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**GENERAL FISHERIES COMMISSION  
FOR THE MEDITERRANEAN  
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PÊCHES POUR LA MÉDITERRANÉE**



**GENERAL FISHERIES COMMISSION FOR THE  
MEDITERRANEAN**

**Thirty-fourth Session**

**Athens, Greece, 14-17 April 2010**

**DRAFT GLOSSARY OF SCIENTIFIC TERMS OF INTEREST  
FOR THE SAC (BY JORDI LLEONART) \*  
-TO BE EDITED-**

**Background**

1. As response to the Commission's request, the update of the SAC glossary was carried out during the intersession. The work was performed by Mr Jordi Leonart with the financial support of the CopeMedII project. This document contains an explanatory note in Part I and the draft glossary is presented as Part II of this document.
2. The SAC and its subsidiary bodies are invited to review in-depth the content of this draft glossary and give guidance for its finalization and publication.

**\* Available only in English**

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**PART I****Explanatory note by the Author****Executive summary**

The first draft GFCM Glossary was elaborated in 2003. It contained 693 terms and 841 definitions. This unbalance is due to the presence of 115 terms with more than one (actually 2 to 7) definition. A number of terms were not directly related to Mediterranean fisheries (i.e. statistics, general ecology or economy, etc.), not relevant to GFCM, or simply obsolete. It is advisable to remove those terms that do not belong to the specific tasks of GFCM. On the other hand multiple definitions for a single term usually mislead the reader. Usually they are redundant. They say the same thing (or similar) with different words and level of precision.

These problems were identified by the SAC and led it to promote the refinement of the glossary. That means to reduce the GFCM Glossary to the terms really significant for the normal scientific work and provide a single clear definition in order to allow the people working on GFCM issues to exactly understand the meaning of the key words in the GFCM context.

A first phase of analysis of the glossary gave the following proposals: to remove: 253 definitions, to modify 359 definitions and to accept as they are 215. A second phase including consultations with GFCM Secretariat and SCESS coordinator and another analysis (not yet finished at the date of this report) the proposals are the following: 224 definitions to be accepted, 76 new terms (with definition) to be added, 36 definitions already modified, 175 definitions to be analyzed and 398 definitions (involving 307 terms) proposed for deletion. In the third and last phase the suggestions provided by SC coordinators, other GFCM experts and the contributions of the last SCs reports (Malaga, 2009) have been incorporated.

As the result of this update, a number of 317 terms (including single words, expressions and acronyms) present in the 2003 Glossary have been deleted. The number of definitions deleted (many original terms had several definitions) is 504.

147 entries have been added to the glossary with their definitions. 230 original definitions have been kept and 103 were modified.

In this updated glossary the total number of terms has been reduced from 652 to 482. The definitions have been reduced from 841 to 484. The previous figures may have small changes due to last minute modifications.

## Introduction

Since the inception of SAC (Scientific Advisory committee) in 1999, a glossary, collecting the technical and scientific terms and their definitions for use of the GFCM, was prepared. An important task, lead by Ms P. Pereda in collaboration with Mr. J.L. Alegret, Mr. A. Abella, Mr. F. Biagi and Mr. J. Leonart was developed and collected up to 652 single words, expressions, symbols and acronyms and 841 definitions. However the task was interrupted and the last update of the glossary was made in 2003. In the document was written “this glossary is in draft until the SAC finalizes it”. Since then several improvements on the methods and approaches to assess and manage fisheries, and some problems arising with regards to definitions and understanding of technical and scientific terms.

The 10<sup>th</sup> session of SAC reiterated the importance of the glossary and the need to update it. The ToRs for this consultancy are presented in the Annex I.

## The 2003 Glossary

### Terms and definitions

The glossary has a number of entries. If only different words (including symbols, acronyms or expressions) are considered the number of terms are 652. However 115 terms have more than one single definition (from 2 to 7), as a result the number of definitions included in the glossary is 841.

The 2003 Glossary has the following quantitative features:

Number of terms with	1	definition	537
Number of terms with	2	definitions	74
Number of terms with	3	definitions	26
Number of terms with	4	definitions	3
Number of terms with	5	definitions	7
Number of terms with	6	definitions	4
Number of terms with	7	definitions	1
<b>Number of terms</b>			<b>652</b>
<b>Number of definitions</b>			<b>841</b>

### Sub-committees role.

The definitions were, in most of the cases, associated to a Sub-committee. It is supposed to correspond to be the Sub-committee that originated the definition, although the defined word is not, or not only, matter of that sub-committee. SCESS is the sub-committee responsible for most of the definitions. The following table shows these figures.

<b>Sub-committee</b>	<b>Number of definitions</b>	<b>%</b>
SAC	1	0.12%
SCESS	571	67.90%
SCMEE	80	9.51%
SCSA	173	20.57%
SCSI	1	0.12%
blank	15	1.78%
<b>Total</b>	<b>841</b>	

### Methodology

#### Preparatory work

1<sup>st</sup> step. Convert the pdf glossary to a word file with the following structure

<b>code</b>	<b>term</b>	<b>n</b>	<b>def</b>	<b>SC</b>	<b>source</b>
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being

- *code*. A symbol representing the result of the evaluation of the definition (delete, modify, add)
- *term*: the word entry
- *n*: ordinal of the definition when more than one
- *def*: definition
- *SC*: Subcommittee responsible of the definition
- *source*: bibliographic source of the definition

the fields *code* and *n* are new. *code* was used to indicate the result of the evaluation of the definition and *n* to the ordinal of the definition when there were more than one

#### 2<sup>nd</sup> step Acronyms

A list of acronyms present o to be included in the glossary was elaborated (Annex II).

#### 3<sup>rd</sup> step other considerations

Identify some general aspects of the glossary and how to manage plurals, expressions, symbols, and acronyms.

### Analysis of the glossary

So far the analysis of the glossary and the proposals for improvement has follow the following steps.

A first lecture with the aim to evaluate words and definitions were done using the following criteria for coding:

OK	Keeping term and definition
A	Adding terms
	A1. Usually employed in GFCM
	A2. Relevant for GFGM
D	Deleting terms:
	D1. Belonging to the general language
	D2. Belonging to other specialized language or jargon non directly related with the normal GFCM work (i.e. general mathematical, statistical, biological, ecological or economic terms)
	D3. Not relevant to the GFCM (although they may be very relevant in other fisheries)
M	Modifying definitions
	M1. Eliminate redundant definition
	M2. Changing definition
	M3. To be revised

The result of the first lecture (before receiving any advice) was:

code	Number of definitions
?	14
D1	116
D2	60
D3	77
M1	279
M2	5
M3	75
OK	215
<b>Total</b>	<b>841</b>

That means an initial proposal to delete 253 definitions, modify 359 and accept as they are 215.

A second revision after consultations with GFCM Secretariat and SCESS coordinator (and not yet finished) gives the following figures (at November, 26<sup>th</sup>, 2009):

Status	Number of definitions
OK	224
Additions	76
Already modified	36
To be modified	175
Deletions	398

A progress report was presented to the Transversal meeting of the Sub-committees meetings in Malaga (Spain), 30 November, 2009.

### Criteria for adding/removing terms or modifying definitions

According to the point 2 of the ToRs:

Whenever possible, a single definition will be kept, otherwise alternative definitions (indicating sources and context) will be presented. "Where a suitable definition can be found in the FAO Fisheries Glossary ([http://www.fao.org/fishery/collection/glossary\\_fisheries/en](http://www.fao.org/fishery/collection/glossary_fisheries/en) or for alternative languages), it should be used unless there are good reasons not to do so".

Not always is possible to follow this mandate since in some cases the FAO Fisheries Glossary presents different alternate definitions.

After a first analysis of the glossary more precise criteria was developed for both words and definitions

- Terms
  - Adding. There were some words used in the GFCM works that were not included in the old glossary. Some of them come from the development of Task1, activity that has defined a number of words. Other
  - Removing. Many words of the old glossary belong to the general language (marine pollution, program, etc.), to other specialties (bayesian, data base, etc.) or to aspects of fisheries not relevant to GFCM (pulse fishing, brood stock, etc.). These words have been removed.
  - Modifying.
    - Singular vs plural. Many words are presented in plural. In many cases both, singular and plural are present. The case of "fishery" vs "fisheries" is quite abundant (i.e. "fisheries management plan" vs "fishery management plan" and also "fisheries planning").
    - Acronym vs full name.
- Definitions
  - Adding.
  - Removing. Many words (115) have more than one definition. Following the mandate of the ToR only one single definition is retained. The definition retained is usually that of the FAO glossary, except in the cases in which the expert recommends another definition.
  - Modifying

Collaboration with the Sub-Committee Coordinators and the GFCM Secretariat,

Finished the preparatory work, according to the ToRs, the complete file with the instructions, was send on October 26<sup>th</sup>, 2009, to the following addresses:

- GFCM Secretariat
- GFCM Executive Secretary a.i.
- Coordinators of SCSA, SCESS, SCSI and SCMEE

With copy to

- SAC president
- COPEMED II coordinator

During the Sub-committees meetings (30 November – 3 December 2009) the intermediate report was presented and discussed in the transversal session. It was agreed that glossary issues were going to be discussed in the SC sessions and that the results and proposals will be delivered to the consultant before 31<sup>st</sup> December, 2009.

The following inputs have been received

- October 29<sup>th</sup>. From the bio-statistician officer of the GFCM Secretariat. The suggestions were incorporated to the glossary
- The days 9, 11 and 19 of November, working meetings with the SCESS coordinator
- 17/12/2009. A proposal from the chairman of SAC (Farrugio) regarding 57 amendments of additions. F. Fiorentino sent a file with further addition on 21/12/2009
- 27/12/2009. A proposal of 75 terms, most are new, some are corrections, regarding fishing technology. By J. Sacchi.
- 29/12/2009. Received comments from the chairman of SCMEE (Bradai) and Mr C. Rais.

Families of concepts and especially important words

There are some clusters of related words that must be defined taking into account the other words of the group. Some of such groups are the following:

- MPA types. There is a number of protection types defined in the Mediterranean. In the Mediterranean are defined about 50 figures of protection (including GFCM FRAs, UNEP RAC/SPA SPAMIs) being most of them of national character<sup>1</sup>. In the Mediterranean there are currently about 280 MPAs including all types.
- Levels of exploitation. Adopted those included in the SCSA assessment sheet D.
- Undersea features. There are about 35 types of features in some cases relevant to fisheries (the most common, seamounts, canyons, ridges, plains, etc.). Should they be included in the GFCM glossary?
- Jurisdictions. Legal aspects are sensitive issues and quite complex in the Mediterranean. Expressions as “high seas”, “historical bay”, among others are relevant in the Mediterranean.

<sup>1</sup> See the webs <http://www.medpan.org/> and <http://www.mpaglobal.org/> but also some national, as the French “Agence des aires marines protégées” <http://www.aires-marines.fr/>



- Accessibility, availability, vulnerability and efficiency are considered components of the catchability. There are a lot of different contradictory definitions. In that case the definitions provided by Laurec and Le Guen (1981) have been taken, being aware that these are not better or worse than other published definitions.

A number of words are especially important for the GFCM issues and require special attention by the part of the sub-committee coordinators and GFCM secretariat. Some of them were already analyzed in Leonart *et al.* (2007). Are the following:

- Fishery.
- Deep sea. Although a discussion has been done in two different sub-committees (SCSA and SCMEE) it is not clear what definition must contain the GFCM glossary. This is a term widely used in fisheries (FAO, 2005; Shotton, 2005) and in the Mediterranean (Sardà *et al.* [eds.] 2004). The expression “deep sea” came up in the meeting on MPAs (GFCM & RAC/SPA, 2007), and many participants provided different definitions.
- Artisanal fishery, small scale fishery and industrial fishery. Artisanal fisheries and related words are often used in GFCM context, and deserve some clear definition. FAO and GFCM have produced documents regarding “artisanal fisheries” including identification criteria (Coppola, 2006; Griffiths *et al.*, 2007)

## Results

### The 2010 Glossary versus 2003 Glossary

The terms of the glossary have been reduced to about 75% of the original. The definitions to 57%.

	2003	2010	Difference
Terms	652	482	-170
Definitions	841	484	-357

The particular changes are showed in the following table:

Terms kept		333
Definitions not modified	230	
Definitions modified	103	
Deletions (terms)		317
Deletions (definitions)		504
Additions (terms+definitions)		147

NOTE: Figures updated at 5<sup>th</sup> of January, 2010. Small changes of these figures can occur due to last minute modifications.

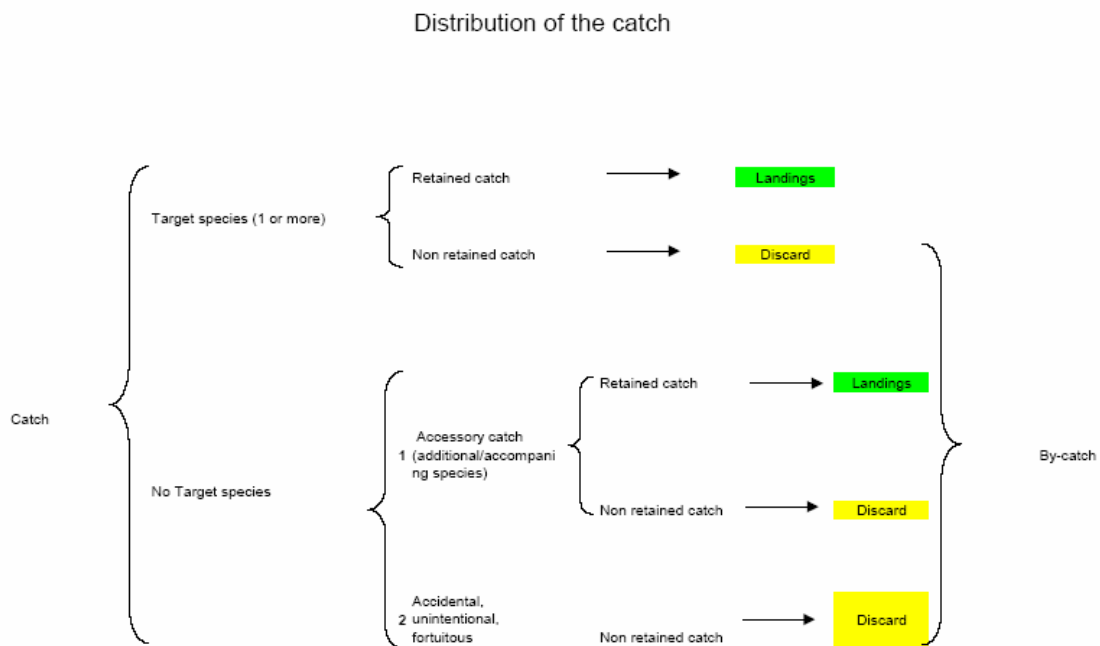
### Responsible Sub-committee

The Sub-committee responsible of the entry has been removed. The reason to do that is the interdisciplinary matter of most of the words of the glossary. i.e. in most of the entries of the 2003 version (68%) SCESS appeared as responsible. That included words more related with other SCs.

### **Pending problems**

Some words/concepts have not been satisfactorily solved due to contradictory inputs from experts. In some cases, entries without definitions were provided by experts.  
*Families of words/expressions*

- There are several words belonging to a group of use of the individuals caught with confusing definitions: these are associated species, accessory catch, additional catch, accompanying species, accidental catch, incidental catch, by-catch, retained catch. This problem was partially addressed in the 2003 GFCM glossary in the annex I with the following scheme:



However it appears some disagreement. The chairman of SCMEE provided the following comment:

The following definitions should be replaced by one term and one definition:

**Accessory catch, additional catch, accompanying species.**

Accidental catch or incidental catch

*“The part of the catch taken together with the authorized target species. In a broad context, this includes all non-targeted catch including discards and species of conservation concern” (GFCM selectivity workshop 2009).*

The case of “By-catch”. The definition provided on the “Report of the ninth session of the Sub-Committee on Statistics and Information (SCSI). Antalya, Turkey, 13–16 October 2008” has been adopted, however other experts prefer the definition of the FAO Glossary:

“Catch of species other than the target species in a fishing operation. Bycatch can either be discarded or landed”.

Discard or discarded catch. The definition provided on the “Report of the ninth session of the Sub-Committee on Statistics and Information (SCSI). Antalya, Turkey, 13–16 October 2008” has been adopted, however other experts prefer the definition of the FAO Glossary:

“The portion of the catch returned to the sea as a result of economic, legal, or personal consideration.”

- Legal words/expressions. SAC should determine what level of detail need to appear legal terms in the glossary. There is a huge amount of legal and juridical terms and expressions. That includes i.e (i) types of national jurisdictions (baseline, internal waters, historical bays, territorial waters, archaeological contiguous area, fishing protection zones, ecological protection zones, exclusive economic zones, high seas, territorial sea or waters, and other particular jurisdictions ). (ii) There are about 50 different types of marine protected areas in the Mediterranean. It is suggested that SAC defines what legal words must be included in the glossary.

In particular SAC should provide a definition for Fishery Restricted Area (FRA) which is the protection expression adopted by GFCM

- Components of catchability: availability, accessibility, vulnerability and efficiency. Regarding “availability” the specialist (J. Sacchi) recommends to “Collect different definitions of this problematic word”.
- Artisanal, small scale, industrial fisheries. For the expression “small scale fisheries”, the specialist on technology (J. Sacchi) indicated: “*Some years ago, a FAO1 committee did an honest attempt to define this. It ended up with a confusing 200 word paragraph. I believe that WFF (World Forum of Fish Harvesters and Fish Workers) came up with a solution: to let each and every nation define their artisan/small-scale fisheries: internationally, each and everyone recognizes the definition. But FAO identify approximately 25 millions of small scale fishers around the world.*” Coppola (2006) deals with these concepts. However up to now there is no agreement among specialists. Simple definitions have been kept (regardless the mentioned contributions) in order to allow further progress.
- Coastal or inshore fisheries vs offshore fisheries. No definition (although coastal, inshore and offshore waters are defined)
- FAO statistical divisions and statistical subareas need definition if SAC wishes to be included in the glossary.

#### *Terms needing two definitions*

- Exploitation pattern or exploitation rate. This expression really needs two definitions because it means two different concepts
- Growth rate. Needs two definitions.
- Production. Needs two definitions
- Productivity. Needs two definitions

*Pending definitions*

- Associated species.
- Deep sea.
- Fleet segment. Definition to be provided by SCESS
- Mesh diamond mesh, square mesh, tnt.
- Mobile gear.
- Net panel braided twisted.
- Statistical division. Definition needed (by FAO)
- Statistical subarea. Definition needed (by FAO)

*Other*

- Fishery. Definition needs to be refined.

**Conclusions and recommendations**

The glossary has been updated according to the contributions of several experts and following the mandate of the Terms of Reference. The new 2010 GFCM glossary is the result of a very general and broad work done by few people in a very limited time. The proposed glossary contains fewer entries than the previous one. The total number of terms has been reduced from 652 to 482 and that of definitions from 841 to 484. The number of terms removed is 317, the number of new terms added is 147. The number of terms kept is 333.

A number of 103 definitions have been modified.

The fisheries science, and its application to the Mediterranean, is matter of continuous changes, some words become obsolete, others appear in the scientific normal activity, some of them come from outside of the Mediterranean, and still others are generated by Mediterranean scientists and/or in the GFCM meetings. Hence the glossary must be constantly reviewed.

It would be advisable to proceed to the annually review and update the glossary incorporating terms and expressions that appear in the different reports of the commission and once a year present to the SAC the possible additions. It is also very important that the Sub-committee Coordinators use the glossary in their works with the Sub-committee to detect obsolete words, propose additions and refine definitions.

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## Terms of Reference for a revision of the GFCM Glossary

**2009 Updating the SAC glossary**

Since the inception, a glossary, collecting the technical and scientific terms and their definitions for use of the GFCM, was prepared. However the last update of the glossary was made in 2003. The progress of the methods and approaches to assess and manage fisheries, and some problems arising with regards to definitions and understanding of technical and scientific words led the 10<sup>th</sup> session of SAC to reiterate the importance of the glossary and the need to update it.

In collaboration with the Sub-Committee Coordinators and the GFCM Secretariat, the consultant will carry out the following tasks:

1. Review the old glossary, and propose deletions and modifications on the list of words and definitions.
2. Whenever possible, a single definition will be kept, otherwise alternative definitions (indicating sources and context) will be presented. "Where a suitable definition can be found in the FAO Fisheries Glossary ([http://www.fao.org/fishery/collection/glossary\\_fisheries/en](http://www.fao.org/fishery/collection/glossary_fisheries/en) or for alternative languages), it should be used unless there are good reasons not to do so".
3. Prepare a list of new words to be incorporated into the glossary with relevant definitions from different sources. This action should be performed in consultation with the Sub-Committee Coordinators and the GFCM Secretariat.
4. Circulate the new proposals among the Sub-Committee Coordinators and the GFCM Secretariat in order to check both the list of words and the definitions. Whenever possible, a single definition will be kept, otherwise alternative definitions (indicating sources and context) will be presented.
5. The Consultant will prepare a Final SAC Revised Glossary document with the proposed deleted words, new words, deleted definitions and proposed (new) definitions, with the necessary explanations and origins.

To carry out this revision the Consultant will use the official GFCM Glossary (GFCM Web page) and it should be done in consults with the GFCM Sub Committees Coordinators and the GFCM Secretariat. The progress of the work will be reviewed during the Sub-Committees meeting scheduled in 2009 (30 November- 3 December).

The language of the glossary will remain English.

The consultant will proceed with these tasks upon signature of the PSA with FAO and during the period included in the aforementioned PSA. The Final document will be send to the CopeMed II Project Coordinator between the previous 5 days before the 10 of January 2010 for clearance. The CopeMed II Coordinator should submit the draft glossary to the GFCM Secretariat by 10 January 2010.

## Acronyms

ABNJ	Area Beyond National Jurisdiction
ACCOBAMS	Agreement on the Conservation of Cetaceans in the Black Sea, Mediterranean Sea and contiguous Atlantic area
ADAPT	A stock assessment program based on VPA
ADRIAMED	FAO regional project “Scientific Cooperation to Support Responsible Fisheries in the Adriatic Sea”
ALK	Age-length key
ASPIC	A Stock Production Model Incorporating Covariates
$B_0$	Virgin Biomass
BE	Bio-economic equilibrium
BRD	By-catch reduction devices
CAA	Catch at age
CAS	Catch at size
CBD	1992 Convention on Biological Diversity
CIESM	Commission Internationale pour l’Exploration de la mer Méditerranée
CIHEAM	International Centre for Advanced Mediterranean Agronomic Studies
CMS	Convention of Migratory Species (UNEP)
COPEMED	FAO regional project: “Coordination to Support Fisheries Management in the Western and Central Mediterranean”.
CPUE	Catch per unit effort
DBMS	Data base management system
DEPM	Daily egg production method
E	Fishing effort
EAF	Ecosystem Approach to Fisheries
EASTMED	FAO regional project: “Sustainable Fisheries Policies and Strategies in the Eastern Mediterranean”
EBFM	Ecosystem-based Fisheries Management
EBSA	Ecologically and Biologically Significant Area
EEZ	Economic Exclusive Zone
EC	European Commission
EFH	Essential Fish Habitat
EIA	Environmental Impact Assessment
ESD	Ecologically Sustainable Development
EU	European Union
f	Fishing Effort
F	Fishing mortality rate
FAD	Fish aggregating devices
FAO	Food and Agriculture Organization of the United Nations
FIFG	Financial Instrument for Fisheries Guidance
FL	Fork length
FMP	Fishery management plan
FRA	Fishery Restricted Area (GFCM protection figure)

GEF	Global Environmental Facility
GES	Good ecological status
GFCM	General Fisheries Commission for the Mediterranean
GLM	Generalized Linear Model
GMO	Genetically Modified Organism
GRT	Gross Registered Tonnage
GSA	Geographical Sub Area (GFCM)
GT	Gross Tonnage
HDI	Human Development Index
HSMMPA	High Seas Marine Protected Area
ICA	Integrated Catch at Age
ICCAT	International Commission for the Conservation of Atlantic Tunas
ICFM	Integrated Coastal Fisheries Management
ITQ	Individual Transferable Quota
IUCN	International Union for Conservation of Nature
IUU	Illegal, unreported and unregulated
K	Growth rate in von Bertalanffy model
K	Virgin biomass or carrying capacity
$L_{\infty}$	Maximum length in von Bertalanffy model
LME	Large Marine Ecosystem
LOA	Length overall
LRP	Limit Reference Point
M	Natural Mortality rate
MAGP	Multi-Annual Guidance Programme
MAP	Mediterranean Action Plan
MCS	Monitor, control and surveillance
MEDFISIS	FAO regional project: "Mediterranean Fishery Statistics and Information System"
MEDITS	An international bottom trawl survey in the Mediterranean
MEDSUDMED	FAO regional project: "Assessment and Monitoring of the Fishery Resources and the Ecosystems in the Straits of Sicily"
MEY	Maximum Economic Yield
MLS	Minimum Landing Size
MPA	Marine Protected Area
MSP	Maximum Sawning Potential of a stock
MSY	Maximum Sustainable Yield
NEI	Not Elsewhere Included
NGO	Non-Governmental Organisation
OECD	Organization for Economic Co-operation and Development
OU	Operational Unit
PA	Precautionary approach
PPR	Primary Production Required (usually expressed as %: %PPR)
PRP	Precautionary Reference Point
q	Catchability
RAC/SPA	Regional Activity Center for Specially Protected Areas
RDBMS	Relational Database Management System
RFB	Regional Fisheries Body
RFMO	Regional Fisheries Management Organization
RP	Reference Point
RRA	Rapid Rural Appraisal



SAC	Scientific Advisory Committee (GFCM body)
SAP	Strategic Action Plan
SBL	Safe biological limit
SCESS	Subcommittee on Economics and Social Sciences (GFCM body)
SCI	Site of Community Importance
SCMEE	Subcommittee on Marine Environment and Ecosystems (GFCM body)
SCSA	Subcommittee on Stock Assessment (GFCM body)
SCSI	Subcommittee on Statistics and Information (GFCM body)
SCRS	Standing Committee of Research and Statistics (ICCAT)
SH	Sensitive Habitat
SPAMI	Specially Protected Area of Mediterranean Importance
SSB	Spawning Stock Biomass
STECF	Scientific, Technical and Economic Committee for Fisheries (EC body)
SURBA	Survey Based Assessment
$t_0$	Adjusting parameter (age at length 0) in von Bertalanffy model
TAC	Total allowable catch
ThRP	Threshold Reference Point
TROM	Target Resource-Orientated Management
TURF	Territorial Use Right Fisheries
UNCLOS	United Nations Conference on the Law of the Sea
UNEP	United Nations Environment Programme
VME	Vulnerable Marine Ecosystem
VMS	Vessel Monitoring System
$W_\infty$	Maximum weight in von Bertalanffy model
WPC	World Parks Congress
WSSD	World Summit on Sustainable Development
WWF	World Wide Fund For Nature
XSA	Extended Survivor Analysis
YOY	Young of the year
Z	Total mortality rate

**DRAFT 2009 SAC GLOSSARY**

**by Jordi Leonart**  
(consultant)

**FAO COPEMED II**

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**Presentation**

Since the SAC inception, a glossary, collecting the technical and scientific terms and their definitions for use of the GFCM, was prepared. However the last update of the glossary was made in 2003. The progress of the methods and approaches to assess and manage fisheries, and some problems arising with regards to definitions and understanding of technical and scientific words led the 10th session of SAC to reiterate the importance of the glossary and the need to update it.

As the result of this update, a number of 317 entries (including words, expressions and acronyms) present in the 2003 Glossary have been deleted. The number of definitions deleted (many original words had several definitions) is 504.

On the other hand 147 entries have been added to the glossary with their definitions. 230 original definitions have been kept and 103 were modified.

In this updated glossary the total number of entries has been reduced from 652 to 482. The definitions have been reduced from 841 to 484.

The previous figures may have small changes due to last minute modifications.

**Abundance index**

A quantitative measure of fish density or abundance, usually presented as a time series. An abundance index can be specific to an area or to a segment of the population, or it can refer to abundance stock-wide; the index can reflect abundance in numbers or weight (biomass). Abundance indices are based on standardized fishery data (e. g. catch per unit effort, CPUE) or fishery-independent data (e.g. scientific surveys).

Modified from Restrepo V. (1999): Annotated Glossary of Terms in Executive Summary Reports of the International Commission for the Conservation of Atlantic Tunas' Standing Committee on Research and Statistics (SCRS). ICCAT. In FAO glossary.

**Access right**

In fisheries, an authorisation (access right) , given to a user (e.g. a vessel owner) by a competent fishery management authority or by legislation, to exploit a resource, a particular species, or a share of a total allowable catch. Access rights can be granted against payment or free of charge. They are usually conditional and used under constraints specified in the management plan.

In FAO glossary

**Accessibility**

Geographical component of the availability consisting in displacement from and to the fishing areas.

Laurec, A. and J.-C. Le Guen.- 1981. Dynamique des populations marines exploitées, Tome 1. Concepts et modèles. Publications du Centre National pour l'Exploration des Océans. CNEXO/Centre Oceanologique de Bretagne. Rapports Scientifiques et Techniques N°45. 117 pp.

**Accessory catch, additional catch, accompanying species.**

The part of the catch that comprises non-target species that is potentially marketable.

**Accidental catch or incidental catch**

Unintentional or fortuitous catch of non-target species that is caught during the normal fishing activity, regardless its commercial interest. This kind of catch could include protected species or specimens that can cause damages in the fishing gear, waste of time, or economical losses.

OECD (1997), Towards sustainable fisheries: issue papers. Report OECD/GD(97)54. In FAO glossary.

**Accompanying species**

Accessory catch

**Activity (as effort parameter)**

Dredged surface area (m<sup>2</sup>), number of fishing sets (deployed) and number of fishing trips.

Report of the ninth session of the Sub-Committee on Statistics and Information (SCSI). Antalya, Turkey, 13–16 October 2008

**ADAPT**

A stock assessment program based on VPA and tuning of abundance indices. The population model is age-structured. Geremont, H.F. and D.S. Butterworth 1997. Specifications for the ADAPT VPA code, September 1996. SCRS96/127. Powers J.E. and V.R. Restrepo 1992. Additional options for age-sequenced analysis. SCRS/91/040. In ICCAT Glossary.

**Adaptive management**

Management process involving step-wise evolution of a flexible management system in response to feedback information actively collected to check or test its performance (in biological, social and economic terms). It may involve deliberate intervention to test the fishery system's response.

In FAO glossary

**Additional catch**

Accessory catch

**Adult**

Individual that has reach the length or age of first maturity.

**Age of Maturity**

Age when 50% of the fish of a given sex are considered to be

reproductively mature.

Restrepo V. (1999): Annotated Glossary of Terms in Executive Summary Reports of the International Commission for the Conservation of Atlantic Tunas. In FAO glossary.

**Age of Recruitment**

The age at which fish, already present in the fishery's operative area, become vulnerable to the employed gear. In stock assessment, this is usually the youngest age group considered in the analyses, typically age 0 or 1 in the low selective Mediterranean groundfish fisheries.

Modified from ICCAT glossary.

**Age-Length Key (ALK)**

One approach used to assign ages to fish, given length measurements. Age-Length Keys can be used to convert catch-at-size data into catch-at-age data. The keys specify the probability that fish of a given size belong to one or several age groups. Age-Length Keys need to be constructed from samples of length/age data.

Hoenig J.M., D.M. Heisey, and R.C. Hanumara. 1994. A new approach to age-length keys: Using last year's and this year's data to estimate age composition. ICCAT SCRS/93/060. In FAO glossary.

**Alien species**

Introduced species

**Allocation**

Refers both to a share and the process of sharing. 1. A share, a portion, of the allowable catch, effort or area attributed to a person, a community, a vessel, or a company. 2. The process of distributing shares (rights) among selected recipients, based on historical, cultural or socio-economic criteria. The beneficiaries could be contemporary (intra-generational allocation) or belong to successive generations (inter-generational allocation). Examples: splitting a total allowable catch among fishing nations or assigning coastal areas to different uses. Synonyms: apportionment, allotment, appropriation, distribution, division, and repartition.

FAO glossary

**Allowable catch**

The catch allowed by a management authority to be taken from a stock of a species or group of species, by a fishery during a specified time period. Often defined as the Total Allowable Catch (TAC), it is often allocated explicitly amongst those having a right of access to the stock.

Modified from FAO (1998). In FAO glossary.

**Anadromous**

Migrating from salt to fresh water, as in the case of a fish moving from the sea into a river to spawn.

A dictionary of Ecology, Evolution and systematics, R.J. Lincoln, G.A. Boxshall, P.F. Clark, Cambridge University Press, 1986.

**Angler**

A recreational fisher whose fishing gear is normally restricted to rods and reels

OECD.

**Apparent Consumption**

Proxy measure for consumption of a product or material, defined as production plus imports minus exports of the product or material. In the case of marine resources, aquaculture and processing sector must be included in the balance.

United Nations (1997): Glossary of Environment Statistics. Studies in Methods, Series F, No. 67. In FAO glossary.

**Aquaculture**

The cultivation of marine or freshwater fish or other aquatic animals or plant species.

OECD.

**Area closure**

In a fishery management system, the closure to fishing by particular gear(s) of an entire fishing ground, or a part of it, for the protection of a section of the population (e.g. spawners, juveniles),

the whole population or several populations. The closure is usually seasonal but it could be permanent.

In FAO glossary.

#### **Artificial reef**

Man made structure intentionally immersed in an aquatic environment to increase or gather biomass or enhance protection of natural habitats.

FAO

#### **Artisanal fishery**

A small scale, low cost and labour-intensive fishery in which the catch is generally consumed locally. See small-scale fishery

#### **ASPIC**

A Stock Production Model Incorporating Covariates, a non-equilibrium implementation of the Schaefer's surplus production model.

<http://nft.nefsc.noaa.gov/ASPIC.html>

#### **Assemblage**

In a particular site and time, a collection of co-existing organisms, not strictly inter-dependent but with unspecified relationships (e.g. trophic) between them. (see community).

In FAO glossary

#### **Associated species**

#### **Availability**

Refers to the distribution of fish of different ages or sizes relative to the distribution of the fishery. Individuals become available to fisheries through migration and or change of behavior.

#### **Average cost (of effort)**

Economic indicator. The total cost divided by the total amount of effort used.

[AGR/FI\(96\)12. In FAO glossary. OECD \(1996\), Synthesis report for the study on the economic aspects of the management of marine living resources.](#)

#### **Average fixed cost**

Economic indicator. The total fixed costs divided by the number of units produced.

[OECD \(1996\), Synthesis report for the study on the economic aspects of the management of marine living resources. AGR/FI\(96\)12. In FAO glossary.](#)

#### **Average revenue (of effort)**

Economic indicator. The total revenue divided by the amount of effort used to produce the revenue.

[OECD \(1996\), Synthesis report for the study on the economic aspects of the management of marine living resources. AGR/FI\(96\)12. In FAO glossary.](#)

#### **Average variable cost**

Economic indicator. The total variable cost divided by the number of units produced.

[OECD \(1996\), Synthesis report for the study on the economic aspects of the management of marine living resources. AGR/FI\(96\)12. In FAO glossary.](#)

#### **Bar mesh size**

The distance between two sequential knots or joints, measured from centre to centre when the yarn between those points is fully extended.

#### **Base port**

The port from which fishing units operate, irrespective of where they are registered (homeport). The differentiation between base ports and homeports occurs when fishing units migrate from the locations indicated by the frame survey to other sites, usually on a seasonal basis.

[FAO \(1998\): Guidelines for the routine collection of capture fishery data. FAO Fish. Tech. Pap. 382: 113 p. In FAO glossary.](#)

#### **Baseline**

The line from which the seaward limits of a state's territorial sea and certain other maritime zones of jurisdiction are measured. The term usually refers to the baseline from which to measure the breadth of the territorial sea. The seaward limits of the contiguous zone (cf. UNCLOS Article 33.2), the exclusive economic zone (cf. UNCLOS Article 57) and, in some cases, the continental shelf (cf. UNCLOS Article 76) are measured from the same baseline. The territorial sea baseline may be of various types depending on the geographical configuration of the locality. The "normal baseline" is the low-water line along the coast (including the coasts of islands) as marked on large-scale charts officially recognized by the coastal State (UNCLOS Articles 5 and 121.2).

[United Nations, 1989, The Law of the Sea. Baselines: An examination of the relevant provisions of the United Nations Convention on the Law of the Sea. Office for Ocean Affairs and the Law of the Sea, UN. 67 p. In FAO glossary.](#)

#### **BE**

Bio-economic equilibrium

#### **Benefit**

The sum remaining after all costs, direct and indirect, are deducted from the income from the fishing activity business. "Profit" expresses the same idea. The economists' concept of profit emphasizes that "costs of production" for purposes of the definition include the full opportunity costs of all the factors of production utilized -- an amount for each reflecting what it could yield if employed in the most lucrative available alternative use. This would include not only the amount of money actually paid out for wages, materials, rent, machinery and what have you but also what the money tied up in the business could otherwise be earning in other uses at similar levels of risk. In theory the benefit in long term is near to zero.

#### **Benthos**

Organisms attached or resting on the bottom or living on the bottom sediments.

[FAO Glossary](#)

#### **Beverton and Holt (Stock recruitment model)**

A particular stock-recruitment formulation in which recruitment reaches an asymptote as stock size becomes very large.

[In ICCAT glossary.](#)

#### **Biocoenosis**

A community or natural assemblage of organisms; often used as an alternative to ecosystem but strictly it is the fauna/flora association per se excluding physical aspects of the environment.

[A dictionary of Ecology. Evolution and systematics. R.J. Lincoln, G.A. Boxshall, P.F. Clark. Cambridge University Press, 1986](#)

#### **Biodiversity (biological diversity)**

The 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.

#### **Bio-economic equilibrium (or BE)**

The simultaneous biological and economic equilibrium in a fishery. In a single stock model, the biological equilibrium condition is that the rate of change of the stock be zero. The economic equilibrium condition is that there be no change in fishing effort. The driving force of effort is profit (or loss). In an open access fishery, the bio-economic equilibrium is given at an effort level where profit is zero and total fishing cost is equal to total revenue. Usually the BE corresponds to very low levels of biomass

[Hannesson, R. \(1993\). Bio-economic analysis of fisheries. Fishing News Books. In FAO glossary.](#)

#### **Bio-economic modeling**

A set of mathematically expressed functional relationships between biological characteristics of the resource base, (e.g. a fishery resource), and the economic (and sometimes social) characteristics of its use by Man. As an abstraction from reality, the validity of a bio-economic model depends on the explicit or implicit assumptions about the biological and human processes it represents.

Modified from FAO (1998): Guidelines for the routine collection of capture fishery data. FAO Fish. Tech. Pap. 382: 113 p. In FAO glossary.

#### **Biological Reference Point (BRP)**

A particular value of stock size, catch, biomass, fishing effort and fishing mortality which may be used as a goal in fisheries management. This reference points can be Limits or Targets, depending on their intended usage. Target reference points represent a desired level of fishing mortality or biomass, while Limit reference points represent either an upper bound to the fishing mortality or a lower bound of the biomass.  
Caddy, 1996 FAO Fish Techn Pap 347.

#### **Biomass**

The sum of weights of all or part of the individuals in a stock. See spawning stock biomass

#### **Biotope**

1. The smallest geographical unit of the biosphere or of a habitat that can be delimited by convenient boundaries and is characterized by its biota. 2. The location of a parasite within the host's body. 3. The location of biocoenosis.

A dictionary of Ecology, Evolution and systematics, R.J. Lincoln, G.A. Boxshall, P.F. Clark, Cambridge University Press, 1986

#### **B<sub>MSY</sub>**

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  $F_{MSY}$ .

ICES-ACFM (1997): Report of the Study Group on the precautionary approach to fisheries management, ICES Headquarters, 5-11 February 1997: 7-9; Modified from Caddy J.F. and R. Mahon (1995) Reference points for fisheries management. FAO Fisheries Technical Paper, 347: 83 p. In FAO glossary.

#### **Bollard pull**

The maximum pulling force of a towing vessel measured from a point of attachment as a mooring bollard; the statement of installed horsepower is not sufficient to understand how strong a trawler is.

#### **Bottom line, leadline**

The lower frame rope of a net where the bottom of the netting is attached; the leads can be fixed directly on it or mounted separately on another rope attached to the bottom frame rope by staple with more or less space.

#### **Bottom-up management**

A process of management in which information and decisions are decentralized, and resource users actively participate in the decision-making process. See top-down management  
In FAO glossary. OECD (1996). Synthesis report for the study on the economic aspects of the management of marine living resources. AGR/FI(96)12.

#### **Box**

Delimited area where the catch of certain species are either forbidden, either limited to a period of time or to certain gear

#### **Branchline, snood**

A thin strong line by which a hook is attached to the main line of a troll or longline

#### **BRD**

By-catch reduction device

#### **Buffer zone**

In precautionary fisheries management, the area between a limit reference point and a threshold reference point. It corresponds to a warning that the limit is being approached. Its purpose is reduce the probability to drive inadvertently the stock / fishery beyond the limit

In FAO glossary.

#### **Buffer zone or buffer area.**

An area inside or adjacent to a protected area where a harmonious relationship between the natural environment and people is promoted.

In FAO glossary. Brown et al. (1992) in Choudhury K. and L.J.M. Jansen (1999): Terminology for Integrated Resources Planning and Management. FAO, Rome, Italy: 69 pages

#### **Buoy line, set line, dahn line**

Rope connecting buoy to that part of the gear being supported or marked.

#### **Buy-back**

Financial mechanism of a fishery management scheme, usually supported and often subsidised by governments, in which governments or any other relevant party (e.g. fishermen associations) buy vessels and fishing licenses from producers in order to reduce fishing effort and capacity.  
In FAO glossary.

#### **By-catch**

The total catch of unwanted animals including vulnerable and endangered species. By-catch of commercial species should be reported as associated species.

Report of the ninth session of the Sub-Committee on Statistics and Information (SCSI). Antalya, Turkey, 13–16 October 2008

#### **By-catch excluder device**

A device inserted in a fishing gear (usually trawl, close to the cod-end, to allow escapement, alive, of unwanted species (including medusae) or individuals (juveniles) or endangered species (e.g. seals, turtles, dolphins).

In FAO glossary.

#### **By-catch reduction device (BRD), grid, panels**

All types of devices used to allow the escapement of unwanted species or fish size. (e.g. grids, turtle exclusion devices, escapement panels)

#### **Capacity**

As effort parameter: Total GT or KW by vessel, by gear and period  
Report of the ninth session of the Sub-Committee on Statistics and Information (SCSI). Antalya, Turkey, 13–16 October 2008

#### **Capital**

A stock of accumulated goods (or the value of these goods) devoted to the production of other goods or accumulated possessions calculated to bring in income.

From Webster Web Dictionary. In FAO glossary.

#### **Capture fishery**

The sum (or range) of all activities to harvest a given fish resource. It may refer to the location (e.g. Morocco waters), the target resource (e.g. hake), the technology used (e.g. trawl or beach seine), the social characteristics (e.g. artisanal, industrial), the purpose (e.g. commercial, subsistence, or recreational) as well as the season (e.g. winter).

Modified from FAO (1997): Fisheries management. FAO Technical Guidelines for Responsible Fisheries, 4: 82 p.). In FAO glossary.

#### **Capture-based aquaculture**

The harvesting of wild individuals from very early stages in the life cycle to large mature adults for on-growing under confined and controlled conditions.

Lovatelli, A.; Holthus, P.F. (eds). Global overview. FAO Fisheries Technical Paper, No. 508. Rome, FAO, 2008. 298 p.

#### **Carrying capacity**

Maximum biomass or population size of a species that the environment can sustain indefinitely, given the food, habitat, water and other necessities available in the environment. It is a parameter ( $K$ ,  $B_0$  or  $B_{\infty}$ ) in production models. See Virgin Biomass.

From Wikipedia

#### **Catadromous**

Migrating from fresh water to sea water, as in the case of fishes moving into the sea to spawn..

A dictionary of Ecology, Evolution and systematics, R.J. Lincoln, G.A. Boxshall, P.F. Clark, Cambridge University Press, 1986

#### **Catch**

The quantity of fish which is retained by the fishing gear during fishing operations.

Report of the 10<sup>th</sup> meeting of the Sub-Committee on Statistics and Information (SCSI) Malaga, Spain, 30 November-3 December 2009

#### **Catch at age (CAA)**

The estimated number of fish caught, tabulated by fish age and year of capture (and by other strata such as gear or nation). CAA is estimated on the basis of CAS, using age-length keys, cohort slicing or growth curves equations

In ICCAT glossary.

#### **Catch at size (CAS)**

The estimated number of fish caught, tabulated by size (length) class and by other strata such as gear, nation and quarter. For any given species, CAS should include all fish killed by the act of fishing, not just those fish that are landed.

In ICCAT glossary.

#### **Catch curve**

A graph that allows the estimation of the instantaneous rate of total mortality of fish. It is built by plotting the natural logarithm of the catch in number of fish of certain age, against the corresponding fish age. Assuming equilibrium conditions, the descending limb of a catch curve can be used to estimate total mortality.

#### **Catch per unit effort (CPUE)**

The amount of the catch that is taken per unit of fishing effort (e.g. number of fish per long line hook, months). Nominal CPUE is often used as a measure of the economic efficiency of a type of gear. Standardized CPUE is normally used as an abundance index for "tuning" or fitting assessment models.

In ICCAT glossary.

#### **Catch quota**

The maximum catch permitted to be taken by a single vessel, vessel, a fleet or a country from a stock; such a limit applied to the total catch from a fishery is often referred to as a global quota (as distinct from an individual quota).

Modified from ICCAT glossary.

#### **Catchability (q), coefficient of**

The constant of proportionality that relates effective effort to fishing mortality ( $q \cdot f = F$ ) or as the constant of proportionality that relates an index of abundance to absolute stock size ( $I = q \cdot N$ ). Catchability is affected by fish availability. Thus, specific climatic conditions may result increased or decreased availability of the fish. This would lead to increased (decreased) catchability and thus, increased (decreased) fishing mortality rate with the same fishing effort.

In ICCAT Glossary

#### **Census**

A complete inventory of all elements of the observed population: a census of fishermen, canoes, households, factories, etc. In fisheries assessment surveys, census are used to provide the comprehensive basis for analysis and classification (typology) of the fisheries systems and, consequently, the basis for statistically representative sampling programmes.

Modified from FAO (1998): Guidelines for the routine collection of capture fishery data. FAO Fish. Tech. Pap. 382: 113 p. In FAO glossary.

#### **Charter fishing**

Recreational fishing practiced from a rented boat, with a captain or fishing guide on board, for leisure or sport purposes.

Report of the 10th meeting of the Sub-committee on Economic and Social Sciences (SCSS) Malaga, Spain, 30 November-3 December 2009

#### **Closed season**

Seasonal closure. The banning of fishing activity (in an area or of an entire fishery) for a few weeks or months, usually to protect juveniles or spawners.

In FAO glossary.

#### **Closure**

The banning of fishing during particular times or seasons (temporal closures) or in particular areas (spatial closures), or a combination of both.

#### **Coastal area**

In general, a geographic area of land and water along the coast, affected by the biological and physical processes of both the terrestrial and marine environments.

Scialabba N. (ed.), 1998. Integrated Coastal Area Management and Agriculture, Forestry and Fisheries. FAO Guidelines: 256 p. A geographic coastal area, defined for the purpose of natural resources management. Scialabba N. (ed.), 1998. Integrated Coastal Area Management and Agriculture, Forestry and Fisheries. FAO Guidelines: 256 p. In FAO glossary.

#### **Coastal Zone**

Coastal area

#### **Codend**

The rearmost part of the trawl where the catch accumulates having either a cylindrical shape, i.e. the same circumference throughout or a tapering shape. The codend includes the codend *sensu stricto* and the extension piece.

#### **Cohort**

The fish born in the same time period. For instance, the 1987 cohort would refer to fish that are age 0 in 1987, age 1 in 1988, and so on.

In ICCAT glossary.

#### **Cohort analysis**

A simplified VPA algorithm based on an approximation that assumes that, in a given time period, all fishing takes place instantaneously in the middle of the time period.

Pope, J. 1974. Note on cohort analysis and age-specific fishing mortality. WPTD/74/025.

#### **Cohort slicing**

One approach used frequently to assign ages to fish, given length measurements. For example, cohort slicing is used to convert catch-at-length data into catch-at-age data before the application of age-structured models. Cohort slicing assumes that there is a one-to-one correspondence between length and age (i.e. the approach ignores individual variability in growth).

In ICCAT glossary.

#### **Collapse**

Reduction of a stock abundance by fishing and / or other causes to levels at which the production is negligible compared to historical levels. The word is normally used when the (reduction) process is sudden compared with the likely time scale of recovery, if any, but is sometimes used melodramatically for any case of overfishing.

COMMENT Term often wrongly used to describe overfishing.

Cooke, J.G. (1984). Glossary of technical terms. In Exploitation of Marine Communities, R.M. May (ed), Springer-Verlag. In FAO glossary.

#### **Co-management**

A process of management in which government shares power with resource users, with each given specific rights and responsibilities relating to information and decision-making.

OECD (1996). Synthesis report for the study on the economic aspects of the management of marine living resources.

AGR/FI(96)12. In FAO glossary.

#### **Combinated net**

Bottom-set net made with a gillnet, the lower part of which is replaced by a trammel net. It may catch bottom fish in the lower trammel net part, together with semi-demersal or pelagic fish in the upper gillnet part.

**Commercial fishing**

The harvesting of fish, either in whole or in part, for sale, barter or trade. It does not include any sport or recreational fishing activity [OECD](#).

**Common Fisheries Policy (CFP)**

The European Union's basic framework for managing the fisheries in the waters of Member states. The CFP was drawn up in 1970 in order to institutionalise cooperation between the EU member states over fisheries management, former principles were established in 1983 based on Articles 38 and 39 of the Treaty of Rome, and were later reinforced in Article 3 of the (Maastricht) Treaty on European Union. The CFP basic legislation [Regulation (EEC) 101/76] was adopted in 1976, and has constantly been adapted to meet changing needs, now covering fish landing, marketing, storage and transport. Generally, the principle of free access to fishing grounds applies (based on TACs), except within predetermined protected areas where the right to fish is restricted or completely withdrawn, and within member states coastal fisheries. Currently, the CFP applies only partially to the Mediterranean Sea.

[OECD](#).

**Common property**

Property held collectively by a community or a particular group (two or more persons) within a community, owned and managed in common for the benefit of the community or that particular group. Excludes individual rights.

[In FAO glossary](#)

**Community**

A tightly structured organised group of organisms at different trophic levels, co-occurring in space and time. Contrary to the term Assemblage, a community implies the existence of known or assumed relations between the organisms.

[In FAO glossary](#).

**Conservation**

The planned management of natural resources: the retention of natural balance, diversity and evolutionary change in the environment; cf. preservation.

[A dictionary of Ecology, Evolution and systematics, R.J. Lincoln, G.A. Boxshall, P.F. Clark, Cambridge University Press, 1986](#)

**Continental shelf**

The shallow gradually sloping seabed around a continental margin, not usually deeper than 200 m and formed by submergence of part of the continent.

[A dictionary of Ecology, Evolution and systematics, R.J. Lincoln, G.A. Boxshall, P.F. Clark, Cambridge University Press, 1986](#)

**Continental slope**

The steeply sloping seabed leading from outer edge of the continental shelf to the continental rise, with an average angle of slope of about 4° and a maximum of about 20° near the upper margin.

[A dictionary of Ecology, Evolution and systematics, R.J. Lincoln, G.A. Boxshall, P.F. Clark, Cambridge University Press, 1986](#)

**Cosmopolitan species**

Species with very large distribution in many, or all, parts of the world and ecosystems.

[In FAO glossary](#).

**Cost Benefit Analysis**

Assessment of the direct economic and social costs and benefits of a proposed project for the purpose of project or programme selection. The cost-benefit ratio is determined by dividing the projected benefits of the programme by the projected costs. A programme having a high benefit-cost ratio will take priority over others with lower ratios.

[United Nations \(1997\): Glossary of Environment Statistics, Studies in Methods, Series F, No. 67. In FAO glossary.](#)

**Count**

Number of specimen of a species include into a given weight (e.g. 1 kg)

**Creel survey**

Catch assessment surveys undertaken to estimate the catches made by small scale or recreational fishermen, usually through a sampling program involving interviews and inspection of individual catches in the identified fishing and landing places.

[In FAO glossary](#).

**Critical age**

See optimum age

**Critical habitat**

Habitat that, due to their particular characteristics, are crucial in the life cycle of marine species, typically, nursery, feeding and spawning areas.

**Critical size**

See optimum size

**Data**

Facts that result from measurements or observations.

[FAO \(1998\): Guidelines for the routine collection of capture fishery data. FAO Fish. Tech. Pap, 382: 113 p. In FAO glossary.](#)

**Days at sea**

Any continuous period of 24 hrs (or part thereof) during which a vessel is present within an area and absent from port

[Report of the ninth session of the Sub-Committee on Statistics and Information \(SCSI\). Antalya, Turkey, 13–16 October 2008](#)

**Decision Rule**

Specification of how pre-agreed management actions will respond to estimated or perceived states of nature.

[Precautionary approach to fisheries. FAO Fisheries Technical Paper. Part 1. Rome, FAO, 1995, Part. 2, 1996.](#)

**Decision-makers**

Decision-makers are referred to as those who are responsible for making strategic decisions regarding the fisheries sector. Thus they are concerned with the formulation of policies for the sector and the development of strategies for its management which will then be implemented by a range of "managers" working at different levels and within different institutions and agencies.

[FAO \(1998\). In FAO glossary](#)

**Deep sea****Delay difference models**

Variant of biomass dynamic model that includes biologically meaningful parameters and accounting for time delays due to growth and recruitment.

**Demersal**

Species which live on the bottom or directly related to it.

[FAO Glossary](#)

**Demersal fishery**

Fishery targeting on demersal species.

**Density**

The number or weight of organisms per unit area or volume.

**Depleted**

Abundances and catches are well below historical levels, irrespective of the amount of fishing effort exerted

[Definition from the stock assessment forms. FAO Marine Resources Service, Fishery Resources Division, Review of the state of the world marine fishery resources. FAO Fisheries Technical Paper. No 457. Rome, FAO, 235 pp.](#)

**DEPM**

Daily Egg Production Method. A method to estimate female spawning biomass from observation of number of eggs. Particularly used for small pelagics. It is considered a direct method for stock assessment.

**Deterministic**

A process that has no stochastic (random) components. For example population models of some stock assessment methods assumes that population growth due to recruitment follows a deterministic formulation.

In ICCAT Glossary.

#### **Direct method**

Fishery independent method used in order to avoid the biases of commercial catch data by using research surveys. Direct methods are traditionally used for estimating abundance, demographic structure at sea, as well as for the collection of other biological information.

#### **Discard Rate**

The proportion of total catch which is discarded. Rates may be computed for individual species or combined groups of species.

Alverson, D.L., Murawski, S.A. and G Pope. 1994. A global assessment of fisheries bycatch and discards. FAO Fish. Tech. Pap. 339, 243 p.

#### **Discards**

The portion of the total organic material of animal origin in the catch, which is thrown away, or dumped at sea for whatever reason. It does not include plant materials and post harvest waste such as offal. The discards may be dead, or alive.

Report of the ninth session of the Sub-Committee on Statistics and Information (SCSI). Antalya, Turkey, 13–16 October 2008

#### **Discount rate**

Discount rate: The rate at which the relative weight attached to benefits or losses is reduced in proportion to their distance into the future. The discount rate is used to represent or measure time preference. Discounting is often used when making investment or policy decisions and can have serious consequences for future generations. Determining the present value (net worth) of assets by applying a discount rate to the expected net benefits from future uses of those assets. The discount rate reflects the social preferences for current (as compared with future) uses.

United Nations (1997): Glossary of Environment Statistics. Studies in Methods, Series F, No. 67. In FAO glossary.

#### **Discounted cash flow analysis**

A method of financial analysis and economic analysis in which future benefits and future costs are reduced to a lower value, which is judged to be their present value, by discounting.

In FAO glossary.

#### **Diversity**

1: The absolute number of species in an assemblage, community or sample; species richness.

2: a measure of the number of species and their relative abundance in a community; low diversity refers to few species or unequal abundances, high diversity to many species or equal abundances.

3: The condition of having differences with respect to a given character or trait.

See biodiversity

A dictionary of Ecology, Evolution and systematics, R.J. Lincoln, G.A. Boxshall, P.F. Clark, Cambridge University Press, 1986

#### **Domestic fishery**

A fishery within the national waters operated by nationals.

In FAO glossary.

#### **Dredge**

A towed gear made up of a bag fixed on rigid frame of which the lower part is a blade forming a scraper.

#### **Drift net**

Net kept vertically on the surface or at a certain distance below it, by numerous floats. It drifts freely with the current, separately or, more often, with the boat to which the net is attached.

#### **EAF (Ecosystem approach to fisheries)**

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.

In FAO glossary

#### **EBFM (Ecosystem-based fisheries management)**

Term defined (US National Research Council, 1998) as “an approach that takes major ecosystem components and services — both structural and functional — into account in managing fisheries... It values habitat, embraces a multispecies perspective, and is committed to understanding ecosystem processes... Its goal is to rebuild and sustain populations, species, biological communities and marine ecosystems at high levels of productivity and biological diversity so as not to jeopardize a wide range of goods and services from marine ecosystems while providing food, revenues and recreation for humans”. The term puts the focus for management on the users. What is managed is the economic activity. The term did not meet with consensus at the 2001 FAO Reykjavik Conference, possibly because some countries took it as implying that the “ecosystem” would become the new “foundation” of fisheries management. This may have been interpreted as giving to environmental considerations pre-eminence over socio-economic and cultural ones, raising concern about equity, political as well as socio-economic costs and feasibility.

Garcia, S.M.; Zerbi, A.; Aliaume, C.; Do Chi, T.; Lasserre, G. The ecosystem approach to fisheries. Issues, terminology, principles, institutional foundations, implementation and outlook. FAO Fisheries Technical Paper. No. 443. Rome, FAO. 2003. 71 p.

#### **Echosurvey**

A method to estimate biomass from measuring it through acoustic methods. Particularly used for small pelagics. It is considered a direct method for stock assessment.

#### **Economic overfishing**

Occurs when a fishery is generating economic rent under the maximum, primarily because an excessive level of fishing effort is applied in the fishery and does not always imply biological overfishing.

Modified from FAO glossary.

#### **Economic policy instruments**

Policy instruments which create the economic incentives for individuals to choose freely to modify or reduce their activities, thus, correctly used, indirectly producing an environmental improvement.

Modified Scialabba N. (ed.), 1998. Integrated Coastal Area Management and Agriculture, Forestry and Fisheries. FAO Guidelines: 256 p. In FAO glossary.

#### **Economic rent**

See Rent.

#### **Ecosystem**

A spatio-temporal system of the biosphere, including its living components (plants, animals, micro-organisms) and the non-living components of their environment, with their relationships, as determined by past and present environmental forcing functions and interactions amongst biota.

In FAO glossary.

#### **Ecosystem management**

Management taking due account of all living organisms and their environment in the management area. In practice, management ensuring sustainability of target, dependant, and associated species. The concept is being generally adopted but its implementation remains problematical due to lack of understanding of interactions within ecosystems.

In FAO glossary.

#### **Ecosystem overfishing**

Occurs when the species composition and dominance is significantly modified by fishing (e.g. with reductions of large,



long-lived, demersal predators and increases of small, short-lived species at lower trophic levels).  
In [FAO glossary](#).

#### EEZ

See Exclusive Economic Zone.

#### Effective fishing effort

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.

[Restrepo V. \(1999\): Annotated Glossary of Terms in Executive Summary Reports of the International Commission for the Conservation of Atlantic Tunas' Standing Committee on Research and Statistics \(SCRS\). ICCAT. In \[FAO glossary\]\(#\).](#)

#### Effectiveness of fishing

A general term referring to the percentage removal of fish from a stock, but not as specifically defined as either rate of exploitation or instantaneous rate of fishing.

[Ricker W.E. \(1975\): Computation and interpretation of biological statistics of fish populations. Bulletin of the Fisheries Research Board of Canada, 191: 2-6. In \[FAO glossary\]\(#\).](#)

#### Efficiency

Component of the catchability that depends, among other factors, on the fishing strategy or fishing tactics.

[Laurec, A. and J.-C. Le Guen.- 1981. Dynamique des populations marines exploitées, Tome 1. Concepts et modèles. Publications du Centre National pour l'Exploration des Océans. CNEXO/Centre Oceanologique de Bretagne. Rapports Scientifiques et Techniques N°45. 117 pp.](#)

#### Effort

See fishing effort.

#### Effort parameter

See time, capacity, activity, gear units

[Report of the ninth session of the Sub-Committee on Statistics and Information \(SCSI\). Antalya, Turkey, 13–16 October 2008](#)

#### EFH

Essential Fish Habitat

#### EIA

Environmental Impact Assessment

#### Embryo

Developmental stage comprised between egg fertilisation and hatching.

#### Encircling net, surrounding net

Gear generally used in shallow water with the float line remaining at the surface. After they have been encircling by the net, the fish are forced to be entangled in the netting surrounding them.

#### Endangered species

species that is in danger of extinction throughout all or part of its range

[Mediterranean SPA Protocol](#)

#### Endemic Species

Species restricted to a specified region or locality.

[United Nations \(1997\): Glossary of Environment Statistics. Studies in Methods, Series F, No. 67. In \[FAO glossary\]\(#\).](#)

#### Environment

The combined external conditions affecting the life, development and survival of an organism or an ecosystem.

[Choudhury K. and L.J.M. Jansen \(1999\): Terminology for Integrated Resources Planning and Management. FAO, Rome, Italy: 69 pages. In \[FAO glossary\]\(#\).](#)

#### Environmental impact

Direct effect of socio-economic activities and natural events on the

components of the environment.

[United Nations \(1997\): Glossary of Environment Statistics. Studies in Methods, Series F, No. 67. In \[FAO glossary\]\(#\).](#)

#### Environmental Impact Assessment (EIA)

A sequential set of activities designed to identify and predict the impacts of a proposed action on the biogeophysical environment and on man's health and well being, and to interpret and communicate information about the impacts, including mitigation measures that are likely to eliminate the risks. In many countries, organisations planning new projects are required by law to conduct EIA. In fisheries, an analysis of the expected impacts resulting from the implementation of a fisheries management or development plan (or some other proposed action) on the environment. The EIA is also referred to in some countries as Environmental Statement (ES)

[Scialabba N. \(ed.\), 1998. Integrated Coastal Area Management and Agriculture, Forestry and Fisheries. FAO Guidelines: 256 p. In \[FAO glossary\]\(#\).](#) [Roberts, K.J. et al., 1995. Defining fisheries: a user's glossary. Louisiana State University, Louisiana, USA, 22 p. \(Rev.\). In \[FAO glossary\]\(#\).](#)

#### Environmental Indicator

Parameter, or a value derived from parameters, that points to, provides information about and/or describes the state of the environment, and has a significance extending beyond that directly associated with any given parametric value. The term may encompass indicators of environmental pressures, conditions and responses.

[United Nations \(1997\): Glossary of Environment Statistics. Studies in Methods, Series F, No. 67. In \[FAO glossary\]\(#\).](#)

#### Environmental management

Management and control of the environment and natural resources systems in such a way so as to ensure the sustainability of development efforts over a long-term basis.

[In \[FAO glossary\]\(#\).](#)

#### Environmental monitoring

Observation of effects of development projects on environmental resources and values.

[In \[FAO glossary\]\(#\).](#)

#### Equilibrium

A situation that arises when the fishing mortality, exploitation pattern and other fishery or stock characteristic (growth, natural mortality, recruitment) do not change from year to year. Many yield per recruit analysis assume equilibrium. Also steady state [Hilborn, R., and C.J. Walters. 1992. Quantitative fisheries stock assessment. Choice, Dynamics and uncertainty. Chapman and Hall, NY. 570 p. In \[ICCAT glossary\]\(#\).](#)

#### Equilibrium Yield

A function that describes the long-term yield which would be obtained at different levels of fishing mortality. At its highest point, the equilibrium yield is the Maximum Sustainable Yield (MSY) and the associated fishing mortality rate is  $F_{MSY}$ .

[Restrepo, V.R., Porch, C.E., Turner, S.C. Scott, G.P. and A.A. Rosemberg. 1994. Combination of spawner-recruit, spawner biomass per recruit and yield per recruit computations for the estimation of the long term potential for West Atlantic bluefin tuna. SCRS/93/072. In \[ICCAT Glossary\]\(#\)](#)

#### Essential Fish Habitat

“Those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity.” “Waters” include aquatic areas and their associated physical, chemical, and biological properties that are used by fish. “Substrate” includes sediment, hard bottom, structures underlying the waters, and associated biological communities. “Necessary” means the habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem; and “spawning, breeding, feeding, or growth to maturity” covers a species' full life cycle.

[Magnuson-Stevens Act Provisions. Essential Fish Habitat. Dpt. of Commerce, NOAA \(USA\). Federal Register, vol 67, n° 12, January 2002.](#)

**Eutrophication**

Over enrichment of a water body with nutrients, resulting in excessive growth of organisms and depletion of oxygen concentration.

A dictionary of Ecology, Evolution and systematics, R.J. Lincoln, G.A. Boxshall, P.F. Clark, Cambridge University Press, 1986

**Eviscerated**

Fish from which the guts have been removed. (see also gutted weight).

In FAO glossary.

**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, F<sub>0.1</sub>, MEY, etc.).

In FAO glossary.

**Exclusive Economic Zone (EEZ)**

A zone under national jurisdiction (up to 200-nautical miles wide) declared in line with the provisions of 1982 United Nations Convention of the Law of the Sea, within which the coastal State has the right to explore and exploit, and the responsibility to conserve and manage, the living and non-living resources.

In FAO glossary.

**Exclusive rights**

The right to do something (in this case, to catch fish) is exclusive to the holder(s) of the right; that is, the holders can exclude others without the right from catching fish in the fishery.

Modified from OECD (1996), Synthesis report for the study on the economic aspects of the management of marine living resources, AGR/FI(96)12. In FAO glossary.

**Exotic species**

Species not native to a particular area which may pose a risk to endemic species.

United Nations (1997): Glossary of Environment Statistics, Studies in Methods, Series F, No. 67. In FAO glossary.

**Exploitation pattern or exploitation rate or fishing pattern**

The distribution of the fishing mortality over the length or age composition of the fish, determined by the fishing gear and the spatial and seasonal distribution of fishing, and by the growth and migration of the fish. In other words, it is the combined effect of gear selectivity and fish availability. The pattern can be changed by modifications to fishing gear; for example, by increasing mesh or hook size or by changing the ratio of harvest by gears exploiting the fish. The pattern can also change due to changes in fishing practices such as avoidance of areas where juveniles reside.

Modified from ICCAT glossary.

**Exploitation rate or exploitation pattern**

The proportion of a population at the beginning of a given time period that is caught during that time period (usually expressed in a yearly basis). It is also defined as the rate between fishing and total mortality ( $E=F/Z$ )

Modified from ICCAT glossary.

**Extension piece, lengthening piece**

Tapered or cylindrical section of netting either inserted between belly and batings and the codend or attached to end of codend to increase the length.

**External cost**

A cost imposed on others and not borne by the party responsible for the cost.

OECD (1996), Synthesis report for the study on the economic aspects of the management of marine living resources, AGR/FI(96)12. In FAO glossary.

**Externality**

An effect from a production or consumption process which is

imposed on others and is not fully borne by the party responsible for the effect. Externalities may be positive or negative OECD.

**Extinct**

An IUCN category for listing endangered species. A taxon is considered "Extinct" (EX) when there is no reasonable doubt that the last individual has died.

IUCN (1994): IUCN Red List Categories. IUCN Species Survival Commission. The World Conservation Union. In FAO glossary.

**f**

Fishing effort

**F**

Fishing mortality rate

**F<sub>0.1</sub>**

A biological reference point. It is the fishing mortality rate at which the increase in equilibrium yield per recruit in weight for an increase in a unit of effort is 10% of the yield per recruit produced by the first unit of effort on the unexploited stock (i.e., the slope of the yield per recruit curve for the F<sub>0.1</sub> rate is 1/10<sup>th</sup> of the slope of the yield per recruit curve at its origin). Originally, F<sub>0.1</sub> was intended as an economic reference point, measuring were additional investment into effective fishing effort would only produce a 10% marginal gain in yield per recruit. It later evolved into a conservative reference point for yield optimization because F<sub>0.1</sub> results in almost as much yield per recruit as F<sub>max</sub> does, but at lower levels of fishing mortality.

Caddy, J.F., and R. Mahon, 1995. Reference points for fisheries management. FAO Fish. Tech. Pap. 347. 83 p. In ICCAT glossary.

**FAD (Fish Aggregating Device)**

Free floating or anchored structures constructed and deployed by fishermen to attract schools of fish.

Armstrong Wesley A. and Oliver Charles W., 1996 Recent use of fish aggregating devices in the eastern tropical Pacific tuna purse-seine fishery: 1990-1994.

**Farm gate price**

In aquaculture, the price for a product at the production site, not taking account of any transportation or subsequent handling costs. FAO (1998): Guidelines for the routine collection of capture fishery data. FAO Fish. Tech. Pap. 382: 113 p. In FAO glossary.

**Fish**

When used as a noun, can include: (a) parts of a fish, (b) shellfish, crustaceans, other marine animals and any parts of shellfish, crustaceans or other marine animals, and (c) the eggs, sperm, spawn, larvae, spat and juvenile stages of fish, shell fish, crustaceans and other marine animals

OECD.

**Fish larvae**

In a general sense, is the individual which have not acquired yet neither the morphology nor the meristic characters of adults, presenting specialised larval structures. The term larvae can be applied also to the developmental stage comprised between those of yolk-sac larvae and post-larvae.

Caddy, F.J. and R. Mahon, 1995. Reference points for fisheries management. FAO Fish. Tech. Pap. 347. 83 p.

**Fisheries management organization**

Institution responsible for fisheries management, including the formulation of the rules that govern fishing activities. The fishery management organization, and its subsidiary bodies, may also be responsible for all ancillary services, such as the collection of information, its analysis, stock assessment, monitoring, control and surveillance (MCS), consultation with interested parties, application and/or determination of the rules of access to the fishery, and resource allocation. Also called: Fishery management arrangement.

FAO (1997): Fisheries management. FAO Technical Guidelines for Responsible Fisheries, 4: 82 p.). In FAO glossary.

**Fisheries regulations**

Controls designed to restrict either effective fishing efforts (input controls) or the total catch (output controls) to predefined limits in a fishery.

#### **Fishery**

Activities in which fish is harvested from the wild using some fishing technology (capture fishery) as well as activities producing fish through aquaculture.

In FAO glossary.

#### **Fishery Management**

The integrated process of information gathering, analysis, planning, decision-making, allocation of resources and formulation and enforcement of fishery regulation by which the fishery management authority controls the present and future behaviour of interested parties in the fisheries, in order to ensure the continued productivity of living resources.

FAO 1995. Guidelines for responsible management of fisheries. (1st draft). Report of the Expert Consultation on guidelines for responsible fisheries management. Wellington, New Zealand, 23-27/1/1995. FAO Fisheries Report, 510: page 54. In FAO glossary.

#### **Fishery management plan**

An explicit arrangement (contract) between the interested parties and the fisheries management authority which makes explicit the objectives and means of management, the nature of the management authority, its powers and responsibilities, its working and consultation procedures, as well as the rights and responsibilities of the interested parties in the fishery.

Modified from FAO (1995a). Guidelines for responsible management of fisheries. In Report of the Expert Consultation on Guidelines for Responsible Fisheries Management, Wellington, New Zealand, 23-27 January 1995. FAO Fisheries Report, 519. In FAO glossary.

#### **Fishery resource**

In general, refers to elements of a natural aquatic resource (e.g. strains, species, populations, stocks, assemblages) that can be caught by fishing.

Modified from FAO (1998): Guidelines for the routine collection of capture fishery data. FAO Fish. Tech. Pap. 382: 113 p. In FAO glossary.

#### **Fishing capacity**

The ability of a stock of inputs (capital) to produce output (measured as either effort or catch). Can be measured by number of vessel, gross tonnage, hold capacity, horsepower, capital used for harvesting fish, etc. Reflects potential rather than nominal fishing effort.

In FAO glossary.

#### **Fishing community**

A community that is substantially dependent on, or substantially engaged in, the harvest or processing of fishery resources to meet social and economic needs, the fishing vessel owners, operators, crew and fish processors that are based in such a community OECD.

#### **Fishing days**

Any continuous period of 24hrs (or part thereof) attributed to the GSA (area) where the most fishing time was spent during the relevant day at sea. However, for passive gears, if no operation took place from the vessel during a day while at least one passive gear remained at sea, that day will be associated to the area where the last setting of a fishing gear was carried out on that fishing trip. Namely, the time calculated from the point where each individual unit of gear has been set, to the time when the same unit starts to be removed

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#### **Fishing effort (f or E)**

A measure of fishing activity expressed as the product of a number of parameters related to the fishing vessel capacity and gear used on the fishing grounds over a given unit of time e.g. hours trawled per day, number of hooks set per day or number hauls of a beach seine per day. When two or more kinds of gear are used, the

respective efforts must be adjusted to some standard type before being added.

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#### **Fishing fleet**

An aggregation of fishing vessels of a particular country (e.g. the European Union fishing fleet) or using a particular gear (a purse seine fleet).

In FAO glossary.

#### **Fishing gear**

Gear according to the fishing license of the vessel or the owner/operator, using the International Standard Statistical Classification of Fishing Gear (The International Standard Statistical Classification of Fishing Gear (ISSCFG) was adopted during the 10th Session of the CWP (Madrid, 22-29 July 1980).

Report of the 10<sup>th</sup> meeting of the Sub-Committee on Statistics and Information (SCSI) Malaga, Spain, 30 November-3 December 2009

#### **Fishing industry**

Includes both recreational, subsistence and commercial fishing, and the harvesting, processing, and marketing sectors.

In FAO glossary.

#### **Fishing intensity**

Amount of fishing effort per unit area

#### **Fishing mortality rate or fishing mortality**

The part of the total mortality rate that is due to fishing. Fishing mortality is usually expressed as an instantaneous rate and can range from 0 per year (for no fishing) to high values such as 1.0 or more per year. Fishing mortality should reflect all deaths in the stock that are due to fishing, not just those fish that are actually landed. It is common practice to refer F as a scalar value but it would be more appropriate to refer to it as a vector.

In ICCAT glossary.

#### **Fishing pattern**

Distribution of fishing mortality among age groups. Also exploitation pattern

From FAO glossary.

#### **Fishing power**

The whole of means of capture implemented by a fishing vessel

#### **Fishing right**

A right to catch a specified quantity of fish, or proportion of the total allowable fish catch or a right to use a boat (or any other specified fishing equipment) in a manner specified in a management plan or in the fishery regulations.

In FAO glossary.

#### **Fishing strategy**

A strategy is a general plan or set of plans intended to achieve something, especially over a long period (see also fishing tactics). Report of the SCSI/SCSA/SCESS transversal workshop on measurement and standardisation of fishing effort. Fuengirola (Malaga), Spain, 30-31 May 2006.

#### **Fishing tactics**

Tactics are the methods that you choose to use in order to achieve what you want in a particular situation (see also fishing strategy). Report of the SCSI/SCSA/SCESS transversal workshop on measurement and standardisation of fishing effort. Fuengirola (Malaga), Spain, 30-31 May 2006.

#### **Fishing vessel**

Any vessel, boat, ship, or other craft that is equipped and used for fishing or in support of such activity. For management purpose, particularly for monitoring and surveillance, may be considered to include any vessel aiding or assisting one or more vessels at sea in the performance of any activity relating to fishing, including, but not limited to, preparation, supply, storage, refrigeration, transportation, or processing (e.g. mother ships).

Modified from FAO (1998): Guidelines for the routine collection of capture fishery data. FAO Fish. Tech. Pap. 382: 113 p. In FAO glossary.

#### **Fixed costs**

Costs that do not vary with output or input. Fixed costs can only be avoided if the firm goes out of business.

OECD (1996), Synthesis report for the study on the economic aspects of the management of marine living resources. AGR/FI(96)12. In FAO glossary.

#### **Fixed gillnet**

Used essentially in coastal waters, this net is mounted on stakes driven into the bottom. The fish are collected at low tide.

Nedelec, C. and J. Prado (1990): Definitions and classification of fishing gear categories. FAO Fisheries Technical Paper, 222 (Rev. 1): 92 p. In FAO glossary.

#### **Fixed gillnet (stake gill net)**

Used essentially in coastal waters, this net is mounted on stakes driven into the bottom. The fish are collected at low tide. Not used in Mediterranean waters. Not to be confused with static gears.

Nedelec, C. and J. Prado (1990): Definitions and classification of fishing gear categories. FAO Fisheries Technical Paper, 222 (Rev. 1): 92 p. In FAO glossary.

#### **Fleet**

The aggregation of units of any discrete type of fishing activity utilising a specific resource. Hence, for example, a fleet may be all the purse seine vessels in a specific sardine fishery

Modified from FAO (1997): Fisheries management. FAO Technical Guidelines for Responsible Fisheries, 4: 82 p.). In FAO glossary.

#### **Fleet segment**

##### **F<sub>loss</sub>**

F corresponding to a SSB/R equal to the inverse of R/SSB at the Lowest Observed Spawning Stock (LOSS).

ICES, 1997; Modified from Caddy J.F. and R. Mahon (1995). Reference points for fisheries management. FAO Fisheries Technical Paper, 347: 83 p. In FAO glossary.

##### **F<sub>low</sub>**

F corresponding to a SSB/R equal to the inverse of the 10% percentile of the observed R/SSB.

ICES, 1997; Modified from Caddy J.F. and R. Mahon (1995). Reference points for fisheries management. FAO Fisheries Technical Paper, 347: 83 p. In FAO glossary.

##### **F<sub>max</sub>**

A biological reference point. It is the fishing mortality rate that maximizes equilibrium yield per recruit. F<sub>max</sub> is the F level that defines growth overfishing. In general, F<sub>max</sub> is different than F<sub>MSY</sub> (the F that maximizes sustainable yield), and is usually higher than F<sub>MSY</sub>, depending on the stock-recruitment relationship. By definition, F<sub>max</sub> is always higher than F<sub>0.1</sub>.

Caddy, J.F., and R. Mahon. 1995. Reference points for fisheries management. FAO Fish. Tech. Pap. 347. 83 p. In ICCAT glossary.

##### **F<sub>MSY</sub>**

A biological reference point. It is the fishing mortality rate which, if applied constantly, would result in MSY. F<sub>MSY</sub> can be estimated in two ways: (1) From simple (Biomass-aggregated) production models; (2) from age-structured models that include a stock-recruitment relationship.

Modified from Caddy, J.F., and R. Mahon. 1995. Reference points for fisheries management. FAO Fish. Tech. Pap. 347. 83 p. In ICCAT glossary.

#### **Footrope, groundline**

Bottom line of a bottom trawl made of connected sections of rope, usually of wire, protected with rope rounding or rubber discs or various types of bobbins to reduce risk of ground damage whilst maintaining ground contact.

#### **Forcing factors**

Factors that condition the behaviour of the resource, such as upwelling, temperature, salinity, etc.

#### **Fortuitous catch**

Accidental catch

##### **F<sub>pa</sub>**

Value of F that represents a precautionary approach.

#### **FRA**

Fisheries Restricted Area

#### **Fully exploited**

The fishery is being exploited at levels of yield or F higher but close to the optimal ones (F<sub>0.1</sub> from Y/R or F<sub>MSY</sub>). Advices to not increase or decrease the fishing mortality may be given.

Adapted from the definition from the stock assessment forms. FAO Marine Resources Service, Fishery Resources Division, Review of the state of the world marine fishery resources. FAO Fisheries Technical Paper. No 457. Rome, FAO. 235 pp.

#### **Fyke net**

Trap net used normally in shallow waters which consists of cylindrical or cone-shaped bags mounted on rings or other rigid structures, completely covered by netting and completed by wings or leaders which drive the fish towards the opening of the bags.

#### **Gear**

Tool used to catch fish, such as hook and line, trawl, gill net, trap, spear, etc.

Modified from FAO (1998): Guidelines for the routine collection of capture fishery data. FAO Fish. Tech. Pap. 382: 113 p. In FAO glossary.

#### **Gear class or gear type**

Labeling of an upper level of identification of fishing gear (code ending by 0.0), as defined by the International Standard Statistical Classification of Fishing Gear

The International Standard Statistical Classification of Fishing Gear (ISSCFG)

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#### **Gear unit**

As effort parameter: number of FAD's, number of traps, number of long line units, number of hooks, length of net, and surface area of net.

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#### **Gear-restriction**

A type of input control used as a management tool whereby the amount and/or type of fishing gear used by fishers in a particular fishery is restricted by law.

In FAO glossary.

#### **Generalized Linear Model (GLM)**

A statistical procedure similar to an analysis of variance or a multiple regression that is used to estimate the magnitude of the effects of different factors on a variable of interest. GLMs are the tool of choice for standardizing CPUE data in order to obtain indices of abundance. In such applications, the variable of interest is CPUE and the factors are year and perhaps others such as area, gear configuration, etc.; the standardized abundance index of annual abundance would then be given by the parameters associated with the factor year.

Brown and Porch, 1997; Cooke and Lankester, 1996; McCullagh and Nelder, 1989. In ICCAT glossary.

#### **Genetic diversity**

All of the genetic variation in an individual, population, or species. ICES 1995: Code of practice on the introduction and transfer of marine, 1994

#### **Geographic region**

With regard to biogeography and species distribution, a region

which is separated from an adjacent region by a barrier which is usually impenetrable to many species, limiting their movement or preventing establishment outside their natural geographical range. Non-native marine species in British waters: a review and directory, Edited by N. Clare Eno, Robin A. Clark & William G. Sanderson. JNCC, Peterborough, 1997

#### **Geographical Subarea (GSA)**

Geographically defined zones, in the Mediterranean, Black Sea and connecting waters, used to compile data, monitor fisheries and assess fisheries resources in a georeferenced manner. Report of the 10<sup>th</sup> meeting of the Sub-Committee on Statistics and Information (SCSI) Malaga, Spain, 30 November-3 December 2009

#### **Ghost fishing**

The accidental capture of aquatic organisms by fishing gear (usually gill nets, or traps, pots, etc.) that has been lost or discarded into the sea and which continues to entangle or trap aquatic animals. In FAO glossary.

#### **Gill net**

Usually rectangular in shape, made of thin twine, which catches fish by holding them in the meshes; held vertically in the water by floats and weights.

#### **Gillnetting**

Fishing method or métier using gillnets or other type of vertical nets

#### **Governance**

A systemic concept relating to the exercise of economic, political and administrative authority. It encompasses: (i) the guiding principles and goals of the sector, both conceptual and operational; (ii) the ways and means of organisation and coordination of the action; (iii) the infrastructure of socio-political, economic and legal instruments; (iv) the nature and modus operandi of the processes; and (v) the policies, plans and measures.

In FAO glossary. Garcia, S.M. 2009. Governance, science and society. In: Quentin Grafton, R.; Hilborn, R.; Squires, D.; Tait, M. and Williams, M. (Eds). Handbook of Marine Fisheries Conservation and Management. Oxford: Oxford University Press: 87-98

#### **Gross registered tonnage (GRT)**

A measurement of ship weight. With fishing vessels often used as a measure of fishing capacity, particularly for ships built before 1994 (when the London Convention replaced the Oslo Convention in providing guidelines for the standard measurement of ship capacity). At present is being replaced by Gross Tonnage (GT) OECD.

#### **Gross tonnage (GT)**

A measurement of ship volume. With fishing vessels often used together with engine power (kW) as a measure of fishing capacity, especially since the London Convention took effect in 1994. The gross tonnage is a function of the moulded volume of all enclosed spaces of the ship OECD.

#### **Groundfish**

A species or group of fish that lives most of its life on or near the sea bottom.

Roberts, K.J. et al., 1995, Defining fisheries: a user's glossary. Louisiana State University, Louisiana, USA, 22 p. (Rev.). In FAO glossary.

#### **Growth model**

A mathematical description or representation of the size of a living organisms at its various ages. There are many such models, the most frequently used being the von Bertalanffy Growth model. In FAO glossary.

#### **Growth overfishing**

Growth overfishing occurs when the fishing mortality rate is above  $F_{max}$ . This means that individual fish are caught before they have a

chance to reach their maximum growth potential.

Gulland, J.A. 1974. The management of marine fisheries. U. Washington Press. In ICCAT glossary.

#### **Growth rate**

1.- The increase in weight of a fish per year (or season), divided by the initial weight.

2.- In fish this is often measured in terms of the parameter K of the von Bertalanffy curve for the mean size (length or weight) as a function of age;

Ricker W.E. (1975): Computation and interpretation of biological statistics of fish populations. Bulletin of the Fisheries Research Board of Canada, 191: 2-6. Cooke, J.G. (1984), Glossary of technical terms. In Exploitation of Marine Communities, R.M. May (ed), Springer-Verlag. In FAO glossary.

#### **Growth rate or intrinsic growth rate**

A value that quantifies how much a population can grow between successive time periods. The intrinsic growth rate is often estimated with production models and plays an important role in evaluating the sustainability of different harvest levels and the capacity to recover after depletion

Restrepo V. (1999): Annotated Glossary of Terms in Executive Summary Reports of the International Commission for the Conservation of Atlantic Tunas' Standing Committee on Research and Statistics (SCRS). ICCAT. In FAO glossary.

#### **GSA**

Geographical Subarea

#### **Gutted weight**

A type of weight measurement where the guts, have been removed and discarded at sea. When it is practised conversion factors are used for each species to obtain total weight.

#### **Habitat**

The locality, site and particular type of local environment occupied by an organism; local environment.

A dictionary of Ecology, Evolution and systematics, R.J. Lincoln, G.A. Boxshall, P.F. Clark, Cambridge University Press, 1986

#### **Handgear**

Handlines may be used with or without a pole or rod. For fishing in deep waters the lines are usually operated using reels. The bait used may be natural or artificial. This category includes the jigging lines, operated by hand and used on small boats. Handlines can be worked mechanically, using powered reels or drums. They are generally used on medium size vessels, but they may also be used on relatively small boats. Pole-lines can also be mechanised, e.g., for tuna catching, with the pole movement being entirely automatic.

Nedelec, C. and J. Prado (1990): Definitions and classification of fishing gear categories. FAO Fisheries Technical Paper, 222 (Rev. 1): 92 p. In FAO glossary.

#### **Handline**

A hand-held line with weighted and hooks fished above the sea bed

#### **Handliner**

A fishing vessel employing handlines. Boats, canoes and other small vessels may be used for handlining, and no special features are required for working the gear.

Commission of the European Communities (1990): Glossarium of fishing vessels and safety on board.: 503 p. In FAO glossary.

#### **Hanging ratio**

Ratio between the length of a hanging line and the stretched length of net panel mounted on it

#### **Harvesting capacity**

Fishing capacity

OECD (1996), Synthesis report for the study on the economic aspects of the management of marine living resources. AGR/FI(96)12. In FAO glossary.

#### **Haul**

A single fish operation

**Headfine, floatline**

The principal upper frame rope of a net to which the netting is attached; it can be made of various materials and generally supports the floats (floatline)

**High seas**

International waters

**Hook selection**

The selection of size of fish by the ability of the fish to take the hook and bait and of the hook to hold the fish.

Pope, 1975

**Hook size**

There is no uniform system of hook measurements. It is generally given by the overall length measured from its upper extremity (eye) to the external side of the curve (bend). For selectivity studies interests, other parameters should be taken into account as the shortest distance (gape) between the point of the hook and its vertical part (shank). (i.e. wide gap hook, circle hooks.

from Mustad

**ICA**

Integrated Catch at age analysis (ICA, Patterson and Melvin 1998) is a stock assessment methodology that uses separable virtual population analysis (VPA) (Pope & Shepherd, 1985) with weighted tuning indices. ICA is based on commercial catch data (landings and catch at age data) and as tuning indices the biomass estimates from acoustic surveys and the Daily Egg Production Method (DEPM) estimates can be used. Specifically input data include annual landings, annual catch at age data, mean weights at age, maturity at age, natural mortality at age and the results of acoustic and DEPM surveys (biomass and abundance at age indices). Assumptions are set concerning the separability period, the weight per age group and the catchability relationship of the tuning indices. The model output concerning estimates includes the annual fishing mortality at age, the annual population abundance at age, the annual recruitment, annual total biomass, annual spawning stock biomass,  $F_{\text{mean}}$  which is considered the mean fishing mortality for the age groups that are considered target for the fishery. Residual tables and diagnostics plots of the model fit are produced in order to evaluate the model performance.

**Ichthyoplankton**

Fish eggs and larvae belonging to the planktonic community.

**Incidental catch**

See accidental catch

**Indirect methods**

Methods for stock assessment based on fishery-dependent data, such as catch and effort statistics and age structure of the catch.

**Individual (non transferable) Quota (IQ)**

A management tool used to allocate Total Allowable Catch (TAC) to individual fishermen or companies. They do not represent long-term rights because they are not tradable by their holders. The management authority retains the prerogative to withdraw and redistribute them under certain conditions.

In FAO glossary.

**Individual transferable quota (ITQ)**

An IQ or IFQ that can be transferred in whole or in part to another individual (a person or a legal entity (e.g. ; a company)). Rules limiting trade in ITQs apply in many countries

OECD

**Industrial fisheries**

Fisheries of which the fishing, landing and commercialisation require industrial processing; these fisheries are targeting mainly species of international interest.

**Inland waters**

Inshore waters

**Input controls**

Limitations on the amount of fishing effort; restriction on the number, type and size of fishing vessels or fishing gears, or on the fishing areas or fishing times in a fishery.

**Inshore waters**

Waters of the shallower part of the continental shelf.

In FAO glossary.

**Integrated Analysis**

Refers to stock assessment methodologies that attempt to integrate multiple sources of data into a single estimation framework. For example, an integrated assessment can attempt to fit the following observations based on model predictions : Total landings by fleet, size samples of landings, discard estimates, size samples of discards, standardized CPUE by fleet, fishery-independent surveys, and tagging records on movement, growth and recoveries

Fournier et al. 1998 ; Porch, 1996. SCRS.

**Integrated Coastal Zone Management**

The process of combining all aspects of the human, physical and biological aspects of the coastal zone within a single management framework. COMMENT Careful planning and management of all sectorial activities simultaneously will result in greater overall benefits than pursuing sectorial development plans independently of one another. Integrated Coastal Area Management makes explicit the fact that degradation of coastal resources may result from activities outside the coastal zone. Where issues are deemed to arise in a watershed, ICAM may. Subject to appropriate institutional arrangements, extend outside the coastal zone.

In FAO glossary.

**Introduced Species**

Any species intentionally or accidentally transported and released by humans into an environment beyond its present range.

Precautionary approach to fisheries. FAO Fisheries Technical Paper, Part 1. Rome, FAO, 1995, Part. 2. Te 1996.

**Juvenile**

Young fish that has passed through the metamorphosis process; but has not reached the length or age of first maturity.

 **$L_{50}$ , the 50 percent selection length (for trawl)**

The fish length for any one mesh size and species as half escape through the codend meshes and half are retained.

Pope, 1975

 **$L_{\infty}$  or  $L(\text{infinity})$** 

Parameter of the von Bertalanffy's growth equation defined as the asymptotic length (length at infinite age) or "the mean length of very old (strictly infinitely old) fish".

Sparre, 1989

**Lampara net**

A surrounding net with the central bunt in the form of a spoon and two lateral wings, making it possible to retain the shoal of fish when the two wings are hauled up at the same time. The ring net type is shaped more like a purse seine and most often fitted with bridles to help pull in the leadline. These nets are generally operated by a simple boat, relatively small.

Nedelec, C. and J. Prado (1990): Definitions and classification of fishing gear categories. FAO Fisheries Technical Paper, 222 (Rev. 1): 92 p. In FAO glossary.

**Landing(s)**

Portion of the catch which is unloaded from a fishing vessel at landing sites. Landings does not include transshipment.

Report of the 10<sup>th</sup> meeting of the Sub-Committee on Statistics and Information (SCSI) Malaga, Spain, 30 November-3 December 2009

**Landing price**

Price for a product at the landing point, not taking account of any transportation or handling costs. Equivalent to the "farm gate" price for aquaculture.

In FAO glossary.

**Landing site**

Location at which boats land their catch. A landing site may be the same as the homeport or base port but it can also be different. Recording of fishing activities tend to be conducted in the vessel homeport or base port, while sampling and recording of catches and species composition, landing prices, etc. are usually undertaken at landing sites.

Modified from FAO (1998): Guidelines for the routine collection of capture fishery data. FAO Fish. Tech. Pap. 382: 113 p. In FAO glossary

#### **Large marine ecosystem (LME)**

Region of ocean space encompassing coastal areas from river basins to estuaries to the seaward boundary of continental shelves and seaward margins of coastal current systems. They are relatively large regions, characterized by distinct bathymetry, hydrography, productivity and trophically linked populations. Mediterranean and Black Sea constitute two different LME, identified by numbers 26 and 62.

Global Biodiversity Assessment, V.H. Heywood, R.T. Watson, Cambridge University Press, 1995

#### **Latent capacity**

Fishing capacity that is not currently deployed in a fishery. Commonwealth of Australia (1997): <http://www.brs.gov.au/fish/gloss.html>. In FAO glossary.

#### **Leisure fishing**

Recreational fishing practiced for pleasure from the coast or a boat Report of the 10th meeting of the Sub-committee on Economic and Social Sciences (CESS) Malaga, Spain, 30 November-3 December 2009

#### **Length Overall (LOA)**

The principle longitudinal dimension (in metres) of the hull of the vessel.

Report of the 10<sup>th</sup> meeting of the Sub-Committee on Statistics and Information (SCSI) Malaga, Spain, 30 November-3 December 2009

#### **Length of net**

The sum of the length of the nets deployed whether connected or deployed separately, i.e., total length of gear deployed Report of the ninth session of the Sub-Committee on Statistics and Information (SCSI). Antalya, Turkey, 13–16 October 2008

#### **Length or age at first maturity**

Length or age at which 50% of the individuals of a given sex (normally females) are considered to be reproductively mature (L50 and A50). It is usually estimated by fitting a logistic curve to the relationship between proportion mature and length or age.

#### **Lessepsian migration**

Migration between the Red sea and the Mediterranean by way of the Suez canal.

A dictionary of Ecology, Evolution and systematics, R.J. Lincoln, G.A. Boxshall, P.F. Clark, Cambridge University Press, 1986

#### **License limitation**

Legally restricting the number of commercial fishermen licensed to fish. Often a management agency uses this as a means of limited entry.

Roberts, K.J. et al., 1995. Defining fisheries: a user's glossary. Louisiana State University, Louisiana, USA, 22 p. (Rev.). In FAO glossary.

#### **License or permit**

A document giving the producer the right to operate in a fishery according to the terms established by the regulating authority. OECD (1996), Synthesis report for the study on the economic aspects of the management of marine living resources. AGR/FI(96)12. In FAO glossary.

#### **Limit Reference Point (LRP)**

Indicates the state of a fishery and/or a resource which is not considered desirable. Fishery development should be stopped before reaching it. If a LRP is inadvertently reached, management action should severely curtail or stop fishery development, as

appropriate, and corrective action should be taken. Stock rehabilitation programmes should consider an LRP as a very minimum rebuilding target to be reached before the rebuilding measures are relaxed or the fishery is re-opened.

Precautionary approach to fisheries, FAO Fisheries Technical Paper, Part 1, Rome, FAO, 1995, Part. 2, 1996.

#### **Limited entry fishery**

Fishery where the number of operators (and size of boats) is restricted through license limitation or quota systems, to control the amount of fishing effort. It frequently involves controls on the number and size of vessels, and conditions relating to the transfer of fishing rights or the replacement of vessels.

Modified from Commonwealth of Australia (1997): <http://www.brs.gov.au/fish/gloss.html>. In FAO glossary.

#### **Littoral zone**

The shallow water region with light penetration to the bottom. Typically occupied by rooted plants.

Odum E.P.(1959) Fundamentals in ecology, 2nd Edition, Philadelphia, Saunders Co: p. 53. In FAO glossary.

#### **Livelihood**

A livelihood comprises the capabilities, assets (including both material and social resources) and activities required for a means of living. A livelihood is sustainable when it can cope with and recover from stresses and shocks and maintain and enhance its capabilities and assets both now and in the future, while not undermining the natural resource base.

Carney D. (Ed.)(1998): Sustainable rural livelihoods: What contribution can we make? UK Department for International Development (DFID). In FAO glossary.

#### **LME**

Large marine ecosystem

#### **LOA**

Length overall

#### **Logbook**

An official record of a fishing vessels fishing operations (including location and time of catches, gear configuration, nominal effort used, size samples, etc.). Logbooks are mandatory in some States. In ICCAT glossary.

#### **Longline**

A number of connected lines, either set at the bottom or drifting, each bearing a large number of baited hooks. a static or drifting fishing gear made up of a main line and secondary lines ( branch lines) bearing each one a hook. they may be set anchored to the bottom (bottom longline, anchored line) or close to the surface (drifting or anchored).

#### **Longlining**

Fishing method or métier using longline

#### **M**

Natural mortality rate

#### **Main associated exploited resources**

The species or species group exploited as by-catch in association with target species. This can also be called by-catch of commercial value.

Report of the ninth session of the Sub-Committee on Statistics and Information (SCSI). Antalya, Turkey, 13–16 October 2008

#### **Main line**

The line of a string to which the branchline (snoods) are attached.

#### **Management**

The art of taking measures affecting a resource and its exploitation with a view to achieving certain objectives, such as the maximization of the production of that resource. Management includes, for example, fishery regulations such as catch quotas or closed seasons. Managers are those who practice management.

Cooke, J.G. (1984), Glossary of technical terms. In Exploitation of Marine Communities, R.M. May (ed), Springer-Verlag. In FAO

[glossary..](#)

#### **Management authority**

The legal entity which has been assigned by a State or States with a mandate to perform certain specified management functions in relation to a fishery, or an area (e.g. a coastal zone). Generally used to refer to a state authority, the term may also refer to an international management organisation.

[FAO \(1998\): Guidelines for the routine collection of capture fishery data. FAO Fish. Tech. Pap. 382: 113 p. In FAO glossary.](#)

#### **Management objective**

A formally established, more or less quantitative target that is actively sought and provides a direction for management action.

[FAO \(1997\): Fisheries management. FAO Technical Guidelines for Responsible Fisheries, 4: 82 p. In FAO glossary.](#)

#### **Management organization**

An institution or arrangement established (usually between two or more States) to be responsible for activities related to fisheries management, including consultation between parties to the agreement or arrangement, formulation of the fishery regulations and their implementation, allocation of resources, collection of information, stock assessment, as well as monitoring, control and surveillance (MCS).

[In FAO glossary.](#)

#### **Management procedure**

A description of the data to collect, the way to analyse it, and the way to translate the analysis into actions.

[FAO \(1995\). Global and national soils and terrain digital databases \(Soter\): Procedures Manual. FAO World Soil Resources Report, 74 Rev.1. In FAO glossary.](#)

#### **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.

[In FAO glossary.](#)

#### **Management Strategy**

The strategy adopted by the management authority to reach established management goals. In addition to the objectives, it includes choices regarding all or some of the following: access rights and allocation of resources to stakeholders, controls on inputs (e.g. fishing capacity, gear regulations), outputs (e.g. quotas, minimum size at landing), and fishing operations (e.g. calendar, closed areas and seasons). COMMENT The management strategy may also include control laws establishing formally the course of management action in relation to stock or fishery indicators. A precautionary management strategy takes uncertainty into account in order to reduce the probability of negative outcomes.

[In FAO glossary.](#)

#### **Marginal cost of effort**

The incremental cost incurred by applying one additional unit of fishing effort.

[OECD \(1996\), Synthesis report for the study on the economic aspects of the management of marine living resources. AGR/FI\(96\)12. In FAO glossary.](#)

#### **Marginal revenue (of effort)**

The incremental revenue generated by applying one additional unit of effort.

[OECD \(1996\), Synthesis report for the study on the economic aspects of the management of marine living resources. AGR/FI\(96\)12. In FAO glossary.](#)

#### **Marginal yield**

The increase in yield obtained by an increase in fishing effort (or fishing mortality) by one unit. In mathematical terms, it is given by the slope of the tangent to the relationship between Effort and Yield (or between Fishing mortality and Yield-per-recruit).

[Gulland J.A and L.K. Boerema \(1973\) : Scientific advice on catch levels. Fishery Bulletin, 71 \(2\): 325-335. In FAO glossary.](#)

#### **Marine habitat**

Marine area distinguished by its geographical, abiotic and biotic characteristics.

#### **Marine Protected Area (MPA)**

A marine reserve, park or other area protected from uncontrolled human access and use by application of various restrictions and activities, development and exploitation. They are defined as Marine Reserves, Parks or with other appellations depending on their characteristics.

#### **Marine refuge**

Area not affected by human interference which may act as "reservoir" from which commercial exploited stocks are replenished.

#### **Maturity**

Refers to the ability, on average, of fish of a given age/length to complete the gametes ripeness in order to be ready for spawning. Maturity is expressed, normally, in percentage of individuals in mature stage by age/size (represented as a "maturity ogive"). It is often used to compute spawning potential.

[Modified from ICCAT glossary.](#)

#### **Maximum Economic Yield (MEY)**

When relating total revenues from fishing to total fishing effort in a surplus production model, the value of the largest positive difference between total revenues and total costs of fishing (including the cost of labour and capital) with all inputs valued at their opportunity costs. COMMENT The MEY is obtained when marginal costs of fishing effort are equal to marginal revenues. It is equal to the maximum rent obtainable from the fishery. The maximum (sustainable) amount of economic benefits, measured as the sum of net benefits to producers and consumers, and resource rent. Under static conditions (deterministic, no discounting), the yield for which average revenue equals long term marginal cost. Actually a social (societal) maximum often equated with maximum rent.

[In FAO glossary.](#)

#### **Maximum Sustainable Yield (MSY)**

The largest annual catch that may be taken from a stock every year without affecting the catch of future years; a constant long-term MSY is not a reality in most fisheries, where stock sizes vary with the strength of the year class moving through the fishery.

#### **MCS**

Monitoring, Control, and Surveillance. Activities undertaken by the fishery enforcement system to ensure compliance with fishery regulations.

[In FAO glossary.](#)

#### **Mechanized pole-line; jigging line**

Fishing techniques for vertical longline or troll line using winche(s) and automatization system able to reproduce the actions of moving down the line, bringing the fish and releasing it on board.

#### **Mesh**

The openings in a piece of netting bounded by the material from which the netting is made. the geometric form may diamond, square or hexagonal

#### **Mesh diamond mesh, square mesh, tnt**

#### **Mesh length**

For knotted netting, the distance between the centres of two opposite knots in the same mesh when fully extended in the N direction. for knotless netting, the distance between the centres of two opposite joints in the same mesh when fully extended along the longest possible axis.

#### **Mesh selection**

The selection of size of fish by the ability of the fish to pass through or be held by the net meshes.



Pope, 1975

**Mesh size**

The size of holes in fishing net. Minimum mesh sizes are often prescribed by regulations in order to avoid the capture of the young of valuable species before they have reached their optimal size for capture. see opening mesh size, mesh length, bar mesh size  
Cooke, J.G. (1984), Glossary of technical terms. In Exploitation of Marine Communities, R.M. May (ed), Springer-Verlag. In FAO glossary.

**Metamorphosis**

Process in which the post-larvae lose the specialised larval features, acquiring definitively the meristic characteristics of the species and the general appearance of adults, becoming a juvenile.

**Métier**

Activity practised by a fishing unit and defined, by the fishing gear, the target species and the area.

**Metric ton (or tonne)**

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

**MEY**

Maximum Economic Yield.  
In FAO glossary.

**Migration**

Systematic (as opposed to random) movement of individuals of a stock from one place to another, often related to season. A knowledge of the migration patterns helps in targeting high concentrations of fish and managing shared stocks.  
In FAO glossary.

**Minimum Landing Size (MLS)**

Minimum legal size

**Minimum legal size**

Size of a species or group of species in lower part of which are prohibited storage on board, the transshipment, transport, the unloading and marketing

**Minimum Mesh Size**

The smallest size of mesh permitted in nets and traps; to allow smaller individuals than a defined size to escape unharmed.

**Mobile gear**

**Modal length**

The optimal fish length for what the maximum of specimen are caught by a given mesh size or hook size.

**Moderately exploited**

The fishery is exploited at levels of yield and of F lower but close to the optimal values of yield and F (F<sub>0.1</sub> from Y/R or FMSY) and believed to have some limited potential for fishery expansion.  
Adapted from the definition from the stock assessment forms. FAO Marine Resources Service, Fishery Resources Division, Review of the state of the world marine fishery resources. FAO Fisheries Technical Paper. No 457. Rome, FAO. 235 pp.

**MPA**

Marine Protected Area

**MSY**

Maximum Sustainable Yield.  
In FAO glossary.

**Natural Mortality Rate**

The part of the total mortality rate that is due to causes other than fishing (e. g., predation, disease, cannibalism, and perhaps increasingly, environmental degradation such as pollution). 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, and

values are often assumed based on life history characteristics such as longevity. Also, M values are often assumed to remain constant through time and by age.

In ICCAT glossary.

**NEI**

Not Elsewhere Included. In fisheries catch statistics, refers to catch data that cannot be linked directly to a State or fishing entity, for whatever reason.  
In FAO glossary.

**Nekton**

Those actively swimming pelagic organisms able to move independently of water currents; typically within the size range 20 mm-20 m. nektonic; cf. Plankton.

A dictionary of Ecology, Evolution and systematics, R.J. Lincoln, G.A. Boxshall, P.F. Clark, Cambridge University Press, 1986

**Neritic**

Pertaining to the shallow waters overlying the continental shelf; cf. Oceanic.

A dictionary of Ecology, Evolution and systematics, R.J. Lincoln, G.A. Boxshall, P.F. Clark, Cambridge University Press, 1986

**Net panel braided twisted**

**Netting**

A meshed structure of indefinite shape and size a) composed of one yarn or of one or more systems of yarns interlaced or joined, or b) obtained by other means, for example by stamping or cutting from sheet material or by extrusion

**Nominal catch**

The sum of the catches that are landed (expressed as live weight equivalent). Nominal catches do not include unreported discards.  
Northeast Fisheries Centre (1997): [http://www.wh.who.edu/homepage/tech\\_terms.html](http://www.wh.who.edu/homepage/tech_terms.html). In FAO glossary.

**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.

Restrepo V. (1999): Annotated Glossary of Terms in Executive Summary Reports of the International Commission for the Conservation of Atlantic Tunas' Standing Committee on Research and Statistics (SCRS). ICCAT. In FAO glossary.

**Non-native species**

Introduced species

**Non-retained catch**

Part of the catch that is discarded and returned to the sea (or eaten on board by the crew or distributed to the crew for particular-personal use).

**Normal profits**

Profits that yield a competitive return on investment and cover the opportunity cost of productive inputs. In equilibrium tend to zero.  
In FAO glossary.

**Number of fishing sets**

Number of fishing operations, i.e. the number of times the fishing gear is deployed and recovered  
Report of the ninth session of the Sub-Committee on Statistics and Information (SCSI). Antalya, Turkey, 13–16 October 2008

**Number of fishing trips**

The number of outings of a vessel from port to carry out fishing operations  
Report of the ninth session of the Sub-Committee on Statistics and Information (SCSI). Antalya, Turkey, 13–16 October 2008

**Oceanic**

Pertaining to the open ocean waters beyond the edge of the

continental shelf; cf. Neritic.

A dictionary of Ecology, Evolution and systematics, R.J. Lincoln, G.A. Boxshall, P.F. Clark, Cambridge University Press, 1986

#### **Offshore waters**

Waters located well beyond the shores (beyond the edge of the nearshore or inshore waters). Are parts of the oceanic environment. In FAO glossary.

#### **Open access resources**

A condition of a fishery in which anyone who wishes to fish may do so COMMENT Open access resources can result from the breaking down of common property resource management institutions or from the privatization or nationalization of common resources. Because these resources are freely available or at minimal costs, they are frequently over-exploited and degraded Recreational fisheries are usually open access Australian Government Publishing Service (1991): Ecologically Sustainable Development Working Groups Final Report – Fisheries, Canberra, 202 p. In FAO glossary.

#### **Opening mesh size**

For the knotted netting, the inside distance between two opposite knots in the same mesh when fully extended in the N-direction (the general course of the netting yarn/ or the direction of the longest possible mesh axis). for knotless netting, the inside distance between two opposite joints in the same mesh when fully extended along its longest possible axis.

#### **Operational Unit**

Within the context of managing fishing effort by Geographical Sub-Area(s), an Operational Unit is a group of fishing vessels which are engaged in the same type of fishing operation within the same GSA, targeting the same species or group of species and belonging to the same economic segment. Fishing vessels may belong to more than one Operational Unit and the composition of Operational Units is subject to change over time.

#### **Opportunistic fishing**

Characterizes a type of adaptive fishing behaviour in which the fishing unit targets species and fishes in areas where fishing opportunities are greatest. In FAO glossary.

#### **Opportunity cost**

Defined as the benefit foregone by using a scarce resource for one purpose instead of its next best alternative. Typically applied to capital and labour inputs to reflect their real costs to society as against their costs to a private entrepreneur which may be lower or higher because of subsidies, taxes and various kinds of market distortions.

Gittinger, J.P. (1992). Economic Analysis of Agricultural Projects, Second Edition. The Economic Development Institute of the World Bank. The John Hopkins University Press. Baltimore and London 505p. In FAO glossary.

#### **Optimum age or critical age**

The average age of the fish of a year-class at which the instantaneous rate of natural mortality equals the instantaneous rate of growth in weight for the year-class as a whole. At this age, the biomass of the age class is maximum. In FAO glossary.

#### **Optimum size or critical size**

The average size of the fish in a year-class at the time when the instantaneous rate of natural mortality equals the instantaneous rate of growth in weight for the year-class as a whole. At this size, the biomass of the age class is maximum. In FAO glossary.

#### **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”. In FAO glossary.

#### **Otolith**

One of the ear bones of a fish. Otoliths are used for ageing fish of many species. Especially for temperate species, regular events lay down on these hard structures clearly recognizable marks. Sometimes age reading is not possible without previous preparation (cutting, burning and colouring, etc.).

#### **OU**

Operational Unit

#### **Output controls**

Management instruments aimed at directly limiting fish catch or landings through Total Allowable Catch and quotas. In FAO glossary.

#### **Overall mortality rate**

An average mortality rate calculated over several (length or age) classes. There are two main kind of such rates: an average of rates of several classes weighted by the time they have acted. For example, the overall total mortality of the length classes  $m$  to  $n$  ( $m < n$ ) is weighted by the time that the class is present (' $t_i$ )

$$\bar{Z}_{mm} = \frac{\sum_{i=m}^n Z_i \Delta t_i}{\sum_{i=m}^n \Delta t_i}$$

When working with age classes, such an overall mortality is simply the average (all residence times are equal).

An average of rates of several classes weighted by the number of individuals they have acted on.

$$\bar{F}_{mm} = \frac{\sum_{i=m}^n F_i \bar{N}_i}{\sum_{i=m}^n \bar{N}_i}$$

#### **Over-capacity**

See overcapitalization.

#### **Overcapitalization**

Where the amount of harvesting capacity in a fishery exceeds the amount needed to harvest the desired amount of fish at least cost. OECD (1996). Synthesis report for the study on the economic aspects of the management of marine living resources. AGR/FI(96)12. In FAO glossary.

#### **Overexploited.**

The fishery is being exploited close to  $F_{max}$  from Y/R or higher than FMSY. Advices to decrease the fishing mortality must be given

Adapted from the definition from the stock assessment forms. FAO Marine Resources Service, Fishery Resources Division, Review of the state of the world marine fishery resources. FAO Fisheries Technical Paper, No 457. Rome, FAO, 235 pp.

#### **Overfishing or overexploitation**

The term generally means that the fishing mortality being exerted is too high. In many fisheries the term is used when  $F$  have been estimated to be above a limit biological reference point that is used as the signpost that defines “overfishing”. Different kinds of overfishing are reported: growth overfishing, recruitment overfishing, ecosystem overfishing and economic overfishing. Modified from ICCAT glossary.

#### **PA**

Precautionary approach

#### **Pelagic**

Species that spend most of their life swimming in the water column with little contact with or dependency on the bottom. Modified from FAO glossary

**Pelagic fishery**

Fishery targeting on pelagic species.

**Plan**

Amplification of the strategy showing the precise means by which objectives will be reached: the policy instruments to be employed; the financial and human resources required; and the time frame for implementation.

Scialabba N. (ed.), 1998. Integrated Coastal Area Management and Agriculture, Forestry and Fisheries. FAO Guidelines: 256 p. In FAO glossary.

**Plankton**

Those organisms that are unable to maintain their position or distribution independent of the movement of water. Cf. Nekton. A dictionary of Ecology, Evolution and systematic, R.J. Lincoln, G.A. Boxshall, P.F. Clark, Cambridge University Press, 1986

**Plateau**

A flat or nearly flat area of considerable extent, dropping off abruptly on one or more sides.

IHO/IOC (1985), Standardization of undersea feature names: guidelines, proposal form, terminology. International Hydrographic Bureau, Monaco. In FAO glossary.

**Plus group or plus class**

The last age or size class which includes all the greater, or more aged, individuals than the nominal number of the class. It is usually marked by the symbol +. Ex. Age class 5+ contains all individuals aged 5 or more.

**Pole and line**

Mobile fishing gear using a hook with or without live bait or lure attached to the line of a pole

**Policy**

A fisheries policy is the definite course or method of action, selected from among different alternatives, by a government or its mandated fisheries authority, in light of given conditions including legal and constitutional constraints, to guide and determine present and future development and management actions towards satisfaction of agreed objectives.

Webster Dictionary. In FAO glossary.

**Population**

A group of interbreeding organisms that represents the level of organization at which speciation begins

In FAO glossary.

**Post-larvae**

Well developed fish larvae in which the processes of rays ossification and urostyle flexion are in an advanced stage. More developed post-larvae have enough swimming capacity to be considered micronekton, presenting in some cases schooling behaviour and/or settling to the bottom. This stage finishes with the metamorphosis.

**Power of auxiliary engine(s) (if any)**

Includes all installed engine power not included under the heading "Power of the main engine(s)"

Fleet Register workshop

Report of the 10<sup>th</sup> meeting of the Sub-Committee on Statistics and Information (SCSI) Malaga, Spain, 30 November-3 December 2009

**Power of the main engine(s)**

Total maximum continuous rated output power in Kw of all the vessel's main propulsion machinery which appears on the vessel's certificate or registry or other official document (STCW-F convention).

Report of the 10<sup>th</sup> meeting of the Sub-Committee on Statistics and Information (SCSI) Malaga, Spain, 30 November-3 December 2009

**Precaution**

An action taken in advance to protect against possible danger or failure; a safeguard. Caution practised in advance. Forethought or

circumspection" (Houghton Mifflin, 1992). Action taken in advance of scientific certainty but within the bounds of scientific uncertainty, to avoid or minimize negative impact, taking into account the potential consequences of being wrong.

Precautionary approach to fisheries. FAO Fisheries Technical Paper, Part 1. Rome, FAO, 1995, Part. 2. 1996.

**Precautionary approach (PA)**

Set of measures taken to implement the Precautionary principle. 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.

García, S. M. 1996. The Precautionary approach to Fisheries and its implications for fishery research, technology and management: An update review. FAO Fish. Tech. Pap. 350.2:1-76.

**Precautionary Reference Points (PRP)**

They are estimated values 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. Two types of PRP 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 stock can produce maximum sustainable yield. Target reference points are intended to meet management objectives.

**Predator-prey relationship**

The interaction between a species (predator) that eats another species (prey). The stages of each species' life cycle and the degree of interaction are important factors.

Roberts, K.J. et al., 1995, Defining fisheries: a user's glossary. Louisiana State University, Louisiana, USA, 22 p. (Rev.). In FAO glossary.

**Present value**

The value of an enterprise at the present time, after applying the process of discounting to its costs or benefits.

FAO (1993), Guidelines for land-use planning. FAO Development Series .1. In FAO glossary.

**Primary production**

Assimilation (gross) or accumulation (net) of energy and nutrients by green plants and by organisms that use inorganic compounds as food.

In FAO glossary.

**Primary productivity**

The rate at which energy is stored (i.e. the amount of energy fixed in a given time) by photosynthetic and chemosynthetic activity of producer organisms (chiefly green plants) in the form of organisms substances which can be used as food materials). Values are expressed in grams of dry organic matter (or carbon) produced per square meter per day.

Odum E.P.(1959) Fundamentals in ecology, 2nd Edition, Philadelphia, Saunders Co: p. 53. In FAO glossary.

**Priority species**

Species considered of interest of the GFCM in the Region. The interest criteria will be based on the volume of landings and economic importance of the species.

**Production (biomass)**

The total living matter (biomass) produced by a stock through growth and recruitment in a given unit of time (e.g. daily, annual production). The "net production" is the net amount of living matter added to the stock during the time period, after deduction of biomass losses through mortality. The total elaboration of new body substance in a stock in a unit of time, irrespective of whether or not it survives to the end of that time. Also called: net production (Clarke et al. 1946) or total production.

Ricker W.E. (1975). Computation and interpretation of biological statistics of fish populations. Bulletin of the Fisheries Research Board of Canada, 191: 2-6. In FAO glossary.

**Production (fishing)**

Total annual catch in weight.

**Production model**

Population model that describes, using simple functions, how the population biomass changes from year to year as a function of fishing mortality. Usually they are adjusted (fitting is made) using annual catch and effort data. Also: global model, catch-effort model, surplus production model  
Cadima E.L., and M.R. Pinho. 1996. Some theoretical considerations on nonequilibrium production models. SCRS/95/123. In ICCAT glossary.

**Productivity**

In general, quantity of weight or value obtained using an unit of input (i.e. labour, vessel, Capacity (GT), Engine Power (HP), etc.)

**Productivity**

Relates to the birth, growth and death rates of a stock. A highly productive stock is characterized by high birth, growth and mortality rates, and as a consequence, a high turn-over and production to biomass ratios (P/B). Such stocks can usually sustain higher exploitation rates and, if depleted, could recover more rapidly than comparatively less productive stocks.  
In FAO glossary.

**Profit**

See Benefit

**Projection**

A computation of how the stock and fishery will behave in the future. Projections are made to address "what-if" questions of relevance to management. Short-term (1-4 years) projections are typically used in support of decision-making on quotas. Longer term projections become much more uncertain in terms of absolute quantities, because predicted recruitment tends to dominate the results and recruitment itself is very difficult to predict. For this reason, long-term projections are more useful to evaluate overall management strategies than for making detailed decisions.  
In ICCAT glossary.

**Property right**

A legal right or interest in respect to a specific property. A type of resource ownership by an individual (individual right) or a group (communal right).  
In FAO glossary.

**Property rights regimes**

A subset of institutions; bundles of entitlements that define owners' rights and duties, and the rules under which those rights and duties are exercised.  
Bromley, D.W. (1989), Economic interests and institutions: the conceptual foundations of public policy. Basil Blackwell, Oxford, UK. In FAO glossary.

**Protected area**

A geographically defined area which is designed and managed to achieve specific conservation objectives.  
Convention on Biological Diversity (1994): Convention on Biological Diversity – Convention Text. Article 2: Use of terms. In FAO glossary.

**Purse seine**

A single-panel multi-sectioned net used to encircle pelagic fish (or mid-water fish as seabream), the bottom of which is closed by the means of a purse cable (purse line) drawn through a series of rings

**Quota**

A share of the Total Allowable Catch (TAC) allocated to an operating unit such as a country, a vessel, a company or an individual fisherman (individual quota) depending on the system of allocation. Quotas may or may not be transferable, inheritable, and tradable. While generally used to allocate total allowable catch, quotas could be used also to allocate fishing effort or biomass.  
In FAO glossary.

**Rate of exploitation**

The fraction, by number, of the fish in a population at a given time, which is caught and killed by man during the year immediately following (= F/Z when fishing and natural mortality are concurrent). The term may also be applied to separate parts of the stock distinguished by size, sex, etc. Also called: fishing coefficient (Heincke).

Ricker W.E. (1975): Computation and interpretation of biological statistics of fish populations. Bulletin of the Fisheries Research Board of Canada, 191: 2-6. In FAO glossary.

**Recovering**

Abundances and catches are again increasing after having been depleted

Definition from the stock assessment forms.

FAO Marine Resources Service, Fishery Resources Division, Review of the state of the world marine fishery resources. FAO Fisheries Technical Paper. No 457. Rome, FAO. 235 pp.

**Recreational fishing**

Non commercial fishing activities exploiting marine living aquatic resources. For Mediterranean fisheries management purposes it comprises four independent segments: leisure, sport, underwater and charter fisheries.

Report of the 10th meeting of the Sub-committee on Economic and Social Sciences (SCESS) Malaga, Spain, 30 November-3 December 2009

**Recruitment**

The amount of fish at the beginning of a given phase. The classic approach distinguishes the recruitment at the fishing ground (for example, presence in a specific habitat exploited by fishing) from the recruits at fishing (for example, presence in the capture of specific gear) based on the type of fishing and gear used.  
From Beverton & Holt, 1957

**Recruitment overfishing**

The rate of fishing above which the recruitment to the exploitable stock becomes significantly reduced. This is characterised by a greatly reduced spawning stock, a decreasing proportion of older fish in the catch and generally very low recruitment year after year. Recruitment overfishing can lead to stock collapse.  
In ICCAT glossary.

**Reference point**

A reference point indicates a particular state of a fishery or corresponding to a situation considered as desirable (Target reference point, TRP) or undesirable and requiring immediate action (Limit reference point, LRP, and Threshold reference point, ThRP)  
Garcia S.M. (1997). In FAO glossary.

**Regional**

In the context of the GFCM means Mediterranean and Black Sea.

**Regional Fisheries Body (RFB)**

A group of States or organizations that are parties to an international fishery arrangement working together towards the conservation and management of fish stocks.  
FAO website

**Rent**

In a fishery, difference between the total revenues obtained from the fishery resource and the total costs of production, i.e. capital and labour valued at their opportunity costs (see Opportunity costs). The total costs of production include a reasonable profit and the rent is often considered as a "surplus" profit, over and above what would be considered a "normal" rate of return. For this reason, the decision as to who gets the rent (e.g. the society, the management authority, or the fishermen) remains a key policy issue.  
In FAO glossary.

**Resilience (ecological resilience)**

Capacity of a natural system (fisheries community or ecosystem) to recover from heavy disturbance such as intensive fishing.  
United Nations (1997): Glossary of Environment Statistics. Studies in Methods, Series F, No. 67. In FAO glossary.

**Resource**

Fishery resource

**Responsible fisheries**

The concept of Responsible Fisheries “encompasses the sustainable utilisation of fishery resources in harmony with the environment; the use of capture and aquaculture practices which are not harmful to ecosystems, resources and their quality; the incorporation of added value to such products through transformation processes meeting the required sanitary standards; the conduct of commercial practices so as to provide consumers access to good quality products.

FAO (1995). Global and national soils and terrain digital databases (Soter): Procedures Manual. FAO World Soil Resources Report, 74 Rev.1. In FAO glossary.

**Retained catch or landing**

Catch that is landed by a fishing vessel.

**Revenue**

Economic income of the fishermen basically obtained from fish sales

**RFB**

Regional Fisheries Body

**Risk**

The probability of something undesirable happening (note that when a technical definition in a decision theoretic framework is needed, it would be appropriate to use the terms “expected loss” or “average forecasted loss”, not risk).

Precautionary approach to fisheries, FAO Fisheries Technical Paper. Part 1. Rome, FAO. 1995, Part. 2. 1996.

**Risk assessment**

Component of risk management which comprises all processes concerned with identification, estimation and qualitative and quantitative evaluation of risks. Risk assessment consists of hazard identification, hazard assessment, risk estimation and risk reduction.

(ISO (1996) Choudhury K. and L.J.M. Jansen (1999): Terminology for Integrated Resources Planning and Management. FAO, Rome, Italy: 69 pages. In FAO glossary.

**Risk management**

The process of evaluating and selecting regulatory and non-regulatory responses to risk. The selection process necessarily requires the consideration of legal, economic, and behavioural factors.

ISO (1996) in Choudhury K. and L.J.M. Jansen (1999): Terminology for Integrated Resources Planning and Management. FAO, Rome, Italy: 69 pages. In FAO glossary.

**Round weight**

The weight of the whole fish before processing or removal of any part.

FAO (1998): Guidelines for the routine collection of capture fishery data. FAO Fish. Tech. Pap. 382: 113 p. In FAO glossary.

**Sampling design**

The sampling design of a scientific survey refers to the statistical techniques and methods adopted for selecting a sample and obtaining estimates of the survey variables from the selected sample.

FAO (1998): Guidelines for the routine collection of capture fishery data. FAO Fish. Tech. Pap. 382: 113 p. In FAO glossary.

**SCI (Site of Community Importance)**

Defined in the European Commission Habitats Directive (92/43/EEC) as a site which, in the biogeographical region or regions to which it belongs, contributes significantly to the maintenance or restoration at a favourable conservation status of a natural habitat type or of a species and may also contribute significantly to the coherence of Natura 2000, and/or contributes significantly to the maintenance of biological diversity within the biogeographic region or regions concerned

**Scientific Survey**

In Fisheries research, a fishery-independent survey is designed scientifically to achieve a given objective. For instance, a scientific survey, due to its standardised methodology, can produce an abundance index that is not affected by changes in catchability due to changes in gear technology.

Modified from ICCAT glossary.

**Seasonal closure**

Closed season. The banning of fishing activity (in an area or of an entire fishery) for a few weeks or months, to protect juveniles or spawners.

In FAO glossary.

**Selection range**

The range of length of fish between the 25 and 75 percent retention lengths on the selection curve

Pope, 1975

**Selection range**

Value corresponding to the Difference between L75-L25 of a gear selection model.

**Selective fishing**

Fishing method's ability to target and capture organisms by size and species during the fishing operation allowing non-targets to be avoided or released unharmed.

FAO

**Selectivity**

The relative vulnerability of different age or size classes to the fishing gear, expressed as probability of retention. Selectivity and exploitation patterns are often used interchangeably.

Modified from ICCAT glossary.

**Selectivity curve**

The curve of probability or percentage of fish retained by length for any particular mesh size or hook size, the curve for trawl selectivity is usually in a "S" shape and symmetrical, in a close approximation to the integral of a normal curve or to the logistic curve.

Modified from Pope, 1975

**Sensitive habitat**

A habitat:

- Essential to the ecological and biological requirements of at least one of the life stages of the species;
- Crucial for the recovery and/or the long term sustainability of the marine biological resources and the assemblages to which the priority species belongs;
- Any other habitat of high biodiversity importance potentially impacted by fisheries activities;
- Any other habitat of high biodiversity importance potentially impacted by climate change

GCFM (2008) criteria for the identification of sensitive habitats of relevance for the management of priority Species. GFCM: SAC11/2008/Inf.20

**Sessile**

Permanently attached to a substratum, at least in adult form.

Non-native marine species in British waters: a review and directory. Edited by N. Clare Eno, Robin A. Clark & William G. Sanderson, JNCC, Peterborough, 1997

**Sex ratio**

The relative number of males and females in a population, expressed as the number of males per 100 females, or as a simple ratio.

A dictionary of Ecology, Evolution and systematics, R.J. Lincoln, G.A. Boxshall, P.F. Clark, Cambridge University Press, 1986

**SH**

Sensitive habitat

**Shadow price**

In economic analysis, this is any distortion of a free market price which is made in order to reflect the real scarcity value of foods or

services, including labour. An example of a shadow price is the elimination of the effect of taxes or subsidised.  
FAO (1993). Guidelines for land-use planning. FAO Development Series .1. In FAO glossary.

#### **Shared stock**

Stock fished by two or more countries.  
Webster Dictionary. In FAO glossary.

#### **Simulation**

The imitative representation of the functioning of one system or process by means of the functioning of another (e.g. a computer simulation of an industrial process).  
Webster Dictionary. In FAO glossary.

#### **Slicing**

Cohort slicing

#### **Small-scale fishery**

Small-scale fisheries can be broadly characterized as a dynamic and evolving sector employing labor intensive harvesting, processing and distribution technologies to exploit marine and inland water fishery resources. The activities of this sub-sector, conducted full-time or part-time, or just seasonally, are often targeted on supplying fish and fishery products to local and domestic markets, and for subsistence consumption. See artisanal fishery  
Poseidon Aquatic Ressources Management Ltd, 2006

#### **SPAMI**

Special protected area of Mediterranean interest. Protection figure defined by UNEP RAC/SPA

#### **Spatial closures**

Permanent or seasonal ban of fishing activities in an area.  
In FAO glossary.

#### **Spawning Stock Biomass (SSB)**

The total weight of the spawning stock. (Usually males and females combined, but sometimes female SSB, alone, is used.

#### **Sport fishing**

Recreational fishing practiced from the coast or a boat with competitive intentions, within an established institutional framework which sets clear rules, collects data on catches and informs the public on the outcomes of the competition  
Report of the 10th meeting of the Sub-committee on Economic and Social Sciences (CESS) Malaga, Spain, 30 November-3 December 2009

#### **Stakeholder**

A large group of individuals and groups of individuals (including governmental and nongovernmental institutions, traditional communities, universities, research institutions, development agencies and banks, donors, etc.) with an interest or claim (whether stated or implied) which has the potential of being impacted by or having an impact on a given project and its objectives. Stakeholder groups that have a direct or indirect "stake" can be at the household, community, local, regional, national, or international level.

FAO (1997): Fisheries management. FAO Technical Guidelines for Responsible Fisheries, 4: 82 p.) Choudhury K. and L.J.M. Jansen (1999): Terminology for Integrated Resources Planning and Management. FAO, Rome, Italy: 69 pages. In FAO glossary.

#### **Standardized**

Refers to quantities that have been adjusted to be directly comparable to a unit that is defined as the "standard" one. Nominal CPUE is standardised to remove the effect of factors that are known not to be related to abundance.  
In FAO glossary.

#### **States of Nature**

A description of a condition and dynamics of the resource and the fishery including parameters such as stock abundance, age structure, fishing mortality, the economic condition of the industry and the state of the environment.

Precautionary approach to fisheries. FAO Fisheries Technical Paper. Part 1. Rome, FAO, 1995, Part. 2, 1996.

#### **Static gear**

Include all gear types which are fixed to the bottom by the means of anchorage devices (grapnels) during all the catch process (soal time); They includes as well gillnet, longline as fixed trawl (chalut à l'étalage). Their catch mode is mainly passive (passive gears), at the opposite of mobile gears, which can be active (purse seine) or passive (troll line).

#### **Statistic**

The estimate of a parameter which is obtained by observation, and which in general is subject to sampling error.

Ricker W.E. (1975): Computation and interpretation of biological statistics of fish populations. Bulletin of the Fisheries Research Board of Canada, 191: 2-6. In FAO glossary.

#### **Statistical Division**

#### **Statistical model**

A component of an estimation model, that defines the criteria for how the observations are fitted. Statistical models include least squares, maximum likelihood, bayesian, and ad hoc procedures.  
Restrepo V. (1999): Annotated Glossary of Terms in Executive Summary Reports of the International Commission for the Conservation of Atlantic Tunas' Standing Committee on Research and Statistics (SCRS). ICCAT. In FAO glossary.

#### **Statistical Subarea**

#### **Status quo**

Can mean the general current state of affairs in a fishery, but in certain for a, such as ICES, it refers specifically to the current level of fishing mortality.

(Cooke, 1984). A status quo management scenario would be one in which no change in fishing mortality is projected. Cooke, J.G. (1984). Glossary of technical terms. In Exploitation of Marine Communities, R.M. May (ed), Springer-Verlag. In FAO glossary.

#### **Steady state**

Equilibrium

#### **Stock**

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

In FAO glossary

#### **Stock Assessment**

The application of statistical and mathematical tools to relevant data in order to obtain a quantitative understanding of the status of the stock as needed to make quantitative predictions of the stocks reactions to alternative future regimes.

In ICCAT glossary.

#### **Straddling stocks**

Stocks that move from the waters of one country to another.

#### **Substratum (pl. substrata)**

Surface available for colonisation by plants and animals; a more correct term in this context than 'substrate'.

Non-native marine species in British waters: a review and directory, Edited by N. Clare Eno, Robin A. Clark & William G. Sanderson, JNCC, Peterborough, 1997

#### **SURBA (Survey Based Assessment)**

A model derived from an analysis of survey data given by Cook (1997), it provides model based estimates of recruitment, SSB and total mortality.

Cook R. M.- 1997. Stock trends in six North Sea stocks as revealed by an analysis of research vessel surveys. ICES Journal of Marine Science, 54: 924-933. 1997

Needle, C.L. 2005. SURBA 3.0 Technical Manual (first draft) Fisheries Research Services, Marine Laboratory, Aberdeen. 10pp.

#### **Surface area of nets**

Total surface area of the nets deployed whether connected or

deployed separately

Report of the ninth session of the Sub-Committee on Statistics and Information (SCSI). Antalya, Turkey, 13–16 October 2008

#### **Sustainable catch or yield**

Equilibrium yield.

#### **TAC**

Total Allowable Catch.

#### **Tag**

A mark implanted on (or inside) a fish to be recovered when the fish is caught. Tagging data are used to learn about a species' biology (e.g. its growth and migrations) but also as auxiliary data for stock assessments (e.g. to calculate mortalities). More modern electronic tags can store information about the life conditions of the animal (archival tag) and may communicate their data by satellite (pop-up tags).

Restrepo V. (1999): Annotated Glossary of Terms in Executive Summary Reports of the International Commission for the Conservation of Atlantic Tunas' Standing Committee on Research and Statistics (SCRS). ICCAT. In FAO glossary.

#### **Tagging**

Marking an individual or group of individuals (e.g. by clipping a fin, injecting a die, inserting a tag) in order to identify it when it will be recaptured. Tagging allows the study of growth, mortality, migration as well as the estimation of the stock size.

In FAO glossary.

#### **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.

FAO (1998\*): Report of the FAO Technical Working Group on the Management of Fishing Capacity. FAO Fisheries Report No. 586. Rome, Food and Agriculture Organization of the United Nations. In FAO glossary.

#### **Target Reference Point**

A state of a fishery and / or a resource which is considered desirable.

Modified from FAO glossary. Garcia S.M. (1996)The precautionary approach to fisheries and its implications for fishery research, technology and management: An updated review. FAO Fish. Tech. Paper. 350.2: 1-76

#### **Target species**

One (or an assemblage of) species that are primarily sought by the fishermen in a particular fishery. The subject of a directed fishing effort in a fishery. [FAO glossary amended by SCSI]

Report of the 10<sup>th</sup> meeting of the Sub-Committee on Statistics and Information (SCSI) Malaga, Spain, 30 November-3 December 2009

#### **Target strength**

The ratio of received signal to transmitted signal from an object as at 1 m from the transmitter. Although it can be expressed in any units, it is convenient to express target strength in db reference 1 ìbar.

Cushing, D.H. (1968): A study in population dynamics. The University of Wisconsin Press. In FAO glossary.

#### **Technological creeping**

Increase of fishing capacity due to technological improvement and, in some cases, the reduction of its price.

#### **Technological interaction**

An interaction between fisheries resulting from the impact of one

fishery using a particular technology on another fishery, usually using a different technology but exploiting the same resources as target or bycatch. Because of their importance the cross-impact of various fleets targeting overlapping species groups must be assessed. Major source of failure in TACs and quotas management strategies for multispecies and multigear fisheries.

In FAO glossary.

#### **Technology transfer**

The introduction and adoption of new (usually more advanced) production methods and equipment already in use in other areas.

Commonwealth of Australia (1989): New directions for commonwealth fisheries management in the 1990s. A government policy statement. December 1989: 114 p. In FAO glossary.

#### **Threatened species**

Species that is likely to become extinct within the foreseeable future throughout all or part of its range and whose survival is unlikely if the factors causing numerical decline or habitat degradation continue to operate

Mediterranean SPA Protocol

#### **Threshold Reference Point or ThRP**

Indicates that the state of a fishery and/or a resource is approaching a target reference point (TRP) or a limit reference point (LRP), and that a certain type of action (usually agreed beforehand) needs to be taken. Fairly similar to a LRP in their utility, the ThRp specific purpose is to provide an early warning, reducing further the risk the LRP or TRP are inadvertently passed due to uncertainty in the available information or inherent inertia of the management and industry systems. Adding precaution to the management set-up, they might be necessary only for resources or situations involving particularly high risk

In FAO glossary. Garcia S.M. (1996)The precautionary approach to fisheries and its implications for fishery research, technology and management: An updated review. FAO Fish. Tech. Paper. 350.2:1-76

#### **ThRP**

Threshold Reference Point

#### **Time (as measure of effort)**

As effort parameter: days or hours (see days at sea and fishing days)

Report of the ninth session of the Sub-Committee on Statistics and Information (SCSI). Antalya, Turkey, 13–16 October 2008

#### **Tonne**

Metric ton

#### **Top-down management**

A process of management in which management information and decisions are centralized and resource users are kept outside the decision-making process. See bottom-up management

In FAO glossary. OECD (1996). Synthesis report for the study on the economic aspects of the management of marine living resources. AGR/FI(96)12.

#### **Total allowable catch (TAC)**

The TAC is the total catch allowed to be taken from a resource in a specified period (usually a year), as defined in the management plan. The TAC may be allocated to the stakeholders in the form of quotas as specific quantities or proportions

Australian Government Publishing Service (1991): Ecologically Sustainable Development Working Groups Final Report – Fisheries. Canberra, 202 p. In FAO glossary.

#### **Towed gear**

Mobile gear of which the catch mode needs that they are built to be towed manually (beach seine) or by the pull of one or two vessel (boat seine, trawl, dredge).

#### **Trade-off**

A balancing of factors all of which are not attainable at the same time (e.g. Maximum economic yield, and Maximum sustainable yield). A giving up of one thing in return for another. COMMENT Sustainability can be evaluated by the sum of the various social,

economic, and natural resources where the degree of use, exchange and trading among resources will vary according to the values given to each. The understanding of social dynamics and resource-use systems and the evaluation of related trade-offs, in terms of equity, productivity, resilience, and environmental stability, are useful to envision alternative development scenarios.  
Webster Dictionary. In FAO glossary.

#### **Traditional fisheries**

Fishing activities which have been passed on from generation to generation (e.g. Mediterranean tuna trap fishing)

#### **Traditional fishing zone**

A marine area in which a group of people living on the adjacent coast traditionally exert their fishing activities on which generally has exclusive right to fish on a subsistence basis.

#### **Trammel net**

Bottom set net which is made with three walls of netting, the two outer walls being of larger mesh size than the loosely hung inner netting panel. The fish get caught in a bag made by a portion of inner small meshed wall passing through one or several meshes of the outer walls

#### **Transition analysis**

Simulation of the evolution of a fishery after a change of management measures (technical or economic), such as total effort, exploitation pattern, subsidies, etc

#### **Trans-national fisheries**

Fisheries in which the same resources stock(s) crosses the EEZs of two or more countries

OECD

#### **Transshipment**

Portion of the catch which is unloaded from a fishing vessel to either another fishing vessel or to a vessel used solely for the carriage of cargo.

Report of the 10<sup>th</sup> meeting of the Sub-Committee on Statistics and Information (SCSI) Malaga, Spain, 30 November-3 December 2009

#### **Trap, pot**

Fishing gear designed to catch fish or crustaceans, in the form of cages or baskets made with various materials and with one or more openings or entrances.

#### **Trapnet, set net**

A fish apparatus consisting on a series of funnels, with their mouths kept open by hoops opening into each other and finally closing into a sack or a chamber forming a trap ( e.g. tuna trap net, fyke net)

#### **Trawl**

Towed net consisting of a cone-shaped body, closed by a bag or codend and extended at the opening by wings. It can be towed by one or two boats and according to the type, is used on the bottom or in midwater (pelagic).

#### **Trawl door**

Device which allow to hold open horizontally the wings and mouth of a trawl. their sires are fitted to the size of the trawl.

#### **Trawl survey**

A method to estimate biomass from measuring it through trawl fishing. Particularly used for demersals. It is considered a direct method for stock assessment.

#### **Trawling**

Towing fishing method or métier using trawl net

#### **Troll line**

Mobile fishing gear made up of single line (s) with baited hook or lure set and towed directly from the vessel or by the means of fish poles winged of each of the vessel. It can be mechanized.

#### **TROM**

Target resource-orientated management. Dominant fisheries management paradigm during the past 50 years at least, it consists to maintain the target resource base through various controls on the size and operations of the fishing activity.

FAO Fisheries Department. Fisheries management. 2. The ecosystem approach to fisheries. FAO Technical Guidelines for Responsible Fisheries. No. 4, Suppl. 2. Rome, FAO. 2003. 112 p.

#### **Trophic level**

Classification of natural communities or organisms according to their place in the food chain. Green plants (producers) can be roughly distinguished from herbivores (consumers) and carnivores (secondary Syn: Trophic group consumers).

United Nations (1997): Glossary of Environment Statistics. Studies in Methods, Series F, No. 67. FAO. In FAO Glossary.

#### **Tuna farming, tuna fattening or tuna ranching**

Capture-based aquaculture of bluefin tuna. Tuna farming involves the collection of wild fish, ranging from small to large specimens, and their rearing in floating cages for periods spanning from a few months up to 1-2 years. Fish weight increment or change in the fat content of the flesh is obtained through standard fish farming practices. Confinement of captured fish during short periods of time (2-6 months) aimed mostly at increasing the fat content of the flesh, which strongly influences the prizes of the tuna meat on the Japanese sashimi market, can also be referred to as 'Tuna fattening'. Future tuna farming practices may evolve to encompass a closed life cycle, i.e. the rearing of larvae in laboratory conditions".

#### **Tuning**

Mathematical procedure aimed at the obtention of a good agreement between the observed trends of abundance or effort derived from a sequential analysis (as VPA) with those proceeding from an independent time series. The choice of a suitable calibration model is very important, especially referred to the way it treats the VPA output that has to be suitable for its comparison with the data proceeding from the independent source.

#### **Tuning fleets**

Fleets used to tune the VPA. May be research vessels making regular surveys, or commercial fleets where fishing activity has been well quantified over a number of years.

#### **TURF**

Territorial use right in fisheries.

In FAO glossary.

#### **Turnover**

Biomass production rate. Production per unit of biomass (no dimensions). It is usually calculated within a time interval (p. ex. One year), and taking the average biomass over this interval, in this case the turnover is equivalent to a total mortality rate in terms of biomass. The turnover is often expressed in %.

#### **Uncertainty**

In general, the incompleteness of knowledge about the states and processes in nature. In statistics and risk analysis, refers to the estimated amount (or percentage) by which an observed or calculated value may differ from the true value.

FAO (1995a), Guidelines for responsible management of fisheries. In Report of the Expert Consultation on Guidelines for Responsible Fisheries Management, Wellington, New Zealand, 23-27 January 1995. FAO Fisheries Report, 519. In FAO glossary.

#### **Underexploited, undeveloped or new fishery**

The fishery is being exploited at a F value lower than the optimal ones (F0.1 from Y/R or FMSY) and believed to have a significant potential for fishery expansion

Adapted from the definition from the stock assessment forms.

FAO Marine Resources Service, Fishery Resources Division. Review of the state of the world marine fishery resources. FAO Fisheries Technical Paper. No 457. Rome, FAO. 235 pp.

#### **Undersized**

Refers to fish that are smaller than a minimum size limit established by regulation.



In ICCAT glossary.

#### **Underwater fishing**

Fishing activity practiced as a sport or for leisure by snorkeling techniques

Report of the 10th meeting of the Sub-committee on Economic and Social Sciences (CESS) Malaga, Spain, 30 November-3 December 2009

#### **Undeveloped fishery**

Underexploited fishery

#### **Unintentional catch**

Accidental catch

#### **Unit stock**

A homogeneous fish group that are subject to the same opportunities of growth and reproduction and to the same risks of natural and fishing mortality.

Hilborn and Walters (1992)

#### **Use Rights**

The rights held by individual fishers, fishing groups, fishing communities or companies to use the fishery resources. These may be in the form of rights to an amount of fishing effort (effort rights) or catch that can be taken in the fishery (harvest rights or harvest quotas). They can be defined by local custom, mutual agreements, or prescribed by other entities holding access rights. They may restrict the use of particular harvesting techniques.

CIFOR (1999): The CIFOR criteria and indicators generic template. Center for International Forestry Research : 53 p. In FAO glossary.

#### **Variable costs**

Costs that vary with the rate of output and input. In fisheries variable costs depends on amount of production and the fishing days

OECD (1996), Synthesis report for the study on the economic aspects of the management of marine living resources. AGR/FI(96)12. In FAO glossary.

#### **Vertical line**

Type of longline maintained vertically in the water column thanks to a buoy fixed to one of the extremity of the main line and a weight on the other. It may set anchored to the bottom or drifting in the current.

#### **Vertical net**

Gears including all types of nets held vertically in the water by floats and weights; they can be static or drift

#### **Vessel type**

Type of vessel according to the International Standard Classification of Fishery Vessels by Vessel Types.

The International Standard Statistical Classification of Fishery Vessels by Vessel Types (ISSCFV), based on the type of gear used by the vessels, approved by the CWP in 1984.

Report of the 10<sup>th</sup> meeting of the Sub-Committee on Statistics and Information (SCSI) Malaga, Spain, 30 November-3 December 2009

#### **Virgin Biomass (B<sub>0</sub> or K)**

Long-term average biomass value expected in the absence of fishing mortality. In production models, B<sub>0</sub> is also known as carrying capacity. It is a biological reference point.

In ICCAT glossary.

#### **VPA (Virtual Population Analysis)**

An algorithm for computing historical fishing mortality rate and stock size by age, based on catches by age or size, an assumption of a natural mortality, and certain assumptions about mortality for the last year and last age group. A VPA essentially reconstruct the history of each cohort, assuming that the observed catches are exact and known without error.

Modified from Powers J.E. and V.R. Restrepo 1992. Additional options for age-sequenced analysis. SCRS/91/040. In ICCAT Glossary.

#### **Vulnerability**

Component of the availability related to fish behaviour.

Laurec, A. and J.-C. Le Guen.- 1981. Dynamique des populations marines exploitées, Tome 1. Concepts et modèles. Publications du Centre National pour l'Exploration des Océans. CNEXO/Centre Oceanologique de Bretagne. Rapports Scientifiques et Techniques N°45. 117 pp.

#### **Warp**

Long flexible steel rope connecting vessel to the trawl gear.

#### **XSA**

Expanded Survivor Analysis, A stock assessment program based on VPA and tuning of abundance indices.

Darby, C. D. and S. Flatman. 1994. Virtual population analysis. Version 3.1 (Windows/DOS). User Guide. Information Technology Series, MAFF Directorate of Fisheries Research, Lowestoft (U.K.). 85 pp.

#### **Year class**

The fish spawned or hatched in a given year.

Ricker W.E. (1975): Computation and interpretation of biological statistics of fish populations. Bulletin of the Fisheries Research Board of Canada, 191: 2-6 See Age class. FAO. Yield per Recruit (Y/R)

#### **Yield**

Catch in weight.

In ICCAT glossary.

#### **Yolk-sac larvae**

Developmental stage comprised between hatching and the complete reabsorption of the yolk-sac.

#### **Z**

Total mortality rate. The sum of natural mortality and fishing mortality rates.

Restrepo V. (1999): Annotated Glossary of Terms in Executive Summary Reports of the International Commission for the Conservation of Atlantic Tunas' Standing Committee on Research and Statistics (SCRS). ICCAT. FAO.

#### **Zero opportunity costs**

Where the next best income alternative yields zero additional earnings.

OECD (1996), Synthesis report for the study on the economic aspects of the management of marine living resources. AGR/FI(96)12. In FAO glossary.