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**STANDARDIZED FISHERY TERMS TO FACILITATE COMMUNICATION WITHIN  
THE SCIENTIFIC COMMITTEE AND WITH THE WCPFC**

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**WCPFC-SC2-2006/FT WP-5**

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**1. INTRODUCTION**

The adoption and use of a common language should be the first requirement of any organization dedicated to communal problem solving and having shared objectives. This especially true of an organization that conducts its business in a common language that is not the mother tongue of most of its members. The Scientific Committee is a prime example of such an organization, whose mandate is to ensure that the Commission obtains the best available scientific information in order to develop conservation and management measures in support of the Convention.

During the First Regular Session of the Scientific Committee<sup>1</sup> (SC1), meaningful discussion between individual speakers was at times hampered by differing perceptions of the definition or context of commonly used fishery terms. The different Specialist Working Groups also applied different interpretations of common terms for subjects such as bycatch, catch or FADs. These discrepancies resulted in the loss of plenary time to an already crowded agenda. The implication of this can be a waste of time and effort within the SC and a hampered ability to communicate discussions and recommendations to the Commission in a concise and accurate manner.

SC1 then charged the Fishing Technology Specialist Working Group (FT-SWG) to develop:

*Standardised terminology for technical terms for use across all SWGs;*<sup>2</sup>

***1.1 Methodology and approach***

This working paper reviews some of the fishery terms used in the Convention and the texts upon which the Convention is based, notably the 1982 United Nations Convention on the Law of the Sea (UNCLOS) and the 1995 UN Fish Stocks Agreement<sup>3</sup>. It is not an exhaustive attempt to define all words and phrases used in these texts but focuses on those terms that relate most closely to the work of the SC and to communication between the SC and the WCPFC. Those terms and phrases that may be open to multiple interpretations or misinterpretation receive particular attention.

The format we have followed in this paper is to identify key words and phrases from the Convention in the order in which they appear, to refer to the FAO Fisheries Glossary<sup>4</sup> definition where this is available, and to suggest an amended definition for consideration by SC2 where this is appropriate. We have also provided the FAO Glossary definitions for many critical fisheries terms that are commonly used during SC deliberations but which are not specifically mentioned in the Convention.

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<sup>1</sup> Noumea, New Caledonia 8 – 19 August, 2005

<sup>2</sup> Report of the First Regular Session of the Scientific Committee, page 44, para 7.20

<sup>3</sup> AGREEMENT FOR THE IMPLEMENTATION OF THE PROVISIONS OF THE UNITED NATIONS CONVENTION ON THE LAW OF THE SEA OF 10 DECEMBER 1982 RELATING TO THE CONSERVATION AND MANAGEMENT OF STRADDLING FISH STOCKS AND HIGHLY MIGRATORY FISH STOCKS

<sup>4</sup> <http://www.fao.org/fi/glossary/>

The FAO Fisheries Glossary was chosen for several reasons:

- The Glossary is the product of the international organization (FAO) that has facilitated the development and implementation of many of the international agreements upon which the Convention is based.
- Every definition in the Glossary has an FAO “owner” who maintains and updates the definitions which lie within his/her area of fisheries expertise.
- Definitions of important fishery terms are referenced to published primary sources and can have multiple definitions to cover a range of circumstances.
- The Glossary is continually evolving to reflect new data and thought.
- Glossary definitions are open to review and comments from users.
- Suggestions for new terms and definitions are solicited

The NOAA Fisheries Glossary<sup>5</sup> was also consulted in the development of this working paper. This glossary was produced by the US National Oceanic and Atmospheric Administration (NOAA) to facilitate lines of communication between NOAA and its constituency, the US fisheries and interested public. The NOAA glossary has drawn elements from the FAO Fisheries Glossary but was developed primarily to explain the specialized language and terminology used by US federal fishery and management agencies as dictated by the Magnuson-Stevens Fishery Conservation and Management Act. Therefore, the document should be viewed as a useful reference guide for interpreting US management policies but not as a principal source for the Commission. However, the development of publication of a fisheries glossary by a large fisheries management organization like NOAA can be seen as supportive of the concept and intent of such an exercise.

## 2. WCPO CONVENTION

The parts of the Convention considered here are the Preamble, Article 1 (*Use of terms*), Article 5 (*Principles and measures for conservation and management*), Article 6 (*Application of the precautionary approach*; including Annex II of the UN Fish Stocks Agreement), Article 12 (*Functions of the Scientific Committee*) and Article 13 (*Scientific services*).

### 2.1 Preamble

*Conservation*

See FAO Glossary definition below.

*Sustainable use*

See FAO Glossary definition below.

*Highly migratory fish stocks*

These are defined in Article 1 – see below for discussion.

*Precautionary approach*

Application of the precautionary approach under the Convention is detailed in Article 6.

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<sup>5</sup> <http://www.st.nmfs.gov/st4/documents/FishGlossary.pdf> (NOAA Technical Memorandum NMFS-F/SPO-69, October 2005, Revised Edition June 2006)

*Best scientific information available*

Generating this information is the responsibility of the SC (Article 12) and providers of scientific services (Article 13). It should be noted that the UNCLOS does not define the quality of scientific evidence necessary to promulgate regulatory action, implying that even poor or sparse evidence can be used if it is the *best* currently available. Quantitative means of supporting what is the *best scientific evidence* have since been proposed, equating *best* with *statistically sound*.

Another aspect that the Convention does specifically acknowledge is that the SC should promote a continual effort to *improve* the best scientific information (Article 12). This is the main reason that the SC must remain open to all relevant contributions and encourage collaborative research. Scientific service providers and other scientific experts present their work to the SC, which then provides a critical forum through which the quality of the data and the analysis are appraised before reporting to the Commission. The process is repeated each year and the quality of scientific information is expected to *improve* over time and to adjust to changes in fisheries, natural abundance and climate. The Convention anticipates that there will always be uncertainty around the *best scientific information available* and notes that “*the absence of adequate scientific information shall not be used as a reason for postponing or failing to take conservation and management measures.*” *Article 6.2*. In the case of missing or sparse data, better data should be collected and analyzed as quickly as possible. We suggest that it is for the SC to assess whether scientific information is inadequate and how to obtain any necessary data, and it is for the Commission to decide whether conservation and management measures are nonetheless warranted.

*Preserve biodiversity*

See FAO Glossary definition for “Biological diversity” below.

*Maintain the integrity of marine ecosystems*

See FAO Glossary definition for “Ecosystem integrity” below.

*Conservation and management measures*

The resolutions passed by the Commission in order to manage WCPO fisheries and to meet the requirements of the Convention with respect to conservation and sustainable use.

**2.2 Article 1. Use of terms**

The purpose of Article 1 is much the same as this Working Paper in that it defines the most important words that might otherwise be open to misinterpretation (i.e. *fishing, fishing vessel, highly migratory fish stocks, transshipment*) – it also abbreviates certain terms, notably other international conventions and treaties and the WCPFC itself, in order to make the rest of the Convention less verbose. For reference, the entire Article is repeated below.

Most of these definitions serve their purpose of being self-explanatory. The one definition that is deliberately left open for subsequent determination by the Commission is that of *highly migratory fish stocks*, which are defined as “...*all fish stocks of the species listed in Annex 1 of the 1982 [Law of the Sea] Convention occurring in the [WCPO] Convention Area, and such other species as the Commission may determine.*” It would seem appropriate that the SC should scrutinize and endorse any recommendations to the Commission as to what species not listed under Annex 1 should nonetheless be classified as *highly migratory species* for the purposes of the Convention.

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*Article 1*  
*Use of terms*

*For the purposes of this Convention:*

- (a) "1982 Convention" means the United Nations Convention on the Law of the Sea of 10 December 1982;*
- (b) "Agreement" means the Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks;*
- (c) "Commission" means the Commission for the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean established in accordance with this Convention;*
- (d) "fishing" means:*
  - (i) searching for, catching, taking or harvesting fish;*
  - (ii) attempting to search for, catch, take or harvest fish;*
  - (iii) engaging in any other activity which can reasonably be expected to result in the locating, catching, taking or harvesting of fish for any purpose;*
  - (iv) placing, searching for or recovering fish aggregating devices or associated electronic equipment such as radio beacons;*
  - (v) any operations at sea directly in support of, or in preparation for, any activity described in subparagraphs (i) to (iv), including transshipment;*
  - (vi) use of any other vessel, vehicle, aircraft or hovercraft, for any activity described in subparagraphs (i) to (v) except for emergencies involving the health and safety of the crew or the safety of a vessel;*
- (e) "fishing vessel" means any vessel used or intended for use for the purpose of fishing, including support ships, carrier vessels and any other vessel directly involved in such fishing operations;*
- (f) "highly migratory fish stocks" means all fish stocks of the species listed in Annex 1 of the 1982 Convention occurring in the Convention Area, and such other species of fish as the Commission may determine;*
- (g) "regional economic integration organization" means a regional economic integration organization to which its member States have transferred competence over matters covered by this Convention, including the authority to make decisions binding on its member States in respect of those matters;*
- (h) "transshipment" means the unloading of all or any of the fish on board a fishing vessel to another fishing vessel either at sea or in port.*

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**2.3 Article 5. Principles and measures for conservation and management**

*Long-term sustainability*

See FAO Glossary definition for "sustainability" below.

*Optimum utilization*

See FAO Glossary definition for "optimal sustainable yield" below.

*Best scientific evidence available*

See discussion above on this topic in the context of the SC and WCPFC and the FAO Glossary definition for "best scientific evidence".

*To maintain or restore stocks at levels capable of producing maximum sustainable yield, as qualified by relevant environmental or economic factors*

See Annex II of the UN Fish Stocks Agreement; this phrase relates to the use of BMSY as a target reference point when the current biomass is below BMSY and a limit reference point where current biomass is above BMSY. It also recognizes that MSY is an equilibrium concept

assuming constant recruitment; seeing as recruitment does in reality vary due to fluctuations in environmental factors, especially during early life history, the concept of *Optimum Sustainable Yield* (OSY) is preferred. See FAO Glossary definition for this below. Economic factors that may qualify what is the OSY include, for example, the price-limited nature of the skipjack fishery, such that there is little point increasing catches as the market then becomes flooded, which is known as *economic overfishing*; OSY in this case would be less than MSY.

*Fishing patterns*

See FAO Glossary definition for “Fishing pattern” below.

*Interdependence of stocks*

This term recognizes that fish stocks, especially of highly migratory species, are not independent of each other in terms of their distribution, trophic status and vulnerability to fishing. Conservation and management measures designed primarily for a single species should therefore take into account their impact on other target or non-target associated and dependent species.

*Any generally recommended international minimum standards*

This clause recognizes the role of non-binding and evolving processes, principles and standards, e.g. *Code of Conduct on Responsible Fisheries*; *Ecosystem Approach to Fisheries*.

*Apply the precautionary approach*

Application of the precautionary approach under the Convention is detailed in Article 6.

*Assess the impacts of fishing...*

These are not defined in the FAO glossary but may be understood primarily as immediate or delayed mortality plus sub-lethal effects, especially those that might result in impaired reproductive potential.

*...other human activities*

These are not defined or listed so the implications of this clause are wide-ranging: members of the Commission must assess the impacts of any other human activity upon target species and any other species belonging to the same ecosystem. Such activities would include land-based pollution; ship-based pollution; transport of radioactive waste; bait fishing; etc.

*...and environmental factors*

These are not defined in the FAO Glossary but might reasonably be defined as any climatic, oceanographic, or ecosystem property (e.g. winds, currents, temperature, oxygen, light, nutrients, primary productivity, trophic interactions etc.) that might impact on target and non-target associated and dependent species.

*Target stocks*

See FAO Glossary definition for “Target species” below.

*Non-target species*

See FAO Glossary definition for “Non-target species” below.

*Species belonging to the same ecosystem*

The meaning of this is self-evident and the implications are extremely wide-ranging. Members of the Commission have an obligation to assess the impacts of fishing, other human activities and environmental factors on essentially all species comprising the ecosystem.

See FAO definition for “Species assemblage”

*Dependent upon...*

See FAO Glossary definition for “Dependent species” below.

*Associated with...*

See FAO Glossary definition for “Associated species” below.

*Minimize waste, discards,..., pollution originating from fishing vessels, catch of non-target species, both fish and non-fish species*

Most of these terms are self-evident (though see FAO Glossary definitions for *waste, discard and non-target species* below). However, it is worth noting that *minimize* in this context has been interpreted legally as being an active and continuous exercise, to be carried out regardless of whether waste, discards, etc., might already be considered minimal.

*endangered species*

See FAO Glossary definition for “Endangered” below.

*Promote the development and use of selective, environmentally safe and cost-effective fishing gear and techniques*

See FAO Glossary definitions for “Selective gear”, “Environmentally safe” and “Cost effectiveness”

*Protect biodiversity*

See FAO Glossary definition for “biological diversity” below.

*Prevent or eliminate over-fishing and excess fishing capacity*

See FAO Glossary definitions for “Overfishing” and “Excess capacity” below. Note that neither of the glossary definitions for “*Overfishing*” are particularly precise. The SCTB and SC1 have previously used the definitions: *overfishing* is when  $F_{\text{current}}$  is greater than FMSY and an *overfished* state is when  $B_{\text{current}}$  is less than BMSY.

*Ensure that levels of fishing effort do not exceed those commensurate with the sustainable use of fishery resources*

This can be interpreted such that fishing effort should not exceed that which would result in fishing mortality  $F_{\text{current}}$  being greater than FMSY, i.e. the effort deployed should not result in overfishing, which by definition is not sustainable.

*Take into account the interests of artisanal and subsistence fishers*

See FAO Glossary definitions for “artisanal” and “subsistence” below.

*Collect and share, in a timely manner...*

Catch estimates presented to the SC in August of any one year and the stock assessments that have been carried out in earlier months of that year include only preliminary catch estimates for the previous year. The SC should consider whether this is sufficiently timely for the purposes of advising the Commission at its meeting in December of the same year, i.e. the Commission is presently reviewing assessments and advice based on data that is only complete for the year ending two years prior to its meeting. This may be unavoidable but for the Commission itself to be able to act in a timely fashion it is worth considering how more up-to-date data and information may be presented to it directly, supplementary to the full SC report.

*complete and accurate data...on...catch of target and non-target species...*

Data collection for target species is presently far more complete and accurate than that for non-target species. The SC needs to consider how this situation might be improved.

*...as well as information from national and international research programmes*

Commission members manage their own processes for identifying and presenting relevant research from their own national programs and those international programs in which they may be involved.

#### **2.4 Article 6. Application of the precautionary approach**

The first clause of this Article requires Commission members to apply the guidelines set out in Annex II of the UN Fish Stocks Agreement; these form an “*integral part*” of the Convention and are repeated below, as they already contain several useful definitions of key words and concepts.

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“AGREEMENT FOR THE IMPLEMENTATION OF THE PROVISIONS OF THE UNITED NATIONS CONVENTION ON THE LAW OF THE SEA OF 10 DECEMBER 1982 RELATING TO THE CONSERVATION AND MANAGEMENT OF STRADDLING FISH STOCKS AND HIGHLY MIGRATORY FISH STOCKS

#### Annex II

GUIDELINES FOR APPLICATION OF PRECAUTIONARY REFERENCE POINTS IN CONSERVATION AND MANAGEMENT OF STRADDLING FISH STOCKS AND HIGHLY MIGRATORY FISH STOCKS.

- 1. A precautionary reference point is an estimated value derived through an agreed scientific procedure, which corresponds to the state of the resource and of the fishery, and which can be used as a guide for fisheries management*
- 2. Two types of precautionary reference points should be used: conservation, or limit, reference points and management, or target, reference points. Limit reference points set boundaries which are intended to constrain harvesting within safe biological limits within which the stocks can produce maximum sustainable yield. Target reference points are intended to meet management objectives.*
- 3. Precautionary reference points should be stock-specific to account, inter alia, for the reproductive capacity, the resilience of each stock and the characteristics of fisheries exploiting the stock, as well as other sources of mortality and major sources of uncertainty.*
- 4. Management strategies shall seek to maintain or restore populations of harvested stocks, and where necessary associated or dependent species, at levels consistent with previously agreed precautionary reference points. Such reference points shall be used to trigger pre-agreed conservation and management action. Management strategies shall include measures which can be implemented when precautionary reference points are approached.*
- 5. Fishery management strategies shall ensure that the risk of exceeding limit reference points is very low. If a stock falls below a limit reference point or is at risk of falling below such a reference point, conservation and management action should be initiated to facilitate stock recovery. Fishery management strategies shall ensure that target reference points are not exceeded on average.*
- 6. When information for determining reference points for a fishery is poor or absent, provisional reference points shall be set. Provisional reference points may be established by analogy to similar and better-known stocks. In such situations, the fishery shall be subject to enhanced monitoring so as to enable revision of provisional reference points as improved information becomes available.*



7. *The fishing mortality rate which generates maximum sustainable yield should be regarded as a minimum standard for limit reference points. For stocks which are not over-fished, fishery management strategies shall ensure that fishing mortality does not exceed that which corresponds to maximum sustainable yield, and that the biomass does not fall below a pre-defined threshold. For over-fished stocks, the biomass which would produce maximum sustainable yield can serve as a rebuilding target.*

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Annex II of the UN Fish Stocks Agreement (above) is quite precise and self-explanatory and we will not expand on it further. Below we consider other terms from Article 6 that do require definition and/or elaboration.

*Assess the impact of fishing on non-target and associated and dependent species and their environment*

This is the purpose of *Ecological Risk Assessment*. When a full stock assessment has been carried out it is possible to estimate fishing mortality  $F$  and its contribution to total mortality. Stock assessments presented to the SC often present *biomass depletion ratios* comparing  $B_{\text{current}}$  with the biomass that would have existed in the absence of fishing. However, full assessments are not routinely carried out for non-target associated and dependent species therefore other less exact methods must presently be used to assess fishing impacts.

*...habitats of special concern.*

These are not defined under the Convention so we assume that the SC might recommend such habitats to the Commission where there is a scientific basis for having special concern. See FAO Glossary definition for “habitat”.

*...new or exploratory fisheries*

Although the term appears to be self-explanatory, the fact that it is intended to signal the need for special precautionary management measures might result in some debate as to whether any particular fishery is new or exploratory and therefore in need of such measures. See FAO glossary for “Developing fishery”; this definition is probably adequate after the removal of the first subclause, which implies that the fishery already exists at a low level of capacity. There is no definition in the FAO Glossary of *Exploratory fishing* or an *Exploratory fishery*.

*If a natural phenomenon has a significant adverse impact on the status of highly migratory fish stocks, members...shall adopt...measures on an emergency basis to ensure that fishing does not exacerbate such effects.*

Exactly what kind of *natural phenomenon* is envisaged under this clause is not specified but might reasonably include, for example, changes in the ocean environment leading to decimation of year classes and perhaps longer periods of reduced recruitment. The clause envisages that *measures taken on an emergency basis shall be temporary* but in the case of protracted periods of low recruitment, *temporary* might equate to a period of several years.

## **2.5 Article 12. Functions of the Scientific Committee**

*The Scientific Committee is established to ensure that the Commission obtains for its consideration the best scientific information available.*

See the discussion above about what constitutes the *best scientific information available*.

The general role of the SC is spelled out clearly in the Convention. It should *encourage and promote cooperation in scientific research, taking into account the provisions of article 246 of the 1982 [Law of the Sea] Convention, in order to improve [the best scientific] information [available] ...*

The most relevant of the provisions on UNCLOS Article 246 are that:

*3. Coastal States shall, in normal circumstances, grant their consent for marine scientific research projects by other States or competent international organizations in their exclusive economic zone or on their continental shelf to be carried out in accordance with this Convention exclusively for peaceful purposes and in order to increase scientific knowledge of the marine environment for the benefit of all mankind. To this end, coastal States shall establish rules and procedures ensuring that such consent will not be delayed or denied unreasonably.*

*5. Coastal States may however in their discretion withhold their consent to the conduct of a marine scientific research project of another State or competent international organization in the exclusive economic zone or on the continental shelf of the coastal State if that project:*  
*(a) is of direct significance for the exploration and exploitation of natural resources, whether living or non-living;*

Cooperation in scientific research that does not involve sea-going work in the EEZ of a coastal state is obviously not affected by this article.

There are two aspects of SC procedures as detailed in the Convention that are worthy of some attention here. Firstly, the SC may recommend in its research plan *items to be addressed by the scientific experts or by other organisations or individuals, as appropriate*. This gives the SC some discretion as to whether it recommends work to be done by members of the Commission in general or in particular, or whether it recommends that work be done by scientific experts contracted by the Commission under Article 13. It is certainly not expected that the research plan be executed solely by scientific experts contracted to the Commission and it has already been noted above that the SC should review relevant *information from national and international research programmes* (Article 5).

Secondly, the SC is charged to *make reports and recommendations to the Commission as directed, or on its own initiative*. This makes it incumbent upon participants to the SC not merely to be reactive to Commission directives but also to initiate and present relevant research designed to *improve the best scientific information available*. Naturally there will be an emphasis at the SC on work that the Commission has previously requested but there must also be time to review scientific information of which the Commission may not yet be aware.

## **2.6 Article 13. Scientific services**

Article 13 includes many of the scientific words and phrases that have been discussed and defined above or in the FAO Glossary and there is no need here to further define them. There is, however, one important scientific research activity that is referred to here but not elsewhere in the Convention, which is that *scientific experts may... assess the potential effects of proposed changes in the methods or levels of fishing and of proposed conservation and management measures*.

### 3. LIST OF REVISED TERMS AND DEFINITIONS SUGGESTED FOR USE BY THE SC

We recommend that the FAO Glossary be consulted and utilized as a general source for definitions of fishery terms for use by the SC and when communicating with the WCPFC. We suggest that the SC endorse in principal the FAO Fisheries Glossary while recognizing that some of the definitions contained therein are inadequate for the needs and purposes of the SC. We propose that the SC examine the FAO Fisheries Glossary to identify terms that may require modification; and recommend that the SC work to develop its own published, online glossary similar in concept to the NOAA Fisheries Glossary but monitored and maintained like the FAO Fisheries Glossary to remain adaptable to changing conditions. We suggest that authors clearly define their use of common fishery terms if they differ substantively from those in the FAO Fisheries Glossary and eventually the WCPFC Fisheries Glossary if this is eventually developed..

As an example, we have identified the following terms for which we feel that the present FAO Glossary definitions are inadequate and we present discussion and some revised definitions for discussion by the SC and endorsement for subsequent communication to the editors of the FAO Glossary. This listing is not meant to be complete but is provided for discussion purposes.

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#### *Age at Maturity*

Add “of particular stock or reproductive unit”

#### *Bycatch*

Delete “usually dead or dying.”.

Several related terms, such as *incidental catch*, *non-target catch*, *discards*, *waste*, *take*, *catch*, *byproduct*, etc. will require careful examination to facilitate clear and unambiguous communication.

#### *Endangered*

Note: this may have to be amended to reflect less severe conditions than “danger of extinction”.

#### *Fish aggregating device*

FAO Definition: *Artificial or natural floating objects placed on the ocean surface, often anchored to the bottom, to attract several schooling fish species underneath, thus increasing their catchability.*

Note: Suggest changing to reflect the definition adopted in management related literature of the Prepcon<sup>6</sup>, FFA and WCPFC, that would read:

*“any man-made device, or natural floating object, whether moored or not, that is capable of aggregating fish”*

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<sup>6</sup> WP 24\_ Management Options for Bigeye and Yellowfin Tuna in the Western and Central Pacific Ocean. WCPFC Preparatory Conference, Sixth session, Bali, Indonesia. 19 – 23 April 2004.

Note: This definition would be equivalent to “floating object catch” or “floating object set” currently used in regional fishery statistics. For more specific uses of the SC, particularly for technical discussions, we suggest the definition of finer categorizations of floating object (FAD) directed fishing effort, all of which would become subsets of “FAD” effort. We suggest the following hierarchical divisions:

- ◆ FAD = all floating objects, moored or drifting capable of aggregating fish
  - Anchored FAD (MFAD) = floating object set for fish aggregation, moored to the bottom
  - Drifting FAD (DFAD) = floating object capable of fish aggregation, free drifting, either natural or artificial
    - Natural Drifting FAD (NDFAD) = naturally occurring drift object, either of natural origin or man-made flotsam/jetsam, i.e. lumber, rubbish, wood pallets, etc.
    - Artificial Drifting FAD (ADFAD) = drift object purposefully set adrift or a NDFAD that has been *significantly altered* to enhance fishing operations.

Note: detailed definitions of FAD categories will be developed further in a separate paper post SC2, with proposed definitions for terms like “significantly altered”.

### *GRT*

Note: The FAO definition should be amended to clearly indicate that GRT is a non-standardized measure of vessel capacity/size that varies between flag of vessel registry and origin.

### *Highly migratory species or stocks*

Note: see earlier comments

### *Overfishing / Overfished*

*Suggest change to:*

*Overfishing* occurs when current fishing mortality  $F_{\text{current}}$  is greater than the fishing mortality that would provide the maximum sustainable yield FMSY.

An *overfished* state is when current biomass  $B_{\text{current}}$  is less than the biomass that would provide the maximum sustainable yield BMSY.

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#### **4. FAO FISHERIES GLOSSARY**

The following is a list of fishery terms with definitions and associated comments extracted from the online FAO Fisheries Glossary (available at: <http://www.fao.org/fi/glossary/>). It is not the full list and for primary sources of the definitions below, please consult the Glossary itself. The terms have not been edited or revised by ourselves except for formatting purposes.

##### ***Age of Maturity***

The age when 50% of the fish of a given sex are considered to be reproductively mature.

##### ***Artisanal fisheries***

Traditional fisheries involving fishing households (as opposed to commercial companies), using relatively small amount of capital and energy, relatively small fishing vessels (if any), making short fishing trips, close to shore, mainly for local consumption. In practice, definition varies between countries, e.g. from gleaning or a one-man canoe in poor developing countries, to more than 20 m. trawlers, seiners, or long-liners in developed ones. Artisanal fisheries can be subsistence or commercial fisheries, providing for local consumption or export. Sometimes referred to as small-scale fisheries.

##### ***Associated species***

Those species that (i) prey upon the target species, (ii) are preyed on by it, (iii) compete with it for food, living space, etc; or (iv) co-occur in the same fishing area and are exploited (or accidentally taken) in the same fishery or fisheries. These interactions can occur at any stage of the life cycle of one or other species and the range of species concerned can therefore be very large.

##### ***Best scientific evidence***

The "best scientific evidence available" is required by UNCLOS as the basis for management decision-making, including for the application of the precautionary approach.

##### ***Biological diversity***

The variety and variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems. Diversity indices are measures of richness (the number of species in a system); and to some extent, evenness (variances of species' local abundance). They are therefore indifferent to species substitutions which may, however, reflect ecosystem stresses (such as those due to high fishing intensity).

The variety of species in a community, sometimes expressed by various quantitative measures which reflect not only the total number of species present but also the degree of domination of the system by a small number of species.

Includes genetic diversity (within species), species diversity (within ecosystems) and ecosystem diversity. Diversity indices measure the richness (the number and relative numeric abundance) of species in a system, and the connections between them but are indifferent to species substitution, which may, however, reflect ecosystem stress (such as those due to high fishing intensity).

##### ***Biological Reference Point***

A biological benchmark against which the abundance of the stock or the fishing mortality rate can be measured in order to determine its status. These reference points can be used as limits or targets, depending on their intended usage.

***BMSY***

Biomass at MSY. Biomass corresponding to Maximum Sustainable Yield from a production model or from an age-based analysis using a stock recruitment model. Often used as a biological reference point in fisheries management, it is the calculated long-term average biomass value expected if fishing at FMSY.

***Bycatch***

Or by-catch. Part of a catch of a fishing unit taken incidentally in addition to the target species towards which fishing effort is directed. Some or all of it may be returned to the sea as discards, usually dead or dying.

***Capacity***

In general, the ability to sustain, harvest, hold or process.

The maximum amount that can be produced per unit of time with existing plant and equipment, provided the availability of variable factors of production is not restricted.

***Conservation***

Redistribution of use in direction of the future.

All those actions which are directed towards sustaining otherwise decreasing rates of use, towards sustained yield management, or towards increasing a sustained use.

The protection, improvement, and use of natural resources according to principles that will assure their highest economic or social benefits for man and his environment now and into the future.

COMMENT: As conservation can be considered the mean to maintain the resource system in "desirable states", it is necessary to define what these states are.

***Cost effectiveness***

Minimization of costs in order to achieve a given end, such as the selection of the alternative(s) with the lowest cost per unit.

***Dependent species***

In general, species within the food chain (e.g. a predator) which depends heavily on another (e.g. a prey species) for its maintenance. Dependency may also be generated by other factors than predation (e.g. commensalism; habitat). UNCLOS refers to "associated and dependent species".

***Depleted stock***

A stock driven by fishing at very low level of abundance compared to historical levels, with dramatically reduced spawning biomass and reproductive capacity. It requires particularly energetic rebuilding strategies and its recovery time will depend on the present condition, the level of protection and the environmental conditions.

***Developed fishery***

A "fully" developed fishery is a fishery which, following a period of rapid and steady increase of fishing pressure and catches, has reached its level of maximum average yearly production. It is usually understood that such a fishery is yielding close to its maximum sustainable yield.

A fishery operating at or near the level consistent with ecologically sustainable development in accordance with a management plan.

### ***Developing fishery***

A fishery which, after a period of very low activity and landings, increases rapidly and steadily its production through increases in fishing effort, often associated with increased fishing capacity.

### ***Discard***

To release or return fish to the sea, dead or alive, whether or not such fish are brought fully on board a fishing vessel .

COMMENT: Estimates of discards can be made in a variety of ways, including samples from observers and logbook records. Fish (or parts of fish) can be discarded for a variety of reasons such as having physical damage, being a non-target species for the trip, and compliance with management regulations like minimum size limits or quotas.

### ***Economic overfishing***

Occurs when a fishery is generating no economic rent, primarily because an excessive level of fishing effort is applied in the fishery and does not always imply biological overfishing.

### ***Ecosystem approach***

An approach that recognizes the complexity of ecosystems and the interconnections among component parts

A strategy for the integrated management of land, water, and living resources that promotes conservation and sustainable use in an equitable way. An ecosystem approach is based on the application of appropriate scientific methodologies focused on levels of biological organization, which encompass the essential structure, processes, functions, and interactions among organisms and their environment. It recognizes that humans, with their cultural diversity, are an integral component of many ecosystems.

### ***Ecosystem approach to fisheries***

EAF. An approach to fisheries management and development that strives to balance diverse societal objectives, by taking into account the knowledge and uncertainties about biotic, abiotic and human components of ecosystems and their interactions and applying an integrated approach to fisheries within ecologically meaningful boundaries. The purpose of EAF is to plan, develop and manage fisheries in a manner that addresses the multiple needs and desires of societies, without jeopardizing the options for future generations to benefit from the full range of goods and services provided by marine ecosystems.

### ***Ecosystem integrity***

Ecosystem integrity is defined as the ability to support and maintain a balanced, integrated, adaptive biological community having a species composition, diversity and functional organization comparable to that of natural habitat in the region.

An ecosystem can be said to possess integrity when it is wild; that is, free as much as possible today from human intervention. It is an unmanaged ecosystem, although not necessarily a pristine one.

Organizing, self-correcting capability capacity of an ecosystem subjected to disturbance to sustain (itself) and to recover toward an end-state that is normal and good for that system.

COMMENT: "Integrity" is, by definition, based on native species and native ecosystems. By implication, Man's activities which affect the "native" state of an ecosystem appear inherently bad or adverse. It is as if the need for products and services of humans to survive or prosper was an unfortunate but unavoidable reality.

***Effective fishing effort***

(F/q). Fishing effort adjusted, when necessary, so that each increase in the adjusted unit causes a proportional increase in instantaneous rate, of fishing.

Measures of fishing effort such as hooks per day of fishing that have been standardized so that the measure is proportional to the fishing mortality rate that the gear(s) impose on the stock of fish. Controls purported to limit effective effort imply that the fishing mortality rate is to be limited.

***Endangered***

Taxa in danger of extinction and whose survival is unlikely if causal factors continue operating. Included are taxa whose numbers have been drastically reduced to a critical level or whose habitats have been so drastically impaired that they are deemed to be in immediate danger of extinction. Also included are those that possibly are already extinct, in so far as they definitely have not been seen in the wild in the past 50 years.

Endangered species are of particular concern for CITES which regulates their trade.

A taxon is considered “Endangered” (EN) by IUCN when it is not Critically Endangered but is facing a very high risk of extinction in the wild in the near future, as defined by any of the relevant IUCN criteria.

***Environmentally safe***

Implies consequences which do not include an unacceptable (particularly, irreversible) environmental impact.

***Excess capacity***

In the short-term, fishing capacity that exceeds the capacity required to capture and handle the allowable catch. In the long-term, fishing capacity that exceeds the level required to ensuring the sustainability of the stock and the fishery at the desired level. Fishing capacity in excess of what is required to reach the agreed catch or effort objectives materialised by agreed target reference points (e.g. MSY, F0.1, MEY, etc.).

When a firm or industry has the potential to produce well in excess of what is actually produced.

Excess capacity is the difference between current fishing capacity and target fishing capacity,  $(Y_c - Y_T)/Y_T$ , in which  $Y_c$  is current yield or catch and  $Y_T$  is target yield or catch (to be evaluated and compared relative to the same stock size).

Occurs when the number of boats fishing exceeds that required to efficiently exploit the fishery or to handle the allowable catch.

Harvesting capacity in excess of the minimum (or least cost) amount needed to harvest the desired quantity of fish at least cost.

***Fish aggregating device***

Artificial or natural floating objects placed on the ocean surface, often anchored to the bottom, to attract several schooling fish species underneath, thus increasing their catchability.

***Fishing pattern***

Distribution of fishing mortality among age groups.

The way in which fishing operations are conducted.



### ***Fishing power***

Of a boat or a fishing gear. Measured by its catch per unit of time, for a given density of aquatic animals. The fishing power depends on: (a) the area (or volume) affected by the gear, relative to the total area covered by the stock ( $a/A$ ); (b) the number of animals present in that area (or volume), relative to the total stock ( $n/N$ ); and (c) the proportion ( $p$ ) of the animals present in that area (or volume) which can effectively be captured by the gear. If the stock ( $N$ ) were randomly distributed in the distribution area ( $A$ ), the proportion of the stock present in the sector affected by the gear ( $n/N$ ) would be equal to ( $a/A$ ) and the catch would be ( $pa/AN$ ). In other words, the product  $p(a/A)$  will give a direct measure of fishing mortality.

The relative vulnerability of the stock to different boats or gears. Usually determined as the catch taken by the given apparatus, divided by the catch of a standard apparatus fishing at nearly the same time and place.

Of a boat, or of a fishing gear: The relative vulnerability of the stock to different boats or gears. Usually determined as the catch taken by the given apparatus, divided by the catch of a standard apparatus fishing at nearly the same time and place.

COMMENT: In such a definition, fishing power is not measured in absolute terms and is dependent on stock size. For this reason, in practice, fishing power is measured only in relative terms.

### ***Gear conflict***

Conflicts between fishing gear on fishing grounds where one type of gear interferes with another type of gear. An example is where mobile trawling gear damages passive gear, such as lobster traps.

### ***GRT***

Gross Registered Tonnage. A measure of a vessel's size and capacity.

### ***Habitat***

The place where an organism lives or the place one would go to find it. The habitat is the organisms's address, and the ecological niche its profession, biologically speaking.

The environment in which the fish live, including everything that surrounds and affects its life: e.g., water quality; bottom; vegetation; associated species (including food supplies).

### ***Harvesting capacity***

The capacity of the fishing fleet to harvest fish, usually expressed in terms of some measure of vessel size, such as gross tonnage, hold capacity, horsepower.

### ***High Grading***

The discarding of a portion of a vessel's legal catch that could have been sold to have a higher or larger grade of fish that bring higher prices. It may occur in quota and nonquota fisheries.

### ***Highly migratory species or stocks***

Marine species whose life cycle includes lengthy migrations, usually through the EEZ of two or more countries as well as into international waters. This term usually is used to denote tuna and tuna-like species, marlins and swordfish.

***Input controls***

Management instruments used to controls the time and place as well as type and/or amount of fishing with the view to limit yields and fishing mortality; e.g. restrictions on type and quantity of gear, effort, and capacity; closed seasons.

***Landings***

Weight of the what is landed at a landing site. May be different from the catch (which includes the discards).

***Limit capacity***

The maximum amount of fish that can be produced on a sustainable basis by a fully-utilized fleet. Thus, the limit capacity corresponds to MSY

***Management reference points***

Conventional (agreed values) of indicators of the desirable or undesirable state of a fishery resource of the fishery itself. Reference points could be biological (e.g. expressed in spawning biomass or fishing mortality levels), technical (fishing effort or capacity levels) or economic (employment or revenues levels). They are usually calculated from models in which they may represent critical values.

***Metric ton***

Tonne (t) mt.. 1,000 kg , equivalent to 2,204.6 lb

***Natural mortality***

M. Deaths of fish from all causes except fishing (e.g. Ageing, predation , cannibalism, disease and perhaps increasingly pollution). It is often expressed as a rate that indicates the percentage of fish dying in a year; e.g. a natural mortality rate of 0.2 implies that approximately 20% of the population will die in a year from causes other than fishing.

The loss in numbers in a year class from one age group to the subsequent one, due to natural death.

COMMENT: These many causes of death are usually lumped together for convenience, because they are difficult to separate quantitatively. Sometimes natural mortality is confounded with losses of fish from the stock due to emigration. M has proven very difficult to estimate directly, and is often assumed based on the general life history. M values is also often assumed to remain constant through time and by age, a very unlikely assumption.

***Nominal catch***

The sum of the catches that are landed (expressed as live weight equivalent). Nominal catches do not include unreported discards

***Nominal effort***

Nominal effort pertains to measures of fishing effort or vessel carrying capacity that have not been standardized. When catchability changes, e.g., through changes in gear technology, trends in nominal effort can give a misleading picture of trends in exploitation.

***Non-target species***

Species for which the gear is not specifically set, although they may have immediate commercial value and be a desirable component of the catch.

### ***Optimum (fishing) capacity***

The desired stock of inputs that will produce a desired level of outputs (e.g. a set of target fishing mortality rates for the species being harvested) and will best achieve the objectives of a fishery management plan (e.g. minimizing costs). Current or transient optimal capacity (related to current fleet and stock conditions) may differ from long run optimal capacity (reflecting management long-term objectives) particularly if the fishery resource is currently depleted and the management strategy is to rebuild this depleted resource.

### ***Optimum Sustainable Yield***

The amount of sustainable yield corresponding to the greatest overall long-term benefits to the Nation in environmental, biological, social and economic terms. Its value depends on the relative weights attached the sometimes conflicting objectives concerning food, revenues, employment, recreation, etc. and to the bio-ecological conservation constraints (e.g. spawning stock size, environmental impact). It also depends on discount rates. In relation to UNCLOS, it corresponds to the concept of “MSY as modified by any relevant economic, social, or ecological factor”.

OSY. The best sustainable yield, for the combined purposes of the fishing industry, of conservation, and of the nation as a whole.

A deliberate melding of biological, economic, social, and political values designed to produce the maximum benefit to society from stocks that are sought for human use, taking account the effect of harvesting on dependent and associated species

The largest net economic return consistent with the biological capacities of the stock, as determined on the basis of all relevant economic, biological and environmental factors

Maximum supply of food and other products. Equivalent to the Maximum Sustainable Yield (MSY).

### ***Overfished***

A stock is considered “overfished” when exploited beyond an explicit limit beyond which its abundance is considered "too low" to ensure safe reproduction. In many fisheries for the term is used when biomass has been estimated to be below a limit biological reference point that is used as the signpost defining an "overfished condition". This sign post is often taken as being FMSY but the usage of the term may not always be consistent.

COMMENT: The stock may remain overfished (i.e. with a biomass well below the agreed limit) for some time even though fishing pressure might be reduced or suppressed.

### ***Overfishing***

In general, action of exerting a fishing pressure (fishing intensity) beyond agreed optimum level. A reduction of fishing pressure would, in the medium term, lead to an increase in the total catch.

In the classical sense, a level of fishing effort or fishing mortality such that a reduction of this level would, in the medium term, lead to an increase in the total catch

COMMENT: For long-lived species, overfishing (i.e. using excessive effort) starts well before the stock becomes overfished. The use of the term "overfishing" may not always be consistent

### ***Precautionary approach***

A set of agreed cost-effective measures and actions, including future courses of action, which ensures prudent foresight, reduces or avoids risk to the resource, the environment, and the people, to the extent possible, taking explicitly into account existing uncertainties and the potential consequences of being wrong.

***Recruitment***

The number of fish added to the exploitable stock, in the fishing area, each year, through a process of growth (i.e. the fish grows to a size where it becomes catchable) or migration (i.e. the fish moves into the fishing area).

The process by which fish enter the exploitable stock and become susceptible to fishing. The process may be short or take more than one year

Addition of new fish to the vulnerable population by growth from among smaller size categories.

The rate of entry of recruits into the fishery or the process by which such recruits are generated

The attainment of a particular level of catchability relative to that of older fish

The number of fish from a year class reaching the size or age-at-first-capture or age-at-recruitment.

The number of fish entering any age or size interval (e.g recruitment into age 3, or the 20-21 cm interval).

The entrance of young fish of a year class into a fishery. The young fish recruit to a fishery over a period, sometimes less than a year and sometimes for one or more years.

***Recruitment overfishing***

A situation in which the rate of fishing is (or has been) such that annual recruitment to the exploitable stock has become significantly reduced. The situation is characterized by a greatly reduced spawning stock, a decreasing proportion of older fish in the catch, and generally very low recruitment year after year. If prolonged, recruitment overfishing can lead to stock collapse, particularly under unfavourable environmental conditions.

***Selective gear***

A gear allowing fishers to capture few (if any) species other than the target species

***Species assemblage***

Group of species co-occurring in a given area and likely to be caught together in a given gear

***Standing stock***

The total weight of a group (or stock) of living organisms (e.g.fish, plancton) or of some defined fraction of it (e.g. spawners), in an area, at a particular time. See: Abundance. Example: the spawning biomass of the cod stock on the Georges Bank in 1999.

The weight of a fish stock, or of some defined portion of it.

***Stock***

The part of a fish population which is under consideration from the point of view of actual or potential utilization.

A group of individuals in a species occupying a well defined spatial range independent of other stocks of the same species. Random dispersal and directed migrations due to seasonal or reproductive activity can occur. Such a group can be regarded as an entity for management or assessment purposes. Some species form a single stock (e.g. southern bluefin tuna) while others are composed of several stocks (e.g. albacore tuna in the Pacific Ocean comprises separate Northern and Southern stocks). The impact of fishing on a species cannot be determined without knowledge of this stock structure

COMMENT: In theory, a Unit Stock comprises all the individuals of fish in an area, which are part of the same reproductive process. It is self-contained, with no emigration or immigration of individuals from or to the stock. On practical grounds, however, a fraction of the unit stock is considered a "stock" for management purposes (or a management unit), as long as the results of the assessments and management remain close enough to what they would be on the unit stock.

***Straddling stock***

Stock which occurs both within the EEZ and in an area beyond and adjacent to EEZ

Fish stocks that migrate between EEZs and the high seas

***Subsistence fishery***

A fishery where the fish caught are shared and consumed directly by the families and kins of the fishers rather than being bought by middle-(wo)men and sold at the next larger market

COMMENT: Pure subsistence fisheries are rare as part of the products are often sold or exchanged for other goods or services.

***Sustainability***

Ability to persist in the long-term. Often used as a "short hand" for sustainable development

Characteristic of resources that are managed so that the natural capital stock is non-declining through time, while production opportunities are maintained for the future.

***Sustainable use***

The use of components of biological diversity in a way and at a rate that does not lead to the long-term decline of biological diversity, thereby maintaining its potential to meet the needs and aspirations of present and future generations.

***Target species***

Those species that are primarily sought by the fishermen in a particular fishery. The subject of directed fishing effort in a fishery. There may be primary as well as secondary target species

***Target fishing capacity***

The maximum amount of fish over a period of time (year, season) that can be produced by a fishing fleet if fully utilized while satisfying fishery management objectives designed to ensure sustainable fisheries,  $YT = Y(ET, S)$  in which YT is target yield or catch; ET is target effort generated by a fully-utilized fleet; and S is stock size (biomass). The "fishing fleet" is meant to be the stock of inputs (i.e. physical capital and human capital). The term "fully-utilized" is used in a precautionary context in that they assume that capacity utilization is 100%. The maximum catch that capital stocks could remove can be determined by observing them during a period with few restrictions.

***Territorial waters***

The area beyond the tidal base line of the open coasts of a country over which that country exercises full control except for innocent passage of foreign vessels. Set at a maximum of 12 nautical miles in breadth by the 1982 Law of the Sea Treaty, the United States claims territorial waters three nautical miles in width.

***Transshipment***

Act of transferring the catch from one fishing vessel to either another fishing vessel or to a vessel used solely for the carriage of cargo.

Offloading and onloading or otherwise transferring fish or fish products and/or transporting fish or products made from fish.

***Trophic group***

Group of organisms eating resources from a similar level in the energy cycle

***UN Fish Stock Agreement***

Abbreviation for the Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 Relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks.

Also called UN Implementing Agreement (UNIA).

***UNCLOS***

United Nations Convention on the Law of the Sea. Adopted in 1982. Entered into force in 1994.

***Waste***

Physical waste is product that is caught but does not have market value. It is a by-product of the production process which is not utilized.

***Yield-per-recruit***

The expected lifetime yield per fish recruited in the stock at a specific age. Depends on the exploitation pattern (fishing mortality at age) or fishing regime (effort, size at first capture) and natural mortality.

COMMENT: For a given exploitation pattern, rate of growth, and natural mortality, an equilibrium value of Y/R can be calculated for each level of F. The Y/R increases with F up to a point where the Maximum Sustainable Yield-Per-Recruit is obtained. Beyond that point, there is growth overfishing. Y/R analyses play an important role in advice for management, particularly as it relates to minimum size controls.

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