Categories I – III data for striped marlin and swordfish and some biological information recently collected by the National Research Institute of Far Seas Fisheries (NRIFSF) on these two species (ISC/06/MARWG&SWOWG-2/01).

Except for the Offshore and Distant-Water longline fisheries, all Category I data from Japanese fisheries are contained in the annually published Yearbooks. Category I data (including effort) for the Offshore and Distant –Water longline fisheries were estimated by the NRIFSF using a

combination of logbook and training vessel data. Between 1952 and 1970, monthly catch was estimated using logbooks. Between 1971 and 1993 monthly catch was determined from logbook data and catch in weight was determined using a combination of commercial and longline training vessel data. A new commercial logbook system was introduced in 1994 and provides catch in numbers and weight.

Japanese commercial fishery statistics are available starting in 1951 and reported annually in Japanese Yearbooks. Category I data was derived from the yearbooks for all fisheries except for the offshore and distant-water longliners, whose Category I data were estimated from logbook data. The logbook data of Japanese offshore and distant-water longliners contains catch in numbers and effort in the period between 1952 and 1970. Annual catch weight from 1952-1970 was estimated using average catch weight in 1971 and 1975 by area and quarter.

Catch weight statistics from Japanese offshore and distant-water longliners are available in the same format as Category II. For the period 1971-1993, catch weight statistics are computed using collected size frequency data. Between 1994 and 2005, catch weight statistics were derived from the newly introduced longline system which requires fishermen to submit average weight of catch by species and set. Historical trend of average weight of striped marlin and swordfish caught by Japanese offshore and distant-water longliners showed some unrealistic up and down in the period before 1994 which is probably caused by a change in the quality of size data used in the estimation. Results of the analysis of length data of swordfish caught by Japanese longliners (Yokawa and Uozumi, 1996) indicated that the difference of length frequency between the commercial and training vessels might be the reason.

The document also reports the decadal and seasonal average distribution pattern of swordfish caught by the Japanese offshore and distant-longliners as well as the length-weight relationship of swordfish from data obtained in a port sampling program initiated in the late 1990s.

For all billfishes caught in the Japanese offshore and distant-water longline fisheries after 1993, catch in number and average weight by species are recorded for each set. For the period 1971 to 1993, however, only catch in number are recorded by set. For this latter period, striped marlin average weights by area (WP01 Fig.1) are used along with the recorded catch numbers to estimate striped marlin landings. While the time series of striped marlin average weights (WP01 Fig.1) are reasonably well behaved, the swordfish average weights – a product of the same sampling program – show a biologically unrealistic, erratic behavior particularly in the early 1990's. Since the striped marlin longline landings estimates (WP01 Table 2) prior to 1994 are dependent upon these average weights, the Group urged caution should these landings be used in the stock assessment.

Chi-lu Sun presented an update on landings and sex-specific size data of striped marlin and swordfish caught in the Taiwanese offshore and coastal fisheries (ISC/06/MARWG&SWOWG-2/02). The historical annual catch for striped marlin by the Taiwanese offshore fisheries were also described in this report. Sex-specific size composition data of striped marlin were collected from the catches of Taiwanese offshore longline, offshore gillnet, and coastal harpoon fisheries landed during 2004-2006 at the Shingkang fishing port in Taiwan. The length distribution, length-weight relationship, and sex ratio at observed lengths were analyzed in this working paper. The results showed that the female striped marlin grow to a larger body length than the

males. The length-weight relationships were not significantly different between the sexes. The proportion of females increased with body length for this species.

The biological data presented (size frequency, length-weight relationships, and sex ratios) may be useful in the upcoming stock assessment. However, because the spatial extent of sampling is consistent with vessels operating only out of the port city of Shingkang and not the entire commercial fleet, care should be taken in using these data as representative of overall catch from the Taiwanese offshore fishery.

Landings shown in Figure 2 of WP02 are preliminary data provided by the Overseas Fisheries Development Council (OFDC) of Chinese-Taipei. The final official statistics will likely not differ greatly from the preliminary data, and as such, the preliminary data could be used as the best available estimates of the Chinese-Taipei landings for stock assessment purposes. However, it was suggested that further work should be done to: (1) estimate the catches prior to 1964; and (2) determine whether some catch landed in Pacific Ocean ports may have been caught in the Indian Ocean.

Robert Humphreys provided updates to biological data for the North Pacific striped marlin and identified areas where additional biological research is required (ISC/06/MARWG&SWOWG-2/03). In this report, the weight-on-length relationships were corrected for striped marlin in the eastern North Pacific. The age-and-growth study conducted by Melo-Barrera et al (2003) in the eastern North Pacific remains the best available age-and-growth study. Data on size at 50% maturity is also restricted to studies conducted only in the eastern North Pacific. Further studies on age-and-growth, as well as age at 50% maturity, are needed for this species in the western and central North Pacific. To ensure comparability it would be useful to reconstruct the tables shown in WP03 using a common length measurement. Also, caution should be used regarding the "longevity" estimates since the methodology used for estimating longevity was not consistent across the various studies

Based on available larval sampling and maturation studies, the central North Pacific is inhabited primarily by juvenile and immature striped marlin that migrate out of this longline fishery at sizes above ~50 kg. The direction of movement of larger fish out of the central North Pacific remains unknown.

3.0 ABUNDANCE INDICES - STRIPED MARLIN

Kotaro Yokawa presented an update of CPUE standardizations of striped marlin caught by Japanese coastal longliners (vessels < 20 tons) in the northwest Pacific Ocean using the Delta log-normal method applied to set level data from 1994-2005 (ISC/06/MARWB&SWOWG-2/04). Data from sets with less than 10 hooks per basket (HPB) and sets with greater than 25 HPB were excluded. Filtering the data decreased the total number of observations to be analyzed and as a result, most interaction terms were included in the model as random effects. Results from CPUE analysis indicate a large difference between the observed and the predicted trends of the proportion of positive sets, as well as a skewed distribution pattern of residuals. This is likely caused by the unbalanced selection of data, however, the estimated trend of CPUE was similar to the one estimated last year using a negative binominal error structure.

3.2 Discussion

Clarification was made that Figure 9 was a presentation of results obtained from analyses conducted for, and presented at, the last joint meeting of the working groups. It was also explained that data from sets when HPB < 3 and HPB ≥26 were assumed to be biased due to reporting error stemming from the introduction of new data reporting requirements. A discussion of area numbering in figures clarified that Area Numbers 1-5 referred to the areas described in the Japanese distant water longline standardization paper ISC/06/MARWB&SWOWG-2/05 (see Figure 1, upper panel), and not to the five regions of the north Pacific being used in the striped marlin assessment (Figure 1, lower panel). The general discussion of the GLM modeling noted that the delta-lognormal error structure was not a good fit to the data (Figures 5 and 8). It was explained that this likely results from an improved reporting of HPB over time and variations in fleet size between ports, which result in a nonlinear pattern (Figure 6 and 7). It was noted that other error structure models may provide a better fit, but that time restrictions prevented investigation prior to the meeting. It was noted that caution is advised in situations where the nominal and standardized trends are so different. A more structured approach to choosing a single CPUE trend over others is required.

Striped marlin standardized CPUEs for the offshore and distant water longline fisheries operating in the North Pacific from 1962 to 2005 were reported by Momoko Ichinokawa (ISC/06/MARWG&SWOWG/05). The metrics were calculated using set-by-set data , which partially included information about HPB before 1970 recently compiled by NRIFSF from logbook data at the trip level. It should be noted that pre-1975 trip specific data is sparse compared to latter years, and additional error checking is necessary before the data can be used. CPUE was standardized for 12 designated areas, weighted by the size of areas, and combined into 5 regions. For assessment purposes a single overall North Pacific CPUE series was also computed.

The overall CPUE was highest in the 1960s, decreased rapidly in the late 1970s, and increased slightly through the late 1980s. Since 1995 CPUE decreased, reaching a historical low (≤ 0.20) in the most recent years (2004 and 2005; Figure 7). CPUEs patterns for the 5 Regions were roughly similar to the overall. However, CPUE in Area 11, one of main fishing grounds of striped marlin, showed the largest increase. These high CPUEs influenced the overall CPUE trend, as well as the trend computed for Region 5. Standardized CPUEs were consistently higher in Region 5, and Area 11 contributed the most to the observed CPUEs in this region. Data from Area 11 ends in 1989 when CPUEs were greater than 3.0, and coincides with the movement of Japanese longline fishing vessels out of this area. Significant changes in HPB by season were observed in Areas 1, 2, 11, and 12. Further investigations to understand the seasonal effects is necessary, as they may have a large effect on the overall trend.

3.3 Discussion

It was pointed out that in previous standardizations of BET and YFT, data from sets with 3-4 HPB were removed from the analyses because these were assumed to be night sets targeting swordfish (pers.comm. Miyabe, NRIFSF). However, in this analysis they were included. It was explained that most operations targeting striped marlin in the EPO are conducted by setting 4 HPB. Further analysis of catch composition at the set level also revealed no difference between sets with 3-4 HPB and 5-6 HPB, especially in EPO. In the Northwestern Pacific areas, most

operations were conducted with 5 HPB, with gradual movement to 4-5 HPB more recently. There is still no way to separate sets into day/night. The WG discussed the utility of aggregated data vs. set-by-set data, especially since at the set-by-set level there are significantly more zeros in the data. In the future analysts explore models that can accomodate zeros, e.g. delta log-normal, which are expected to improve the fit and normalize the residuals. Discussion indicated that the basis for the conclusion, there is a difference in CPUE trends going from east to west, centers around data differences presented in Figure 2, Areas 1 and 2 in the west and Figure 2, Areas 11-13 in the east.

At the workshop, analyses were conducted to determine if a standardized CPUE time series for the Japanese distant water longline fishery could be calculated back to 1952 using the set-by-set data recently compiled by NRIFSF. The current annual CPUE time series covers the period 1962 to the present, despite the fact that fishing was occurring prior to 1962. Because the analytical approach taken was the same as presented in WP05, the results are included as Appendix 2 in WP05. Set-by-set data prior to 1961 are very scarce, resulting in extensive spatiotemporal constraints during model estimation phase. For example, data in Region 5 before 1961, and data from 1957-1958 in the other regions, are missing. The model for standardizing CPUE was the same as that used in the main document. Model 1, without an effect of HPB, was applied to regions 2-4. Model 3, including an effect of HPB, and assumption of 5-7 HPB from 1952-57, was applied to region 1.

Least square means of standardized CPUE before 1961 was relatively higher than that during 1960s in areas within Regions 1 and 2 (Northwestern Pacific Ocean), while it was lower in the North Central Pacific, Regions 3 and 4. Consequently, scaled indices are different among regions, especially between Region 1-2 and 3-4 during 1950s. Overall CPUE during the 1950s was at a moderate level. Due to the paucity of data to compute standardized CPUEs and uncertainty surrounding these metrics prior to 1961, the incorporation of such data in the pending assessment is considered premature.

3.4 Discussion

It was suggested that the observed difference in CPUE trends among regions may result from spatiotemporal changes in fishing areas during this period, and not from changes in abundance. The fishery in the North Central Pacific was still developing during 1950s, resulting in low catchability of the fishery in this region. In contrast, the fishery in the North Western Pacific was already fully developed during the 1950s, and likely had higher catchabilities (similar to that in the 1960s). Fishing in the EPO occurred later as the fleet moved eastward from the North Central Pacific. Because there is not enough data during the 1950s, especially in the North Central Pacific and EPO, the indices in these regions are not accurate measures of abundance of striped marlin. In addition, because of incomplete catch data, especially from the Taiwanese fisheries before 1964, it was recommended that the stock assessment commence from 1964, when complete catch data and CPUE series are available.

Chi-lu Sun presented a paper on the standardization of Taiwanese tuna longline catch rates for striped marlin in the North Pacific Ocean (ISC/06/MARWB&SWOWG-2/06). Catch rate of striped marlin for Taiwanese longline fishery in the North Pacific Ocean was standardized using a general linear model (GLM). The standardized CPUE had been low from 1969 to 1977, except for 1973 when CPUE was about 0.31 fish per thousand hooks. The standardized CPUE reached

its maximum of 0.37 fish per thousand hooks in 1982, and has been stable since 1995 within a range between 0.09 and 0.16 fish per thousand hooks.

3.5 Discussion

Chi-Lu Sun indicated that the standardized CPUE series is preliminary and should not be used in the upcoming assessment because the yield of the fishery is not high, while the noise in the trend is high. It was noted by participants that the formula used for the GLM included a constant of 1 added to CPUE, while the mean-CPUE is 0.2. Use of a lower constant was recommended. In recent years the data contains information from the EPO, and it was noted that an improved CPUE series for use in this area would be welcomed, as the Japanese fishery has been reducing effort in the area. The WG noted that diagnostics were included in this WP and recommends that the hooks per basket information, if available, be included in the model.

Keith Bigelow presented a comparison of applications of a delta-GLM and statistical habitat-based (statHBS) models to estimate standardized CPUE for striped marlin caught in the Japanese distant-water longline fishery (ISC/06/MARWG&SWOWG-2/07). Models were applied to two datasets: 1) from 1975 to 2004 when gear configuration (HPB) was known and 2) during the entire time-series (1952-2004). The delta-GLM separately estimated the proportion of positive catches assuming a binomial error distribution and the mean catch rate of positive catches with a lognormal (preferred), gamma or inverse-Gaussian distribution. Delta approaches may be appropriate for striped marlin in the north Pacific as the percentage of 5 degree month strata with zero catch for the five area structure ranged from 12 to 70%. Nominal CPUE is relatively stable from 1952 to 1960, increases sharply from the early 1960s to early 1970s perhaps due to directed targeting and then has moderate inter-annual variability to 2004. Increases in standardized CPUE from the early 1960s to early 1970s were not as large as nominal trends. Additionally, the trend in standardized CPUE from 1975 to 2004 is much more optimistic then the trend in nominal CPUE. The statHBS model estimated a year effect and habitat preferences within the water column for each of the five areas. For each area, the model had 15 ambient temperatures at 2°C intervals from 3.5 to 33.5°C and 15 temperature gradients at 0.03 $^{o}C*m^{-1}$ from -0.40 to 0.05 $^{o}C*m^{-1}$. Fitted temperatures and thermocline gradient differed by area for striped marlin. The trend in standardized CPUE from the statHBS model from 1975 to 2004 is more optimistic then the trend in nominal CPUE, but less optimistic than the delta-GLM standardized CPUE. The estimated trend in gear catchability was similar between the delta-GLM and statHBS analyses. In general, catchability of deeper gear (20−25 HBF) was 30−50% of shallow gear, which appears reasonable for a marlin species.

3.6 Discussion

The following discussion clarified that the GLM included no interaction terms and that no examination was made whether or not interactions were significant. It was also made clear that in Figures 3 and 4 the modeling was the same, and during the period 1952-1974 it is assumed that gear configuration is 5 HPB (no data was available for the period). No data with HPB of 3-4 was used in either analysis. No month/area and year/area interactions were included in the analysis. There was a discussion about what seemed to be anomalous results of high catch rates for HPB = 26, which may be a different gear configuration. This gear configuration variation is being investigated. It was recommended that some work be done to look at the effects of averaging across scales of fishing vs. oceanography in comparing results of HBS framework models to

GLM models. It was noted that in Figures 3 and 7 the early periods are lower and later periods higher, which in both was explained as due to normalization to the means. There was a general discussion about the need to study the minimum effort sample size necessary to use catch and effort data from an undefined area in stock assessments, e.g. how many hooks or long line sets of a minimum number of hooks should be placed in a region before the data from that region is considered of sufficient quality for use in stock assessments.

Minoru Kanaiwa made a presentation that introduced a new method to estimate parameters of longline gear depth by the catenary equation in the statHBS framework using multiple species (ISC/06/MARWB&SWOWG-2/08). Previous applications of statHBS have included only a single deterministic catenary curve, but recent information indicates that Japanese longliners have modified gear components historically over time, by area and season. Introducing multiple species data, which have different vertical distribution patterns into a single standardization process, provides a wider range of vertical information into the model. Various scenarios were examined by changing the catenary curve parameters of float and branch line length and catenary angle, and selected an optimal scenario by minimizing AIC. The model estimated the set depth of longline gear changes by area, season and target species. A test run was conducted using catch and effort data of Japanese longliners in recent years for blue marlin, striped marlin and yellow-fin tuna. Vertical distribution pattern derived from electric tag data was used as a prior. Oceanographic data provided from PIFSC was used as habitat information. The result of the test run was rather realistic, e.g., a shallower gear depth in temperate areas and a deeper gear depth in tropical areas. This indicates the fitting of multiple CPUE data may improve estimates of longline shape parameters obtained from statHBS.

3.7 Discussion

It was noted during the following discussion, that although the actual shape of the longline will be influenced by currents, the author employed a very simple and likely unrealistic equation, even though a more realistic formula could easily have been applied. The species used were chosen because data were available. It was noted that the approach is novel: it uses information from a suite of species with different preferences to develop information about the actual fishing depth of the gear, rather than depending on a single species or a deterministic model. In Figures 4a and b, and in both areas 1 and 3, a sudden increase in CPUE in the early 1990s was observed. This shift corresponds to the time (1993-1994) when monofilament gear was introduced into the fishery. It was noted that development of a break-point, or other model with varying catchability for the different periods, is being considered to account for the periods of change in gear construction.
It was noted that there are problems with all standardization techniques and that many of these problems will be discussed at the February 2007 CPUE standardization workshop. Results from this workshop will be available at the March 2007 meeting of the ISC MAR & SWO WG.

4.0 STOCK STRUCTURE – STRIPED MARLIN

The current assessment is building off of the last provisional assessment, which assumed a single North Pacific stock. No new information was presented regarding stock structure. The WG recommended that the stock structure scenario for the next assessment be consistent with the last assessment, i.e. a single North Pacific-wide stock.

It should be noted that previous studies have suggested the occurrence of two North Pacific striped marlin stocks. Given the influence of stock structure on assessment results and subsequent management decisions, this uncertainty will be addressed in the next striped marlin assessment.

5.0 IDENTIFY ASSESSMENT MODELING PLATFORM

The WG discussed which data sources were to be used in the next Striped Marlin stock assessment. The WG also discussed the format of the data to be used in the stock assessment and the assessment model structure. The working group did not formally endorse a single modeling platform, but discussion focused upon providing information for use in a Stock Synthesis II model.

5.1 Model Structure

The WG also discussed starting the stock assessment model in 1952 with an equilibrium catch of the same magnitude as the early 1950's fisheries because there is reliable information that longline fisheries developed prior to 1952. Because of the uncertainties in early catches it is also suggested that another model starting in 1964 with an equilibrium catch about the same magnitude as the 1950's fisheries be provided. Additional sensitivity runs to the assumption of the equilibrium catch should be made to both models.

The time step for CPUE series is annual. Catch and size data will be quarterly where possible.

5.2 Catch data

Catch data from the previous stock assessment will be used (Table 1) except where changes were presented at the meeting. The WG recommended that an effort be made to extend historical catches back to 1952.

5.3 Size composition

The use of fleet-specific length composition information in the stock assessment model was also discussed by the WG. Available size composition data is outlined in Table 4. The WG noted that both training vessel and commercial vessel data was available for the Japanese Longline fleets. Training vessel information contains information on all sizes potentially captured by longline gear, but may not be identical to the commercial fleet because of potential differences in areas fished and high grading. The commercial vessel information may not have size information on small fish caught but not landed. The WG agreed that the assessment model be run using either the training vessel or commercial vessel size composition information. If feasible, the following scenario should also be analyzed: separating the training vessel and commercial vessel catches into their own fleet and using both commercial and training vessel size composition. Possible sensitivity runs may include not separating fleet catches and using either: 1) training vessel length composition only or 2) commercial length composition data only.

The Hawaiian Longline fleet also has two sources of length composition data available (observer and auction data). Observer data includes all sizes of fish caught and auction data are only from those fish landed. Similar to the Japanese Longline fleet recommendation, the WG recommended

the assessment model be run using both types of data separately. It was noted that when using the Hawaiian Longline observer data the assessment should also use the Japanese Longline training vessel information because both include small fish which may not be representative of the landings. Conversely, when using Hawaiian Longline auction data the Japanese Longline commercial data should be used as both may not have information of small fish caught but not landed.

The WG also discussed the use of the Eastern Pacific Ocean purse seine size composition information. It was noted that length samples are much larger than the sizes observed in all other fisheries. The WG agreed that for the next assessment, these length data be used. Subsequent assessments should further investigate this matter.

The WG also noted that size composition information was available for the Chinese-Taipei Coastal Longline and Other fisheries. The information presented was aggregated across years and fisheries. The group agreed not to use these data in the current assessment until a more detailed review is provided.

The WG also recommended that all size composition information be presented by year and quarter when possible so that a quarterly assessment model could be explored.

5.4 CPUE

The WG discussed which CPUE series should be used in the assessment modeling. The working group recommended using the Hawaiian Longline, Japanese Coastal Longline, and Japanese Distant Water Longline indices for assessment modeling. The Japanese Distant Water Longline is available for all 5 assessment regions, but the WG recommended that the assessment model first use a single North Pacific Ocean index starting in 1964. The single index should be developed using area weighting methods, but other approaches should be considered. Similar approaches to combine areas in the Hawaiian Longline and Japanese Coastal Longline CPUE series should be used. The WG also recommended that a stock assessment, with area-specific indices should be investigated.

After reviewing this section, the Marlin Working Group Chairman determined that the regional combination index recommendation for the Japanese Distant Water Longline Fishery was ambiguous and provided no clear direction (do you proceed with a single North Pacific Ocean index based on all 5 regions or one based on Regions 1-4). As a point of departure, the Chair recommends that the initial assessment runs presented in March 2007 use an index based on a combination of Regions 1-4.

5.5 Biological Parameters

The working group reviewed and discussed the biological parameters to be used in the stock assessment model. It was noted that the length-at-age and weight-at-length growth forms used in the previous stock assessment may not have been in the same metric units (i.e. EFL vs LJFL). An effort should be made to ensure that the appropriate, and consistent, biological units are used. The WG noted that there is considerable uncertainty in many of the biological parameters including natural mortality (*M*). The WG discussed doing sensitivity analyses on a range of fixed *M* values (0.2-0.4); in the last assessment the value of M was set at 0.3.

The size at sexual maturity used in the previous assessment will be retained for this assessment.

5.6 Model Parameters

The WG discussed parameterization of the stock assessment. It was noted that the assessment is sensitive to the specification of steepness (h) of the Beverton and Holt Spawner-Recruit relationship. The working group recommended that a range of steepness (h=0.5-0.9) be used. Furthermore, it was noted that the assessment should consider estimating recruitment deviations to reduce the dependency on the model's stock recruitment relationship, although information on size composition will be necessary to estimate the recruitment deviations. However, the assessment may have to consider structuring the model to use "super year" observations of size composition information because of sparse data. "Super year" data are those size compositions aggregated across adjacent years to improve sample size. It was noted the Stock Synthesis II is designed to generate the appropriate model expectation to this data.

6.0 SCHEDULE TO COMPLETE ASSESSMENT – STRIPED MARLIN

The goal is to complete a suite of sensitivities outlined in this report in time for the next MARWG workshop, currently scheduled for March 2007. This schedule is set so that the WG has ample time to review and offer suggestions for changes to the assessment prior to the March WG meeting. Based on comments, a final assessment will be conducted at the March 2007 workshop, or shortly after.

Late November, 2006 – Chair contacts data correspondents for updated data.

December 18, 2006 – Final data from all data contacts should be submitted to Chairman.

Mid-January, 2007 – Chair assembles and distributes the modified striped marlin stock assessment database including the new data presented at this workshop.

March 1, 2007 – report of preliminary assessment results distributed.

March 12, 2007 – WG papers due.

March 19, 2007 – Next MARWG workshop. Review sensitivity runs and complete final assessment.

6.1 Future Research

1. One potential investigation is to compare the average weight from the Mexican recreational catch to the Eastern Pacific Ocean size composition information.

2. The WG recommended that a stock assessment using area-specific indices should be investigated. As a point of departure, the WG should investigate the residual pattern of the Japanese coastal longline fishery GLM and see if it can be resolved. The WG should also investigate the Mexican longline catch and effort data from Region 5.

7.0 PRESENT, REVIEW, AND PREPARE DATA INPUT FILES - SWORDFISH

Robert Humphreys, SWOWG chair, convened the opening of this WG whose objective was to identify available Categories I, II, and III data, to review available biological data and product form conversion ratios for swordfish, to discuss standardization techniques and spatial extent of the data to be examined, and to discuss initial assessment models that might be considered in a future stock assessment of North Pacific swordfish. Special considerations regarding swordfish were pointed out in order to better frame the context of any future swordfish stock assessment. These special considerations were categorized in terms of fisheries, life history parameters, and environmental effects on CPUE. In regard to fisheries, swordfish differ from other billfish species in the extent that they are targeted by several international longline fishing fleets. Prior to 1970, the Japanese longline fleet targeted swordfish by methods that involved shallow, night sets. Targeting in the Hawaii longline fleet employed the use of light sticks attached to gangions and large whole squid as bait. Other fisheries targeting swordfish include harpoon and driftnet. Target switching also occurred during longline vessel trips and delineation of these sets will be needed. The spatial boundary limits will also need to decided, particularly for the eastern equatorial Pacific where high CPUEs typically straddle both sides of the equator. Sexual dimorphism in swordfish will present major challenges in our approach to stock assessments. These include factoring in the effects of sex-specific growth rates, sex-specific size and age at 50% maturity, size specific sex ratios, differences in the latitudinal distribution and local movements of swordfish by age and size, and the distinct possibility that large females undergo greater vertical migrations than males. Spawning is restricted to surface waters with sea surface temperatures at 24°C or higher and young-of-year individuals appear to reside in these warm waters, entering the tuna longline fishery at about ~60 cm EFL. Environmental factors that affect swordfish longline CPUE include the preferential association of swordfish (particularly large fish that are mostly females) with frontal zones in the North Pacific.

7.1 Review of Data Sources from 2004 North Pacific Swordfish Stock Assessment

The catch & effort (Category II) and size data (Category III) used by Pierre Kleiber and Kotaro Yokawa in their previous working paper (ISC/04/SWO-WG/07) entitled “MULTIFAN-CL Assessment of Swordfish in the North Pacific” were reviewed. The spatial bounds of this previous assessment encompassed 10-50° North Latitude and longitudinally from the western North Pacific east to 140° West Longitude. Within this spatial boundary, areas were subdivided latitudinally at 30° North Latitude and further subdivided longitudinally at 160° East Longitude. These regions are referred to as the NW, SW, NE, and SE. Standardized CPUE data existed for 14 North Pacific fisheries.

The Category II data series from the Japan longline fisheries included data from 1952-2002. The two types of longline sets are the traditional shallow, “night” set and “other” set; a deeper fishery developed starting in 1970. “Night” set (targeted) and “other” set (non-targeted) operations occurred in each of the 4 regions recognized.

Data for the Hawaii longline fisheries (1990-2002) was aggregated into two subregions; a NE targeted region and a SE non-targeted region. The longline data fields consisted of set type, year, month, quarter, subregion, number of hooks per basket (HPB), number of sets, and number of swordfish caught.

A third data series (late 1970s to early 1990s) used was the Japan high seas drift net fishery which was also aggregated by subregion. The data fields consisted of set type, year, month, quarter, subregion, effort in km's of drift net, and number of swordfish caught.

Length-frequency data (Category III) was available for Japan longline "night" set fisheries (mid-1980s to early 2000s) in the four subregions and from the "other" Japan longline fisheries in the NW and SW subregions (mid-1970s to 2000) and in the NE and SE regions (1970s to 1980s). Category III data was also available from the Hawaii longline fisheries (NE and SE subregions; 1994-2002) and from the Japan coastal drift net fishery for the NW region (1999-2001).

Data containing length and sex by fish was only available from the Hawaii longline fishery (observer collected) and from Japanese training vessels. However, since the data from Japanese training vessels originated from south of the commercial swordfish fishing grounds, this data was not considered representative of the commercial longline fleet and excluded from the analysis. The length frequency data for the SE subregion of the Hawaii longline fishery contained a large mode corresponding to young-of-year fish (~60 cm EFL) which was not evident in any of the four subregions of the Japan longline fisheries. It would appear that these fish were released unmeasured by the Japan longline fishery.

7.2 Potential Data Sources Available For Swordfish Stock Assessment

Category I Data Sources

Participants worked to update Category I data in Table 2 (Swordfish catches (in metric tons) by fisheries, 1952-2005). Japan and the USA provided updates for provisional estimates for recent years. Chinese Taipei provided an update of landing estimates for its offshore longline fishery and total yearly landings covering the period 1964-2005.

The USA California data contains an 'unknown' category that represents catches not attributable to other fishery sectors. During the meeting further clarification was received on this from Al Coan (SWFSC). Using the year 1994 as an example, the "unknown" category for USA California data included catches attributed to half-ring, trammel net, troll, vertical hook and line, and unknown. If 1994 is representative of other years, the "unknown" gear is the largest contributor to the total unknown category.

Catches reported by Chinese-Taipei prior to 1964 may be estimated from there published annual Taiwan Yearbook. An analysis of the reliability of these data are a high priority and should be investigated.

Gerard DiNardo presented a report on the status of U.S. swordfish fisheries in the North Pacific in 2006 (ISC/06/MARWG&SWOWG-2/09). Fisheries in the U.S. include harpoon, drift gillnet, and longline. The harpoon and drift gillnet fisheries are based in California, the longline fisheries are based in Hawaii and California. Largest catches are associated with the longline fisheries.

Two fishing strategies are associated with the Hawaii-based longline fishery. Deep-setting gear targets bigeye tuna and shallow setting gear targets swordfish. Each gear setting strategy is subject to separate federally imposed limits on the number of allowable interactions with sea

turtles. In early 2006, the shallow-set fishing for swordfish reached the allowable annual interaction limit of 17 loggerhead sea turtles and this fishery was closed on March 20, 2006. The California-based longline swordfish fishery (shallow-setting) is now prohibited from fishing inside the west coast EEZ. Total landed catch of swordfish by longline vessels through June 2006 was estimated at 1,051 metric tons. Due to the closure of the Hawaii-based shallow-set longline fishing, total U.S. catch will be significantly lower in 2006. Hawaii-based vessels that initially targeted swordfish converted their operations to target tuna after the closure.

Preliminary estimates indicated that 32 California-based drift gillnet vessels fished in 2006. Landing in 2006 are estimated to be similar to previous years at approximately 185 metric tons. Final catch from the California-based harpoon fishery is expected to be slightly less than the 2005 catch of 73 metric tons.

Category II Data Sources

Participants identified available datasets of catch and effort that would be available for submission to the SWOWG by February 1, 2007. For the Japan longline fisheries, datasets associated with the distant water longline, offshore longline, and coastal longline fleets were identified. The time period of coverage of these datasets are 1952-2005 for the distant water logline fishery, 1959-2005 for the offshore longline fishery, and 1994-2005 for the coastal longline fishery. Other available datasets from Japan include the high-seas drift net fishery with data coverage for the period 1960-1992. Japan has initiated a data rescue effort to obtain distant-water set by set data from the 1950s and 1960s for the distant-water longline fishery. Coverage is small for this dataset compared to the 5 degree by month data, but represents a finer spatial scale of analysis compared to the current data spatial structure. Category II datasets available for USA fisheries include the Hawaii-based longline fishery (1990-2006) and the California-based longline fishery (1990-2004). Two additional California-based fisheries providing catch and effort data include the coastal gill-net fishery (1980-present) and the swordfish harpoon fishery (1974-present). The IATTC has available data from the eastern Pacific Ocean (EPO) purse-seine fishery (1990-present) and also China-based longline fishery data from the EPO. Chinese-Taipei has offered to provide catch and effort data for their distant water longline fleet for the period 1967-2004. Other datasets were identified but would not be available by the February 1, 2007 data submission deadline.

Category III Data Sources

Category III data (length, weight, sex) are of particular importance for swordfish stock assessments due to this species sexual dimorphism and the tendency of adults to spatially segregate by sex. For the Japan longline fisheries, length data and a limited amount of port-sampled weight data (no sex data) are available for the distant-water longline fishery (1970-2005), the offshore longline fishery (1970-2005), and the coastal longline fishery (1994-2005). USA sources of available length-frequency data (no sex data) includes the California gillnet fishery (1980-present) and California harpoon fishery (1974-1999). Other available sources of length-frequency data (no sex data) is from the IATTC and includes data from the EPO purse-seine fishery (1990-present) and from EFL measurements taken at sea or from port sampling during efforts to collect DNA samples.

Kotaro Yokawa reviewed Japanese distant-water swordfish size data from a paper presented at the 2nd International Pacific Swordfish Symposium entitled “Evaluation and preliminary analysis of size data of swordfish caught by Japanese longliners during 1970-1994”. A discrepancy was

noted between length-frequencies taken from catches by Japanese training vessels and Japanese commercial longliners. This is attributed to both the release of small swordfish by commercial vessels and also from dropping off hooks during rapid retrieval of the gear by commercial longliners. Sex composition data obtained from Japanese training vessels is quite good.

Differences in length-frequency composition also exist within the Hawaii-based longline fishery. The swordfish longline sector exploits large adults to the north of the Hawaii archipelago while the tuna sector incidentally catches juveniles that are typically not landed. Consequently, different size compositions exist between data from observed tuna longlines and auction sampling. NRIFSF have port sampling data since 1998 targeting offshore longliners in the northwest Pacific. Training vessel data (EFL measurements) have decreased in recent years.

7.3 Discussion

For the Japan distant water and Hawaii-based longline fisheries it may be appropriate to use two series of size data for each fishery: 1) the training vessel and observer data to capture juvenile sizes indicative of a recruitment signal and 2) commercially landed swordfish. It may be worthwhile to evaluate the spatial distribution in effort by training vessel by year in relation to commercial effort to assess the overlap or how representative the training vessel size data are for the commercial fleet.

Sources of sex specific size data are only available for the Japanese training vessels, for observer data of the Hawaii-based longline fishery, and the Chinese-Taipei longline fishery operating off it's eastern coast.

The WG also noted that size composition information was available for the Chinese-Taipei coastal longline and other fisheries. The information presented was aggregated across years and fisheries. The group agreed to use these data in the future assessment after a more detailed review is provided.

7.4 Review of Biological Data-Swordfish

In comparison to striped marlin, the available biological data on swordfish is more extensive. Length-to-length and length-to-weight relationships are available from the western, central, and eastern North Pacific. The most extensive data exists for the central North Pacific in the report by Uchiyama et al. (1999). This report examined a number of interrelationships between round (whole) weight and various types of processed (dressed) weights and then relates these various weights to length. Age and growth estimates exist for waters adjacent to Chinese-Taipei (Sun et al. 2003), from the central North Pacific around Hawaii (DeMartini et al. *in press*), and off the Pacific coast of Mexico (Castro-Longoria 1995). In each of these studies, age & growth relationships were modeled using the von Bertalanffy growth function. Each of these studies derived sex-specific growth models and showed that females exhibit faster growth rates and attain a larger adult size than males. Estimates of size at 50% maturity are available for waters adjacent to Chinese-Taipei (Wang et al. 2003) and the central North Pacific around Hawaii (DeMartini et al. 2000). Both studies indicate that females attain 50% maturity at ~144 cm EFL while males (available only from the study by DeMartini et al. 2000) attain 50% maturity at 102 cm EFL. This latter study also derived a relationship between sex ratios (females/total) and EFL

based on a power function that increases (in the proportion of females) over a size range of 100-220 cm EFL. Above 220 cm EFL, nearly all swordfish are female. Based on surface plankton net surveys, larval swordfish have been captured in warm surface waters (≥24°C) in the western and central North Pacific. Swordfish larvae have not been recorded for the eastern North Pacific east of 120°W longitude although mature females in an advanced reproductive state have been observed. As adults, swordfish differ from other billfishes as they are not restricted to warm waters and can occur up to 50° North latitude. Swordfish also differ from other billfishes in their vertical range and have been recorded to depths of 800 m and more. Movement data on swordfish remains limited; current data shows that most recaptures and movement tracks are not long-distance.

7.4 Stock Assessment Spatial Boundaries

A preliminary area stratification scheme was presented which subdivides the North Pacific into five regions within the area between the equator and 50°N. In the ensuing discussion, the WG agreed that the proposed area stratification was premature and that area stratification should be considered after an analysis of Category II and III and standardized CPUE values are developed. The spatial boundary limits will also need to be decided, particularly for the eastern equatorial Pacific where high CPUEs typically straddle both sides of the equator. To accomplish this, longline catch and effort data from fleets fishing in this region will be necessary (e.g. including Spanish and Chilean fleets considered important)

8.0 REVIEW PRODUCT FORM CONVERSION RATIOS - SWORDFISH

Previous conversion factors used to convert dressed weight to round weight have employed a single multiplier value in this conversion. In the study by Uchiyama et al. (1999), relationships between various dressed weights and round weights were derived using a power function rather than a linear function and achieved better fits to the data. Data from this study was compiled onboard research cruises where whole fish were first weighed followed by various types of dressed weights. The analysis also indicates that variability in the length-weight estimated relationship when examined on a monthly scale.

Kotaro Yokawa reported on the length to processed weight (gilled and gutted) relationship of swordfish in the northwest Pacific estimated from port sampling data initiated in the late 1990's (ISC/06/MARWG&SWOWG-2/01). This relationship changed significantly by month, year, and area, suggesting the necessity of continued data collection until adequate conversion factors are obtained. Data collected during a longline research cruise in 2004 was utilized in establishing a relationship between eye-fork and lower-jaw fork length of striped marlin, as well as a length to whole weight relationship. The amount of data used in this analysis is limited. However, the data includes information from small sized fish (<100 cm) which are rarely reported by commercial longliners.

Chi-lu Sun reported on the length to round weight and sex ratio at size relationships of swordfish caught by Chinese-Taipei coastal longline, gillnet and harpoon fisheries (ISC/06/MARWG&SWOWG-2/02). These fisheries mainly operate in near shore waters off the eastern side of Chinese-Taipei.

8.1 Discussion

Since reported conversion factors vary spatially and seasonally, it was recommended that scientists choose the appropriate factor in the conversion of their data. It was also recommended that the factors used in these conversions be clearly reported by scientists to the SWOWG.

9.0 ABUNDANCE INDICES - SWORDFISH

The SWOWG discussed a time-line for the near future in order to proceed towards the development and review of abundance indices (standardized CPUE series) by the next joint MARWG & SWOWG workshop in March 2007. First, Category I-III data will need to be submitted by February 1, 2007 to both the SWOWG chair and ISC. Subsequently, data summaries would be distributed to the SWOWG members by March 1, 2007**.**

At the next SWOWG workshop in March 2007, participants will review these standardized CPUE swordfish trends, and determine the overall assessment region and sub-area structure. Spatio-temporal protocols for Category II have been determined, but for the purposes of the future assessment, individual countries would provide their own standardized CPUE series for their fisheries. The meeting will focus on extending the time series of standardized CPUE and size data for the major fisheries across the North Pacific. A general recommendation is to further examine CPUE time-series in the Eastern Pacific Ocean (EPO). Time-series of several central American longline fisheries are short and it is premature to produce standardized CPUE series. The IATTC is requested to produce a short working paper for the March 2007 meeting documenting trends based on Category II data from these countries. A further recommendation is that the analyses of CPUE in the EPO be conducted to delineate a spatial region for use in future ISC swordfish assessments. Data and analytical considerations are extensive, but potential data sources that should be considered include Japan, Chile and Spanish longline fisheries.

The issue of stock boundaries will be considered at the July 2007 workshop and a stock structure scenario developed for the July 2008 ISC North Pacific Swordfish stock assessment. Given the current pace of progress, the SWOWG will provide to the Plenary Session in July 2007 an updated comparison of trends in abundance indices for the North Pacific swordfish. Completion of a stock assessment for swordfish is scheduled for the Plenary Session in 2008.

10.0 IDENTIFY ASSESSMENT MODELING PLATFORM - SWORDFISH

The working group had no discussions on this topic. Discussion about assessment modeling will be delayed until more progress on the data is completed.

11.0 ADMINISTRATIVE MATTERS

11.1 Terms of reference

A striped marlin working group Terms of Reference (TOR) document was introduced by Gerard DiNardo. Participants modified the TOR (Attachment 4). The WG noted that this document is

written in a general way to be useful for other ISC species WGs. The group also recognized that these general TORs are not a substitute for a work plan for individual WG meetings.

11.2 Working Group Protocols

The group agreed that it was unsatisfactory to have working papers submitted the day of the presentation. It does not allow for ample time to review the document in detail. It was agreed upon that submitting working papers a week in advance to working group workshops will be encouraged.

11.3 World Swordfish Update

Robert Humphreys reports progress on a World Swordfish Meeting. The idea to hold a World Swordfish Meeting would be to bring together both fisheries and academic scientists to present and discuss our current state of knowledge. A broad scope of disciplines would be represented including the fields of physiology, genetics, ecology, movement, life history, stock structure, stock status, management strategies, and the role of swordfish in the pelagic ecosystem. The meeting would preferably be held in a place that would draw researchers from all oceans and seas where swordfish research and fisheries are being conducted. In March 2006 at the ISC06 Plenary session, conditional support was granted to begin the process of contacting other management bodies to seek there interest in such a meeting. In August 2006, Victor Restrepo (ICCAT) was contacted regarding the idea of organizing a World Swordfish Meeting. Restrepo responded with the comment that it was a good idea and that the format could be like the World Bigeye Meetings that were previously held in La Jolla (1996) and in Madrid (2004). In terms of timing, the Fall (in the Northern Hemisphere) is not the best timing since ICCAT holds there SCRS and Committee meetings then. Restrepo also mentioned the budget issues would need to be resolved in terms of meeting rooms, simultaneous translation (if needed), and publication costs. The principal swordfish officers at ICCAT were contacted by Restrepo for their comments but have not responded as yet.

12.0 FUTURE MEETINGS

The next ISC Marlin and Swordfish working group workshop is tentatively scheduled for March 19-26, 2007. A location is currently being explored, with the possibility of holding it in Taiwan. The chairman is pursuing discussions. Kotaro Yokawa of the NRIFSF has offered an invitation to host the next meeting if Chinese-Taipei cannot host the meeting. The members of the MARWG and SWOWG will be notified once a location has been established.

13.0 RECOMMENDATIONS REQUIRING ACTION BY CHAIRMAN

1. The chairman will produce a spatial plot of category III striped marlin and swordfish size data considering all longline fleets. Spatial plots should consider all size data and additional plots disaggregated by sex.
2. Follow up with Eric Chang for final 1964-2005 total catch and offshore longline catch of striped marlin and swordfish (preliminary data provided in working paper ISC/06/MARWG&SWOWG-2/02). Also, inquire about the accuracy of 1953-1963

striped marlin and swordfish catch data published in the annual Taiwan yearbooks, and if any modifications to those data have been made. Request Category III data for the distant water longline fishery (Eric). Request Category II-III for offshore longline fishery.

3. Request Mexico for striped marlin and swordfish Category I-III longline data. Chairman will contact Michel Dreyfrus regarding this request.
4. Check with IATTC for availability of ETP data.
5. Chair will check on availability of swordfish longline data for Spanish and Chilean fleets.
6. Request Korea for striped marlin and swordfish Category I-III longline data. Chairman will contact Dr. Moon regarding this request.
7. Request China for striped marlin and swordfish Category I-III longline data. Chairman will contact Dr. Dai regarding this request.
8. Verify that catch of striped marlin by U.S. recreational fishermen in Mexican Waters is reported as catch by Mexico.
9. Request complete US data, Categories I-III for swordfish and striped marlin.

Table 1. Striped marlin catches (in metric tons) by fisheries, 1952-2005. Blank indicates no effort. - indicates data not available. 0 indicates less than 1 metric ton. Provisional estimates in ( ).

	Japan							Chinese Taipei[1,2]					Costa Rica[1]	Korea			Mexico			United States					Grand Total
Year	Distant-water and Offshore Longline	Coastal Longline	Other Longline	Small Mesh Gillnet	Large Mesh Gillnet	Other[3]	Total	Distant-water Longline	High seas Drift Gillnet	Offshore Longline	Other	Total	Sport	High-seas Drift Gillnet		Total	Longline	Sport[1]	Total	Longline	Troll	Handline	Sport[1]	Total	
1952	2,901		722	0	0	1,564	5,187					-		-		0			0				23	23	5,210
1953	2,138		47	0	0	954	3,139					-		-		0			0				5	5	3,144
1954	3,068		52	0	0	1,088	4,208					-		-		0			0				16	16	4,224
1955	3,082		28	0	0	1,038	4,149					-		-		0			0				5	5	4,154
1956	3,729		59	0	0	1,996	5,785					-		-		0			0				34	34	5,819
1957	3,189		119	0	0	2,459	5,766					-		-		0			0				42	42	5,808
1958	4,106		277	0	3	2,914	7,301					-		-		0			0				59	59	7,360
1959	4,152		156	0	2	3,191	7,501					-		-		0			0				65	65	7,566
1960	3,862		101	0	4	1,937	5,905					-		-		0			0				30	30	5,935
1961	4,420		169	0	2	1,797	6,388					-		-		0			0				24	24	6,412
1962	5,739		110	0	8	1,912	7,770					-		-		0			0				5	5	7,775
1963	6,135		62	0	17	1,910	8,124					-		-		0			0				68	68	8,192
1964	14,304		42	0	2	2,344	16,691			560	199	759		-		0			0				58	58	17,508
1965	11,602		19	0	1	2,796	14,418			392	175	567		-		0			0				23	23	15,008
1966	8,419		112	0	2	1,573	10,106			356	157	513		-		0			0				36	36	10,655
1967	11,698		127	0	3	1,551	13,379	2		385	204	591		-		0			0				49	49	14,018
1968	15,913		230	0	3	1,040	17,186	1		332	208	541		-		0			0				51	51	17,778
1969	8,544	600	3	0	3	2,630	11,780	2		571	192	765		-		0			0				30	30	12,575
1970	12,996	690	181	0	3	1,029	14,899	0		495	189	684		-		0			0				18	18	15,601
1971	10,965	667	259	0	10	2,016	13,917	0		449	135	584		-		0			0				17	17	14,518
1972	7,006	837	145	0	243	990	9,221	9		380	126	515		-		0			0				21	21	9,757
1973	6,299	632	118	0	3,265	630	10,944	1		568	139	708		-		0			0				9	9	11,660
1974	6,625	327	49	0	3,112	775	10,888	24		650	118	792		-		0			0				55	55	11,735
1975	5,193	286	38	0	6,534	685	12,736	64		732	96	892		-		0			0				27	27	13,655
1976	4,996	244	34	0	3,561	571	9,406	32		347	140	519		-		0			0				31	31	9,956
1977	2,722	256	15	0	4,424	547	7,964	17		524	219	760		-		0			0				41	41	8,766
1978	2,464	243	27	0	5,593	418	8,745	0		618	78	696		-		0			0				37	37	9,478
1979	4,898	366	21	0	2,532	526	8,343	26		432	122	580		-		0			0				36	36	8,960
1980	5,871	607	5	0	3,467	537	10,488	61		223	132	416		-		0			0				33	33	10,937
1981	3,957	259	12	0	3,866	538	8,632	17		491	95	603		-		0			0				60	60	9,295
1982	5,211	270	13	0	2,351	655	8,500	7		397	138	542		-		0			0				41	41	9,083
1983	3,575	320	10	22	1,845	792	6,564	0		555	214	769		-		0			0				39	39	7,373
1984	3,335	386	9	76	2,257	719	6,782	0		965	339	1,304		-		0			0				36	36	8,122
1985	3,698	711	24	40	2,323	732	7,528	0		513	181	694		-		0			0				42	42	8,263
1986	5,178	901	33	48	3,536	571	10,267	0		179	148	327		-		0	-		0				19	19	10,614
1987	5,439	1,187	6	32	1,856	513	9,033	31		383	151	565		-		0	-		0	272	30	1	28	331	9,928
1988	5,768	752	7	54	2,157	668	9,406	7		457	169	633		-		0	-		0	504	54	1	30	589	10,628
1989	4,582	1,081	13	102	1,562	537	7,877	8		184	157	349		-		0	-		0	612	24	0	52	688	8,914
1990	2,298	1,125	3	19	1,926	545	5,916	2		137	256	395		-		0	-	181	181	538	27	0	23	588	7,079
1991	2,677	1,197	3	27	1,302	506	5,712	36		254	286	576	106	-		0	-	75	75	663	40	0	12	715	7,184
1992	2,757	1,247	10	35	1,169	302	5,520	1		219	197	417	281	-		0	-	142	142	459	38	1	25	523	6,884
1993	3,286	1,723	1	0	828	443	6,281	5		221	142	368	438	-		0	-	159	159	471	68	1	11	551	7,796
1994	2,911	1,284	1	0	1,443	383	6,022	1		137	196	334	521	-		0	-	179	179	326	34	0	17	377	7,433
1995	3,494	1,840	3	0	970	278	6,585	27		83	82	192	153	-		0	-	190	190	543	52	0	14	609	7,729
1996	1,951	1,836	4	0	703	152	4,646	26		242	51	319	122	348		348	-	237	237	418	54	1	20	493	6,165
1997	2,120	1,400	3	0	813	163	4,499	59		433	45	537	138	828		828	-	193	193	352	38	1	21	412	6,607
1998	1,784	1,975	2	0	1,092	304	5,157	90		306	40	436	144	519		519	-	345	345	378	26	0	23	427	7,028
1999	1,608	1,551	4	0	1,126	183	4,472	66		191	37	294	166	352		352	-	266	266	364	28	1	12	405	5,955
2000	1,152	1,109	8	0	1,062	297	3,628	153		241	55	449	97	436		436	-	312	312	200	14	1	10	225	5,147
2001	985	1,326	11	0	1,077	237	3,636	121		192	50	363	151	206		206	-	237	237	351	42	2		395	4,988
2002	764	795	5	0	1,264	291	3,119	251		337	29	617	76	153		153	-	305	305	226	29	0		255	4,525
2003	1,008	826	3	0	1,064	203	3,104	-		131	42	173	79	172		172	-	322	322	538	28	0		566	4,416
2004	(761)	(964)	(2)	(0)	(1,339)	(90)	(3,066)	-		(143)	(23)	(166)	(19)	(75)		(75)	-	-	0	(384)	(56)	(2)		(442)	(3,768)
2005	(803)						(803)	-		(139)	(31)	(170)	-	(115)		(115)	-	-	0	(377)	-	-		(377)	(1,465)

[1]Estimated from catch in number of fish.

[2]Data from assessment table.

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

Table 2. Swordfish catches (in metric tons) by fisheries, 1952-2005. Blank indicates no effort. - indicates data not available. 0 indicates less than 1 metric ton. Provisional estimates in ( ).

	Japan								Chinese Taipei[5]				Korea	Mexico	United States[6]						
															Hawaii	California					
Year	Distant-water and Offshore Longline[2]	Coastal Longline	Driftnet	Harpoon[3]	Other Bait Fishing	Trapnet	Other[4]	Total	Distant-water Longline	Offshore Longline	Other	Total	Longline	All Gears	Longline	Longline	Gill Net	Harpoon	Unknown[7]	Total	Grand Total
1952	8,890	152	0	2,569	6	68	6	11,691	-	-		-	-	-	-	-	-	-	-	-	11,691
1953	10,796	77	0	1,407	20	21	87	12,408	-	-		-	-	-	-	-	-	-	-	-	12,408
1954	12,563	96	0	813	104	18	17	13,611	-	-		-	-	-	-	-	-	-	-	-	13,611
1955	13,064	29	0	821	119	37	41	14,111	-	-		-	-	-	-	-	-	-	-	-	14,111
1956	14,596	10	0	775	66	31	7	15,485	-	-		-	-	-	-	-	-	-	-	-	15,485
1957	14,268	37	0	858	59	18	11	15,251	-	-		-	-	-	-	-	-	-	-	-	15,251
1958	18,525	42	0	1,069	46	31	21	19,734	-	-		-	-	-	-	-	-	-	-	-	19,734
1959	17,236	66	0	891	34	31	10	18,268	-	-		-	-	-	-	-	-	-	-	-	18,268
1960	20,058	51	1	1,191	23	67	7	21,400	-	-		-	-	-	-	-	-	-	-	-	21,400
1961	19,715	51	2	1,335	19	15	11	21,147	-	-		-	-	-	-	-	-	-	-	-	21,147
1962	10,607	78	0	1,371	26	15	18	12,115	-	-		-	-	-	-	-	-	-	-	-	12,115
1963	10,322	98	0	747	43	17	16	11,243	-	-		-	-	-	-	-	-	-	-	-	11,243
1964	7,669	91	4	1,006	42	17	28	8,858	-	343	18	361	-	-	-	-	-	-	-	-	9,219
1965	8,742	119	0	1,908	26	14	182	10,991	-	358	10	368	-	-	-	-	-	-	-	-	11,359
1966	9,866	113	0	1,728	41	11	4	11,764	-	331	27	358	-	-	-	-	-	-	-	-	12,122
1967	10,883	184	0	891	33	12	5	12,008	-	646	35	681	-	-	-	-	-	-	-	-	12,689
1968	9,810	236	0	1,539	41	14	9	11,649	-	763	12	775	-	-	-	-	-	-	-	-	12,424
1969	9,416	296	0	1,557	42	11	5	11,327	0	843	7	850	-	-	-	-	-	-	-	-	12,177
1970	7,324	427	0	1,748	36	9	1	9,545	-	904	5	909	-	-	5	-	-	612	10	627	11,081
1971	7,037	350	1	473	17	37	0	7,915	-	992	3	995	-	-	1	-	-	99	3	103	9,013
1972	6,796	531	55	282	20	1	1	7,686	-	862	11	873	-	2	0	-	-	171	4	175	8,736
1973	7,123	414	720	121	27	23	2	8,430	-	860	119	979	-	4	0	-	-	399	4	403	9,816
1974	5,983	654	1,304	190	27	16	1	8,175	1	880	136	1,017	-	6	0	-	-	406	22	428	9,626
1975	7,031	620	2,672	205	58	18	2	10,606	29	899	153	1,081	-	-	0	-	-	557	13	570	12,257
1976	8,054	750	3,488	313	170	14	1	12,790	23	613	194	830	-	-	0	-	-	42	13	55	13,675
1977	8,383	880	2,344	201	71	7	1	11,887	36	542	141	719	-	-	17	-	-	318	19	354	12,960
1978	8,001	1,031	2,475	130	110	22	1	11,770	-	546	12	558	-	-	9	-	-	1,699	13	1,721	14,049
1979	8,602	1,038	983	161	45	15	1	10,845	7	661	33	701	-	7	7	-	-	329	57	393	11,946
1980	6,005	849	1,746	398	30	15	1	9,045	10	603	76	689	-	380	5	-	160	566	62	793	10,907
1981	7,039	727	1,848	129	59	10	0	9,812	2	656	25	683	-	1,575	3	1	461	267	20	752	12,822
1982	6,064	874	1,257	195	58	7	0	8,546	1	855	49	905	-	1,365	5	2	911	156	43	1,117	11,933
1983	7,692	999	1,033	166	30	9	2	9,931	0	783	166	949	-	120	5	1	1,321	58	378	1,763	12,763
1984	7,177	1,177	1,053	117	98	13	0	9,635	-	733	264	997	-	47	3	14	2,101	96	678	2,892	13,571
1985	9,335	999	1,133	191	69	10	0	11,737	-	566	259	825	-	18	2	46	2,368	211	792	3,419	15,999
1986	8,721	1,037	1,264	123	47	9	0	11,201	-	456	211	667	-	422	2	4	1,594	236	696	2,532	14,822
1987	9,495	860	1,051	87	45	11	0	11,549	3	1328	190	1,521	-	550	24	4	1,287	211	300	1,826	15,446
1988	8,574	678	1,234	173	19	8	0	10,686	-	777	263	1,040	-	613	24	19	1,092	180	344	1,659	13,998
1989	6,690	752	1,596	362	21	10	0	9,431	50	1491	38	1,579	-	690	218	29	1,050	54	224	1,575	13,275
1990	5,833	690	1,074	128	13	4	0	7,742	143	1309	154	1,606	-	2,650	2,436	18	1,028	50	137	3,669	15,667
1991	4,809	807	498	153	20	5	0	6,292	40	1390	180	1,610	-	861	4,508	39	836	16	137	5,536	14,299
1992	7,234	1,181	887	381	16	6	0	9,705	21	1473	243	1,737	-	1,160	5,700	95	1,332	74	44	7,245	19,847
1993	8,298	1,394	292	309	43	4	1	10,341	54	1174	310	1,538	-	812	5,909	165	1,400	169	36	7,679	20,370
1994	7,366	1,357	421	308	37	4	0	9,493	-	1155	219	1,374	-	581	3,176	740	799	153	8	4,876	16,324
1995	6,422	1,387	561	440	17	7	0	8,834	50	1135	225	1,410	-	437	2,713	279	755	96	31	3,874	14,555
1996	6,916	1,067	428	633	9	4	0	9,057	9	1130	23	1,162	12	439	2,502	347	752	81	10	3,692	14,362
1997	7,002	1,214	365	396	11	5	0	8,993	15	2190	6	2,211	246	2,365	2,881	664	707	84	3	4,339	18,154
1998	6,233	1,190	471	535	9	2	0	8,441	20	1900	68	1,988	123	3,603	3,263	422	924	48	13	4,670	18,825
1999	5,557	1,049	724	461	2	5	0	7,798	70	2234	37	2,341	104	1,136	3,100	1,333	606	81	2	5,122	16,501
2000	6,180	1,121	808	539	7	5	1	8,661	325	2470	60	2,855	161	2,216	2,949	1,908	646	90	9	5,602	19,495
2001	6,932	908	732	255	5	15	0	8,848	1,039	2727	40	3,806	349	780	220	1,763	375	52	5	2,415	16,198
2002	6,230	965	1,164	222	8	11	0	8,600	1,633	2511	24	4,168	350	465	204	1,320	302	90	3	1,919	15,502
2003	5,352	1,039	1,198	167	10	4	0	7,770	1,084	3196	11	4,291	311	671	147	1,812	216	107	0	2,282	15,325
2004	(6165)	1,454	1,339	33	33	23	1	(9,048)	884	(3,167)	(15)	(4,066)	(350)	-	(213)	(898)	182	89	(37)	(1,419)	(14,883)
2005	(6972)							(6,972)	(437)	(4,012)	(26)	(4,475)	(407)	-	(1,360)	-	219	73	(0)	(1,652)	(13,506)

[1]Catch data are currently unavailable for Republic of Korea, Philippines, 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] Contains trolling and harpoon but majority of catch obtained by harpoon.

[4]For 1952-1970 "Other" refers to catches by other baitfishing methods, trap nets, and various upspecified 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…(Al Coan to provide footnote)

Table 3. List of potential data sources under consideration for swordfish stock assessment.

Fishery/Source	Data Cat.	Spatial Scale	Japan	USA California	USA Hawaii	IATTC	Chinese Taipei	Mexico	Korea	SPC	China	Philippines
Country/Organ.			Yokawa	Coan	Coan, (Skillman)	Hinton	Chang	Fleischer	Moon	Lawson	Dai	
(Data Contact)												
Analyst			TBN	TBN	TBN		TBN					
Distant	I		Yes		N/A	No	NPALBWG	N/A	In NPALBWG?	Ask?	Ask?	
Longline	II	1° x 1° or 5 x 5; 1959-1974 set x set data prel.	1952→2005	N/A	N/A	Various by flag.	5° x 5°, 1967-2004	N/A	5° x 5° (Maybe) Ask Dr. Moon	Ask?	Ask?	
	III		1970-2005 EFL no sex, port data=proc-Wt (few)	N/A	N/A	Yes	No	N/A	No	Ask?	Ask?	
Offshore	I		Yes	N/A	N/A	Partial	Yes	N/A		Ask?	Ask?	
Longline	II	1° x 1° or 5 x 5, 1959-74 set x set data prel.	1959-2005	N/A	N/A	Various time	No	N/A		Ask?	Ask?	
	III		1970-2005 EFL no sex, port data=proc-Wt (few)	N/A	N/A	No	No	N/A		Ask?	Ask?	
Coastal	I		Yes	N/A	N/A	Partial	Partial	N/A				
Longline	II	1° x 1° or 5 x 5	1994→2005	N/A	N/A	1° x 1° lit	No	N/A				
	III		EFL, proc. Wt	N/A	N/A	Little	No	N/A				
Longline	I		N/A	Yes	Yes	Partial	N/A	Yes, 50-75 nmi offshore			Cat. II data thru IATTC for EPO but whole Pacific?	
	II		N/A	1990→2004, logbook	1991→2006, logbook	Costa Rica, Panama, Belize, other flags	N/A	Maybe				
	III		N/A	?	1994-on	Spotty	N/A	Maybe				
					EFL&Sex							
High-Seas Drift Net/Large Mesh	I		Yes	N/A	N/A	N/A		N/A				
	II	1° x 1°	1960-92	N/A	N/A	N/A		N/A				
	III		EFL (Observer)	N/A	N/A	N/A		N/A				
Coastal Gill-Net	I		Yes	Yes	N/A	N/A		Yes, 50-75 nmi offshore				
	II		No	1980-on, logbook	N/A	no fishery		Inside EEZ				
	III		Yes, 2002-	Observers; sex?	N/A	N/A		Maybe				
Harpoon	I		Yes	Yes	N/A	N/A	Cat I yearbook, Cat II none	N/A				
	II		No	1974-on,	N/A	no fishery		N/A				
	III		Yes, 2002-	Partial, 1974-1999; sex?	N/A	N/A		N/A				
Purse Seine	I		Yes	See IATTC data	See FAA/SPC	Very low		N/A		?		
	II				Databases	1° x 1°, 1990-on		N/A		?		
	III					EFL		N/A		?		
State Records	I		Yes	Yes	1948→	N/A		Yes				
Fishing Clubs	I		Yes		No	N/A		N/A				
	III		No	RW Wt. only	No	N/A		N/A				
				1950? →								
Research/	III			No	EFL, Wt, by Sex	N/A		N/A				
Training			1970-2005 EFL&Sex data, port data=proc-Wt (few)		1950s→							Handline but variety of fisheries
Cruises												
Market	III		1970s for wt.	Yes, F&G,	1960→	EFLs @ sea or landed for DNA, Mexico,etc.	LJFL, Wt.,	No				
Samples			1998 for EFL	Pre 2000	Auction		Sex, 1997-2006, not every year					
					Limited FL, proc Wt.							Annual est. of catch (I), annual est. of size frequency (III), not Cat. II data
Observers	III		No	EFL, Wt., sex	EFL, sex, see LL cell	EFL		N/A				

=Data will be delivered by February 1, 2007 for analysis

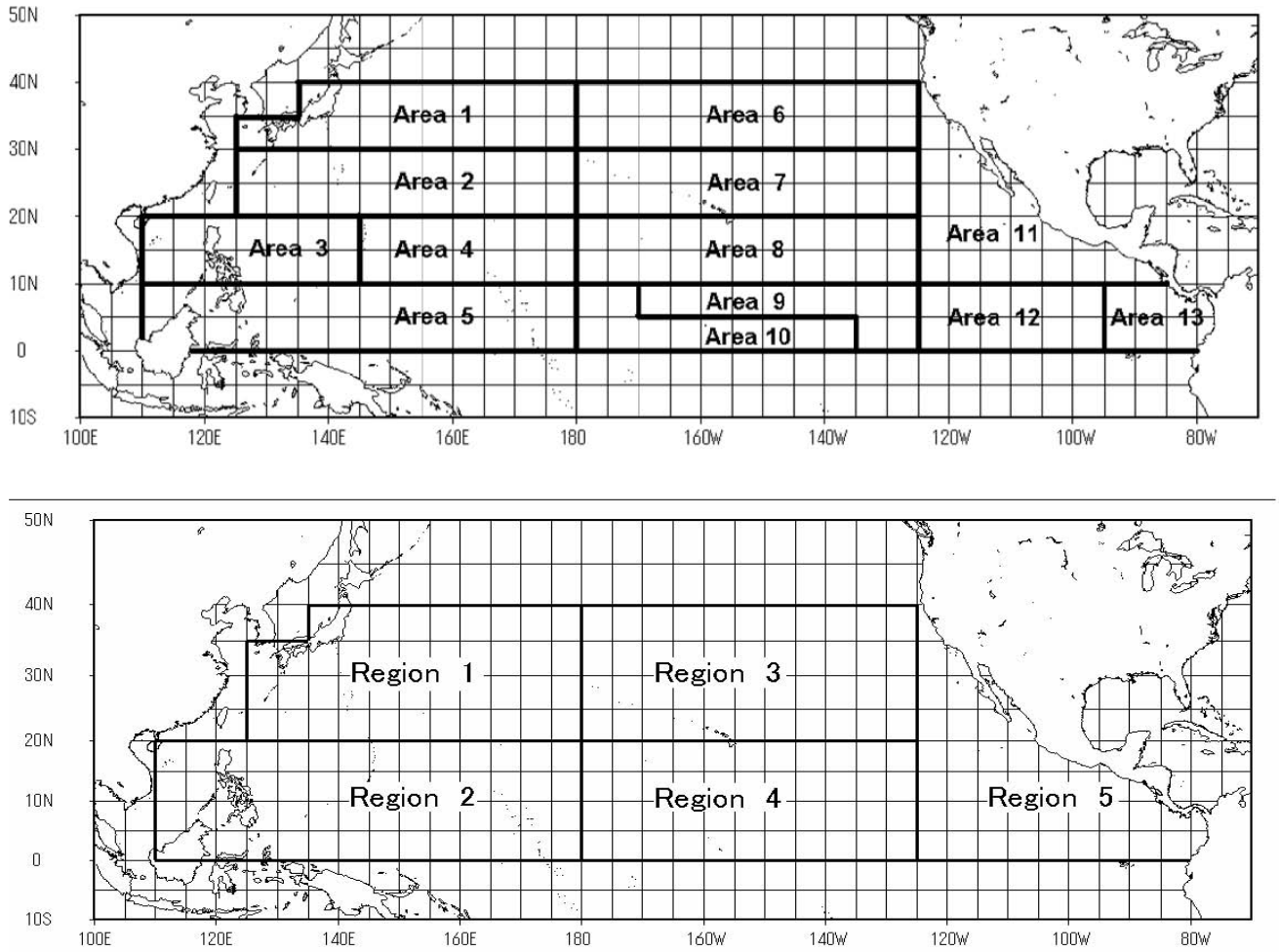
=Data records exist but would probably not be deliverable by February 1, 2007

=Data not available

Table 4. List of potential data sources (by country and organization) under consideration for use at the March 2007 striped marlin stock assessment.

Fishery/Source	Data Cat.	Spatial Scale	Japan	USA California	USA Hawaii	IATTC	Taiwan	Mexico	Korea	SPC	China
Country/Organ. (Data Contact)			Yokawa	Skillman	Skillman	Hinton	Chang	Dreyfus	Moon	Lawson	?
Distant Longline	**I** **II** **III**	1º x 1º	Yes 1960s→ EFL, p-Wt			No Yes, Time? No	NPALBWG 5º x 5º No		NPALBWG 5º x 5º No	Ask? Ask? Ask?	Ask? Ask? Ask?
Offshore Longline	**I** **II** **III**	1º x 1º	Yes 1960s→ EFL, proc. Wt	Yes 1990→ No	Yes 1991→ No	Partial Time? No	Yes No? No			Ask? Ask? Ask?	Ask? Ask? Ask?
Coastal Longline	**I** **II** **III**	1º x 1º	Yes 1994→? EFL, proc. Wt			Yes 1º x 1º lit Little	Partial No? No	Ask? Ask? Ask?			
High-Seas Drift Net/Large Mesh	**I** **II** **III**	1º x 1º	Yes 1960-92 EFL (Observer)				Yes? ? No				
Coastal Gill-Net	**I** **II** **III**		Partial 1970s→ None					Ask? Ask? Ask?			
Purse Seine	**I** **II** **III**					Yes 1º x 1º EFL				? ? ?	
State Records	**I**				1948→						
Fishing Clubs	**III**		RW only 1986→	RW Wt. only 1950? →							
Research/ Training Cruises	**III**		EFL, Wt, Sex		EFL, Wt, by Sex 1950s→						
Market Samples	**III**				1960→ Auction EFL, Wt.		EFL, Wt., Sex				
Observers	**III**			EFL	EFL	EFL	2004→?	Ask?			

Figure 1. Area stratification used in the standardization of CPUE of striped marlin caught by Japanese distant-water longliners (upper panel) and area stratification scheme adopted for current assessment (lower panel). This definition is followed from the previous stock assessment.



Attachment 1. List of Participants

Chinese-Taipei

Chi-Lu Sun
Institute of Oceanography
National Taiwan University
1, Sect. 4, Roosevelt Rd., Taipei, Taiwan, 106
886-2-23629842 (tel&fax)
chilu@ntu.edu.tw

Kotaro Yokawa
National Research Institute of Far Seas Fisheries
5-7-1 Orido, Shimizu, Shizuoka, Japan, 424-8633
81-543-36-6035, 81-543-35-9642 (fax)
yokawa@fra.affrc.go.jp

Japan

Hitoshi Honda
National Research Institute of Far Seas Fisheries
5-7-1 Orido, Shimizu, Shizuoka, Japan, 424-8633
81-543-36-6000, 81-543-35-9642 (fax)
hhonda@affrc.go.jp

Momoko Ichinokawa
PIFSC, Visiting Scientist
National Research Institute of Far Seas Fisheries
5-7-1 Orido, Shimizu, Shizuoka, Japan, 424-8633
81-543-36-6014, 81-543-35-9642 (fax)
ichimomo@fra.affrc.go.jp

Mikihito Kai
National Research Institute of Far Seas Fisheries
5-7-1 Orido, Shimizu, Shizuoka, Japan 424-8633
81-543-36-6035, 81-543-35-9642 (fax)
kaim@affrc.go.jp

Minoru Kanaiwa
Tokyo University of Agriculture
196 Yasaka, Abashiri, Hokkaido, Japan 099-2493
81-152-48-3906, 81-152-48-2940 (fax)
m3kanaiw@bioindustry.nodai.ac.jp

Yukio Takeuchi
National Research Institute of Far Seas Fisheries
5-7-1 Orido, Shimizu, Shizuoka, Japan 424-8633
81-543-26-6039, 81-543-35-9642 (fax)
yukiot@affrc.go.jp

United States

Keith Bigelow
NOAA/NMFS PIFSC
2570 Dole Street
Honolulu, HI 96822-2396
808-983-5388, 808-983-2902 (fax)
Keith.Bigelow@noaa.gov

Ramon Conser
NOAA/NMFS SWFSC
8604 La Jolla Shores Dr.
La Jolla, CA 92037
858-546-5688, 858-546-7003 (fax)
rconser@ucsd.edu

Gerard DiNardo
NOAA/NMFS PIFSC
2570 Dole Street
Honolulu, HI 96822-2396
808-983-5397, 808-983-2902 (fax)
Gerard.Dinardo@noaa.gov

Robert Humphreys
NOAA/NMFS PIFSC
99-193 Aiea Heights Drive, Suite 417
Aiea, HI 96701-3119
808-983-5377, 808-983-2902 (fax)
Robert.Humphreys@noaa.gov

Kevin Piner
NOAA/NMFS SWFSC
8604 La Jolla Shores Dr.
La Jolla, CA 92037
858-546-5613, 858-546-7003 (fax)
Kevin.Piner@noaa.gov

Gary Sakagawa
NOAA/NMFS SWFSC
8604 La Jolla Shores Dr.
La Jolla, CA 92037
858-546-7177, 858-546-5653 (fax)
Gary.Sakagawa@noaa.gov

Lyn Wagatsuma
Joint Institute of Marine and Atmospheric Research
2570 Dole Street
Honolulu, HI 96822-2396
808-983-2966, 808-983-2902 (fax)
Lyn.Wagatsuma@noaa.gov

IATTC

Michael G. Hinton
Inter-American Tropical Tuna Commission
8604 La Jolla Shores Drive
La Jolla, CA 92307-1508
858-546-7033, 858-546-7133 (fax)
mhinton@iattc.org

Attachment 2
Working Papers and Background Papers

Working Papers

ISC/06/MARWG&SWOWG-2/01 Brief review of Japanese striped marlin and swordfish catch in the north Pacific. (K. Yokawa)

ISC/06/MARWG&SWOWG-2/02 An update on landing and sex-specific size composition data of striped marlin and swordfish in the Taiwanese offshore and coastal fisheries. (C.L. Sun, S.Z. Yeh, S.P. Wang, Y.J. Chang, W.C. Chiang)

ISC/06/MARWG&SWOWG-2/03 Updated review table of vital rates and life history parameters for striped marlin, swordfish, and blue marlin in the North Pacific Ocean. (J.H. Uchiyama, R.L. Humphreys, Jr.)

ISC/06/MARWG&SWOWG-2/04 Update of CPUE Standardizations of striped marlin caught by Japanese coastal longliners in the northwest Pacific. (K. Yokawa)

ISC/06/MARWG&SWOWG-2/05 Standardized CPUE of striped marlin caught by Japanese distant water longliners using set-by-set data in the north Pacific. (M. Ichinokawa, K. Yokawa)

ISC/06/MARWG&SWOWG-2/06 Standardization of Taiwanese Tuna Longline catch rates for striped marlin in the North Pacific Ocean. (C.L. Sun, S.Z. Yeh, S.P. Wang)

ISC/06/MARWG&SWOWG-2/07 Comparison of Delta GLM and statistical habitat-based models (statHBS) to estimate standardized CPUE for striped marlin. (K.A. Bigelow)

ISC/06/MARWG&SWOWG-2/08 Using statHBS with multiple species to estimate catenary curve. (M. Kanaiwa, K. Yokawa)

ISC/06/MARWG&SWOWG-2/09 U.S. Swordfish Fisheries in the North Pacific Ocean. (R.Y. Ito, A.L. Coan, Jr.)

Background Papers

Genetic heterogeneity of Pacific swordfish (*Xiphias gladius* L.) revealed by the analysis of ldh-A sequences. [Draft manuscript]. (J.R. Alvarado-Bremer, M.G. Hinton, T.W. Grieg, 2005)

Review of the ISC Albacore Working Group Data Base. (A.L. Coan, Jr. ISC/05/MAR&SWO-WGs/02)

Sexual maturity, sex ratio, and size composition of swordfish, *Xiphias gladius*, caught by the Hawaii-based pelagic longline fishery. (E.E. DeMartini, J.H. Uchiyama, H.A. Williams, 2000. U.S.Fish. Bull.)

Status of swordfish stocks in the eastern Pacific Ocean estimated using data from Japanese tuna longline fisheries. (M.G. Hinton, 2003. Mar. Freshwater Res.)

Assessment of swordfish in the eastern Pacific Ocean. (M.G. Hinton, W.H. Bayliff, J.M. Suter, 2005. IATTC Stock Assessment Report 5)

Distribution and stock assessment of swordfish, *Xiphias gladius*, in the eastern Pacific Ocean from catch and effort data standardized on biological and environmental parameters. (M.G. Hinton, R.B. Deriso, 1998. NOAA Tech. Rep. NMFS 142)

Methods for standardizing CPUE and how to select among them. (M.G. Hinton, M.N. Maunder, 2004. Col. Vol. Sci. Pap. ICCAT)

Review of product form conversion ratios for the Hawaii billfish catch. (R.Y. Ito ISC/05/MAR&SWO-WGs/03)

U.S. Swordfish Fisheries in the North Pacific Ocean. (R.Y. Ito, A.L. Coan, Jr. ISC/06/MAR&SWO-WGs/08)

MULTIFAN-CL assessment of swordfish in the North Pacific. (P. Kleiber, K. Yokawa ISC/04/SWO-WG/07)

Size trends and population characteristics of striped marlin, Tetrapturus audax caught in the New Zealand recreational fishery. (R.K. Kopf, P.S. Davie, J.C. Holdsworth, 2005. New Zealand Jour. of Mar. and Freshwater Res.)

Biological reference points for use by ISC. (S. Kohin, R. Conser, G. Sakagawa ISC/06/PLENARY/15)

An operational model to evaluate assessment and management procedures for the North Pacific swordfish fishery. (M. Labelle, 2002. NOAA-TM-NMFS-SWFSC-341)

Estimating relative abundance from catch and effort data, using neural networks. (M.

Maunder, M.G. Hinton, 2006. IATTC Special Report 15)

Developing indices of abundance using habitat data in a statistical framework. (M.N. Maunder, M.G. Hinton, K.A. Bigelow, A. Langley, In Press. Bulletin of Marine Science)

Evaluating empirical indicators and reference points for fisheries management: application to the broadbill swordfish fishery off eastern Australia. (A.E. Punt, R.A. Campbell, A.D.M. Smith, 2001. Mar. Freshwater Res.)

Structure and migration corridors in Pacific populations of the swordfish *Xiphias gladius*, as inferred through analyses of mitochondrial DNA. (C.A. Reep, L. Arcangeli, B.A. Block, 2000. Mar. Biol.)

Estimation of abundance index of swordfish caught by Japanese longliner in the North Pacific 1956-2002. (H. Saito, K. Yokawa ISC/04/SWO-WG/04)

Spatial and temporal CPUE trends and stock unit inferred from them for the Pacific swordfish caught by the Japanese tuna longline fishery. (O. Sosa-Nishizaki, M. Shimizu, 2001. Bull. Natl. Res. Inst. Far Seas Fish.)

Length-weight interrelationships for swordfish, *Xiphias gladius* L., caught in the central North Pacific. (J.H. Uchiyama, E.E. DeMartini, H.A. Williams, 1999. NOAA-TM-NMFS-SWFSC-284)

Analyses of observed longline catches of blue marlin, *Makaira nigricans,* using generalized additive models with operational and environmental predictors. (W.A. Walsh, E.A. Howell, K.A. Bigelow, M.L. McCracken, In Press. Bull. of Mar. Sci.)

Evaluation of a sex-specific age-structured assessment method for the swordfish, *Xiphias gladius*, in the North Pacific Ocean. (S.P. Wang, C.L. Sun, A.E. Punt, S.Z. Yeh, 2005. Fish. Res.)

Analysis of the sexed size data of billfishes from the Taiwanese offshore and coastal fisheries. (S.P. Wang, C.L. Sun, S.Z. Yeh, W.C. Chiang, N.M. Su, C.H. Liu ISC/05/MAR&SWO-WGs/11)

Size composition data for billfishes caught by the Hawaii-based U.S. longline fleet: Data collection, sample sizes, and other metadata. (J. Wetherall, B. Miyamoto ISC/05/MAR&SWO-WGs/10)

Status of ISC Data Base Inventory for the Fisheries Related with Marlins and Swordfish. (H. Yamada, M. Takahashi, F. Muto ISC/05/MAR&SWO-WGs/01)

Estimation of abundance index of swordfish caught by Japanese longliners by the Habitat model. (K. Yokawa ISC/04/SWO-WG/05)

Comparison of three abundance indices estimated by catch and effort data of Japanese offshore and distant water longliners. (K. Yokawa ISC/04/SWO-WG/06)

Review of size data of swordfish caught by Japanese longliners in the North Pacific. (K. Yokawa ISC/05/MAR&SWO-WGs/09)

Evaluation and Preliminary Analysis of Size Data of Swordfish Caught by Japanese Longliners during 1970-1994. (K. Yokawa, Y. Uozumi)

Estimates of the catch and effort by foreign tuna longliners and baitboats in the fishery conservation zone of the central and western Pacific, 1965-77. (M.Y.Y. Yong, J.A. Wetherall, 1980. NOAA-TM-NMFS-WSFC-2)

Catch Tables for the International Scientific Committee's Albacore, Bluefin Tuna, Striped Marlin and Swordfish Working Groups. (ISC/06/PLENARY/14)

Report of the ISC Marlin and Swordfish Working Group Joint Meeting. January 29 and 31, 2004, Honolulu, Hawaii.

Report of the ISC Marlin and Swordfish Working Group Joint Meeting. August 29-September 2, 2005, Shimizu, Japan.

Report of the ISC Marlin Working Group Meeting. November 15-21, 2005, Honolulu, Hawaii U.S.A.

Report of the ISC Marlin and Swordfish Working Group Joint Meeting. March 20-22, 2006, La Jolla, California, U.S.A.

Report of the Sixth Plenary Meeting of the International Scientific Committee for Tuna and Tuna-Like Species in the North Pacific Ocean. March 23-27, 2006, La Jolla, California U.S.A.

Attachment 3
Agenda

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

MARLIN AND SWORDFISH WORKING GROUP WORKSHOP

National Research Institute of Far Seas Fisheries (NRIFSF)
5-7-1 Orido
Shimizu-ku, Shizuoka-shi, 424-8633 Japan

November 8-15, 2006

November 8 (Wednesday), 0930-1700 – Striped Marlin

1. Registration and Distribution of Documents **(0930-1000)**

2. Opening of Joint Intercessional MARWG & SWOWG Workshop
    a. Welcoming Remarks by NRIFSF Director Dr. Kobayashi
    b. Introductions, Meeting Protocols, and Logistics

3. Adoption of Agenda, Assignment of Rapporteurs & Document Numbering

4. Computing Facilities
    a. Access
    b. Security Issues

5. Review and Finalize Striped Marlin Data Input Files (Category I, II, & III)
    a. Country/Organization Reports
    b. Catch and Effort
    c. Size (length or weight) Data
    d. Biological Data

6. Abundance Indices for Striped Marlin
    a. Standardization Approaches
    b. Relative Importance of CPUE Series

November 9 (Thursday), 0900-1700 – Striped Marlin

6. Abundance Indices for Striped Marlin *(Continued)*
    a. Standardization Approach
    b. Relative Importance of CPUE Series

7. Stock Structure – Striped Marlin

a. Stock Structure Scenario for Assessments (should be consistent with last assessment)

8. Identify Assessment Modeling Platform

9. Schedule to Complete Assessment

Reception: 1730-1930 (NRIFSF) – Welcome Reception with Guests and Friends

November 10 (Friday), 0900-1700 – Swordfish

10. Present, Review, and Prepare Data Input Files for Swordfish
    a. Country/Organization Reports (Swordfish)
    b. Catch and Effort
    c. Preliminary Size (length and/or weight) Data
    d. Biological Data

November 11 (Saturday), 0900-1700 - Swordfish

10. Present, Review, and Prepare Data Input Files for Swordfish (Continued)
    a. Catch and Effort
    b. Preliminary Size (length and/or weight) Data
    c. Biological Data

11. Review Product Form Conversion Ratios for Swordfish
    a. "Raising factors" for converting processed weight to whole weight

Reception: Dinner at Local Restaurant

November 12 (Sunday), No Meeting

November 13 (Monday), 0900-1700 - Swordfish

12. Abundance Indices for Swordfish
    a. Standardization Techniques

November 14 (Tuesday), 0900-1200 - Swordfish
(Rapporteurs "Stay" after 1200 to Complete Assignments)

13. Identify Initial Assessment Models for Swordfish (who, when, how)

14. Administrative Matters
    a. Terms of Reference
    b. Working Group Protocols (working papers, engagement, etc.)
    c. Working Group Over Commitments & Work Plans
    d. World Swordfish Meeting-update

15. Future Meetings

November 15 (Wednesday), 1100-1600

16. Finalize Report

17. Adjournment

Attachment 4
Draft Terms of Reference and Operating Procedures

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

Marlin Working Group

The Marlin Working Group coordinates and fosters research initiatives to improve understanding of the biology and ecology of marlin stocks in the North Pacific Ocean. The research focus is to provide advice to the ISC on the effects of fishing on the stock. Proposed terms and reference and operating procedures for the Working Group follow.

Terms of Reference

1. Recommends and coordinates the conduct of biological, ecological, and other pertinent research initiatives to support stock assessments through collaboration among ISC members and other research entities.

2. Provides a framework for evaluating estimates of biological parameters.

3. Conducts stock assessments and provide a framework for reviewing the assessments and stock status conclusions.

4. Provides advice on effects of fishing on the stock including ecosystem considerations.

5. Establish international data bases suitable for stock assessment.

6. Provide analyses and advice on fishery management issues as required.