

PROCEEDINGS
OF THE
INTERNATIONAL
TUNA FISHERS
CONFERENCE ON
RESPONSIBLE FISHERIES
& THIRD INTERNATIONAL
FISHERS FORUM

July 25–29, 2005
Inter-Continental Grand
Yokohama, Japan





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SPONSORED BY:

Organization for the Promotion of Responsible Tuna Fisheries

Western Pacific Regional Fishery Management Council

Fisheries Agency of Japan

Hawaii Longline Association

Japan Fisheries Association

National Marine Fisheries Service

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Contents

A Message from the Conference Hosts and Sponsors	1
Conferences Goals and Objectives	3
Executive Summary — International Tuna Fishers Conference on Responsible Fisheries	5
Executive Summary — Third International Fishers Forum	7
Yokohama Declaration (English)	10
Yokohama Declaration (Japanese)	12
Program	15

PRESENTATION ABSTRACTS AND PAPERS

OPENING ADDRESSES

Mr. Isao Nakasu , <i>President, Organization for the Promotion of Responsible Tuna Fisheries, and President, Japan Fisheries Association</i>	23
Mr. Akira Nakamae , <i>Deputy Director General, Fisheries Agency of Japan</i>	23
Dr. Rebecca Lent , <i>Director for NMFS Office of International Affairs</i>	24
Mr. Sean Martin , <i>President, Hawaii Longline Association</i>	24

INTERNATIONAL TUNA FISHERS CONFERENCE ON RESPONSIBLE FISHERIES

“Decade of Implementation” : Review of the result of 26th FAO COFI and the 6th UNICPOLOS — Mr. Patrick McGuinness, <i>Fisheries Council of Canada, ICFA representative to the 26th FAO COFI</i>	29
Capacity Control and IUU Fisheries — Mr. Katsuma Hanafusa, <i>Counselor, Fisheries Agency of Japan</i> ..	31

PRODUCTION

Current Status of Tuna Stocks — Dr. Robin Allen, <i>Director IATTC</i>	33
Production for Sashimi Market — Mr. Yasuo Sato, <i>Japanese fisher</i> , and Mr. Scott Barrows, <i>Hawaii Longline Association</i>	33
WTPO Initiative to Manage Tuna Purse-seine Fishing Effort — Mr. Kazuo Shima, <i>Japan Far Seas Purse Seine Fishing Organization</i>	35

MARKETING AND CONSUMPTION

Farmed Tuna — Dr. Arata Izawa, <i>WWF Japan</i> , and Mr. Michel Dreyfus, <i>Instituto Nacional de la Pesca Mexico, Mexico tuna farming</i>	39
Responsible Trading — Mr. Paul Bartram, <i>U.S. Trader</i> , and Dr. Hiroshi Sakamoto, <i>Organization for the Promotion of Responsible Tuna Fisheries</i>	42
Responsible Consumption — Mr. William Emerson, <i>FAO ecolabeling guidelines</i> , and Ms. Yuriko Shiraishi, <i>Chairman, Womens’ Forum Fish</i>	44
Monitoring and Control Over Fishing Activities — Mr. Yoshitsugu Shikada, <i>Fisheries Agency of Japan</i> ..	46

SHARKS

Status of Shark Stocks — Dr. Hideki Nakano, <i>Fisheries Agency of Japan</i> , and Dr. John Stevens, <i>CSIRO Australia</i>	47
Shark Fisheries and Utilization — Mr. Kuo-Ping Lin, <i>Taiwan Fisheries Agency</i>	50
International Trading of Shark Products — Dr. Shelley Clarke, <i>Joint Institute for Marine and Atmospheric Research, University of Hawaii</i> and <i>National Research Institute of Far Seas Fisheries</i> ..	55
Promotion of Full Utilization — Mr. Toshikazu Miyamoto, <i>Global Guardian Trust</i> ..	55

THIRD INTERNATIONAL FISHERS FORUM

Reporting on commitments and progress since IFF2 and process for IFF3 participant commitments — Ms. Kitty Simonds, <i>Western Pacific Regional Fishery Management Council</i>	59
--	-----------

REVIEW OF THE STATE OF BYCATCH IN LONGLINE FISHERIES

Approaches to Solving Fisheries Bycatch Problems — Dr. Martin Hall, <i>IATTC</i>	63
---	-----------

FISHERS EFFORTS

Mr. Kouichi Teramoto, <i>Japan Fishers Cooperative Association</i>	63
Mr. Leland Oldenburg, <i>Hawaii Fisher</i>	64
Mr. Wang Shuu-Lung, <i>Taiwanese fisher</i>	68
Mr. Miguel Cuentas, <i>Peru fisher</i>	68
Mr. Yeon JIB Chu, <i>Korean fisher</i>	69
Mr. Guillermo Moran, <i>Ecuador fisher</i>	69
Mr. Augusto Natividad, <i>Filipino fisher</i>	70
Mr. R.P. Poernomo, <i>Indonesian fisher</i>	71
Ms. Zhang Xiao Li, <i>Chinese fisher</i>	72
Mr. Wawan Koswara, <i>ASEAN Fisheries Federation</i>	73
Mr. David Kreutz, <i>Extension Officer, Seanet, Australia</i>	74

MONITORING BYCATCH

Mr. Kazuhisa Tsuzuki, Mr. Ryoichi Saito, <i>Mitsubishi Space Software</i>, and Mr. Shin Fujita, <i>Japan Fisheries Information Service Center</i>	77
--	-----------

SEABIRD BYCATCH IN LONGLINE FISHERIES

RESEARCH ON SEABIRD BYCATCH AVOIDANCE METHODS

Japan Research — Mr. Masashi Kiyota, <i>National Research Institute of Far Seas Fisheries</i>	79
Review of Latin American Research — Dr. Patricia Gandini, <i>Universidad Nacional de la Patagonia Austral</i>, and Dr. Carlos Moreno, <i>Universidad Austral de Chile</i>	81
Review of Technical Strategies to Reduce Seabird Bycatch and Research Results — Mr. Nigel Brothers, <i>Marine Ecology and Technology Consultant, Australia</i>, and Dr. Svein Lokkeborg, <i>Institute of Marine Research, Norway</i>	82

REGIONAL AND INTERNATIONAL INITIATIVES

Review of International Governmental Initiatives — Professor John Croxall, <i>British Antarctic Survey</i>, and Ms. Kim Rivera, <i>U.S. NOAA Fisheries</i>	87
---	-----------

NGO initiatives — Mr. Noritaka Ichida, <i>BirdLife International</i>, and Dr. Ben Sullivan, <i>Royal Society for the Protection of Birds</i>	88
---	-----------

Southern Seabird Solutions — Ms. Janice Molloy, <i>New Zealand Department of Conservation</i>	88
--	-----------

SESSION MAIN POINTS — Mr. Eric Gilman, <i>Fisheries Bycatch Program Director, U.S. Blue Ocean Institute</i>	89
--	-----------

SEA TURTLE BYCATCH IN LONGLINE FISHERIES

Japan Research — Dr. Hiroshi Minami, <i>National Research Institute of Far Seas Fisheries</i>, and Dr. Daisuke Shiode, <i>Tokyo University of Marine Science and Technology</i>	91
--	-----------

U.S. Research and Regional Review — Mr. John Watson, <i>U.S. NOAA Fisheries</i>	92
--	-----------

Research on Turtle Bycatch in Sicilian Channel Longline Fisheries and Regional Mediterranean Review — Dr. Susanna Piovano, <i>University of Torino, Italy</i>	93
--	-----------

Latin America Pacific Research — Dr. Martin Hall, <i>IATTC</i>	98
---	-----------

Role of NGOs in Addressing Sea Turtle Bycatch Problems — Dr. Arata Izawa, <i>WWF</i>	98
---	-----------

Indian Ocean - South-East Asian Bycatch Initiatives — Mr. Douglas Hykle, <i>IOSEA Marine Turtle MoU Secretariat</i>	99
--	-----------

RESEARCH ON SEA TURTLE NESTING AND MIGRATION

Comprehensive Conservation Efforts to Stop the Decline of Leatherback Sea Turtles; Report from Asian Nesting Beaches — Mr. Hiroyuki Suganuma, <i>Everlasting Nature</i>	102
--	------------

Migration, Habitat Use and Conservation of Western Pacific Leatherback Nesting Stocks — Dr. Peter Dutton, <i>U.S. NOAA Fisheries Southwest Fisheries Science Center</i>	104
--	------------

A Pelagic Hotspot for Japanese Juvenile Loggerhead Sea Turtles: The Kuroshio Extension Current Bifurcation Region — Dr. George Balazs, <i>U.S. NOAA Fisheries Pacific Islands Fisheries Science Center</i>	104
---	------------

SESSION MAIN POINTS — Mr. Masashi Kiyota, <i>National Research Institute of Far Seas Fisheries</i>	105
---	------------

Inaugural Jade Sea Turtle Award and 2nd Golden Albatross Award	106
---	------------

Appendix 1: Update on IFF2 Commitments	107
---	------------

Appendix 2: Summary of Participant Commitments	121
---	------------

Appendix 3: List of Sponsors and Participants	129
--	------------

Conference Photos	141
------------------------------------	------------

A Message from the Conference Hosts and Sponsors



Aloha and Ohiyo Gozaimasu!

We would like to thank all of the people who made the International Tuna Fishers Conference on Responsible Fisheries and the Third International Fishers Forum a success.

This joint meeting was broad in its scope. We continued discussions from the two previous International Fishers Forums, focusing on preventing the incidental capture of seabirds and sea turtles in longline fisheries. We also addressed other globally important issues including sustainable tuna and shark fisheries; fishing capacity; production; marketing; consumption monitoring; and illegal, unregulated and unreported fisheries.

The conferences provided an important opportunity for fishermen and scientists to meet to exchange ideas and identify solutions to priority management and conservation issues. We greatly appreciate the time participants took from their busy schedules as fishermen, researchers, gear manufacturers, fishery managers and wildlife conservation advocates to attend this joint conference.

We thank you for having come to Japan from the many countries you represent and are encouraged that together we will continue to pursue solutions that ensure our fisheries are conducted in an environmentally responsible manner.

Comprehensive proceedings from the conferences are now being compiled and edited for publication. In the interim, this synopsis provides a timely summary of main points and conclusions from the conferences.

Mahalo and Arigato,







Conference Goals and Objectives

THE INTERNATIONAL TUNA FISHERS CONFERENCE ON RESPONSIBLE FISHERIES aims to identify effective approaches to ensure that tuna and shark fisheries are sustainable and use responsible practices. This goal recognizes the worldwide nutritional, economic, social, environmental and cultural importance of fisheries. The Conference has the following objectives to attain this goal:

REVIEW

- Status of tuna and shark stocks
- Tuna production for sashimi and canning markets
- Production and utilization of sharks
- Global marketing and consumption of tuna and sharks
- Effective principles for eco-labeling programs to promote responsible seafood consumption

IDENTIFY

- Priority management and conservation issues for tuna and shark fisheries and alternative solutions
- Solutions to overcapacity and illegal, unregulated, and unreported fishing
- Effective institutional frameworks for fisheries monitoring

THE THIRD INTERNATIONAL FISHERS FORUM aims to facilitate identification, discussion, planning and implementation of effective practices and approaches to abate seabird and sea turtle bycatch in longline fisheries. The Forum will pursue the following objectives to reach its goal:

REVIEW

- Commitments and progress since the Second International Fishers Forum
- Knowledge for reducing seabird and sea turtle bycatch in pelagic and demersal longline gear

SHARE

- Experiences on effective/ineffective approaches to abate fisheries bycatch Identify
- Effective approaches to design and implement experiments and commercial demonstrations of technical measures, including changes in fishing gear and fishing practices, to reduce seabird and sea turtle bycatch in longline fisheries
- Constructive roles for environmental non-governmental organizations and for regional fishery management organizations to help abate fisheries bycatch



Executive Summary – International Tuna Fishers Conference on Responsible Fisheries



Over the two days of the conference, experts in various fields related to tuna fisheries made valuable presentations on many issues facing tuna and shark fisheries. The presentations covered a wide range of topics concerning responsible and sustainable tuna and shark fisheries, including the status of global tuna stocks, fishing capacity, production, marketing, trade, consumption, conservation efforts for sharks, and illegal, unregulated, and unreported fisheries, and the role of the United Nations General Assembly and Food and Agricultural Organization in tuna fisheries.

Main points from the presentations and ensuing discussions related to responsible tuna and shark fisheries include:

Positive developments promoting responsible fisheries

- With the establishment of the Western Central Pacific Fisheries Commission, regional fishery management organizations now have global coverage of tuna and tuna-like resources within the international framework envisaged in Article 64 of the United Nations Convention on the Law of the Sea;

Problem identification – activities that are counter to responsible tuna and shark fisheries

- Several tuna and tuna-like stocks are fully exploited or overexploited. In spite of this, the number and capacity of tuna fishing vessels are increasing and tuna farming is rapidly expanding. Fully developed conservation and management policies are lacking to govern these expansions, in spite of the United Nations Food and Agriculture Organization adoption of the International Plan of Action for the Management of Fishing Capacity in 1999 and efforts to limit fishing capacity by large-scale longline vessels;
- Despite the United Nations Food and Agriculture Organization's adoption of the International Plan of

Action for combating illegal, unregulated, and unreported (IUU) fisheries and efforts of regional fishery management organizations to eliminate IUU fishing activities, IUU fishing activities still persist. One IUU activity of particular concern is the shifting of operations from larger to smaller vessels to avoid RFMO regulations of larger vessels;

- Some longline fleets operate large directed shark fisheries solely for the purpose of taking shark fins. This is inconsistent with United Nations General Assembly Resolutions;

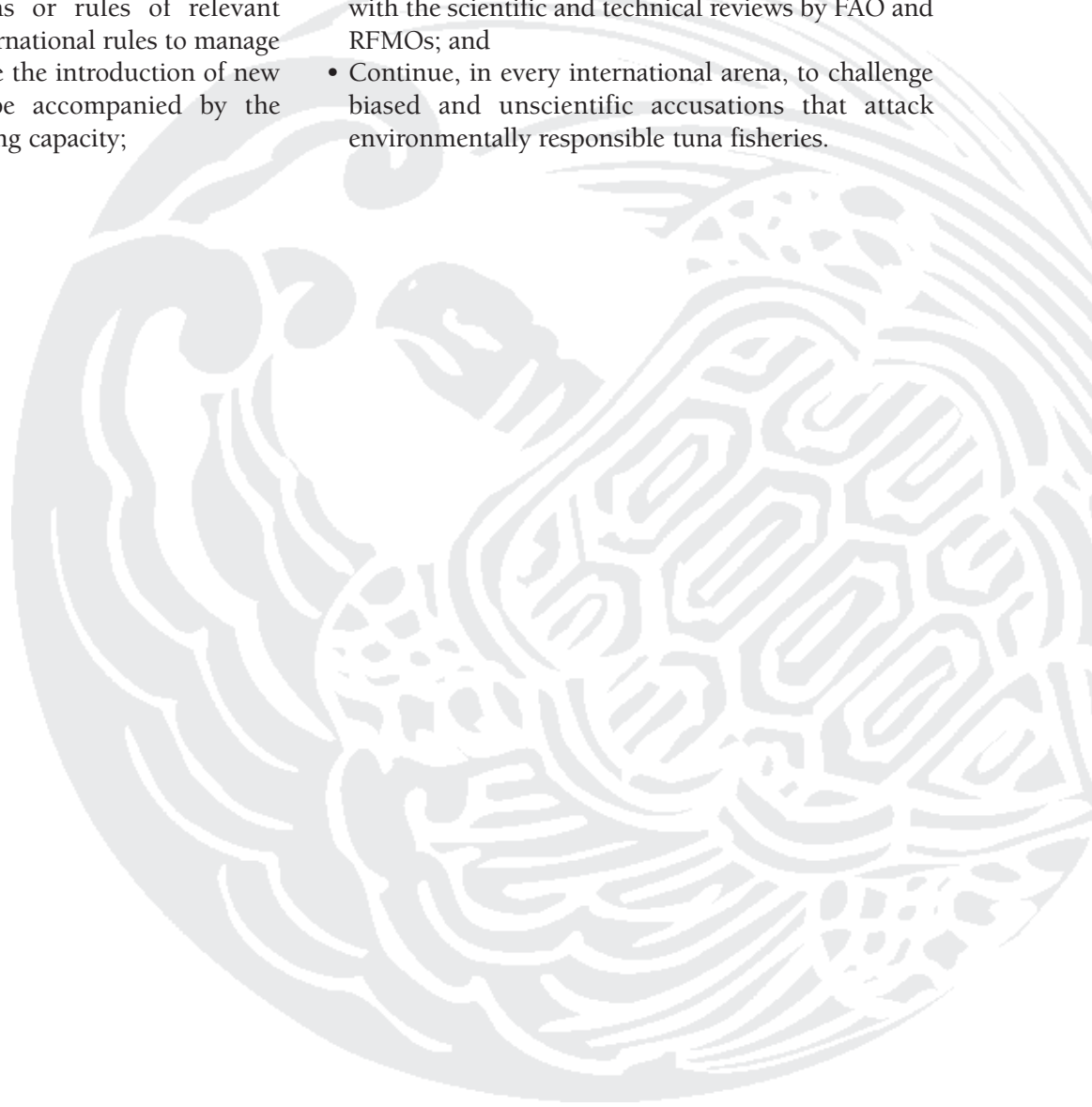
The Conference clarified the goals for promoting responsible tuna fisheries, identifying practical measures to be implemented by fishers. These are expressed in detail in the Yokohama Declaration (page 14). Some of the main points identified in the presentations and ensuing discussions related to strategies for fishers to promote responsible fisheries include:

- Responsible trading and marketing of tuna products is necessary to ensure that responsibly-managed fisheries can effectively compete in the marketplace, otherwise, lowest-cost seafood, potentially from irresponsible fisheries, will drive the market. This can be accomplished by educating and providing seafood consumers with adequate information so they can make wise purchasing decisions and differentiate products based on their origins and management for environmental and safety criteria;
- Eco-labeling of tuna products, voluntary product labeling to convey environmental information to consumers that seeks to create a market-based incentive for better fisheries management, based on internationally-accepted guidelines developed by the United Nations Food and Agriculture Organization, may influence seafood consumer practices to increase demand and value of seafood caught in

responsible and sustainable fisheries. Certification under an eco-labeling scheme can be used as a marketing tool to develop and market an image and product differentiation, through advertising, sales promotion, public relations, direct marketing, and media coverage;

- Encourage all tuna purse seine fishers to become members of the World Tuna Purse seine Organization and support this organization's activities;
- Promote cooperation between longline and purse seine fisheries and other stakeholders to improve techniques for the use of fish aggregating devices, in particular, to pursue reducing the impact of purse seiners on juvenile bigeye tuna, while recognizing the impact of longliners on bigeye adults;
- Consistent with the United Nations International Plan of Action on Management of Fishing Capacity and the recommendations or rules of relevant RFMOs, establish new international rules to manage tuna fishing capacity where the introduction of new fishing capacity would be accompanied by the removal of equivalent fishing capacity;

- Discourage the reflagging of fishing vessels to non-parties of relevant RFMOs and RFMO Parties with little to no ability to control their fishing vessels;
- Urge RFMOs to conserve and manage shark stocks on a scientific basis in accordance with their respective resolutions and recommendations and those of the United Nations. Promote full utilization of sharks retained onboard and the elimination of directed shark fisheries conducted solely for the purpose of harvesting shark fins;
- Reaffirm that the United Nations Food and Agriculture Organization (FAO) and RFMOs have primary responsibility to address international tuna fisheries management issues, and encourage governments to ensure that consideration of such issues by other international frameworks, including the United Nations General Assembly, be conducted with the scientific and technical reviews by FAO and RFMOs; and
- Continue, in every international arena, to challenge biased and unscientific accusations that attack environmentally responsible tuna fisheries.





Executive Summary – Third International Fishers Forum

The Third International Fishers Forum opened, appropriately enough with an accent on the human dimension of tuna fisheries. Martin Hall opened the session where fishers reported on their efforts to fish in a more environmentally responsible manner. He made the observation that nobody wants turtles or seabirds to go extinct, but at the same time fishermen should not have to lose their jobs in order for species to be conserved. To accomplish this we either must fish less, or fish in better. The second option is the one being pursued by folks around the globe and by participants at this meeting. Great progress has been made since IFF2 in reducing the hookings of turtles by longlines and increasing the survival rates of accidentally hooked turtles.

Participants heard from a number of different fishers representing the entire spectrum of pelagic longline fishing, from small scale artisanal fishers, such as in Ecuador, small and medium scale longliners such as in Hawaii and American Samoa, and large scale high seas longliners from Japan and Chinese Taipei. Above and beyond the achievements of fishers in improving their abilities to fish in an environmentally responsible manner were fishers perceptions of the problems and their commitments to solving problems. We heard that for Japanese and Chinese fishermen turtles are an omen for good catches and hooked animals are handled and released with great care and respect. We also heard that fishermen know that their efforts alone will not be sufficient to recover some bird and turtle species. At-sea conservation must be matched by similar efforts on land, otherwise the excellent work by fishermen will be wasted.

Lawsuits brought by environmental organizations have galvanized conservation of turtles and birds in the US, but continued litigation at the expense of cooperative research with fishermen is an egregious waste.

Fishermen in Hawaii and elsewhere have been instrumental in the development of mitigation techniques for seabirds and turtles. Fishermen are both keen observers of the natural world and smart innovators with fishing gear and fishing technology. This combination is a winning combination when fishermen and scientists collaborate to develop mitigation methods and strategies. Deep setting of longlines, use of circle hooks, night setting, tori poles, are all methods that fishermen developed to fish without catching seabirds and turtles.

We have also had a sense in this meeting of the economic and cultural importance of fishing. Fishing is the second most important activity in Peru for example, with over 6000 boats employing 20,000 fishers. The fishing industry in Ecuador is also of a similar scale and represents one of the success stories of IFF2. A whole avenue of research was inspired by the 2002 IFF meeting, which resulted in trials of circle hooks in the Ecuadorian artisanal longline fishery.

All indicated that their respective countries and organizations had commitments to fishing in an environmentally responsible manner, improving statistics on bycatch of protected species such as turtles and seabirds, educating fishers on the need to be conscious of the need to conserve birds and turtles, and to make it harder for IUU vessels to operate. Monitoring bycatch through observer programs is one of the best ways to evaluate the volume of turtles and birds taken by longliners, but, of course, observer programs are expensive to implement and maintain. The meeting also heard advances in digital technology using video cameras to take images every 5 minutes during a 4 month experiment on a Japanese longline vessel. Despite some problems encountered, such as glare, salt accumulation and lack of contrast, these are all solvable and this technology could be an effective method to monitor bycatch.

SEABIRDS

The second part of the first day of IFF3 was devoted primarily to the way different demersal and pelagic longline fisheries are managing to minimize interactions with seabirds. The various methods described by participants can be broadly divided into measures which scare birds away, such as tori lines, lights and sound, and water cannon, and measures which conceal the baited hooks such as dyed bait, setting chutes and capsules, distract the seabirds such as strategic offal discards or deny seabirds the opportunity to seize the baited hook by making baited hooks sink quickly. Reports were made by participants from Japan, Argentina, Uruguay, Brazil, Ecuador, Peru, Australia, New Zealand, Bering Sea, and the Southern Ocean.

No single method is suitable for all fisheries and sometimes combinations of methods may be the most suitable approach to reducing seabird interactions with longlines. Testing one type of method may lead to the emergence or discovery of alternative methods for seabird mitigation. An excellent example was the testing of underwater setting chutes in Hawaii, through which the technique of side setting was 'discovered'. Crew safety was an issue, where weighted hooks were used to improve sink rates but which can and do injure fishermen lines snaps and weighted lead swivels become lead bullets!

Participants reported the wholesale reduction of seabird takes where in several instances reductions of bird takes were of two or three orders of magnitude. Participants also reported on partnership initiatives to accelerate the acceptance of mitigation techniques. Finding leaders or 'early adopters' of new techniques helps this process, and have been instrumental in the adoption of new measures in Hawaii and New Zealand, for example. Some mitigation regulations also allow for flexibility to let fishers adopt measures which best suit them and their vessels. For example, in Hawaii, not all longline vessels can switch to side setting and so a suite of other measures are also available for fishers to employ.

The seabird session finished by focusing on the different fisheries and circumstances reported by the meeting participants. While these generally reflected successes and progress, it also meant that there were a range of different standards in place and made comparisons across fleets more difficult. Efforts were being made to develop minimum standards for reporting by observers to remedy this problem.

TURTLES

Unlike our seabird efforts which have over a decade of concerted efforts to reduce interactions with longlines, our work on turtles has had to play catch up. I think we can all agree that the rate of catch up since 2002 has been very impressive. In 2002 we were getting the first glimmerings of how circle hook and fish bait combinations could radically reduce pelagic longline hookings of turtles, and if hooked, improve survival rates. Thanks to John Watson and his team at the NMFS Pascagoula Lab, we were able to reopen the swordfish fishery in Hawaii based on the results of their work. The reopening of the swordfish fishery was not only an economic benefit to the state of Hawaii but serves as a model fishery for other longline fisheries.

But the US was not the only country looking at hook and bait technology. One of the most important developments during the interim between IFF2 and IFF3 has been the collaborative works between Japanese and US scientists on the ways to test bait/hook technology. This had involved not just trying hook and bait combinations at sea but also observing the way turtles such as loggerheads feed in captivity.

This collaborative effort between Japan and the US has been termed the JHSTSE (just see) program and involves not just testing different hook sizes and bait, but also looking at the critical depths to set hooks and thereby avoid catching turtles. We heard how a mid-water float system being trialed by Japanese scientists to get most longline hooks at depths that avoid taking a range of epi-pelagic bycatch including turtles.

We have also heard that rings on hooks are thought to be important in making circle hooks acceptable to fishers since it may reduce the tearing loose of hooks from the jaws of swordfish. This is important since asking fishermen to change from their traditional hook and bait combinations should not result in their being compromised by lower catch rates of the target species. As with bird mitigation, it is often a case of 'horses for courses' i.e. there are different combinations of hook size and bait that work best for different fisheries.

Besides Japan and the US, there have been active programs elsewhere on turtle mitigation, especially in the Mediterranean. In the crowded waters of the Med., we heard that between 25,000 and 35,000 turtles are caught per year by longliners. Various factors affecting turtle takes such as float attractiveness, lit versus unlit

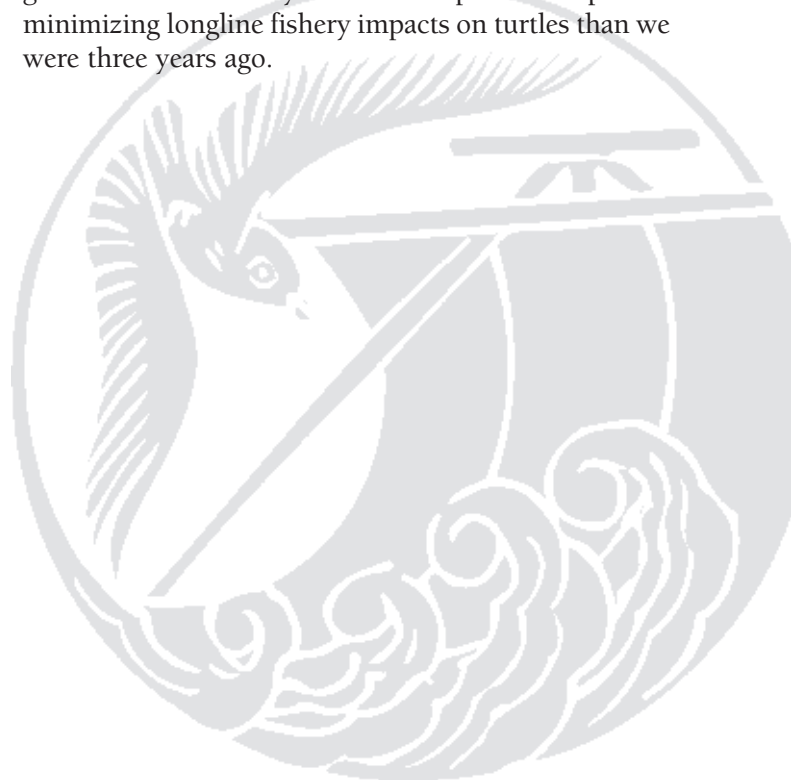
floats sounds, bait color, bait smell have all been tested with varying degrees of success. One further avenue of investigation is the difference of the speed of vision of turtles versus fish, which may permit the development light sticks which fish can detect but not turtles.

The meeting also heard about practical extension programs in Latin America that have resulted from the successes of the hook and gear investigations. A large scale hook exchange project was implemented with small scale artisanal longline fisheries in Ecuador and other parts of Latin America, with only one boat asking for their original hooks back. The results from this project were reductions of 40-70% reductions in turtle hookings and 70-90% reductions with 18/0 circle hooks. Part of this hook exchange project also involved workshops with fishermen to explain why circle hooks were a good idea, i.e. by saving turtles fishermen were saving their jobs. Ecuadorian fishermen have clearly become so enthused and committed to the promotion of circle hooks.

The types of projects are where conservation NGOs have an important role. WWF, for example, has been sponsoring circle hooks experiment throughout the role. NGOs have a strong role to play in the other important element of turtle conservation, the management of nesting beaches to conserve egg production, and the minimizing of hunting adult turtles at nesting beaches and foraging grounds. NGOs also have an important role in the development and promotion of international conservation conventions for turtles. In the Asia Pacific Region, the Indian Ocean South East

Asian Memorandum of Understanding has been instrumental in mobilizing and motivating turtle conservation in the Western Pacific and Indian Ocean. IOSEA focuses on the FAO guidelines, including turtle handling, promotion of the use of trawl turtle excluder device or TEDs, purse seine avoidance, promotion of turtle-safe longline gear, regulation of gillnets.

Several presenters showed how our understanding of the spatial distribution of turtles on the oceans is improving through the use of satellite tags and may offer additional ways in which to reduce interactions with longlines. Area closures may be impracticable but it may certainly be possible to advise fishermen of areas or hot spots to avoid at particular times of the year. All of this is leading inevitably to the need for a comprehensive approach to Sea Turtle Conservation which is what is being planned through the Bellagio Blueprint, an initiative which is ongoing and aims at developing a comprehensive integrated approach to Pacific turtle conservation. In a way its very easy, all we have to do is reduce mortality in coastal and pelagic fisheries and protect all remaining nesting beaches— increase hatchling production. Of course the political realities are difficult but there are real signs of hope. We are finding more nesting beaches, we are seeing some populations recover, and fisheries such as Chinese Taipei are reducing their longline fleets, as announced this morning. There is a still a long way to go but we are certainly in better shape with respect to minimizing longline fishery impacts on turtles than we were three years ago.





Yokohama Declaration

DECLARATION OF RESPONSIBLE TUNA FISHERS ISSUED AT THE INTERNATIONAL TUNA FISHERS CONFERENCE ON RESPONSIBLE FISHERIES AND THIRD INTERNATIONAL FISHERS FORUM

July 25-29, 2005, Yokohama, Japan

HAVING actively exchanged wide-ranging perspectives and approaches to promote responsible tuna fisheries and to reduce sea turtle and seabird incidental catch in longline fishing,

COMMITTING ourselves to sustainable use of world tuna resources and conservation of marine ecosystems,

EMPHASIZING that sustainable fisheries depend on a healthy oceanic environment, and expressing our strong desire to make every effort to harmonize fisheries with the environment in order to ensure sustainable marine productivity and healthy ecosystems,

RECOGNIZING that upon the establishment of the Western Central Pacific Fisheries Commission (WCPFC), regional fishery management organizations (RFMOs) achieved world coverage of tuna and tuna-like resource conservation and management within the international framework envisaged in Article 64 of the United Nations Convention on the Law of the Sea,

EXPRESSING concern that the number and capacity of tuna fishing vessels are still increasing and that tuna farming is rapidly expanding in the absence of fully developed conservation and management policies, even though several tuna and tuna-like stocks are fully exploited or overexploited, in spite of (a) the adoption of the UN Food and Agriculture Organization (FAO)

International Plan of Action (IPOA) for the Management of Fishing Capacity in 1999 and (b) the efforts to limit fishing capacity by large-scale longline vessels,

Expressing concern that illegal, unreported and unregulated (IUU) fishing activities still persist, including shifting operations from larger vessels to smaller vessels to avoid RFMO regulations for larger vessels despite the adoption of the IPOA for IUU fishing and the efforts of RFMOs to eliminate IUU fishing activities,

ALSO EXPRESSING concern that certain longline fleets operate directed shark fisheries of considerable size solely for the purpose of harvesting shark fins inconsistent with United Nations General Assembly Resolutions,

RECOGNIZING the need for all parties both on land and at sea to take holistic approaches to conserve sea turtles and seabirds, particularly, the importance of the role of fishers in implementing the FAO Guidelines to Reduce Sea Turtle Mortality in Fishing Operations, the IPOA for seabirds and the relevant mitigation measures adopted by tuna RFMOs, and

BEING gravely concerned that some elements of the environmental community are conducting a concerted emotional campaign at international bodies such as the United Nations to implement a moratorium on longline fisheries in the Pacific contrary to scientific evidence and deliberately ignoring the efforts of managers and responsible fishers to introduce, implement, raise awareness and disseminate techniques for the reduction of incidental catch,

WE, FISHERS—operators of large- and small-scale longline, purse seine, artisanal and other vessels—participating in the International Tuna Fishers Conference on Responsible Fisheries and the Third International Fishers Forum, do declare to engage in the following activities in order to further promote responsible tuna fisheries to:

1. Promote cooperation, information sharing and constructive dialog among all tuna resources' stakeholders—fishers, traders, distributors, fish workers, canners, processors and consumers—in order to promote responsible tuna fishing, trade, marketing and consumption, and to facilitate conservation and sustainable use of tuna and tuna-like species;
2. Support activities of the World Tuna Purse seine Organization (WTPO) and to promote cooperation in realizing sustainable use of tuna resources by encouraging all tuna purse seine fishers to participate in WTPO where, at the present time, about 65% of tuna purse seine fishers are members;
3. Emphasize the importance of longline and purse seine fisheries working cooperatively with each other and with other stakeholders to improve techniques for use of fish aggregating devices (FADs) with the aim of reducing the impact of purse seiners on bigeye tuna, especially the juveniles, while recognizing the impact of longliners on bigeye adults;
4. Facilitate the establishment of new, or cooperation with existing, international rules for management of tuna fishing capacity based on the principle that any introduction of new fishing capacity should be accompanied with removal of equivalent fishing capacity consistent with the FAO IPOA on Management of Fishing Capacity and the recommendations or rules of relevant RFMOs, while taking due note of the rights and obligations of developing countries;
5. Refrain from circumventing conservation and management measures by reflagging our fishing vessels to non-parties of relevant RFMOs and/or RFMO Parties with little to no ability to control their fishing vessels;
6. Support the Joint Meeting of Tuna RFMOs to be held in Japan in early 2007 to promote cooperation and coordination of tuna RFMOs and to achieve a global consistency in tuna conservation and management measures;

7. Urge RFMOs to ensure conservation and management of shark stocks on a scientific basis in accordance with their respective resolutions/recommendations and those of the United Nations and to promote full utilization of sharks retained on board and the elimination of directed shark fisheries conducted solely for the purpose of harvesting shark fins;

8. Actively cooperate with the relevant RFMOs to make the best attempts to reduce incidental catch of sea turtles and seabirds through the following actions:

- the collection of scientific data, including observer data whenever feasible,
- the development and implementation of practical measures for monitoring incidental catch including, among others, the introduction of electronic observer techniques, and
- the development and use of technology to reduce incidental catch and improve post-release survival rates for sea turtles;

9. Vigorously promote the immediate use of appropriate combinations of circle hooks and type of bait, including use on a trial basis, to reduce sea turtle incidental catch and improve post-release survival rate;

10. Vigorously promote the widespread use of proven techniques (such as tori poles, night setting, side setting, blue-dyed bait, etc.) to reduce seabird incidental catch, particularly, in areas with high rate of seabird incidental catch;

11. Reaffirm that the FAO and RFMOs are the organizations that have primary responsibility for addressing international tuna fisheries issues, and to encourage governments to ensure that consideration of such issues by other international frameworks, including the United Nations General Assembly, be conducted with the scientific and technical reviews by FAO and RFMOs; and

12. Continue, in every international arena, to challenge biased and unscientific accusations that attack environmentally responsible tuna fisheries.

WE WILL TRANSMIT this declaration to the Secretary-General of the United Nations, the Director-General of the Food and Agriculture Organization of the United Nations and relevant RFMOs for their consideration, and we will request that Governments, including the Governments of Japan and the United States, support fishers worldwide to implement this declaration.

横浜宣言

責任あるまぐろ漁業者の宣言

「責任あるまぐろ漁業に向けた国際漁業者会議」

及び

「第3回国際漁業者フォーラム」において

平成17年7月25日～29日 横浜市

責任あるまぐろ漁業の推進及びはえ縄漁業における海亀・海鳥の偶発的捕獲の削減について、幅広く活発な意見交換を行い、

世界のまぐろ資源の持続的利用と海洋生態系の保全に取り組むことを約束し、

持続的漁業は、健全な海洋環境に依存することを強調し、持続的な海洋生産力及び健全な生態系の確保のため、漁業と環境との調和に積極的に取り組んでいく強い意図を表明し、

中西部太平洋まぐろ類委員会（WCPFC）の発効により、まぐろ類資源の保存管理を目的とする地域漁業管理機関（RFMO）

が世界の全水域で設立され、国連海洋法条約第64条に記載された国際的枠組みが実現したことを認識し、

（a）FAOの漁獲能力管理に関する国際行動計画の採択及び
（b）大型はえ縄漁船の漁獲能力制限の努力にもかかわらず、いくつかのまぐろ類資源が満限または過剰に利用されている中で、依然としてまぐろ漁船の数及び漁獲能力が増加し続けていること、また、保存管理に関する諸対策が不十分なまま、まぐろ類の畜養事業が急速に拡大していることを懸念し、

FAOの違法・無報告・無規制（IUU）漁業を予防・抑止・廃絶するための国際行動計画の採択及びRFMOによるIUU漁業廃絶のための努力にもかかわらず、RFMOによる大型漁船への規制措置を逃れる目的で大型漁船から小型漁船へとシフトするなど、IUU漁業活動が後を絶たないことを懸念し、



また、一部はえ縄漁船が、国連決議に反する形で、サメヒレのみを採取することを目的とする操業を相当規模で行っていることを懸念し、

海亀、海鳥の保存のためには、全ての関係者が陸上、海上の両方において幅広い措置をとることが重要であること、また、特に、FAOの漁業操業における海亀死亡を削減するためのガイドライン、はえ縄漁業における海鳥の偶発的捕獲を削減するための国際行動計画及びRFMOが採択している偶発的捕獲の削減措置を実施する際の漁業者の役割の重要性を認識し、

一部の環境団体が、政府当局及び責任ある漁業者による偶発的捕獲の削減のための技術の導入、実施及び啓発普及の努力が行われていることを故意に無視し、科学的根拠無く、国連など国際機関において太平洋の大型はえ縄漁業モラトリアムを求める感情的なキャンペーンを連携して行っていることを強く懸念し、

我々、「責任あるまぐろ漁業に向けた国際漁業者会議」及び「第3回国際漁業者フォーラム」に参加した大規模、小規模のはえ縄漁業者、まき網漁業者、小規模漁業者、その他の漁業者は、責任あるまぐろ漁業をさらに推進するため、以下の行動をとることを宣言する。

1. 責任あるまぐろ漁業・貿易・取引・消費を促進するため、また、まぐろ類の保存及び持続的利用を推進するため、漁業者、貿易業者、販売者、漁業関係労働者、缶詰業者、加工業者及び消費者など、全ての関係者間での協力、情報交換及び建設的な対話を推進する。
2. 持続的なまぐろ資源の利用を実現するため、世界まぐろまき網機構（WTPO）の活動を支持し、また、現在世界のまき網漁業者の65%が加盟するWTPOに対し、全てのまき網漁業者が加盟することを奨励する。
3. はえ縄によるめばち親魚への影響を認識しつつも、まき網によるめばちへの影響、特に小型めばちへの影響の削減に向けたFADs操業技術の改善のため、はえ縄漁業とまき網漁業及び他の関係者が協力することの重要性を強調する。
4. 新たな漁獲能力の導入の際には、同等の漁獲能力を削減することを基本とする、まぐろ漁獲能力管理のための新たな国際ルールの作成または既存の国際ルールへの協力を、FAOの漁獲能力削減に関する国際行動計画及び関連するRFMOの勧告や規則に合致する範囲で、かつ、発展途上国の権利及び義務に留意しつつ推進する。
5. 資源保存管理措置を回避する目的でRFMO非加盟国及び漁船を管理する能力の低いRFMO加盟国へ漁船を置籍しない。

6. 各RFMOの間の連携と協力を推進し、世界的に一貫性のあるまぐろ類の保存管理措置を実現するため、2007年早期に日本で開催される「まぐろ類RFMO合同会合」を支援する。
7. 各RFMOの決議・勧告及び国連決議に基づき、サメ資源について科学的根拠に基づいた保存管理を確保するよう、RFMOに強く求める。また、漁獲したサメの完全利用を推進するとともに、サメヒレのみの採取を目的とする漁業の廃絶を推進する。
8. 関連するRFMOと積極的に協力し、以下の行動をとることにより、海亀、海鳥の偶発的捕獲の削減に最大限の努力をする。
 - 科学的データの収集（可能な場合にはオブザーバーデータを含む）
 - 機械オブザーバーの導入等、実用的な偶発的捕獲の監視手法の開発と実施
 - 偶発的捕獲の削減及び偶発的に捕獲された海亀の放流後の生残率を向上するための技術の開発・使用
9. 海亀の偶発的捕獲及び放流後の死亡を削減するため、試験的使用を含め、サークルフックと餌の種類適切な組み合わせを直ちに使用することを積極的に推進する。
10. 海鳥の偶発的捕獲を削減するため、海鳥の偶発的捕獲が多い海域においては特に、有効性が確認されている技術（トリポール、夜間投縄、サイドセッティング、青染色餌など）の幅広い使用を積極的に推進する。
11. FAO及びRFMOがまぐろ漁業に関する国際的問題についての一義的責務を有していることを確認し、これらの問題が国連総会など、その他国際機関において議論される際には、FAOやRFMOによる科学的・技術的な評価を前提として行われるよう政府に働きかける。
12. 責任ある漁業活動に対する、偏見に基づいた非科学的な非難に対し、今後あらゆる国際的な場において対抗する。

また、我々は、この宣言を国連事務総長、FAO事務局長、関連RFMOに送付し、考慮を求めるとともに、各国政府、特に日本政府、米国政府に対し、漁業者が本宣言を実施することを支援するよう求める。



INTERNATIONAL
TUNA FISHERS
CONFERENCE ON
RESPONSIBLE FISHERIES
& THIRD INTERNATIONAL
FISHERS FORUM

25-29 JULY, 2005
INTER-CONTINENTAL GRAND
YOKOHAMA, JAPAN

Program

SUNDAY, JULY 24, 2005

09:00 - 18:00	Secretariat Move-in	Atlantic
14:00 - 15:00	Speaker Briefing Meeting	Atlantic
15:00 - 17:00	Registration	Atlantic

MONDAY, JULY 25, 2005

09:00 - 18:00	Secretariat	Atlantic
09:00 - 17:00	Exhibits & Poster Display	Adriatic
09:00 - 10:00	Registration	Cannes/Nice (Foyer)

Opening

10:00 - 11:15	Opening Addresses	Cannes/Nice
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Chairperson: **Mr. Eiji Ishihara**, Managing Director,
Japan Fisheries Association

Mr. Hiroshi Nakada, Mayor, Yokohama City

Mr. Isao Nakasu, President
Organization for the Promotion of Responsible Tuna Fisheries,
and President Japan Fisheries Association

MONDAY, JULY 25, 2005 (continued)

10:00 - 11:15 (continued)	Opening Addresses (continued) Mr Akira Nakamae , Deputy Director General Fisheries Agency of Japan Dr. Rebecca Lent , Director for NMFS Office of International Affairs Mr. Sean Martin , President Hawaii Longline Association	Cannes / Nice
11:15 - 11:45	Coffee break Press interview	Cannes / Nice
11:45 - 12:00	Forum structure, goals, objectives and social events Mr. Yuichiro Harada , Managing Director Organization for the Promotion of Responsible Tuna Fisheries	Cannes / Nice
12:00 - 12:30	Group Photo	
12:30 - 14:00	Lunch on Own International Tuna Fishers Conference on Responsible Fisheries begins Conference Chairperson: Mr. Eiji Ishihara , Managing Director Japan Fisheries Association	
14:00 - 15:00	“Decade of Implementation”: Review of the result of 26th FAO COFI and the 6th UNICPOLOS Mr. Patrick McGuinness , Fisheries Council of Canada, ICFA representative to the 26th FAO COFI	Cannes / Nice
15:00 - 16:00	Capacity Control and IUU Fisheries Mr. Katsuma Hanafusa , Counselor Fisheries Agency of Japan	Cannes / Nice
16:00 - 16:15	Coffee break	
16:15 - 17:15	Production Current Status of Tuna Stocks Dr. Robin Allen , Director IATTC	Cannes / Nice
18:00 - 20:30	Welcome reception hosted by OPRT	

TUESDAY, JULY 26, 2005

08:30 - 18:00	Secretariat	Atlantic
08:30 - 10:00	Registration	Foyer of Pacific
08:30 - 17:00	Exhibits & Poster Display	Adriatic
08:30 - 10:00	Morning Coffee, Tea & Pastry	
9:00 - 10:20	Production (Continued)	Pacific



Production for Sashimi Market

Mr. Yasuo Sato, Japanese fisher (20 min)

Mr. Sean Martin, Hawaii Longline Association (20 min)

Tuna Production for the Canning Industry

(20 min)

WTPO Initiative to Manage Tuna Purse-seine Fishing Effort

Mr. Kazuo Shima, Japan Far Seas Purse Seine

Fishing Organization (20min)

10:20 - 10:35 Coffee break

10:35 - 12:15 Marketing and Consumption

Pacific

Farmed Tuna

Dr. Arata Izawa, WWF Japan (30 min)

Mr. Michel Dreyfus, Instituto Nacional de la Pesca Mexico,
Mexico tuna farming (30 min)

Responsible Trading

Mr. Paul Bartram, U.S. Trader (20 min)

Dr. Hiroshi Sakamoto, Organization for the Promotion of
Responsible Tuna Fisheries (20 min)

12:15 - 14:00 Lunch (on own)

14:00 - 14:40 Marketing and Consumption (continued)

Pacific

Responsible Consumption

Mr. William Emerson, FAO ecolabeling guidelines (20 min)

Ms. Yuriko Shiraishi, Chairman, Womens' Forum Fish (20min)

14:40 - 15:10 **Monitoring and Control Over Fishing Activities**

Pacific

Mr. Yoshitsugu Shikada, Fisheries Agency of Japan
(30 min)

15:10 - 15:30 Coffee break

15:30 - 17:00 Sharks

Pacific

Status of Shark Stocks

Dr. Hideki Nakano, Fisheries Agency of Japan (30 min)

Dr. John Stevens, CSIRO Australia (30 min)

TUESDAY, JULY 26, 2005 (continued)

Shark Fisheries and Utilization

Mr. Kuo-Ping Lin, Taiwan Fisheries Agency (30 min)

17:00 - 18:00

Sharks (continued)

Pacific

International Trading of Shark Products

Dr. Shelley Clarke, Joint Institute for Marine and
Atmospheric Research, University of Hawaii and National
Research Institute of Far Seas Fisheries (30 min)

Promotion of Full Utilization

Mr. Toshikazu Miyamoto, Global Guardian Trust (30 min)

18:00 - 20:30

Reception Hosted by WPRFMC
& Hawaii Longline Association

Bayview Room

WEDNESDAY, JULY 27, 2005

Third International Fishers Forum begins

8:30 - 12:00	Secretariat	Atlantic
8:30 - 9:00	Registration	Foyer of Pacific
8:30 - 12:00	Exhibits & Poster Display	Adriatic
8:30 - 10:00	Morning Coffee, Tea & Pastry	
	Session Chair: Mr. Roy Morioka , Chair Western Pacific Regional Fishery Management Council	
9:00 - 9:30	Reporting on commitments and progress since IFF2 and process for IFF3 participant commitments Ms. Kitty Simonds , Western Pacific Regional Fishery Management Council (30 min)	Pacific
9:30 - 11:35	Review of the state of bycatch in longline fisheries	Pacific
	Approaches to Solving Fisheries Bycatch Problems Dr. Martin Hall , IATTC (15 min)	
	Fisher's Efforts (110 min) Mr. Kouichi Teramoto , Japan Fishers Cooperative Association Mr. Leland Oldenburg , Hawaii Fisher Mr. Wang Shuu-Lung , Taiwanese fisher Mr. Miguel Cuentas , Peru fisher Mr. Yeon JIB Chu , Korean fisher Mr. Guillermo Moran , Ecuador fisher Mr. Augusto Natividad , Filipino fisher Mr. R.P. Poernomo , Indonesian fisher Ms. Zhang Xiao Li , Chinese fisher Mr. Wawan Koswara , ASEAN Fisheries Federation Mr. David Kreutz , Extension Officer, Seagnet, Australia	
11:35 - 12:00	Monitoring Bycatch Mr. Kazuhisa Tsuzuki , Mr. Ryoichi Saito , Mitsubishi Space Software, and Mr. Shin Fujita , Japan Fisheries Information Service Center (25 min)	Pacific
12:00 - 14:15	Lunch – Fishers Exchange Luncheon (by invitation)	Bayview Room
14:15 - 17:30	Drafting Committee (by invitation)	Atlantic
14:15 - 18:15	Seabirds Session Chair Mr. Eric Gilman , U.S. Blue Ocean Institute Session Assistant Chairs Mr. Masashi Kiyota , National Research Institute of Far Seas Fisheries Mr. Kuo-Ping Lin , Fisheries Agency of Taiwan	Pacific



WEDNESDAY, JULY 27, 2005 (continued)

Session Program and Presentations
(time for discussion will follow each section)

Research on Seabird Bycatch Avoidance Methods

Japan Research (35 min)

Mr. Masashi Kiyota, National Research Institute of
Far Seas Fisheries

Review of Latin American Research (35 min)

Dr. Patricia Gandini, Universidad Nacional de la Patagonia
Austral, Argentina, and
Dr. Carlos Moreno, Universidad Austral de Chile

**Review of Technical Strategies to Reduce Seabird Bycatch
and Research Results (35 min)**

Mr. Nigel Brothers, Marine Ecology and Technology
Consultant, Australia, and
Dr. Svein Løkkeborg, Institute of Marine Research, Norway

Coffee break (15 min)

Regional and International Initiatives

Review of international governmental initiatives (35 min)

Professor John Croxall, British Antarctic Survey, and
Ms. Kim Rivera, U.S. NOAA Fisheries

NGO initiatives (20 min)

Mr. Noritaka Ichida, BirdLife International, and
Dr. Ben Sullivan, Royal Society for the Protection of Birds

Southern Seabird Solutions (20 min)

Mr. Malcolm McNeill, Vessel Manager, Sealord Ltd.,
New Zealand, and
Ms. Janice Molloy, New Zealand Department
of Conservation

Coffee break (15 min)

Closing discussion and summary of session main points (30 min)

THURSDAY, JULY 28, 2005

8:30 - 17:00	Secretariat	Atlantic
8:30 - 9:00	Registration	Foyer of Pacific
9:00 - 17:00	Exhibits & Poster Display	Adriatic
9:00 - 10:00	Morning Coffee, Tea & Pastry	
9:00 - 14:20	Sea Turtles	Pacific



Session Chair

Dr. Hideki Nakano,

Fisheries Agency of Japan

Session Program and Presentations

(time for discussion will follow each section)

Research on Sea Turtle Bycatch Avoidance Methods

Japan research (35 min)

Dr. Hiroshi Minami, National Research Institute of Far Seas Fisheries, and

Dr. Daisuke Shiode, Tokyo University of Marine Science and Technology

U.S. Research and Regional Review (35 min)

Mr. John Watson, U.S. NOAA Fisheries

Research on Turtle Bycatch in Sicilian Channel Longline Fisheries and Regional Mediterranean Review (35 min)

Dr. Susanna Piovano, University of Torino, Italy

Coffee break (15 min)

Latin America Pacific Research (35 min)

Pacific

Dr. Martin Hall, IATTC

Role of NGOs in Addressing Sea Turtle Bycatch Problems (35 min)

Dr. Arata Izawa, WWF

Coffee break (15 min)

Indian Ocean - South-East Asian Bycatch Initiatives (20 min)

Mr. Doug Hykle, IOSEA Marine Turtle MoU Secretariat

Research on Sea Turtle Nesting and Migration

Pacific

Comprehensive Conservation Efforts to Stop the Decline of Leatherback Sea Turtles; Report from Asian Nesting Beaches (20 min)

Mr. Hiroyuki Suganuma, Everlasting Nature

THURSDAY, JULY 28, 2005 (continued)

Migration, Habitat Use and Conservation of Western Pacific Leatherback Nesting Stocks (20 min)

Dr. Peter Dutton, U.S. NOAA Fisheries Southwest Fisheries Science Center

A Pelagic Hotspot for Japanese Juvenile Loggerhead Sea Turtles: The Kuroshio Extension Current Bifurcation Region (20 min)

Dr. George Balazs, U.S. NOAA Fisheries Pacific Islands Fisheries Science Center

14:20 - 15:20 Closing discussion and summary of session main points (35 min)

15:20 - 17:00 Lunch (on own)

Summary

Pacific

- Reports from the meetings
- Report participant commitments
 - a. OPRT Representatives
 - b. ASEAN Secretariat
 - c. Hawaii Longline Association – Sean Martin

17:00 - 17:30 • Develop Conference Declarations

17:30 - 18:00 Closing

Press interview

FRIDAY, JULY 29, 2005

Field Trip to Misaki

6:30 am Depart Inter-Continental Grand Yokohama

8:00 am Misaki Fish Market and Fishing Port

9:30 am Ultra-low temperature freezing facility

10:30 am Urari (Direct sales fish and foods store)

12:00 pm Lunch

2:00 pm Boat cruise of Misaki area and Jogashima Island

3:00 pm Kangawa Prefectural Fisheries Research Institute

4:30 pm Return to Inter-Continental Grand Yokohama (Return at 6:00 pm)



Opening Address

MR. ISAO NAKASU

President, Organization for Promotion of Responsible Tuna Fisheries

It is my pleasure and honor to announce the opening of the International Tuna Fishers Conference on Responsible Fisheries and the Third International Fisheries Forum (IFF3), co-hosted by the Western Pacific Regional Management Council and Organization for Promotion of Responsible Tuna Fisheries.

I wish to extend my hearty welcome to all the participants from more than 25 countries worldwide including many fishers, government officials, researchers and representatives of the relevant organizations, who came here after a lengthy trip. I also thank all of the participants who are not directly involved in tuna fisheries but are attending the Conference and IFF3 with serious interest.

I wish to express my sincere appreciation for the support and cooperation provided by both governments of the USA and Japan as well as the Hawaii Longline Association and Japan Fisheries Association for holding this meeting.

At present, the international community has serious concerns about tuna resources and tuna fisheries. We, those who are involved with tuna fisheries, are required to sincerely respond to such concern by recognizing the state of tuna resource and conducting fishing operations with due consideration for the sustainable functioning of marine ecosystems. To this end, holding this meeting at this time is really meaningful.

World experts from each area concerned will provide valuable information and views during the four days of the conference. Representatives of fishers of each represented country will present how fishers are addressing the problems, focusing on bycatch issue. Four days is a short amount of time to cover these issues

but I hope constructive dialogue can be held among fishers and experts during the period.

I expect that the result of the meeting will clarify the points which fishers must address on the issues and also will propose concrete measures to be taken. I believe the meeting will be beneficial for fishers to further promote responsible fisheries. Thank you.

MR. AKIRA NAKAMAE

Deputy Director General, Japanese Fisheries Agency

I wish to extend my hearty welcome to all of the participants gathered here today. More than 160 tuna fishers, government officials, and scientists from over 30 countries are participating in the conference. It is more than we expected. I am pleased to know that such a large number of participants from so many countries are able to attend. I wish to acknowledge my appreciation for all of the participants. I also wish to express my sincere appreciation to our partners in the United States who have contributed so much to convene this Conference.

Yokohama is one of the leading international cities in Japan, which has been developed as an international port since the Meiji Period, which commenced in 1868. I therefore believe that this is an appropriate location to hold an international conference of this nature.

This conference offers a good opportunity for tuna fishers from around the world to get together and consider how to promote responsible tuna fisheries, while obtaining advice from experts on each issue. A campaign blaming fishers as a cause of depletion of tuna resource and destruction of marine ecosystem is being promoted. Fishers suffer most of the repercussions from such a campaign. In fact, maintaining healthy marine ecosystem and sustainable use of tuna resource

are desires of fishers. Fishers take actions to conserve resources and maintain a healthy marine ecosystem to protect their job for the future as well. Priority should be given to adherence to the international conservation and management measures established by regional fisheries management organizations rather than seeking profit through escaping such measures.

This conference is extremely timely. Tuna fisheries are facing various issues such as illegal, unregulated, and unreported (IUU) fishing operations, fishing overcapacity and by catch of sea turtles and seabirds. Each issue is not easily addressed, however, it is necessary to steadily solve these problems. I believe that the exchange of views and ideas by all participants during this conference will encourage fishers to address these issues.

In the meantime, the emotional anti-fishing campaign, which lacks a scientific basis, is prevailing in recent years. This campaign apparently supports the movement to eliminate even legal, legitimate fishing activities. It is unfortunate. It is important that all fishers present here today unite and take actions together against such unreasonable blame.

Through the wise use of marine resources, we can continue to enjoy seafood indefinitely. We, therefore, intend to take responsible actions together with you all as a user of marine resources.

I sincerely wish the conference would be fruitful for everyone. Thank you for your attention.

REBECCA LENT
U.S. NOAA Fisheries

It is an honor for the NOAA Fisheries Service of the United States to participate in this Third International Fishers Forum (IFF3). As in past years, this forum is a critical process to allow fishermen from all over the world to share real world problems and solutions not only with fellow fishermen but also with scientists and fishery managers. The United States is pleased to report on various bycatch reduction projects that have been successfully implemented in our fisheries, in most cases, with the critical support and collaboration of our own fishing fleet. Under the auspices of our multi-part National Bycatch Strategy, we have made progress on identifying and implementing a standardized bycatch reporting methodology in federally managed fisheries, improving education and outreach, and taking many of our tried and true solutions to other countries. Highlights of our research include the

circle hook technology for reducing sea turtle bycatch by pelagic longline fishing gear, which was developed through a three-year experimental fishery by our fleet, working alongside scientists. This work has been taken to numerous other countries, and the FAO has also adopted the sea turtle guidelines that call for research and implementation of these hooks. Measures calling for paired streamer lines in Alaska and side-setting in Hawaii, which were first implemented on a voluntary basis by fishermen, have resulted in a significant drop in the bycatch and bycatch mortality of seabirds in the fishery. These measures have also been taken to other fisheries, including in Russia, Japan, and the Falkland/Malvinas Islands. There has also been significant progress in various Regional Fishery Management Organizations in address shark bycatch, including bans on finning. All of these efforts to address bycatch help ensure continued movement towards an ecosystem approach to living marine resource stewardship. Continued progress will depend on research, effective and workable technologies, and continued collaboration between scientists, managers, and the fishing community.

SEAN MARTIN
President, Hawaii Longline Association

Thank you, I'd like to begin by thanking the Organization for the Promotion of Responsible Tuna Fisheries and the Western Pacific Regional Fishery Management Council, and Isao Nakasu-san, for co-hosting this important conference, and for the opportunity to address you during this morning's opening ceremonies.

We have an extremely full program ahead of us over the coming four days, where we will discuss strategies for sustainable tuna and shark fisheries, fishing capacity, production, responsible marketing and consumption, monitoring, illegal and unregulated fisheries, and bycatch of sea turtles and seabirds. The Hawaii Longline Association is pleased to participate in these discussions. We recognize achieving sustainable pelagic fisheries requires contributions by all fishery sectors, including suppliers and seafood consumers, as well as international collaboration and management, to develop and implement agreed policies.

The Hawaii Longline Association represents 132 Hawaii-based longline tuna and swordfish vessels. Last year there were 125 of these vessels were active in the fishery and made about 1,300 trips, setting around

32 million hooks. In 2004, the Hawaii longline fisheries landed 18.5 million pounds and generated ex-vessel revenues estimated at \$42.6 million.

The Hawaii longline fleet's current major issues include measures to prevent Pacific-wide overfishing of bigeye tuna, bycatch of sea turtles, and interactions with cetaceans. Recent issues that have for the most part been resolved include seabird bycatch and shark finning.

Bigeye tuna in the Pacific Ocean are being fished at unsustainably high levels, based on recent stock assessments for the Western and Eastern Pacific. What this means is that while bigeye is not overfished, it cannot support the current level of fishing pressure indefinitely. In the US, under the Magnuson-Stevens Act, such a situation means that management agencies, such as the Western Pacific Council, are obliged to take action to reduce fishing pressure on bigeye. Clearly, the US cannot accomplish this alone, and this requires management initiatives to be implemented at the international level. Such actions are currently in place in the Eastern Pacific, through the inter-American Tropical Tuna Commission, where longline vessels now operate under a bigeye quota, and purse seine vessels must opt for one of two periods in the year when the purse seine fishery is closed. The newly established Western and Central Pacific Fishery Commission will likely have to consider similar measures for the Western Pacific when it meets later this year.

As a result of concerns over turtle interactions the Hawaii longline swordfish fishery was closed for over four years and is now subject to strict management measures, including prescribed use of large circle hooks and fish bait, restricted annual effort, caps on turtle captures, 100% onboard observer coverage, required possession and use of specialized de-hooking equipment, and mandatory attendance of an annual protected species workshop. If seasonal limits on turtle interactions are reached, the fishery is closed for the remainder of the year, and if a threshold is exceeded, federal resource management agencies consult to determine if additional restrictions on the fishery are warranted.

Over the past five years, there have been numerous lawsuits filed against the U.S. fishery management authority by both environmental non-governmental organizations and the Hawaii Longline Association primarily over the issue of sea turtle bycatch in Hawaii longline fisheries. There have been a number of positive results from the litigation, but overall this has not

been a wise long-term approach or efficient use of money, time, or energy to address fisheries bycatch.

The litigation brought about substantial improvements involving changes in fishing gear, fishing practices and methods to handle and release caught turtles. Turtle bycatch levels are now much lower than in the past, and turtles are being released with less injury and higher chance of survival. The litigation also increased cohesiveness of Hawaii Longline Association members. The numerous ethnic groups comprising the fishery came together to counter efforts to eliminate their source of livelihood and denigrate the reputation of Hawaii longline fisheries. The industry is now in a much better position to represent their interests.

However, even after substantial improvements were made, litigation continued, as some environmental groups pursued their goal of permanently closing the fishery. The result was that fishers became bitter, were less receptive to collaborating with outside groups, and lost the drive to pursue voluntary initiatives. Ironically, the efforts to close the Hawaii fleet may have actually increased turtle and bird mortality. During a four-year closure of the Hawaii longline swordfish fishery due to concerns over bycatch of sea turtles, swordfish supply to the U.S. marketplace traditionally met by the Hawaii fleet was replaced by imports from foreign longline fleets, which have substantially higher ratios of sea turtle captures to unit weight of swordfish catch and less stringent or no measures to manage seabird bycatch. Groups that wanted to pursue collaborative work with the Hawaii longline fleet to make the Hawaii fleet a model fishery, and to export identified solutions internationally, were frustrated by the misplaced efforts to close the Hawaii fisheries.

The Hawaii Longline Association spent over U.S. \$1.6 million and enumerable staff hours as a result of this litigation. If this money, plus the funds spent on the litigation by the U.S. Government and environmental groups, had instead been used to conduct cooperative research to find effective and commercially viable solutions in the Hawaii fleet and abroad, this might have saved many more turtles.

As I will next describe, collaborative, industry-lead research has been equally effective at reducing seabird bycatch in the Hawaii longline fisheries, substantially more progress has been made to find effective and practical solutions to seabird bycatch than turtle bycatch in Hawaii pelagic longline gear, without litigation as a motive, and at a cost an order of magnitude lower than that spent on lawsuits.

The Hawaii longline swordfish and tuna fleets are each authorized to annually take, through injury or mortality, one federally listed endangered Short-tailed Albatross. If more than one Short-tailed Albatross is observed to interact with gear of the Hawaii longline tuna or swordfish fleet in a single year, resource management agencies consult to determine if the fleet should be required to employ additional seabird avoidance measures. Less than 50 Laysan and Black-footed albatrosses are now captured by the fleet, down from thousands before the fleet was required to employ seabird avoidance methods and restrictions on swordfish fishing effort. The fleet has not had any observed captures of a Short-tailed Albatross. Cooperative research by the Hawaii Longline Association, fishery managers, and an environmental organization identified effective and commercially viable solutions to seabird bycatch in our fisheries, an approach that we aim to replicate to address other sustainability issues. The longline association became an active participant to address seabird bycatch problems by instituting and participating in research and commercial demonstrations and supporting adoption of regulations based on best available science before restrictions, embargos, and possible closures were imposed on the fleet. This bottom-up approach fostered a sense of industry ownership for effective seabird mitigation methods, and resulted in high compliance with resulting rules.

A Joint Japan-Hawaii Sea Turtle and Seabird Experiment to Reduce Bycatch in Pelagic Longline Fisheries is now underway, being conducted by the Japan Fisheries Research Agency, Western Pacific Regional Fishery Management Council, and U.S. National Marine Fisheries Service Pacific Islands Fisheries Science Center. Current activity includes assessing turtle and target fish catch rates on various combinations of hook and bait types. And there are plans to conduct a commercial demonstration on a Japanese longline vessel of a fishing method called side-setting, which was identified in the Hawaii cooperative research to be the most effective and operationally beneficial method for reducing seabird bycatch.

Another issue that has recently received attention is the interactions between the Hawaii longline fleet and False Killer Whales. While there have been claims that this is causing population-level effects, in reality, there is very little understanding of the status and trends of False Killer Whale populations or the consequence of interactions with longline gear.

Collaboration by fishing industry, government, and environmental organizations has proven to be an effective

approach to reduce fisheries bycatch in Hawaii. This cooperative approach can be accomplished with strong and enlightened leadership, and willingness to put differences aside to work towards a common good. While the effectiveness of this approach is broadly recognized, insufficient funding has been allocated for cooperative research and commercial demonstrations to find solutions to fisheries bycatch and other problems. In the U.S., this is partially due to the government's fear of being sued if they propose to conduct or fund experiments in U.S. fisheries that result in injury to protected resources, even though these experiments may potentially result in substantial reductions in mortality of these species. As a result, some U.S. fishery research agencies have had to resort to funding experiments in foreign longline fisheries to test technical measures to reduce sea turtle bycatch.

Fishers also have a responsibility to produce safe and wholesome seafood for consumers. The FAO Code of Conduct for Responsible Fisheries includes criteria for harvesting, handling, processing and distributing seafood in a manner which will maintain the nutritional value, quality and safety of the products. Fishers must meet the safe fish handling requirements of both local markets and importing countries. In the US, the FDA Seafood HACCP regulations and Good Manufacturing Practices apply. The control of histamine (scombrototoxin) is the key seafood safety issue facing the fresh tuna industry. In the Hawaii longline fishery, great efforts have made in research and training to develop and implement an effective HACCP-based histamine control system that is practical for fishers, documents safe fish handling and produces safe seafood.

In closing, the Hawaii Longline Association is committed to taking steps necessary to ensure our fisheries are conducted in a responsible and sustainable manner, to continue to collaborate with others to conduct cooperative research to identify the most effective and commercially viable solutions to fisheries conservation problems, and to work with regional fishery management bodies, such as the new Western and Central Pacific Fisheries Commission, to achieve the international cooperation necessary to ensure sustainable pelagic fisheries. And finally, we urge national and regional management bodies to recognize that, ensuring sustainable management of pelagic fisheries requires contributions by all economic sectors, including suppliers and seafood consumers.


It only remains for me to welcome you all to the meeting and hope that we all have a productive and informative week.

The background features a stylized, circular arrangement of fish swimming in a clockwise direction. The fish are rendered in a light gray color against a darker gray background. Below the fish, there are wavy lines representing water. The entire graphic is contained within a rounded rectangular frame.

International Tuna Fishers Conference on Responsible Fisheries



International Tuna Fishers Conference on Responsible Fisheries – Presentation Abstracts and Papers



DECADE OF IMPLEMENTATION: REVIEW OF THE RESULTS OF THE 26TH FAO COFI AND THE 6TH UNICPOLOS MEETINGS

MR. PATRICK MCGUINNESS

Fisheries Council of Canada, ICFA representative to the
26th FAO COFI

I attended the COFI and UNICPOLOS meetings representing the International Coalition of Fisheries Association (ICFA). Below are summary observations and comments on these meetings.

FAO COFI MEETING, MARCH 2005, ROME, ITALY

The tone of the discussions at the FAO meeting was very comforting in terms of delegates trying to work with industry to solve problems. Unlike other fora such as the Biodiversity Conference and the UN General Assembly which identify problems and propose blunt instruments such as bans and unscientific based targets. Of particular note are:

FAO/CITES

There was general agreement to reconvene the FAO Expert Advisory Panel when commercially exploited aquatic species are proposed for listing in CITES. The Panel would review the proposed listing based on the agreed FAO/CITES listing criteria for commercially exploited aquatic species and advise CITES of its recommendations. Work needs to continue to come to an agreed FAO/CITES memorandum of understanding (MOU) regarding the status of such recommendations.

ICFA noted that the recommendations should be clear and not open to various interpretations. As well, ICFA wants the FAO/CITES MOU to confirm that the FAO's Expert Panel's analysis and recommendations be the documentation provided by the CITES secretariat to the CITES delegates regarding proposed listing of commercially exploited aquatic species.

SEA TURTLES AND FISHERIES

There were considerable interventions from ENGOs calling for bans and restrictions on tuna longline fishing. However, the discussion among States were very focussed, recognizing the issue and trying to determine what positive contributions could the FAO make to improve the situation. In the end, COFI recommended:

- To develop technical guidelines on how to reduce turtle mortality;
- To use gear (such as circle hook) reducing turtle mortality;
- To coordinate research, promote information exchange;
- To review progress and report (website);
- To broaden RFMOs' mandate to reduce fishing impacts;
- To better link environmental and fisheries agencies;
- To facilitate regional harmonization of legislation and management;
- To look for extra-budgetary resources for the above

DEEP SEA FISHERIES

The final report of the meeting makes no mention of bottom trawling as a destructive fishing gear. It recognizes a problem both with respect to the sustainability of the fisheries and, because of the location of the fisheries, the concern regarding adverse impact on vulnerable marine ecosystems. In response to the direction of the UNGA on this issue, the FAO will undertake a 4 part program mainly aimed at developing the data on the past and present deep sea fishing, the stocks in question, the impact on ecosystems, and a code of practice/technical guidelines for deep sea fishing in areas of highly sensitive vulnerable ecosystems.

Also, there were strong comments regarding the so-called “unregulated” high seas. Many delegates noted that such statements are somewhat extreme as most states are signatories to the FAO’s Code of Conduct for Responsible Fisheries and the four International Plans of Actions.

ICFA emphasized that we have had 10 years of negotiating these instruments and now the focus should be on implementing these instruments to address issues such as the deep sea fishing. We need to develop strategies and actions that bring all parties (government, industry, ENGOs) to work together to solve the problems, not blunt prescriptions that breed confrontation.

MARINE PROTECTED AREAS (MPA)

The interventions from most delegates were in keeping with ICFA’s view. MPAs are important to protect special areas of high biodiversity or biological productivity but their contribution to fisheries management and conservation is uncertain. As well, MPAs must be based on sound science and meet certain criteria. As such, many delegates stated they do not support the random setting of targets.

REGIONAL FISHERIES MANAGEMENT ORGANIZATIONS (RFMO)

In view of the increased profile that RFMOs are receiving there were many delegates who suggested that there is a need to establish principles in order to review and assess the performance of RFMO as responsible fisheries management organizations. It was uncertain, however, what body or mechanism should be developed to do the assessment, report the findings, and make the recommendations.

This meeting just opened the dialogue on the issue. It is anticipated that subsequent meetings may increase focus on this issue either in the FAO or other fora.

UN MULTILATERAL FORA

Several delegates noted that States have to speak with one voice regarding fisheries management issues in the various UN fora that now appear to be venturing into fisheries management issues. ICFA noted that it was important that representatives of States fisheries department actively participate in States delegations to UN fora such as the CBD and UNICPOLOS.

CONCLUSION

The meeting advanced a number of issues of concern to ICFA and showed leadership in trying to bring back into the FAO/COFI the high seas fishing/bottom trawling and MPA issues that the CBD and UNICPOLOS/UNGA had raised.

UNICPOLOS MEETING, JUNE, 2005, NEW YORK

ICFA participated in the discussions and also made a presentation to the meeting on large-scale fishing and its contribution to sustainable development. The purpose of the UNICPOLOS meeting is to develop elements for consideration in November for the UN General Assembly (UNGA) to consider regarding resolutions pertaining to “Oceans and the Law of the Sea”

The main objectives of ICFA’s participation was (i) to counter a campaign to propose a ban on “industrial” tuna longline fishing in the Pacific because of the bycatch of sea turtles and (ii) to rebuff any efforts to rekindle the discussion last year regarding a ban on bottom trawlers in the deep sea to protect sea mounts, etc. Both objectives were met.

TUNA LONGLINE FISHING

Regarding tuna longline fishing and sea turtle bycatch, the meeting proposes that the UNGA “request States and regional fisheries management organizations and arrangements to urgently implement all measures recommended in the FAO “Guidelines to Reduce Sea Turtle Mortality in Fisheries Operations” to help prevent the decline of all species of sea turtles. Although ENGO voices were persistent in their interventions calling for a ban, no States took up the cause.

It was evident States did not want to venture down the banning track and the gear stigmatization track that they got caught into last year with bottom trawling.

ICFA emphasized that bans do not work and are counterproductive in areas that are not tightly regulated. In such situations, if bans are imposed, the responsible fishing nations will, in fact, ban their vessels. However, IUU fishing will continue and under such circumstances increase. As such, the perverse outcome is that responsible fleets that are regulated by their countries stop fishing to the benefit of the IUU fleet because there is no legal mechanism to stop such fishing in those areas.

At the meeting, ICFA displayed 150 copies each of three OPRT pamphlets — initiatives taken to reduce sea turtle bycatch; meeting the challenge; and promoting responsible tuna fishing.

BOTTOM TRAWLING

Regarding bottom trawling, the meeting proposes that the UNGA:

- urge accelerated progress regarding last year's resolution
- welcome the progress regarding the establishment of a new RFMO on the high seas. This refers to the discussions among Australia, New Zealand, Chile, and Peru
- request RFMOs to implement "spatial and temporal" measures to protect vulnerable marine ecosystems.

The Deep Sea Conservation Coalition (DSCC) was active trying to reintroduce wording to support a ban. Government delegates avoided entering the issue, noting that last year's resolution is due for review by the UNGA at its November 2006 meeting.

ICFA comments were as above regarding the call for a ban on tuna longline fishing as well as noting that the calling for the imposition of blunt instruments such as bans block discussions among responsible parties to develop mitigating measures to address the issue.

CLOSING COMMENTS

The meeting decided to change the name of the meetings to the Informal Consultation Process (i.e. ICP instead of UNICPOLOS)

The ICP meeting is very attractive to the ENGOs because of its informal nature and lack of the usual protocols of UN meetings, such as the FAO COFI.

Only 20 of the 95 government delegations had a fisheries official as part of the delegation. Most delegations were represented by their permanent representatives to the UN. There were 21 inter-governmental and special UN agencies. 10 ENGO organizations. 1 small-scale fishermen's association and ICFA. ICFA's participation was very useful.

This was the 6th meeting of the ICP Three more are scheduled and then their continuation is up for review. Mr. McGuinness assessment is that ICFA, at the appropriate time, should lobby for the end of the forum. It simply gives ENGO a theatre to repeat their firmly held and immovable positions.

IUU FISHING AND MANAGEMENT OF FISHING CAPACITY

KATSUMA HANAFUSA

Counselor, Resource Management Department, Fisheries Agency of Japan, 1-2-1 Kasumigaseki, Chiyoda-ku, Tokyo, Japan

Illegal, unregulated, and unreported (IUU) tuna longline fishing began in the early 1990's. Most IUU longline vessels were owned and operated by Taiwanese fishermen. The International Commission for Conservation of Atlantic Tuna (ICCAT) took a lead role to combat IUU fishing. ICCAT instituted a number of trade sanctions against countries that provided 'flags of convenience' to IUU fishing vessels. However, these vessels continued operations by changing flags and vessel names. ICCAT and other tuna regional fishery management organizations (RFMOs) adopted a Positive List, a registration scheme for legitimate vessels, which prevents the sale of fish taken by non-listed vessels from the international market. In response to these international developments, IUU tuna longline vessel owners started two new practices: tuna laundering and the creation of new fishing capacity in less regulated waters. Tuna laundering (providing falsified information on fishing grounds and/or vessel name) resulted from the overcapacity of Taiwanese longliners compared to the availability of fishing opportunities. A substantial number of large-scale tuna purse seine vessels were built in the past five years by Taiwanese

fishermen in the Pacific using flags of convenience. These five years constitute the period when the tuna RFMOs exerted their effort to eliminate IUU tuna longline fishing. IUU fishing and over capacity are closely linked. Reducing capacity to be commensurate with fishing opportunities (e.g. through quotas and catch limits) is key to eliminating IUU fishing. Developed countries should stop the construction of new tuna fishing vessels except to replace existing vessels with equivalent fishing capacity, regardless of what flag is used. RFMOs should prioritize the establishment of a management system to transfer fishing capacity from developed to developing countries without increasing overall fishing capacity and without undermining these nations' legitimate right to develop their fisheries.



Production

CURRENT STATUS OF TUNA STOCKS

ROBIN ALLEN

Inter-American Tropical Tuna Commission

From 1950 to 2003 the global catches of the principal market species of tuna (skipjack, yellowfin, bigeye, albacore, and the three species of bluefin) grew ten fold, from about 400,000 metric tons to about 4,000,000 tons. In recent years skipjack has comprised about 50%, yellowfin about 30%, bigeye a little more than 10%, and albacore about 7% of this catch.

Stock assessments for tunas are carried out by the Regional Fisheries Management Organizations, which are responsible for their management: the Inter-American Tropical Tuna Commission in the eastern Pacific, the Western and Central Pacific Fisheries Commission in the western and central Pacific, the Indian Ocean Tuna Commission, the International Commission for the Conservation of Atlantic Tunas, and the Commission for the Conservation of Southern Bluefin Tuna. With the exception of skipjack, it is unlikely that the major tuna species can sustain significantly greater catches. In all oceans, yellowfin tuna stocks are near the levels that can provide the maximum sustainable yields (MSYs). Albacore stocks in the North Atlantic and North Pacific are below the levels corresponding to the MSYs, while those in the South Atlantic and South Pacific are above their MSY levels. All of the assessments for bigeye tuna at least indicate that caution is in order, and in the eastern Pacific the assessments indicate that the stock is overexploited. Atlantic bluefin and Southern bluefin tuna are overexploited. The status of the other stocks is uncertain. Increase of skipjack catches may be possible, but the most productive method for catching skipjack, setting purse seines on schools associated with floating objects, is likely to be limited to protect small bigeye and yellowfin.

A major development in tuna fishing technology, the use of fish-aggregating devices (FADs) to aggregate small tunas, took place in the early 1990s. This is a very efficient method of catching skipjack. However, it also increases the catches of small yellowfin and bigeye, and of unmarketable fish, such as sharks and dorado (“bycatch species”). In particular, the concern noted above for the stocks of bigeye is due, at least in part, to the large numbers of small bigeye taken in purse-seine sets on FADs.

There have been closures for purse-seine fishing in the eastern Pacific to conserve bigeye since 1999; however, these have not been sufficient to arrest the decline and to allow the stock to rebuild. One of the challenges for future management of bigeye tuna is to find ways of reducing the purse-seine catches of bigeye without unduly restricting those of skipjack.

PRODUCTION FOR SASHIMI MARKET

MR. YASUO SATO

Japanese fisher

I will discuss production for the sashimi market from the fisheries point of view, where we stand now, as well as what we are likely to face in the future.

Longliners, purse seiners, and tuna farming producers are all involved in tuna production. However, there is also a role to be performed by fishers to transport the catch. Then there is an intermediary that is engaged in the trade and processing and distribution. All of them are users of the resources. And consumers play a major role as a user. All of these stakeholders should share information in utilizing tuna resources and try to establish a common understanding about the status of the stock, as well as the market, and based upon that common understanding, we have to consider how we can go about the consistent stock management involving all those stakeholders.

About 1.9 million tons of tuna is harvested annually. The majority goes to canneries for processing and is caught primarily in purse seine fisheries. Tuna shipped to the sashimi market amounts to about 550,000 tons annually, caught primarily in longline fisheries. Purse seiners target smaller fish. Longliners target the larger mature fish. In recent years we have seen a new type of production for the sashimi market through fish farming. The market and fishing methods are different, yet they target the same stock. That means to manage the stock there has to be consideration of the life history of the fish

Since the late 1980s, there has been a sharp increase in production by purse seine fisheries. As a result, the supply of sashimi tuna to the Japanese market has decreased. Production and effort by the Japanese vessels has also been declining. The reduction in catch by the Japanese vessels is offset through increasing imports.

In late 1998, Japan reduced the number of vessels by 20 percent to 132 vessels. While the Japanese vessels were reduced in number, the number of foreign vessels increased, built primarily by Taiwanese and Chinese shipping yards. At the end of last year, in view of the sharp increase in longline vessels, Taiwanese authorities announced a new policy to reduce the number of vessels. From fishers' point of view, this is a welcomed action by the Taiwanese authorities. The total number of longline vessels in the world is estimated to be 1,500. More than 80 percent, or 1,100 of these, are registered either by Japan or Taiwan. Both of these nations have decided to reduce their longline capacity.

Despite such efforts by these main longlining nations, purse seine capacity is increasing very quickly. This poses a major challenge for managing tuna stocks.

We conducted research using data from the Sikiji Market to look at bigeye tuna of > 40 kilograms, which caters to the sashimi market. Its average unit price reached a peak from 1992 to 1993, and then started to decline. But in 1999, all of a sudden the degree of decline was more significant than in previous years. From 1991 to 1992 the Japanese economy experienced dramatic growth, but this suddenly crashed. As a result, demand for expensive products including sashimi declined, and Japanese longlining capacity also declined, resulting in reduction of the supply of sashimi by 30,000 tons. This resulted in a rise in the price for sashimi. There were also structural changes that took place starting in late 1990s. Tuna coming from fish farms started to rise very rapidly.

In the late 1990s Southern Bluefin Tuna (SBT) began to be raised fish farming operations, raising juvenile fish to a large size in growout cages. In 2002, this industry reached a peak with SBT production reaching 8,000 tons, primarily through SBT farmed by Australians. Once the Australian SBT farming production leveled off, the Spanish SBT farming production started to increase. Then Turkey, Croatia, Libya, Tunisia, Turkey, and other Mediterranean nations, experienced an expansion in tuna farming. At this same time, tuna farming in Japan also increased to 3,000 tons. Then in 2004, Mexico was supplying 5,000 tons from their fish farms. Total tuna being produced from fish farms worldwide reached 30,000 tons in 2004.

Of course, compared to the total size of the sashimi market of 460 to 470,000 tons, the share of the tuna from fish farms is relatively small. But the fatty tuna from the fish farm is now ranked number two in terms of price, ahead of the red meat from wild fish. There are other species that are cultured and supplied to the market, but except for tuna, all of them receive a higher price for the wild fish than the aquaculture products. In the case of tuna, although the annual weight of production is only 30,000 tons, the fact that the price is more expensive than the wild products means that the introduction of farmed tuna has substantially affected the market.

Longlining operations, purse seining operations, as well as the fish farming producers, as well as the processors, distributors engaged in those fisheries and the consumers have to share information on the status of tuna stocks, as well as the market, so they will cooperate with each other for effective management of tuna stocks.

PRODUCTION OF TUNA FOR THE SASHIMI MARKET IN THE HAWAII LONGLINE FISHERY OVER THE LAST CENTURY

SCOTT BARROWS

General Manager, Hawaii Longline Association

HISTORY

The history of commercial fishing in Hawaii dates back to 1917 when Japanese immigrants introduced sail powered vessels to the islands. Inshore fishing in the early 1900's involved sail powered vessels and manual labor. Around the 1940's engine powered vessels such

as sampans with hydraulic capstans slowly replaced the more primitive and less efficient sailboats. The influx reached its peak by 1950 with approximately 70 vessels joining the fleet. By the 1970s the fleet was down to around 35 vessels. In the late 1980's, attracted by the prospect of a profitable fishery, an influx of vessels from the U.S. East and Gulf Coasts brought on a second influx of new interest to the Islands. To protect the fishing grounds from over fishing, the Western Pacific Regional Fishery Management Council implemented a limited entry program which stopped the ongoing influx of vessels. In 2004, we find 124 fishing vessels actively fishing in Hawaii.

THE FISHERY IN 2004

A record high of over 140 vessels are actively registered in Hawaii today. Almost all of the vessels sell their catches in Honolulu at the United Fishing Agency. Tuna composed 66% of the landing where approximately 60% is consumed in Hawaii, 30% is shipped to Japan and the remaining 10% is shipped to the U.S. mainland.

Longline vessels were equipped with an electronic vessel monitoring system (VMS) by 1996. VMS is used to determine if longline vessels are fishing in areas closed to longline fishing around the Hawaiian Islands. Vessels operating within and outside the EEZ are tracked by VMS.

FISHING AREAS & EFFORT

VMS, observers and log book data show that fishing outside the EEZ accounts for 54% of the total hooks set followed by the 34% within the Main Hawaiian Islands EEZ. In 2004, a total of 17 million hooks were set outside the EEZ while 11 million hooks were set in the MHI EEZ

According to National Marine Fisheries Service data a total of 1338 trips were made in 2004; up 123 trips from the previous year. Of these, all but 6 trips targeted tuna. 18.4 million pounds were landed in 2004. Bigeye tuna landings were 9.5 million pounds and made up 52% of the total landings in 2004 with a record 32 million hooks set. The increase in effort is due to more vessels participating in the longline fishery as well as to the shift in effort towards tuna over the time period.

The fleet's catch was comprised mostly of Big Eye Tuna (BET) with a record 142 thousand being caught in 2004. In 2003, Yellow Fin Tuna (YFT) catch was 27 thousand and albacore was 17 thousand in 2004.

WESTERN TUNA PURSE SEINE ORGANIZATION INITIATIVES TO MANAGE TUNA PURSE SEINE FISHING EFFORTS

MR. KAZUO SHIMA (Presenter)

President of the Japan Far Seas Purse Seine Fishing Association

MR. TARO KAWAMOTO

Manager, Fisheries Dept. Purse seining section, Kyokuyo Suisan Co., Ltd

WORLD TRENDS OF TUNA FISHING

1.1. GLOBAL CATCH: The global catch of tuna was 200,000 metric tons in the 1950s. It surpassed the 1 million metric ton mark in the 1960s and reached 2 million metric tons in 1984. It reached 4 million metric tons in 2000. In particular, the catch in the Western Central Pacific Ocean (WCPO) has increased dramatically. In 2000, it reached 2 million metric tons. This constitutes half of the total global catch of tuna in the same year.

In the WCPO, from the 1950s through the 1980s, the majority of global tuna catch was caught in pole and line and long line fisheries. But since 1980, purse seine tuna catch has increased dramatically, accounting for about 60% of the total global catch of tuna in 2000. Skipjack comprises 75% of the total purse seine catch and yellowfin tuna 23%. Even though bigeye tuna comprises only 2% of the total catch by purse seines, we have made every effort to preserve stocks of this species.

1.2. STATUS OF TROPICAL TUNA STOCKS: The World Tuna Purse Seine Organization (WTPO) claims that all the stocks of tropical tuna have been exploited to the limit, as many scientists in the world have warned. The following is our personal assessment of tropical tuna stocks: Skipjack stocks appear to be in good shape. Yellowfin tuna stocks have been exploited almost to the limit. And bigeye tuna is approaching a state of overfishing and there is a need for measures to preserve the stock. Even for skipjack stocks, the current catch is very close to the limit from a socio-economical viewpoint.

1.3. TAIWAN AND FLAGS OF CONVENIENCE (FOC): I would like to draw your attention to the nations that have been dramatically increasing their

tuna catches in recent years, in particular, the combined catch of Taiwan and vessels sailing under FOC operated with Taiwanese capital in the 21st century. Fig. 1 shows the trends in the number of fishing vessels registered to the Forum Fisheries Agency, or FFA. This graph clearly shows that, while major fishing nations such as Japan, the US and South Korea have not increased their number of vessels since 2000, Taiwan has rapidly increased its number of vessels, including those under FOCs, over the same period. This is counter to the resolution passed by MHLC in February 1999, which states that increases in fishing effort and capacity in the WCPO should be voluntarily controlled.

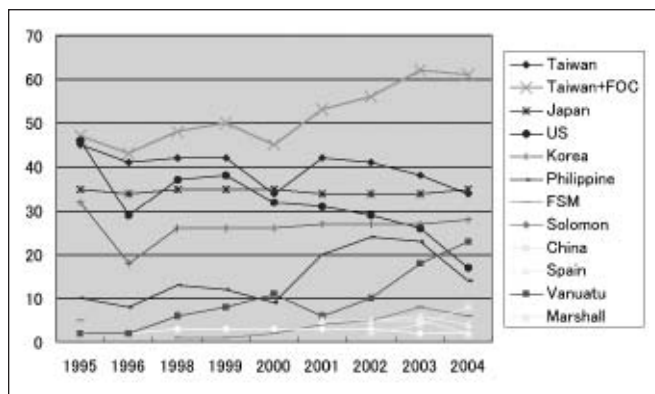


FIG. 1 TRENDS IN NUMBER OF FISHING VESSELS REGISTERED TO THE FORUM FISHERIES AGENCY.

2. CATCHES AND TUNA PRICES

Fish prices decline when supply increases. Fig. 2. shows the relationship between the market price and landings of skipjack in Bangkok, one of the major production sites of canned tuna in the world. The red thin line represents the monthly trend in the price of 4 lbs to 7.5 lbs of skipjack and the blue thin line represents monthly trends in the amount of skipjack delivered to the Bangkok market. In this graph, the simple moving averages of the two parameters over three-month periods are shown in thick lines.

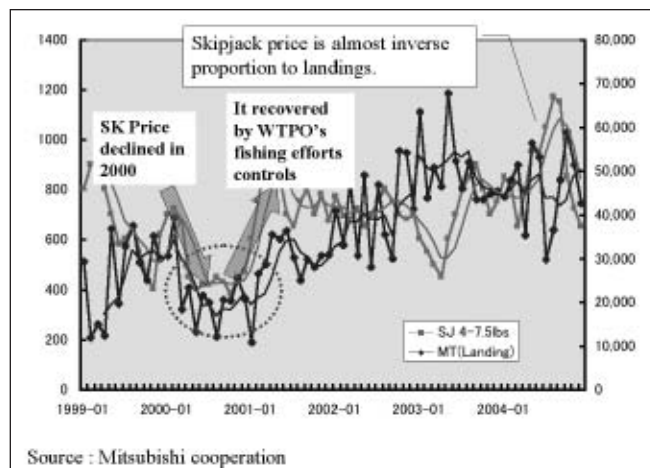


FIG. 2 MARKET PRICE AND LANDINGS OF SKIPJACK IN BANGKOK.

FIG. 2. SUGGESTS THAT THERE IS AN INVERSE RELATIONSHIP BETWEEN MARKET PRICE AND LANDINGS. IN 2000, AT ONE POINT, AS GLOBAL OVER-SUPPLY OF SKIPJACK LED TO A SHARP DECLINE IN PRICE TO US \$400 PER METRIC TON, THE MEMBERS OF WTPO VOLUNTARILY TOOK STEPS TO REDUCE THE CATCH. AS A RESULT, THE PRICE RECOVERED QUICKLY AND IT CURRENTLY RANGES AT BETWEEN US\$700 TO \$900 PER METRIC TON.

3. WTPO HISTORY AND INITIATIVES TO CONTROL FISHING EFFORT

3.1. HISTORY OF THE WRPO: Initially, in response to the rapid increase in the number of tuna fishing vessels in the WCPO, moves towards the establishment of a regional fishing organization in the WCPO were accelerated mainly by the Secretariat of the Pacific Community, or SPC.

After negotiations to conclude a convention among the coastal nations and fishing nations, which had been very close to conclusion, collapsed in 1978, The Forum Fisheries Agency was established in 1979 under the South Pacific Forum (SPF), which consisted of the Pacific island nations. In 1994, the first session of the Multilateral High-Level Conference, or MHLC, on the Convention for the Management of Highly Migratory Fish Stocks in the WCPO was held in Honiara, Solomon Islands. It was attended by 16 FFA member nations and six fishing nations. This was the first time that some purse-seine ship owners who attended the MHLC expressed the need to form an organization of ship owners from fishing nations with a direct interest and responsibility for tuna fishing operation in cooperation with FFA.

When the third session of the MHLC was held in Tokyo in 1998, Japanese, South Korean and Taiwanese ship owners held a meeting to exchange views on issues of common interest, including fishing-license fees, MHLC and the creation of a World Tuna Purse-seine Organization, or WTPO. This meeting was the starting point of WTPO-Asia conferences and WTPO conferences.

Ship owners in Europe, North America and South America responded to a call from Asian ship owners to have a preparatory meeting for the establishment of the WTPO. The meeting was held in Paris in July 2000. Subsequently, two preparatory meetings were held in Manila in December 2000 and January 2001. In 2001 the inaugural general assembly of the WTPO was held in Guayaguil, Ecuador.

3.2. PRESENT MEMBERS OF THE WTPO: The replacement of WTPO members occur annually. Seven nations, Ecuador, France, Japan, South Korea, Spain, Taiwan, and the Philippines, sent representatives to the fourth conference in 2004.

3.3. CONCLUSIONS: The timing of the preparatory meeting in July 2000 coincided with the sharp decline in the price of skipjack, so discussion at the meeting was centered on this issue. Participants agreed that each nation should reduce the number of days of fishing operations voluntarily for the time being.

At the Manila Conference in November 2000, the members decided to voluntarily reduce the number of fishing days in the Pacific Ocean by 50% from December 1, 2000 to January 31, 2001, or to introduce 30 non-operational days in a sixty-day period during the said time period. They agreed to extend implementation of the measure four times. The measure were implemented until October, 2001. Implementation of the same measure was extended until March 31, 2002 at the meeting in October in Manila. At the conference held in April 2002, the members agreed that they should refrain from dumping fish on the Bangkok market and European ships should voluntarily refrain from selling fish at the Bangkok market. At the conference held in June 2002, the members agreed to urge WTPO non-member vessels to join the WTPO.

These control measures resulted in rapid recovery of the market price of skipjack at the Bangkok market. On the other hand, this price recovery prompted an increase in fishing efforts by Taiwanese capital in the WCPO.

Based on the current state of tropical tuna stocks, I think it is our obligation to manage these stocks prudently for the benefit of future generations. We have learned that over-supply leads to a decline in fish prices and poor business performance. These facts have led me to believe that there should be no further increase in fishing effort. We have to stop the activities of some fishermen who are increasing their fishing effort unfairly by FOC and other means. To solve these problems, members of the WPTO have agreed to take the following actions:

- Increase WTPO membership coverage
- Fight illegal, unreported and unregulated fishing
- Actively contribute to regional fishing control
- Reduce post-harvest loss
- Expand the tuna market, and
- Avoid the use of hydro-proteins.

The members of WTPO are making every effort to promote responsible fishing so that we will be able to utilize the stocks in a sustainable manner.





Marketing and Consumption

FARMED TUNA

DR. ARATA IZAWA

WWF Japan

In Japan, bluefin tuna is eaten primarily in sushi and sashimi. Bluefin tuna migrate across the northern hemisphere in the Pacific and Atlantic Oceans, the cold waters of the higher latitudes giving it more fatty tissue than other tunas like the bigeye tuna and yellowfin tuna. Given the great demand for toro or tuna with high fat content, it is bluefin tuna that commands high prices in the Japanese market.

In 1960, the Pacific bluefin tuna catches totaled 30,000 t, falling to 5,000 t in the mid-1980s and estimated at about 10,000 t in recent years. Yamada (1950) estimates recent mature stocks (5 years old and over) to be at about one half of 1960 levels. A total catch of 30,000 t was recorded for this species outside the Mediterranean in the mid-1950s, declining to 5,000 t in the mid-1980s and recently estimated at between 10,000 to 15,000 t. Some of the Atlantic bluefin tuna migrate to the Mediterranean Sea to lay their eggs. In contrast to areas outside the Mediterranean, the catch here totaled 5,000 t in the 1950s, increasing to almost 40,000 t in the 1990s and falling to 20,000 t in recent years.

ICCAT SCRS (2002) noted “The Committee is concerned about the status of East Atlantic (including Mediterranean) bluefin tuna resources in the light of assessment results; the historically high reported catches made in 1994-1997 (in excess of 46,000 t 1994-97; and in excess of 50,000 t in 1996), and possible under-reporting since 1998”. ICCAT SCRS (2002) also warned “Analyses suggest that at current levels of recruitment and the present level of large- and small-fish fisheries,

catch levels of 26,000 t or more are not sustainable over the long-term.”

Behind the increase in bluefin tuna fisheries in the Mediterranean is the growth of the farming industry. Farming is a method of taking live marine organisms and placing them in offshore cages for relatively short periods of time before shipping. This differentiates it from aquaculture, which starts with eggs and fry and raises them to maturity. Purposes of farming include being able to sell larger-sized fisheries products with more fatty tissue, to adjust the quantity of product to market prices and to stabilize the amount of product being shipped out to markets.

Bluefin tuna farming started in the Mediterranean when lean fish that had finished laying their eggs were caught in fixed nets and fattened up to qualify for the higher prices. About the same time, farming technology developed in Australia for southern bluefin tuna where fish caught in purse seines were raised in offshore cages and then transferred to the Mediterranean area. With this method, fish caught in purse seines are towed in special cages to farms and after several months are shipped out to the markets. The harvesting of juvenile bluefin tuna has also been on the increase.

Most of the bluefin tuna produced by farming are headed for the Japanese sashimi market. Since the import item codes for bluefin tuna and southern bluefin tuna in Japan were divided in 1993, it is noted that bluefin imports have been increasing, with product from Mediterranean fisheries making up 60% of the total. The major export nations in the 1990s were Spain, Italy and France but recently, imports from France have fallen. These countries are now catching their fish in purse seines and selling to farmers both

within their own countries and internationally. On the other hand, countries with newly established farming industries such as Croatia, Turkey and Malta are buying live bluefin tuna, expanding their farming business and increasing their exports to Japan. The product has a good fat content and is cheaper than wild bluefin tuna. This, together with the fact that it offers stable supply and demand conditions, has made it increasingly popular with supermarkets and the kaiten (conveyor type) sushi restaurants. It is the huge demand for toro or high fat tuna has led to the demand for the bluefin tuna and southern bluefin tuna. With the subsequent decline in stocks has farming become the means of responding to demand.

France is currently the most important supplier of live tuna to Mediterranean farms. With a local fleet of 40 purse seiners based in the Gulf of Lions, reported French captures in the Mediterranean amounted to 5810 t in 2002. While historically exploiting mostly North western Mediterranean fishing grounds, in recent years French purse seines have extended their operations to the South of Malta as well as to the waters off Libya and Cyprus.

A total 92 purse seiners from Italy operate in the Mediterranean. According to official statistics, they captured 4,700 tons of bluefin tuna in 2002, 86% of which was devoted to farming. According to ICCAT, tuna farming is exacerbating problems with monitoring catch levels and determining the size composition of the catch since most of purse seine catches are sold at sea in international waters and transported to third countries.

Spain has 6 modern purse seiners based in the Mediterranean, which captured a total 1453 t of tuna in 2001. Reported bluefin tuna catches in the Mediterranean were 2200 tonnes in 2002. 70% in weight of this catch was destined to farming. The start of tuna farming activities in Spain soon led to conflicts with the rest of stakeholders sharing the coastal fringe with. Recently, the Murcia-based NGO ANSE sub-mitted an official complain against the Ministry of Agriculture of Murcia to the Spanish Ombudsman relating to many irregularities attributable to tuna farms in the area that were inadequately addressed by the local administration; they ranged from the lack of availability of Environmental Impact Assessment re-ports, the illegal extension of farms towards environmentally sensitive areas, the lack of implementation of the governmental decision to concentrate all farms on selected offshore areas, etc.

In Croatia, captures are based on immature animals, with the average mean size strongly decreasing in the last few years (from 24,2 kg in 1999 to only 8,2 kg in 2002). The 2 February 2003 a local referendum in the island of Vis stopped a new tuna-farming project from taking off. Currently the local NGO Sunce is working together with the local communities to oppose to new tuna farm projects on the islands of Brac and Lastovo, where there is a strong opposition from the locals.

In Turkey, villagers opposed to a tuna farm project in Assos and won the court case against the farm promoters. Fishing effort in Turkey has almost doubled in one year, from 28 purse seine units targeting tuna in 2002 to 50 in 2003. Bluefin tuna catch in 2002 amounted to 2300 t, 1400 of which were transferred to farms. Turkish purse seiners caught all tuna entered into Turkish cages in 2002 and 2003. It is important to stress here that Turkey is a contracting party to ICCAT only since August 2003.

In Libya, according to MaltaToday (2005), catches are higher than 9,000 t (to be compared with the Libyan quota of 1,400 t and the French quota of 5,272 t). French purse seiners reflagged in Libya without due notification to ICCAT. The use of more than 50 tuna cages lacking authorisation by ICCAT ("IUU farms") and the massive use of spotting airplanes during the month of June.

WWF proposals to ensuring the conservation and sustainable exploitation of the Eastern Atlantic Bluefin Tuna stock are;

- 1) Establishing a specific quota for tuna caging, as a share of the total catch quota. This quota should be allocated to countries having purse-seining fleets in the Mediterranean, and be calculated according to a) national purse seine fishing capacity before the start of tuna farming activities in the region and b) current fishing possibilities allocated by ICCAT.
- 2) Eliminating the loopholes in EU legislation that allows tuna farms benefiting from structural funds aimed at aquaculture development. All kind of national subsidies to this activity should also be dropped, for that subsidizing farms leads to increasing fishing over-capacity.
- 3) Establishing a comprehensive monitoring scheme of catches in real time, at both national and international level, centralized by ICCAT. The fishing countries as

well as ICCAT must have real time information about the total amount of bluefin tuna caught at any given moment. This is a basic prerequisite to make the current quota system being of real use in the effective management of the stock, allowing for the closure of the fishery when the quota has been reached.

4) Setting up a comprehensive programme of on-board observers under ICCAT. The presence of observers must be compulsory for all purse seiners harvesting the Eastern Atlantic stock of bluefin tuna. They should supervise the real time reporting of catch statistics referred to above, as well ensuring the traceability of catches, from the catch to the transshipment and transfer of live fish to farms or the landing at the ports.

BLUEFIN TUNA FARMING IN MEXICO

MICHEL DREYFUS-LEON

Instituto Nacional de la Pesca, Mexico

Several stocks of bluefin tuna are being exploited worldwide: in the Atlantic from the Gulf of Mexico to Newfoundland; in the West Atlantic; from the Canary Islands to the south of Iceland in the East Atlantic; as well as in the Mediterranean Sea; primarily between 20° N and 45° latitude in the Western Pacific and between 23° N and 33° N latitude in the Eastern Pacific; and in the southern hemisphere around 40° S (Miyake et al., 2004). Except for the north Pacific stock, bluefin tuna stocks are considered to be overexploited. In total somewhere around 50 to 70 thousand tons of bluefin is caught each year from those stocks. Bluefin tuna is the most valuable tuna but is the least abundant of all tunas. Since 1996, bluefin tuna farming began in Mexican waters in the west coast of Baja California (Fig. 1). This activity has grown. Although 10 companies have the rights to farm this tuna, 6 have been working with variable degree of success. There are Australian, Japanese and Mexican investments involved in those companies. The purpose is to fatten the tuna by feeding them in holding pens for a period of 4 months or longer depending on biological as well as market conditions. The main market for bluefin tuna is Japan, where this tuna can reach a high price. The bluefin farming technique is basically the same in Mexico as in Australia or the Mediterranean.



FIG. 1 BLUEFIN TUNA FARMING IN MEXICO.

North Pacific Bluefin tuna spawning grounds are located in waters between the Philippines and Japan. Very young bluefin tunas (age 0 or older) are caught mainly by Japanese purse seiners, although others countries including South Korea also profit. Some tunas stay in the west of the Pacific Ocean and some start a migration to the eastern Pacific. Organisms of age 1 to 3 are located in waters off California, USA as well as Baja California, Mexico. The Mexican bluefin fishery starts in May and ends around September (Fig. 2). The amount of tuna catch is dependent in part on ocean temperatures. Baja California is the southern limit of the eastern distribution of this stock. During warm years (ENSO year) lower amount are to be expected to be found in Mexican waters.

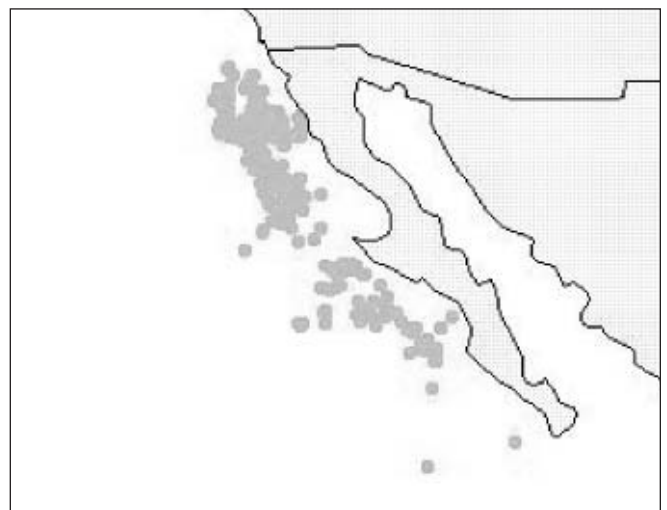


FIG. 2 FISHING GROUNDS FOR BLUEFIN TUNA IN MEXICAN WATERS.

Bluefin tuna has been almost an incidental catch for the Mexican purse seine fleet whose main target species have been yellowfin tuna and skipjack, both for the cannery. Due to the commercial difficulties to export tuna associated with dolphins, several entrepreneurs decided to start farming bluefin tuna. Some companies have ships to capture tuna as well as the small pelagic fishes for fattening during the enclosure period; other companies have to make arrangements with purse seiners to get the tuna as well as the sardines.

In 2004, almost 9,000 tons of bluefin tuna, a record high, was captured by Mexico (Fig. 3). Somewhere around 6,000 tons were used for the farming activity. In the 1970's USA made all the catch in the eastern Pacific while in recent years all the catch comes from Mexican vessels. One advantage of this farming activity in Mexico versus other areas is the presence of small pelagic fishes in high concentrations in the same region. This activity has given a new impulse to the small purse seine fleet that catches sardine and mackerel in the region.

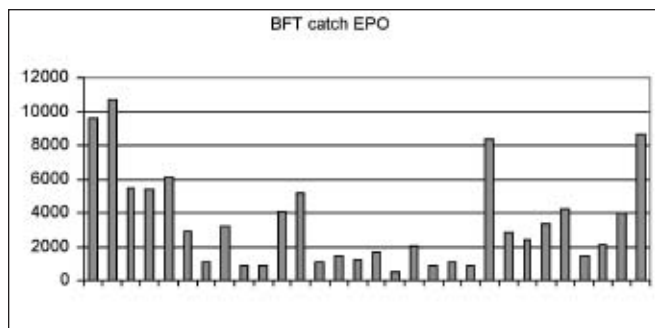


FIG. 3 BLUEFIN TUNA CATCH IN THE EASTERN PACIFIC FROM 1975 TO 2004.

Catching bluefin tuna is done with the traditional purse seine fishing methods; vessels involved have observers on board from the Inter American Tropical Tuna Commission or from the Mexican research program. After encircling the bluefin tuna, which has generally no bycatch, the purse is kept open (this might take hours or even days) until another vessel brings the transporting net that will keep the bluefin until they reach the fattening pens (several companies use the same pens for both processes). The process of passing the tuna from the purse seine to the transporting pen is recommended to be done in daylight to avoid stress for the fish. An initial count of the number of tunas and their condition is made with a camera by a diver. Depending on the duration of the transportation, bluefin tuna are fed, although due to stress they

do not eat much. In the feeding phase, tunas are held in pens and fed daily with small pelagic fishes until the “matanza” or killing and processing of individuals to be sent to Japan



FIG. 4 MEASURING TUNAS BEFORE PACKING AND TRANSPORTATION TO JAPAN.

Until now purse seine vessels in Mexico have the right to fish bluefin tuna, since the fishing permit is for all tuna species. Due to the economic value of bluefin tuna and the small amounts available some options are being considered by policy makers. For the moment most of the companies involved in the bluefin farming have a limitation to grow, due to the area they have for this process as well as imposed catch limitations.

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RESPONSIBLE TRADING

MR. PAUL BARTRAM

U.S. Trader

I want to give you my very personal perspective to what I do in Hawaii, which is market Hawaii fresh fish. I want to tell you who I feel responsible to, what I feel responsible for, how I fulfill my responsibilities and the criteria that I use in doing all of this.

I'm responsible for consumers of all ages and sizes in Hawaii. Eating fish in Hawaii is very much a family activity. Also responsible to provide the fish that our cultures

need in Hawaii. Hawaii is settled by fish-eating people, starting with Hawaiian people, but including more recent immigrants to Hawaii. Each one of those cultures has its own needs for fish. It's part of our identity.

To do that job, I have to offer a wide choice. There are people that want only wild fish. There are people that want only Grade A fish. There are people, who because of a lower budget, they may want a lower grade of fish. But still, a wholesome fish. We have many species that we offer into the fresh fish market in Hawaii. I don't know if you've heard of the slow-food movement. But Hawaii's food is very much a part of the slow-food movement. It's about choice, wide choice. It's not about fast food or limited amount of species that is sold in fast food.

Part of what I do is not only to keep consumers happy, but also help our industry promote our local catch, our local species. This is good for our local fishermen. Also, it helps to support responsible fishing. Not only that, it helps make us more secure in our food supply. We're supplied over a long distance by container ships bringing food to Hawaii.

I'm also responsible for — because so many people in Hawaii eat fish, and throughout the Pacific Basin, and in our host country for this meeting, eat fish raw, I'm responsible for providing steady access to that grade of fish. I said that we are a fresh fish market in Hawaii. I cannot tell my customers that we are out of sashimi fish whether because of government closures or quotas. That would not be acceptable. Not every fish, not every species, is sashimi grade. So for the rest of the fish that will be prepared by cooking, part of my responsibility is to make sure that that fish is wholesome fish, safe to eat.

What are the methods? How do I do this? Well, the first thing is to know the source. In Hawaii, at our Hawaii Fish Auction, the fish that is put on the auction is identified by the name of the boat. Fish is often sold and tracked fish by fish, and that's also very helpful. I have to know the specific fishing method. Longlining is not a good enough answer because longline gear and tactics are so different from fleet to fleet. There are so much diversity in the longline fisheries, that it's difficult for me understand when groups talk about banning longlining. I often wonder, what type of longlining exactly do these groups want to ban, there's so much difference. And small differences in how the gear is used can make big differences in the impacts of the gear.

In Hawaii, we use the standard tuna grading and sensory examination of fish as in Japan to judge the safety and the quality of the product. We are also very active in getting consumers to understand where their fish comes from and how it's caught. All the things that we have to know, we want the consumers to know. So we are very active. But a consumer, at least in Hawaii, will not read a management plan. A consumer is going to get the information in bite-sized pieces, just like the consumer does his testing of fish, or his sampling of fish, in bite-sized pieces. There are plans, such as eco-labeling and consumer guidance to try and guide consumers toward environmentally-friendly choices of fish. I think, and I know I am joined by other people in the Hawaii industry, we think that consumers want to compare information. It's just like when consumers go to the market and buy other things, they want to compare information. So the more information and the simpler, the easier it is to make comparisons.

Many consumers are interested in the condition of the stocks, whether there are protected species that are caught in the process of fishing, and so forth. So the specific criteria for doing these jobs is — and I'm so lucky to be working in Hawaii, because most of the fish that I deal in is from the Hawaii longline fleet, and that is one of the best managed, most regulated, most monitored fisheries in the world. So we want to be assured that our fish is LRM, legal, regulated and monitored. Not IUU. The method for doing that is information. Sometimes information starting ship-board, like observer information.

But my job is easy in Hawaii. There's a lot of concern about fish bycatch. We eat virtually everything that we catch in Hawaii. Many species have been popularized through promotion of Hawaii seafood, such as moon-fish and the large-scaled pomfret.

Again, I'm lucky to be working in Hawaii because overall we have a very high level of dealing with seafood safety, because so much of the fish is eaten as sashimi. It's a very simple reason. Now, in the best case, if I'm successful, my fellow marketers are successful in not only providing good fish, but providing all the information that people want, then in that case, responsibility is actually value added to the product. That would be the ideal. Longlining sometimes is perceived as being a very evil fishery. The good fishermen, the legal, regulated and monitored fishermen, are lumped together with the IUU fishermen. So who decides? Governments don't really decide. Governments can set standards. But consumers

decide. I answer to the consumer. Ultimately, people have to make their case to the consumer if they want to make any changes in the marketplace and whether the marketplace is going to reward irresponsible fishing or punish irresponsible fishing.

DR. HIROSHI SAKAMOTO

Organization for the Promotion of Responsible Tuna Fisheries

Tuna are highly migratory species, and as such, all countries, including coastal states and far seas fishing states must work together to effectively manage tuna stocks. Management by single countries alone to prevent overfishing will not be sufficient because the catches by other countries could be unsustainable.

Now, in order to understand the status of stocks, we can look at the catches by different fishing methods. The longlining and pole-and-line fishing are controlled. Yet, we have seen a major expansion of purse seine fishing of tuna. Also, if we look at tuna catches by oceans, we have seen an increase in the catches in the Pacific Ocean. As a measure to conserve stocks, we have regional fishery management organizations.

To address IUU fishing operations, FAO, Japan and several other nations have instituted the Positive List. National fishery management authorities are responsible for managing large-sized tuna vessels. They register the vessels with the regional fishery organizations to place the vessels on the Positive List. Catches by these registered tuna vessels may be exported to other countries. Then the importer will ask for the import permit from the importing countries, and they must check whether the vessels which harvested the fish are on the Positive List. When the vessel is not found on the Positive List, then the import is not allowed.

However, the Positive List scheme has several implementation problems:

- (i) The Positive List applies only to vessels > 24 meters. To avoid complying with the Positive List, tuna vessels can be built to be shorter than 24 m.
- (ii) Vessels on the Positive List can misreport their fishing grounds and catches.
- (iii) Because of problems with chain-of-custody records, an IUU vessel's catch can be transhipped to a carrier allowing fish not caught from a vessel on the Positive List to enter the market.

- (iv) Tuna farming is increasing production, which is not covered under the Positive List scheme, and can lead to unsustainable fishing practices.

Tuna is a common property of mankind to be passed on to the future generations. It takes a good management practice for us to be able to pass on the stocks to the future generations. We need this common understanding to be shared not only by the producers, but also by the exporters and importers. This trading part is what I call the responsible trading. We need to introduce a Code of Conduct for Responsible Trading. The awareness for responsible trading and Code of Conduct for Responsible Trading alone would not be very effective. So we need to establish an effective trade management system, which will take some time. I hope the need for establishing such a system will be understood as one of our immediate challenges and should be taken up by FAO.

FAO ECOLABELING GUIDELINES

WILLIAM EMERSON

Food and Agriculture Organization of the United Nations

In 2005 the FAO Committee of Fisheries (COFI) adopted new Guidelines for the Ecolabelling of Fish and Fishery Products from Marine Capture Fisheries. An ecolabel is a tag or a label placed on a product that certifies that it was produced in a sustainable, environmentally friendly way. Such tags let consumers make informed choices about what they are buying, so that those who wish to can support responsible food production. In essence, they create a market mechanism that promotes sustainable production methods.

The new guidelines are aimed at providing guidance to governments and organizations that already maintain, or are considering establishing, labeling schemes for certifying and promoting labels for fish and fishery products from well-managed marine capture fisheries. The guidelines outline general principles that should govern ecolabelling schemes, including the need for reliable, independent auditing, transparency of standard-setting and accountability, and the need for standards to be based on good science. They also lay down minimum requirements and criteria for assessing whether a fishery should be certified and an ecolabel awarded.

With trade in fishery products at an all-time high and concern over the status of wild marine stocks growing, ecolabelling offers a way to promote responsible fish trade — crucial for many developing countries — while preserving natural resources for future generations.

While intended for application in all countries, whether industrialized or underdeveloped, the FAO guidelines acknowledge the hurdles that developing countries face in responsibly managing their fisheries due to a lack of financial and technical resources as well as the particular challenges posed by the small-scale fisheries common in many developing nations.

The export value of fish and fishery products has soared from US\$15 billion a year in 1980 to \$63.3 billion in 2003. For developing countries — whose market share of those exports in value terms is just over 50% — this trade offers a vital source of income. In fact, net revenues from fish trade (exports minus imports) by developing countries have reached US\$18.3 billion — a figure larger than that earned from their exports of tea, rice, cocoa and coffee combined.

FAO ECOLABELING GUIDELINES

MS. YURIKO SHIRAIISHI

Representative, Women's Forum for Fish

Japanese consumers are interested in the sustainable utilization of tuna resources because we've been eating tuna for so many years and we want to be able to continue to eat tuna. So it's necessary to have appropriate resource management. Tuna consumers need to be made aware of management and sustainability issues so they are brought to feel that they are directly involved in contributing to these management decisions.

With the establishment of the Organization for the Promotion of Responsible Tuna Fishing (OPRT) in December 2000, consumers have begun to recognize different factors related to the tuna industry. OPRT has helped to raise consumer understanding of tuna fisheries management issues.

Japanese people have through several generations made use of marine resources. We have been able to develop different types of fishing methods and we have been using the whole fish without wasting any part of it. We are very proud of that. But with rapid economic development in Japan, many Japanese consumers are losing

interest in the sea and fish. We are beginning to forget that the source of our culture is related to this fishery industry. Now we tend to eat a lot of imported and processed foods. We are forgetting the wonderful tradition that we have inherited from our ancestors on seafood.

In 1993 I established the Womens' Forum for Fish to do something about this deterioration of Japan's fish culture and diet.

Consumers were not aware that we were importing fish from so many different countries. We were not receiving adequate consumer education on fisheries. We are behind by 30 years, compared to agriculture, in this regard.

Since the establishment of the Womens' Forum for Fish, we have placed a focus on increasing consumer education related to tuna fisheries problems. We started by learning from fishery managers and fishery industry representatives.

In 1996, I started to produce publications including a brochure for seafood consumers on fish including tuna.

It will allow the consumers, through the illustrations, to comprehend how much tuna is coming into Japan and the sources. The publication was well received. In 1996, the government adopted a law on tuna.

One specific measure we pursued was to come up with labels to differentiate tuna coming from sustainable fisheries. The government assisted our organization to implement this initiative. A law was passed requiring a label to identify if the fish is from a domestic or foreign fishery, and if it is imported, the label identifies the country from where the fish is imported.

Japanese consumer demand for tuna is higher than ever. In the past tuna consumption was only for special occasions, when we had festivals or New Year's celebration. Tuna was very expensive, and was not affordable on a daily basis. But now, Japanese seafood consumers can find affordable tuna and it's easy to eat without a lot of time for preparation. Tuna is now a part of Japanese consumers' daily lives. As a result, consumers have an even larger interest in ensuring tuna resources are sustainably managed to ensure that they can continue to enjoy this food.

The Women's Forum for Fish has several new initiatives planned for tuna and other fisheries. We recognize that

to be successful, management of tuna fisheries requires international cooperation, because tuna are highly migratory. I hope a Consumers International Forum can be held in the near future. Consumers need to understand fisheries management issues.

MONITORING AND CONTROL OVER FISHING ACTIVITIES

MR. YOSHITSUGU SHIKADA

Fisheries Agency of Japan

I will explain the existing fishery management framework, management measures for large longliners adopted by regional fishery management organizations, main challenges faced by this management framework, and future issues. Effective fisheries management will lead to an effective chain of custody.

Due to its highly migratory nature, tunas have been managed under regional fisheries management organizations in the Atlantic, Pacific and Indian Oceans to ensure sustainable use. Regional fishery management organizations are in charge of tuna stock management and conservation throughout the world's oceans to sustain tuna resources

To that end, conservation and management measures have been implemented, including instituting total allowable catch limits and national quotas. The protection of juvenile fish by restricting the catch of fish under a certain size, restrictions on discards, and protection of spawning grounds are other conservation measures. Furthermore, for the purpose of compliance and effective implementation of enforcement of the conservation and management measures, various measures are in place. For instance, restrictions on fishing capacity via limiting the number of fishing vessels, restrictions on fishing effort, restrictions on the use of fish aggregating devices (FADs), establishing closed areas and seasons, statistical certification systems to enable the tracing of the chain of custody of a caught tuna, and registration of legally licensed vessels are examples of enforcement measures. To restrict the distribution of catch from unregistered vessels there are sanctions to encourage compliance. And vessel monitoring systems collect real-time fishery operation data.

By combining and choosing the various measures out of those options, regional management organizations strive to effectively conserve and manage tuna resources. For compliance purposes, the responsibility

of fishery management lies in the hands of the flag state. For instance, adoption of the Compliance Agreement in 1993, as well as the Code of Conduct for Responsible Fisheries in 1995 by FAO provides for the responsibilities of the flag state. According to those agreements and provisions, the flag state is responsible for implementing various measures to ensure the compliance with conservation and management measures. However, because the distant water tuna fishery is carried out on the high seas away from the flag state, and because those vessels land their catch in foreign ports, their enforcement capabilities are limited.

Therefore, the regional fishery management organizations have been looking into management standards for large-scale tuna longliners. In 2001 ICCAT and in 2005 IOTC adopted management standards for flag states. The management standards include three parts: Control and management at the fishing ground, control and management of transshipment, and control and management at the landing port and transportation. To control activities at the fishing ground, the inspection and monitoring by enforcement vessels, dispatching of scientific observers, satellite-based vessel monitoring systems, reporting on entry and exit to and from managed areas, and catch reports occurs. Patrol vessels are in charge of conducting boarding inspections, as well as observing fishing vessel operations on the fishing grounds.

Scientific observers onboard the fishing vessels collect information about overall operations and detailed scientific data. Observer programs are limited due to their large expense. VMS can collect continuous position information. If the vessel monitoring system has a receiver that is placed onboard of the enforcement vessels, then efficient and effective control of enforcement at sea is feasible. The catch report is useful to implement quotas, but it is a challenge to ensure reports are reliable.

The management of transshipment and transport is also difficult. There is a requirement for reporting all catches by species and fishing grounds under regional management bodies. Port inspections and implementation of a Statistical Document Program are also required. This is our chain of custody process starting from the fishing grounds all the way to the final landing place. But management by a flag state alone has limitations. Port inspections and implementation of Statistical Document Programs is needed to ensure proper chain of custody management occurs.

Sharks



STOCK STATUS OF SHARKS CAUGHT BY JAPANESE LONGLINE FISHERIES

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Japanese have utilized sharks since ancient times. Although world shark landing have been sharply increasing over the last five decades and exceeded 800,000 MT in the late 1990s, there has been a decreasing trend in Japan over the past five decades. Fisheries statistics show more than 100,000 MT of sharks landing in Japan during the late 1940s, but it has gradually decreased since then to around 20,000-30,000 MT in recent years.

The major cause of the decreasing trend of shark landings in Japan is from a decrease in spiny dogfish landings. In Japan, spiny dogfish was an important food resource after World War II due to food shortages. Spiny dogfish shark landings sharply decreased because of over fishing and decreased consumer demand. Longline fisheries contribute a major part of shark landings in recent years. Although about 20 species of sharks are recorded as by-catch in tuna longline fisheries, blue shark comprises more than 80% of shark landings followed by salmon shark, short fin mako shark and other shark species.

There has been international concern about the status of shark stocks around the world. Some people have concern that pelagic sharks are threatened. To address this concern, ICCAT conducted stock assessments of pelagic sharks focusing on blue and shortfin mako shark in the Atlantic Ocean in 2004 at their meeting in Tokyo. According to ICCAT (2005):

“The primary objective for the 2004 Inter-sessional meeting of the ICCAT Sub-Committee on By-Catches was to conduct stock assessments of Atlantic blue shark (*Prionace glauca*) and shortfin mako (*Isurus oxyrinchus*) stocks, including a review of their biology, a description of the fisheries, analyses of the state of the stocks and outlook, analyses of the effects of current regulations, and recommendations for statistics and research. Due to limitations on quantity and quality of the information available for the stock assessment of blue shark and shortfin mako, the assessment was considered very preliminary in nature.”

Pelagic sharks are caught in a variety of gears in the Atlantic Ocean, Gulf of Mexico, and Caribbean, including in longlines, gillnets, handlines, rod and reel, trawls, trolls, and harpoons. But they are mostly caught as by-catch in pelagic longline fisheries targeting tuna and swordfish and are sometimes the target species. There are also recreational fisheries that catch sharks in some countries, including the United States, Canada, EC-UK, and EC-Ireland. Little is known of the elasmobranchs taken in European fisheries.

The results of the ICCAT stock assessments indicate that, for both North and South Atlantic blue shark, current biomass appears to be above the biomass at MSY. In many model runs, stock status appeared to be close to unfished biomass levels. The results are highly conditional on the assumptions we made. Those assumptions include estimates of historical shark catch as described above, the relationship between catch rates and abundance, the initial conditions of the stock in 1971 and various life-history parameters. Unless these assumptions can be confirmed, it is not possible to provide a more precise or accurate stock assessment, since the available data are quite limited.

Historical CPUE trends and model outputs suggest that North Atlantic shortfin mako has historically experienced some level of stock depletion. We cannot rule out the possibility that the current stock is below biomass at MSY in the North Atlantic as trends in CPUE suggest that depletions of fifty percent or more may have occurred. For the South Atlantic shortfin mako, the stock may have decreased since 1971, but the magnitude of decline appears to be less than in the North Atlantic. The current biomass may be above the biomass at MSY, but due to the lack of a clear signal from catch rates, there are a wider variety of possible historical stock trends. In particular, life history parameters of shortfin mako are more uncertain than blue shark.

A number of uncertainties remain regarding basic life-history characteristics of blue sharks and shortfin mako. There remain questions on the reproductive cycle for blue sharks, which if addressed through research, may result in more certain stock evaluations in the future. For the shortfin mako, our understanding of life history traits is much less refined than for blue sharks and considerable improvement in understanding of mako shark biology should result from intensified research on this species.

In addition to blue sharks and short mako, Japan is monitoring stock conditions of salmon sharks, porbeagle, oceanic whitetip sharks, silky sharks, thresher sharks, and crocodile sharks. Standardized catch rates of the salmon shark and porbeagle have been monitored using logbook data collected separately by species since 1992. There are no significant upward or downward trends for salmon in the North Pacific Ocean and porbeagle in the Atlantic Ocean.

Trends of catch rates for oceanic whitetip sharks, silky sharks, thresher sharks, and crocodile sharks in the Pacific Ocean have been monitored through analysis of fisheries research data. Comparisons between catch rates from the late 1960s and the more recent period of 1992-2001 were made. Trends are relatively stable except for a downward trend in oceanic whitetip sharks and an upward trend in thresher sharks. It is considered that those trends are due to the historical change in fishing methods, which is now being set deeper than historically.

This brief review of pelagic sharks reveals no significant change in the status of stocks with some exceptions. However, it is also becoming clear that

there is a lack of available fishery statistics. Therefore, it is important to continue monitoring the stock status of pelagic shark and to establish the infrastructure to collect fishery statistics of pelagic sharks by individual species.

ASSESSMENT OF BLUE SHARK POPULATION STATUS IN THE WESTERN SOUTH PACIFIC

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Blue sharks are captured from the world's oceans in greater quantities than any other single species of chondrichthyan. However, commercial catch data are poor because most individuals are finned and their carcasses discarded at sea. The increasing price of shark fins coupled with increasing management restrictions on coastal populations will almost certainly lead to greater pressure on high-seas stocks of pelagic sharks. In the Pacific, high-seas fish catches from pelagic longlining are increasing. In the light of international concern over shark stocks (FAO, IUCN) there are questions over the sustainability of this shark catch, and the resulting effects on the ecosystem.

We compiled all data available to us on catch/effort extending back to the 1950s primarily for the southwest Pacific region, but extending to the whole Pacific basin. This mainly comprised commercial high-seas pelagic longline data (from 10 nations), but also research data as well as some gillnet and coastal fleet information. This revealed a number of problems mainly comprising a lack of species-specific data, variable and poor reporting rates for sharks, limited observer coverage and poor spatial and temporal coverage, all of which make it very difficult to construct meaningful time-series of abundance.

Commercial logbook data from longliners operating in Australian waters did not identify the main shark species until the 1990s, and reporting of sharks appears to be variable. There is a short time-series from 1992-95 for which the Japanese logbook data are considered reliable, but shark reporting-rates declined

after 1995 when disagreements on southern bluefin tuna (SBT) quotas emerged. Reporting rates for sharks in the Australian domestic longline fishery, which has expanded rapidly since the mid-90s have never been high, and probably reflect non-reporting.

There is a complete absence of documented research longline catch-effort data in Australian waters except for some work off northeastern Australia by Japanese Fishery High School vessels from 1967–71. It is possible that there may be additional training vessel data available from later cruises, possibly with species-specific shark catch data especially after the early 90s. These data reside in institutions in Japan.

In Australia, reliable observer shark catch data for the Japanese longline fleet operating within the AFZ only exists from 1991–97. Observer blue shark catch-rates increased towards the end of this period when effort fell as the Japanese fleet withdrew. A similar pattern was seen in the northern sector of the New Zealand tuna fishery. The reasons for this remain unclear. To date there has been only a limited amount of scientific observer coverage on the Australian domestic longline fleet.

The data we have compiled confirms the previously reported general pattern of lower catch-rates in equatorial waters and elevated catch-rates at high latitudes. Catch-rates also vary with longitude but no clear trend is apparent. Length and sex-ratio data from observers off the east coast of Australia show that average size decreases and the number of females increases to the south. Juveniles of 105–130cm TL dominate below 40° S, while mature fish dominate to the north. The Japanese SBT fishery was concentrated in these southern areas whereas the current domestic longline fishery operates to the north. In New Zealand waters, the smaller (<130cm TL) blue sharks were also only found south of 35° S, but they were outnumbered by larger size classes. Size-structure and sex-ratio also varies with longitude in other areas of the Pacific and is doubtless related to the complex but currently unknown stock structure of this highly migratory shark.

Pelagic longline fishing in New Zealand removed about 1400t of blue sharks in 1997–98 with about four million hooks set. The Japanese longline fishery in the eastern Australian AFZ caught about 1100t per year from 1992–95 with an average of about 10 million hooks set per year. In the east coast domestic fishery, observer catch-rates are some five times lower than those reported by observers on Japanese vessels when

standardised for fishing area. This results in an estimated blue shark catch for the domestic fishery in 2000 of only 230t based on domestic observer catch-rates compared with over 1000t if based on catch-rates observed on the Japanese fleet. This five-fold decrease in estimated catch from the 1990s to the early 2000s may be due to different fishing practices between the fleets, or to a real decline in blue shark abundance in the region. There is no consistent picture emerging from analyses of blue shark fisheries in the Pacific to guide us in the likely sustainability of current catches or to suggest likely levels (in tonnes, rather than as a % of biomass) of sustainable removals from the waters off Australia. There are very few areas where sophisticated formal assessments for blue sharks are available. In many cases only catch-rate analyses (standardised CPUE) have been applied and results, even for the same oceans, vary considerably. The overall picture emerging on the sustainability of pelagic shark catches is conflicting, with some studies suggesting major declines, while others suggest little change.

The lack of data and questions about the reliability of existing data, particularly with regard to total catches and catch-effort, implies that any assessment will have high uncertainty. There is uncertainty in input data and input/assumed parameters, uncertainty in estimated parameters and also uncertainty about process, for example stock structure or predator-prey interactions. From a life-history point of view, blue sharks are considered to be less vulnerable than most shark species (but not most teleost species). However, even demographic analyses, which do not use catch or effort data, can have high uncertainty in estimates of intrinsic rate of increase, depending on uncertainties in life-history parameters such as mortality and growth.

We carried out a yield analysis for blue sharks which incorporated a stock-recruitment relationship, uncertainty in the parameter describing the "steepness" of this relationship, and uncertainty in the input parameters of growth, mortality and age at maturity.

Our yield analysis suggests that the maximum sustainable harvest in weight is likely to be only a few percent of the unexploited stock biomass, implying low harvest rates. The percentage depends on the size range of animals taken in catches.

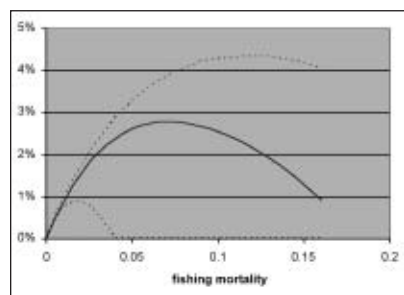
If all blue sharks older than 6 months were vulnerable to exploitation, then the maximum yield is likely to be less than 4% (Table 1, Figs 1 & 2). This estimate would

be conservative if growth and natural mortality rates have been under-estimated. Due to a lack of data, it is not possible at the moment to quantify the risk of current removals to the blue shark population in Australia.

TABLE 1. MAXIMUM YIELD RELATIVE TO THE UNEXPLOITED FISHABLE BIOMASS (FBO) AS A PERCENTAGE FOR THREE LEVELS OF STEEPNESS IN THE STOCK-RECRUITMENT RELATIONSHIP AND TWO ASSUMPTIONS ABOUT AGE AT FIRST CAPTURE. FOR COMPARISON, RESULTS FOR STEEPNESS UNIFORMLY DISTRIBUTED BETWEEN 0.2 AND 0.9 ARE ALSO PRESENTED. MEDIANS AND 10TH AND 90TH PERCENTILES (IN BRACKETS) ARE GIVEN.

MAXIMUM YIELD/UNFISHED FISHABLE BIOMASS (AS %)	AGE AT FIRST CAPTURE = 6 MONTHS	AGE AT FIRST CAPTURE = 6 YEARS
	median (10th, 90th %-iles)	median (10th, 90th %-iles)
Steepness = 0.3	1.0 (0.9, 1.4)	2.4 (1.7, 3.7)
Steepness = 0.5	2.6 (2.0, 3.1)	6.3 (4.0, 8.8)
Steepness = 0.7	3.7 (2.8, 4.3)	8.8 (5.4, 12.6)
Steepness range 0.2–0.9	2.8 (0.8, 4.3)	6.5 (1.9, 11.6)

FIG. 1. YIELD AS A PROPORTION OF UNEXPLOITED FISHABLE BIOMASS (AGE 6 MONTHS AND OLDER) AT DIFFERENT FISHING MORTALITY RATES. THE SOLID LINE IS THE MEDIAN, THE DOTTED LINES ARE THE 10TH AND 90TH PERCENTILES.



BIOMASS (AGE 6 MONTHS AND OLDER) AT DIFFERENT FISHING MORTALITY RATES. THE SOLID LINE IS THE MEDIAN, THE DOTTED LINES ARE THE 10TH AND 90TH PERCENTILES.

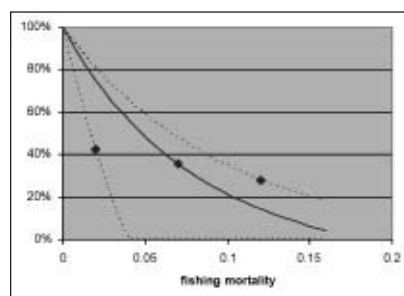


FIG. 2. BREEDING BIOMASS (SSB) AS A PROPORTION OF UNEXPLOITED BREEDING BIOMASS (SSB0) FOR HARVESTING AGE 6 MONTHS AND OLDER FISH AT DIFFERENT FISHING MORTALITY RATES. THE SOLID LINE IS THE MEDIAN, THE DOTTED LINES ARE THE 10TH AND 90TH PERCENTILES. THE DIAMONDS INDICATE THE POINTS WHERE MAXIMUM YIELD IS OBTAINED – SEE FIG. 1.

THE SOLID LINE IS THE MEDIAN, THE DOTTED LINES ARE THE 10TH AND 90TH PERCENTILES. THE DIAMONDS INDICATE THE POINTS WHERE MAXIMUM YIELD IS OBTAINED – SEE FIG. 1.

We have identified a number of short, medium and longer-term priorities for data collection and analysis that will allow development of regional assessments. In

the short-term, it is critical that reliable catch-effort data are being collected and continue to be collected to ensure a time-series. Very important are improved estimates of current catches and, if possible, historic catches. In spite of the problems with reporting rate, exploration of the different, and relatively reliable catch-rate series and development of standardised indices of abundance, should be attempted. Information on size-frequencies and sex-ratio in the catch is important. The relevance of these data to assessing which age-classes are vulnerable to fishing is illustrated in the yield analyses.

In the medium-term, information on life-history parameters should be collected for blue sharks in Australian waters, particularly age and growth. Age is required for demographic and risk assessment models, and for more detailed age-structured models. Catch, CPUE, size, sex and age data can be used to develop biomass models. Mixing rates and residency times should be studied to understand fishery impacts on the local population. Management will need the development of performance indicators for monitoring the status of the stock. Associated reference points will be required to provide an overall management framework. Trophic and dietary studies, together with information on feeding behaviour, are important for developing ecosystem models.

A co-ordinated research plan for the Pacific is required, and should be encouraged, to assess blue (and other pelagic) shark populations in the Pacific. This plan could be co-ordinated by an international commission such as APEC, or one of the tuna bodies (as is currently the case in the Atlantic under ICCAT). Regional studies could then be developed and integrated under this overall plan.

SHARK FISHERIES AND UTILIZATION

KUO-PING LIN

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1. GLOBAL SHARKS FISHERY

According to FAO statistics, chondrichthyans represent only a minor group in terms of total catches. In 2002 they accounted for only 0.75% of total world captures. Total chondrichthyan catches have grown considerably, from 271,800 tonnes in 1950 to a record

of 818,542 tonnes in 2002. This growth was fairly regular, with some slow periods of increase (early 1950s and most of the 1970s) and some sustained increases (1955-73 and 1984-96).

1.1 CATCHES BY SPECIES

Bonfil has estimated that sharks represent 60% of the world elasmobranch catch. Requiem sharks (*Carcharhinidae*) and dogfish represent the major shark groups caught, followed by smooth-hound (*Mustelus* spp.). Of the identified species, the greatest volumes are reported for picked dogfish (*Squalus acanthias*), the silky shark (*Carcharhinus falciformis*), and narrownose smooth-hound (*Mustelus schmitti*).

Shark species usually targeted by directed fisheries are as follows:

Picked dogfish (*Squalus acanthias*)
Silky shark (*Carcharhinus falciformis*)
Tope shark (*Galeohinus galeus*)
Shortfin mako (*Isurus oxyrinchus*)
Blue shark (*Prionace glauca*)
Porbeagle (*Lamna nasus*)
Smooth-hound (*Mustelus* spp.)
Thresher shark (*Alopias* spp.)
Dusky shark (*C. obscurus*)
Sandbar shark (*C. plumbeus*)
Oceanic whitetip shark (*C. longimanus*)
Whitetip reef shark (*Triaenodon obesus*)
Basking shark (*Cetorhinus maximus*)

Picked dogfish inhabits warm temperature to boreal waters throughout the world and is one of the most common sharks in the North Atlantic. In 2002, a total of 28,886 tonnes of this species were landed. Silky sharks are commonly taken as bycatch in swordfish and tuna fisheries and there are significant fisheries in the Gulf of Mexico and Caribbean Sea. In 2002, a total of 16,960 tonnes of silky shark were landed. Tope shark fisheries are found in American and Australian waters. A total of 4,100 tonnes tope sharks were landed in 2002. Shortfin mako shark inhabits warm temperate waters worldwide. It is an important shark for fisheries because its meat is considered to be of the highest quality. In 2002, a total of 2,170 tonnes of shortfin mako were landed. Blue shark occurs in tropical, subtropical and temperate waters worldwide and represents one of the major species caught as bycatch. It is usually finned and remaining carcass discarded due to the low value of its meat. A total of 2,170 tonnes of blue shark were landed

during 2002. Porbeagles are common in deep cold temperate waters of the North Atlantic, South Atlantic and South Pacific oceans. Catches of porbeagles have been particularly important in the North Atlantic. A total of 2,135 tonnes of porbeagles were landed in 2002.

1.2 CATCHES BY COUNTRY

In 2001 Indonesia was by far the world's leading chondrichthyan fishing nation, followed by India, Pakistan, Taiwan, Mexico, Japan and USA. Other countries, with more than 10,000 tonnes of sharks caught, were Argentina, Spain, Malaysia, France, UK, New Zealand, Sri Lanka, Republic of Korea, Thailand and the Maldives.

Indonesia has considerably increased its elasmobranch catch, from 1,000 tonnes in 1950 to 114,600 tonnes in 2001, which represents 14.0% of total world chondrichthyan catches. India has traditionally had an important elasmobranch fishery. In 1950 its catches represented 11.0% of the total world production of chondrichthyans and in 2001 India was the second largest shark fishing country with 67,385 tonnes, or 8.2% of the world total. The chondrichthyan fisheries of Pakistan have shown several ups and downs since 1950. They have increased considerably from 4,800 in 1950 to a peak of 74,000 tonnes in 1973. In 2001 Pakistan was the third shark fishing country with 49,900 tonnes, or 6.1% of the world total. Taiwan's chondrichthyan catch has substantially increased from 9,000 tonnes in 1950. The growth was particularly significant in the mid 1970s and the mid 1980s, with a peak of 75,700 tonnes in 1990. Since then shark catches have declined sharply, with a slight exception in 1995. In 2001 Taiwan was the fourth largest shark fishing country with 43,327 tonnes, or 5.7% of the world total. Mexican elasmobranch catches have increased appreciably from 3,600 tonnes in 1954 to 45,200 tonnes in 1996, which represents the peak year. In 2001 Mexico was the fifth largest shark fishing country with 30,900 tonnes, or 3.8% of the world total.

1.3 CATCHES BY FISHING AREA

Table 1 presents chondrichthyan catches by FAO fishing areas from 1998 to 2002. In 2002 the Western Central Pacific Ocean was the major fishing area for chondrichthyans, followed by the Western Indian Ocean, Eastern Indian Ocean, North Eastern Atlantic Ocean and South Western Atlantic Ocean.

TABLE 1. CHONDRICHTHYAN CATCHES (TONES) BY FAO FISHING AREAS FROM 1998 TO 2002.

FAO MAJOR FISHING AREA	1998	1999	2000	2001	2002
27 NE Atlantic Ocean	94286	98654	104071	107084	82758
21 NW Atlantic Ocean	51296	49186	49360	39746	35639
47 SE Atlantic Ocean	6531	8334	10688	15221	13826
41 SW Atlantic Ocean	57896	61308	60197	62855	57721
31 E Central Atlantic Ocean	11330	12468	9569	9440	10595
34 W Central Atlantic Ocean	26838	25680	26505	24147	24537
67 NE Pacific Ocean	5142	9340	8628	8313	10420
61 NW Pacific Ocean	34383	57887	56079	35970	39671
87 SE Pacific Ocean	21856	15433	23948	18487	25211
81 SW Pacific Ocean	18773	22584	20172	22452	24149
77 E Central Pacific Ocean	38346	39191	43727	37032	34990
71 W Central Pacific Ocean	143310	139951	146527	148968	151084
51 W Indian Ocean	120715	119038	126347	121676	141293
57 E. Indian Ocean	127229	121470	119552	116425	116615
37 Mediterranean and Black Sea	14886	12157	12514	11395	10863

The most relevant growth in catches during 1950-2002 period took place in FAO fishing areas of the Indian Ocean, the Northwest Atlantic and the Western Central Pacific. On the other hand, a decline in catches occurred in the Southeast and Southwest Pacific, and in the Northeast Atlantic.

WESTERN CENTRAL PACIFIC OCEAN

Growth has been particularly significant since 1970. Catches peaked at 164,900 tonnes in 1990. The main fishing nations in this area were Indonesia, Taiwan, Malaysia, Thailand and Philippines.

WESTERN INDIAN OCEAN

In 1996 the western Indian Ocean was the world's top fishing area for chondrichthyans. Requiem sharks were the dominant shark species caught in this area, followed by silky sharks. The major fishing nations in this area were India, Pakistan, Sri Lanka and Maldives.

EASTERN INDIAN OCEAN

Chondrichthyan catches have also grown remarkably in the Eastern Indian Ocean, from 18,600 tonnes in 1950 to 116,615 tonnes in 2002. The major fishing nations in this area were India, Indonesia, Malaysia, Australia and Thailand.

NORTHEASTERN ATLANTIC OCEAN

Chondrichthyan catches have slightly decreased from 80,300 tonnes in 1950 to 74,100 tonnes in 1996. This decline was episodic and not continuous. The main fishing nations in this area were France, UK, Spain, Portugal, Ireland and Norway.

SOUTHWEST ATLANTIC OCEAN

Catches of chondrichthyans in this area have shown a large increase, growing from 3,200 tonnes in 1950 to 57,700 tonnes in 2002. This growth was fairly regular, accelerating from the mid 1960s. The main fishing nations in this area were Argentina, Brazil, Republic of Korea and Uruguay.

2. TAIWAN'S SHARK FISHERIES

Between 1993 and 2002 the annual landing of sharks in Taiwan were between 40,000-50,000 tonnes, comprising 5-6% of global shark catch.

2.1 COASTAL AND OFFSHORE FISHERIES

The major base for coastal and offshore shark fisheries is in Nanfang Ao. According to market data, shark landings were 1,500 - 2,500 tonnes from 1990 to 2002. There are several shark fishing vessels in Nanfang Ao. Most of these vessels target sharks from September to April and shift to targeting bony fishes in the remaining months of the year. The major fishing method used is the bottom longline, fishing at depths between 80-200m. The major fishing ground is in northeastern Taiwan waters. The dominant species caught are the shortfin mako shark (*Isurus oxyrinchus*), scalloped hammerhead (*Sphyrna lewini*), bigeye thresher (*Alopias superciliosus*), pelagic thresher (*Alopias pelagicus*), and dusky shark (*Carcharhinus obscurus*).

2.2 FAR SEA FISHERIES

2.2.1 SHARK BY-CATCH BY TUNA LONGLINERS

35,000-40,000 tonnes of sharks were landed per year during the last 5 years by tuna longliners, representing 75-80% of global shark landings. The dominant species are blue shark (*Prionace glauca*), crocodile shark (*Pseudocarcharias kamoharai*), silky shark (*Carcharhinus falciformis*), oceanic whitetip (*Carcharhinus longimanus*), shortfin mako shark (*Isurus oxyrinchus*), thresher sharks (genus *Alopias*), and hammerhead sharks (genus *Sphyrna*). According to observer data and logbooks the landings of blue shark represented 87% of global shark catch.

2.2.2 SHARK SPECIES IDENTIFICATION BY OBSERVATION OF DENTICLE

To establish a species-specific shark landing data set for stock assessment, the researchers attempt to establish a method for identifying shark species via scanning electron microscope (SEM) observations of dermal denticle (scales of sharks) on fins sampled from the 12 most common pelagic shark species. A key of dermal denticle to these 12 species are described as following:

- 1a. Posterior margin of denticles are "U" or "V" shaped ----- 2
- 1b. Posterior margin of denticles are "W" shaped - 3
- 2a. Denticles sparsely distributed, posterior margin "V" shaped, like a flying bird - *Galeocerdo cuvier*
- 2b. Denticles densely distributed, posterior margin "U" shaped, like a diamond or an ellipsoid ---- *Prionace glauca*
- 3a. Denticles with longer vertical width than horizontal length ----- 4
- 3b. Denticles with vertical width about equal to horizontal length ----- 6
- 3c. Denticles with shorter vertical width than horizontal length ----- 8
- 4a. Vertical width of most denticles are smaller than 400µm ----- *Carcharhinus falciformis*
- 4b. Vertical width of most denticles are larger than 400 µm ----- 5
- 5a. Denticles with 5 and 7 ridges, diagonal arrangement of denticles is regular ----- *Carcharhinus longimanus*
- 5b. Denticles with 3 and 5 ridges, diagonal arrangement of denticles is irregular ---- *Carcharhinus obscurus*

- 6a. Denticles with 3 ridges, vertical width of most denticles are smaller than 300 µm - *Carcharodon carcharias*
- 6b. Denticles with 5 or 7 ridges, vertical width of most denticles are larger than 300 µm ----- 7
- 7a. Vertical width of denticles ranges 330-350 µm -- *Sphyrna zygaena*
- 7b. Vertical width of denticles ranges 350-400 µm -- *Sphyrna lewini*
- 8a. Denticles with 5 ridges, diagonal arrangement of denticles is unregular ----- *Isurus oxyrinchus*
- 8b. Most of the denticles with 3 ridges ----- 9
- 9a. Diagonal arrangement of denticles is irregular, central ridge is not strongly pointed ---- *Alopias pelagicus*
- 9b. Diagonal arrangement of denticles is regular, central ridge is not strongly pointed ----- 10
- 10a. Vertical width of dermal denticle 180-220 µm, horizontal width of dermal denticle < 1.3 folds in vertical width ----- *Isurus paucus*
- 10b. Vertical width of dermal denticle 120-150 µm, horizontal width of dermal denticle > 1.5 folds in vertical width ----- *Alopias superciliosus*

2.2.3 FIN WEIGHT VS. WHOLE WEIGHT FOR SHORT-FIN MAKO

The following equations provide a means to estimate the weight of whole shortfin makos based on the weight of their fins.

X equals the pectoral fin weight in g. Y equals whole weight in kg.

$$Y = 0.094X + 6.021 \quad (r^2 = 0.97, Fn=14)$$

X equals the 1st dorsal fin weight in g. Y equals whole weight in kg.

$$Y = 0.106X + 15.948 \quad (r^2 = 0.93, Fn=14)$$

X equals the caudal fin weight in g. Y equals whole weight in kg.

$$Y = 0.054X - 4.947 \quad [r^2 = 0.98, Fn=14]$$

X equals the combined weight of pectoral, 1st dorsal, and caudal fins, in g. Y equals whole weight in kg.

$$Y = 0.020X + 3.622 \quad [r^2 = 0.97, Fn=14]$$

3. CONSERVATION AND MANAGEMENT

In order to be consistent with modern trends in global shark conservation, the Fisheries Agency of Taiwan has adopted appropriate management policies.

3.1 ESTABLISHMENT OF SHARK RESOURCES MANAGEMENT WORKING GROUP

In 2002, the “Shark Resources Management Working Group” was established. The group, which is composed of academics, fishermen, fisheries organizations, and officials, is aimed at consolidating consensus on shark conservation from all stakeholders. Besides, the group is also responsible for drafting practical methods to manage vulnerable species such as whale shark.

3.2 SCIENTIFIC RESEARCH ON WHALE SHARKS AND RELATED MANAGEMENT REGULATION

Academic institutes along with TRAFFIC carried out investigation on the population status and utilization of whale sharks. Using satellite-tagging techniques, scholars at National Taiwan Ocean University are gradually gaining an understanding of the ecology and migration of whale sharks around Taiwan waters. Starting in July 2001, the “Reporting System on Whale Sharks” helped monitor accurate landings in Taiwan. Fishermen who caught whale sharks must follow specific steps and requirements to file the Reporting Form. A year later, a Total Allowable Catch (TAC) came into force on July 1, 2002. From this date through June 30, 2003, the total allowable catch cannot exceed 80 individuals. Once the reported catch reaches 80 individuals, the government immediately prohibits any additional catch. The quota was decreased to 65 individuals during 2005.

3.3 INTERNATIONAL SHARK CONFERENCE

Under the auspices of the government, the National Taiwan Ocean University and WildAid organized an international shark conference entitled “Sustainable Utilization and Conservation of Sharks”. The conference was held from May 13 - 16, 2002 in Taipei. Forty experts from home and abroad presented papers covering topics including “Shark Fisheries and Utilization”, “Stock Assessment and Management”, “Whale Sharks”

and “Conservation and Education”. More than 600 people from 19 countries participated in this conference. Experts, conservationists, fishermen, management officials and traders shared their professional perspectives to explore approaches for sustainable management. This conference has successfully evoked public awareness for conservation and enhanced regional cooperation on shark management.

4. SHARK UTILIZATION

In Taiwan, sharks are utilized completely. Shark products include flesh (fresh, smoked and dried), skin (for food), fish paste (minced fish products), liver oil, cartilage, fins and decorations from teeth. Sharks caught in inshore and coastal waters are consumed locally. Sharks from deep-sea tuna longline vessels are frozen and mostly sold at adjacent harbors or exported to other countries. Shark cartilage is believed to have many health benefits, such as helping treat arthritis, psoriasis colitis, acne, enteritis, phlebitis, rheumatism, peptic ulcers, hemorrhoids, herpes simplex, melanoma, and AIDS.

5. RECOMMENDATIONS

The conservation and management of shark resources is attracting more and more international attentions since the 1990s. In 1992, IUCN/SSC established the Shark Specialist Group (SSG) to promote international research into the status and conservation of shark species. In 1994, the CITES conference of the parties expressed their concern over increasing volumes of trade in shark products and the lack of available information to determine the impact of that trade.

A comprehensive data-collecting system needs to be established through international corporation to collect fisheries information including species-level catch data (species, length weight, sex, age, maturity), landings versus discards, geographical locations and catch per unit effort data. This information can best be obtained through the combined use of logbooks and observers.

On the other hand, there is a need to increase the uses of shark products to move towards the full utilization of sharks.

INTERNATIONAL TRADING OF SHARK PRODUCTS

SHELLEY CLARKE

Joint Institute for Marine and Atmospheric Research,
University of Hawaii and National Research Institute
of Far Seas Fisheries

The use of shark meat, fins, cartilage, liver oil, skin and teeth for products ranging from food to industrial extracts to accessories, makes sharks one of the most versatile of all fishes. Due to the low value of shark meat, statistics indicate that meat production totals only 10% of the reported weight of shark catches. In contrast, shark fins are highly valued in Chinese cuisine with retail prices reaching \$1,000 US per kg. Since better records are kept for more valuable products, shark fins are the most useful product to study in order to fill gaps in our knowledge about shark fisheries.

Through 2002, Hong Kong handled one-half to two-thirds of the global trade in shark fins. In recent years, imports to Hong Kong from Taiwan have increased whereas imports from Japan, the United States, India and Yemen have dropped. Spain, Indonesia, the United Arab Emirates and Singapore continue to be major suppliers. Import growth of 5% per annum to Hong Kong through 2000 has recently leveled off, but this is more likely a reflection of an increasing direct trade with Mainland China than a decline in demand for shark fins. The previous trend of growing demand for shark fins appeared to be tracking the increase of disposable income in Mainland China as well as recent cycles in the regional and global economy. This trade growth may be somewhat balanced by periodic reports in the Asian press of high levels of harmful substances such as mercury, hydrogen peroxide or formaldehyde in shark fin products.

In the absence of detailed and/or accurate information on shark fisheries worldwide, it is possible to use trade information from the Hong Kong shark fin market to estimate the number of sharks represented in the shark fin trade each year, and compare this to estimates of maximum sustainable yield (MSY) catches. The effect of finning regulations can also be assessed by comparing Hong Kong imports from major supplier countries before and after the regulations take effect. Recently, new directed fisheries for sharks aimed at supplying the Hong Kong/China market are believed to have been initiated in Palau, the Indian Ocean off Africa and the Marshall Islands, and likely in other locations. This

illustrates that despite finning regulations, market demand is expected to continue to grow, resulting in increasing pressure on shark resources and declines in species whose productivity is unable to keep pace.

PROMOTION OF FULL UTILIZATION OF SHARKS

MR. TOSHIKAZU MIYAMOTO

Global Guardian Trust

Since 1999 Global Guardian Trust has conducted research on the development of shark and seabird conservation and management programs. We have selected fishing ports of the country landing sharks and skates, and conducted a field study surveying the landing and management schemes for the coastal fisheries catching sharks and skates. Also, we have done a number of hearings with local communities for the effective use of sharks. The six-year project on the effective use of the sharks is a result of Japan's implementation of the International Plan of Action on sharks adopted by the United Nations Food and Agriculture Organization. I will describe the way sharks are used in different parts of Japan and discuss the future promotion of effective use of sharks in Japan.

Different regions use different parts of the same species of sharks in different ways, creating a unique food culture. With the wisdom and implementation of fishers and those in the processing and sales industry, there are a variety of practices for using sharks.

Some of the uses of sharks, skates, and stingrays include:

- Skates are boiled in soy sauce or sometimes tossed in vinegar and miso;
- Spiny dogfish are put into miso and grilled;
- Starspotted smooth hounds are chopped or soaked in vinegar, and covered with spiny dogfish;
- Surimi-paste products is made from sharks;
- Some of the shark will be eaten raw in the form of sashimi;
- Shark meat can be pickled in vinegar;
- Shark fins can be used to make shark fin ramen, Chinese noodle, shark fin sushi, and shark fin porridge;
- The heart of the salmon shark is eaten raw;

- Shark skin is processed through a leather tanning and dyeing process to make a variety of products including belts, wallets, shoes and handbags. Cooking utensils are also made from shark skin;
 - Skates are exported to South Korea where they are chopped into pieces and fermented with pickles;
 - In Hagi, Cloudy catshark is transported live and kept as an ornamental fish in ponds;
 - The Angel Fosu and the Japanese stingray are landed alive and eaten raw;
 - In Ehime Prefecture, sharks caught in bottom trawl fisheries are used for important rituals, including weddings, ceremonial events, funerals and at New Year's celebrations;
 - Shark meat can be made into dumplings, deep fried or smoked;
 - Shark can be made into agricultural fertilizers;
- and
- Shark cartilage is used as a raw material for cosmetics, lubricants, and medical products.

Some species of shark are in demand in some regions but not others depending on local tastes. For instance, shortfin mako, which is perceived as having high quality meat in Kesen-numa, is considered to be of low quality in Kii-Katsuura. Therefore, the price per unit weight is lower for shortfin mako in Kii-Katsuura, while Bigeye thresher is valued highly in this area.

Prices for sharks and skates are not always high. As a result, fishermen do not target sharks and skates. Depending on the fluctuation in demand for sharks, as well as fluctuations in fishing effort, there is a tendency not to target and retain sharks and skates, and in some regions fishermen will release sharks and skates. Demand for specific species of sharks differs by region. Pelagic longline vessels, which operate for a long period of time, might retain and land shark fins in the past due to the capacity of its hold.

We hope to promote research and development to increase the use of underutilized parts of sharks to move towards full use of these resources.

A stylized graphic featuring several fish swimming in a circular pattern, with wavy lines representing water below them. The entire graphic is rendered in a light gray tone against a darker gray background.

Third International Fishers Forum



Reporting on Commitments and Progress Since IFF2 and Process For IFF3 Participant Commitments

KITTY SIMONDS

Executive Director, Western Pacific Regional Fishery Management Council

Aloha and welcome to the International Tuna Fishers Conference on Responsible Fisheries and Third International Fishers Forum. In this part of the program we are going to hear from colleagues about the progress we have made in reducing the impacts of pelagic longline fishing on the marine environment and promoting responsible fishing practices.

Many of you were at the Second International Fishers Forum in Honolulu, held towards the end of November 2002. It is worth recounting the circumstances in which this Council found itself nearly 3 years ago. At that time the swordfish segment of the Hawaii-based longline fishery had been closed for nearly two years, with about one fifth of the fleet moving their operations to California, at great cost to themselves and their families. The remaining tuna-targeting longliners were forbidden to fish south of 15 degrees North for April and May, the two months when the southern fishing grounds around Palmyra Atoll are most productive. The National Marine Fisheries Service and the Hawaii Longline Association were locked in litigation over the way the longline fishery was being managed and the prospect of reopening the swordfish fishery was remote. Revenues from the loss of the swordfish fishery had declined by about 40%, affecting up to 500 to 600 jobs in the Hawaii seafood industry.

By 2002 we felt confident about dealing with seabird interactions, and had completed an amendment to our Pelagics Fishery Management Plan which implemented measures such as night setting and blue dyed bait for the Hawaii-based longline fishery. But the prospect

of a solution to dealing with turtle interactions still seemed a long way off. We heard during IFF2 that NMFS was conducting fishing experiments in the Atlantic and Gulf of Mexico, and that large circle hooks and mackerel bait showed potential to not only reduce loggerhead interactions with pelagic longlines, but also to have a beneficial reduction with leatherback turtles. This work was being conducted by John Watson and his colleagues at the NMFS Pascagoula Laboratory, with US longline vessels on swordfish grounds off the northeastern United States, and in the Gulf. Despite these optimistic results, there seemed little prospect of having this technology tested in the Hawaii longline fishery.

However, in August 2003, the Hawaii Longline Association's legal challenge against the NMFS was successful and meant that a new management regime had to be developed for the longline fishery. By this time the results from John Watson's team had been thoroughly assessed and showed that large 18/0 circle hooks with mackerel fish bait could achieve significant reductions of leatherback and loggerhead turtles. This Council worked with colleagues in NMFS to develop a set of management alternatives which implemented circle hook and mackerel bait, with various levels of fishing effort in order to reopen the longline fishery. A feature of this new approach was the incorporation of specific conservation measures at loggerhead and leatherback nesting beaches along the Pacific Rim, to offset impacts of the longline fishery not covered by the new hook and bait technology. Such an approach was not entirely unique, and NMFS has used a similar offsetting approach for the California-Oregon drift gill-net fishery, where nesting beach conservation for leatherbacks in South and Central America was incorporated into measures to address turtle interactions with this fishery.

The offsetting measures for the Hawaii longline fishery were developed by the Council's Turtle Advisory Committee. The TAC was one of the products of the Council's first Western Pacific Sea Turtle Cooperative Research and Management Workshop, which had been conducted prior to IFF2 in mid 2002. This workshop had laid out in detail the work that was required to address turtle-longline interactions as well as identifying the range of other threats posed to Pacific turtle populations. The workshop kick-started the Council's turtle conservation program, and with the hiring of a full time coordinator in 2003, has assumed a major role in sea turtle conservation in the Pacific. This includes not only conducting conservation of adults, eggs and juvenile leatherback and loggerhead turtles at nesting beaches and foraging grounds, but also supporting education programs, tagging database development and further fishing gear experiments. Moreover, several of these projects grew directly from the experiences of participants at IFF2 and have led to successful partnerships between the Council, NMFS and conservation NGOs. Much of what happened with our longline fisheries is a result of the commitments that were made at the Second International Fishers Forum.

Those of you who also participated in IFF2 will recall that 65 participants stood before their colleagues and committed to specific actions individuals or part of an agency or group to address seabird and sea turtle bycatch. The commitments made were wide-ranging in terms of geographic scope and the nature of the tools, techniques and strategies to be employed. Many commitments were concerned with simply educating fishermen to the nature of the problem between seabirds, turtles and longlines. Many fishermen were aware of the problem, but not how seriously the accidental hookings of sea turtles and seabirds could affect the populations of these animals. Many participants followed through on commitments to hold meetings with fishermen and to develop educational materials including brochures, posters and videos, often in multiple languages for dissemination to several longline fleets.

For example the video *Off the Hook: An Informational Video for Alaska Longliners* was distributed in 2003 and NMFS is currently funding the production and distribution of a Spanish version to be distributed in Latin America. In Hawaii many educational materials were produced in several languages, including a poster on methods to release seabirds and avoid bird capture in longline gear; a booklet on methods to reduce turtle bycatch in pelagic longline gear, a poster and booklet

on side setting for pelagic longliners; and a brochure summarizing the government's protected species program. A tuna longline manual for Pacific Island fishermen was published in mid-2003 by the Secretariat of the Pacific Community (SPC) and includes bycatch issues (such as handling and releasing sea turtles alive) and the importance of completing logbooks. The Fisheries Training Section of SPC also developed a set of plastic cards on the identification of the seven species of sea turtles and posters and laminated cards on releasing sea turtles alive.

IFF2 also inspired folks to continue experimenting with techniques to minimize interactions between longlines, birds and turtles. Australia and New Zealand have taken a lead in conducting research in ways to conceal bait from seabirds as the longline is set, using a setting chute or capsule delivery systems. Additional research has been conducted in Australia on double tori lines used in combination with differently weighted swivels, as well as the use of an acoustic bird-scaring device. New Zealand has also pioneered the use of weighted lines for deep sea or demersal longlines, which has a faster sink rate. Similar progress has been made in other locations such the Southern Ocean longline fisheries and in the Pacific Islands. Mitigation and conservation measures for seabirds and turtles have been introduced into demersal and pelagic longline fisheries, as well as the use of dehookers for releasing hooked animals with the minimum of damage.

A rewarding feature of the outcomes of IFF2 was the collaborative partnerships that developed from this meeting. The novel approaches of colleagues in Australia and New Zealand to minimize seabird interactions with pelagic longlines struck a chord with the Hawaii Longline Association. HLA partnered with the Blue Ocean Institute, the Council, and NMFS to test Australian setting chute designs on Hawaii-based longliners. Although the chutes performed well, this work led to a wholly new method of seabird mitigation, known as side setting, where seabird takes were reduced to almost zero in trials. Moreover, the conversion of longliners from stern to side setting actual has positive operational benefits, which led a significant portion of the Hawaii fleet to voluntarily convert to side setting.

Another excellent example was a fishing industry representative at IFF2 from Ecuador, who was made aware of the plight of the severely depleted Eastern Pacific leatherback turtle population and the threat posed to these animals by coastal longline fishing off the coast

of Central and South America. In Ecuador, there are thousands of these small one and two man longline vessels, and the industry produces employment for tens of thousands of families. Restrictions on fishing gear or on markets would have a major impact in a vulnerable economy. A partnership was developed between the Ecuadorian fishing industry and government, the Western Pacific Council, Inter-American Tropical Tuna Commission and the World Wildlife Fund. A project was developed to test different sized circle hooks in the Ecuadorian small-scale longline fishery. More than 15,000 circle hooks were exchanged for J-hooks and tested throughout 2004 in this fishery. The results of this project were so encouraging that it has developed into a regional program covering most of the Pacific coast of the Americas. Biologists from Colombia, Costa Rica, Guatemala, Panama and Peru have visited Ecuador to observe the program, and how the hook exchanges are implemented and observers are trained. On returning home, they have subsequently launched programs in these countries under the sponsorship of WWF.

There are many similar examples reported of other initiatives to disseminate lessons learned in one longline fishery to other similar fisheries. In New Zealand, a crew member exchange program was established to bring Chilean fishermen to work on New Zealand vessels to gain experience with seabird mitigation techniques. Alaska the NOAA Fisheries office supported the workshop, "Development of Best Practices for the Collection of Longline Data to Facilitate Research and Analysis to Reduce Bycatch." In April this year, fishermen and fishery scientists from the Asia-Pacific Region came to Hawaii to a workshop convened by NMFS to learn more about the use of circle hooks and mackerel-type bait. This in turn has led to a large number of collaborative efforts between the NMFS Pacific Islands Fisheries Science Center and countries such as Panama, Ecuador, Guatemala, Peru, Brazil, Costa Rica, Italy, Korea, Philippines and Spain, to conduct trials with circle hooks and mackerel bait. Further, Japanese and NMFS scientists in Hawaii met to plan and coordinate their respective investigations into the use of circle hooks, deep set longlining to avoid epi-pelagic bycatch and side setting. Such collaboration and coordination will avoid duplication and permit meaningful statistical comparisons between the results from this work.

The results of research and collaborations have been the translation into regulations and protocols to promote environmentally responsible fisheries. My organization,

the Western Pacific Council developed several amendments to our pelagics FMP in 2004, to implement turtle and seabird conservation measures, including circle hooks, mackerel bait, dehookers and side setting. There were concerns that the reopening of the swordfish fishery would lead to a major rise in seabird takes by the Hawaii fishery, however, the take rate of the newly reopened fishery in the first quarter of 2005 was 1% of the historical average in the unconstrained fishery. Elsewhere in the US, seabird avoidance regulations for the groundfish and halibut demersal longline fisheries were revised based on research that showed that paired streamer lines could reduce seabird bycatch by 80% to 100%. In the Southern Ocean, The Incidental Mortality Associated with Fishing (IMAF) working group of the Convention for the Conservation of Antarctic Marine Living Resources (CCAMLR) comprehensively revised conservation measures governing mitigation of seabird bycatch in CCAMLR waters at its meeting in October 2003. The new conservation measures, including revised line weighting procedures, were approved and adopted by CCAMLR in November 2003 and came into force in May 2004 for all 24 member countries. In Australia, the fishing industry took the lead in developing and adopting an Industry Code of Practice, which highlights techniques to avoid interactions and handling to increase survivorship.

These are just some of the examples of the progress that has been made since 2002 and how folks at that meeting have addressed and, most gratifyingly, gone beyond the commitments made at IFF2. Now, let's discuss IFF3 commitments.

Based on our latest count we have 216 participants from 24 countries attending the Third International Fishers Forum. This includes 40 fishermen, along with researchers, members of environmental NGOs, fishery managers, representatives from international organizations and fishing gear manufacturers. As we did at the last Fishers Forum, we are again asking you to write your commitments towards reducing sea turtle and seabird bycatch in your longline fisheries by the Fourth International Fishers Forum.

We hope that this week's meeting will lead to new ideas for ensuring the sustainability of tuna fisheries, including reducing seabird and sea turtle bycatch in longline gear and will result in cooperative work in progress toward our goals.

Mahalo.



Review of the state of bycatch in longline fisheries



APPROACHES TO SOLVING FISHERIES BYCATCH PROBLEMS

MARTIN A. HALL

Inter-American Tropical Tuna Commission

Bycatch problems should be faced like any other scientific challenge: examining the different ways to approach the problem, and generating a program to implement those approaches. Successful examples show us the way. A sequential approach, exploring the different options to mitigate bycatch through the process leading to capture is recommended. The participation of the fishing community is crucial to developing practical and viable solutions. Data collected at sea by observers and subject to a rigorous statistical analysis by scientists are required to verify the effectiveness of the program. An example is developed for the bycatches of sea turtles in longlines. The implementation is based on voluntary participation of the fishers, and on the direct test of the alternative technology in normal fishing operations. Frequent workshops are held to explain the problems and the proposed solutions to the fishing community, and to receive its feedback.

FISHERS EFFORTS

MR. KOUICHI TERAMOTO

Japan Fishers Cooperative Association

My company is located to the south of Yokohama, based out of Misaki seaport. We own seven tuna longline vessels, which fish in the western Pacific Ocean. Japanese tuna fishermen are for the most part family businesses. For instance, in my case, my grandfather was also a tuna longliner. He once told me about catching sea turtle. According to him, Japanese fishermen welcomed the sea turtle and entertained it before returning it to the sea because the sea turtle is a messenger from the ocean. He believed that when he returned a sea turtle safely to the sea, this would result in his having a large catch. If new practices are identified to reduce turtle capture and increase post-release survival prospects of turtles, I'm confident that Japanese fishermen will employ them. Thanks to the government's support, circle hooks have been introduced to the fishery. Last year my vessels were equipped with circle hooks on an experimental basis. Results are not yet available. I have heard that other vessels participating in this experiment have avoided turtle bycatch. Also, we are cooperating in collecting data on bycatch, location of bycatch, and so on. Because sea turtles face a large number of threats, including from pollution and predation of eggs, if these other threats are not addressed, fishers' efforts to reduce bycatch may not be sufficient to save turtles. Because our vessels are operating in the western Pacific Ocean, bycatch of seabirds is not a major problem. I understand that the tori line, developed by Japanese fishermen, is very effective at avoiding bird bycatch. We believe longlining is the form of fishery that is viable in the 21st Century, and we will make further efforts to avoid bycatch.

HAWAII LONGLINE ASSOCIATION INITIATIVES TO REDUCE FISHERIES BYCATCH

LELAND OLDENBURG

Hawaii Longline Association

INTRODUCTION

Hawaii pelagic longline fisheries are faced with strong economic and social incentives to reduce bycatch of sensitive species, including sea turtles and albatrosses. Here we describe the Hawaii longline industry's experiences with alternative approaches to address fisheries bycatch, including cooperative research, litigation, commercial demonstrations, educational materials, industry capacity-building, and contribution to international conferences. Cooperative research has proven an extremely successful approach to reduce seabird bycatch in Hawaii pelagic longline fisheries, and serves as a global model for addressing fisheries bycatch.

THE HAWAII LONGLINE FLEET AND PROMINENT BYCATCH ISSUES

In 2004 there were 125 active Hawaii longline tuna and swordfish vessels, which made 1,338 trips, setting about 32 million hooks. Table 1 summarizes target species catch-per-unit-of-effort for the combined Hawaii longline tuna and swordfish fisheries from 1999-2004. In 2004, the Hawaii longline fisheries landed 18.5 million pounds and generated ex-vessel revenues estimated at \$42.6 million with tuna (*Thunnus* spp.) the dominant components of longline landings.

TABLE 1. HAWAII PELAGIC LONGLINE TUNA AND SWORDFISH FISHERIES CATCH-PER-UNIT-OF-EFFORT (CPUE), NUMBER OF FISH PER 1,000 HOOKS, 1999-2004 (U.S. NATIONAL MARINE FISHERIES SERVICE PACIFIC ISLANDS REGIONAL OFFICE UNPUBLISHED DATA, MARCH 2005).

YEAR	TUNA CPUE	SHARKS CPUE	BILLFISH CPUE	OTHER CPUE ^A
1999	9.21	4.59	3.9	4.8
2000	8.18	3.91	2.88	4.8
2001	8.64	2.1	1.61	4.21
2002	7.48	1.87	0.98	4.27
2003	6.33	2.32	1.77	4.58
2004	6.42	2.34	1.24	5.49

^A Mahimahi, moonfish, oilfish, pomfret, wahoo

The shallow-setting Hawaii longline swordfish fishery results in much higher levels of seabird and sea turtle bycatch than the deep setting longline tuna fleet. The Hawaii longline swordfish fishery was closed for over four years and is now subject to strict management measures, including prescribed use of large circle hooks and fish bait, restricted annual effort, caps on turtle captures, 100% onboard observer coverage, required possession and use of specialized dehooking equipment, and mandatory attendance of an annual protected species workshop by vessel operators and owners, as a result of concerns over turtle interactions. If seasonal limits on turtle interactions are reached, the fishery is closed for the remainder of the calendar year, and if a threshold is exceeded, federal resource management agencies consult to determine if additional restrictions on the fishery are warranted. Furthermore, the Hawaii longline swordfish and tuna fleets are each authorized to annually take, through injury or mortality, one federally listed endangered Short-tailed Albatross. If more than one Short-tailed Albatross is observed to interact with gear of the Hawaii longline tuna or swordfish fleet in a single year, resource management agencies consult to determine if the fleet should be required to employ additional seabird avoidance measures. Fewer than 100 Laysan and Black-footed albatrosses are now annually captured by the fleet. This is down from thousands of albatrosses being captured each year, before the fleet was required to employ seabird avoidance methods and restrictions on swordfish fishing effort were in place. The fleet has not had any observed captures of a Short-tailed Albatross. Since June 2001 management authorities have required the Hawaii longline tuna and swordfish fisheries to employ a number of measures intended to reduce seabird bycatch, including weighted branch lines, thawed and dyed bait, offal discards, and night setting in certain geographical areas for certain components of the Hawaii longline fleet. The Hawaii seabird regulations are being revised this year to allow the fleet to employ an extremely effective and commercially beneficial seabird avoidance method called side setting. Interactions between the Hawaii longline fleet and False Killer Whales is another issue that has received recent attention. While there have been claims that this is causing population-level effects, in reality, there is very little understanding of the status and trends of False Killer Whale populations or the consequence of interactions with longline gear.

COLLABORATIVE RESEARCH AND COMMERCIAL DEMONSTRATIONS TO REDUCE BYCATCH

Between 1999 and 2003, the Hawaii Longline Association collaborated with fishery management authorities and an environmental organization to conduct three research experiments and commercial demonstrations of various strategies (blue-dyed bait, towed buoy, offal discards, streamer line, underwater setting chute, and side setting) to reduce seabird bycatch in longline gear. We have determined that several seabird bycatch avoidance methods are capable of nearly eliminating bird captures in pelagic longline fisheries when effectively employed. Our industry-lead experiments have focused on identifying the most effective seabird bycatch reduction methods that are also economically viable and practical. Fishery management authorities are now amending regulations on measures for the Hawaii longline fleet to reduce seabird bycatch based on results from the most recent research.

Longline fishers are some of the most qualified people to develop and improve seabird bycatch mitigation techniques. Longline fishermen have a large repository of knowledge and information related to bycatch, which can be tapped to contribute to finding effective and practical solutions. This has been demonstrated by the successful collaborative research initiatives in Hawaii and elsewhere. Mitigation methods that effectively avoid seabirds, do not reduce fishing efficiency, or better yet, increase fishing efficiency and provide operational benefits, have the highest chance of being accepted by industry. The longline association became an active participant to address seabird bycatch problems by instituting and participating in research and commercial demonstrations and supporting adoption of regulations based on best available science before restrictions, embargos, and possible closures were imposed on the fleet. This bottom-up approach fostered a sense of industry ownership for effective seabird mitigation methods, and resulted in high compliance with resulting rules requiring use of seabird avoidance methods. By being directly involved in the development and testing of seabird avoidance methods, Hawaii longline fishers developed a sense of ownership for these tools and now support their required use.

LITIGATION

Over the past five years, there have been numerous lawsuits filed against the U.S. National Marine Fisheries Service by environmental non-governmental organizations and the Hawaii Longline Association generally over the bycatch of sea turtles, seabirds, and whales by the Hawaii longline fisheries. There have been a number of positive results from the litigation, but overall this has not been a wise long-term approach or efficient use of money, time, or energy to address fisheries bycatch.

There was little attention paid to reduce bycatch of sea turtles in the Hawaii longline fisheries since the fisheries inception until the litigation began in 1999, aimed to close the fisheries, brought about substantial improvements involving changes in fishing gear, fishing practices, and methods to handle and release caught turtles. Turtle bycatch levels are now much lower than in the past, and turtles are being released with less injury and higher chance of survival.

Another positive result of the litigation was increased cohesiveness of Hawaii Longline Association members. The three main ethnic groups comprising the fishery came together to counter efforts to eliminate their source of livelihood and denigrate the reputation of the Hawaii longline fisheries. The industry is now in a much better position to represent their interests.

However, even after substantial improvements were adopted by fishery management authorities and the longline industry, the litigation continued, as some environmental groups continued to pursue their goal of permanently closing the fishery. The result was that the fishers became bitter, were much less receptive to collaborating with outside groups, and lost the drive to pursue voluntary initiatives to innovate new bycatch solutions, which might also be exportable to longline fleets internationally. Other environmental groups with a goal of reducing fisheries bycatch and reducing a source of turtle mortality by working with fishers had a much more difficult time gaining industry's trust to work with them as a result of the actions of the groups that were working to close the fishery. Groups that wanted to pursue collaborative work with the Hawaii longline fleet to make the Hawaii fleet a model fishery, and to export identified solutions internationally, were frustrated by the misplaced efforts to close the Hawaii fisheries.

The efforts to close the Hawaii fleet may have actually increased turtle and bird mortality. During a four-year closure of the Hawaii longline swordfish fishery due to concerns over bycatch of sea turtles, swordfish supply to the U.S. marketplace traditionally met by the Hawaii fleet was replaced by imports from foreign longline fleets, including from Mexico, Panama, Costa Rica, and South Africa, which have substantially higher ratios of sea turtle captures to unit weight of swordfish catch and less stringent or no measures to manage seabird bycatch.

The Hawaii Longline Association spent over U.S. \$1.6 million and enumerable staff hours over the past five years as a result of involvement in this litigation. If this money, plus the funds spent by the U.S. Government and environmental groups on the litigation, had instead been used to conduct research to find effective and commercially viable solutions in the Hawaii fleet and abroad, this might have saved many more turtles' lives.

In the Hawaii longline fisheries, collaborative, industry-lead research has resulted in substantially more progress towards identifying effective and practical solutions to seabird bycatch than litigation has at identifying solutions to turtle bycatch. Furthermore, the collaborative research cost an order of magnitude less than that spent on lawsuits.

ECONOMIC VIABILITY, PRACTICALITY, AND ENFORCEABILITY CONSIDERATIONS IN DESIGNS OF COOPERATIVE RESEARCH

The research experiments on techniques to reduce seabird bycatch in the Hawaii longline fisheries provide an example of how research can be designed to collect information on economic viability, practicality, and enforceability. Analyzing differences in alternative seabird avoidance methods' effect on bait retention, hook setting rates, and target fish catch-per-unit-of-effort; operational benefits and costs; time and money to adopt and employ; and enforceability is of high interest to industry, fishery management authorities, and other stakeholders.

Given the political context and management frameworks of the majority of the worlds' longline fisheries, there is a need to focus on the commercial viability of bycatch reduction methods in order to catalyze changes in fishing methods and gear and regulatory measures that will reduce longline bycatch. To resolve global fisheries bycatch problems, there is a need to

identify and institute the broad use of methods that not only have the capacity to minimize bycatch of sensitive species, but which are also practical and convenient and provide crew with incentives to employ them consistently and effectively. It is critical to account for economic and social values of longline fisheries to achieve changes that reduce bycatch.

For instance, as the loss of bait to seabirds and concomitant reduction in catch of fish can be significant, the use of seabird avoidance measures is expected to be cost saving for longline fisheries. However, most longline fleets do not employ effective seabird avoidance methods despite the availability of effective methods that also increase fishing efficiency (Brothers et al. 1999a; Gilman 2001; FAO 2003). Reasons for this may be (1) low industry awareness of the availability, effectiveness, and practicability of these seabird avoidance methods; (2) few national fishery management authorities manage interactions between seabirds and longline vessels or require employment of effective seabird avoidance methods (Brothers et al. 1999a; BirdLife International 2003; FAO 2003; Gilman and Freifeld 2003); and (3) lack of a sufficiently strong economic incentive for industry to change long-standing fishing practices. Recognizing that this context of global longline fisheries applies to many global commercial marine fisheries, maximizing industry's sense of ownership for using effective bycatch avoidance measures and providing industry with incentives for voluntary compliance are needed. Commercial fishing industries responds best to economic incentives and disincentives (Gilman et al. 2002). Bycatch mitigation methods that increase fishing efficiency and have operational benefits have the best chance of being accepted by industry. Eco-labeling and certification programs can also provide industry with strong market-based and social incentives to meet criteria to be certified as a sustainable fishery, including the employment of effective bycatch reduction methods, but requires adequate marketing of the label to make it economically viable for industry to participate (Gilman et al. 2002). Additionally, if regulations requiring the use of bycatch avoidance methods are effectively enforced and carry sufficient economic consequences for noncompliance, broad industry compliance can be achieved.

OUTREACH, CAPACITY BUILDING, AND DISSEMINATING LESSONS LEARNED

The Hawaii longline association, in partnership with fishery management authorities and environmental

conservation groups, has produced a number of educational materials on methods to reduce fisheries bycatch. These include a poster and pamphlet on side setting to reduce seabird bycatch, a poster on best practices to handle and release incidentally caught seabirds in longline gear and methods to reduce seabird capture, and a booklet on methods to reduce sea turtle bycatch in pelagic longline gear and practices to handle and release captured turtles. We produced these educational materials in several language lots to enable the various ethnic groups in our fleet, and longline fisheries abroad, to access the information. The Hawaii Longline Association is also able to disseminate lessons learned from research experiments and commercial demonstrations and learn from other fisheries bycatch research through participation in and providing financial support for conferences such as the International Fishers Forum series.

The Hawaii Longline Association is working with management authorities and an environmental organization to initiate a dockside-training program for longline vessels to convert deck designs from conventional setting position from the stern to the side of the vessel to reduce seabird bycatch. Deck conversion will require considering the deck position for setting; selection of main line shooter hinges and hydraulics, line pullers, motor and mounting plate design for starboard setting; and design, construction, and installation of a bird curtain. Technical assistance will also be available to captains and crew on best fishing practices for setting from the new position, including timing for clipping branch lines to the main line, and practices for baited hook throwing.

Because most bycatch species are highly migratory, which frequently move in and between national jurisdictions and interact with longline vessels on the high seas, international collaboration is necessary to effectively address fisheries bycatch problems. As a global and multinational problem, the solution to seabird and sea turtle mortality in longline fisheries will require international collaboration by management authorities, industry, and other stakeholders to share technical and financial resources to augment capacity. These education and outreach programs are an investment to bring about changes in behavior and attitudes by having a better informed industry of prescribed fisheries bycatch avoidance methods, and in some cases operational benefits from employing these techniques. Showcasing the results of industry-lead research to reduce fisheries bycatch also has the benefit of broadly

disseminating the results so that the effective methodology can be replicated in other fleets worldwide and ineffective components can be improved.

CONCLUSIONS

In Hawaii and elsewhere, we have seen that fishers are some of the most qualified people to develop and improve bycatch avoidance strategies. Fishers have a large repository of knowledge and information related to bycatch, which can be tapped to contribute to finding effective and practical solutions. Mitigation methods that effectively avoid bycatch, do not reduce fishing efficiency, or better yet, increase fishing efficiency and provide operational benefits, have the highest chance of being accepted by industry. Fishers and fishery associations need to become active participants to address bycatch problems by participating in research and commercial demonstrations, implementing best practices, and supporting adoption of regulations based on best available science before restrictions, embargos, and possible closures are imposed on them.

Fishers are among the most qualified people to innovate mitigation methods, and should be encouraged to develop and test bycatch avoidance methods. In this way, industry develops a sense of ownership for these tools and supports their required use. Collaboration by fishing industry, government, and environmental organizations is the most effective approach to reduce fisheries bycatch, and can be accomplished with strong and enlightened leadership, and willingness to put differences aside to work towards a common goal.

While the effectiveness of this approach to address fisheries bycatch is broadly recognized, there has been much too small an amount of funding allocated for cooperative research and commercial demonstrations to find solutions to sea turtle, seabird, and other bycatch problems in longline gear. In the U.S., this is a result of the government's fear of being sued if they propose to conduct or fund experiments in U.S. fisheries that result in injury to protected resources, even though these experiments will potentially result in substantial reductions in mortality of these species when best practices are identified and spread to multiple fisheries. Some U.S. fishery management authorities are funding experiments to test technical measures to reduce sea turtle bycatch in longline fisheries abroad, in part, to avoid problems with trying to receive permits and risk being sued by conducting the

research in domestic fisheries, but too little research is being supported, there is no coordination and efforts are duplicative, and solutions found abroad may not be relevant to domestic fisheries. The amount of research being conducted is too small, research needs to occur at home to find solutions that we can have confidence will work in our fisheries, and the agencies designing the experiments need to do more to tap into fishers' knowledge to identify new promising strategies.

FISHERS EFFORTS

MR. WANG SHUU-LUNG

Director General, Taiwanese Fishers Association

I will describe the efforts made by Taiwanese fishers to reduce bycatch, with a focus on activities conducted by fishers of Taiwan's far seas tuna fleet. The target species are bluefin, yellowfin, albacore and bigeye tuna and sharks.

The Taiwanese fisheries have no shark bycatch. We do not discard any part of the shark, we use non-marketable parts for bait, so there is no waste. Shark meat is used for paste, bowls and smoked to be eaten. The skins are processed to make leather products. Bones are processed to make health supplements. Sharks are highly valued in Taiwan.

We have strong religious beliefs in worshipping sea turtles. Taiwanese fishers believe in Buddhism where turtles are a symbol of god and longevity of life. When a sea turtle is incidentally caught, we avoid further fishing in that area to avoid catching additional turtles. Once caught, we try to release the turtles in good condition. Taiwanese vessels operating in the Pacific are now using circle hooks. This will help reduce any turtle captures, which are few to begin with as a result of the deep depth that we set our hooks, below 200 m.

Incidental catch of sea turtles and seabirds is very limited in Taiwanese fisheries. About 80 percent of the fleet fishes at latitudes where there are no seabirds, with only 20 percent of our operations conducted in higher latitudes where seabirds of concern range. We conduct night setting and haul at dawn to reduce seabird interactions. We also thaw the bait, use weights on branch lines to increase the baited hook sink rate, and vessels targeting bluefin tuna are required by the government to use tori lines to deter bird interactions. We also throw baits away from the setting area to attract seabirds to areas away from where hooks are

being set. We also have educational materials to help raise fishermen's awareness of how to avoid seabird bycatch.

MR. MIGUEL CUENTAS

Peru fisher

I am a Peruvian fisher and an observer for the Ecuadorian circle hook project.

I work in the main seaport of Peru, called Ilo. Fishing is the second main economic activity for Peru. Artisanal fisheries in Peru are spread out along the entire coast. The fishery contains about 6,000 artisanal boats and employs about 28,000 fishermen. Artisanal fishing methods used are longlines and gillnets. Diving is also an economic activity. All of these are coastal fisheries. Vessels will travel a maximum of 700 miles from port. The most active longline fishery in Peru is based out of the seaport of Ilo. It's located very close to the border with Chile. Ilo is home to as many as 200 longline vessels in the summer, with 50 boats based here year-round. There are two fishing seasons. Here is a summer mahimahi season, which is when most of the longline vessels are working. The mahi season is from December to February. For the rest of the year, the fleet targets blue and mako sharks. Longlines extend approximately 22 miles and contain between 700 to 2,000 hooks. The gear configuration changes by target species. The majority of the fleet uses J-hooks. Fishing trips last two to three weeks during the winter season. During the summer mahimahi season, trips last about five days.

The main bycatch species of concern in this fishery are sea turtles. There are few interactions with seabirds or marine mammals. Loggerhead sea turtles are the most common in this fishery. The fleet also interacts with green and leatherback turtles. Legislation prohibits the capture of turtles, marine mammals and seabirds. There is also legislation establishing a minimum size limit for sharks. While shark fins are sold separately, the entire shark body is used.

The fishery is working with nongovernmental organizations to estimate levels of bycatch and to reduce bycatch. I have observers on my boats to monitor bycatch. Our vessels use dehookers. My boat is now using circle hooks as part of a research experiment. I have also helped deploy satellite tags on loggerheads through a project with nongovernmental organizations. The circle hook experiment is still in an early

stage in Peru. There are now eight vessels currently using these hooks. Most of the boats from Ilo are trying circle hooks. This is a good first step. The vessels want to determine the commercial viability of circle hooks to determine how well they catch target species, if they are difficult to use to put on bait, and what modifications they will need to make to their gear to use circle hooks. Having fishermen who are trying or have tried circle hooks can share their experiences with other fishermen in from their seaport in Peru to spread information about this technology. This is a good approach as the fishermen will be more receptive to information coming from another fisherman than information coming from non-fishermen.

MR. YEON JIB CHU

Korean fisher

I will describe the Korean tuna industry's efforts to reduce bycatch. Currently, Korean tuna fishers have seven purse seiners and 193 longliners mostly operating in the Pacific Ocean. Several of our longline vessels operate in the Pacific Ocean and the Indian Ocean and to some extent in the Atlantic Ocean, depending on the condition of the different fishing grounds. The major target species of the longline and purse seine fleets are skipjack, yellowfin and bigeye tuna.

In 2004 Korea had only 28 active purse seiners and 182 active longliners. Longline fisheries in 2004 caught 53,667 tons of fish comprised primarily of bigeye, yellowfin, and albacore tuna. The tuna purse seine fisheries caught 108,285 tons of skipjack, yellowfin and bigeye tuna. In 2004 Korea's total tuna exports were 101,377 tons, a 16 percent decrease from 102,280 tons in 2003.

Participants of the World Tuna Longline Fishery Conference held in Tokyo in August 2003, which included representatives from fisheries of Korea, Japan, Indonesia, and China, took joint action to promote responsible fishing. In April 2004 the Korea Fishery Association, through a project sponsored by the Ministry of Fisheries of the Korean Government, made a Korean version of a pamphlet on bycatch by longline fisheries and distributed the pamphlets to the tuna longliners. The pamphlet recommends that tuna fishers use a tori pole to reduce seabird bycatch and includes information to identify albatrosses and giant petrels of the Southern Ocean. The pamphlet also includes information on sea turtle species identification, and best practices to safely release caught sea turtles.

Korean established an observer program in 2004. We are collecting baseline information on catch rates of target and bycatch species, as well as monitoring compliance with conservation measures of regional fishery management organizations. We are also conducting a two month test in the Pacific Ocean on longline vessels of circle hooks versus J-hooks, mackerel versus squid bait, and blue-dyed bait to assess the effectiveness at reducing turtle and seabird bycatch. Three tuna longliners and one tuna purse seiner were monitored in the Pacific and Indian Oceans for about 50 days, from July through September in 2004 and 2005, respectively. Results showed changes in areas and species fished.

Korea welcomes any management measures to address conservation concerns and is interested in working with the international and regional fisheries management organizations to develop practical measures to minimize the incidental catch of sea turtles and seabirds.

MR. GUILLERMO MORAN

Ecuador Fisher, Technical Director,
Association de Exportadores de Pesca Blanca

I will provide information on Ecuador's longline fishing industry efforts to reduce bycatch. The work I am to describe is the result of efforts of a large team of people, several of whom are able to attend this conference. In addition to being a fishermen, I am a teacher at a fisher's school. Ecuadorian fishers are very aware and very sensitive to incidental catch issues, and they've been participating in programs, such as a program to reduce dolphin incidental mortality in the tuna fishery, programs to reduce sea turtle bycatch in shrimp fisheries.

In the case of reducing sea turtle bycatch in Ecuador's pelagic longline fisheries, the fishing industry became aware of initiatives to reduce bycatch at the Second International Fishers Forum held in Honolulu. Through the Ecuador government and the Inter-American Tropical Tuna Commission, industry promoted the development of these initiatives. The key to this cooperation is the very close work of the different sectors of the industry to an industrial processor or exporter sector, together, with the people doing the actual fish work in the field that has translated in the activities of the program. The process of industry adopting measures to reduce sea turtle bycatch is still in an early stage, but the Industrial Secretary of Exporters is committed to making this successful.

With regards to the industrial longliners, the foundation for consideration of tuna has also been crucial in the handling of incidental mortality issues. For the longliners, they are also interested in addressing bycatch of seabirds and sharks. With regards to seabirds, although we don't believe that it's a significant bycatch problem in our fleets, we are prepared to adopt measures to reduce seabird bycatch as recommended by a forum such as this conference. In the case of sharks, the different sectors of the fishing industry have been working to develop an Ecuador National Plan of Action for the conservation of sharks. Through all these activities and the utilization of resources, they are working on achieving the sustainability of marine resources. It is a big challenge to work with the fishing industry to solve the problems as is being done in Ecuador. We continue to be open to any initiatives of international organizations with regard to the sustainable use of resources for the well-being of the fishermen and the marine ecosystems.

MR. AUGUSTO NATIVIDAD

Vice President, Bell Fishing, Philippines;
Philippine International Tuna Longline Association;
Director, OPRT Philippines

I will present the Philippines efforts to address IUU fisheries and bycatch, and broad contributions for creating responsible fisheries. I am vice-president of Bell Fishing, a Philippine-based deep sea fishing company involved both in purse seine and longlining. I am also President of PNG, another deep sea fishing company involved in purse seine fishing and owner of a tuna cannery in Papua New Guinea. I'm an officer of the Philippine International Tuna Longline Association and a Director of OPRT Philippines. OPRT Philippines is not a branch of the international OPRT. It is a different entity, but it is through OPRT Philippines that the Philippines is participating in the international OPRT. I am also the vice-chairman for the Philippine Tuna Council.

Through the representation of OPRT Philippines, the Philippine Fisheries Agency has adopted the OPRT Positive List scheme. As a result any attempt to register longline vessels outside of this list has been effectively blocked off. We have also taken measures to prohibit the export from the Philippines of any catch from vessels not listed on the OPRT Positive List. Among the requirements that an exporter needs in order to be able to export tuna from the Philippines are: (i) A Custom Export Declaration and Export Permit. The Export Permit must identify the source of the fish. All sashimi

fish must have Bigeye Tuna and Swordfish Statistical Documents. All bigeye tuna and swordfish caught by purse seine must also have the Statistical Documents. The bigeye tuna and swordfish Statistical Documents identify the name of the vessel from where the fish are caught, area where the fish was caught, date the fish was caught, and must have the Government of BFAR validation. (ii) An OPRT certificate, which certifies that the fish is a proper Philippine tuna product. OPRT issues this only to exporters that declare their participation in the Responsible Tuna Fisheries Program of OPRT. Through the above certification procedure, which is required by our buyers in Japan, our government and OPRT Philippines, working in close coordination with each other, we are effectively ensuring that all tuna exports from the Philippines are caught within the guidelines of responsible fisheries.

Philippine fishermen consider all catch has value and a use, and there is no such thing as bycatch in our fisheries. All marine products are properly utilized. Catch of any kind is never discarded into the sea. There is no Philippine law addressing fisheries bycatch. However, we have a Fisheries Administrative Order prohibiting the capture of whale shark and manta ray, as well as the Department of Environment and Natural Resources Administrative Order prohibiting capture of endangered species, which includes sea turtles.

Our longline fleet consists of 19 boats operating mainly in the Indian Ocean, with some effort in the Pacific. Our bycatch of seabirds, sharks, and sea turtles is close to zero. In the past our crew removed shark fins and discarded the remainder of the body. But following responsible fishery practices, the whole shark is now frozen and landed.

The Philippines is a member of IOTC and ICCAT. Very recently our government also ratified the Western Central Pacific Fisheries treaty. We are also cooperating and conducting party to the CCSBT. As a member of these regional fishery organizations, we are committed to adhere to the decisions and to adopt compatible conservation and management measures. The Philippine tuna industry, together with the government, has established the Philippine Tuna Council. It is composed of governmental agencies that deal with foreign affairs and fisheries and of private sector representatives of the different tuna industries. The Council provides guidance in establishing tuna policy for the Philippines. OPRT Philippines is an active member of this Council and an active member of OPRT Japan. In conclusion, the

Philippines is accepting the responsibilities of and shall continue to play its role as a responsible fishing nation. Likewise, despite our negligible catch of seabirds and turtles, we are committed to continue participating in the International Fishers Forum series to reduce sea turtle and seabird bycatch. We shall continue to prevent this as much as possible, and we shall continue with more effort in our awareness campaign not only among our commercial fishermen but now also our coastal fishers.

REVIEW OF THE STATE OF BYCATCH IN LONGLINE FISHERIES AND INDONESIAN FISHER'S EFFORTS

R.P. POERNOMO

Chair, Indonesian Tuna Association

THE INDONESIA TUNA LONGLINE INDUSTRY

The development of a tuna industry in Indonesia started in 1975 with four state enterprises operating 18 longline vessels as pioneers. Within three decades the tuna longline fleet has rapidly grown. In 2005 there were more than 1600 vessels varying from less than 30 GT to greater than 300 GT operating in Indonesian waters and its EEZ.

Of these 1600 vessels, 474 vessels are members of the Indonesia Tuna Association (ASTUIN), of which only 13 are registered as members of the Organization for the Promotion of Responsible Tuna Fisheries (OPRT).

The tuna fleet fishes at grounds in the Indian Ocean, Sulawesi Sea, Banda Sea, Maluku Sea and Pacific Ocean. Large longline vessels are only permitted to operate in the Indonesian EEZ, outside of coastal waters.

Tuna caught by longline vessels is primarily exported fresh and frozen to Japan. Based on the data from Japan Trade Statistics, the export of fresh and frozen tuna and marlin from Indonesia to Japan in 2003 was 14,326 tons and 6,865 tons, respectively. The principle species caught by the industrial longline fleet are bigeye, yellowfin, albacore, and marlin. Artisanal fisheries catch many of the same species using handlines or troll lines.

MANAGEMENT AND CONSERVATION MEASURES

In response to concerns over the sustainability of fishery resources, the Indonesian government has

developed environmental policies to achieve sustainable use. A number of measures were adopted to regulate the use of certain fishing gears and grounds, to discourage fishing effort in highly exploited areas, and to reduce the catch of non-target species. In compliance with UNCLOS, its Compliance Agreement and Implementation Agreement (UNIA), Indonesia is going to join the IOTC. To address bycatch issues, through cooperation with the National Marine Fisheries Department, the USA introduced Turtle Excluder Devices (TEDs) to our trawl fishery. The government also launched a program to conserve turtles through the restocking of offspring and through the regulation of the harvesting of turtle eggs.

INTERACTION BETWEEN TURTLES AND LONGLINE GEAR

Located between the Pacific and Indian Oceans, Indonesia is a migration corridor for several important marine species, some of which are protected by international law. There is little information available on interactions between sea turtles and longline vessels.

Most of the Indonesian tuna longline fleet operates in the Indian Ocean. Compared with the Pacific Ocean the possibility of interactions with leatherback and loggerhead turtles is small. Six species of marine turtles are found in Indonesia: *Celonia midas*, *Dermochelys coreacea*, *Eretmochelys imbricata*, *Lepidochelys alivaceae*, *Carreta carreta* and *Natator depressus*.

The decline of turtle populations is not solely due to interaction with fisheries. The tuna longline fishery, in particular, is likely a small source of turtle mortality. Other anthropogenic mortality sources, including human activities in coastal areas that degrade turtle nesting sites, local communities consuming turtle eggs and meat, and use of turtle carapaces to make handi-crafts, are likely larger mortality sources.

EFFORT TO MINIMIZE TURTLE CAPTURE

To address the issue of interactions between sea turtles and the longline fishery, the government, in cooperation with the World Wildlife Fund (WWF), USAID, UNEP, and the Blue Ocean Institute, recently published a booklet concerning methods to minimize the incidental catch of turtles in longline fisheries. In cooperation with WWF, the Indonesian government developed several new programs in the Fisheries

Department, including establishment of an observer program, trial of new fishing gear to reduce bycatch, and sharing catch and bycatch data. A public consultation was held recently in Bali, organized jointly by the government and WWF. Longline fishermen, government officials, universities and NGO's attended.

Based on information from fishermen, there is no record of turtles being captured in Indonesian longline operations. If any turtles are caught, the numbers are few, as is also the case for the bycatch of seabirds and sharks. The main line of our longline gear is set to a depth of between 80-300 m while turtles are found at shallower depths, from 0-120 m. This explains why our fleet catches few turtles. Based on observer data from four vessels, which just returned from fishing trips, only one vessel caught one turtle during their 130-day-long trip with 80 sets.

On May 23, 2002 the Indonesia Tuna Association (ASTUIN) joined OPRT. We are working closely together to develop responsible tuna fisheries to ensure the sustainable use of tuna resources through eliminating IUU tuna fishing, FOC, regulating fishing capacity and reducing by-catch.

The issue on the incidental catch of turtle and seabird has been addressed in the Joint Declaration declared by tuna longline industry nations, including from Indonesia, at the World Tuna Longline Fishery Conference in Tokyo, August 2003. Through this declaration, member countries will work together to conduct research and use available tools to minimize interaction with bycatch species and report the result of these activities to relevant international organizations.

We have translated pamphlets produced by OPRT on seabird, turtle and shark bycatch into Indonesian and distributed them among our members. We appreciate OPRT's effort to date to introduce modified technology that could reduce interactions between longline gear and turtles and seabirds, such as circle hooks and the tori line. We do not use a tori line because so far Indonesian vessels do not catch seabirds. This might be a result of the type of bait used in our fishery: We mainly use milkfish and scad, and not squid for bait.

The Indonesian fleet has yet to adopt the use of circle hooks. We are awaiting results of research on the efficacy of these hooks at reducing leatherback sea turtle bycatch and effect on tuna capture rates.

FISHERS EFFORTS – INFORMATION ON BY-CATCH OF SEA TURTLES AND SEA BIRDS BY CHINESE TUNA FISHING COMPANIES AND THEIR PRECAUTION MEASURES

MS. ZHANG XIAO LI

Chinese Fisheries Companies Association

At present China has 293 tuna fishing vessels, including 113 deep-freezing vessels, 172 ice fresh and deep frozen vessels and 8 purse seiners.

According to information from the fishing companies, the length of the main line of Chinese long line tuna vessels is 130~150 km, while the length of branch lines varies from ocean to ocean. The length of branch lines are 30~35 meters, 50 meters and 35~40 meters long in the Indian Ocean, the Atlantic Ocean and the Pacific Ocean respectively with 2800~3200 hooks on each set. Bycatch of sea turtles and seabirds may happen in the longline fisheries. There has been no record of seabird or sea turtle bycatch on high seas vessels in the past two years. Turtle and seabird bycatch does occur on vessels fishing within 50 nautical miles from shore. According to our statistics, 3~5 for sea turtles and 10~20 seabirds are caught annually. Bycatch may occur on vessels from other countries licensed to fish within 50 nautical miles of shore.

Reasons for this low bycatch include:

1. The fishing grounds where Chinese fishing vessels operate are far from sea turtle habitat;
2. According to Chinese culture and tradition, the sea turtle is the symbol of long life and is believed to be a supernatural being. It is a cultural norm to not harm or injure sea turtles. Chinese fishers will purposely fish far from areas where turtles are present; and
3. Hooks are set deeper than 150 meters, while sea turtle are present abundant at shallower depths.

In an effort to conserve marine living resources, the Chinese government established the Department for Wild Aquatic Animals Conservation. The Chinese government has actively participated in international initiatives to achieve sustainable tuna fisheries. The Distant Water Fisheries Branch of the China Fisheries Association has undertaken the following measures to prevent sea turtle and seabird bycatch:

1. Strengthen data collection and monitoring to get information on bycatch.
2. Educate tuna fishermen to avoid operating in areas where turtles aggregate.
3. Instruct fishermen about laws on sea turtles and seabirds of other countries. Materials and information on how to handle and release sea turtles and seabirds, if caught, are distributed to fishermen. Due to this training, bycatch in the last two years has been reduced substantially. Even if bycatch occurs, the sea turtles and seabirds can be handled and released in accordance with best practices.
4. Strengthen research and innovation of new fishing gear and methods to avoid bycatch. Japan is promoting the use of circle hooks to reduce by-catch of sea turtles. We wish that Chinese fishing gear manufacturing companies could produce these hooks to allow Chinese tuna fishing companies to replace their hooks with these new turtle-safe ones as soon as possible.

With these great efforts, bycatch has been substantially reduced. We will continue efforts to encourage tuna fishermen to protect sea turtles and seabirds. In addition, we are eager to receive information on methods to avoid bycatch from other countries, so that Chinese fishing companies can further protect sea turtles and seabirds more effectively in accordance with international standards.

FISHERS EFFORTS – MANAGEMENT MEASURES ON FISHERIES

WAWAN KOSWARA

ASEAN Fisheries Federation (AFF)

BACKGROUND

A campaign, which started on August 2002, appears to be underway in the United States by protectionist groups whose objective is to generate public concern over the rapid worldwide depletion of stocks of large ocean fish species such as tuna. The campaign aims to raise public concern over the impacts of pelagic long-line and gillnet fishing on the alleged endangered Pacific leatherback sea turtle. Their strategy is making appeals at various international fora and mass media.

Involving the UN is one of the strategies. Such undertaking was previously successful with the global moratorium of drift net fishing through a UN resolution. Environmental NGOs intend to apply the same strategy to other fishing methods, including long-line and gillnet fishing. The campaign began several years ago by the “Ocean Wildlife Campaign” which has been promoted by leading international environmental NGOs, including WWF.

The Global Response and Sea Turtle Restoration Project organized international letter-writing campaigns to deliver letters to the UN Secretary General. They asserted that gillnet and long-line fisheries are wasteful and harm and kill millions of non-targeted (by catch) animals each year, causing unsustainable mortality of sea turtles, seabirds, swordfish and sharks. Among the marine species most threatened by long-line and gillnetting is the Pacific leatherback turtle.

Fishery scientists all over the world do not accept the claims of the campaign and recognize that there are serious flaws in the claims. The campaign is deliberately misleading the public. The campaign ignores efforts of the international fisheries community, including scientists, administrators and fishermen, to conserve fish stocks and protect the marine environment. Furthermore, the campaign unreasonably denies, the principles of sustainable use agreed to by UN member countries, which is reflected in the UN-FAO Code of Conduct for Responsible Fisheries adopted by all FAO member nations, as well as International Plans of Action to tackle many of the issues confronting nations striving to achieve sustainable fisheries management.

Tunas are highly migratory fish species traveling thousand of miles each year through economic zones of coastal states and across the high seas. With respect to the management of highly migratory species, the UNCLOS called on states to cooperate directly or through appropriate international organizations to enable the conservation and optimum use of these species, both within and beyond the EEZ.

It is important to note that almost all pelagic fish as well as fishing methods are subject to international management regimes that include virtually all fishing nations, the best fisheries scientists, and important stakeholders such as fishermen and environmental groups.

Internationally, there are currently four regional fisheries management organizations covering the world's

four main oceans, with specific management measures for each area, namely ICCAT (International Commission for the Conservation of Atlantic Tunas), IATTC (Inter-American Tropical Tuna Commission), CCSBT (Commission for the Conservation of Southern Blue fin Tuna), and IOTC (Indian Ocean Tuna Commission). There will be a new regional fishery management organization in the Western and Central Pacific, called the Multi High Level Convention for the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific.

Conservation and management of fish and other marine resources should be dealt with by UN-FAO, Regional Fisheries Management Organizations and government fisheries management authorities that have the technical capacity to ensure that sound, scientifically based, fair and reasonable decisions on fisheries management are made.

The ASEAN Fisheries Federation consists of eight member countries and an aquaculture society: Brunei Darussalam, Indonesia, Malaysia, Myanmar, Philippines, Singapore, Thailand, Vietnam and the ASEAN Aquaculture Federation. Of the eight member countries, only Indonesia, Malaysia and the Philippines conduct tuna longlining. Indonesia and the Philippines have been OPRT members since 2002.

TUNA LONGLINING

Longlining is a passive and selective fishing method, and as such is environmentally responsible. Longlines are more selective than trawl, gillnet and purse seine fisheries. Tuna longlines do not touch the seabed and so do not damage habitat.

Pelagic longlining uses baited hooks hanging from a long drifting mainline to attract and catch fish. Longlines with baited hooks and floats are usually laid out (“set”) and pulled back (“hauled”) once within a 24 hour period. The shape of a longline, the number of hooks, the distance between floats, and the bait used will vary depending on the target species and the skipper’s judgment. Pelagic longlines use a large number of hooks spread over a wide area to specifically target tuna and related species.

SEA TURTLE SPECIES

- Six of the world’s seven species of marine turtle occur in Indonesia: Hawksbill (*Eretmochelys imbricata*),

Olive Ridley (*Lepidochelys olivaceae*), Leatherback (*Dermodochelys coriacea*), Green (*Chelonia mydas*), Loggerhead (*Caretta caretta*), and Flatback (*Natator depressus*). The most abundant species in Indonesia are the green, hawksbill and loggerhead. Green turtles are caught by fishermen.

- Observation from 2000 to 2004 of 120 tuna longline sets found no sea turtles were captured. Some seabirds were captured.

PROPOSED COUNTER MEASURE

The AFF appeals to the 25th Meeting of ASEAN Ministers on Agriculture and Forestry to develop an ASEAN position to strongly oppose efforts to institute a moratorium on longline fishing. The responsibility for conservation and management of marine resources, including fish, should be dealt with by UN-FAO, Regional Fisheries Management Organizations under UN-FAO and national fisheries management authorities. We also request that ASEAN seek clarification from the UN Secretary General on this issue.

FISHERS EFFORTS

MR. DAVID KREUTZ

Extension Officer, Seaset, Australia

Australia has two pelagic longline fisheries: the Eastern Tuna and Billfish Fishery, with 107 boats fishing from Cape York in Queensland down around Tasmania; and the Western Tuna and Billfish Fishery, with seven boats fishing in the Southern Ocean and the West Coast of Australia. Major target species are yellowfin tuna, bigeye tuna, broadbill swordfish, and seasonally, southern bluefin tuna and striped marlin. These fisheries catch around 7,000 and 1,200 tons a year of target and byproduct species, respectively.

Like most southern fisheries, the most significant issue for Australian pelagic longline fisheries is the bycatch of seabirds. Additionally, we occasionally encounter sea turtles, but very rarely interact with marine mammals. In terms of shark bycatch, we have a relatively low shark trip limit and a complete ban on finning.

Since IFF2 (the Second International Fishers Forum) the Australia Fisheries Management Authority has developed management plans for these fisheries and Bycatch Action Plans specific to all of Commonwealth

fisheries. We are developing an updated Seabird Threat Abatement Plan, which is the second phase of an existing five-year plan. We also have a National Plan of Action for sharks and various Threatened Species Recovery Plans. We have developed, in conjunction with fishers, Industry Codes of Practice for both longline fisheries. These outline the obligations fishers will need to adopt in order to address their bycatch issues.

Since IFF2, our fishers in conjunction with scientists, have taken great steps with line weighting mitigation strategies to reduce seabird bycatch. We conducted a 42 vessel trial using 38 and 60-gram weights, at a distance of six meters from the hook. We covered 30% of the hooks set in the trial area with observers. We didn't meet our target of less than 0.05 bird captures per thousand hooks, but we came very close. From these positive results we conducted a second trial with 350,000 observed hooks on a smaller number of vessels, and no birds were caught. Therefore, the methodology developed in this trial has now become our management measure – fishers have a choice of using 60 grams two meters from the hook or 100 grams at three and a half meters from the hook. We are confident that this will produce a seabird bycatch rate below the government limit.

We have developed a user-friendly and effective tori line with an advanced streamer combination, using a material that was brought to our attention at IFF2 through the efforts of the Alaska demersal fishery. An additional modification, devised following the trialling of many different items that could work as a drogue, is the use of a road-cone to keep the tori line straight in crosswinds thereby reducing the risk of tangles with the fishing gear. We have also done extensive trials with an underwater setting chute. One of the drawbacks with the underwater setting chute is its relatively high cost. We have a commercial partner now who is further developing an underwater setting capsule and have an advanced prototype ready for testing.

A sea turtle mitigation project, that has been running for three years, is monitoring turtle captures and helping fishers to address their turtle bycatch issue. This project, run by the Belldi Consultancy and Seanet, conducted 20 workshops to educate fishers on the biology and life cycle, handling, and research on sea turtles. We gave rewards and certificates as part of our individual accreditation process. We produced a DVD called, *Crossing the Line*, which includes the same information as presented in the workshops. The strategy was

to change the culture and provide knowledge for empowerment of fishers to make informed decisions and handling of our sea turtles in our fishery.

Additionally, we have completed a dehooker and line-cutter trialling project, and now every longliner will be provided with a free set of dehookers and line-cutters and instructional videos in the use of these equipment. We will be running workshops around Australia demonstrating how to use the equipment in September 2005.

I've also constructed a sticker that fishermen place on the side of their vessel to inform the general public that fishermen are concerned and are now trying to address bycatch issues.

We are currently running a pilot circle hook project. We are conducting a trial with two vessels. They're reasonably happy with their swordfish catch rate on the circle hook versus their traditionally used Japanese tuna hook. Another vessel will trial live bait trial using a 13/0 circle hook to test the effect on target and non-target species.

Research on deep-setting to reduce bycatch was conducted by Steve Beverly of SPC (the Secretariat of the Pacific Community). The experiment trialled a technique to set gear at two to four hundred meters in order to reduce bycatch, while increasing target catch. The research was funded through our Eastern Tuna and Billfish Research funds.

What are our next steps? We're going to conduct compulsory workshops on how individual fishers can reduce their bycatch levels, with talks on the Bycatch Action Plans, the latest techniques, tori lines, dehookers, and line-cutters. Training DVDs will be used to demonstrate mitigation techniques for various bycatch species. SEANET, in conjunction with the Australian Fisheries Management Authority, has established a Fisher Bycatch Mitigation Service. If a fishing vessel, has a problem or a fisher has an idea, they can give us a call and we'll help them.

Together with government authorities and fishermen, we'll continue to conduct research and mitigation refinement and development. Last but not least, we want to foster greater international cooperation. There's some very good ideas that get put forward at these forums, or are being developed, and the exchange of those ideas is crucial in fast-tracking them into other fisheries.





Monitoring Bycatch

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Here we present technical perspectives on monitoring bycatch. Monitoring and surveillance of fishing activities helps ensure that tuna vessels comply with conservation and management measures and assists with stock assessments.

Onboard observer programs are very effective at providing detailed scientific data, as well as monitoring for compliance with management measures. But it is expensive and requires vessels to provide living space for the observer. In order to mitigate these problems with onboard observer programs, and to be used as a measure in addition to observers, we are developing a technological automated observer system.

Digital still cameras can be used for real-time monitoring. There were several reasons why we selected to use a digital camera for monitoring fisheries. It is necessary to identify fish species and the quantity of fish being hauled aboard based on visual information. Digital cameras can be used to provide this information. One problem with using digital cameras to monitor fisheries catch is that, on small vessels, it may be difficult to find space to locate the camera. Therefore, the equipment needs to be compact. Also, the digital camera needs to be able to take clear images despite vibrations caused by the vessel engine and waves, and be able to handle environmental factors such as getting wet and exposure to the sun.

We assessed the quality of images from the digital camera through a trial on the vessel Kaihatsu-Maru over a four-month period in the central western Pacific. The camera takes an image periodically, and not continuously. If the interval were too small, the amount of data being collected would be too large to process. It was necessary to determine the appropriate interval to take an image. We selected to take an image at an interval of every five minutes for this experiment. The area covered in each image was ten meters by ten meters. The resolution of the images was about 300,000 pixels, which is relatively small.

In addition to the camera, we needed network cables to connect the PC and camera. We needed to have insulation to reduce vibrations. We found that the images had a lot of reflection from the sea surface and glare from the sun. But the resulting images were still useful to identify the species of catch. Our equipment was able to provide adequate illumination when taking images at night. When a fish was on the deck and the deck was wet, there was low contrast between the fish and deck, making it difficult to identify the species of the fish. The species of smaller fish was difficult to identify with the 300,000 pixel resolution. The camera image proved to be insufficient to properly identify a caught sea turtle. It may be necessary to increase the camera resolution to also address this problem. We found that the camera was only able to show 21 percent of target catch and 15.4 percent of all caught species.

In conclusion, we found that the camera system was adequately designed to handle the environmental exposure on a fishing vessel, and illumination was adequate to take images at night. But the 300,000 pixel resolution was insufficient for smaller fish. We found that the percent of target fish that were identified by the camera images was lower than we predicted. We may need to decrease the interval that images are taken to increase the percent of target fish caught on camera.

We then conducted a second experiment to test modified digital camera equipment. We used a fake turtle for the experiment. We used a megapixel class digital camera with three interchangeable lenses for this second experiment. The lenses used were a wide angle, super wide angle, and fisheye. The area covered in each image was four meters by four meters. Each of the three lenses produced sufficient images, however there was some distortion at the edges of the images taken using the fisheye lens. To improve contrast between a fish laying on the wet deck, a new processing technique of adjusting the tone and hue was tested. The conclusions of this second experiment were that the megapixel-class camera is adequate to distinguish the species of caught fish to a certain degree. As for the focus distance, a wide-angle lens was best.

Seabird Bycatch in Longline Fisheries – Research on Seabird Bycatch Avoidance Methods

JAPANESE RESEARCH ON MITIGATION MEASURES TO REDUCE INCIDENTAL CATCH OF SEABIRDS IN TUNA LONGLINE FISHERY

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According to Japan's National Plan of Action - Seabirds, a variety of mitigation measures have been developed and tested in Japan. Since albatrosses are surface scavengers, incidental catch of seabirds in the longline fisheries occur in a limited zone near the sea surface behind the stern of vessels while lines are set. Any devices that prevent seabirds from feeding in this zone will reduce the occurrence of incidental hooking. Various methods that take advantage of the biological characteristics of albatrosses have been invented to avoid catching seabirds.

1) DETERRENT DEVICES

Deterrent devices keep seabirds away from baited hooks thrown from the fishing vessels. A tori-pole (Tori-line, bird-scaring line) is a line and streamer towed from a pole installed on the stern of a ship (Fig. 1). It was invented voluntarily by Japanese fishermen. On average, tori-poles can reduce the catch rates of seabirds by one third compared to a control. This device is simple and cheap, so it is one of the most practical and cost effective methods. However, tori-poles have some drawbacks: i) Effectiveness depends on the configuration and use of the pole and streamers, ii) Streamers sometimes tangle with fishing gear and

propellers, and iii) Handling a tori-pole manually is laborious. The fishing industry of Japan specified the standard configuration of a tori-pole and encourages the use of devices meeting this configuration. Fishermen also have made improvements by themselves voluntarily. For example, tori-poles powered by hydraulic or electric power have been introduced to some newly constructed vessels to reduce labor during fishing operations.



FIG. 1. TORI POLE

A water cannon is another deterrent device designed to keep seabirds away from baited hooks (Fig. 2). It blows a jet of water at seabirds during line setting. Results of at-sea experiments show that seabirds avoided the water curtain made by the device. It does not interfere with fishing gear, and is easy to operate. However, water cannons require large machinery, and the water-jet is affected by strong winds. Because of these disadvantages, only a few large vessels are using the water cannon system.



FIG. 2. TWIN WATER CANNONS.

Other deterrent stimuli such as light, sound, and electric pulse have been tested to deter seabirds. Most of them were not very effective. In general, seabirds quickly habituated to these external stimuli.

2) IMPROVEMENT OF SINK RATES OF BAITED HOOKS

Increasing sink rates of baited hooks makes baited hooks less accessible to albatrosses, which have poor diving abilities. Adding weights to branch lines, avoiding propeller turbulence by using bait casting machines, underwater setting, and use of less buoyant thawed bait, have been tested to determine their ability to improve sink rates of baited hooks of pelagic longlines. Line weighting is suited for demersal long-line fishing in which heavy weights are attached to the mainline in order to submerge the fishing gear. Pelagic longlines have a complicated structure and usually have no weights. Adding weights to pelagic longline

branch lines is a simple way to improve sink rates of baited hooks. We found from our sink-rate experiments that adding weights to the distal end of branch lines is most effective at improving sink rates. However, attaching weights to the end of branch lines is dangerous to fishermen because the weights and hooks sometimes break off the line during line retrieval and shoot at the fishermen, especially when nylon leaders are used. Improvement of sink rates is more effective if it is used in combination with other methods such as deterrent devices.

Underwater setting and side setting methods require modifications to the vessel design and fishing operations. These methods are still in an experimental stage in Japan.

3) CONCEALING BAIT, REDUCE ATTRACTIVENESS

Concealing bait is another method to avoid bait stealing and incidental hooking of seabirds. The use of blue-dyed bait reduces the visual detection of baited hooks from the sky. Results of our experiments in the North Pacific and Southern Ocean have shown that blue-dyed bait is highly effective at avoiding seabirds. Blue-dyed bait can reduce the incidental hooking of seabirds to almost zero. It does not affect the catch rate of targeted fish. The only problems are the required amount of labor to dye the bait and the economic cost for the dye.

TABLE 1. LIST OF MITIGATION TECHNIQUE TESTED IN JAPAN.

TYPES OF METHODS AVOIDANCE	SEABIRD AVOIDANCE TECHNIQUE	EFFECTIVENESS	ADVANTAGE AND DISADVANTAGE
Deterrent devices	Tori-pole	good	Effectiveness depends on configuration and usage of the pole and line. Sometimes cause trouble with fishing gear.
	Water-cannon	subsidiary	Limited deterrent range. Requires excessive machinery.
	Light and sound deterrent	temporary	Seabirds are easily accustomed to these stimuli.
Improvement of sinking rates of fishing bait	Underwater setting	good	Needs improvement of the setting device.
	Line weighting	subsidiary	May be hazardous to fishermen during line hauling.
Conceal bait or reduce attractiveness	Blue-dyed bait	good	Very effective but require additional cost and/or labor for bait dyeing.
	Night setting	good	Affected by moon light and deck lighting. May be hazardous to fishermen during line setting.
	Offal Control	subsidiary	Not very effective but important to keep seabirds away from fishing vessels.

Line setting at night is another effective way to avoid seabirds because most surface scavenging seabirds are inactive at night. But this method is less effective during a full moon or when a lot of deck lighting is used. Some fishermen do not like night setting because line setting in the dark is dangerous. Many fishermen prefer to fish in the hours around sunrise and sunset, because they believe the foraging activity of fish are higher at these times. Therefore, in many cases, longlines are set partially during nighttime. In this partial night setting, another mitigation measure should also be employed to avoid seabird activities during the daytime periods of setting.

Proper control of offal discharge is very important to avoid seabirds. Some fishermen store frozen offal (e.g., shark livers) and throw it overboard when large number of seabirds are taking baited hooks during line setting. The frozen offal helps to keep seabird flocks away from fishing vessels for a while.

To date, a number of mitigation techniques have been developed in Japan (Table 1). However, no single technique completely solves seabird-longline interactions. A combination of methods can improve the effectiveness and practicality of mitigation measures. Given a variety of mitigation measures, fishermen can choose and adopt their preferred options to meet the needs of their fishing operations. Fishermen's understanding of the use of mitigation methods is another key to solve the seabird problem.

LONGLINE FISHERIES AND THEIR INCIDENTAL CATCH OF SEABIRDS IN SOUTH AMERICA

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Interactions between seabirds and fisheries have existed since humans first went to sea to catch fish. Both predators take advantage of upwelling situations or high productive oceanic areas overlapping between them. In South America, foraging areas of significant populations of albatrosses and petrels overlap with fishing grounds both in the Atlantic and Pacific,

including fishing grounds of both industrial and artisanal fisheries. All longline techniques are used. Surface longlines, where hooks remain close to the sea surface are a threat to seabirds throughout the fishing operation. Mid-water longlines are used to catch tuna, swordfish and sharks. Bottom longlines are used to catch demersal species. Main target species of surface, mid-water and bottom longlines include Patagonian toothfish (*Dissostichus eleginoides*), Austral hake (*Merluccius australis*), Argentine hake (*Merluccius hubbsi*), ling or kingclip (*Genipterus blacodes*), swordfish (*Xiphias gladius*), Blue shark (*Prionace glauca*), Tunas (*Thunnus* spp), and skates (*Raja* spp).

Data on seabird bycatch indicate that many different species of albatrosses and petrels are being affected, some of which are globally threatened, such as the Spectacled Petrel (*Procellaria conspillata*), Atlantic yellow-nosed albatross (*Thalassarche chlororhynchus*), Black Browed Albatross (*Thalassarche melanophrys*), Grey headed albatross (*T. crysostoma*), white-chinned petrels (*Procellaria aequinoctalis*), Wandering albatross (*Diomedea exulans*), Southern giant petrels (*Macronectes giganteus*), and Southern Royal albatross (*D. epomophora*). Some of these species have a critical conservation status because of small breeding populations over short period of time. In many areas these declines were attributed to mortality associated with longline fisheries.

In South American countries began to conduct research in their Exclusive Economic Zones during the mid 1990's. Today each fishing country has developed different levels of knowledge to address seabird bycatch. International pressure to develop technical solutions for reducing incidental seabird mortality has influenced some countries to adopt voluntarily solutions, and other countries have promulgated legislation to regulate seabird bycatch.

A variety of seabird mitigation measures have been identified internationally. There is no single measure that is effective in all fisheries. The occurrence of seabird bycatch varies between fisheries for a number of reasons, including the proximity of fishing grounds to seabird nesting colonies; environmental factors, which change the number of birds in the vicinity of vessels; the proportion of birds of different species; and whether mitigation measures are effectively employed. Research on the efficiency of mitigation measures in South America outside the CCAMLR Convention Area is still crude and fragmented. Research has been

conducted on blue-dyed bait, tori lines, strategic discharge of offal, night setting, thawed bait, underwater setting chute, and designs for weighting gear including integrated line weighting. All countries recognize that research on specific mitigation measures must be conducted in individual fisheries to determine their efficacy at avoiding seabirds. While the degree of research activity varies from country to country, there commitments from governmental institutions and the fishing industry to identify effective solutions has increased in recent years.

SOLVING BYCATCH PROBLEMS IN LONGLINE FISHERIES BY REASSESSING THE BASICS AND TRADITION OF FISHING EQUIPMENT AND HOW IT IS USED

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Just because the basics of the boats and equipment used in longline fisheries have changed little over time, it is wrong to assume that a reappraisal is not warranted to overcome bycatch problems. To do so could also achieve dramatic advantage in a wide range of areas such as safety, profitability and sustainability simply through focusing alone on pursuing strategies for bycatch avoidance. Finding better ways than existing methods for fishermen to prevent bycatch is also needed.

For the longline fishing method to regain and maintain a reputation for being relatively efficient and benign it seems inevitable that uniform, worldwide standards for vessel design, fishing equipment and its use be formulated. Without it sufficient and sustained reduction in bycatch is unlikely.

The focus of this paper is to illustrate how a single change to vessel design and one to fishing equipment has the potential to dramatically reduce bycatch of several species, have some safety advantages, deliver better operating efficiency and increase profit. Such changes are the ones best suited to application on all longline vessels, both pelagic and demersal, having the capacity to dispel the rhetoric that mitigation measures need to be tailored to suit changing circumstances or specific needs of each longline fishery.

Longline fisheries are characterized by vessels of many designs - big boats, small boats, fibreglass, steel, or timber, and can vary in condition immensely. But even in longline fisheries where vessels and fishing gear are remarkably homogenous which is the case for over 500 of Japan's high seas fleet, there is one characteristic of virtually all longline vessels that is identical - line setting is carried out from the stern. And it is the same for demersal fishing as it is for pelagic. It seems the easiest and most efficient way, preventing obvious problems such as gear being cut or entangled. But to a seabird this presents the best opportunity for gaining access to baited hooks - the moment they leave the stern. Putting baits immediately into propeller turbulence is also a serious problem contributing to bird deaths. Often stern height, the extent of propeller turbulence, the frequency of line setting tangles, even the amount of work light illumination at night, all make seabirds that much more vulnerable, because baited hooks that are set from a vessel's stern are all at least momentarily available on or near the surface. There are few if any precautions that can be or have been used to reliably prevent this. So the other common feature of all longline boats is that wherever vulnerable species of seabirds occur they are caught.

Overcoming the causes of problems resulting from line setting off a vessel's stern that result in the death of seabirds has led to the development of a variety of mitigation measures, equipment that attempts to make line setting from a vessel's stern safe. Achieving this is reliant upon concealing baited hooks or preventing bird access for sufficiently long to allow baited hooks to sink. Of the mitigation measures used to conceal baits from birds night setting is perhaps the most obvious example. It is also very effective. Aside from seabird activity generally being a lot less at night, more baits avoid detection when set in darkness. Although very effective, night setting is not popular with fishermen for a variety of reasons, and hence seems not to be viable as a mitigation measure. But in some circumstances all mitigation measures may not be adequate to protect baits unless line setting is confined to night also. At least this is still a better combination than the only alternative of area and/or season closure.

Likewise, perhaps the best known and most widely used mitigation measure preventing bird access to baits, the bird scaring line is also very unreliable because it is easier for a fisherman to not use one than to use one. Despite design standards that improve

reliability and minimize operational problems from bird line use we see a range of less effective troublesome lines in use. In certain circumstances up to 8 people can be needed to handle certain bird lines – hardly conducive to routine deployment and ironically such a bird scaring line is approaching being more lethal to birds than are the hooks it protects. Regardless of the above issues, bird-scaring lines simply do not, alone provide sufficient protection against all seabird species in all circumstances and the question will be ever present as to whether in fact this equipment is being used consistently.

Underwater setting devices of which there are a number for both demersal and pelagic fisheries aim to conceal baits from detection by birds. This is achieved by releasing them at sufficient depth to either make location impossible or if located, access to the bait at depth too difficult. Despite such devices proving their effectiveness they have a variety of associated problems. Unavoidably, all baits are still released directly into propeller turbulence astern and it seems that with rougher conditions this influence on bait sink rate still provides some species of birds with too many opportunities. Operationally devices such as the chute have their drawbacks at 10 kgs per meter they are a handful, being 9 meters in overall length; correct usage demands consistent diligence making them unpopular for crew to use; design faults still exist in them with no pathway apparent by which these will be rectified; again, in certain circumstances against particular seabird species these devices, alone have not adequately prevented seabird mortalities but the true reasons for this have not yet been determined.

The bait-casting machine, unlike other mitigation measures, was exceptional in that it became widely used for labor-saving advantages and the reliability with which it could perform a simple task. Though it could not entirely prevent bird mortalities the bait casting machine does deliver good performance simply because it will be consistently used. Even better performance can be achieved by combining the capacity of this device with bird-scaring line protection – and of course here again is the problem, bird-scaring lines are not used reliably.

Some mitigation measures are not taken seriously by many fishermen. It doesn't help when these turn out to be not so effective as has been the case for blue dyed bait. Designed to conceal bait, making them hard for seabirds to find, seabirds do however have no difficulty

in locating them and especially when weather conditions are most favorable. Besides, as a fisherman would you bother to dye your bait if you knew how ineffective it was on top of the daily inconvenience of additional bait preparation time that the dyeing process necessitates?

More line weight to improve line sink rates is slowly gaining prominence as a sensible strategy to not only reduce bird problems but to improve other aspects such as better overall economic performance from consistent target species line set depth (pelagic fisheries) or more total fishing time (demersal fisheries). But, irrespective of actual sink rate if baits are set from a vessel's stern each one is still momentarily at risk to seabirds unless some form of protection is used – bird scaring line, night setting for example. Without protection even baits with a sink rate as fast as 0.8 seconds per meter are taken by birds.

So, all the problems that arise just because line setting is done off a vessel's stern surely suggest that to at least question this practice is warranted. Further evidence of the potential to change the way longlines are set was of several vessels already operating successfully by setting lines from the side amidships, not from the stern area. What had not been correlated was any relationship between this and the rate of seabird interactions, impact on fish catches or evaluation of operational effects, such as line tangling rates. Trials to answer such questions have been undertaken in Hawaii's pelagic longline fishery and demonstrated considerable improvement to bird mitigation but with no economic or logistic shortcomings. Trials evaluated the extent of options for line setting away from the vessel's stern, just forward of the stern, as far forward as possible, and from both port and starboard sides. Since the trials, real evidence of the benefit of this system of line setting is perhaps that a number of vessels have already voluntarily converted to set lines from amidships. What are the advantages? One primary advantage is that it combines essentially two working environments, line setting and line hauling into one. To do so has immense space saving advantage, and in new ships great construction cost saving potential. Take a typical Japanese high seas longliner, line buoys and branchline aft storage becomes redundant as does aft line hauling machinery, bait setting conveyor and the port side full length conveyor that brings all the line setting components aft each day, bait as well. Similar space saving and daily labor saving is just as possible for demersal vessel conversion as for pelagic. There are safety

advantages in having line setting crew in full view of the captain at all times. Likewise on smaller vessels that often have forward wheelhouses, from a seaworthiness point of view alone are uncomfortable and a hazard as are the dangers inherent in line setting not being immediately visible to the captain at all times.

For bird mitigation the advantages are simple and obvious. Using the hull of the vessel to conceal and protect baits, these are being put into 'clean' water, not propeller 'turbulent' water and so sink uninterrupted being well underwater by the time they are left astern. In fact there is evidence suggesting that baits set into 'clean' water sink 20% faster. Take as an example a 50 meter Japanese longline vessel from which a side set bait enters the water 30 meters forward of the stern. With a line setting boat speed of 10.5 knots this bait will be left astern after 5.5 seconds which is sufficient time to allow a conventional un-weighted bait with a sink rate of about 4 seconds per meter to sink unseen to one meter. By comparison the same bait set off the stern will have actually been visible and accessible to birds throughout that whole time and for perhaps even 20% longer, there being evidence that baits set into propeller turbulence may be affected to this extent. On smaller vessels, obviously shorter distances buy less sink rate time but this is usually offset somewhat with a slower setting speed. Say at 7 knots and with bait entry being 15 meters forward of the stern, a sink rate of 1 second per meter will have achieved a similar depth as the stern passes.

Obviously there is a performance relationship between vessel size, setting speed and how far forward of the stern setting takes place, but by adding weight to increase bait sink rate then these parameters become less relevant. If, in my estimation a sink rate of about 1.4 seconds per meter is as safe for birds as is likely to be operationally feasible for all longline fisheries to attain by adding the correct amount of weight in relation to distance from each hook then side set baits will be about 4 meters underwater when left astern by a Japanese longliner or by smaller style vessels. This performance is equivalent to that achievable with underwater setting devices but with none of the associated hassles.

It is obviously better to create greater rather than smaller margins of error in any side setting conversion by having faster bait sink rates and whilst this sink rate should be around 1.4 seconds per meter, a sink rate of 1 second per meter during trials produced excellent

results regardless of whether the setting position was 15 meters or 10 meters forward of the stern. Such good performance may however have not been delivered if more proficient, deep diving species were prevalent. Neither may even a faster sink rate, necessitating the additional strategy under these circumstances of night setting.

So, for best performance correct line sink rate is essential and will greatly enhance the benefit of side setting. But it is valid to question why bait sink rate should be increased if with side setting existing sink rate on some vessels is sufficient to avoid birds. With increasing line sink rate come additional advantages: less pelagic longline fishing gear is likely to remain in depths most utilized by sea turtles so inadvertent entanglement diminishes and baited hooks are not so readily available for turtles to find. This is because insufficient branchline weight does cause baited hooks to be under the variable influence of tides or currents forcing them upward – not ideal to ensure optimum exposure of baits to target species or for avoiding sea turtles.

Shark conservation too may benefit from such changes that improve branch line sink rate. With fisheries nowadays imposing specific catch limits for sharks and shark finning there is both incentive to avoid capture if possible but to release those that are caught efficiently and by means that improve their survival prospects. Here the incorporation of additional weight for seabird and turtle avoidance through improved sink rate may also assist. An appropriately positioned weight with wire trace attachment to the hook can be used most effectively to release sharks in good condition and also minimizes the economic impact of gear damage, including recovery of hooks. Otherwise the incentive is for sharks to be landed just to recover hooks, a process that can invariably be lethal.

Coincidentally the ideal wire length (around 1 meter) between hook and line weight not only optimizes sink rate performance, it is also most operationally efficient to set. It also allows captured sharks to be pulled close alongside for release. Such strategies if used for conservation minded discarding of species, particularly those with some degree of financial return associated (shark fins for example) are of course reliant on appropriate fisheries management – enforceable regulations. Without, the use of wire to the line weight will continue to be perceived solely as a destructive fishing practice rather than one with great potential in the right operators hands to conserve those sharks that are

caught, combining well with the needs for seabird and turtle mitigation. It is important not to consider mitigation measure potential for various species separately. One measure may be applicable to more than one bycatch problem. One measure applied to conserve a species may inadvertently further diminish the conservation status of another.

In conclusion, line setting from amidships may be the most simple and effective means of minimizing seabird captures in all longline fisheries. At this point in time it is likely to be viewed negatively because it is a very different way of fishing and has yet to be demonstrated in all longline fisheries and on various vessel types. But whether vessels do need to also increase line sink rate to gain maximum benefit from amidships setting has yet to be determined. There are likely to be some vessels for which conversion may not be so easily or economically achieved. But there will always be a need for new vessels: Some sink, some burn, others just wear out or are assumed into alternate fisheries. Therefore the design requirements of new vessels for side setting must be considered now, not in five, ten or twenty years time.

Perhaps one of the most important challenges is to ascertain through trials whether the perceived suitability of this line setting method is actually viable on the largest, most operationally precise and demanding vessels such as those in Japan's high seas operations.

REVIEW OF TECHNICAL STRATEGIES TO REDUCE SEABIRD BYCATCH AND RESEARCH RESULTS FROM DEMERSAL LONGLINE FISHERIES

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Incidental bycatch in longline fisheries is regarded to be a significant source of mortality in many seabird populations identified as threatened but also in populations where there is no evidence of decline. Irrespective of population level effects of the seabird species affected, it is not consistent with the principles of ecologically sustainable management for fisheries to take large numbers of seabirds. Several mitigation measures capable of reducing incidental seabird bycatches have been developed and tested in demersal longline fisheries, e.g. night setting, bird-scaring streamer line, underwater setting funnel, line shooter and weighted longline. The most promising and widely tested mitigation measure in demersal longlining is the bird-scaring streamer line. This device reduced seabird bycatch by 88-100% in Alaska demersal longline fisheries and by 98-100% in northeast Atlantic fisheries. The underwater setting funnel was shown to reduce seabird bycatch by 72-92% in these two fisheries. The Patagonian toothfish fishery is a third important demersal longline fishery that has achieved focus due to its interactions with seabirds. In this fishery night setting, release of offal during setting and underwater setting have been tested and proved to be efficient in reducing seabird mortality rates. Longlines with added weights sink faster and thus reduce the time available for seabirds to seize baits, but the effect of line sink speed on seabird mortality has not been critically determined.





Seabird Bycatch in Longline Fisheries – Regional and International Initiatives

INTERNATIONAL GOVERNMENTAL INITIATIVES: CCAMLR, FAO, AND ACAP

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Against a background of the current status of albatross and petrel populations and their vulnerability to bycatch in fisheries, we review relevant initiatives, under the auspices of three major international bodies and agreements, which seek to minimise bycatch of seabirds. The approaches used by CCAMLR (in force 1982, 24 members, 32.5 million km² of Southern Ocean): establishing a special Working Group to advise its Scientific Committee, implementing an interim suite of mitigation measures (which reduce bycatch by 75%-90%), applying measures in relation to area-specific bycatch risk assessments and promoting development and implementation of new and improved mitigation measures, is a model for other RFMOs. Current challenges for CCAMLR involve mitigating seabird mortality (especially of white-chinned petrels), combating IUU fishing in the vicinity of breeding colonies, and collaborating with adjacent RFMOs to reduce the incidental mortality of birds

breeding in the CCAMLR area in these other areas. The FAO's International Plan for Reducing the Incidental Catch of Seabirds in Longline Fisheries (IPOA) was adopted in 1999 and calls for Member States to conduct assessments of longline fisheries and develop and implement National Plans of Action (NPOA) if a seabird bycatch problem exists. Such plans would include prescription of effective mitigation measures, monitoring of bycatch, continued research and development for more effective measures, and outreach and education programs for the fishing industry. Current challenges for the FAO initiative include accelerating the uptake of NPOA development where seabird bycatch problems are known to exist, encouragement of RFMOs to implement similar plans, and to broaden the scope of plans to address seabird bycatch problems in fisheries using other than longline gear. The Agreement on the Conservation of Albatrosses and Petrels (ACAP) (in force 2004, currently 7 members and restricted to the Southern Hemisphere) is designed to improve the conservation status of albatrosses and large petrels both at breeding sites and feeding areas by addressing an array of known and potential threats to these populations. In the marine environment its main objectives are conservation (including development of management plans) of areas critical to survival of ACAP species and sustainability of the marine living resources of which they depend. Its effectiveness is likely to depend on close cooperation between breeding range states and countries undertaking or regulating fishing in the main southern hemisphere albatross habitats.

BIRDLIFE INTERNATIONAL GLOBAL SEABIRD PROGRAMME – NGO INITIATIVES

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The most widespread and urgent threat facing seabirds, particularly albatrosses, is the threat of being killed in longline fisheries. Currently, 19 out of 21 species of albatrosses are classified by the IUCN as being under threat of extinction. As seabirds pay little heed to national boundaries and many species spend the majority of their lives migrating and foraging in waters distant to their breeding grounds, including considerable time in high seas areas, where no national jurisdiction exists, their protection cannot be tackled effectively by national measures alone. Consequently, in 1997, BirdLife International established the Global Seabird Conservation Programme. This programme, international in its nature and scope, operates through a developing alliance of regional task groups, supplemented by close links to in-country BirdLife partners. BirdLife International is a worldwide partnership of independent and national NGOs from more than a hundred countries with a special focus on conservation and birds.

While the programme addresses a range of issues, its main focus, exemplified by BirdLife's 'Save the Albatross' Campaign, is the mortality caused by longline and other fisheries. In broad terms, the programme focuses on local, regional and international advocacy to raise awareness of the issue within the fishing industry and wider community and works with fishermen on 'grass roots' projects for the adoption of mitigation measures to reduce the level of seabird mortality. Programme personnel are also actively involved in lobbying at the level of international organisations and agreements to develop and implement appropriate regulatory frameworks.

The role of Regional Fisheries Management Organisations (RFMO) in seabird conservation is critical as under various international instruments they are responsible for the management of high seas fisheries. The Global Seabird Programme recently launched a review of the role and performance of RFMOs and is

working closely with several organisations to reduce bycatch of seabirds and other non-target species.

Closely linked to our RFMO strategy is the application of the BirdLife Global Procellariiform (albatross and petrel) Tracking Database, which comprises over 90% of the world's remote-tracking data of albatrosses and petrels. We are working with a range of industry and government stakeholders to highlight areas where seabirds are most at risk from fishing effort, in space and time, and to assist agencies to target conservation efforts most effectively.

SOUTHERN SEABIRD SOLUTIONS

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The Southern Seabird Solutions group has been working to spread behavior change amongst fishers to avoid seabirds being killed during fishing; first in New Zealand waters, but now increasingly in other parts of the Southern Hemisphere. The Southern Seabirds group sprang from a workshop in Nelson, New Zealand, that incorporated fishers and fishing company representatives, government departments, environmental NGOs, and seabird researchers. Picking respected and committed fishers as role models to champion behavior change is a cornerstone of the Southern Seabird Solutions approach. What was needed was to accelerate the transference of 'seabird-smart' attitudes and behaviors amongst the skippers and crews in a fishing fleet. Doing this required the trust and co-operation of all parties. And this trustful attitude came surprisingly readily.

Both fishers and companies need to feel good about themselves, and about their adoption of 'seabird-smart' fishing techniques. Like everyone, they like to be seen as 'good citizens'. So with the help of environmental NGOs and government agencies, the Southern Seabirds group has helped industry mitigation efforts and successes to be celebrated publicly through the general news media, as well as through seafood trade publications.

The key elements of success have been good timing in terms of the public profile of the issue, developing a common goal everyone can agree to, having someone to provide leadership within the group, patience, a no-surprises approach, behaviors that engender trust, use of fishers as role models and messengers, and public acknowledgement of the efforts of fishers.

Seabird Bycatch in Longline Fisheries – Main Points and Summary



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The following are thirteen main points from the presentations and discussion from the session on seabird bycatch in pelagic and demersal longline fisheries.

- Many methods have been demonstrated to significantly reduce seabird bycatch in numerous pelagic and demersal longline fisheries;
- At this stage, due to differences between fleets, no single seabird avoidance measure or combination of methods is likely to be effective and practical in all longline fisheries. Testing in individual fleets is needed to determine efficacy, practicality, and economic viability;
- Improving fishers' capacity to employ effective bird avoidance methods is important;
- Assessing longline vessel design and equipment will help identify changes to reduce bird capture as well as improvements in safety, operational efficiency, and profitability;
- Identifying and adopting appropriate global performance standards for longline vessel design and equipment will reduce global seabird bycatch;
- Because seabirds are highly migratory, international collaboration is necessary to effectively address bycatch in longline fisheries. Organizations implementing international initiatives (CCAMLR, FAO, ACAP Secretariat) play important roles. Priorities are to:
 - Combat IUU longline fishing
 - Produce & implement FAO National Plans of Action for reducing seabird bycatch
 - Produce & implement plans of action by regional fishery management organizations
- Adopt international performance standards for vessel design and equipment
- Establish minimum observer data collection protocols
- Identifying temporal and spatial bird bycatch hotspots may help prioritize bird bycatch avoidance efforts;
- Spreading changes in fisher and longline industry behavior that result in minimized seabird bycatch, using fishers as role models and messengers, is an effective strategy to reduce seabird bycatch.
- It is important to develop trust and cooperation of all parties involved to achieve the desired change in behavior;
- Raising public awareness of industry initiatives to reduce seabird bycatch supports fleet-wide adoption of best practices to minimize bird capture.
- Given the political context and capacity of management authorities of the majority of longline fisheries, it is critical to identify seabird avoidance strategies that are not only highly effective, but are also economically viable and commercially practical;
- Longline fishers should directly participate in trials as fishers have a large repository of knowledge and skills to effectively develop and improve seabird bycatch avoidance techniques, and this provides industry with a sense of ownership for uptake of effective bycatch reduction methods;
- Design seabird avoidance research to consider effects on bycatch of other sensitive species, and coordinate with other fisheries bycatch reduction initiatives to ensure they account for their effects on seabird bycatch.





Sea Turtle Bycatch in Longline Fisheries

JAPANESE RESEARCH ACTIVITIES TO REDUCE INCIDENTAL MORTALITY OF SEA TURTLES IN TUNA LONGLINE FISHERY

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A variety of mitigation measures have been tested to reduce incidental mortality of sea turtles in the Japanese longline fisheries. We review some results from our field and laboratory experiments. Circle hooks, bait type and blue-dyed bait have been tested in the western North Pacific. Large circle hooks reduced the hooking rate of sea turtles compared to conventional tuna hooks. There were no substantial differences in hooking rates of sea turtles between small circle and conventional tuna hooks. However, small circle hooks reduced the deep hooking rate of sea turtles and may improve the post-hooking survival of hooked sea turtles. Fish bait resulted in a lower catch rate of sea turtles than squid bait, because sea turtles are likely to swallow the whole squid bait because squid is hard to bite into pieces. Blue-dyed bait was not effective in reducing the incidental catch of sea turtles. In general, sea turtles spend most of their time within the shallow surface layer of the water column. Deep-setting longlines is known to avoid the incidental catch of sea turtles. Although shallow-set longlines have a higher risk of catching sea turtles, many of the hooked sea turtles are retrieved alive, which is not the case with deeper-set longlines.

Longline vessels are encouraged to carry large hoop nets, which can be used to help haul live sea turtles onboard where de-hooking devices can be used on hooked sea turtles. We investigated the survivorship of loggerhead turtles ingesting hooks and monitored the sea turtles using X-rays. Internal deep hooking itself didn't cause serious injury. Hooked sea turtles survived and discharged fishing hooks within a year. This result indicates that live retrieval and release of sea turtle is effective in improving the post-hooking survival of hooked sea turtles even if hooks remain in their bodies.

MID-WATER FLOAT SYSTEM ON TUNA LONGLINES TO REDUCE SEA TURTLE BY-CATCH: JAPAN RESEARCH

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In recent years, there has been increasing concern over interactions between tuna longline fisheries and sea turtles. The shape of the mainline in tuna longlines is a catenary curve, and the depth of each branch line and hook in one basket varies depending on the attachment position. Some reports of sea turtle behavior in the open ocean suggest that sea turtle by-catch in tuna longline fisheries occurs mainly on shallower hooks. To reduce sea turtle by-catch, all hooks in longline gear should be set deeper.

We present a new method to reduce sea turtle by-catch. All branch lines are set at almost the same depth. This is achieved by installing mid-water floats and long float lines to lift the mainline and subsequently set all hooks in water deeper than where sea turtles predominantly forage. The buoyancy of mid-water floats must be roughly equivalent to half of the in-water weight of the part of the mainline and branch lines that are to be lifted by the float. This arrangement maintains the joint of the mainline with the mid-water float at the same depth as the lower end of the float line.

Sea trials were carried out on research ships to test two mid-water float systems: (i) a one-float set, longline with one mid-water float (e.g. 2,200 gf of buoyancy used in “Umitaka-Maru” experiments) in the center of the mainline; and (ii) a two-float set, longline with mid-water floats (e.g. 1,770 gf of buoyancy) in two positions at an equal interval. A conventional longline setting (12 hooks in one basket) without any mid-water floats was also conducted as a control treatment.

The vertical distances between the shallowest and deepest hooks were 50 m in the one-float set and only 20 m in the two-float set, which were both smaller than up to 160 m in the conventional longline set. The shape of the mainline between mid-water floats and float lines was close to a catenary curve. These results demonstrate that it is possible to set all the hooks at almost the same depth by giving adequate buoyancy at points on the mainline. Mid-water floats could be snapped onto the mainline with 10 m drop lines and deployed during the set in the same way branch lines are deployed. No significant reduction in sinking speed was observed for hooks on the longlines with mid-water floats compared to the control.

This system would be effective for reducing sea turtle by-catch when the mainline is set deeper with sufficiently long float lines. Moreover, it would also provide for more efficient catch of the main target species when the hook depth is adjusted to the swimming depth of the target species.

RESEARCH ON SEA TURTLE BYCATCH AVOIDANCE METHODS: U.S. RESEARCH AND REGIONAL REVIEW

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Estimates of sea turtle takes in pelagic longline fisheries have raised concern that these fisheries are impacting the potential for recovery of loggerhead and leatherback sea turtle populations. The U.S. NOAA Fisheries Service and research partners have conducted several research projects to investigate and develop sea turtle mitigation technology to address this problem. This research has determined that the use of circle hooks in place of traditional J hooks and tuna hooks reduces the proportion of hard shelled turtles swallowing hooks and that the use of large circle hooks 4.9 cm or larger in width significantly reduces turtle capture when compared with 4.0 or smaller J and tuna hooks. The use of large mackerel bait in the shallow set swordfish fishery was also determined to reduce turtle interactions compared to squid bait and the combination of large circle hooks and mackerel bait was the most effective mitigation measure evaluated.

The U.S. shallow set swordfish fisheries in Hawaii and the distant waters of the Western Atlantic Ocean which were closed due to sea turtle interaction rates have been conditionally reopened with the requirement to use large circle hooks and mackerel bait (Hawaii fishery) and initial evaluations indicate that mitigation measures are working.

Turtle feeding studies indicate that the proportion of pelagic-stage loggerhead sea turtles that attempt to swallow circle hooks varies with turtle size, circle hook size, bait type, and baiting technique suggesting that combinations of circle hook size, bait type, and baiting technique may have potential to reduce deeply ingested hooks.

Data have shown that sea turtles and other longline bycatch species spend a large proportion of time in water depths less than 100 meters. A proposed method of avoiding sea turtle interactions in the tuna longline fishery is to fish hooks below 100 meters in depth. Fishing methods that deploy all hooks below 100 meters are being investigated as a potential sea turtle avoidance measure.

Other areas of research include studies to investigate the visual and chemosensory capabilities of sea turtles, which may lead to techniques to avoid turtle interactions; changes in gear soak times; fleet communication to avoid areas of turtle concentration; area and seasonal closures; and additional research on hook design.

Research has also resulted in the development and evaluation of tools for effective and safe removal of fishing gear from sea turtles and other longline bycatch species to increase post release survival prospects of bycatch species.

TURTLE BY-CATCH IN THE STRAIT OF SICILY BY LONGLINE FISHERIES, AND A REGIONAL MEDITERRANEAN REVIEW

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Five sea turtle species are known to occur in the Mediterranean waters. Loggerhead and Green Turtles are the most frequent and are the only ones known to reproduce in this area (Groombridge, 1990).

Bottom trawling and drifting longlines have been identified as significant threats to marine turtles since the late 1980s (Camiñas, 1988) and remain one of the main threats to these reptiles (Camiñas, 1997), particularly where large pelagic fisheries are concerned (Margaritoulis *et al.*, 2003; FAO, 2004).

Not all Mediterranean countries are equally committed to collecting data on sea turtle by-catch on longlines. Many more data are available for Spain, Italy and Greece, for example, than for most other countries (Laurent *et al.*, 2001).

Reports of *Dermochelis coriacea* captures on drifting longlines are rare (De Metrio *et al.*, 1983), probably because of the low density of this species in Mediterranean waters.

No reliable figure is available for the Green Turtle, *Chelonia mydas*, and this is probably due to two main factors (Gerosa & Casale, 1999):

1. There is a tendency for fishermen to group all hard-shell marine turtles under the most common and best-known species, *Caretta caretta*, and
2. Data are usually collected in the western and central Mediterranean, while green turtles spend mostly of their time in the eastern part of the basin.

Available data demonstrate that *Caretta caretta* is the most negatively impacted species by this kind of gear. In the Mediterranean, excluding the Spanish, Italian and Maltese longline fisheries, the yearly turtle by-catch was estimated to be between 6,000 and 8,000 specimens (UNEP/IUCN, 1990). Some authors estimated that over 20,000 subadult loggerheads are caught annually by the Spanish longline fleet targeting swordfish, with 6-10 specimen incidentally caught per boat per day (Aguilar *et al.*, 1995). In 1991, the CPUE recorded an average 4.5 sea turtles per 1,000 hooks during July and August in Southeast Spanish waters alone (Aguilar *et al.*, 1995). An annual total incidental catch ranges between 22,000 and 35,000 turtles in the Western Mediterranean alone, more than half of which are captured during the summer months (Aguilar *et al.*, 1995).

The estimated catch rates on swordfish longlines in the year 2000 was 0.22 per 1000 hooks in the northern Italian Ionian Sea and 0.71 per 1000 hooks in the south (Laurent *et al.*, 2001). A four year study carried out 20 years ago recorded a lower by-catch figure of 0.06 loggerheads per 1,000 hooks on swordfish longlines from April to August and an average by-catch of 0.155 loggerheads on albacore longline from August to December (De Metrio *et al.*, 1983). The latter study speculated that the numerous loggerhead by-catches during albacore fishing was mostly due to the smaller sized of the hooks (about 3 cm in length), their major

number and the bigger length of the main line. Both studies highlighted that in the Northern Ionian Sea, loggerhead by-catch by the Italian longline fisheries peaks during the summer months, from June to August.

Also Greek longlines usually operate in the Ionian sea, where Tudela (2004) estimated 280 turtles caught per year by professional longline fleets. The Greek drifting longline fisheries mainly target swordfish. These longlines operate also in the Aegean Sea. The turtle catch rate of the entire longline fleet in the year 2000 was of 0.297 (Laurent *et al.*, 2001), 57% of which occurred in the Ionian Sea, while 43% occurred in the Aegean Sea. Relatively few Italian longline swordfish fishermen operate in the Adriatic Sea, which is characterized by very shallow waters (the average depth is 444 meters and the maximum depth is 1,324 meters). No published data are available, but a monitoring programme was started in 2005 at Italian harbours and preliminary findings are expected to be available in one year.

In order to evaluate the impact on sea turtles of different fishing gear types, and with the additional objective of finding a way to reduce, mitigate, or prevent turtle by-catch, two European projects were run in the Strait of Sicily with the cooperation of fishermen. Within the context of these projects we evaluated the impact of different fishing gears on sea turtle incidental catch, and the importance of olfactory and visual stimuli on loggerhead feeding behaviour.

The Project “Urgent Conservation Measures for *Caretta caretta* in the Pelagie Islands” involved government agencies, administrative public bodies, NGOs and public research institutes.

A second LIFE Project, called “Del.Ta.”, is in progress. It involves the same categories of partners as the first project, with the addition of a fishermen corporation, the Italian General Cooperative Association of Fishermen, and the Italian Department of Fisheries.

Within the framework of the first project, the impact of fisheries on sea turtles in the Pelagian waters was investigated. The Pelagie Islands are located in the middle of the Mediterranean Sea. Our field-base was initially on the island of Linosa, but in 2003 we extended onboard observers to the Lampedusa fishery. Preliminary data allow us to estimate turtle by-catch on drifting swordfish longlines of around 0.88 units per 1,000 hooks. Such a high value confirms this area as a Mediterranean hot spot.

We collected by-catch data in the waters surrounding the island of Linosa from 2000 to 2002 (June to September). Most of the vessels present in summer came from Sicily and stayed from 14 to about 60 days. Six out of 8 swordfish fishing boats cooperated and regularly provided their by-catch to the Linosa Marine Turtles Rescue Centre. Three boats fishing with nets were also involved, as well as some diving centres. Every morning the staff of the turtles rescue centre would go to the jetty and collected incidentally caught turtles from fishermen.

All these turtles were loggerheads. Guglielmi *et al.* (2000) estimated loggerhead by-catch in the Sicilian area to be 4.7 to 8.5 turtles per ton of swordfish. In the Pelagie islands, the estimated loggerhead catch was of 4-5 turtles per ton of swordfish (Dominici *et al.*, 2003). This result was produced from data collected over a three year period (2000-2002). In the year 2000, more than 140 *Caretta caretta* turtles were caught by only three vessels (less than 15 m length) over two summer months. Therefore, turtle by-catch ranged from 34 to 57 specimens/boat, with a maximum of 15 turtles recorded on a single longline and night.

Our findings confirm that drifting longlines have a strong negative impact on the local population of *Caretta caretta*. The problem is that turtles are incapable of “learning from their mistakes” and thus avoiding a second capture. For example, six days after its release, one loggerhead turtle was recaptured by the same fishing boat and in the same fishing area.

All turtles hospitalized at our local rescue centre were visited by a veterinarian. The location of hooks was ascertained by external observation or by x-raying. A total of 92% of all recovered turtles (N=277) had one or more hooks embedded in their flesh. We did not observe any turtles dying in captivity that had hooks deep in the body, even after longer than 200 days. One of the monitored turtles passed the hook in 68 days, showing no sign of harm.

As a second step, in an effort to reduce loggerhead sea turtle by-catches without impacting negatively on swordfish (*Xiphias gladius*) catch size, we investigated the possibility of:

- reducing bait attractiveness,
- evaluating float attractiveness, and
- utilizing acoustic deterrents.

All our experiments were initially run at Cattolica “Delphynursery” in a round open tank having a 10 m diameter and a 1.9 m depth. A total of 27 turtles were included in the study. All specimens were previously hospitalized at Rescue Centres and were tested after being declared healthy by the veterinary staff, and after acclimating. Once testing was concluded, each turtle was released.

Concerning fishing gear attractiveness, since fishermen suggested that a higher number of turtles are captured on hooks near radar reflector floats, we tested loggerhead’s behaviour with respect to illuminated and non-illuminated floats (Piovano *et al.*, 2003). We found no statistically significant difference between the time the turtles spent near to or far from the float, as well as between the experimental treatment and the control (when no float or reflector was in the tank).

We also tested the possible attraction of the flashing light usually present on radar reflectors by putting a similar light on the float, to imitate fishing conditions. Also in this case, the presence or absence of the illuminated float did not influence the spatial distribution of the turtles.

Our findings show that the spatial distribution of loggerhead turtles in captivity is not influenced by the presence of a float, either lit or unlit. It means that radar reflector floats are neither an attractant nor deterrent to turtles. We still need to test if loggerhead by-catch is more frequent near floats, in part, because the pulse light on the float may attract loggerheads’ prey species.

In another set of experiments, we tested if sounds may elicit avoidance reactions on loggerheads (Piovano *et al.*, 2002). Each individual was subjected to both noises and pure sounds. Each sound was played for 30 seconds, followed by a 30 seconds silence period. Each experiment had a maximum total duration of 4 minutes. After 120 seconds of silence, we passed on to the next frequency.

Behavioral responses were classified as avoidance, attraction, neutral response, and no effects. We defined as “no effect” all the turtle’s responses that were unrelated to the sound emission, for example when turtles reached the water surface for breathing.

Noises sequence ranged from 0-50 to 0-500 Hz, while the sequence of pure sounds ranged from 50 to 800 Hz. The incremental step was every 50 Hz. On average, the most common response to sound emissions was indifference, both for tones and for noises. At the lowest frequencies, however, both sound types may elicit a slight avoidance reaction. This research, therefore, was discontinued as results were not compatible with a real application by fishermen.

Two series of experiments were aimed at testing the colour and smell attractiveness of bait. First we used three sheaths, each colored red, yellow, or blue. Each sheath was filled with odorless inert material or with a scomber and anchored to the tank’s bottom. This experiment was repeated six times in order to test all possible color sequences and to exclude the border effect. No selection was recorded for scomber-less sheaths, while when scomber-containing sheaths are offered, red were preferred and blue were avoided, while we didn’t have statistically significant results for yellow. We observed that sniffing behaviour was frequent in adults, but not in immatures, and that scomber smell increases the artificial bait’s attractiveness. Our study has shown that bait smell is an important component of lure detection by turtles (Piovano *et al.*, 2004).

These findings were confirmed by data obtained during a second series of experiments (Piovano *et al.*, 2005a). During these experiments odourless and artificial bait with a small piece of scomber were offered to single turtles. The odourless baits were generally unattractive to turtles, particularly when scomber and scomber-less baits were simultaneously presented. Results (Fig. 1) showed that 18 out of 27 turtles bit the lure having a scomber odor, 1 bit only the odorless lures, and 8 never showed the final behavior of the predatory sequence and never bit a lure. The number of bites aimed at lures having scomber odor was significantly higher than that elicited by the odorless lure. Scomber odor caused a significant decrease (47%) in the behavior pattern of ignoring the lure while it nearly tripled the frequency of bites and other behaviors showing attraction to the lure, irrespectively of whether one or two lures having scomber odor were present.

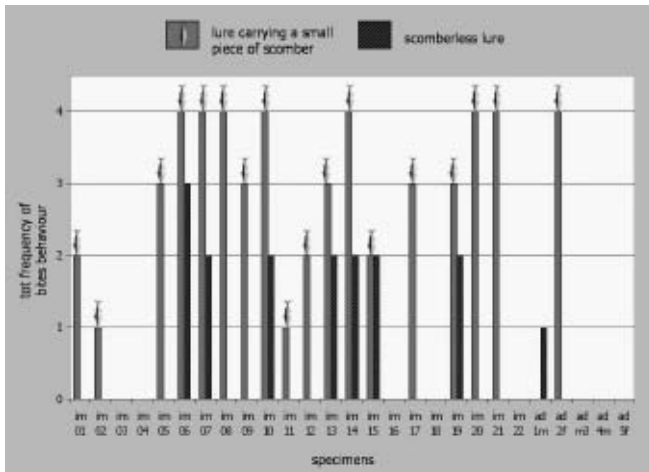


FIG. 1. Frequency of turtle bite frequency of lures with and without scomber.

When one scomberless lure and one scomber-containing lure were tested simultaneously, all the turtles bit the lure having scomber odor, even if it was set only 10 cm apart from the odorless one.

Finally, we tested lures at sea. Before looking for new lures, the European Commission asked that we test types already commercially available. Therefore, we tested in the laboratory several kinds of lures and we selected the least attractive one for turtles. Following fishermen requests, we joined 3 or 4 units together, to obtain a bigger lure (Fig. 2). Five vessels were involved in the study, for a total of 16 experimental fishing trips. Our lures reduced turtle by-catch, but also swordfish catch size (from 4.92 to 0.35 specimen of *Xiphias gladius* per 1,000 hooks) (Fig. 3). Our findings show that our lures were good for limiting loggerhead by-catch, but were not good enough for fishermen (Piovano *et al.*, 2005b).



FIG. 2. FOUR LURES (ARTIFICIAL BAITS) JOINED TOGETHER, FOR TESTING ATTRACTIVENESS TO SEA TURTLES.



FIG. 3. SWORDFISH CATCH SIZE WAS REDUCED ON LURES VERSUS A CONTROL.

In order to continue our search for an acceptable modification in drifting longline gear, we are now involved, still in collaboration with fishermen, in testing the effects of circle hooks on both target and by-catch species.

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A REGIONAL PROGRAM TO REDUCE SEA TURTLE BYCATCHES IN THE EASTERN PACIFIC: ACTIVITIES AND RESULTS FROM THE FIRST YEAR IN ECUADOR, AND REGIONAL DEVELOPMENT

MARTIN A. HALL

Inter-American Tropical Tuna Commission

A strategy was developed to reduce the mortality of sea turtles in coastal artisanal longline fisheries of the eastern Pacific. It consists of: 1) voluntary replacement of J hooks with circle hooks in operating fishing boats; 2) training in the use of instruments and techniques to release hooked and entangled turtles; 3) an observer program to record results; and 4) a series of workshops to communicate with the fishing community. The Ecuadorian Program is an effort supported by the Western Pacific Regional Fishery Management Council (WPRFMC), with contributions and important collaboration from World Wildlife Fund (WWF), the U.S. National Oceanographic and Atmospheric Administration (NOAA), Inter-American Tropical Tuna Commission (IATTC), U.S. State Department, U.S. Agency for International Development, The Ocean Conservancy, Defenders of Wildlife-Mexico, and national organizations, (i.e. in Ecuador the Subsecretaria de Recursos Pesqueros, the Asociacion de Exportadores de Pesca Blanca (ASOEXPEBLA), the Federacion Nacional de Cooperativas de Pescadores del Ecuador (FENACOPEC), the Programa Nacional de Onservadores Pesqueros del Ecuador (PROBE-CUADOR), fishers' schools, and environmental groups). The Overseas Fishery Cooperation Foundation of Japan is now joining the effort. Under the leadership of the national and regional offices of WWF, working together with government and industry sectors, and with the continued support from the WPRFMC, NOAA, and other organizations, the project has expanded to the entire eastern Pacific coast. Results from the first season for the tuna fishery from Ecuador were very encouraging. The main conclusions were:

Circle hooks were found to reduce the hooking rates of sea turtles by 44 to 88% in the tuna fishery (a statistically significant difference), and by 16 to 37% in the mahi-mahi fisheries (not tested yet for statistical significance).

Circle hooks were also found to result in more benign (survivable) hookings in the turtles that were hooked

in both fisheries. The proportion of hookings with lower survival declined from 70% to 25% - 40% in the tuna fishery, and from 96% to 18% - 53% in the mahi-mahi fishery (statistically-significant differences).

Considering both the reductions in hookings and the expected reductions in mortality of the turtles that are hooked, and applying a range of estimates of post-hooking mortality for different scenarios, it is estimated that the total reduction in mortality could be 63 to 93% in the tuna fishery, and 41 to 93% in the mahi-mahi fishery.

With regard to catch rates of the target species, in the tuna fishery the catch rates for the circle hooks were quite similar to those for the J hooks, but in the mahi-mahi fishery the catch rates for the circle hooks dropped by almost a third. Thus, the exchange of J hooks for circle hooks for the mahi-mahi fishery will depend on achieving better target catch rates through learning or additional changes in fishing gear and methods.

Larger samples, covering more seasons, and areas are required to confirm these results.

THE ROLE OF NGOS IN ADDRESSING SEA TURTLE BYCATCH PROBLEMS

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Sea turtle numbers have declined to the point that long-term survival of many populations is in serious jeopardy. There is increasing concern about the future of Pacific leatherback and loggerhead turtles, particularly in the eastern Pacific where some populations have declined by more than 90% in the last twenty years. The need to protect marine turtles when they return to nesting beaches is already well recognized. It is becoming increasingly clear, however, that enhanced efforts to protect them in the water are equally, if not more, crucial to their future.

WWF seeks to minimize bycatch of turtles and other non-target species in the context of ecosystem based fisheries management. This approach uses multiple points through the chain of custody to create different opportunities for sustainable fishing practices. WWF's

approach is practical, solution-oriented, and collaborative. WWF works with fishermen, traders, and consumers to create the demand for, and supply of, fish caught through sustainable fisheries management. We acknowledge that other NGOs may hold different view-points and work through different approaches.

WWF works to influence markets and purchasing to provide incentives for responsible fishing, including minimal bycatch. In Japan, the work focuses directly on traders and retailers to influence seafood consumption patterns and to ensure a continuing supply of sustainably sourced seafood. There is evidence that consumers, given information and choice, will choose not to buy seafood caught by environmentally harmful methods. WWF is developing guidelines for traders and retailers on responsible procurement of sashimi tuna, including the use of circle hooks where appropriate.

WWF is also working cooperatively with fishermen to reduce turtle bycatch through improvements to fishing gears and techniques. Fishing experiments in the North Atlantic have demonstrated that modifications to usual longline fishing gears and techniques, including especially the use of circle hooks instead of traditional J-shaped hooks, can dramatically reduce longline turtle bycatch while maintaining target catches. WWF is working across the Pacific to test circle hooks, evaluating their impact to catch rates for both turtles and fish.

In the Eastern Pacific, circle hook fishing experiments with observers onboard are currently underway in Mexico, Guatemala, El Salvador, Costa Rica, Panama, Colombia, Ecuador and Peru. In every country WWF is partnering primarily with fishers and their organizations, both at industrial and artisanal levels, and with fishing authorities, research institutions, and local NGOs. This effort has been made possible by funds provided by USAID and the US Department of State, as well as circle hooks donated by NOAA-Hawaii. In Ecuador, the effort is led by the IATTC, while in other countries the project is coordinated by offices of WWF in Peru, Colombia, Central America, and Mexico. The program is expected to increase its scope and coverage in the near future to increase both the number of fishing vessels joining the fishing experiments as well as the number of hooks being replaced throughout the region.

In the Western Pacific, the lessons learned during the first year of operations in the Eastern Pacific will help the implementation of a similar effort next year. Investigative work into the severity of the bycatch

problem is planned or underway in Indonesia, the Philippines, Papua New Guinea, Solomon Islands and Viet Nam. Circle hook trials with onboard observers will commence in Indonesia in the next season. This work is again conducted in partnership with fishing organizations and governments, and supported by USAID and NOAA-Hawaii.

Circle hooks alone may not solve the problems or be the best solution in every circumstance. Approaches such as time-area closures based on better understanding of migratory pathways of sea turtles may also be necessary. Other gear types also require bycatch mitigation strategies. There needs to be more widespread adaptation and use of turtle excluder devices in trawl fisheries, and a suite of solutions developed for artisanal gill-net fisheries. WWF is working with partners to help advance all of these issues.

One example is the SmartGear competition (www.smartgear.org) through which WWF hopes to inspire the development of new ideas for 'smarter' fishing. This competition supports the development of practical, cost-effective technologies that allow fishers to fish while also reducing the accidental catch of species like sea turtles, marine mammals, sea birds and juvenile fish. The USD 25,000 winner of the inaugural competition in 2005 was Steve Beverly of the South Pacific Commission, for his design of a lead-weighted mainline that delivers longline baits for tuna and day-swimming swordfish beyond the normal depth range of Pacific sea turtles.

WWF is investing in the development, testing and promotion of practical solutions to reduce bycatch. WWF is looking for pledges from both governments and fishing companies to work for solutions and we seek additional partners in our efforts.

INDIAN OCEAN – SOUTH-EAST ASIAN BYCATCH INITIATIVES

MR. DOUGLAS HYKLE
IOSEA Marine Turtle MoU Secretariat

In this presentation, I will provide an overview of the Indian Ocean – South-East Asian (IOSEA) Marine Turtle Memorandum of Understanding, and I will introduce the United Nations' Food and Agriculture Organization guidelines on reducing sea turtle mortality.

IOSEA MARINE TURTLE MEMORANDUM OF UNDERSTANDING

The IOSEA Marine Turtle MoU is an agreement among Governments that works in collaboration with a number of nongovernmental and intergovernmental partners. It was developed under the Convention on Migratory Species (CMS) about five years ago, and has been operational for about two and a half years. The agreement covers more than 40 countries of a vast region extending from South Africa into the Red Sea and Gulf region, across the Northern Indian Ocean to Southeast Asia, and even beyond into East Asia and Australia. The geographic coverage of the agreement overlaps to a very large extent with that of the Indian Ocean Tuna Commission.

The Memorandum of Understanding covers all six turtle species found in the region. The work of the MoU is conducted under a very detailed conservation and management plan, which contains about 100 activities grouped into six major objectives. The conservation plan deals with many more issues apart from fisheries bycatch; it is concerned with all sources of turtle mortality and ways of mitigating them.

So far, 22 governments have signed the Memorandum of Understanding and a number of other countries are expected to join soon. Saudi Arabia has signaled its intention to join, and India is said to be at a very advanced stage in its considerations. With those two countries, the agreement will cover the vast majority of the coastline of the Indian Ocean and Southeast Asia region.

About a year and a half ago, the IOSEA signatories agreed to extend the agreement's boundaries to cover also China, Japan and Korea. This recognized the fact that these countries share some of the same turtle populations, but even more importantly that they have sizeable fishing fleets operating in the Indian Ocean and interacting with turtles. The invitation for them to join the IOSEA MoU is still an open one, and one that hopefully will be realised in the next few years.

For practical purposes, the IOSEA Marine Turtle MoU is divided into four subregions. The member States do tend to organize themselves in their own sub-regional units. The Secretariat of the MoU, helping to coordinate the overall activities, is based in Bangkok.

Within a fairly short space of time, a number of tools have been developed on the IOSEA website

(www.ioseaturtles.org) that are helping to promote the exchange of information within the region. One of them is an interactive mapping system that we developed with the World Conservation Monitoring Centre, in Cambridge, U.K. This is a tool that allows users to view, through the web, about 30 years of data on turtle nesting and migration, and to overlay that information on other datasets on coral reefs, mangroves and seagrass.

Another tool offered on the IOSEA website is a projects database that compiles details of marine turtle projects from around the region. The database currently summarises information on about 50 projects from nearly 20 countries.

The Online Reporting Facility developed over the past year or so allows member States to submit their national reports online. The system can be queried by anyone using an interactive menu-based interface. Over 100 different aspects of implementation of the IOSEA MoU can be queried through this system – by country, by subregion, or for the entire region. A parallel database exists for sites and threats to marine turtles, allowing users to query the degree of threat to marine turtles, for any one of about a dozen threats, at any of the sites contained in the database.

FAO GUIDELINES TO REDUCE SEA TURTLE MORTALITY IN FISHING OPERATIONS

About five years ago, the Food and Agriculture Organization (FAO) began to recognize that some sea turtle stocks are impacted by fishing. Quite a lot has happened over the last year to develop guidelines aimed at reducing this mortality. An expert consultation and a technical meeting held last year in Bangkok served to produce the Guidelines that I am going to introduce today, which were then adopted in March 2005 by FAO's Committee on Fisheries (COFI).

The Guidelines are supposed to be elaborated further by FAO, and member states will be invited to report on their implementation by the next COFI meeting in 2007. It should be noted that these guidelines are voluntary, and are not binding on the countries. They are meant to apply only where fisheries interactions are occurring or are suspected to occur. The Guidelines are meant to be applied globally, but also to take into account regional differences.

The Guidelines are quite comprehensive, covering a wide range of policy areas. In this presentation I will

focus only on three specific areas within the context of the Indian Ocean: Fishing operations; research, monitoring and exchange of information; and, lastly, reporting.

Aspects of appropriate handling and release of caught turtles are covered by the Guidelines in quite some detail. I am not aware of any concerted program in the Indian Ocean to disseminate information on appropriate handling techniques, but I do know of a number of activities carried out through national programs, such as in Japan and Australia, where information is being disseminated to fishers. The extent to which these mitigation measures are actually being applied, however, needs to be assessed.

The Guidelines also encourage the identification of fisheries interactions with turtles in coastal trawling operations, and encourage the use of TEDs or equivalent bycatch mitigation measures. In the Indian Ocean, TEDs are not widely distributed and are not widely applied. The Guidelines also cover purse seines and, in particular, the need to avoid encircling turtles and to encourage the safe release of turtles. Improvements are recommended in the design of FADs. The extent of turtle interactions with FADs and purse seines is largely unknown.

The Guidelines also cover changes to fishing gear and fishing practices. Considerable progress has been made in this regard in some parts of the world, but these advances have not been promoted widely in the Indian Ocean. Australia has done a lot of work on net retention and recycling schemes, also mentioned by the Guidelines.

While the Guidelines also deal with spatial and temporal control of fishing operations, this presumes that hotspots for turtle bycatch have been identified. In the Indian Ocean, this work has not advanced very far. Finally, concern about the impact of turtle bycatch avoidance measures on other sensitive bycatch species is only just beginning to be discussed in the Indian Ocean context.

The FAO Guidelines also include a research and monitoring component, encouraging the collection of data on fisheries interactions through the establishment of observer programs. There is also a need for better data on turtle post-hooking survival prospects.

As mentioned earlier, the FAO Committee on Fisheries is supposed to receive reports on implementation of these guidelines every two years, and progress is meant

to be reported voluntarily to other bodies that have an interest in this issue, such as the IOSEA Marine Turtle MoU.

A couple of important issues are worth raising in relation to reporting. First, there is not yet a standard format for reporting in the FAO framework. The second concerns the limited amount of time that is available in COFI to deal with any reporting that might be done through that framework. There are serious constraints on COFI, given that it is dealing with many other issues other than turtle bycatch.

As noted earlier, the IOSEA agreement has already an existing online reporting template and an annual system of monitoring, with enough time available to critically examine the progress that has or has not been made. In March 2005, the signatories to the MoU decided that the reporting template should be adapted to enable IOSEA Signatory States to report also on measures they are taking to implement the FAO Guidelines. The IOSEA reporting template has been revised accordingly to accommodate the specific aspects of the FAO Guidelines.

Turning now to the Indian Ocean Tuna Commission (IOTC), based in Seychelles, with a membership of about 25 countries. By its own admission, the IOTC is lagging behind other Regional Fisheries Management Organisations (RFMOs), such as the Inter-American Tropical Tuna Commission, in work on bycatch mitigation. But it is starting now to look at bycatch of non-target species, beginning with sharks as a first priority, but also seabirds and turtles. The very first meeting of a bycatch working party was held in Phuket in July 2005 to try to set some priorities for work.

The IOTC needs to be doing at least three things in relation to turtles. One is to begin testing mitigation measures that have been demonstrated to be effective in other oceans. The second is to begin to provide for standardized data collection on turtle bycatch in any observer schemes that might be developed. (There is a process now to begin to develop such an observer scheme in the Indian Ocean.) The third is to work with organisations like the IOSEA MoU to identify critical areas of potential turtle interactions with fisheries, both spatially and seasonally.

In summary, the IOSEA Marine Turtle MoU and its online information exchange portal offers a number of tools to analyse threats to turtles, such as its interactive

mapping system (IMapS), projects database and online reporting facility. IOSEA has an important role to play in monitoring the FAO Guidelines by producing annual syntheses on implementation progress. Hopefully, two rounds of reporting will have been completed prior to the next COFI meeting. We are also working within the IOSEA region to develop a network of sites of importance for turtles that would mimic in some ways successful site networks that have been developed for migratory birds. Finally, I would like to call attention to a major awareness campaign to be conducted next year around the Indian Ocean. The “Year of the Turtle” will be an opportunity not only for conservation groups, but also industry, to demonstrate and hopefully receive credit for some of the mitigation work that they’re doing.

The International Fishers Forum facilitates a unique convergence of fisheries, seabird and turtle interests; and I understand that it may be extended to cover marine mammals as well. I don’t know of any other forum that brings together people in this way. To the extent that the International Fishers Forum is contributing to a useful process of “constructive engagement”, as opposed to the “destructive disengagement”, we can all be grateful to the Western Pacific Regional Fishery Management Council for making this possible.

RESEARCH ON SEA TURTLE NESTING AND MIGRATION: COMPREHENSIVE CONSERVATION EFFORTS TO STOP THE DECLINE OF LEATHERBACK SEA TURTLES; REPORT FROM ASIAN NESTING BEACHES

HIROYUKI SUGANUMA
Everlasting Nature of Asia

The first research on leatherback sea turtle nesting was conducted in the early 1980s at Jamursba-Medi region in Papua, Indonesia, the location of a leatherback rookery. The number of nests was estimated to be 13,000 (Bhaskar, 1985). Bhasker (1985) reported that leatherback eggs were predated by feral pigs. Local people had collected eggs from leatherback nests for consumption until 1992. The local community was aware that number of nests was gradually decreasing

and voluntarily decided to stop collecting eggs in 1993. The Department of Forestry and WWF-Indonesia supported the monitoring project conducted by the local community. Unfortunately, support was temporally stopped in 1999. The Everlasting Nature of Asia visited the site to survey hawksbill turtles in 1999, at which time we were asked to support their monitoring project. We decided to take part in the monitoring activities and have support the project since 2000.

There are four turtle nesting beaches, Wembrak, Batu Rumah, Lapon and Warmamed, in the Jamursba-Medi region. The total beach length is 18 km. The number of leatherback nests was gradually decreasing in this region (Fig 1). The nesting season is April through September. The decreasing trend here is much different from rookeries of Mexico and Costa Rica. There was an abrupt decrease of leatherback nesting in the Eastern Pacific regions. It is said that these decreases are caused by longline fishery (2000, Spotila et al).

Predation rates by feral pigs were surveyed in the Jamursba-Medi region in 1999. Sixty three percent of whole nests were predated by feral pigs. In March 2000 and July 2001 we installed electric fences totaling 4 km in length along the section of beach with the highest turtle nesting density to prevent pig predation. The electric fences resulted in a dramatic reduction in feral pig predation (Table 1). The predation rate was 83.1% on September 1999 in front of the electric fences, decreasing only 1.2% by September 2003. The fences were completely destroyed by a tsunami in October 2003. The predation rate increased 36.3% in front of the fences and 19.0% on all nesting beaches by August 2004. We repaired the fences at that time. The predation rate is gradually decreasing again.

The turtle hatching rate was surveyed in 1999, 2001 and 2004 for the Jamursba-Medi region. Normal eggs were 73.0 (40-117) eggs and yolkless eggs were 26.8 (1-76) eggs. The hatching rate was 77.1% (N=7) in 1999, 58.1% (N=15) in 2001 and 20.1% (N=50) in 2004. Hatching rates at each beach in 2004 were 9.2% at Wembrak beach, 15.5% at Batu Rumah beach and 46.9% at Warmamed beach including Lapon beach. Much sand at Wembrak beach was washed away by the tsunami in October 2003. Therefore, the mean rate of unfertile eggs that were likely caused by high waves was 76.8%. On the other hand, the mean rate of late embryos and piping embryos that were caused by high sand temperature were 13.0% at Warmamed beach. Little sand was washed by the tsunami at this beach. The mean rate of unfertile eggs was 24.4%.

We have also conducted surveys at the Wermon region since 1999 (Suganuma, 2000). This region has one turtle nesting beach, called Wermon beach, which is managed by Wau village. This region is located 30 km west of the Jamursba-Medi region. The total length of this beach is 5km. We employed four local people from Wau village to be monitoring guards and in January 2005 began to monitor the number of leatherback nests. There were 647 leatherback nests from January to June 2005. The monitoring data show that the nesting season is from January to March. The predation rate of nests by pigs or dogs is very low, 2.7% in 2005. The hatching rate is critically low at 6.8% (N=51); almost all nests were submerged by high waves in 2005. This low hatching rate was due to eroding sand that was caused by a tsunami in October 2003 as also occurred at Wembrak beach. 40.8% of leatherback nests were collected by local people in 2004. We discussed this problem with the local community at Wau village. As a result of our negotiations, no nests were subsequently taken in 2005.

We conducted a training program at three islands in the western Java Sea where we have conducted conservation and management of hawksbill turtles. We took local guards of Papua to those islands, and conducted a tagging program and survey of hatching success.

WWF-Indonesia and the U.S. National Marine Fisheries Service also conduct research on leatherback turtles in Papua. They conduct a monitoring program, satellite tracking and aerial surveys. There is a need for coordinating our research for the conservation and management of leatherback turtles of Papua. The aim of our project is not to study leatherbacks but to achieve the recovery of leatherback populations in Papua.

TABLE 1. AFFECT OF ELECTRIC FENCES ON TURTLE PREDATION BY FERAL PIGS. FENCES WERE INSTALLED ON MARCH 2001 AND JULY 2002. THE FENCES WERE DESTROYED BY A TSUNAMI IN OCTOBER 2003, AND WERE REPAIRED IN AUGUST 2004.

DATE	PREDATION RATE IN FRONT OF ELECTRIC FENCE	PREDATION RATE FOR THE ENTIRE NESTING BEACH
SEP 1999	83.1%	63.3%
JUL 2001	8.8%	24.0%
JUL 2002	19.8%	17.5%
SEP 2002	6.9%	11.2%
SEP 2003	1.2%	7.1%
AUG 2004	36.3%	19.0%
JUN 2005	18.3%	16.5%

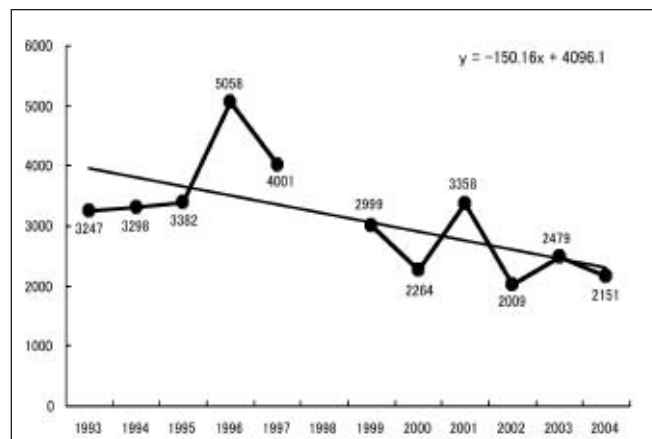


FIG 1. NUMBER OF LEATHERBACK TURTLE NESTS IN JAMURSBAMEDI, PAPUA.



FIG. 2. MAP OF PAPUA.

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RESEARCH ON SEA TURTLE NESTING AND MIGRATION: MIGRATION, HABITAT USE AND CONSERVATION OF WESTERN PACIFIC LEATHERBACK STOCKS

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The collapse of leatherback populations in the eastern Pacific and Malaysia have led to concern over the status of leatherbacks in the Pacific. Results of genetic studies reveal that leatherbacks encountered in the Hawaii-based longline fishery and the California-Oregon gillnet fishery in the North Pacific are primarily from the western Pacific nesting stock. The status and structure of this stock is not well understood. The U.S. NOAA Fisheries Service and research partners have conducted nesting beach monitoring and aerial surveys to identify the key nesting sites for leatherbacks in the western Pacific region, including Solomon Islands, Vanuatu, Papua New Guinea (PNG) and Irian Jaya (Papua-Indonesia). Preliminary surveys indicate greater nesting activity than previously reported. In addition, satellite telemetry studies have been conducted in order to better understand the linkages between nesting beaches and foraging areas, and determine patterns of migration and habitat use for this species. Movements of a total of 53 leatherbacks that have been tracked since 2000 reveal that Irian Jaya nesters migrate to different areas across the North Pacific, ranging from coastal areas around the Philippines, to coastal areas off the U.S. west coast, and that foraging male and female leatherbacks move between near-shore and open ocean habitats in the North Pacific. Nesters from PNG migrate south, and are therefore exposed to potential threats from fisheries in the southern hemisphere. In addition to the far-ranging threats of pelagic high seas fisheries, there is a need to address the extent of illegal, undocumented fisheries in the regions adjacent to nesting areas. Our studies reveal extensive inter-nesting movement by female leatherbacks during the months that they are nesting throughout the waters in the region from Huon Gulf in PNG and through the Raja Ampat Islands in Indonesia. Capacity to evaluate and monitor fishing activities in these and other regional waters further offshore is limited.

A PELAGIC HOTSPOT FOR JAPANESE JUVENILE LOGGERHEAD SEA TURTLES: THE KUROSHIO EXTENSION CURRENT BIFURCATION REGION

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Satellite telemetry of 43 Japanese juvenile loggerhead turtles (*Caretta caretta*) in the western North Pacific together with satellite-remotely sensed oceanographic data identified the Kuroshio Extension Current Bifurcation Region (KECBR) as a forage hotspot for these turtles. In the KECBR juvenile loggerheads resided in Kuroshio Extension Current (KEC) meanders and the associated anti-cyclonic (warm core) and cyclonic (cold core) eddies during the fall, winter, and spring when the KEC water contains high surface chlorophyll. Turtles often remained at a specific feature for several months. However, in the summer when the KEC waters become vertically stratified and surface chlorophyll levels are low, the turtles moved north up to 600 km from the main axis of KEC to the Transition Zone Chlorophyll Front (TZCF).

In some instances, the loggerheads swam against geostrophic currents, and seasonally all turtles moved north and south across the strong zonal flow. Loggerhead turtles traveling westward in the KECBR had their directed westward movement reduced 50% by the opposing current, while those traveling eastward exhibited an increase in directed zonal movement. It appears, therefore, that these relatively weak-swimming juvenile loggerheads are not passive drifters in a major ocean current but are able to move east, west, north, and south through this very energetic and complex habitat.

These results indicate that oceanic regions, specifically the KECBR, represent an important juvenile forage habitat for the North Pacific stock of threatened loggerhead turtles nesting exclusively in Japan. Interannual and decadal changes in productivity of the KECBR may be important to the species' population dynamics. Further, conservation efforts should focus on identifying and reducing threats to the survival of loggerhead turtles in the KECBR.

Sea Turtle Bycatch in Longline Fisheries – Main Points and Summary



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CURRENT STATUS OF SEA TURTLES

It was recognized that many sea turtles populations are at low levels or showing decreasing trends. Some populations need conservation efforts to avoid extinction. Many factors, both on land and at sea, are affecting sea turtle populations. Participants recognized the importance of reducing detrimental impacts from fishery-sea turtle interactions for the sustainable coexistence of sea turtles and fisheries.

MITIGATION MEASURES

A number of potential mitigation measures are currently available (as shown below) to reduce incidental mortality of sea turtles in longline fisheries:

- * Fishing practice modification
 - selection of fishing area/period
 - selection of fishing depth
- * Gear/bait modification
 - use of circle hooks
 - use of fish bait instead of squid bait
- * Handling and rescue
 - proper handling and release

As an immediate measure, use of circle hooks, fish bait, and a rescue kit to handle and release caught turtles is a good starting point. Field tests and data collection on these methods and other possible methods are necessary.

Telemetry studies will identify the hotspots of sea turtle-fisheries interactions where the introduction of mitigation measures is urgently needed. Development and improvement of mitigation measures should be continued to increase effectiveness and practicality. In this respect, co-operation and information exchange among fishers, managers and scientists are important.

HOLISTIC APPROACH FOR THE CONSERVATION OF SEA TURTLES

Fishery-related mortality is not the only factor threatening sea turtle populations. It is important to monitor the status of sea turtle populations and to manage all potential factors affecting sea turtles. A combination of efforts both on land and at sea will make actions to improve the conservation status of turtles more effective. The FAO guidelines provide a good reference for this holistic approach.

INAUGURAL JADE SEA TURTLE AWARD and 2ND GOLDEN ALBATROSS AWARD

The International Fishers Forum presented the Hawaii Longline Association (HLA) with the Jade Sea Turtle Award for being, “a shining example to other fishers on reducing sea turtle interactions.” While accounting for only 2 percent of the longline effort in the Pacific, the Hawaii longline fleet has had to deal with the Pacific-wide impact of all fisheries on sea turtles as well as land-based impacts on turtle nesting beaches. The Hawaii longline swordfish fishery was closed for over four years and is now subject to strict management measures, including prescribed use of large circle hooks and fish bait, restricted annual effort, annual limits on turtle captures, and 100% onboard observer coverage, due to turtle interactions.

The Forum awarded its second Golden Albatross Award to the federation of Japan Tuna Fisheries Cooperative Association (NIKKATSU-REN) for developing the tori line. The tori line reduces longline interactions with seabirds, and is now being used in longline fisheries worldwide.

Certificates of recognition for turtle conservation work in Ecuador were awarded to Guillermo Moran and the Asociation de Exportadores de Pesca Blanca (ASOEXPEBLA) and to Luis Torres and Programa Nacional de Observadores Pesqueros del Ecuador (PROBECUADOR).

A large, light gray graphic on a darker gray background. It features several stylized fish swimming in a circular pattern, with wavy lines representing water or currents. The fish are simple shapes with small dots for eyes. The overall style is clean and modern.

APPENDIX 1:

Update on IFF2 Commitments





Update on IFF2 Commitments

At the Second International Fishers Forum (IFF2), 65 participants stood before their colleagues to commit to specific actions as an individual or part of a group to address seabird and sea turtle bycatch. The commitments made were wide-ranging in terms of geographic scope and the nature of the tools, techniques and strategies to be employed.

Below is a summary of actions that have been completed since IFF2 as reported by 10 of the participants as well as a summary of all of the commitments that were made at IFF2. To protect confidentiality, forum participants agreed that the commitments would be attributed to specific regions and topical foci but not to particular individuals.

REPORTED ACCOMPLISHMENTS SINCE IFF2

AUSTRALIA

Awareness of fishing interactions increased through direct communications with fishers and talks at meetings, including participation at Southern Seabird Solutions, Threat Abatement Team meetings, intergovernmental meetings dealing with protected species and industry meetings to discuss solutions to deal with interactions.

The Industry Code of Practice was finalized, distributed, adopted by industry and implemented. It highlights, among other things, techniques to avoid interactions and handling to increase survivorship. It is available at www.tuna-ectboa.com.

The SEO Fishermen's competition was publicized by e-mail and through published articles. Presentations on

the outcomes of the forum were conducted throughout the industry.

A brochure to educate fishers on the effect of monofilament in the marine environment has been initiated and approved.

The use of line cutters and de-hookers in the fishery has been facilitated through dedicated projects.

Progress has been made on the mandatory use of seabird bags on boats to collect samples for research.

Finances were approved and directions given to support the hosting of an Ocean Watch Seanet Program extension officer.

Meetings were facilitated and attended; solutions negotiated; and partnerships with government agencies entered into on behalf of and with fishermen.

The protected species handling manual was revised as a reference manual for the Industry Code of Practice.

The following research projects were approved, supported and assisted:

- “Seabird mitigation trials” (underwater line setting chute, 60 gram swivel in combination with double tori lines, 38 gram swivel in combination with double tori lines);
- “Acoustic (bird scaring) device trial”;
- “Sea turtle mitigation for Australian pelagic long-line fisheries” (involves fishers attending workshops covering sea turtle biology, sea turtle handling techniques and sea turtle research and collecting information and samples for turtle research);

- “New deep setting long-line technique for bycatch mitigation” (trials a technique to stop catch of turtles and other bycatch by setting at depth); and
- “Increasing the uptake of line cutters and de-hookers in the ET&BF &WTBF” (demonstrates and places de-hookers and line-cutters on vessels).

Assistance was provided to researchers to establish the collection of critical samples.

Long-term arrangements and collaborative partnerships with fishers, government agencies and researchers were facilitated.

A long-term partnership with Ocean Watch and long-term relationships with MSC and WWF were established and maintained.

Industry funds were used to facilitate and attend meetings associated with the objectives. Ensured funds are secured to undertake the projects through various avenues, including Fisheries Research and Development Cooperation, Management Advisory Committee Research funds.

NEW ZEALAND

Close contact was kept with several New Zealand fishers. Information and ideas to improve existing proven methods were exchanged. New methods—offal retention and integrated weighted lines—were discussed.

Integrated weighted line is now being used aboard two deep-sea longliners. All of the skippers are impressed with the line. Others will be encouraged to use it.

A crewmember exchange program was started in conjunction with Southern Seabird Solutions and a Chilean fisherman.

The boom and bridal system is now part of the standard mitigation equipment aboard four of the five deep-sea bottom longliners operating from New Zealand. Further developments are ongoing. The line jiggler is now installed aboard two New Zealand vessels and is gaining support for further applications.

UNITED STATES

ALASKA

In 2003, a final proposal, “Seabird Bycatch Initiative: Assessing and mitigating the impact of seabird bycatch from pelagic longline fisheries in the Pacific,” was submitted to APEC’s Fisheries Working Group (FWG) jointly by Chile and the United States and co-sponsored by Australia, Peru and New Zealand. Unfortunately, APEC’s FWG was facing budget constraints, and the seabird bycatch proposal was not funded.

Distribution of the video *Off the Hook: An Informational Video for Alaska Longliners* was coordinated with the Washington Sea Grant Program in 2003. The video was sent free-of-charge to all Alaska longliners and numerous longline associations, government agencies and international contacts. National Marine Fisheries Service (NMFS) is currently funding a project to produce and distribute a Spanish version of the video. The video is scheduled to be distributed in Chile, Uruguay, Peru, Argentina and Ecuador in 2005-2006.

Trawl mitigation research in Alaska got underway in 2003-04 and is being conducted by Washington Sea Grant Program along with related projects by NMFS Alaska Fisheries Science Center. Both groups have consulted on the trawl mitigation work with Falkland Conservation.

NMFS support was gained for the “Regional Technical Workshop on Seabird Bycatch and Mitigation,” held in Kaoshiung, Taiwan, January 13-14, 2004. Two presentations were made: “Solving the Seabird By-catch Problem through International Cooperation” and “Seabird Mitigation and Research.”

In August 2004, NMFS sponsored a workshop at the 3rd International Albatross & Petrel Conference in Montevideo, Uruguay, on “Quantifying seabird bycatch: a global perspective,” which was instrumental in fostering discussion and creating a network for future collaborative bycatch research.

New NMFS regulations for the longline fleet performance standards came into effect January 1, 2004, and so far, appears to have had an effect. Total number of birds, all species, taken is about half from the previous year. New mitigation measures for the trawl fleet went into effect as well. No short-tailed albatrosses were taken during the year.

In 2004, final seabird avoidance regulations for the groundfish and halibut demersal longline fisheries off Alaska were revised. The improvements were based on research conducted by Washington Sea Grant Program that showed that paired streamer lines could reduce seabird bycatch by 80% to 100%. Information on the revised requirements can be found at <http://www.fakr.noaa.gov/protectedresources/seabirds/guide.htm>

In 2004, the NMFS National Seabird Program received funding through the NMFS Reducing Bycatch Initiative to fund projects to address seabird/fishery issues. Funding was again received in 2005 and the National Seabird Program has been able to support various projects in the US and international projects, some of which include sponsorship at the 3rd International Albatross & Petrel Conference and the workshop “Development of Best Practices for the Collection of Longline Data to Facilitate Research and Analysis to Reduce Bycatch,” monitoring seabird bycatch in Peru, support of a World Wildlife Fund project to build capacity and reduce seabird bycatch in Russia’s longline fisheries, support of integrated weight groundline testing in Alaska, support development of a North Atlantic seabird identification guide, and outreach and characterization of seabird bycatch in various US fisheries.

Numerous international colleagues were contacted to assess the current status of NPOA development in longline nations. This information was incorporated into a presentation made at a NMFS sponsored side session “IPOA-Seabirds: Best Practices for NPOA Development” at COFI on March 26, 2005, in Rome, Italy, along with presentations made by the American Bird Conservancy and BirdLife International. Presentations were also made at the meeting of the Regional Fisheries Bodies that followed COFI. All presentations can be viewed at <http://www.fakr.noaa.gov/protectedresources/seabirds/national.htm>

Coordination has taken place with Canadian scientists and the US Fish & Wildlife Service (USFWS) for the development of this laminated seabird ID guide. USFWS is funding and in charge of this project.

EAST COAST

Several conference calls were held regarding a technical working group on satellite technology, but lobbying for a meeting was not successful.

In 2003, techniques were developed to safely board large leatherback turtles onto commercial fishing vessels to allow gear removal and satellite tagging.

A pilot satellite tagging research was conducted in 2003 and was to continue in 2004 to determine the feasibility of satellite tagging technology for determining sea turtle post release survival.

The effectiveness of mitigation measures already implemented (such as line cutters, dehookers, and turtle handling and release techniques) has been determined.

Procedures for turtle handling and release have been developed and implemented.

Limited success has been achieved to allow biological data collection by fishermen.

Attempts to develop a protocol to allow fishermen to administer antibiotics to injured turtles prior to release has been unsuccessful.

Research results have been posted on NOAA Fisheries websites. Link-<http://www.mslabs.noaa.gov>

GUAM

Funding to initiate a bigeye tuna longline fishery pilot project, which will address seabird and turtle bycatch issues, has been secured.

HAWAII

A sea turtle conservation program has been implemented to bolster population recovery and offset impacts of the Hawaii-based longline fishery. Projects include:

- Three nesting beach projects to maximize hatching production and protect nesting turtles and their habitats in Papua (Indonesia) and Papua New Guinea for leatherback turtles and in Japan for loggerhead sea turtles;
- Two foraging habitat projects to reduce direct harvest and fishery impacts of leatherback (Kei Islands, Indonesia) and loggerhead (Baja California, Mexico) sea turtles in their coastal foraging grounds;
- Data Management: Regional sea turtle tagging database (TREDs) under development – to be launched during the Year of the Turtle 2006 campaign; and

- Assistance to IOSEA and International Sea Turtle Society meetings to promote sea turtle conservation and research activities

Several fishery mitigation projects are underway including:

- Support was provided for year 1 (March 2004 to March 2005) of an Ecuador project to study the impacts on the fishery and turtle bycatch by using circle hooks instead of J hooks. Results show that up to 93% reduction in sea turtle bycatch and mortality can be achieved by use of circle hooks. In 2005, the project continues in Ecuador and has been expanded to Peru and Columbia;
- International meetings convened for bycatch reduction and gear technology transfer;
- Participation in US delegations at FAO, COFI and other key meetings to help find solutions to bycatch problems and transfer best practice technology to the international longline fleet;
- Hawaii-based longline swordfish fishery reopened April 2004 with requirement to use circle hooks in combination with mackerel-type bait. Preliminary results indicate low bycatch rates and no reduction in catch rates of target species;
- Side-setting research conducted with 100% reduction in seabird interaction rates achieved;
- Approximately eight Hawaii-based longline boats voluntarily switch to side-setting; and
- Additional seabird mitigation measures are now required on Hawaii-based longline boats (line shooter, weighted branch lines, blue dyed bait, offal discard, tori lines, set at night).

Educational materials have been produced, including a poster on methods to release seabirds and avoid bird capture in longline gear; a booklet on methods to reduce turtle bycatch in pelagic longline gear (Catch Fish Not Turtles brochure in English, Spanish, Japanese and Mandarin); a poster and booklet on side setting for pelagic longliners (in Japanese, English and Korean with a Vietnamese translation underway); a brochure summarizing the protected species program; a brochure summarizing year one of the Ecuador project to transfer circle hook technology; and a brochure summarizing the Baja project to reduce gillnet fishery and direct harvest impacts to north pacific loggerhead sea turtles.

IFF2 proceedings have been produced.

The stage is set for cooperative fishery mitigation experiments between the United States and Japan.

The concept of an international performance standard for a hook sink rate for both pelagic and demersal longline fisheries was described in the three publications:

- Gilman E, N Brothers, D Kobayashi. 2005. Principles and approaches to abate seabird bycatch in longline fisheries. *Fish and Fisheries* 6(1):35-49.
- Gilman E, C Boggs, N Brothers. 2003. Performance assessment of an underwater setting chute to mitigate seabird bycatch in the Hawaii pelagic longline tuna fishery. *Ocean and Coastal Management* 46(11-12):985-1010.
- Gilman E, H Freifeld. 2003. Seabird mortality in North Pacific longline fisheries. *Endangered Species Update* 20(2):35-46.

A second experiment was conducted in the Hawaii longline fisheries on two lengths of underwater setting chutes, side setting and blue-dyed bait.

Colleagues were helped to apply for and manage a grant from the USFWS to support research on seabird avoidance methods in the Argentinean demersal longline fleet.

Dockside technical assistance program for Hawaii longline fleet to switch to side set has been planned and funded and starts in August 2005.

The state of knowledge of methods to reduce sea turtle bycatch in pelagic longline fisheries has been reviewed.

A design is underway for a pilot fleet communication program for the Hawaii longline fleet, to be implemented in late 2005.

WASHINGTON

Communications are ongoing with nongovernmental organizations to try to bridge the gap between points of view.

PACIFIC ISLANDS

A tuna longline manual for Pacific Island fishermen was published in mid-2003 and includes bycatch issues (such as handling and releasing sea turtles alive) and the importance of completing logbooks.

Work has commenced on a species identification manual, including sea turtles, to increase accuracy of species specific data provided in logbooks by tuna longline fishermen in Pacific Island countries and territories.

The use of logbook, including the identification and recording of bycatch species such as turtles, in domestic tuna longline operations and the use of observers are being promoted through the Oceanic Fisheries Programme at the Secretariat of the Pacific Community (SPC).

The Fisheries Training Section of SPC has developed a set of plastic cards on the identification of the seven species of sea turtles and posters and laminated cards on releasing sea turtles alive.

A booklet on bycatch species and issues, including sea turtles, is being finalized.

An article on sea turtle mitigation measures was anticipated to appear in 2004.

SOUTHERN OCEAN

An analysis of the potential role and priority topics for an Advisory Committee [to the CMS Agreement on Albatrosses and Petrels], together with suggestions for inputs from partners and non-governmental organizations, has been circulated.

The Incidental Mortality Associated with Fishing (IMAF) working group of the Convention for the Conservation of Antarctic Marine Living Resources (CCAMLR) comprehensively revised conservation measures governing mitigation of seabird bycatch in CCAMLR waters at its meeting in October 2003. The new conservation measures, including revised line weighting procedures, were approved and adopted by CCAMLR in November 2003 and came into force in May 2004 for all 24 member countries. The issue of using these measures to allow vessels to fish in summer in areas of high risk of interaction with seabirds still remains to be addressed. The critical test is the ability of existing mitigation measures to perform adequately in areas of high density of breeding seabirds.

BirdLife International secured a commitment from the European Community Directorate General of Fisheries to produce a draft FAO Plan of Action-Seabirds for the European Community during 2006.

BirdLife is completing a review of the performance of Regional Fisheries Management Organizations (RFMOs) in respect of albatross bycatch. BirdLife is also developing an analysis of which areas and fisheries have the potential for most serious adverse interactions.

ARGENTINA

Continue working with fishers in solving the seabird bycatch problems in Argentina

Develop a project, jointly with the Fish and Wildlife Service from the United States to identify candidate methods, and determine their effectiveness at reducing seabird mortality in Argentina.

AUSTRALIA

Work through boat-owner associations to gain assistance, support and funds to educate fishermen and increase the awareness of bycatch problems throughout the industry.

Disseminate the information from IFF2 and encourage the use of all tools and devices to reduce mortalities of turtles and seabirds.

Develop strong partnerships with researchers and non-governmental organizations to support fishermen in finding solutions to bycatch problems.

Disseminate a bird guide and a turtle guide that will be produced by the Secretariat of the Pacific Community to help with identification of seabird and sea turtle species for logbooks.

Collaborate with fishers to write articles for both the mainstream media and nongovernmental organizations on the achievements of fishers in devising mitigation methods for the reduction of bird or turtle bycatch.

Encourage the use of dehooking and line cutting devices by fishermen along the coast.

Encourage the Australian Fisheries Management Authority in further trials of seabird and turtle mitigation devices to have real-time reporting to fishermen.

Increase awareness of seabird and turtle bycatch problems throughout the industry and in forums.

Educate and extend the information from IFF2.

Encourage the use of all tools and devices to reduce mortalities of turtles and seabirds.

Provide resources to facilitate education and awareness within the fisheries.

Support and assist fishermen especially in formulating solutions.

Develop strong long-term partnerships with researchers, nongovernmental organizations and others to help to achieve goals.

Establish avenues to gain assistance, support and funds to make objectives a reality.

Establish and maintain, or contribute data to, an internet database site on bycatch generated by marine fisheries.

Prepare training modules for web-based delivery.

Sponsor research on new mitigation technology, marine protected areas and engendering common ownership and a commonly accepted solution.

Provide information on IFF2 processes and outcomes, and identify any deficiencies in the Australian Fisheries Management Authority.

Coordinate consultation with fishery managers, EA, nongovernmental organizations and industry to develop a new strategic plan to address seabirds and turtles.

Provide transparent data to be used to chart progress against objectives.

CANADA

Organize and contribute to an improved system of utilizing birds caught in fishing gear in Canadian waters to not only help ascertain the age, sex, and provenance of birds caught, but also provide data on diet, molt, and location hooked (i.e. wing, bill).

Analyze the distribution and abundance of albatrosses in the proximity of a shallow seamount, in relation to

oceanographic data such as salinity, temperature, and nutrients to help assist in the understanding of the significance for and the need to protect, through fisheries management and/or the establishment of MPAs, shallow seamounts within the temperate North Pacific.

Continue to work with fisheries observers and others (including the skipper and crew) to raise awareness of seabird bycatch and to train them in seabird identification, data collection, specimen storage and retrieval and ensure that there is a feedback mechanism to guarantee that observers and fishers feel that they are part of the process.

Collaborate with local fishermen to

- Continue to develop integrated monitoring applications for commercial fisheries (i.e. integrated EM/observer monitors);
- Raise awareness of bycatch with the goal of developing ownership of the problem;
- Work with industry groups and Canadian agencies to develop a pilot program for the use of EM;

Collaborate with fishing groups outside of BC, Canada to

- Share experience with fishermen and agencies and discuss ideas regarding integrated monitoring and industry led data collection initiatives;
- Work with interested groups to pilot test electric monitor for various fishing monitoring applications;

Include issues on bycatch, particularly seabird bycatch, in the Western Conference on fisheries in Victoria, BC.

Encourage Canadian fishermen to come to IFF3.

Develop recovery strategies for leatherback turtles in the Canadian Pacific and Atlantic.

Distribute education and training materials to the fishing industry, government, general public, and fishery managers.

Assess fishery interactions in Canadian waters to include assessment of sighting, and catch and release data.

Assess application of potential gear modification to reduce bycatch (leatherbacks, other sea turtles, and seabirds) in Canadian waters.

Support and facilitate national and international information exchange opportunities.

Participate in multi-interest stakeholder undertakings to develop recovery strategies and actions for leatherback turtles in Canadian waters. Objectives include:

- Foster buy-in and commitment;
- Identify a common mission and agree on goals;
- Encourage openness and transparency;

Identify scope of bycatch problems in Canadian waters.

Review and assess data collection methodology to detect gaps in knowledge.

Support Canadian research actions.

Foster international research collaboration.

Participate in international forums and conferences.

Invite international participation in the development of Canada's recovery strategies.

CHILE

Continue efforts to advance effective reduction of seabird bycatch in Chile.

Collaborate with international initiatives focused on maintaining the basic ecological processes of the marine ecosystem.

CHINA

Disseminate information from the forum.

Collect data from distant water fleets through fishing companies.

Seek financial resources from FAO for data collection from Chinese fleets.

MEXICO

Disseminate, via a new website and other means, information on actions to solve the bycatch problem among scientists, fishermen and government agencies.

Implement, test and improve mitigation practices introduced at IFF2.

Encourage other fishers to implement these practices once they have proven effective in our fleet.

Disseminate the actions to solve the bycatch problem in the government, in the scientific community and among fishermen in Mexico.

Create a website to assist in implementing and testing of mitigation practices.

Encourage others to implement proven mitigation practices.

NEW ZEALAND

Continue research and development on the weighted line for bottom longline fishing, which has produced highly positive results to date, and perfect its performance.

Expand the number of vessels that use this weighted line for trials.

Work to refine the code of practice to increase the minimum standards of bird mitigation currently used on vessels in New Zealand.

Promote introductions of an inshore fleet to the Ling Longline Working Group and help them to develop a code of practice for their fishery.

Draw in representatives of fisheries that aren't yet participants in the alliance.

Pursue joint projects with other countries that share albatrosses and petrels with New Zealand.

Continue to modify the Code of Practice to increase the minimum standards of bird mitigation currently used on the boats in New Zealand.

Help the smaller boats and the smaller inshore fleet to develop a code of practice for their fisheries.

Continue research and include results from the comparison of target catches, bycatch and longevity of gear.

Continue trials for the integrated weighted line, working collaboratively with the Department of Conservation in New Zealand observer program to gather the data.

Conduct trials on the weighted line with bigger gear to ascertain the sink rate, and how it would affect fishing in CCAMLR waters for toothfish.

Install the jigger on boat.

Purchase a new longline vessel that has the ability to haul the line through the middle of the boat rather than from the outside, thus any fish that drops off would stay there instead of drifting and potentially attracting birds.

Determine the feasibility of installing an inboard line-setting chute as a means to mitigate bird interactions with longline vessel.

Facilitate feedback of the NZ observer program to the longline fishermen concerning the following items and execute and present the findings from this initiative in a timely manner to help fishermen plan next year's fishing season.

- The percentage of compliance with voluntary codes of practice;
- The environmental and fishing factors relative to rates of incidental take (i.e. sink rate, time of set); and
- The number of fishermen exerting greater effort towards mitigation than required.

Approach companies about certifying vessel crews for environmental benefits in New Zealand.

Inform fishermen of the mitigation measures presented at IFF2

Conduct test trails of several of these measures on fisherman's vessel.

Get more fisheries to join Southern Seabird Solutions, and expand the group as well as lift the bar within New Zealand.

Pursue joint projects with other countries that share similar albatrosses and petrels issues as them.

Establish and promote a Global Mitigation Coordinator position.

Work with fishermen from the New Zealand surface and bottomline fisheries to encourage participation in such programs and projects.

Advocate the use of integrated line weighting.

Investigate the feasibility of instituting a crewmember exchange program with South American fishermen to allow fishermen to learn alternate seabird mitigation techniques from one another.

Continue development and refinement of the boom and bridal system.

Continue enhancement of the tori line jigger.

SCOTLAND

Establish a working group to gather comprehensive information on bycatch and establish a website to educate diverse audiences.

Gather existing information and put it on a website that would include not only information on how to do things, how to produce the best products, and how to deliver them but also educational material designed specifically for various audiences, including governments not at IFF2, the crew, skippers, NGOs, fishing companies, trainers, general public, managers, administrators, researchers and educators.

SOUTH AFRICA

Apply the knowledge gained from the IFF2 to provide feedback to the industry. The information to be imparted will consist of:

- Lessons learned and ideas regarding the elimination of seabird/turtle bycatch;
- Strategies and techniques used by foreign nations to eliminate seabird/turtle bycatch;and
- Recommendations to implement a seabird/turtle bycatch elimination program in South Africa.

Maintain contact with people encountered at the IFF2, and advise them on new developments for eliminating seabird/turtle bycatch.

Compare and contrast all the FAO national plans of action in seabirds that have been done or are in the process of completion and perhaps work towards an example for a national plan of action that might provide guidance for developing countries and small-island developing states in producing their own national plans of actions.

UNITED STATES

ALASKA

Gain NMFS support and participation for a BLI seabird bycatch workshop in Taiwan in 2003.

Coordinate the distribution of WSGP outreach video to Alaska longline fishermen.

Work with Canada on a laminated seabird ID card to complement the NP albatross guide.

Exchange information and work with Falkland Conservation on trawl fishery seabird bycatch mitigation measures.

Work with colleagues to coordinate reporting to COFI on the status of NPOA development.

Work with Chilean, Australian and New Zealand colleagues in the drafting of a seabird bycatch proposal to be submitted by Chile to the APEC FWG in March 2003.

Help solicit interest and funds for a proposal for a global seabird bycatch database.

Write an article about the IFF2 for the local newspapers.

Provide a report about IFF2 in a weekly electronic bycatch newsletter.

Write letters responding to misinformation or outdated information in articles, advertisements and Internet chat rooms.

Establish a system for long-term at sea surveys of birds and a pelagic seabird database and provide for analysis and dissemination of the data. Actions to be taken include:

- Compile data on all existing marine/oceanographic surveys;

- Contact biologists, agencies or research groups and, if necessary, draft MOUs to commit “top” level to the arrangements;
- Obtain funding for deployment of seabird observers on vessels;
- Establish a long-term pool of qualified observers;
- Provide training on at sea surveys and protocols;
- Compile and establish protocols and database framework;
- Coordinate access to data on oceanographic, biological and fisheries data collected on surveys; and
- Establish a data coordinator position to maintain the integrity of the data and make it accessible to end-users.

Finalize and make available seabird bycatch numbers in the Alaskan demersal longline fishery to track progress and inform all stakeholders.

Invite the American Bird Conservancy to conduct a site visit at the Alaska Fisheries Science Center, and focus on operations of the observer program and the handling of data and information.

Describe a best process/best practice model for collaborative process solving of bycatch issues.

Implement a vessel specific outreach and training program to reduce seabird bycatch.

Work with the Alaskan small-boat fleet to promote the use of appropriate seabird avoidance measures.

Participate in and support the North Pacific albatross working group to enhance meeting the objectives of the group.

Propose to the regulatory agency the need for captain/vessel certification, which could be tied to the captain fishing permit from the State of Alaska, and include workshops, video presentations accompanied by a training manual, and a required Captain interview and questionnaire.

Institute, through the Fishing Association, a VIP program that rewards complying vessels, and possibly removes offending vessels from the fishery for one to two days and provides vessels utilizing best practice techniques higher consideration for scientific charters.

EAST COAST

Address the lack of technology to determine impacts of fishing and mitigation. Specifically:

- Lobby to convene a technical working group on satellite technology and develop an experimental design for implementation by June 2003 in the NED research program.
- Determine the effectiveness of mitigation measures already implemented, including line cutters, dehookers and other turtle handling-and-release techniques.
- Implement developed procedures for turtle handling and release by June 2003.
- Allow biological data collection by fishermen.
- Develop protocol for fishermen to administer antibiotics to injured turtles prior to release.
- Post research results at relevant websites.

Continue NED research in partnership with NOAA researchers in 2003 to possibly refine the swordfish directed protocols that have been worked on over the past two years.

Begin work on tuna-directed protocols.

Continue turtle survivability and mitigation research necessary for the NED.

Order tori lines and dehookers for boats in South Africa.

Communicate with the South African fishermen to employ tori lines and dehookers.

Work to get turtle samplings from leatherbacks and loggerheads to the United States.

GUAM

Initiate a pilot project in the bigeye tuna longline fishery to address seabird and turtle bycatch issues. Specifically:

- Establish an advisory body that would include NMFS, NGOs, fishermen and scientists to review and analyze data on a quarterly basis and recommend changes to mitigation strategies on an ongoing basis.
- Set up an education and training program centered on the NMFS protected species course and to include data collection (logbook, fish identification, etc.).
- Establish a comprehensive logbook that would embrace all the needs of stakeholders in the fishery.

- Ensure consistent communication to all stakeholders;
- Evaluate or test known and emerging technologies for seabird and sea turtle bycatch mitigation (tori lines, blue-dyed bait, line shooters, weighted swivels, etc.).
- Promote monitoring by at-sea observers, VMS, or electronic means.
- Incorporates a management regime that rewards excellence and invokes developmental sanctions.

HAWAII

Adopt the use of the ARC dehookers in all turtle mitigation research conducted with the Hawaii-based longline fleet.

Urge adoption of the ARC dehookers as part of turtle handling-and-release protocols for the Hawaii-based fishery.

Promote Pacific-wide testing of circle hooks in the tuna pelagic longline fisheries and post research results on IFF website and other relevant websites

Continue to work towards real world solutions to the problems of solving bycatch issues.

Promote cooperation and education by all interested groups and encourage them to keep strive for a healthy co-existence of a commercial fishing industry that provides food for many people, as well as a balanced and healthy ecosystem that we all share with those ecosystems.

Produce the Proceedings of the IFF2 and generate it into different editions for different audiences and translate it into other languages.

- Produce products such as videos and DVDs.
- Train crews to collect sea turtle and/or seabird data at sea in the Western Pacific Region and help identify fishermen incentives for collecting these data.
- Write letters to ACAP as well as other regional international bodies concerning the international adoption of a performance standard for a hook sink rate for both pelagic and demersal longline fisheries to help address IUU longline fishing.
- Pursue, refine and further assessment of the underwater setting chute in the Hawaii longline fishery.

Work with project partners in Argentina to identify candidate methods, such as changes in gear and fishing practices, and the testing of these ideas to determine their effectiveness at reducing seabird mortality.

WASHINGTON

Promote the placement of nongovernmental organizations on fishing vessels.

Fill a position as a global coordinator for seabird mitigation strategies.

PACIFIC ISLANDS

Undertake the development and dissemination of the following items within the region of the Secretariat of the Pacific Community (SPC):

- Turtle ID cards (small, laminated) in English, French and possibly in Korean, Taiwanese, Japanese and Mandarin if funding permits;
- “Resuscitation of hooked turtles” posters, stickers and laminated cards in English, French, and possibly in Korean, Taiwanese, Japanese and Mandarin if funding permits; and
- A teaching module on bycatch issues with an emphasis on turtles in English and French for Pacific Island fisheries training institutions.

Work towards increasing data collection on bycatch, especially for sea turtles and seabirds, in south Pacific countries and territories.

Increase awareness of the bycatch issue among south Pacific longline fishermen to facilitate greater understanding of the issue.

Develop and distribute materials regarding turtle identification to Pacific Island longline fishermen.

Disseminate information on effective mitigation techniques for reducing sea turtle bycatch in the SPC Fisheries newsletter.

SOUTHERN OCEAN

Work with the Incidental Mortality Associated with Fishing (IMAF) working group of the Convention for the Conservation of Antarctic Marine Living Resources (CCAMLR) to define a new standard line weighting for auto liners that will enable vessels to fish year-round in all parts of the CCAMLR Convention Area.

Through collaboration within the Birdlife International partnership, attempt to identify a way by which the Directorate-General of fisheries of the European

Community will take responsibility for formally addressing seabird bycatch issues (especially data collection and the use of mitigation measures) in all relevant Regional Fisheries Management Organizations (RFMOs) of which it is a member.

Devise ways to get the main relevant southern hemisphere RFMOs, especially the tuna commissions, to assess which fisheries under their jurisdiction have actual or potential seabird bycatch problems; devise appropriate harmonized and coordinated data collection programs that include bycatch; and identify appropriate mitigation measures for fisheries where problems exist.

Proactively facilitate the development of a potential advisory committee to the CMS Agreement on Albatrosses and Petrels to involve all relevant national stakeholder groups.

- Improve CCAMLR estimates of bycatch at regional to global levels and identify research gaps at regional levels.
- Encourage countries to actively address IUU fishing from national, regional and global levels.
- Institute seabird mitigation programs in [CCAMLR] member countries where they don't yet exist.

Produce educational products.

Provide input to network website.

Get and improve estimates of bycatch at a regional to global level.

Identify research gaps at a regional level.

Upgrade website with data and reports on the regional level.

Translate and interpret meetings and relevant literature in four languages.

Create regional, international and national awareness at a national-to-global level.

Institute seabird mitigation programs in the 31 member nations of CCAMLR.

Promote investigation of remote observer programs.

UNSPECIFIED

Help draft a seabird bycatch proposal to be submitted to the APEC fisheries working group in March 2003.

Assist in coordinating reports to COFI on the status of MPOA development.

Contact individuals and agencies around the world that have drafted FAO national plans of action for seabirds to propose formation of an informal group to support their efforts and possibly develop a prototype national plan of action.

- Pursue carrying out a study to quantify post-release survivorship of longline-hooked loggerhead turtles.
- Bridge the gap among fishermen, the government, and nongovernmental organizations.

Work toward the establishment of a Bycatch Commission, similar to the Tuna Commission, with United Nation funds to:

- Coordinate, design, and disseminate research;
- Conduct veterinarian research;
- Promote education and mitigation methods;
- Organize international fisher forums.

Identify bird mitigation measures that are appropriate for vessels less than 18 meters in length.

Implement regulations that have adaptive capabilities to assure that industry can innovate and solve the problems of bird mortality.

Experiment with alternative measures to reduce bird mortality.

Publish a plumage-based ageing method for black-footed albatrosses, a criterion that will allow observers on dedicated surveys and fishing vessels to characterize the population age structure at-sea in the North Pacific.

Work to develop a global marine bird/turtle/mammal distribution database, which incorporates bycatch distribution data along with fisheries-independent information (i.e., satellite telemetry, vessel-based surveys). This database is part of the Ocean Biographic Information System (OBIS), a multi-investigator project spearheaded by the Census of Marine Life.

Analyze Black-footed and Laysan albatross telemetry data with respect to Bering Sea/Gulf of Alaska longline fisheries effort and the Hawaiian pelagic longline fishery effort.

Write a paper describing standardized methods for “cleaning” and “analysis” of satellite telemetry data.

Contribute information concerning at-sea distribution of susceptible seabirds to a global seabird database.

Test and trial the underwater setting capsule in the New Zealand pelagic fishery.

Help coordinate and synthesize knowledge and skills of fishers, researchers, and gear manufacturers to begin to investigate the feasibility and/or development of an underwater setting chute/capsule for the Spanish system.

Raise the global coordinator issue at the 2003 meeting of Incidental Mortality Associated with Fishing (IMAF - CCAMLR).

Increase direct communication and exchange between the regulators of fishing operations and operators of fishing vessels.

Purchase and use dehookers, biopsy poles, and tori-lines in the Hawaii, NED and Indian fisheries.

Provide fishermen with tools to collect bycatch data.

Increase communication and education on fishing gear alternatives to help reduce sea turtle bycatch internationally.

Develop mitigation measures and coordinate research efforts.

Establish regulations implementing effective and economically viable sea turtle mitigations practices.

Communicate effective bycatch reduction fishing techniques with other fishermen.

Provide fishermen with feedback on the data collected.

Further research and develop the integrated weight line to achieve the optimal sink rate and determine how much weight per meter needs to be targeted.

Expand the number of vessels using the integrated weight line for trail purposes, and report and inform fishermen of the findings.

Undertake a study to quantify post-released survivorship of longline-hooked loggerhead turtles, including defining what is meant by survivorship (e.g., whether the animal lives or dies, and if the animal survives, does it continue to function as a normal healthy animal, or is its feeding capacity and growth compromised).

A large, light gray graphic on a darker gray background. It features several stylized fish swimming in a circular pattern, with wavy lines below them representing water. The fish are simple shapes with small dots for eyes. The overall style is clean and modern.

APPENDIX 2:

Summary of Participant Commitments





Summary of Participant Commitments

PATRICIA GANDINI, ARGENTINA

Disseminate information of the forum to government and local scientist

To continue working with fishers for finding solutions to diminish bycatch

Continue evaluating seabird mortality in longliners and trawls

Continue evaluating the efficacy of different mitigation measures in reducing bycatch

Continue providing education materials

To collaborate with international initiatives. **IFF3**

DAVID KREUTZ, AUSTRALIA

Develop in conjunction with my international counterparts, better responsible fishing guidelines.

In my role as the eastern tuna and billfish extension officer, develop and communicate:

- Seabird mitigation education strategies for the fleet.
- Sea turtle mitigation education strategies
- Research domestically and internationally better mitigation methods and test these methods in my fishery
- Continue in my role as a member of Southern Seabird Solutions.
- Continue in my role as a member of Southern Seabird Solutions **ITFCRF/ IFF3**

ANGELO MAIORANA, AUSTRALIA

As an industry operator, I will continue to strive for better fishing practices by:

- circle hook trials
- tori line experiments
- weighted snood gear

Interactions need to be reduced just as education with operators and crew is as important as the mitigation devices above.

From our contacts at this forum, I am prepared to work the international community to educate other fishers to catch better and reduce interactions with the wildlife.

ANGELO MOUZOUPOULOS, CENTRAL AMERICA

To use my best endeavors as director – general of the international merchant marine registry of Belize (IMMARBE) to:

- Introduce additional measures to reduce/eliminate bycatch of sea turtles and seabirds
- Convince my shareholders and as many of our shipowners of longliners of 24 meters and above as possible to join OPRT, thus supporting OPRT's valuable work and objectives.
- Continue my efforts to eliminate IUU activities in close cooperation with RFMOs, FAO, IMO, OPRT, and others.

CARLOS MORENO, CHILE

Be a bridge between the fishery authority and the fishermen that are all the Chilean WPOA.

Do my best to continue the research on incidental mortality of seabird in Chile. Specifically, trials to obtain sound to include the evaluation on monitoring the Chilean NPOA.

Be available for any international initiative to avoid the incidental mortality on any kind of vertebrate.

Teaching a course on ecosystem approach to management of fisheries in my university. **IFF3**

KUO-PING LIN; WEN-SEN CHEN; S.G. JOUNG, CHINA

Thanks for the IFFs hospitality to hold this fruitful meeting. It helps people from tuna industry and conservation organization get together to study concerning conservation issues, making each opinion closer, keeping proceed conservation and better management.

For sustainable tuna resource, all parties should cooperate together, enhance management and information exchange, fighting against IUU to ensure the right of legal fishery.

We have to continue researching effective method to reduce bycatch seabirds and sea turtles.

We have to research ways to fully utilize shark and increase all parts utilization.

We should invite more people from other aspects and environmental conservation NGO's, to understand our effort for reducing bycatch of seabirds and sea turtles. **ITFCRF AND IFF3**

LEE, KUAN-TING, CHINA

Give all concerning environmental conservation organization the Yokohama declaration

Having scientist working group to study and hopefully outcome some effective and practical methods to avoid bycatch.

Rectify and explain some wrong information about longliners

Voluntary fund from every longline organization to support legal suit in the US. **ITFCRF AND IFF3**

SUN-KUANG PAN, CHINA

Submit Yokohama Declaration to every environmental organization (NGOs, UN, FAO).

Enforce and enhance communication and cooperation between all parties

Correct same wrong understanding of NGOs.

Keep promoting avoidance of bycatch with sea turtle and sea birds to tuna longliners.

Unite scientist and industry people to research effective practical methods to reduce bycatch. And Inform every party if found some solutions.

Invite some unfriendly NGOs to attend our conferences and let them see how much effort we will do (or did) for conservation. **ITFCRF AND IFF3**

ZHANG XIAOLI, CHINA

I want to, on behalf of our delegation, say thank you to the organizers for their effective work, so that we can join together to discuss every issue covered by international fisheries, including promoting of responsible fisheries. I think that all of us including fishers, traders, consumer, etc. should work together to conserve the marine resource, not only tuna resources, but all. because our business rely on it, also we need to eliminate the IUU vessels, as they will destroy the order. Finally, please give more chance to the developing countries, because we are now in the same aim that is promote the sustainable fisheries and responsible fisheries.

GIAN S. PEROTTI, ECUADOR

Make sure all large scale tuna longliners that fly the Ecuadorian flag become members of a foundation and therefore abide by the rules set forth by the OPRT.

Pressure my government to start a well documented register of longline vessels of less than 24 meters and make sure that we can start "negative lists" of vessels not complying with rules of responsible and sustainable fishing. **ITFCRF**

MANNY DUENAS, GUAM

Continue the commitment made at IFF2 related to a pilot longline fishery project that intended to start in fall 2005. Specifically:

- establish an advisory body that would include NMFS, NGOs, fishermen and scientist to review and analyze data on a quarterly basis and recommend changes to mitigation strategies on an ongoing basis.
- Set up an education and training program centered on the NMFS protected species course.
- Establish a comprehensive logbook that would embrace all the needs of stake holders in the fishery.
- Evaluate or test known and emerging technologies for seabird and sea turtle bycatch mitigation
- Promote monitoring by at-sea observers, VMS, or electronic means
- Advocate and incorporate management regimes that would reward excellence and invoke developmental sanctions.

In addition:

- full utilization of non-tuna catch to minimize fish bycatch
- targeting of deep water larger bigeye tuna, advance of shallow-water smaller bigeye tuna.
- compliance with seafood safety standards under HACCP. **ITFCRF AND IFF3**

WAWAN KOSWARA, INDONESIA

To vigorously promote cooperation, information sharing and constructive dialog among all stake holders of tuna producer association, such as purse seine, long-line and farmer, due to over capacity of tuna products all over the region.

To vigorously promote the immediate use of appropriate combination of circle hook and tori poles especially to local fishermen within existing RFMOs in all regions.

Propose to continue the international fishers forum in the next 2 or 3 years, and it should be within a fixed timeframe. The next IFF meeting should be in Bali, China or Philippines. **ITFCRF AND IFF3**

R.P. PERNOMO, INDONESIA

It is a matter of fact that tuna producers (longliners, Purse Seiners and Tuna Farmers) are using the one and the same tuna source, while sashimi market is limited. It is necessary that the producer groups meet together and agree on how they will arrange their activities as to ensure the sustainability of their business

To socialize the result of the trials of the right hooks, the right baits and the right teaching of setting in order to minimize the bycatch.

IFF and OPRT to organize another conference especially with the objective to eliminate IUU. It is a matter of fact that not every country is capable to take efficient steps to do the job. Some needs help and assistance if we want to get the job done. **ITFCRF**

KAORU HANEDA, JAPAN

Coexistence of tuna long line fishers

Effort to avoid incidental catch of sea turtles/sea birds or protected species

Improvement to more eco-friendly fishing methods

Calling for cooperation for arrangement/management for nest of sea turtles/ sea birds

Refusing purchase IUU products

Supplying safe fish to consumers

Sanction of net fishing caused fish resource depression **ITFCRF AND IFF3**

TOSHIKAZU MIYAMOTO, JAPAN

Full utilization of sharks.

Bycatch zero campaign for seabirds and sea turtles by using effective measures whenever appropriate. **ITFCRF AND IFF3**

P.M. MIYAKE, JAPAN

Engage in study of over-capacity as a FAD TAC member. Specifically, by submitting a report on options of management policies on fishing capacity for longline fleets on a global basis.

Secondly, engage WG on tuna farming of ICCAT and establish proper management scheme for sustainable tuna farming. **ITFCRF**

MASASHI NISHIMURA, JAPAN

To promote responsible tuna fisheries as part of diverse activities to conserve fish eating culture, particularly through the following actions:

- to disseminate to the general public with publications correct understanding of fishermen's

commitment to responsible fisheries demonstrated throughout the conference and the forum.

- to share the achievement of the Conference and the forum with the members of the International Coalition of the Fisheries Associations (ICFA) and encourage them to incorporate the achievement in the position and actions of the ICFA **ITFCRF AND IFF3**

KAZUTERU SAKAMOTO, JAPAN

Japanese people, have an old tale, URASHIMA TARO, which tells that the hero of the story helps a stranded sea turtle at the beach just by viewing this old tale, we can show how we have been taking care of sea turtles. We, not only fishermen, have released sea turtles, which hooked or netted, after praying for the God shine.

It is very rare to find incidental catch in a practical fishing operation. Even though, it happened, all caught sea turtles are released.

Respects to seabirds, fishers have paid efforts to refrain from stealing the bait by sea birds, because they do not want to lose fishing efficiency.

Negative impacts on seabirds or sea turtles are derived from human activities on the coast, such as waists, environmental distractions rather than longline/purse seine fishing activities. We are requesting to the UN or a NGO to consider this matter.

We know the importance of sea turtle and sea bird; however sustainable use of tuna resource is more than that by avoidance juvenile catch brought from large scale purse seines. We request to WCPFC to intake such issue in the treaty for the resources management promotion.

KANTARO TABATA, JAPAN

I believe that we need to go on the countermeasures, to avoid by-catch marine turtles/sea birds, which Japanese fishers have been practiced. We also feel necessity to promote our countermeasures to develop and to cover all parts of the problem. **ITFCRF AND IFF3**

TARO TAKESHITA, JAPAN

Indeed I agree to the effect of side-setting in certain level. However it should be considered more deeply through further experiments to conclude the total effects. Nevertheless I believe that it is effective on sea turtles. **IFF3**

KOICHI TERAMOTO, JAPAN

I felt the situation of by-catch issue is becoming worse. I am interested in side-setting method. **IFF3**

HIDEO UETAKE, JAPAN

In order to avoid incidental catch of sea birds and sea turtles, we already introduced such effective methods using Tori-pole, setting the line outside the screw whirl; improving sinking speed by heavier weight, and setting line in the dark. We are willing to introduce further mended methods for lessened incidental catch. We fisher have to cooperate each other to sustain this eco-friendly fishing method against the pressure.

To stop the fishing method considered cause of tuna resource depression by catching juvenile, we tuna long line fishers have to cooperate at the discussion of RFMOs. For the sake of our purpose, we have to avoid any activities which may be blamed or lessened our trust abilities such as stealing fish/gear from other vessels or disturbing other operations. We need to unify our mind into one to fight against the pressure. **ITFCRF AND IFF3**

YEONJIB CHU, KOREA

Manual pamphlet on bycatch of sea turtles and sea birds — Korean Deep Sea Fisheries Association made Korean version on the manual pamphlet on the bycatch by longline fishery and distributed these pamphlets to all Korean longliners.

Implement reducing bycatch program. Test the varieties of catch by fishing gears (circle hook and J hook), baits (mackerel, squids and blue-dyed baits) and biological varieties of the catches (targeting species and bycatch), by boarding a sea scientist and observer from July to August in this year in the Pacific Ocean.

Observer program — Korea has run the observer program to collect verified catch data including targeting species and bycatch and to monitor the implementation of the conservation and management measures in each convention area by using 3 longliners and a purse seiner for 50 days from July to September in 2004 and 2005 respectively. **IFF3**

LINDSAY CHAPMAN, NEW CALEDONIA

Conduct further research trials of Steve Beverly's deep-setting technique with other researchers

Produce a booklet on the deep-setting technique to raise awareness of their fishing technique.

Produce a species identification manual for tuna longline fishermen in the Pacific island countries and territories plus Hawaii – this manual will cover target species, by products and bycatch species.

Try to improve the quality and quantity of data collected from PICT domestic longline operations – especially in regards to seabirds, sea turtles and sharks and cetaceans (toothed whales and dolphins)

Produce other awareness information on bycatch mitigation techniques. **IFF3**

BUNDIT CHOKESAANGUAN, THAILAND

We will manage (implementation) the project on collection on the information on sea turtle interaction of fishing operations in south east Asia in collaboration with south east Asian countries.

We will produce the Campaign Calendar on sea turtle in the year 2006 (the year of turtles), produce the promotion materials, such as t shirts, poster, booklets, cartoon on sea turtles, included VCD and Video on sea turtle conservation and management. I intend to send the 2006 calendars to all participants of this meeting.

We will conduct the circle hook and j hook experiment in southeast asia waters in collaboration with member countries of SEAFDEC. **ITFCRF AND IFF3**

CHARLES BERGMAN, USA

Continue domestic and international workshops and experiments on sea turtle mitigation. **IFF**

SCOTT BARROWS, USA

Implement or install any systems or gear that is proven to be effective in the mitigation of interactions with endangered species. (on my vessels)

Support and assist with any data collection regarding my fishery (longline) on my vessels.

As a member of HLA, I will support its effort to bring the information presented at this forum to its members and the public.

As GM of the HLA, I will attempt to inform the public that the longline fishers is mostly made up of responsible fishers throughout the world. (mostly) **IFF3**

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SEAN MARTIN, USA

Continue to advance and promote the development of environmentally sensitive fishing methods, technologies and fishing gears that will build on the successes fishers have achieved in areas of supporting sustainable fisheries, and incidental takes of protected species.

However, as important as the development of technologies and methods are, they are of limited value unless we are able to convince fishers themselves of the importance of adopting and continuing to refine responsible fishing practices.

I will continue to advance and promote to fishers the importance of these initiatives. **IFF3**

ROY MORIOKA, USA

Continue discussion and engage dialog between NGOs, fishers and managers to collaborate efforts and energies toward a consensus approach to achieve conservation goals that all have an interest in achieving. **IFF3**

LEONARD SONNENSCHIN, USA

Communication to the consumers is a key objective of the global strategy of the World Ocean Network through the public aquariums of the world findings and communications along the chain of custody regionally specific information to motivate sustainable seafood awareness. By educating consumers and children has influences on the issues associated with commercial fisheries and aquaculture will empower them with actions they can use and spread in the market place and/or restaurants.

Our goals are to:

- promote sustainable use of marine/freshwater resources;
- promote responsible aquaculture; any fish consumed affects an ecosystem;
- to encourage consumers to make sustainable choices;
- to encourage use of products and services that support positive environmental changes;

We will accomplish these goals by first learning the issues on a regional basis and then presenting learned information to the thousands of millions visitors annually and through media and to continue studies and other interests in the field.

TIM WERNER

Support experiment involving fishers and scientist to evaluate new and existing fishing gear modifications for reducing the bycatch of non target species (involving cetacean and sea turtles).

Disseminate the results of field experiments on potential bycatch reducing gear for non target species among fishers in scientific peer-reviewed publication and through other media.

Contribute time and expertise for advancing collective goals and objectives identified in international meetings and initiatives – such as IFF – that are focused on bycatch reduction. **IFF**

PHAN HONG DUNG, VIETNAM

Assist the developing countries in adding observer programs in order to increase and complete the scientific information

Conduct investigation at the “hotspot” in relation to seabird, sea turtle and shark ... bycatch.

Improve bait, hook styles now to reduce the mortality of endangered species.

Promote the responsible fisheries operation.

Enhance regional and international coordination and collaboration. **IFF**

PHAN HONG DUNG, VIETNAM

Continue collecting the tuna data in all regions in order to serve as a management tool.

Pursuit the global policy on responsible fisheries FAO in terms of code of conduct for responsible fisheries

Enhance the regional awareness in relation to capture, trade and consuming tuna product.

Control number of IUU vessels both at regional and international levels.

Continue assessing the negative impact in tuna longline to endangered species such as seabird, sea turtle and sharks.

Improve methodologies, equipment and transfer of the advanced technique in tuna longline fisheries to developing countries in the world.

Using positive and negative lists as well as quota and sanction if possible.

Develop the advanced technology in regarding to tuna marine ranching and artificial hatcheries for tuna in the forthcoming time. **ITFCRF**

SEAFDEC

SEAFDEC has developed the research program on interaction of longline fisheries to the sea turtle which will be started this year. With regard to this we plan to promote the use of circle hooks for our SEAFDEC member countries. Pilot project will be started in Vietnam and Philippines in collaboration with the department of fisheries.

With regard to the bycatch from longline and purse seine, we have studied since 2001 in the eastern Indian ocean, the results were presented in IOTC meeting.

A large, stylized graphic in shades of gray and white. It features several fish swimming in a circular pattern, with wavy lines representing water or movement. The fish are simple shapes with small dots for eyes. The background has a subtle, repeating pattern of wavy lines.

APPENDIX 3:

List of Sponsors and Participants



Sponsors



INTERNATIONAL
TUNA FISHERS
CONFERENCE ON
RESPONSIBLE FISHERIES
& THIRD INTERNATIONAL
FISHERS FORUM

JULY 25-29, 2005
INTER-CONTINENTAL GRAND
YOKOHAMA, JAPAN

ORGANIZATION FOR THE PROMOTION OF RESPONSIBLE TUNA FISHERIES (OPRT)

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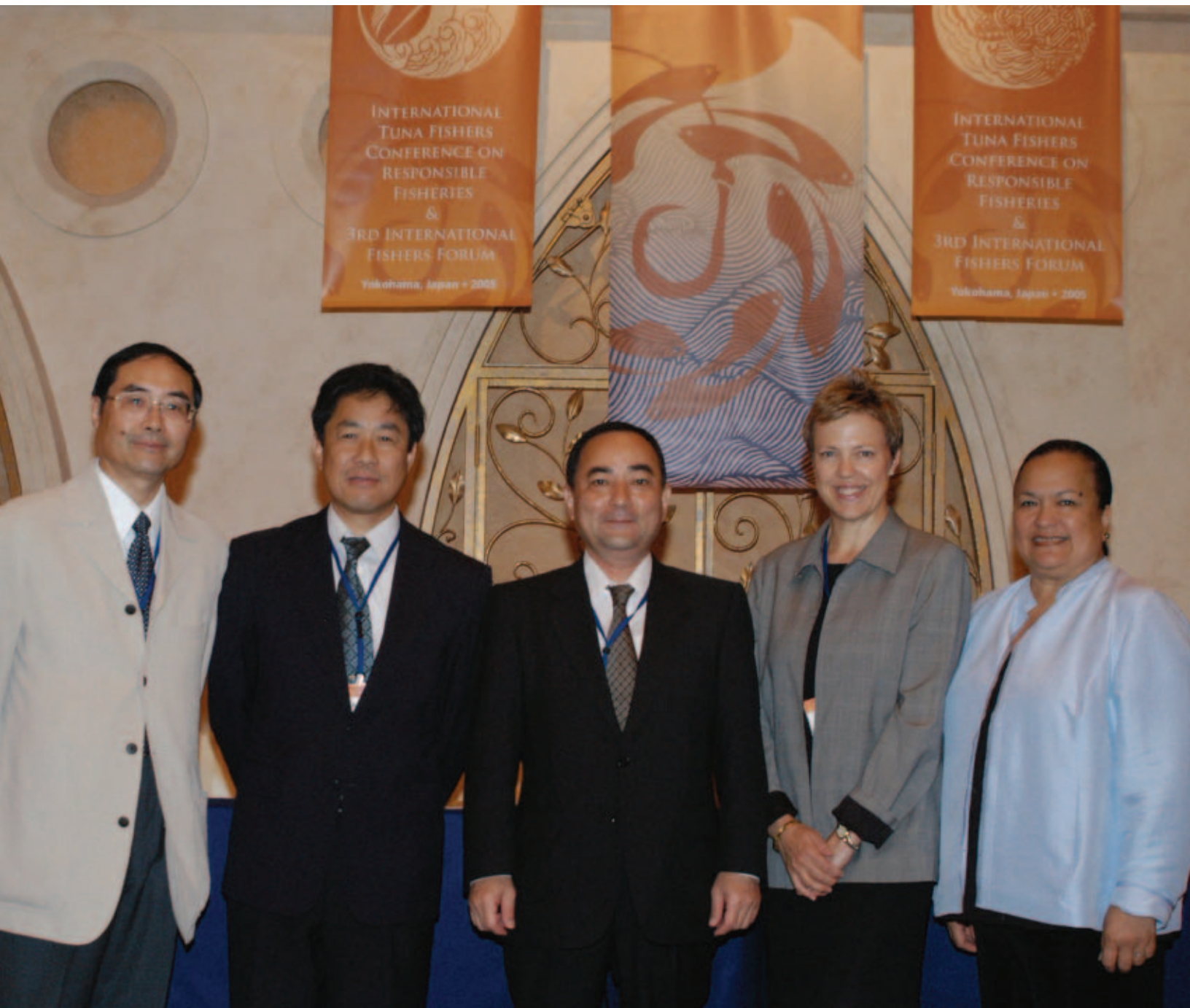
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CONFERENCE HOSTS AND SPONSORS

(l-r) Yuchiro Harada, Managing Director, Organization for the Promotion of Responsible Tuna Fisheries (OPRT); Akira Nakamae, Fisheries Agency of Japan; Isao Nakasu, President, OPRT and Japan Fisheries Association; Rebecca Lent, Director, U.S. National Marine Fisheries Service's Office of International Affairs; and Kitty Simonds, Executive Director, U.S. Western Pacific Regional Fishery Management Council. Not pictured: Sean Martin, President, Hawaii Longline Association.





CONFERENCE PARTICIPANTS

The International Tuna Fishers Conference on Responsible Fisheries and the Third International Fishers Forum brought together more than 80 longline, purse-seine, artisanal and other fishermen and approximately 170 researchers, government officials and non-government organization representatives from 26 North and South American, Asian and Pacific Island countries.

OPENING CEREMONY

A hula group from Japan welcomes conference presenters and participants to Yokohama.





OPENING
ADDRESSES



HIROSHI NAKADA
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PRESS CONFERENCE

Representatives from the Japan Fisheries Association, Organization for the Promotion of Responsible Tuna Fisheries, Fisheries Agency of Japan, U.S. National Marine Fisheries Service and Hawaii Longline Association respond to press queries about the conference.



Conference participants were treated to more than 60 presentations covering over 30 topics ranging from production, marketing and consumption, to sharks, seabirds and sea turtles.







Registration booth for Asian-speaking participants.



(l-r) Lawrence Enomoto, Alice Worthy, Yuriko Enomoto and MaryLou Mauliola of Hawaii at the conference T-shirt booth.



Finding Solutions to the Incidental Catch of Seabirds and Sea Turtles in Longline Fisheries

www.wprfmc.org

THE COUNCIL

The Western Pacific Regional Fishery Management Council (WPRFMC or Council) is one of eight Councils in the United States (and one of three in the Pacific), established by the Magnuson Fishery Conservation and Management Act of 1976 to oversee the nation's fisheries in the 200-mile U.S. Exclusive Economic Zone (EEZ). The WPRFMC oversees the 112 waters around the Pacific Islands Region (as vast as the land surface of the continental United States), and has managed fisheries for tuna and tuna-like species since 1986 through its Pacific Fishery Management Plan (PFMP). The Hawaii-based longline fishery operates under this PFMP and is comprised of approximately 700 active boats, or 75% of the total pelagic longline fleet in the Pacific (PFMP 2007).

Management objectives by the WPRFMC are to achieve optimum yield, without jeopardizing the long term existence of protected species, while at the same time operating a "best practice" and environmentally responsible fishery.

RECOGNIZING THE ISSUES

- The incidental catch of protected species such as seabirds and sea turtles in pelagic longline fisheries is of primary concern.
- Most longline fishery interactions occur when the line is set shallow (between the surface and 100m) to target swordfish (SPRF 2001).
- The global pelagic longline fleet has expanded dramatically since the 1950s to meet consumer demand for high-quality pelagic fish. Currently, 33 nations operate approximately 6,000 vessels in the Pacific Ocean (IPC 2005).
- Although it is not the largest in terms of catch volume, pelagic longlining has become one of the most economically important fisheries in the Pacific (Williams 2004). Finding cost-effective solutions to reduce bycatch is a priority at both the national and international level.
- Successful mitigation measures must significantly reduce or eliminate bycatch levels without making fishing operations difficult or unprofitable. These measures can then be "exported" to other fisheries.

FISHERY MITIGATION STRATEGIES

Collaboration between fishing industry, scientists and resource managers has identified a number of mitigation strategies which can successfully reduce seabird and sea turtle interactions. These efforts have developed cost-effective techniques that reduce interactions without impacting fishing operations.

Sea turtles

Sea turtle mitigation measures which significantly reduce interaction rates can be achieved by setting hooks deeper than where turtles normally occur in the water column (Roberts et al. 2002), by using a combination of circle hooks and modified jugs bait (Roberts et al. 2004), or by reducing soak times and removing gear earlier in the day (Stokes et al. 2004).

Bycatch of sea turtles tends to occur with increasing frequency near the surface and decreasing frequency at progressively greater depths. Hence, longlines set below the water layer in which turtles are concentrated i.e. 100m tend to interact with turtles far less frequently.

Seabirds

Successful seabird mitigation quickly removes baited hooks from the surface. Conventional baited hooks when they are being set, or turned back away when hooks are being set and hauled, frighten seabirds and also ineffective in certain areas, as seabirds are usually daytime foragers. Recent research indicates that setting the longline from the side of the vessel can reduce seabird bycatch to almost zero (Williams et al. 2005).

INTEGRATED FISHERY MANAGEMENT

Promote Conservation Measures

The Council recognizes that effective solutions must encompass a species' entire life history, and address both terrestrial and oceanic impacts. Promoting internationally-based conservation measures within IFMPs at landing beaches and coastal foraging grounds may provide greater benefits than mitigation measures focusing only in the pelagic environment.

Consequently, a number of sea turtle conservation projects have been supported and/or implemented in Indonesia, Papua New Guinea, India, and in California, Mexico to bolster population recovery of North Pacific loggerheads and West Pacific hawksbills.

Improve "Best Practice" Technologies

- International and domestic partnerships among government, industry, and non-governmental organizations are essential to develop effective fishery management solutions.
- Mitigation measures must not only be practical and consistent, but be cost-effective and provide some with incentives to employ them consistently and effectively.
- Collaboration provides a forum to disseminate tools and strategies that have been developed and implemented in US longline fisheries. These approaches can then be refined and adapted as necessary for foreign fleets.

Fishers are encouraged to participate in the Third International Fishers Forum, Japan 2005!
www.fishersforum.org

The France-based World Ocean Network (top) and Hawaii-based Western Pacific Regional Fishery Management Council (bottom) were among the exhibitors providing handouts on a range of responsible-fishery related topics.

SPEAKERS

Among the 61 plenary speakers at the conference were the following:



NIGEL BROTHERS
Marine Ecology &
Technology, Australia



KAZUO SHIMA
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Fishing Association, Japan



HIROSHI SAKAMOTO
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Kitty Simonds, Executive Director, Western Pacific Regional Fishery Management, flanked by MaryLou Mauilola (left) and Marion Muller at the conference registration table.



PARTICIPANTS FROM HAWAII, GUAM AND AMERICAN SAMOA

(front row, l-r) Kitty Simonds, Alice Worthy, MaryLou Mauilola, Yuriko Enomoto, Roy Morioka, Paul Dalzell, John Kaneko; (back row, l-r) John Ordenstein, Paul Bartram, Mark Mitsuyasu, Sylvia Spalding, Lawrence Enomoto, Frank McCoy and Manuel Duenas.



Participants from Korea.



Participants from Japan.



(l-r) Akiko Sato (Japan), Yuriko Shiraishi (Japan) and Yasuyuki Teruki (Japan)



(l-r) Makoto "Peter" Miyake (Japan) and Yonat Swimmer (Hawaii)



Lindsay Chapman (New Caledonia), Nigel Brothers (Australia) and Janice Molloy (New Zealand)



(l-r) Scott Barrows and Sean Martin of the Hawaii Longline Association



(l-r) Ryuzo Ito (Japan), Francisco Tiu Laurel (Philippines), Wawan Koswara (Indonesia), Osamu Shirakawa (Japan), Sri Titeik Harini Nalendra (Indonesia), Richard Sy (Philippines), Gian Sandro Perotti (Ecuador), John Reynald Tiangco (Philippines) and Pandji Poernomo (Indonesia)



(l-r) Yuchiro Harada (Japan), Eiji Ishihara (Japan) and Roy Morioka (Hawaii)



(l-r) Masashi Kiyota (Japan), Toru Kitamura (Japan), and Toshikazu Miyamoto (Japan)



(l-r) Kim Rivera (Alaska), Carlos Moreno (Chile), Patricia Gandini (Argentina) and John Croxall (United Kingdom)

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