Annex I

Guidelines to Reduce Sea Turtle Mortality in Fishing Operations (excerpt from FAO, 2005, Appendix E)

Preamble

The FAO Code of Conduct for Responsible Fisheries calls for sustainable use of aquatic ecosystems and requires that fishing be conducted with due regard for the environment. Some sea turtle stocks are seriously impacted by fishing and require urgent attention. Because of the critical status of these stocks a broad suite of measures is recommended that includes reduction of fishery-related mortality in addition to other conservation measures.

Because of the concern regarding the status of sea turtles and the possible negative effects of fishing on these populations, the twenty-fifth Session of the FAO Committee on Fisheries (2003) raised the question of sea turtle conservation and interaction with fishing operations and requested that a Technical Consultation be held on the subject matter to consider, *inter alia*, the preparation of guidelines to reduce sea turtle mortality in fishing operations. These guidelines respond to the request of the Committee on Fisheries (COFI) and have been developed on the basis of the report of the Expert Consultation, held in Rome in March 2004.

These guidelines are intended to serve as input to the preparation of FAO Technical Guidelines as well as to offer guidance to the preparation of national or multilateral fisheries management activities and other measures allowing for the conservation and management of sea turtles. These guidelines are voluntary in nature and non-binding. They apply to those marine areas and fisheries where interactions between fishing operations and sea turtles occur or are suspected to occur. They are global in scope but in their implementation national, subregional and regional diversity, including cultural and socio-economic differences, should be taken into account.

These guidelines are directed towards members and non-members of FAO, fishing entities, subregional, regional and global organizations, whether

governmental or non-governmental, concerned with fisheries management and sustainable use of aquatic ecosystems.

All activities associated with these guidelines should be undertaken with the participation and, where possible, cooperation and engagement of fishing industries, fishing communities and other affected stakeholders.

Implementation of the guidelines should be consistent with the Code of Conduct for Responsible Fisheries as well as with the Reykjavik Declaration on Responsible Fisheries in the Marine Ecosystem with regard to ecosystem considerations and based on the use of best available science.

1. Fishing operations

A. Appropriate handling and release.

In order to reduce injury and improve chances of survival:

- (i) Requirements for appropriate handling, including resuscitation or prompt release of all bycaught or incidentally caught (hooked or entangled) sea turtles.
- (ii) Retention and use of necessary equipment for appropriate release of bycaught or incidentally caught sea turtles.

B. Coastal trawl

- (i) In coastal shrimp trawl fisheries, promote the use of turtle excluder devices (TEDs) or other measures that are comparable in effectiveness in reducing sea turtle bycatch or incidental catch and mortality.
- (ii) In other coastal trawl fisheries, collect data to identify sea turtle interactions and, where necessary, conduct research on possible measures to reduce sea turtle bycatch or incidental catch and mortality.
- (iii) Implementation of successful methodologies developed as a result of B(ii).

C. Purse seine

- (i) Avoid encirclement of sea turtles to the extent practical.
- (ii) If encircled or entangled, take all possible measures to safely release sea turtles.
- (iii) For fish aggregating devices (FADs) that may entangle sea turtles, take necessary measures to monitor FADs and release entangled sea turtles, and recover these FADs when not in use.

(iv) Conduct research and development of modified FADs to reduce and eliminate entanglement.

(v) Implementation of successful methodologies developed as a result of C(iv).

D. Longline

(i) Development and implementation of appropriate combinations of hook design, type of bait, depth, gear specifications and fishing practices in order to minimize bycatch or incidental catch and mortality of sea turtles.

Recent research has shown positive results for:

- Use of large circle hooks with no greater than a 10 degree offset, combined with whole fish bait. These measures have shown to be effective in reducing sea turtle interactions and mortality;
- Arrangement of gear configuration and setting so that hooks remain active only at depths beyond the range of sea turtle interaction; and
- Retrieval of longline gear earlier in the day and reducing soak time of hooks.

(ii) Research should include consideration of the impact of various mitigation measures on sea turtles, target species and other bycaught or incidentally caught species, such as sharks and seabirds.

(iii) Retention and use of necessary equipment for appropriate release of bycaught and incidentally caught sea turtles, including de-hooking, line cutting tools and scoop nets.

E. Other fisheries

(i) Assessment and monitoring of sea turtle bycatch or incidental catch and mortality in relevant fishing operations.

(ii) Research and development of necessary measures for reducing bycatch or incidental catch or to control mortality in other fisheries with a priority on reducing bycatch or incidental catch in gillnet fisheries.

(iii) In other set-net fisheries, collect data to identify sea turtle interactions and conduct when needed research on possible measures to reduce sea turtle bycatch or incidental catch and mortality.

(iv) Implementation of successful methodologies developed as a result of E (ii) and (iii).

F. Other measures as appropriate for all fishing practices

   (i) Spatial and temporal control of fishing, especially in locations and during periods of high concentration of sea turtles.

   (ii) Effort management control especially if this is required for the conservation and management of target species or group of target species.

   (iii) Development and implementation, to the extent possible, of net retention and recycling schemes to minimize the disposal of fishing gear and marine debris at sea, and to facilitate its retrieval where possible.

2. Research, monitoring and sharing of information

A. Collection of information and data, and research

   (i) Collection of data and information on sea turtle interactions in all fisheries, directly or through relevant RFBs, regional sea turtle arrangements or other mechanisms.

   (ii) Development of observer programmes in the fisheries that may have impacts on sea turtles where such programmes are economically and practically feasible. In some cases financial and technical support might be required.

   (iii) Joint research with other states and/or the FAO and relevant RFBs.

   (iv) Research on survival possibilities of released sea turtles and on areas and periods with high incidental catches.

   (v) Research on socio-economic impacts of sea turtle conservation and management measures on fishers and fisheries industries and ways to improve communication.

   (vi) Use of traditional knowledge of fishing communities about sea turtle conservation and management.

B. Information exchange

   (i) Sharing and dissemination of data and research results, directly or through relevant RFBs, regional sea turtle arrangements or other mechanisms.

   (ii) Cooperation to standardize data collection and research methodology, such as fishing gear and effort terminology, database development, estimation of sea turtle interaction rates, and time and area classification.

C. Review of the effectiveness of measures
- (i) Continuous assessment of the effectiveness of measures taken in accordance with these guidelines.
- (ii) Review of the implementation and improvement of measures stipulated above.

3. Ensuring policy consistency

A. Maintaining consistency in management and conservation policy at national level, among relevant government agencies, including through inter-agency consultations, as well as at regional level.

B. Maintaining consistency and seeking harmonization of sea turtle management and conservation-related legislation at national, sub-regional and regional level.

4. Education and training

A. Preparation and distribution of information materials such as brochures, manuals, pamphlets and laminated instruction cards.

B. Organization of seminars for fishers and fisheries industries on:
- Nature of the sea turtle-fishery interaction problem
- Need to take mitigation measures
- Sea turtles species identification
- Appropriate handling and treatment of bycaught or incidentally caught sea turtles
- Equipment to facilitate rapid and safe release
- Impacts of their operations on sea turtles
- Degree to which the measures that are requested or required to adopt will contribute to the conservation, management and recovery of sea turtle population.
- Impacts of mitigation measures on profitability and success of fishing operations
- Appropriate disposal of used fishing gear

C. Promotion of awareness of the general public of sea turtle conservation and management issues, by government as well as other organizations.

5. Capacity building

A. Financial and technical support for implementation of these guidelines in developing countries.

B. Cooperation in research activities such as on status of sea turtle incidental catch in coastal and high seas fisheries and research at foraging, mating and nesting areas.

C. Establishment of a voluntary support fund.

D. Facilitation of technology transfer.

6. Socio-economic and cultural considerations

A. Taking into account :

 (i) socio-economic aspects in implementing sea turtle conservation and management measures.

 (ii) cultural aspects of sea turtles interactions in fisheries as well as integration of cultural norms in sea turtle conservation and management efforts.

 (iii) sea turtle conservation and management benefits to fishing and coastal communities, with particular reference to small-scale and artisanal fisheries.

B. Promotion of the active participation and, where possible, cooperation and engagement of fishing industries, fishing communities and other affected stakeholders.

C. Giving sufficient importance to participatory research and building upon indigenous and traditional knowledge of fisherfolk.

7. Reporting

Reporting on the progress of implementation of these guidelines as part of Members' biennial reporting to FAO on the Code of Conduct for Responsible Fisheries and, as appropriate, and, voluntarily, to other relevant bodies such as regional sea turtle conservation and management arrangements.

8. Consideration of other aspects of sea turtle conservation and management

Fishers, research institutions, management authorities and other interested parties dealing with fisheries conservation and management should collaborate with relevant conservation and management bodies, at national, sub-regional and regional level, in the following subject matters:

A. Collection and sharing of information on sea turtles relative to:

    (i)   Biology and ecology (population dynamics, stock identification, behaviour, diet selection, habitats, breeding, nesting, foraging, migration patterns/areas, nursery grounds, etc).

    (ii) Sources of mortality other than fisheries.

    (iii) Status of sea turtle populations, including human-related threats.

B. Improvement and development of conservation and management measures applied throughout the sea turtle life cycle (habitat or nesting beach protection, enhancement of sea turtle populations).

C. Promotion, as appropriate, of participation in regional sea turtle conservation and management arrangements with a view to cooperate on sea turtle conservation and management.

Annex II

Regional fishery bodies and other intergovernmental organizations responsible for regional sea turtle conservation

A list follows of (i) all RFBs categorized by type of body (available at www.fao.org/fishery/rfb/search/en), and (ii) list of other IGOs with a responsibility of regional sea turtle conservation. Those organizations that have an interest in addressing sea turtle bycatch in marine capture fisheries are identified with the symbol "●" before the acronym.

REGIONAL FISHERY BODIES (RFBs)

Regional fishery management organizations and RFBs that directly establish management measures

CCAMLR	– Commission for the Conservation of Antarctic Marine Living Resources
CCBSP	– Convention on the Conservation and Management of the Pollock Resources in the Central Bering Sea
CCSBT	– Commission for the Conservation of Southern Bluefin Tuna
(**CEPTFA**)	– Council of the Central Eastern Pacific Tuna Fishing Agreement (not yet entered into force)
● **GFCM**	– General Fisheries Commission for the Mediterranean
● **IATTC**	– Inter-American Tropical Tuna Commission
IBSFC	– International Baltic Sea Fishery Commission
● **ICCAT**	– International Commission for the Conservation of Atlantic Tunas
● **IOTC**	– Indian Ocean Tuna Commission
IPHC	– International Pacific Halibut Commission
IWC	– International Whaling Commission
● **NAFO**	– Northwest Atlantic Fisheries Organization
NASCO	– North Atlantic Salmon Conservation Organization
NEAFC	– North East Atlantic Fisheries Commission
NPAFC	– North Pacific Anadromous Fish Commission

PSC   – Pacific Salmon Commission

● SEAFO   – South East Atlantic Fisheries Organization

(SIOFA)   – South Indian Ocean Fisheries Agreement (not yet entered into force)

(SPRFMO)   – South Pacific Regional Fisheries Management Organisation (not yet entered into force)

● WCPFC   – Western and Central Pacific Fisheries Commission

Advisory bodies and RFBs that provide members with scientific and management advice

APFIC   – Asia-Pacific Fishery Commission

BOBP-IGO   – Bay of Bengal Programme Inter-Governmental Organisation

● CECAF   – Fishery Committee for the Eastern Central Atlantic

CIFA   – Committee for Inland Fisheries of Africa

COMHAFAT   – Ministerial Conference on Fisheries Cooperation among African States Bordering the Atlantic Ocean

COPESCAL   – Comision de Pesca Continental para America Latina (Commission for Inland Fisheries of Latin America)

COFREMAR   – Comision Tecnica Mixta del Frente Maritimo (Joint Technical Commission for the Argentina/Uruguay Maritime Front)

COREP   – Regional Fisheries Committee for the Gulf of Guinea

CPPS   – Comisión Permanente del Pacífico Sur (Permanent Commission for the South Pacific)

EIFAC   – European Inland Fisheries Advisory Commission

FFA   – Pacific Islands Forum Fisheries Agency

LVFO   – Lake Victoria Fisheries Organization

MRC   – Mekong River Commission

NAMMCO   – North Atlantic Marine Mammal Commission

● OLDEPESCA – Organización Latinoamericana de Desarrollo Pesquero (Latin American Organization for Fisheries Development)

RECOFI   – Regional Commission for Fisheries

SRFC   – Commission Sous-Regionale des Peches (Subregional Fisheries Commission)

SEAFDEC   – Southeast Asian Fisheries Development Center

SWIOFC   – South West Indian Ocean Fisheries Commission

● WECAFC   – Western Central Atlantic Fishery Commission

Scientific bodies that provide scientific information and advice

ACFR – Advisory Committee on Fishery Research
CWP – Coordinating Working Party on Fisheries Statistics
ICES – International Council for the Exploration of the Sea
NACA – Network of Aquaculture Centres in Asia-Pacific
PICES – North Pacific Marine Science Organization
SPC – Secretariat of the Pacific Community

OTHER IGOS WITH A RESPONSIBILITY OF REGIONAL SEA TURTLE CONSERVATION

- **IAC** – Inter-American Convention for the Protection and Conservation of Sea Turtles
- **IOSEA MoU** – Memorandum of Understanding on the Conservation and Management of Marine Turtles and their Habitats of the Indian Ocean and South-East Asia
- **UNEP RSP** – United Nations Environment Programme Regional Seas Programmes
- **West Africa MoU** – Memorandum of Understanding Concerning Conservation Measures for Marine Turtles of the Atlantic Coast of Africa

Annex III

Research results on the effects of circle vs. tuna and J hooks and alternative types and sizes of bait on catch rates of target and bycatch species in pelagic longline fisheries (courtesy of John Watson, NOAA, United States of America).

Hook/Bait	Target Species					Bycatch Species			Comments
	SWO	BET	YFT	ALB	Mahi Mahi	Logger-head Turtle	Leather-back Turtle	Blue Shark	
U.S. North Atlantic Swordfish Fishery									
(Results are relative to 25° offset J hook with squid bait)									Observer data indicates six times lower sea-birds CPUE with circle hooks
18/0 non-offset circle hook/squid bait	-33%	24%		33%	-61%	-77%	-75%	3.80%	
18/0 10° offset circle hook/squid bait	-29%	35%		64%	-80%	-85%	-50%	-9%	
18/0 10° offset circle hooks/mackerel bait	30%	-63%		86%	-85%	-88%	-63%	-30%	
20/0 10° offset circle hooks/mackerel bait	17%	-92%		95%	-95%	-68%	-74%	-44%	
300-500 gram mackerel bait (25° offset 9/0 J Hook)	63%	-90%		97%	7.60%	-71%	-66%	-42%	
Canadian North Atlantic Tuna & Swordfish fishery									
16/0 10° offset circle hook, mixed bait									Leatherback turtle captures increased when J hooks were used 95.5% of hardshell turtles captured on sets using squid bait
U.S. Pacific Swordfish Fishery									
18/0 10° offset circle hook/mackerel bait	16%		all tuna	-50%	Mahi opah & wahoo 34%	-90%	-83%	all sharks -36%	
U.S. Gulf of Mexico Tuna Fishery									
(Results are relative to 16/0 non-offset circle hook/sardine bait)									A significantly higher proportion of white and blue marlin were released alive from circle hooks compared to J hooks
18/0 non-offset circle hook/sardine bait			26%						
15/0 & 16/0 circle hooks, mixed bait									
U.S. Atlantic Tuna Fishery									
16/0 non-offset circle hook, mixed bait									2.5 times higher CPUE for yellowfin tuna, 31% mortality vs 42% mortality for all species combined

Hook/Bait	Target Species					Bycatch Species			Comments
	SWO	BET	YFT	ALB	Mahi Mahi	Logger-head Turtle	Leather-back Turtle	Blue Shark	

Azores Swordfish and Blue Shark Fishery

Hook/Bait	SWO	BET	YFT	ALB	Mahi Mahi	Logger-head Turtle	Leather-back Turtle	Blue Shark	Comments
(Results are relative to 9/0 non-offset J hook)									
16/0 non-offset circle hook/squid bait						ns			
16/0 non-offset circle hook/squid bait	-31%					ns			
(Results are relative to 3.6 mm ringed tuna hook)									
18/0 non-offset circle hook/squid bait						-74%			
16/0 non-offset circle hook/squid bait						-58%			

Eastern Pacific Coastal Longline Fishery for Tuna, Billfish, Sharks and Dorado (Provisional Results)

Hook/Bait	Target Species	Comments
16/0 10° offset circle hook/mixed bait	Catch rates for target species were quite similar between circle hooks and J hooks	16/0 Circle hook caught 40–60% fewer hardshell turtles than J hooks in the tuna, billfish, shark fishery
15/0 non-offset circle hook/mixed bait		Mixed results between countries in the dorado fishery some areas showed promise for reduction in hardshell turtle catch
14/0 non-offset circle hook/mixed bait		

Japan Far Seas Fishery

Hook/Bait	Target Species	Comments
(Results are relative to 3.5 sun J hook)		Small (3.8 sun) circle hook was not effective in reducing loggerhead turtle CPUE – Loggerhead turtle catch rate for squid was substantially higher than that for mackerel
3.8 Sun Tankichi circle hook Mackerel bait compared to squid bait	No substantial difference in catch rates for swordfish, bigeye, albacore or yellowfin tuna	
(Results are relative to 3.8 sun J hook, squid bait)		
Mutsu Hokubel 4.3 sun 10° other circle hooks	Use of circle hooks had little effect on the catch of tuna, but large-sized circle hooks showed negative impact on billfish catch	No difference in hooking rates of loggerhead turtles between tuna hooks and small-sized circle hooks. Large-sized circle hooks had potential to reduce hooking rates of loggerhead turtles

Hook/Bait	Target Species					Bycatch Species			Comments
	SWO	BET	YFT	ALB	Mahi Mahi	Logger-head Turtle	Leather-back Turtle	Blue Shark	
Japan Western North Pacific Swordfish & Pelagic Shark Fishery									
(Results are relative to 3.6 10° offset J hooks, squid bait) 4.3 sun & 5.2 sun 10° offset circle hooks									Catch rates for blue shark did not differ significantly between J and circle hooks. Circle hooks used in this study had little effect on catch rate and mortality of blue shark.
Korean Eastern Pacific Tuna Fishery									
(Results are relative to 4.0 tuna hook, mixed baits) 15/0 & 16/0 circle hooks	For tunas J hooks had a 2% higher catch rate than 15/0 circle hooks and a 35% higher rate than 18/0 circle hooks					Only 3 turtles were caught all on J hooks			For billfishes J hooks had a 40% higher catch rate than 15/0 circle hooks and a 17% higher rate than 18/0 circle hooks For sharks J hooks had a 52–57% higher catch rate than 15/0 and 18/0 circle hooks respectively
U.S. Rrecreational Fishery									
10/0 &12/0 circle hook compared to 5/0 and 8/0 J hook 7/0 & 8/0 circle hooks compared to 6/0 J hook									Juvenile bluefin tuna release mortality 4% for circle hooks compared to 28% for J hooks. Circle hooks had the greatest conservation benefit of survival after release in the recreational live bait fishery for sailfish
Spanish Indian Ocean Fishery									
18/0 ???° offset circle hooks/squid bait	-21%	29%	6%	16%		Most enta-ngled		6%	Very small number of turtles (21 entangled, 4 bit the hook (3 J hook). Very small number of seabirds (3)
18/0 ???° offset circle hook/mackerel bait compared to 16 J hook	5%	30%	46%	56%				16%	

Azores Swordfish and Blue Shark Fishery

United States North Atlantic Swordfish Fishery	For J hooks, 68.8% of loggerheads caught swallowed the hooks compared to 27.3% for circle hooks
United States Pacific Swordfish Fishery	22% swallowed circle hooks compared to 60% with J hooks prior to circle hook regulations
Azores Swordfish and Blue Shark Fishery	For J hooks, 60% of loggerheads caught swallowed the hooks compared to 13% for circle hooks
Eastern Pacific Coastal Longline Fishery for Tuna, Billfish, Sharks and Dorado	Considerable reduction in swallowed hooks with circle hooks for all fisheries
Japan Far Seas Fishery	The 3.8 sun circle hook reduced the proportion of turtles hooked in the throat and increased the proportion hooked in the mouth. Ingestion of circle hooks, especially the large-sized (4.3 & 5.2 sun) hooks, occurred less frequently than that of tuna hooks.

Sea turtles are affected by a range of different factors, some natural and others caused by human activities, including fishing operations. As a result, all sea turtle species whose conservation status has been assessed are considered to be threatened or endangered. These guidelines provide assistance for the preparation of national or multilateral fisheries management measures and industry initiatives that may help to conserve sea turtles by reducing the negative impacts that fisheries may have on them. The guidelines are voluntary and non-binding. Their scope is global, but when they are implemented, national and regional diversity, including cultural and socio-economic differences, should be taken into account. These guidelines present our best understanding of how to reduce interactions between sea turtles and fishing gear and reduce the proportion of caught turtles that are killed as a result of interactions with marine capture fisheries. They include information about how to change fishing gear and fishing methods and how the fishing industry can adopt voluntary approaches to reduce sea turtle mortality. The guidelines make suggestions about implementing management actions, such as input and output controls and bycatch fees and they cover subjects such as bycatch hotspot avoidance, best practices for the handling and release of caught turtles and reducing derelict fishing gear and other marine debris. They also identify fisheries and areas where fishing may be a relatively important cause of sea turtle deaths. Research, monitoring, information exchange, capacity-building, financial support, socio-economic, cultural and legal aspects are also discussed.