Second Meeting of the
Interim Scientific Committee on Tunas and Tuna-like Species in the North Pacific (ISC)

Honolulu, Hawaii U.S.A.

Plenary Session January 20-23, 1999

1. Opening of the meeting:

The participants were welcomed to the Second ISC Meeting. Dr. William Hogarth, head of the United States Delegation, gave a welcoming address in which he stated that Pacific issues regarding highly migratory species are very important to the United States. He praised the excellent work that has been done so far by the participants to provide scientific input regarding pelagic fisheries. Looking forward to the upcoming meeting of the Multilateral High Level Conference (MHLC) in Honolulu, with participation of 27 nations, and expecting to finalize a fourth MHLC agreement, Hogarth said that it will be a critical issue to bring groups like ISC together for management of Pacific highly migratory species.

2. Appointment of Chair and Rapporteurs:

The Japan Delegation proposed to follow the precedent set by the First ISC Meeting where Japan hosted and chaired the meeting. And since this Second ISC Meeting was being hosted by the United States, the suggestion was made that the United States provide the Chair. The United States agreed to the suggestion and M. Tillman accepted the Chair.

Rapporteurs were chosen from the United States (C. Boggs and P. Kleiber) and Japan (H. Yamada and M. Kato). The members of the Delegations introduced themselves including Canada, Chinese Taipei, Japan, Mexico, Peoples Republic of China, and United States, and also participants from PICES, SPC, and IATTC (a list of participants is appended).

3. Adoption of Agenda:

The Chair noted it had been almost 3 years since the First ISC Meeting and distributed an ISC guidelines document (ISC2/99/PLEN/20) to remind participants that the purpose of the ISC is to encourage cooperative scientific research and establish scientific groundwork for a possible future multilateral fishery management regime. The current working group structure of the ISC and the species emphasized in the ISC agenda are the result of agreements developed at the First ISC Meeting in Tokyo.

The agenda was read and adopted. A request for each presenter to aid the rapporteurs by providing a one paragraph summary of their talk was adopted, and a schedule was set for daily activities.

A list of the working papers and their authors is appended.

4. Delegation Reports:

Canada Report: An Update of the Canadian North Pacific Albacore Fishery (ISC2/99/PLEN/1)

The Canadian albacore fishery continues as a troll jig fishery and consists of 2 fleets. The largest is the coastal fleet which operates within the 200 nm Exclusive Economic Zone (EEZ). The highseas fleet is smaller in capacity and operates as far west as the International Dateline. In the last 10 years the Pacific salmon opportunities, primarily

for chinook and coho, have decreased significantly due to severe conservation concerns of both Canadian and United States stocks. As a result, the Canadian troll albacore fishery off the west coast of Canada and the United States continues to diversify and expand.

Albacore catches from 1945 to 1998 have ranged from 0 metric ton (t) to the record high of 3,921 t in 1972. Since the early 1990's catches have been increasing and reached a high catch level of 3,023 t in 1998. This is substantially higher than the 1990-97 average catch of 738 t. The catch estimates for 1998 are still considered preliminary. The Department of Fisheries and Oceans is currently reviewing the historical vessel catches. Preliminary examination of CPUE indicates that estimates from the highseas fleet are about twice that of the coastal fleet.

The fishery season inside Canadian waters extends from July to November with the majority (45-60%) of the catch occurring in September. This could be related to the increased numbers of salmon fishers gearing up for the albacore fishery after the end of the salmon season, which is usually in September.

In 1997 the Canada/United States albacore treaty of 1981 governing port privileges was amended to include additional ports. As of 1997 United States ports open for Canadian vessels are: Astoria, Bellingham, Coos Bay, Newport, Westport and Eureka. Canadian ports open for United States vessels are: Port Hardy, Prince Rupert, Victoria, Ucluelet, Coal Harbour and Vancouver.

Off the west coast of Vancouver Island the mean sea surface temperature (SST) (from 1935 to 1998) increased as the season increased from July (12.9 °C), August (13.4 °C) to September (13.0 °C). Since 1977 the average temperature has increased by +1.1 °C for July and +0.4 °C for the other months. The mean SST in 1998 for the months of July was 12.0 °C, August 13.3 °C and September 13.0 °C. These temperatures are –1.4 °C to –3.0 °C from those recorded in 1997. Continual positive SST anomalies as

a result of recent El Nino trends will mean that the temperature conditions inside the Canadian EEZ deemed preferable for albacore will continue to arrive early in the season, remain longer, and provide longer fishing seasons.

All vessels are required to keep an accurate fishing log while fishing for albacore tuna in any waters. Sales slips of the landings are sent into Department of Fisheries and Oceans Catch Statistics Unit and entered into the regional catch database. Presently, there is no port monitor to collect logbooks or sample the catch for biological information. Canada has been assisting the Fishery Agency of Japan with the preparation, sectioning, and aging of albacore fin rays.

Discussion of Canada Report: It was noted that the Canadians have a good time series of CPUE data for research on effects of temperature on albacore CPUE. They intend such an analysis after checking and editing the CPUE time series. As the Canada fleet has switched to target albacore it has moved south and now partly overlaps areas which have been analyzed by Bartoo. It was asked if higher CPUE occurs at an area with seamounts, but the reported CPUE difference was just that the high seas fleet has higher CPUE than the coastal fleet.

People's Republic of China Report: 1998 Report to the Second Meeting of the Interim Scientific Committee on the People's Republic of China for Tuna and Tuna-like Species in the North Pacific Ocean (ISC2/99/PLEN/2).

Fishing vessels from the mainland of China began tuna fishing in 1998. The catch of tuna and tuna-like species of this country in the North Pacific was mainly from Secretariat of the Pacific Community (SPC) statistical area in the Central Western Pacific. The fishing method is longlining, targeting bigeye tuna and yellowfin tuna. In 1998, the number of fishing vessels was rapidly reduced; only 66 fishing vessels operated in the Central Western Pacific area, producing a total catch of 1024 mt, of which bigeye tuna was 72%, yellowfin tuna was 22% and CPUE was 0.76. The Bureau

of Fisheries, Ministry of Agriculture of the People's Republic of China takes responsibility for monitoring the country's tuna and tuna-like fisheries in the Pacific. Shanghai Fisheries University and the Distant Water Fisheries Development Research Center of the Ministry of Agriculture are recently carrying out research on tuna and tuna-like species in the Pacific Ocean.

Discussion of People's Republic of China Report: Regarding a question about the fate of vessels leaving the fishery during the dramatic decline after 1994, many return to port in the People's Republic of China where they remain inactive, and some change to other fishing methods such as trawling.

Japan Report: National Report of Japan (ISC2/99/PLEN/3)

The catch and value of the tuna in all Japanese fisheries, including aquaculture, is about 10% (600 thousand tons) and 14% (300 billion yen) in 1996. Skipjack catch in weight occupied about a half of the total catch. The Japanese tuna fisheries fall into two major categories, surface and longline fisheries. The tuna catches from the North Pacific by longline fisheries exceeded 36 thousand tons for coastal fisheries in 1996, and 77 thousand tons for offshore and distant water fisheries combined in 1997. Purse seine and bait boat vessels operate in the tropical waters and temperate waters of North Pacific, and their tuna catches were 220 thousand tons and 120 thousand tons respectively in 1997. In addition, there are miscellaneous small scale fisheries which take tunas and tuna-like fish in the coastal Japanese waters. Among them, trolls and trap nets are important for the catch of tunas. The major tuna fisheries in Japan account for almost all the Japanese catches of tunas. Catch and effort statistics for these fisheries have been collected by the National Research Institute for Far Seas Fisheries (NRIFSF). NRIFSF is now also in charge of data processing and compilation of the bait boat statistics, as the result of the shift of the skipjack section in the Tohoku National Fisheries Research Institute (TNFRI) to NRIFSF last October. Researches on tunas, e.g., early life history, tagging experiment, telemetry study and stock assessment

have been carried out by the NRIFSF. Several cooperative works are on-going with foreign countries including international organizations.

Discussion of Japan Report: It was asked if there were coastal longline landings data for 1997. These data are not available.

Chinese Taipei Report: Status of Taiwan Tuna and Tuna-Like Fisheries in the North Pacific Ocean (ISC2/99/PLEN/4)

Three fleets (distant-water longline, offshore longline and distant-water purse seine fisheries) have operated in the North Pacific Ocean in recent years. During 1995-1997, they caught around 120,000-150,000 MT of tuna and tuna-like species. Distant-water purse seiners made the predominant part of the catch, and skipjack was the major catch species.

The distant-water longline fishery has increased its activities since 1995, with 5-10 vessels operating in the North Pacific Ocean. It has produced 2,000-4,000 MT of albacore during 1995-1997. An abrupt increase of albacore was observed in 1998. The offshore longline fishery targets mainly yellowfin and bigeye tuna, with bluefin and swordfish as seasonal targets. Catches in 1997 from waters off Taiwan were 9,400 MT of yellowfin (decreased from previous years) and 3,500 MT of bigeye (increased). Preliminary 1998 catches are similar to those of 1997. The distant-water purse seine fishery produced 167,000-179,000 MT in the entire Pacific Ocean by 42 vessels during 1994-1997, the major catch being skipjack. The percentage of catch in the north has decreased from 91% in 1994 to 49% in 1997, showing a southward movement. The fishing ground of this fishery has been noted to extend eastward to the waters off Kiribati in 1997.

Logbook data have been collected from the three fisheries, but only the distant-water longline fishery has routinely collected size data, although port sampling of size data

from the offshore fishery has been conducted recently. Revision of historical data from the distant-water longline fishery has been proposed and will be finished in 1999.

Discussion of Chinese Taipei Report: The areal distribution of effort and species composition given for the offshore longline fishery (ISC/2/99/PLEN/4, Fig. 3) is not complete because it is based on sample logbooks, in which the coverage rate is very low. The catch composition changes in the North Pacific distant-water longline fishery (Fig. 2) are mostly due to changes in the distribution of effort, with the fleet not going north to target albacore in some periods. The offshore longline fleet does catch billfish species, which are not shown in the data table, as these are considered bycatch.

United States Report: 1999 Report to the Interim Scientific Committee on United States Fisheries for Tuna and Tuna-like Species in the North Pacific Ocean (ISC2/99/PLEN/5)

The United States continues to be a major consuming and harvesting nation for tuna and tuna-like species. In 1997 significant catches of yellowfin tuna, skipjack tuna, bigeye tuna, albacore, swordfish and other species exceeded 112,000 mt from the North Pacific Ocean. Production was from surface, longline and recreational fisheries on the high seas and in the United States EEZ.

Principal species landed by the U.S. in the North Pacific included skipjack, yellowfin, albacore and bigeye tunas, swordfish and marlins. Major United States fisheries for North Pacific tunas and billfish include purse seine fisheries in the Central Western and the Eastern Tropical Pacific, troll and longline fisheries, and several smaller scale fisheries. Detailed data on catch, catch-effort, size composition and other biological measurements are collected and archived for use in fishery monitoring and stock assessment. The United States conducts various kinds of research on tunas, swordfish, billfish, and other species for fishery monitoring and stock assessment purposes.

Discussion of United States Report: A peak in the catch of bluefin tuna in 1996 was questioned and explained as an opportunistic response of purse seiners to a tuna aggregation of bluefin found off the west coast in 1996. In the troll/handline fishery the high blue marlin catch (higher than the skipjack tuna catch) was questioned and explained as a result of targeting blue marlin. The troll/handline blue marlin catch includes mostly Central and Western Pacific island charter troll vessels providing blue marlin sport fishing experiences, and troll vessels seasonally harvesting blue marlin for local markets.

Mexico Report: National Report of Mexico (ISC2/99/PLEN/10)

Tuna Fisheries

In the Eastern Pacific Ocean (EPO), the Mexican surface fishery catches yellowfin, skipjack, bluefin, bonito and bigeye tunas. The purse seine and pole and line fisheries are the dominant gear in the fishery. They catch up to 99% of the landings. Small amounts of tunas are taken by artisanal and recreational fisheries. Fishing operations take place for the most part in the Mexican Exclusive Economic Zone and its adjacent areas. Yellowfin is the most important species taken by the surface fishery and skipjack is the second most important. In the last ten years the catches varied from about 119 to 151 thousand metric tons with an average of 135 thousand metric tons. The Mexican fleet concentrates on fishing yellowfin schools associated with dolphins and those associated only with other fishes.

The Mexican fleet is the dominant fishery in the EPO with a total capacity of over 46 thousand metric tons. In 1998 it operated with 52 purse seine and 11 pole and line boats ranging from 45 mt to 1450 mt of carrying capacity. For several years, Mexico has developed and maintained a methodology to monitor, collect and report fishery data. Because of the importance of tuna fisheries to Mexico, the collection of these data is done through logbooks and onboard observers. Research is concentrated on yellowfin and incidental mortality of dolphins. In 1998 the research focused on

modeling the fishery, the interaction between different fleets harvesting different sizes/classes of yellowfin tuna, the incidental catches of the different type of sets, and the incidental mortality of dolphins. Biological and ecological research was also conducted by both governmental institutions and universities.

Marlin and Swordfish Fisheries

Commercial billfish-targeted fishing started by Japanese longliners in the late 50's and stopped in 1980. From 1980 through 1990 longline fishing was conducted by joint-venture arrangements in the EEZ of Mexico. Conflicts between sport fishermen and commercial fishing industry arose in the mid-80's, leading to the present Mexican regulations that ban commercial fishing targeting billfishes within 50 nautical miles from the coastline. Sport-fishing for billfishes is encouraged and commercial fishing is allowed only beyond 50 miles off the coast. A monthly sampling program has been implemented at the main sport fishing sites in the Mazatlan area since 1986, in the La Paz and Los Cabos areas since 1991, and in the Manzanillo area mainly for sailfish.

The only remaining commercial billfish fishery in Mexico is a small gillnet fishery for swordfish that has been developed in Ensenada, Baja California, beyond 50 nautical miles from the coast. Catches have ranged from over 800 tons in 1991 to 100 tons in 1994. Catches have increased since to 250 tons in 1998.

A new data collection system is envisioned for the sport fishery, and several research projects based on an observer program will start in 1999.

Discussion of the Mexico Report: None

Presentations by Other Organizations:

Other organizations were invited to make presentations at this time. IATTC and PICES chose to make their presentations, while SPC chose to present later, under various

agenda items.

IATTC Presentation: Important Resolutions Adopted at IATTC Meetings During 1998 (ISC2/99/PLEN/6)

Several important actions were taken by IATTC during 1998 concerning the conservation and management of tuna in the Eastern Pacific Ocean (EPO):

* A limit on the catch of yellowfin tuna in the EPO was implemented in late 1998.

* A catch quota on bigeye tuna was set for 1998, but the catch did not exceed the limit; so a closure was not necessary.

* Certain actions were taken to limit the use of FADs in the EPO.

* Action was taken to limit the size of the purse-seine fleet operating in the EPO. A total limit on fleet capacity was allocated among participants.

Discussion of IATTC Presentation: The IATTC presentation provided an interesting example of the types of management actions that can be taken by a fully mature multilateral fisheries management organization.

PICES Presentation: PICES: The North Pacific Marine Science Organization (ISC2/99/PLEN/9)

PICES is an intergovernmental scientific organization with current members consisting of Canada, People's Republic of China, Japan, Republic of Korea, Russian Federation, and the United States. The primary purpose of this organization is to: promote and coordinate marine research in the northern North Pacific and adjacent seas; advance scientific knowledge about the ocean environment, global weather and climate change,

living resources and their ecosystems, and the impacts of human activities; and to promote the collection and rapid exchange of scientific information on these issues. PICES does its work through its scientific and technical committees and its scientific program on climate change and carrying capacity. PICES has scientific committees on physical oceanography, biological oceanography, fisheries science, and marine environmental quality.

PICES holds annual scientific meetings in the autumn of each year, with the location rotating among member nations. In the year 2000, an international symposium will be held March 23-26 in La Jolla, California to examine Pacific climate variability and marine ecosystem impacts, from the tropics to the Arctic. Present cosponsors include PICES, SCOR, IATTC, NPAFC, and IPHC. The conference will look at interannual, decadal, and interdecadal scales of variability in the Pacific and will review evidence for variability, the consequences of such variability, the mechanisms of interaction with the ecosystems, and the implications for fishery production and management. Participation of scientists from countries around the Pacific Basin will be welcomed as would co-sponsorship of ISC in this scientific exchange of information. The cooperative nature of this conference by several international fishery organizations with a common interest in determining the nature of these several scales of climate variations and their effects on marine ecosystems will help us move forward in advancing our knowledge in this area. By pooling the information of atmospheric scientists, physical and biological oceanographers, and fishery scientists, the several involved organizations will be able to make significant progress and hope the ISC will join this effort.

Discussion of PICES Presentation: The discussion of proposed co-sponsorship of the "Beyond El Nino" Conference by the ISC was deferred to Agenda Item 11 (Other Business).

5. North Pacific Ecosystem Considerations

5.1 Dynamics in the NPTZ: Interannual Dynamics in the North Pacific Transition Zone (ISC2/99/PLEN/7)

Two examples of interannual dynamics of the North Pacific Transition Zone (NPTZ), one from ocean color and the other from altimetry satellite remote sensing data were described. The ocean color data covered the winter and spring of 1997 and 1998 from OCTS and SeaWifs sensors. Results were that January to June Transition Zone surface chlorophyll was 30-50% greater in 1997 compared to 1998. Transition Zone chlorophyll fronts were also substantially stronger, more southward shifted, and more persistent in the winter and spring of 1997 compared to 1998. In the second example, satellite altimetry data from the TOPEX/Poseidon sensor for the period 1993-98 were used to construct an index of the strength of the Subtropical Front which is the fishing ground for the Hawaii longline fishery for swordfish. About 75% of the variation in January - June catch-per-unit of effort (CPUE) of the swordfish fishery over the period 1993-98 was explained by variation in the satellite-based index of the Subtropical Front. Thus at least on a regional basis it appears feasible to use remote sensing data to construct an environmental index to standardize CPUE for environmental variation.

Discussion of Dynamics of the NPTZ: It was clarified that the index related to swordfish CPUE in the Hawaii-based fishery is the change in sea surface height between the summer stratification and the winter convergence based on satellite altimetry. The fishery concentrates its efforts during the period of the convergence from winter through spring. It was suggested that to extend the study of frontal dynamics effects on swordfish fisheries over a broader range than the Hawaii-based NPTZ fishery would require finer resolution. The annual index for the main fishing ground of the Hawaii-based fishery was used to provide advice regarding the annual performance of that fishery to the United States Western Pacific Fishery Management Council which regulates that fishery. However, increasing the resolution does improve the fit of the relationship between CPUE and the index. More work to incorporate frontal dynamics indices in stock assessments is needed.

The movement of satellite tracked loggerhead sea turtles coinciding with the moving frontal boundary suggests active swimming by healthy turtles because mapping of currents using altimetry data shows that the turtles are moving against prevailing currents. To better indicate mortality, which is confounded with tag shedding or battery failure, future turtle tags will indicate tag battery strength and indicate whether or not the turtle is alive. Programs to look at NPTZ dynamics effects on other species include studies of monks seals and tuna. Turtle tracking work is also being conducted on green and olive ridley turtles.

5.2 Predator/Prey Relationships: Keystone Predators in the Central Pacific (ISC2/99/PLEN/8)

Keystone predators are predators that have a large impact on the structure or stability of a community or ecosystem. This United States National Science Foundation project is using trophic ecosystems modeling approaches called Ecopath and Ecosim (http//www.fisheries.com) to model the effects of various fishery exploitation patterns and environmental changes on sharks, tunas, billfishes, and their prey in the central North Pacific. No single group of the highest trophic levels (e.g. sharks) appears to have a profound and uniquely important role in the organization and structure of this ecosystem. Species interactions appear to increase the vulnerability to overexploitation of long-lived predators such as sharks and billfishes. Increased pelagic fisheries effort may have increased the productivity of rapidly growing animals such as juvenile tunas and especially mahimahi. This modeling approach is seen as a valuable tool for conceptualizing ecosystem interactions arising from fisheries exploitation and could provide indications of which species among a multitude of target and non-target species may require the greatest attention.

Discussion of Predator/Prey Relationships: It was clarified that the model as presented does not include spawner-recruit relationships. Therefore adult and juvenile forms of a species can vary independently in the model. Future versions of the model

may incorporate spawner-recruit relationships, but so far, attempts to do so have made the model very unstable. Other developments in progress include spatial variability and movement. Tests were conducted on the effect of raising fishing mortality on sharks but not other fishes caught by longline.

6. Review of Species of ISC Concern:

6.1 Swordfish: Report of the Swordfish Working Group (ISC2/99/PLEN/11)

The primary tasks of the ISC Swordfish Working Group are to regularly assess the status of the swordfish resource in the North Pacific, to develop cooperative swordfish research and monitoring programs, and to report the findings to the ISC Committee. Swordfish are harvested throughout their distribution by coastal and high-seas fisheries. In the North Pacific Ocean, between one half to two thirds of the swordfish catch is taken incidentally to fisheries targeting tunas.

The second meeting of the working group was held in Honolulu, Hawaii during January 15-16, 1999. Participants included 27 scientists from four delegations and two international fisheries organizations. Ten working papers were presented and discussed. Attempts were made to evaluate the stock status of the resource, and critical research needs in fishery monitoring and biological and oceanographic research were identified to improve models of population dynamics and to reduce uncertainties in stock assessments.

Stock Status

K. Yokawa used the computer program ASPIC to fit non-equilibrium logistic production models to standardized CPUE statistics from the Japanese longline fishery and estimates of total swordfish catch based on logbook statistics (for fisheries of Japan and United States) and the FAO Yearbook of Fishery Statistics (ISC2/99/SFWG/2.1). The region addressed in the ASPIC assessment was the North Pacific west of 125 EW.

The CPUE statistics were derived from two series of Japanese longline catch and nominal effort data analyzed at a resolution of 5E× 5E latitude-longitude area and quarter of the year. The first data series spans the period from 1952-1975 with catch in number of fish and effort in hooks by time and location of fishing. The second data set covers the period 1975-1997 and contains additional information on configuration of the gear, specifically the number of branch lines between floats. The second data base enables the separation of swordfish catch and effort according to whether the gear was set to catch bigeye tuna (>9 branch lines between floats), swordfish (usually 3-4 branch lines between floats), or other species (intermediate gear configurations). Data were first grouped into spatial strata containing similar CPUE trends and values of average CPUE. Generalized Linear Model (GLM) procedures were used to estimate standardized CPUE within each spatial stratum. An aggregate annual standardized CPUE series was estimated as the sum of the stratum-specific standardized CPUEs, weighted by the area of each stratum.

The aggregate standardized CPUE time series for the Japanese longline fishery shows an essentially flat long-term trend. Estimates of standardized CPUE for recent years are equal to the estimates for 40 years ago. Steep declines observed in nominal CPUE during the 1952-1975 period, as the longline fishery expanded geographically, were not evident in the standardized CPUE series, as the latter series was adjusted for spatial heterogeneity in CPUE and effects of effort distribution. Given the relatively steady standardized CPUE, the annual catch has been approximately linearly related to effective fishing effort (total catch divided by standardized CPUE). Results of the ASPIC analysis were indeterminate but indicated that swordfish biomass levels have been and remain above the levels associated with MSY in the logistic production model. Achieving convergence of the ASPIC model required fixing of one or more of the model's parameters. Such difficulties in the application of ASPIC can be caused by a low exploitation rate, as suggested by the lack of a relationship between CPUE and catch, or can result from other causes. For example, they can also arise from inaccuracies in the total catch data, unrealistic assumptions about swordfish stock

structure, or errors in the CPUE standardization, including the lack of adjustment for effects of environmental factors that may influence stock productivity, availability or catchability. Resolving the source of the difficulties in the swordfish ASPIC analysis will require further study.

Results of fitting two types of production models to combined Japanese and Hawaiian longline catch and effort data (ISC2/99/SFWG/2.2) were presented. One was the Pella-Tomlinson model with extensions to allow two fishing fleets, variable catchabilities, variable carrying capacity, and a "cryptic" catch by fisheries for which there is little or no effort information. The other model had similar extensions and also attempted to dissociate the net production parameter, *r*, of the Pella-Tomlinson model into components of recruitment and natural mortality. The region considered was the North Pacific north of 15EN and west of 135EW, a region similar to Yokawa's. The model fitting procedures were implemented using AD ModelBuilder software. In both approaches, problems were encountered in fitting the model to the data due to difficulties such as multiple minima in the objective function and "runaway" parameters. Nevertheless, some plausible parameter convergences were obtained, including estimates of time series of catchability and production or carrying capacity parameters. However, the results were extremely sensitive to assumed values of weighting factors in the objective functions, and furthermore, different estimations implied conflicting scenarios of increasing or decreasing abundance, fast or slow population turnover, and high or low exploitation rates.

Progress was reported in the development of a stochastic computer simulation model of swordfish population dynamics and exploitation that will be used to generate sets of observations to test stock assessment procedures (ISC2/99/SFWG/2.3). The model mimics key aspects of the swordfish population dynamics and fisheries with detailed representations of biological processes, including somatic growth, maturation, reproduction, recruitment and mortality . Catch statistics are generated with size and/or age structure. Plans call for expanding the model to incorporate spatial structure and

dynamics (e.g., movement probabilities), the effects of environment processes, fishery monitoring and management options, and more. The model is intended to be used to evaluate the effectiveness and reliability of alternative stock assessment procedures and indicators.

Based on the production model assessments, the current level of exploitation and condition of the swordfish resource could not be determined and remain unknown. Both analyses were inconclusive and sometimes gave conflicting results depending on choices of initial conditions and the fixed values given to unknown model parameters in order to achieve convergence. The working group noted, however, that standardized CPUE in the Japanese longline fishery has been stable at least since the mid-1970s, by which time Japanese longline fishing effort was broadly distributed over the region, and has been directly and linearly related to the total catch. Assuming the standardized CPUE in the Japanese longline fishery reflects swordfish abundance, these facts are consistent with a low exploitation rate.

The difficulties in fitting the production models could be attributed to one or more conditions, or combinations of them:

* First, they could be caused by a low exploitation rate. A low exploitation rate would mean there would be little response of the swordfish population to fishing pressure and, consequently, insufficient change in CPUE with changes in fishing effort or catch -- a strong population response and sharp contrast in CPUE over the range of fishing effort or catch is needed for the production models to fit well.

* Second, they could simply reflect the inability of the spatially-aggregated production models used so far to accommodate the complex spatial heterogeneity and spatial dynamics that undoubtedly exist in the swordfish population.

* Third, they could indicate a failure of the key assumption of the production model

analyses, viz., that the standardized CPUE statistics accurately reflect relative abundance. In the Hawaii longline fishery, Seki et al. (ISC2/99/SFWG/3.3) showed that swordfish CPUE in the core area of the fishery is closely related to the strength of the Subtropical Front, as inferred from TOPEX/Poseidon satellite altimetry data. Therefore, a useful index of abundance in this fishery will have to account for variability in frontal structure, at a minimum. The same situation may hold for the Japanese longline fishery; the standardized CPUE series could be altered by the inclusion of environmental factors and other effects.

To resolve these uncertainties and improve stock assessments, it will be necessary to develop production models that are spatially disaggregated and make use of ancillary information (e.g., environmental data) that may be linked to variations in catchability, turnover, carrying capacity and other production model parameters. Accordingly, the working group recommended that research be focused toward five key objectives: (1) development and application of spatially-explicit models (including clarification of stock structure); (2) analysis of factors affecting CPUE; (3) development of a capability for age-structured stock assessment models; (4) continued development of a basin-wide simulator to test stock assessment and estimation procedures; and (5) development of a comprehensive swordfish catch database.

Swordfish was adopted as a species of interest and a swordfish working group was established at the inaugural meeting of the ISC held in Tokyo, Japan in May 1996. The ISC also endorsed an international swordfish symposium to be held in 1997, and the United States agreed to organize, coordinate, and facilitate the symposium. In addition, the ISC agreed that organizing future symposia would be an activity of the swordfish working group. The purposes of the swordfish symposia are to provide a forum for the review and synthesis of developments in biological, fisheries oceanography, and resources assessment research on swordfish in the Pacific Ocean and relevant research in other oceans, and to promote international scientific collaboration in assessments of Pacific Ocean swordfish.

The Second International Pacific Swordfish Symposium was held in Kahuku, Hawaii during March 3-6, 1997. Approximately 200 scientists, representing seven countries, participated in the symposium. Descriptions of swordfish fisheries in the Pacific were presented by representatives from the United States, Japan, Mexico, Chile, Australia, and in the Indian Ocean by the delegations from Reunion. In addition, a report on the Atlantic "swordfish experience" was presented by an ICCAT representative and an Expert Panel was convened to discuss stock assessment approaches and data needs. Three concurrent working group sessions were held focusing on specific themes: Biological Input to Stock Assessment, Fisheries Oceanography and Habitat, and Resource Assessment and Monitoring. The conclusions and recommendations drawn from this symposium will benefit research conducted on Pacific swordfish through the identification and advancement of methodologies in each of the research areas. The proceedings from the symposium are scheduled to be published in March, 1999.

The final report of the Working Group is an Appendix to the Report of the Second ISC Meeting. The next Working Group meeting will be held in conjunction with the next ISC meeting. However, ad-hoc subgroups of the Swordfish Working Group may have inter-session meetings related to cooperative research studies.

Discussion of Swordfish Working Group Report: It was emphasized that stock structure of swordfish in the Pacific is not clear. Therefore tagging and genetic and meristic analyses are planned. The future work plan was reviewed and some change was made, including to add comparative stock analysis with Atlantic swordfish. The standardized CPUE of swordfish caught by Japanese longliners showed steady decreasing trend in the North Atlantic since the mid-1970s and the value of the CPUE in 1996 was about 20% of that in 1975. By comparing the trend of CPUE in the North Atlantic to that in the North Pacific, the stock status in the North Pacific swordfish fishery seemed to be healthier than that in the North Atlantic.

The necessary research funds to conduct the extensive work plan need to be acquired

by the effort of each participating institution. Further consideration by the working group scientists through appropriate means such as e-mail was encouraged. The next working group meeting will be held in conjunction with the next plenary session in not more than two years.

6.2 Bigeye Tuna: Review on Biology, Fisheries and Research Activities on Bigeye tuna in the Pacific Ocean (ISC2/99/PLEN/12)

Biology

While genetic analyses showed that genetic structure of Atlantic bigeye tuna is substantially different from that of Indo-Pacific bigeye, the results did not indicate the existence of genetically isolated bigeye stocks within the Pacific Ocean. This species appears to inhabit deeper water than yellowfin in or just below the thermocline. Recent research using acoustic and archival tags revealed that bigeye stay in very shallow water, 50m or shallower, during night time and move to deep water below the thermocline during day time. Age and growth using daily rings of bigeye otoliths revealed that length at age 1 is around 60-65 cm which is much larger than indicated in some of the past studies.

Fisheries

Total catch of the bigeye tuna in the Pacific Ocean was less than 100,000 MT before 1974. It increased gradually with fluctuations to about 160,000 MT in 1987 and this high catch level was maintained thereafter. In most recent years, the percentage of bigeye catch by each gear is about 50% and 40% for longline and purse seine, respectively. Longline bigeye catch, which was around 100,000 MT during the early half of 1980s increased to 140,000MT in 1986 and the catch was kept relatively high until 1992. It decreased thereafter, and in the latest years it has been 90,000-100,000 MT. Though the bigeye catch by Japanese longline comprised 80-90% of the total longline catch till 1993, it went down to less than 60% in recent years. This change in the proportion of bigeye catch by country is mainly caused by the decline in Japanese

catch, which is about 100 thousand MT until 1992 and reduced to 53 thousand MT in 1996 and 1997. The main purse seine fisheries operating in the Western and Central Pacific Ocean (WCPO) are Japan, Korea, Chinese Taipei and United States. Total purse seine bigeye catch in the WCPO, estimated from the species composition of United States catch, ranged from 11-19 thousand MT in 1989 through 1996, and jumped up to 28 thousand MT in 1997. 80-90 % of operations by the United States targeted on free swimming schools until 1994, but thereafter operations on log associated schools predominated. In the Eastern Pacific Ocean (EPO), bigeye catch was relatively low, less than 10,000 MT until 1993 when United States purse seiners began to shift their target from dolphin-associated school to flotsam-associated schools. Columbia, Ecuador, and Vanuatu then followed the target shift. As a result, the bigeye catch jumped up to 29,000 MT in 1994, and further increased passing 50,000 MT in 1996 and 1997. During this decade, bigeye catch by Japanese pole-and-line was about 1,000-3,000 MT, and that of Indonesia was 200-600 MT. In the EPO, bigeye catches by pole-and-line are insignificant.

Stock status

Standardized CPUE analysis by Miyabe (1995) indicated that the decline in abundance was much larger in the area east of 160W than to the west. Hampton *et al.* (1998) adjusted the Japanese longline catch rates of this species depending on the depth of longline fishing, water temperature and dissolved oxygen preferences. Result of the latter analysis indicated that standardized CPUE in the WCPO declined more sharply than that in EPO, although the trend changed depending on the assumed preferences of bigeye tuna to temperature and dissolved oxygen. IATTC has regularly updated a production model study on bigeye tuna in the EPO. Though IATTC estimated that MSYs were 66,000 MT and 92,000 MT by different procedures, it also stated that these estimates are not reliable, as there is a considerable difference in CPUE between the observed values and values predicted by the model. It is also likely true that the estimated parameters based on longline data should not be relied on as an increase of juvenile catch may have caused a shift in stock response to the catch. Other resource

analyses including VPA, Y/R and interaction studies were conducted by IATTC. The results indicated that the bigeye resource will decrease if the assumed natural mortality (M) is 0.4, while it will stabilize or increase if assumed M is 0.6 or 0.8. Summarizing the results of recent studies on stock status, with longline CPUE showing a declining trend, it is hard to regard bigeye stock status as good. However, since there are many obscure parameters, the stock status is considered uncertain.

Future research plan

Research coordination on Pacific bigeye tuna has been on-going, and a workshop was recently held in Hawaii in November 1998. The main objective of this workshop was to finalize a research plan of a coordinated Pacific-wide project on bigeye tuna whose major activity will be tagging (mostly archival tag but also conventional tags). Research activities with R/V Shoyo Maru will focus on a behavioral study regarding movement, swimming depth and feeding. With the objective to avoid catching small bigeye, studies on biological characteristics of juvenile tunas around FADs are being considered. NRIFSF and the SPC cooperative studies of bigeye CPUE on smaller strata (1°x1° square) are under way, and are taking account of water temperature and dissolved oxygen preference.

Discussion of the Bigeye Report: The difference of bigeye behavior patterns observed by NMFS and NRIFSF could be explained by unusual behavior due to tagging stress during some days just after release (Figs. 1 and 2 of ISC2/99/PLEN/12).

It is necessary that the statistical data for Chinese Taipei (Table 1) be revised based on the data provided by Chinese Taipei in Document ISC2/99/SFWG/1.2. Mexico explained that its purse seine fleet does not participate in the FAD-based fishery that catches juvenile bigeye south of 50° N in the EPO.

SPC reported that the 1998 bigeye tagging campaign in the Coral Sea was not successful because the expected high abundance of bigeye did not materialize.

Another attempt will be made in 1999.

The director of the Pelagic Fisheries Research Program (PFRP) of the University of Hawaii noted that a PFRP tagging program has released approximately 14,000 tagged tunas, about half of which were juvenile bigeye. Some of these fish are now reaching the age of vulnerability to longline gear, and recaptures are coming in from the Hawaiian longline fleet. An appeal was made for assistance in the return of tags from fish recaptured by other fleets.

The PFRP also hosted a bigeye research planning meeting in November, 1998. Following that meeting, a draft proposal for an international bigeye research program was circulated to interested parties. The principal effort would be tagging with both conventional and archival tags in many parts of the Pacific where bigeye are known to occur. International collaboration as detailed in the proposal is necessary to successfully promulgate such an ambitious tagging program on a fish population that straddles multiple jurisdictions. It is hoped that the common front of scientists represented in the proposal will facilitate acquiring funds for the program.

Assessment of Bigeye Tuna in the Eastern Pacific Ocean (ISC2/99/SFWG/13)

During recent years the catch of large bigeye tuna taken by longline vessels declined from about 90 thousand tons in 1990 to about 40 thousand tons in 1996. During the same period the catch of small bigeye taken in the purse seine fishery increased from less than 5 thousand to more than 50 thousand tons. Cohort analysis, using an M of 0.4, projected that if age-specific fishing mortality remained at the 1995/1996 level, by 1998 catches in both the surface and longline fishery would decline; but using an M = 0.8, total catch would increase. The surface catch during 1997 reached 51 thousand tons. Based on this analysis and the high surface catches in 1997, the Commission set a limit of 45 thousand tons on the 1998 catch of purse seine caught yellowfin from the EPO. This limit was not reached. The preliminary estimate of the 1998 purse seine

catch is about 32 thousand tons, a figure close to that projected by the cohort analysis using an M = 0.4.

Discussion of EPO Bigeye Assessment:
The importance of investigating natural mortality in bigeye, e.g. by tagging experiments, was emphasized.

The future of the BET-WG was discussed and it was determined that this WG should continue to exist. Japan, which took responsibility for conducting this WG, apologized for having no meeting and declared the future importance of the WG for discussing stock assessment issues such as the impact of the catch of juveniles on the stock. With regard to the bigeye stock assessment activities are already underway at IATTC and SPC. It was determined that stock assessment of BET in ISC will progress in conjunction with these other organizations.

6.3 Northern Bluefin Tuna: Review on the Present Status of Bluefin Tuna Resources (ISC2/99/PLEN/14).

Bluefin tuna in the Pacific are mainly distributed in an area between 20 N and 45 N. A small number of fish are caught in an area along the western rim of the Pacific extending to the southern hemisphere and in an area around 30 S along South America. The fish are known to reach around 50 - 60 cm FL at age 1 and around 80 - 90 cm at age 2. The species seems to be a multiple spawner. Minimum size of fish at spawning has been around 60 kg at age 5 along the Pacific coast of Japan, and around 30 kg at age 4 in the Sea of Japan. Spawning occurs between the southern part of Japan and off the Philippines during April to July and in the Sea of Japan in July and August. Juvenile fish migrate toward north in summer and back south in fall and winter along the Japanese coast. Some portion of the population departs for trans-Pacific migration at the end of age 0 or at age 1. It is revealed that young bluefin make the trans-Pacific for only two months from departure off the east coast of Hokkaido to

reaching to the offshore area off San Francisco by archival tagging experiment. Fish in the Eastern Pacific also appear to show a seasonal migration, moving close to the coast during summer and going offshore during winter. Bluefin move back to the Western Pacific, after staying in the east for various time periods.

Bluefin are exploited in the Western Pacific by various gears, including trolling targeting juveniles up to age 3, purse seine mainly harvesting pre-adult and adult in summer, and longline catching large tuna. Purse seiners also catch on age 0 - 1 fish around the Tsushima strait, between Japan and Korea in winter. In the Eastern Pacific, the major fishing gear is purse seine operating along the western coast of Baja California and Southern California during May to October.

The total annual catch of bluefin tuna in the Pacific remained at around 20,000 tons with fluctuations until 1982 but has dropped to around 12,000 tons afterwards. The more significant decline was observed in the Eastern Pacific, where total catch has dropped from 6,000 10,000 tons level before 1980 to around 1,000 tons level afterwards, although the catch recovered to 7,000 tons in 1996. Standardized CPUE of Japanese longline, for which bluefin tuna is a secondary target species, showed a drastic decline during 1960s for mature fish, and has remained at a low level afterward. In recent years, it is suggested that 1994 and 1996 cohorts are significantly more abundant than others. Because of the complexity of fisheries harvesting bluefin tuna, especially in the Western Pacific, serious and careful consideration should be given to socio-economic factors when developing an appropriate management scheme for this species.

Discussion of Northern Bluefin Tuna Report: IATTC mentioned that the decline since 1980 in bluefin catch in the EPO was more likely the result of a reduced fishing effort and variability in the proportion of the population migrating to the EPO.

The Trans-Pacific Migration of Young Bluefin Tuna, *Thunnus thynnus,* Recorded

by an Archival Tag (ISC2/99/PLEN/15).

The National Research Institute of Far Seas Fisheries (NRIFSF) has conducted a tagging project of the Pacific northern bluefin tuna since 1995 and has released about 50 tunas every year with archival tags applied. On August 1, 1998, one bluefin tuna fitted with an archival tag was recaptured by a recreational fisherman off northern Baja California. This is the first recapture of a northern bluefin tuna that traversed the Pacific Ocean from the Japan coast to the U.S. coast, with an archival tag attached. The tag, which collects and stores data of daily location as well as environmental and internal conditions such as water temperature, swimming depth, and body temperature, was returned to the NRIFSF through the IATTC.

The fish remained in the East China Sea until April 1997 after being released off Tsushima Island in November1996, then moved to the Pacific Ocean side of the Japanese coast. The fish moved through the coastal areas off southern Japan until the middle of May. After that, the fish stayed in the area off the northeast coast and the dispersion area of the Kuroshio current, with slight shifting of its location toward the east until mid-November, and then suddenly started a big trip toward the Eastern Pacific. The fish first moved eastward along 40-45 N, passing through International Date Line, reaching to 160W line on December 8. From there the fish changed its direction toward southeast until reaching to the point of 150W and 35N. After that, the fish again started moving eastward along 30-35N, reached the area off San Francisco in the middle of January 1998, and stayed in the Eastern Pacific since then. However, during this time, the fish shifted between two spots; the area off San Francisco and the area off Baja California. The recapture was after 20 months since release. It was noted that the fish showed two distinct modes of behavior; the moving mode and settling mode. The overall average moving speed was about 130 km/day.

Discussion on The Trans-Pacific Migration of Young Bluefin Tuna: Japan mentioned that JFA continues their archival tagging project, and additionally, promotes

the feasibility study on the pop-up satellite tagging as a one year project.

Japan stated that the stock status of bluefin tuna is very important, and this working group is the only group addressing this, so they wish to keep the working group on northern bluefin tuna.

Assessment of Bluefin Tuna in the Pacific Ocean (ISC2/99/PLEN/16)

The IATTC had a substantial research program on bluefin tuna since the early 1960`s and has worked very closely with Japanese scientists from the Far Seas Fisheries Laboratory in Shimizu on various aspects of bluefin research. Since 1985 the IATTC, in conjunction with colleagues from Japan, has had five workshops on bluefin tuna and that a 6th workshop is planned for late 1999.

6.4.1 Yellowfin Tuna: Fisheries and Stock Assessment of Yellowfin Tuna in the Western and Central Pacific (ISC2/99/PLEN/17).

A review of the status of yellowfin tuna in the western and central Pacific Ocean (WCPO) was presented by the SPC. Yellowfin tuna have a continuous distribution in the Pacific Ocean. Tagging studies indicate separate stocks in the WCPO and eastern Pacific Ocean (EPO). Other evidence (e.g. larval distribution and genetic studies) also suggests that separate WCPO and EPO stocks exist for assessment purposes.

A variety of gear types harvest yellowfin in the WCPO. From 1994 to 1997, yellowfin catch in the WCPO varied between 265,000 and 394,000 tonnes (t). The 1997 catch of 394,000 t was the largest on record. Purse seine harvested the majority of the yellowfin catch (54%) by weight, while longline and pole-and-line fisheries caught 19% and 4%, respectively. Yellowfin catches in the Philippines and eastern Indonesia have increased in recent years and now comprise about 20% of the total WCPO catch.

Longline fleets usually operate in equatorial and tropical waters throughout the WCPO, while the distribution of the purse seine fleets is primarily equatorial. Both access agreements with Pacific Islands and ENSO events affect the distribution of catch in the WCPO.

Size (fork length) composition was presented for the purse seine (associated and unassociated sets) and longline fisheries. Length composition in the purse seine fishery is unimodal or bimodal. In 1997, larger (adult) yellowfin were caught in the purse seine fishery, possibly because the fleets were distributed farther eastward.

Time-series of both nominal and standardized CPUE are available as fishery indicators. In the purse seine fishery, nominal CPUE (catch per day fished) fluctuates greatly for both the Japanese and United States fleets, but there is no declining trend. For both fleets, CPUE was low during 1995 and 1996, but recovered strongly in 1997. Trends in standardized CPUE are similar to nominal CPUE. The CPUE time-series from the Japanese fleet is the most appropriate longline fishery indicator. Time-series stratified by Western Pacific Yellowfin Research sub-areas indicates that CPUE is highest in the tropics (20°S-20°N), where most of the effort is expended. Nominal CPUE has declined in the tropics. Results of the GLM analysis indicate that standardized CPUE peaked in 1978, gradually declined slightly throughout the 1980s and was stable from 1989 to 1996.

As an alternative to general linear models, standardized longline effort and CPUE were estimated using gear depth, habitat preferences and constraints, in combination with environmental data. For the tropical sub-areas, the model indicates that directed effort in the yellowfin habitat has reduced from ~18% prior to 1975, to ~8 % in the late 1980s. Standardized yellowfin CPUE in the main yellowfin areas differs markedly from nominal CPUE trends. In one sub-area there are two periods of recovery and decline, whereas in another sub-area there is an increase after 1975 and a period of stability thereafter.

Progress has been made in developing a length-based age-structured model that integrates WCPO yellowfin catch, effort, size and tagging data. Data structures and model attributes were presented. Preliminary results from the age-structured model and previous results from a tag attrition model indicate that there is no compelling evidence to suggest that any decline in the yellowfin stock has occurred in the WCPO.

Discussion of Fisheries and Stock Assessment of Yellowfin Tuna in the Western and Central Pacific:

The lack of tag migrations between the eastern and central Pacific contrasts with yellowfin in the Atlantic where there is abundant evidence of east-west migration from tagging. This could be attributed to the smaller width of the Atlantic basin. Catch and effort data for 1998 are still preliminary. Smaller catches in 1998 may be due to lower effort as a result of lower price for skipjack which is the primary target species in the purse seine fishery. The distribution of the purse seine fleet is expected to be shifted somewhat westward of its position during the previous el Niño year.

ETP Yellowfin: Assessment of Yellowfin Tuna in the Eastern Pacific Ocean (ISC2/99/PLEN/18).

A review of the status of the stock of yellowfin tuna in the eastern Pacific Ocean was presented by the IATTC. Analyses showed that after a period of growth overfishing during the late 1970`s, the stock recovered to levels that could support maximum yield. In recent years the purse seine fleet, which accounts for more than 90 percent of the harvest, has been increasing to a level capable of exerting a greater fishing mortality than needed to harvest MSY. The IATTC has taken action to limit fleet growth in the EPO, and implemented during 1998 a limit on the allowable harvest of yellowfin tuna. The stock of yellowfin continues to be at near optimum level of abundance.

Discussion: No motions were proposed for ISC action with respect to yellowfin.

6.4.2 Marlin

Blue and striped marlins are species of interest to ISC. Blue marlin occurs widely in tropical and subtropical waters, notably in central and western Pacific. Striped marlin is distributed in more temperate waters in the Eastern Tropical Pacific, Northwest Pacific and South Pacific. Marlins are generally a non-target, but a very valuable, component of the catch in longline fisheries directed towards tunas. Marlins are also a prized target of recreational fisheries. Pacific marlins stock assessments have been few and infrequent. The first general assessment was presented at a billfish workshop held in Hawaii in 1977. The most recent assessments were presented by Japan and United States scientists in 1989 at the 2nd International Billfish Symposium. Several fisheries organizations in the Pacific engage in research on marlins and have interest in stock assessments. There are needs for assessments of marlins due to concerns about their stock status. For example, in the United States, the Western Pacific Regional Fishery Management Council has urged that a blue marlin stock assessment be conducted in the near future through international cooperation. Mexican fisheries scientists have also expressed the need for a striped marlin stock assessment. The requirements to conduct assessments for marlins include: comprehensive catch and effort statistics, biological and oceanographic information, and international cooperation.

Recommendation is made to establish an ISC Marlins Working Group and the United States will accept leadership of the Working Group. The Working Group would be charged to carry out assessments and related research with other organizations, e.g., South Pacific Community, Standing Committee for Tuna and Billfish, Inter-American Tropical Tuna Commission, and others. Initial priority may be given to blue marlin assessment.

Discussion of Marlin Report: Additional information about Marlins was presented by the Western Pacific Regional Fishery Management Council. The Council places a high

priority on blue marlin, which is an important target for sports fishing in Hawaii, and forms part of the incidental catch in the Hawaii longline fishery. There were indications of a decreasing trend of nominal CPUE of blue marlin in the main charter vessel fishery in Hawaii (at Kona), and in the small scale longline fishery in American Samoa.

Mexico supported the formation of an ISC Marlin working group and stressed that Striped Marlin should also be considered by the Marlin WG. It was noted that SPC had established a Billfish and Bycatch WG handling Marlins and IATTC started to monitor catch of Marlins. It is agreed that the Marlins WG be established, and in coordination and collaboration with IATTC and SPC work toward and develop a marlin stock assessment.

6.4.3 North Pacific Albacore

The 15th North Pacific Albacore Workshop was held at Nanaimo, British Columbia, December 3--5, 1997. A report of the workshop is available either from the author or from

http://www.pac.dfo-mpo.gc.ca/ops/fm/Commercial/tuna/albacore.htm

At the workshop, 16 participants from the United States, Japan, Chinese Taipei, and Canada attended the meetings. The participants reviewed 17 working documents on North Pacific albacore and achieved several workshop objectives, including selection of biological reference points to be used for monitoring overfishing of the stock and comparing independent stock assessments of stock conditions. The descriptions of the fisheries were updated to 1996 with preliminary information for 1997. The 1996 all nation albacore catch was 76,132 metric ton (t). The United States agreed to continue as the clearing house for catch/effort and biological data for each nation and agreed to continue servicing the FTP site to allow member nations to retrieve data. Stock assessment models used by the workshop indicate that the condition of the albacore stock is improving to a biomass level near maximum sustainable yield, which was

estimated to be from 80,000 t to 110,000 t. Throughout the North Pacific a number of strong year classes were noted in the catch with the 1989 year class being the strongest since 1967, followed by 1991 and 1993. This increasing trend was attributed to increased productivity in the North Pacific Ocean. If future catches do not increase greatly above the current level (70,000 t) and stock parameters remain at current levels, the biomass should continue to increase or remain stable.

The 16th North Pacific Albacore Workshop is planned to be held in Japan this year. The detailed venue and date will be announced to the members in the near future.

Discussion of North Pacific Albacore Report: With regard to the appearance of strong year classes it was pointed out that some studies suggest that there are some relationships between productivity of albacore and oceanographic conditions, though the actual mechanism is uncertain. The study on the south Pacific albacore showed a negative relationship between ENSO and recruitment of albacore.

The effect of the driftnet fishery on the albacore stock was discussed. The results of the studies in the previous north Pacific albacore workshops are that the total fishing mortality of the surface fisheries decreased since the mid 1970s, though the portion of fishing mortality due to the drift net fishery increased since the 1980s because of the significant decrease of the fishing effort of the pole and line fishery. The abundance began to decrease before the expansion of the driftnet fishery in the north Pacific. A conclusion of the previous albacore workshop was that the driftnet fishery did not affect the stock of albacore significantly. It was noted that in the south Pacific the SPC also found little effect of the driftnet fishery on the stock of albacore.

In this year, the economic condition in the United States tuna market had seriously affected the albacore fishery. There is a strong relationship between the market condition and fishery. In the future workshop, it is desired to investigate this

relationship.

7. Consideration of Statistics and Data Format

Deliberations of the Statistical Working Group (STATWG) were reported to the meeting (ISC2/99/PLEN/19). The STATWG meeting was held at January 18-19 chaired by Dr. Sakagawa with participants from Japan, Mexico, United States, Chinese Taipei, IATTC and SPC. The working group concluded agreements on the following topics:

- Historical data to be contributed by participants
- Data to be reported (Categories I, II, III)
- Species to be included
- Data resolution - time-area strata (aggregation)
- Timetable for submitting data
- Data sharing and procedures
- Procedures for addressing non-contributor data request
- Data submission procedures
- ISC Internet website and contents
- Data clearing house in Japan
- Data base management
- Future work plan
- Time and place of next STATWG meeting

The STATWG recommended the ISC consider and authorize a general ISC website.

Discussion of Statistical Working Group Report:

The Chair noted that not all parties to ISC were present at the Statistics Working Group.

It was clarified that Category II data are intended to be aggregated from logbooks and not data on individual fishing operations. Details, such as how the catch data are

expressed (round weight or processed weight) and whether the data are raised, are left to the discretion of individual contributors. However, contributors should submit a document detailing their data processing procedures. That document should include information on coverage rate and conversion factors for calculating catch in round weight. International agencies that contribute to the data base should exclude data from other contributors to avoid possible double counting.

The Chair submitted for approval by the ISC several propositions emanating from the report of STATWG and ensuing discussion: 1) the schedule of deadlines outlined in the report; 2) the requirement for a data processing procedure document; 3) development of a web site maintained by Japan; 4) contents of that web site as outlined in the report; 5) establishment of a Data Correspondents Group staffed by the individuals named in the report; 6) next meeting of the Statistics Working Group to be in conjunction with the next ISC meeting. The plenary meeting assented to all propositions and agreed to append the final STATWG report to the Report of the Second ISC Meeting.

8. Expansion of Participation in ISC

The Chair referred to the Guidelines for the ISC (ISC2/99/PLEN/20) part B. on membership and reminded participants that the existing membership in ISC was determined by agreement at the previous meeting in Tokyo to constitute the attendants at that meeting. The Chinese Taipei delegation proposed amendments to the membership guidelines that would enable full participation of Chinese Taipei in ISC as a "member" rather than an "observer participant". The proposed membership section would read as follows:

B. MEMBERSHIP

1.MEMBERS

A. Coastal states/ **ECONOMIES** of the region

B. States/**ECONOMIES** with vessels fishing for these species in the region.

2.OBSERVER PARTICIPANTS

A. Relevant intergovernmental fishery organizations;

B. Relevant intergovernmental marine science organizations.

C. (DELETE)

The full text of the Chinese Taipei statement is appended (Appendix 1). A counter-proposal by the People's Republic of China delegation would change item B.2.C. from "other entities with vessels..." to "other entities, fishing entities with vessels...". The United States delegation stated that the United States could accept the Chinese Taipei proposal on the grounds that the ISC is a technical body and does not take legally binding actions. The People's Republic of China stated that their delegation is not currently delegated to accept the Chinese Taipei proposal. The People's Republic of China delegation stated that the ISC is still in the developmental stage, and it is not time to extend the membership. The Japan delegation stated that this issue should be treated through mutual understanding amongst members, and the ISC continues to seek a reasonable mechanism of participation. Referring to the proposal from the People's Republic of China delegation, Chinese Taipei stated that its proposal which originated from the APEC formulation, should be a more appropriate solution. The meeting assented to a suggestion from the Chair that the delegations should consult with higher authority in their governments with regard to this issue and that consultation between governments should be encouraged so that the issue can be resolved before the next ISC meeting.

9. Operational Procedures

Referring to the Draft ISC Operational Procedures (ISC2/99/PLEN/21) that was presented at the previous ISC meeting, the Chair noted that only two editorial comments about the draft procedures had been received since that meeting and invited additional comments from the current meeting. Regarding the section on observers, IATTC felt that observers should at least be able to comment on the accuracy of the

record of their own contributions to ISC meetings and suggested that the provision that observers have "no voice in the review of minutes of ISC meetings" should be deleted. In referring to its own rules of procedures, IATTC also suggested that, the Chair might develop a list of observers to be invited and, prior to the convening of an ISC meeting, circulate it to members for their consideration and approval. The People's Republic of China suggested the addition of "fishing entities" following the word "entities" in the section on observers, but Chinese Taipei felt that consistency should be maintained with the language in the Guidelines document (ISC2/99/PLEN/20). Chinese Taipei also proposed that the role of the Chairperson should include invitation of members and observers. Since the operational procedures needed to be revised in light of the comments received, the United States undertook to develop the procedures further in consultation with the National Correspondents Group and to report to the next ISC meeting.

10. Future Meetings

The Chair and Japan both emphasized that responsibilities and benefits of hosting ISC meetings need not be limited to the United States and Japan and that an invitation from any other party to host ISC would be welcome. Japan offered to host the upcoming meeting in case no other offer arises. The time was tentatively set for year 2001 with details to be determined later via the National Correspondents Group. Japan noted that the period December– May is preferable due to the press of other fishery meetings during June–November.

11. Other Business

The question of ISC co-sponsorship of a symposium, "Beyond El Niño", was taken up again. Canada, Mexico, and Chinese Taipei assented to the proposition. Chinese Taipei suggested that all parties to ISC should be invited to the symposium. Japan reserved its position on the matter until it could consult with PICES members in Japan

and undertook to report the result to the Chair as soon as possible following the meeting. The meeting assented to the proposal from the Chair that a positive response from Japan would indicate official ISC co-sponsorship for the symposium, and a negative response would indicate no co-sponsorship.

There was no other business and the meeting adjourned following review of the rapporteur's report (1/23/99).

LIST OF APPENDICES

Appendix 1.

CHINESE TAIPEI STATEMENT ON PARTICIPATION

It has been the foundation of international fishery legislation that all the regulatory framework of enforcement mechanism must be conducted subject to the sound scientific evidence. This requirement also evidences the importance of this meeting. Today, we would like to indicate our appreciation for the considerate arrangement of the host state first. Then, we also sincerely wish that, in the subsequent ISC meetings, the tradition of fair treatment provided by the host should be followed.

Also, we would like to indicate that it is a nation's responsibility to carry out a flag-state's responsibility in compliance with the requirements provided by the LOS Convention of 1982 and UNIA of 1995. Also, it is undeniable which responsibility may not be substituted, neither be subdivided. Otherwise, the international efforts to establish a responsible fishing system and to promulgate the rules regarding FOC will both be in vain.

Therefore, we are here to pledge on the willingness to take this responsibility as a whole and to honestly exhibit our capability to perform the international obligation of contributing the scientific data and information. Also, we believe that all your recognition of our credits in this regard are not only important to the future implementation of international rules but also crucial to the practicability of the conservation and management of the marine resources in the north Pacific. And, that's why our full participation deserves your special attention.

We firmly believe that the responsibility must come from the same origin as where the right is gained. Only a state or an economy capable of authorizing the fishing operation on the high sea should and may legitimately and effectively bear the responsibility of

regulating those fishing activities. This is especially true when the state or the economy is the only entity conducting the scientific studies in collecting the related data for those operations. Don't you agree to impose a nation the obligation as a full member without granting her the participation right in equal is an inequitable treatment?

Concerning with the issue of expanding the participation, we would like to propose that, taking the APEC model as an example, the ISC, a professional group, could also treat us as an economy vis-`a-vis a state. The revised guideline in this regard will be provided for your consideration and adjustment.

THE ORIGINAL PROVISION OF ARTICLE B	THE PROPOSED REVISION OF ARTICLE B
B. MEMBERSHIP 1. MEMBER a. Coastal states of the region. b. States with vessels fishing for these species in the region. 2. OBSERVER PARTICIPANTS a. Relevant intergovernmental fishery organizations; b. Relevant intergovernmental marine science organizations; c. Other entities with vessels fishing for these species in the region.	B. MEMBERSHIP 1. MEMBER a. Coastal states/**ECONOMIES** of the region. b. States/**ECONOMIES** with vessels fishing for these species in the region. 2. OBSERVER PARTICIPANTS a. Relevant intergovernmental fishery organizations; b. Relevant intergovernmental marine science organizations. c. **(DELETE)**

We also believe that adding the term "/economies" behind the word "state" in the guideline is necessary.

Appendix 2.

WORKING PAPERS

Paper Number	Title and Author(s)
ISC2/99/PLEN/1	An update of the Canadian North Pacific albacore fishery *William Shaw*
ISC2/99/PLEN/2	1998 report to the second meeting of the Interim Scientific Committee (ISC) on the People's Republic of China for tuna and tuna-like species in the North Pacific Ocean
ISC2/99/PLEN/3	National report of Japan *Harumi Yamada and Yuji Uozumi*
ISC2/99/PLEN/4	National report – status of Taiwan tuna and tuna-like fisheries *Shui-Kai Chang*
ISC2/99/PLEN/5	1999 report to the Interim Scientific Committee on United States fisheries for tuna and tuna-like species in the North Pacific Ocean *Staff*
ISC2/99/PLEN/6	Important resolutions adopted at IATTC meetings during 1998 *IATTC*
ISC2/99/PLEN/7	Interannual dynamics in the North Pacific transition zone *Polovina et al.*
ISC2/99/PLEN/8	Keystone predators in the Central Pacific *Kitchell et al.*
ISC2/99/PLEN/9	PICES: the North Pacific Marine Science Organization *Patricia Livingston*

ISC2/99/PLEN/10	National report of Mexico *P. Arenas, M. Dreyfus, and G. Compean*
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ISC2/99/PLEN/12	Review of biology, fisheries, and research activities on Bigeye tuna in the Pacific *Hiroaki Okamoto and Naozumi Miyabe*
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ISC2/99/PLEN/14	Review of the present status of Bluefin tuna resources *Harumi Yamada and Sachiko Tsuji*
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ISC2/99/PLEN/16	Assessment of Bluefin tuna in the Pacific Ocean *IATTC*
ISC2/99/PLEN/17	Fisheries and stock assessment of Yellowfin tuna in the Western and Central Pacific *Keith Bigelow*
ISC2/99/PLEN/18	Assessment of Yellowfin tuna in the Eastern Pacific Ocean *IATTC*
ISC2/99/PLEN/19	Report of the statistical working group *Yoshio Ishizuka*
ISC2/99/PLEN/20	Guidelines for the Interim Scientific Committee for tuna and tuna-like species in the North Pacific Ocean
ISC2/99/PLEN/21	Draft ISC operational procedures

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