



STRATEGY FOR IMPROVING INFORMATION  
ON STATUS AND TRENDS OF CAPTURE  
FISHERIES



## Fisheries Inventory: Method and Guidelines

Management Summary		
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March 2005	A. Bensch E. Balestri	Inventory approach and definitions of attributes describing a fishery
January – February 2006	M. Taconet E. Balestri A. Bensch	Revision of the approach section Revision of the template
16 May 2007	E. Balestri M. Taconet	Revision of the inventory structure as evolving from the design of the internet based fisheries module and the need to systematically map data fields between Excel template and Fisheries schema. <small>This revision is stored in FisheriesInventoryGuidelines 04-07.doc</small>
06/01/2009	E. Balestri M. Taconet A. Gentile	Revision of the guidelines taking into account the fisheries module design and standards eventually approved by the 5 <sup>th</sup> FIRMS Steering Committee (July 2008) <small>This revision is stored in FisheriesInventoryGuidelines 01-09.doc</small>

## **INTRODUCTION**

This document describes the rationale, method and the template used to inventory marine fisheries in a specific area of the world. The delicate aspect of an inventory of fishery is to acquire and fix a good understanding of the scope, level of granularity and meaning of the fishery units to identify, and thereof to organize and structure the information in a consistent way. The present guidelines intend to provide the required background.

This inventory is connected (however not subordinated) to the developments taking place as part of the Fishery Resources Monitoring System<sup>1</sup> (FIRMS) initiative. In FIRMS, fisheries are inventoried for reporting purpose, and the inventories constitute the backbone of the FIRMS system. Each partner enumerates the list of Resources and Fisheries under its monitoring and/or management mandate, and the system organizes the reporting on status and trends according to these lists.

The inventory is implemented using an Excel format for initial data input where each row of the excel file describes an inventoried Fishery unit (see annex 1a). This fishery information is afterwards loaded using the FIGIS system and disseminated as a web fact sheet format (see annex 1b). The columns of the inventory provide the various FIRMS standard descriptors for each Fishery unit (e.g. fishery title, area names, area codes, species scientific name, various controlled terms for categorizing the fishery, ...), and a number of attributes such as catches, number of vessels, management overview, bibliographic reference, etc... Descriptors and attributes found as columns of the Excel file are a subset of the Metadata elements which FIRMS is developing as standards for the description of each reporting field. These standard terms are found in the FIRMS data dictionary<sup>7</sup> which enable to structure the information in fact sheets.

This document is intended to be a practical instrument to fill in or validate the inventory table (the excel file).

- Chapter I explains the rationale underlying inventory of Fisheries.
- Chapter II aims to clarify the concept of Fishery and other related key criteria driving the identification of fishery units in an inventory, in order to allow the reader to draw meaningful list of fisheries and structure them in a consistent way. This section assists in understanding the nature of the rows of the Excel file.
- Chapter III describes the Excel template by providing working definitions for each field/attribute of the inventory. This section assists in understanding the columns of the Excel file.

## **I RATIONAL**

Fisheries should be managed and the first step to sound management is to ensure that all fisheries are enumerated, identified and categorised. The present inventory fulfils this primary goal. Subsequent steps to sound fisheries management are to ensure that fisheries status and trends are monitored through relevant indicators. This inventory also supports this role considering that fisheries enumerated here constitute a reporting backbone.

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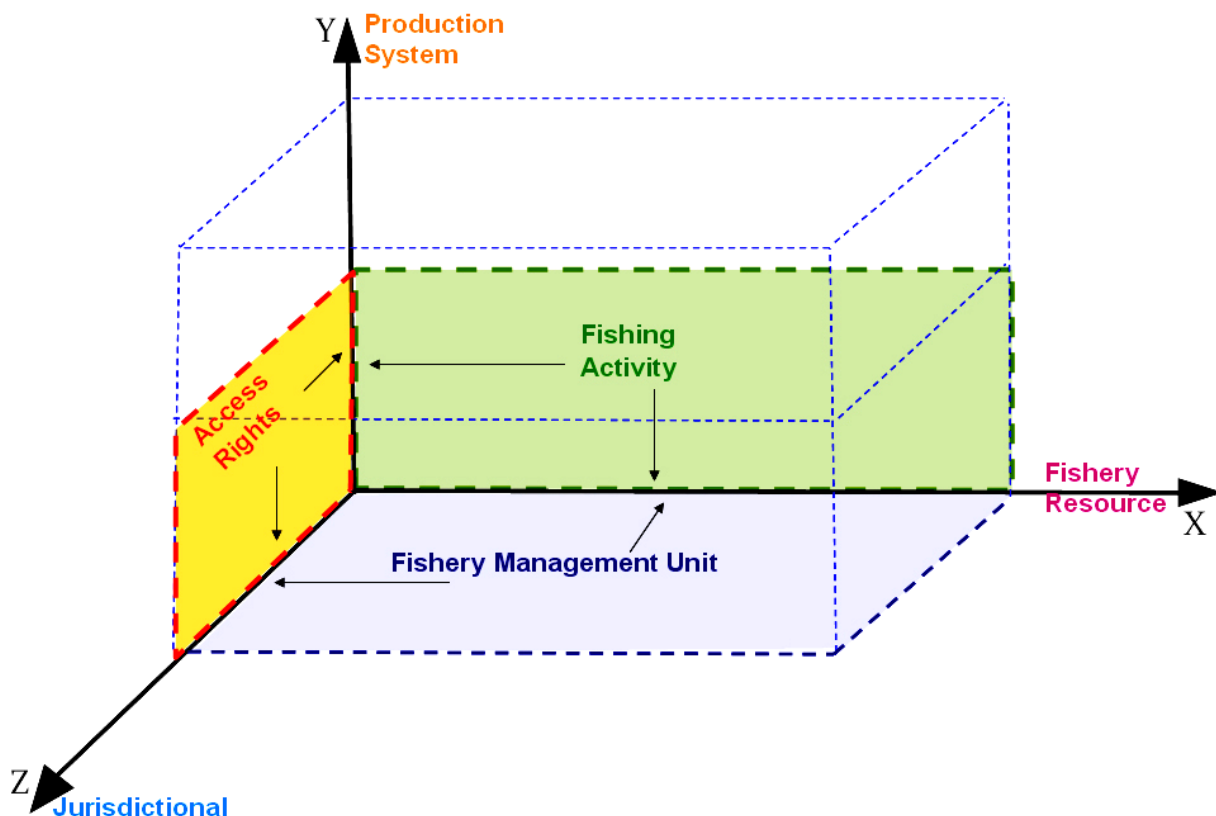
<sup>1</sup> see FIRMS at <http://firms.fao.org/firms>

## II CONCEPTS AND DEFINITIONS

Depending on the situations and needs, fisheries are identified through various methods including surveys with professionals, statistical analyses, literature, management practices, etc. An inventory of fisheries would consist of drawing a list of fishery units from those gathered through those various methods.

However, the concept of fishery encompasses an inherent complexity also referred as “multifaceted”, owed to the various perspectives/perceptions people have on fisheries. The 3 dimensional diagram represented in Figure 1 helps to visualise these various perspectives/perceptions: three fundamental approaches, represented on the main axes of the diagram, are proposed as the Fishery resource (biological view), the Jurisdictional approach (legal view), and the Production systems approach (socio-economic view); other perspectives at the cross-road of these main ones are represented on the plans of the diagram: a Management unit approach, a Fishing activity (métier) approach, an Access rights approach. FIRMS Partners believe that most existing definitions of fisheries can be mapped to this standard framework, without pre-empting the possibility to extend the standard framework if required.

Figure 1: Conceptual model of the multifaceted approach to fisheries



## II.1 Definitions:

Fishery inventory: “A **Fishery Inventory** is a comprehensive list of fishery units identified at an agreed scale and within a defined scope, including consideration of Geographic reference, thematic approach, and purpose”. Geographic reference, thematic approach, and purpose are the main criteria driving the identification of fishery units in an inventory.

Fishery: “A *Fishery* is an activity leading to the harvesting of fish, within the boundaries of a defined area. The fishery concept fundamentally gathers indication of human fishing activity, including from economic, management, biological/environmental and technological viewpoints (FIRMS 2006, modified from FAO glossary of fisheries)”.

Geographic reference: “The geographic frame[work] from which fisheries are considered for inclusion in the inventory (modified from FIRMS, 2008)”.

The geographic reference enables for example to discriminate highly aggregated world fisheries reported by FAO at global level, from North West Atlantic fisheries reported by NAFO (a Regional Fishery Body) at regional level.

Examples of geographic references are *Western Central Pacific Ocean* (an SPC regional geographic reference), *Senegal* (a national geographic reference), or *Florida* (a USA sub-national geographic reference).

The geographic reference is a key factor of the level of granularity for identification of a fishery.

Purpose: “The **purpose** puts emphasis on the end-usage of the inventory (FIRMS 2008)”.

The purpose might be to organise information for input to an analytical process (for example stock assessment, which would e.g. distinguish fleet segments having different fishing mortality), to a management process, for reporting on Status and Trends, or simply for grouping items within an organized list. Purpose is a key factor in the final validation step.

Thematic Approach: “The **thematic approach** highlights the disciplinary viewpoint prevailing in the identification of fishery units (FIRMS 2008)”.

Species or harvested resources, sea beds, fishing practices (or “métiers”), vessels, people or households are the elements which people perceive as fisheries. The task of the inventory is to partition (or segment) these elements in a set of Fishery units.

Depending on the disciplinary viewpoint, this partitioning process would lead to different results, and accordingly, six thematic approaches have been recognized: Fishery resource, Jurisdictional, Production system, Fishery Management unit, Fishing activity, and Access rights. The thematic approach plays a key role in the definition of a fishery, and accordingly in setting the key descriptors required for its identification. The next section develops definitions for each of the main thematic approaches.

### Definitions for Main thematic approaches

The Thematic approaches presented in this paragraph are meant to represent the main classes of fisheries, and the definitions provided should assist users of these guidelines to map their “local Fisheries” to one or more of the thematic approach(es). This mapping will help to structure a global report of fisheries allowing the comparison among similar fishery units (i.e. fisheries pertaining to same classes).

With reference to the diagram represented in figure 1, three fundamental thematic approaches are represented on the main axes:

X axis	<p>a <b>Fishery Resource approach</b> refers to elements of natural aquatic resources (biotic element) which can be legally caught by fishing;  <u>example:</u> "Deep-sea shrimp fishery", where reference is made to the resources of shrimps in deep-sea waters off Angola  <u>example:</u> "Shrimp and groundfish fishery – Gulf of Paria", where reference is made to the resources of shrimps and groundfish in gulf of Paria, in Trinidad and Tobago waters</p> <p>Note: the fishery resource approach would correspond to the Marine resource concept already released as part of FIRMS;</p>
Y axis	<p>a <b>Jurisdictional approach</b> emphasises geopolitical and institutional boundaries which provide legitimacy for development of Management systems; as such, it describes the set of governing rules agreed within a recognized legal framework for the management of a fishery or group of fisheries;  <u>example:</u> "Commonwealth fisheries" (Australia), where reference is made to Australian fisheries operated within Australian Commonwealth waters and managed at federal level (as opposed to those occurring within state territorial waters and managed at state level)  <u>example:</u> "Alaska fisheries", where reference is made to the USA Alaskan fisheries operated within the NPFMC management system.  <u>example:</u> "Municipal fishery - Philippines", where reference is made to the Philippines fisheries occurring within a jurisdiction area of 15 kms coastal waters strip, and managed by local municipal and city government under municipal management systems.</p>
Z axis	<p>a <b>Production System approach</b> identifies homogeneous segments of means of production (eg vessel type, fleet segments, or fishers communities) including through consideration of their enterprise or livelihood strategies, and focuses on the description of their socio-economic aspects;  <u>example:</u> "Coastal trawlers - Italian Adriatic coast", where reference is made to the fleet of coastal trawlers based in the various ports of the Italian Adriatic coast and operating according to same enterprise strategies  <u>example:</u> "family-scale fishing and rice field fisheries", where reference is made to household communities in Cambodia basing their subsistence strategies on mixed fishing and rice culture activities</p>

In addition of the fundamental approaches represented along the axes, other main approaches can be derived by combining these fundamental ones on the plans of the cube.

X-Y plan	<p>a <b>Fishery Management Unit approach</b> highlights those harvested fishery resources under management considerations; a Fishery Management unit evolves from a Resource focus, while taking into account the jurisdiction within which this Resource is managed;  <u>example:</u> "Toothfish – South Georgia Maritime Zone", where reference is made to the harvested toothfish resources under CCAMLR-South Africa joint management responsibilities.</p>
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X-Z plan	<p>a <b>Fishing activity</b><sup>2</sup> approach stresses the fishing activity component and identifies classes of fishing activity implemented by a fishing fleet or fishermen community; this approach is positioned at the crossroad of the production system approach and the Resource;</p> <p><u>example</u>: " offshore flatfish trammel netting", where reference is made to the fishing practice making use of trammel net for catching flatfish in offshore waters of French continental shelf</p>
Y-Z plan	<p>an <b>Access rights</b> approach identifies Means of production authorized to operate within a jurisdiction;</p> <p><u>example</u>: " European industrial fisheries", where reference is made to the european fishing fleet authorized to operate in Senegalese waters under Senegal-EU fisheries agreement.</p>

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<sup>2</sup> The concept of Métier: "A métier is usually defined by the use of a given fishing gear in a given area, in order to target a single species or group of species, e.g. inshore shrimp trawling, offshore flatfish trammel netting ... (Mesnil and Shepherd, 1990; Laurec et al., 1991).

## II.2 Stepping into the inventory

What follows dissects concepts which could be more or less intuitive for the production of a fisheries inventory.

A first step into the inventory would be to identify the purpose of the end-usage of the inventory itself which firstly helps the selection and the choice of the concerning information. Whatever the purpose, a main issue to be kept in mind is that data must be organized in a way which ensures the consistency and the possibility of updates on a periodical basis, which is the choice of the most appropriate reporting level. Once sources of fisheries information have been collected, the typology of data will drive the choice of the prevailing thematic approach that will be reflected on the whole structure of the inventory.

The prevailing thematic approach chosen will further drive the enumeration of the fishery units in a structured list.

### Hierarchical organization:

Once the prevailing thematic approach to an inventory has been identified, the fisheries list would first enumerate items flatly.

An analysis of the flat list brings to address distinguishing criterion for each of the fishery unit. The application of the criteria will finally produce a hierarchical structure and a possible breakdown of fishery units into sub-levels.

Criteria can be applied either for the creations of higher levels (or groups) to better organize the inventory for an enhanced readability or for addressing distinct thematic approaches for each stage of the breakdown process.

See Figure 2 as the summary of the fishery inventory workflow and Table 1 for an example.

Figure 2: Fishery inventory workflow

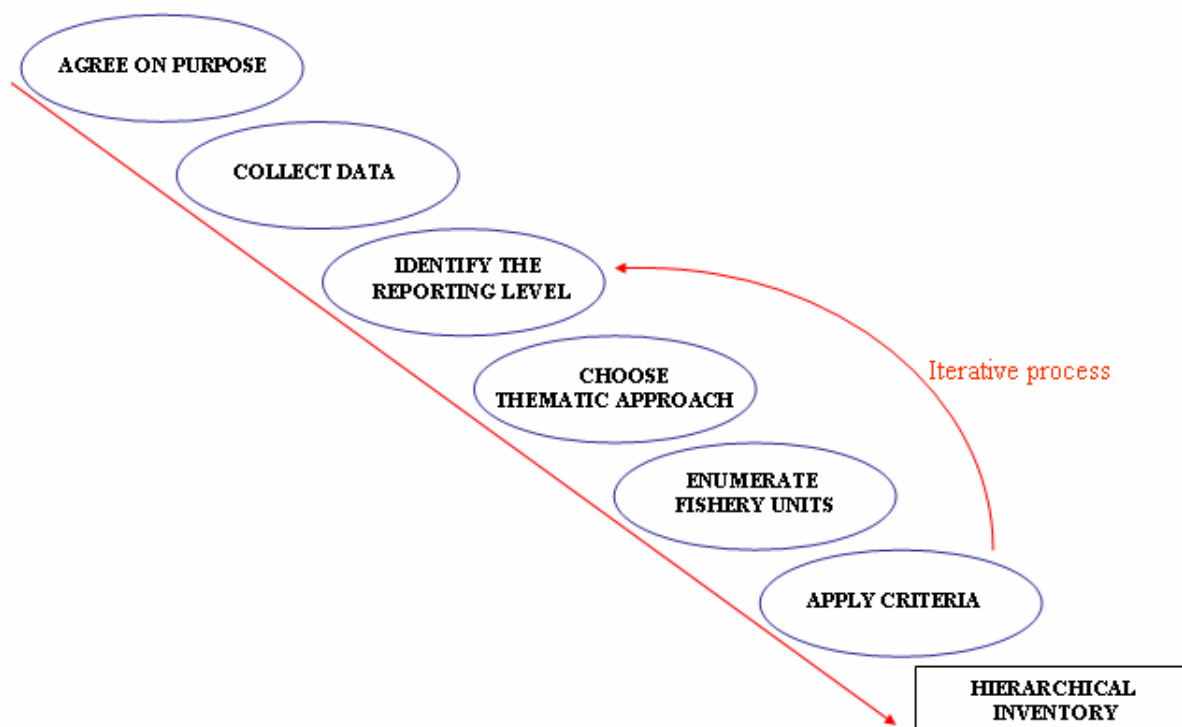


Table 1: example of a hierarchical inventory

Thematic Approach	Enumeration of Fishery Units in a flat list	Criteria applied	Hierarchical Inventory
	All fisheries Northwest Africa		All fisheries – Northwest Africa
	All fisheries - Morocco	Geographical scale	All fisheries - Morocco
Fishery Resource	Demersal resources fishery - Morocco Atlantic coast	Vertical distribution	Demersal resources fishery - Morocco Atlantic coast
Fishery Resource	Demersal fish fishery - Morocco Atlantic coast	Taxonomic	Demersal fish fishery - Morocco Atlantic coast
Fishing Activity	Artisanal gillnet fishery - Morocco Atlantic coast	Métier	Artisanal gillnet fishery - Morocco Atlantic coast
Fishing Activity	Artisanal hooks and lines fishery - Morocco Atlantic coast	Métier	Artisanal hooks and lines fishery - Morocco Atlantic coast
Fishery Resource	Pelagic resources fishery - Morocco Atlantic coast	Vertical distribution	Pelagic resources fishery - Morocco Atlantic coast
	All fisheries - Mauritania	Geographical scale	All fisheries - Mauritania
Fishery Resource	Demersal fishery - Mauritania	Vertical distribution	Demersal fishery - Mauritania
Fishery Resource	Demersal fish fishery - Mauritania	Taxonomic	Demersal fish fishery - Mauritania
Fishing Activity	Bottom Trawler fishery - Mauritania	Métier	Bottom Trawler fishery - Mauritania
Fishing Activity	Artisanal pot and hooks and lines demersal fish fishery - Mauritania	Métier	Artisanal pot and hooks and lines demersal fish fishery-Mauritania

Yellow shades: higher levels (or groups) added to better organize the inventory for an enhanced readability.

Grey text: fishery units produced by a cyclic identification of approaches driven by the application of criteria.

**In conclusion:** “the inventory is generally presented as a list organizing fishery units in 2 or 3 hierarchical levels, presented with indentations”

### Relationships among fisheries

Relationships among fisheries can be established within the same branch of the inventory (1) or among different branches (2).

1) The organization developed in the previous paragraph describes the hierarchical relationships:

- a “parental” relationship occurs within fishery units deriving from a common ancestor; these units can have the same approach or not (see loop in the workflow) and intended to correspond to the notion of sub-component, eg sub-fleet segment, or sub-geographical scale;
- a “sibling” relationship occurs within fishery units of the same hierarchical level and usually having the same approach.

2) Another kind of relationship is the one which brings to define the concept of related fisheries. In example, the same fleet exploiting different resources in different seasons caters to define two related fishery units.

The web of relationships gathered through various inventories authored by different teams working at different scales and following different thematic approaches, provides a great perspective of interactive navigation between logically related fisheries added in the system.

For example the “Fiji Deep water snapper fishery” (Fishery Resource approach) inventoried by biologists will be related to the “Fiji Inshore fleet” and “Fiji Offshore fleet” fisheries identified by socio-economists through a “Production System” approach.

### **III FISHERY DESCRIPTION INSTRUCTIONS (EXCEL TEMPLATE)**

In order to facilitate the integration of the inventory in the FIRMS system, each fishery identified in the inventory is described as one row in an Excel table following the instructions provided for each attribute in table 2 below. Annex 1 visually illustrate how a Fishery unit thus described through one row under Excel format (annex 1a) is then transposed for web dissemination as a FIRMS fact sheet format (annex 1b), such fact sheet then possibly evolving with more text or images information (annex 1c).

For some of the attributes, a standard terminology is used. In order to facilitate choices of standard terms, each cell of the Excel file for these attributes gives the possibility of selecting terms from a list. If no term matches, new terms or a combination of standard ones can be proposed (in this case it’s enough to write the chosen combination using a comma as separator). For further information on controlled terms and standards an Excel file is provided (FR\_ReferenceTerms.xls).

If the inventory of Marine resources in the same region is available, the user of these guidelines should ensure good cross-referencing between column **Target marine resources** of the Fisheries inventory and column **Exploiting Fisheries** of the Marine Resources inventory.

The following table provides some instructions to describe each fishery inventoried. Cells filled in with **light grey font** are for FAO/FIGIS internal use.

#### Table 2: Instruction for description of a fishery in an inventory

The excel worksheet ReferencedTerms often indicated in Column “Description” of this table can be found in the inventory files (or in the file FR\_Templates.xls)

ATTRIBUTE		DESCRIPTION	
FISHERY REFERENCE	Inventory identifier	A unique alphanumeric code must be assigned to any fishery inserted in the inventory. Use an alphanumeric code: 3alpha + a minimum of 2 digit numbers. The 3 alpha may be the country code (Use the country 3-alpha code - see ReferencedTerms worksheet) or any appropriate code (Gear, Species, Regional Fishery Body, etc)	
	Parent Fishery	Inventory identifier of the parent fishery. A “parental” relationship occurs within fishery units deriving from a common ancestor; these units can have the same approach or not and intended to correspond to the notion of sub-component, e.g. sub-fleet segment, or sub-geographical scale	
	Related Fisheries	If the fleet/fishers' community concerned by this fishery is also involved in other fisheries, list their inventory identifiers. Use comma as separator	
FISHERY TITLE	Local title	Title	Name usually given to the fishery in the area
		Language	Language in which the local title is expressed - see language codification ( <a href="#">ISO 639</a> ) in ReferencedTerms sheet
	English Title		Name of the fishery in English
	Fishery standard title		For internal use. Name of the fishery has to be established in English following FIRMS naming conventions (see Annex 1). Fishery titles should be indented to highlight the hierarchical relationships between the fisheries inventoried
PERSPECTIVE	Geographic Reference	<i>The geographical basis at which fisheries are included in the inventory. It is composed of a Land Area, or Water area. The Area should be a name.</i>	
	Reporting Spatial Scale	Geographic scale of the Geographic reference.	

ATTRIBUTE		DESCRIPTION	
	<b>Thematic approach</b>	<i>The thematic approach highlights the disciplinary viewpoint prevailing in the identification of the fishery unit.</i> Use the standard term for the approach: Fishery Resource, Jurisdictional, Production System, Fishery Management Unit, Fishing Activity, Access Rights (see point II.1 of the Guidelines)	
<b>FISHERY AREA</b>	<b>Fishery area name</b>	Name of the area where the fishery takes place, independently from the names indicated in the geo-references sections. Generally is the one which will appear in the FIRMS Fishery Title.	
	<b>Primary Georeferences</b>	<b>Georeferencing System Name</b>	Primary coding system used to list the area(s) enabling georeferencing of the fishery. Please give the system name and provide if necessary in the annex all the information related to this system: codes, limits of the areas, map, etc
		<b>Area Codes in this system</b>	Specify the code of the area(s) according to this coding system. Area names could be added within brackets after the code, or if name of a group of areas as a single bracket after the list of codes.
	<b>Other Georeferencing System</b>	<b>Georeferencing System Name</b>	Other coding system used to list the area(s) enabling georeferencing of the fishery. Please give the system name and provide in the annex all the information related to this system: codes, limits of the areas, map, etc
		<b>Area Codes in this system</b>	Specify the code of the area(s) according to this codification system. Area names could be added within brackets after the code, or if name of a group of areas as a single bracket after the list of codes.
	<b>CHARACTERISTICS OF THE FISHING GROUND</b>	<b>Geoform</b>	Sea floor physiography at fishing ground level. If possible use standard terms (see list <i>Geoform</i> in ReferencedTerms sheet). If more than one use comma as separator.
<b>Depth zone</b>		Bathymetric depth interval of fishing ground. If possible use standard terms (see list <i>Depth zone</i> in ReferencedTerms sheet). If more than one use comma as separator.	

ATTRIBUTE		DESCRIPTION
	<b>Horizontal distribution</b>	Marine habitat of the marine resource: Horizontal distribution. If possible use standard terms (see list <i>Horizontal distribution</i> in ReferencedTerms sheet). If more than one use comma as separator
	<b>Vertical distribution</b>	Vertical distribution in biotic terms. If possible use standard terms (see list <i>Vertical distribution</i> in ReferencedTerms sheet). If more than one use comma as separator.
	<b>Bottom type</b>	Bottom type at fishing ground level. If possible use standard terms (see list <i>Bottom type</i> in ReferencedTerms sheet). If more than one use comma as separator.
	<b>Climatic zone</b>	Marine habitat of the marine resource: Climatic zone. Use a standard term (see list <i>Climatic zone</i> in ReferencedTerms sheet)
	<b>Fishing ground description</b>	Free text to describe all the biotic characteristics of the fishing ground
<b>HARVESTED RESOURCES</b>	<b>Exploited fishery resources</b>	Fishery resource(s) exploited by the fishery. If the Fishery Resources inventory is available, identify each exploited fishery resource using its inventory identifier. If not, define a name for the fishery resource. If more than one fishery resource is exploited, use comma as separator.

ATTRIBUTE			DESCRIPTION	
	Captured species	Name	Name (s) of the captured species <sup>3</sup> . The list of items should be structured with the following layout: <Scientific name> (<English common name (When available use ASFIS name (See ReferencedTerms Sheet))>). Or, if the local name is available: <Scientific name> (<English common name (When available use ASFIS name (See Species Sheet))> / <local common name>)  Remarks: - for scientific name, put the lowest known taxonomic level (species, genus, family, order) - If there are more than one species, use comma as separator.  Example: Parapenaeus longirostris (Deep-water rose shrimp / Crevette rose du large ), Xiphopenaeus kroyeri (Atlantic seabob/Camarón blanco)	
		Description	Additional description on Species or group of species with particular emphasis on biological/physiological status or relevant information: Take care of connecting comments with sub-set of species: Migrating (tunas), Adults(swordfish)	
	Target species	Name	Name (s) of the target species <sup>4</sup> . The list of items should be structured with the following layout: <Scientific name> (<English common name1>). Or, if the local name is available: <Scientific name> (<English common name (When available use ASFIS name (See ReferencedTerms Sheet))> / <local common name>)  Remarks: - for scientific name, put the lowest known taxonomic level (species, genus, family, order) - If there are more than one species, use comma as separator.  Example: Parapenaeus longirostris (Deep-water rose shrimp / Crevette rose du large ), Xiphopenaeus kroyeri (Atlantic seabob/Camarón blanco)	
		Description	Additional description on Species or group of species with particular emphasis on biological/physiological status or relevant information: Take care of connecting comments with sub-set of species: Migrating (tunas), Adults(swordfish)	
	By-catch <sup>5</sup>	Associated species <sup>6</sup>	Name	Use scientific names if known, otherwise common names (When available use ASFIS name (See ReferencedTerms Sheet). If more than one use comma as separator

<sup>3</sup> Captured Species: Those species considered part of the catch, according to the criteria used in the concerned fishery. These criteria would usually refer to the on board retained catch, including possible protected species.

<sup>4</sup> Target Species: Those species that are primarily sought by the fishermen in a particular fishery. The subject of directed fishing effort in a fishery. There may be primary as well as secondary target species.

<sup>5</sup> By-catch: Part of a catch of a fishing unit taken incidentally in addition to the target species towards which fishing effort is directed. Some or all of it may be returned to the sea as discards, usually dead or dying.

<sup>6</sup> Associated Species: Commercial species caught with the main target ones.

ATTRIBUTE			DESCRIPTION	
			<b>Description</b> Additional description on Species or group of species with particular emphasis on biological/physiological status or relevant information: Take care of connecting comments with sub-set of species: Migrating (tunas), Adults(swordfish)	
		Discard species <sup>7</sup>	<b>Name</b> Use scientific names if known, otherwise common names <sup>1</sup> . If more than one use comma as separator  <sup>1</sup> When available, use ASFIS name (See ReferencedTerms Sheet)	
			<b>Description</b> Additional description on Species or group of species with particular emphasis on biological/physiological status or relevant information: Take care of connecting comments with sub-set of species: Migrating (tunas), Adults(swordfish)	
		Protect ed species <sup>8</sup>	<b>Name</b> Use scientific names if known, otherwise common names <sup>1</sup> . If more than one use comma as separator  <sup>1</sup> When available, use ASFIS name (See ReferencedTerms Sheet)	
	<b>Description</b> If available, information about assessment of these species can be listed here			
	MEANS OF PRODUCTION	<b>Type of production system</b>		Standard terms (see list <i>Production system type</i> in ReferencedTerms sheet). The combination of standard terms is allowed. In case of type built on combined terms (example: commercial-small scale) put them together without using a comma. Instead use comma as separator in case of list of multiple values. (example: Artisanal Small Scale, Commercial Small Scale, Semi-industrial)
		Fishing Vessel	<b>Vessel type</b>	Fishing vessels used in this fishery. ISSCFV Standard terms (see list <i>Vessel type</i> (ISSCFV) in sheet ReferencedTerms). If more than one code use comma as separator
			<b>Description</b>	Free text to describe all the characteristics of the vessel: material, size (Length, Tonnage), power, capacity and all other information available

<sup>7</sup> Discarded Species: Those species, including for specific life stages, released or returned to the sea, dead or alive, whether or not such organisms are brought fully on board a fishing vessel.

<sup>8</sup> Protected Species: Species (marine mammals, seabirds etc.) caught accidentally with the main target ones.

ATTRIBUTE		DESCRIPTION	
		<b>On-board processing facilities</b>	Description of on-board facilities (freezer, etc)
		<b>Average range of crew size</b>	Number or average range of persons which compose the crew
		<b>Flag State</b>	Nationality of vessels. Use country 3-alpha code (see sheet ReferencedTerms). If more than one code, use comma as separator.
	<b>LOCAL FLEET SEGMENT</b>	<b>System name</b>	Any classification system which may be used to describe local fleet segment. Please give the system name and within parenthesis the related acronym (if any). Detailed information on the submitted classification systems should be provided as side documentation.
		<b>Fleet segment units</b>	Specify the names of the fleet segment in this codification system and within parenthesis the related code. If more than one use comma as separator
		<b>Description</b>	Free text to describe all the characteristics of the fleet segment
	<b>FLEET SIZE</b>	<b>Vessel or Fishing Unit</b>	Indicate if the quantity represents Vessels "V" or Fishing Units "FU". The year or timeframe corresponding to this value will be in parenthesis. If the year is omitted, the <i>Reference year</i> will be considered. Example: V(1999-2004)
		<b>Quantity</b>	Number of vessels or fishing units Examples: (300, 30-35, ~50)
		<b>Quantitative value</b>	For Internal use
		<b>Involved community or group</b>	Community practicing the fishery (name of ethnic group, nationality, etc.). If available, insert the number of persons involved and the <i>Reference year</i> corresponding to this value between parentheses. If the year is omitted, the <i>Reference year</i> prevailing for the entire fishery record will be considered
		<b>Estimated number of fishermen</b>	Number of fishermen and their nationalities in parenthesis, plus the <i>Reference year</i> or timeframe corresponding to this value in parenthesis. (Example: 50(JPN, KOR)(2001-2003)). If the year is omitted, the <i>Reference year</i> prevailing for the entire fishery record will be considered

ATTRIBUTE		DESCRIPTION	
EXPLOITATION	FISHING GEAR	Gear Type	Fishing gears used in this fishery. ISSCFG Standard terms (see list <i>Gear type</i> (ISSCFG) in sheet ReferencedTerms). If more than one code use comma as separator
		Description	Free text for characteristics of the fishing gear (local name, length, mesh size, number of hooks, etc.)
	Fishing season		Months of the year during which this fishery operates. An interval may be given (example: May-Sept.)
	Environmental limitations		Environmental factors that interfere with the activity of the fishery in time (for example spawning aggregation, fish migration, monsoon, etc.)
	Port (s)		Indication of the port from which the fleet operates. If more than one code, use comma as separator
	Trip duration		Average duration of fishing trip specifying in which unit it is expressed
	Catches	Catches or landings	Annual catches or landings. Indicate if the quantity represents catch "C" or Landing "L ". Indicate also in parenthesis the <i>Reference year</i> or time frame corresponding to this quantity Examples: C(2000), L(1999-2001). If the year is omitted, the <i>Reference year</i> prevailing for the entire fishery record will be considered.
		Quantity	Quantity in tonnes
		Quantitative value	For Internal use
	Economic value	Production Economic Value	Indicator of the economic importance of the fishery, assessed through various possible measures of the economic value: see ReferencedTerms worksheet for the list of possible measures (if "Other economic value" is used, please specify in the column "Notes" the kind of measure, respecting the following convention: the label "Production Economic Value:" precedes the description of the kind of measure). Specify the unit in which the measure is expressed and the <i>Reference year</i> or timeframe between parenthesis. Example: for Landed value --> 1000\$/year(2000-2004), for Wholesale price --> \$/Kg(2000). If the year is omitted, the <i>Reference year</i> prevailing for the entire fishery record will be considered.

ATTRIBUTE			DESCRIPTION
		Quantity	Quantity Value expressed according to the chosen unit. If more than one, separated by comma and between parentheses the species to which the value is referring. Example referring to the description column: 18(Sparus aurata), 15 (Dicentrarchus labrax)
		Quantitative value	For Internal use
POST-HARVEST USE	Commodities derived from the fishery		Description of all commodities derived from the catches
	Market of destination		List of places (city, country, etc.) where commodities are merchandized. Use the country name or the corresponding 3-alpha code (see sheet ReferencedTerms). If more than one use comma as separator
MANAGEMENT	Management system		= "Yes" if the fishery provides the basis/platform for the set-up of a management system. In this case, the concerned fishery can be considered itself a Management System.
	Management unit		= "Yes" if the fishery is considered a management unit.
	Legal definition		Term defining the fishery from a legal viewpoint. Please provide the definition. (Example: "Municipal" for "Municipal fishery - Philippines": in this case the term "municipal" "is defined in Presidential Decree 704 (PD 704) as referring to fishing that utilizes boats of three gross ton (GT) or less or uses gear not requiring the use of boat. Municipal fishing areas include not only streams, lakes, and tidal waters within the municipality, but also marine waters within three nautical miles of the municipal coastline."

ATTRIBUTE		DESCRIPTION		
	Management	Management Authority(ies)/ Body(ies)	Fishery management institution(s) (Authority or Body) involved in the management of that fishery at national, regional or supra-national level (e.g. EC)	
		Code/Acronym/ Title related to Management Authority/Body	For Internal use	
		Mandate/Competence/ Role	Functions fulfilled by management body or authority within its jurisdiction area	
		Jurisdiction Area	Maritime Area	Definition of maritime area under the jurisdiction of the management authority. Use standard terms (see list in ReferencedTerms sheet) or free values if more appropriate. (High Seas, National Waters, EEZ, Territorial Sea, Archipelagic Zone). If more than one use comma as separator
			Exclusive Economic Zone (EEZ)	If relevant, EEZ (or list of EEZs) delimiting the jurisdiction area for the fishery. Use the country 3-alpha code (see sheet ReferencedTerms). If more than one code, use comma as separator
			Other Georeferencing System Name	Other georeferencing system may be used to describe jurisdiction areas (e.g. Regional Fishery Body competence area). Please give the name and provide, annexed to this inventory, all the information related to this other system: codes, limits of the areas, map, etc
			Area Codes in this system	Specify the codes of the areas in this codification system. If more than one, use comma as separator
		Management overview	Overview of Management (kind of policy, rules, status, existence of co-management, etc.)	
		Management method type	Type of Management methods. Use standard terms (see list <i>Management Method Type</i> in ReferencedTerms sheet). If more than one use comma as separator	
		Aquatic species-related measures	Measures related to the target species. Use standard terms (see list <i>Aquatic species related measures</i> in ReferencedTerms sheet). If more than one use comma as separator	
Gear-related measures	Measures related to the fishing gears. Use standard terms (see list <i>Gear-related measures</i> in ReferencedTerms sheet). If more than one use comma as separator			

ATTRIBUTE		DESCRIPTION
	Vessel-related measures	Measures related to the vessels. Use standard terms (see list <i>Vessel-related measures</i> in ReferencedTerms sheet). If more than one use comma as separator
	Fishing activity-related measures	Measures related to the fishing activity. Use standard terms (see list <i>Fishing activity-related measures</i> in ReferencedTerms sheet). If more than one use comma as separator
Trend of the fishery		Important changes in the fishery, such as its start, modification of trend, etc. If possible put chronological references (year into parenthesis): Declining(2003);Temporary closure(1999)
REFERENCES	Bibliography	Bibliographic references of literature consulted and used for identifying and documenting the fisheries inventoried. For each bibliographic reference, a code must be defined and used in the inventory sheet. The code has to be explicit but short, 15 characters maximum, and should not include blank. The bibliographic reference has to be described in the sheet "Bibliographic References". If more than one code, use a comma as separator between the codes. Sort the codes from the most relevant to the less relevant bibliographic reference
	Source	Bibliographic reference of the source publication for a specific sub-set of data included in the inventory
	Reporting unit	Yes or No: in order to know if this fishery represents a unit of reporting. A fishery is considered a reporting unit when data-owner decides to report on this level (for example in a hierarchy data-owner can decide to report only at the highest level)
	Existence of sub levels	For Internal use
	Reference year	<i>The Reference year is defined as the year for which the status of the Fishery has been evaluated. Reference Year is mandatory for each fishery and in a Fishery fact sheet is displayed in the title just after the name of the object</i>
	Reporting year	<i>Reporting year is defined as the year in which the scientific meeting (or equivalent scientific validation process) reviewed the status of the fishery inventoried. Reporting Year is not mandatory and is displayed simply as an extension of the Cover page title</i>
	Ownership	Inventoried by
Collection identifier		For Internal use

<b>ATTRIBUTE</b>		<b>DESCRIPTION</b>
	<b>Cover page identifier</b>	For Internal use
<b>Brief description of the fishery</b>		Short text to describe main characteristics of the fishery
<b>Notes</b>		Any comment regarding the inclusion of this fishery in the inventory

Annex 1a: example of Fishery unit inventoried as a row in excel format

FISHERY REFERENCE			FISHERY TITLE				PERSPECTIVE			FISHERY AREA			
Inventory identifier	Parent Fishery	Related Fisheries	Local title		English Title	Fishery standard title	Geographic reference	Reporting Spatial Scale	Thematic approach	Fishery area name	Primary Georeferences		Other Georeferences
			Title	Language							Georeferencing System Name	Area Codes in this system	
ATA12			Fishery for Toothfish in Division BB 1	en	Toothfish fishery - Eastern Ross Sea Southern Ocean	Regional	Fishery Management Unit	Eastern Ross Sea	BB 1				
CHARACTERISTICS OF THE FISHING GROUND							HARVESTED RESOURCES						
Geoform	Depth zone	Horizontal distribution	Vertical distribution	Bottom type	Climatic zone	Fishing ground description	Exploited marine resources	Captured species		Target species		Associated species	
								Name	Description	Name	Description	Name	Description
							006 0001		Dissostichus eleginoides (Patagonian Toothfish), Dissostichus mawsoni (Toothfish)				
MEANS OF PRODUCTION													
Type of production system	FISHING VESSEL				LOCAL FLEET SEGMENT			FLEET SIZE				Involved community or group	Estimated number of fishers
	Vessel type	Description	On-board processing facilities	Average range of crew size	Flag State	System name	Fleet segment units	Description	Vessel or Fishing Unit	Quantity	Quantitative value		
EXPLOITATION											POST-HARVEST USE		
FISHING GEAR		Fishing season	Environmental limitations	Port (s)	Trip duration	CATCHES			Economic value			Commodities derived from the fishery	Market of destination
Gear Type	Description					Catches or landings	Quantity	Quantitative value	Type of Economic value	Quantity	Quantitative value		
MANAGEMENT													
Management system	Management unit	Legal definition	Management entity						Management overview	Management method type	Aquatic species-related measures	Gear-related measures	
			Management Authority(ies)/Body(ies)	Code/Acronym/Title related to Management Authority/Body	Competence/Role	Jurisdiction Area							
						Jurisdiction area type	Exclusive Economic Zone (EEZ)	Other Georeferencing System Name					Area Codes in this system
			CCAMLR	1. Scientific advice	High seas		ccamlr_co mp	CCAMLR					
Trend of the fishery	REFERENCES						Ownership			Brief description of the fishery	Notes		
	Bibliography	Source	Reporting unit	Existence of sub levels	Reference year	Reporting year	Inventoried by	Collection identifier	Cover page identifier				
	Source 1				2009	2008	11	16		Managed by CCAMLR - fishery targets both D. eleginoides and D. mawsoni			

## Fishery Fact Sheet

Search Save Print

### Resource report

# Southern Ocean Toothfish fishery - Eastern Ross Sea (Subarea 88.1), 2008

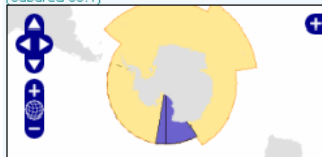
Fishery for Toothfish in Subarea 88.1

Citation

Owned by Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR) [more>>](#)

**Overview:** The fishery is in an exploratory phase and is limited to CCAMLR Member countries who have provided advanced notification of their intentions to participate in the fishery.

Location of Toothfish fishery - Eastern Ross Sea (Subarea 88.1)



Geographic reference: Southern Ocean  
Scale: Regional

### FISHERY MANAGEMENT UNIT APPROACH

Jurisdiction  
Management Body: Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR)  
Jurisdiction Area: CCAMLR competence area - High Seas  
Competence: Management [more>>](#)

Harvested Resource  
Target Species: Patagonian toothfish [more>>](#)  
Fishery Area: CCAMLR competence area [more>>](#)

Fishery Indicator: Catch; By-catch of Fish and Invertebrates; Interactions with Seabirds and Marine Mammals

### Table of Content

[Overview](#) - [Harvested Resource](#) - [Management](#) - [Source of information](#)

## Harvested Resource

### Target Species

*Dissostichus eleginoides*

Fao Names : en - Patagonian toothfish, fr - Légine australe, es - Austromerluza negra



*Dissostichus mawsoni*

Fao Names : en - Antarctic toothfish, fr - Légine antarctique, es - Austromerluza antártica

### Bycatch type: Associated species

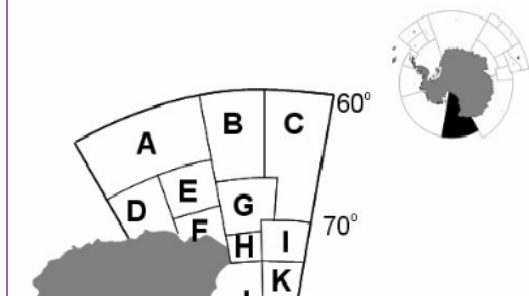
Macrourids, Rajids, other by-catch species.

### Bycatch type: Protected species

Seabirds, marine mammals.

### Fishery Area

A fishery for toothfish (*Dissostichus mawsoni* and *Dissostichus eleginoides*) operates in the Ross Sea in Subarea 88.1 in the Southwest Pacific Ocean, and the fishing grounds are divided into thirteen small-scale research units (Figure 1). This region is subject to sea-ice which extends north to 60-65°S in winter, and retreats to the permanent ice shelf near 78°S at the height of summer.



### Geo References of Toothfish fishery - Eastern Ross Sea (Subarea 88.1)

CCAMLR Convention areas	CCAMLR: CCAMLR competence area
FAO Fishing Statistical Sub Areas	88.1: Pacific Antar / 88.1

More Geo References

### Fishing Gear

The main species caught is *D. mawsoni* which is taken using longlines only. Participating vessels use deepwater, bottom-set longlines which must comply with CCAMLR's mitigation measures aimed to reduce the incidental mortality of seabirds during longline fishing. Vessels deploy either autolines, some using integrated-weighted lines, or Spanish-type longlines.

[Set longlines](#)

### Seasonality

Fishing generally occurs in the austral summer from December to March each year.

### Catch

For the 2008/09 fishing season, CCAMLR set a precautionary catch limit for *Dissostichus* spp. of 2700 tonnes in Subarea 88.1. This catch limit was subdivided among the small-scale research units B, C and G (352 tonnes total), H, I and K (1994 tonnes total), and J and L (354 tonnes). Small-scale research units A, D, E, F and M were closed to fishing.

The catch history of the fishery for *Dissostichus* spp. in Subarea 88.1 is summarized in Table 1. The estimated catch of toothfish taken by illegal, unreported and unregulated (IUU) fishing in Subarea 88.1 ranges up to 240 tonnes per season.

Table 1 Catch history for *Dissostichus* spp. in Subarea 88.1 by CCAMLR seasons (i.e. 2004/05 is 1 December 2004 to 30 November 2005).

Season	Regulated fishery						Estimated IUU catch (tonnes)	Total removals (tonnes)
	Effort (number of vessels)		<i>Dissostichus</i> spp.					
			Catch limit (tonnes)	Reported catch (tonnes)				
Limit	Reported			<i>D. eleginoides</i>	<i>D. mawsoni</i>	Total		
1996/97	-	1	1 980	0	0	0	0	0
1997/98	-	1	1 510	1	41	42	0	42
1998/99	2	2	2 281	1	298	297	0	297
1999/00	-	3	2 090	0	751	751	0	751
2000/01	6	10	2 064	34	628	660	0	660
2001/02	10	3	2 508	12	1 313	325	92	1 417
2002/03	13	10	3 760	26	1 805	831	0	1 831
2003/04	28	21	3 250	13	2 184	197	240	2 437
2004/05	21	10	3 250	7	3 098	105	23	3 128

2001/02	3*	0	0
2002/03	3*	0	0
2003/04	3*	0.0001	1
2004/05	3*	0	0
2005/06	3*	0	0
2006/07	3*	0	0
2007/08	3*	0	0

\* Per vessel during daytime setting.

## Related Fisheries

[Toothfish fishery - Western Ross Sea \(Subarea 88.2\)](#)

## Management

Management unit: Yes

## Jurisdiction

**Management Body:** Competence: Management, Scientific Advice

Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR)

Jurisdiction Area: High seas

## Management Status

### Assessment Summary

### Resources Assessed

Toothfish - Southern Ocean, 2008

Fishery assessments are founded on Article II of CCAMLR's Convention which embodies ecosystem-based fishery management and the precautionary approach (see [http://www.ccamlr.org/pu/e/e\\_pubs/bd/pt1.pdf](http://www.ccamlr.org/pu/e/e_pubs/bd/pt1.pdf)). CCAMLR aims to regulate fishing on target species while ensuring that harvesting does not adversely impact other species that are related to, or dependent on, the target species.

Article II is implemented by a 3-part decision rule where yield is a proportion ( $\gamma$ ) of the pre-exploitation biomass. The decision rule for toothfish is: Part 1 (the recruitment criterion) - Choose a yield ( $\gamma_1$ ) so that the probability of the spawning biomass dropping below 20% of its median pre-exploitation level over a 35-year harvesting period is 10%; Part 2 (the predator criterion) - Choose a yield ( $\gamma_2$ ) so that the median escapement at the end of a 35 year period is 50% of the median pre-exploitation level; and Part 3 - Select the lower of  $\gamma_1$  and  $\gamma_2$  as the yield. CCAMLR's Working Group on Fish Stock Assessment conducts annual assessments based on the best available scientific information including fishery, observer, research and compliance data (see [http://www.ccamlr.org/pu/e/e\\_pubs/tdrt.htm](http://www.ccamlr.org/pu/e/e_pubs/tdrt.htm)). CCAMLR's Scientific Committee reviews each assessment and develops management advice.

A Bayesian sex and age structured population model was used to assess *D. mawsoni* in Subareas 88.1 and the western sector of Subarea 88.2 (small-scale research units A and B). The model was fitted to CPUE indices, catch-at-age data, and tag-recapture data from the fishery. Overall, model fits to the data are adequate, with the tag-release and recapture data providing the most information on stock size. The Monte-Carlo Markov Chain (MCMC) estimate of initial (equilibrium) spawning stock abundance ( $B_0$ ) for the model was 71200 tonnes (95% credible interval: 59570–87900 t), and the current biomass was estimated as 82% of  $B_0$  (Figure 2). The yield for the model was estimated using the 3-part decision rule.

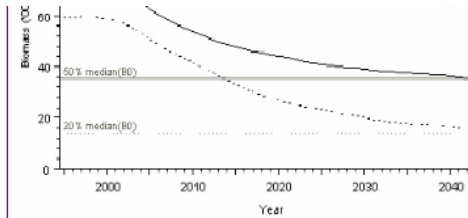


Figure 2 Estimated spawning stock biomass median (solid line) and 95% credible interval (dashed lines) for the base-case assessment of *Dissostichus mawsoni* in Subarea 88.1 and the western sector of Subarea 88.2.

## Management Regime

The fishery is in an exploratory phase and is subject to a notification procedure within CCAMLR's regulatory framework for managing fisheries (see CCAMLR Conservation Measure 21-02).

The operation of fishing gear is strictly regulated and vessels must comply with CCAMLR's mitigation measures which minimise the attraction of seabirds to fishing vessels and reduce the risk of birds seizing baited hooks, particularly during the period when the lines are set (see Conservation Measure 25-02).

Fishing vessels must also report potential encounters with vulnerable marine ecosystems (VMEs). Vessels which exceed a threshold of VME-indicator organisms per longline line segment (5 or more VME-indicator units) must notify the encounter to the CCAMLR Secretariat (see Conservation Measure 22-07, see also <http://www.ccamlr.org/pu/E/sofish/forms.htm>). Risk areas are declared where 10 or more VME-indicator units are recovered from a single line segment, and these areas shall remain closed to bottom fishing until they have been reviewed by CCAMLR's Scientific Committee and management actions are determined by the Commission. In addition, fishing is prohibited in depths shallower than 550 m in order to protect benthic communities.

Vessels operating in this fishery are also subject to a by-catch move-on rule: If the by-catch of any one species is equal to or greater than 1 tonne in any one haul or set, then the fishing vessel is required to move to another location at least 5 nautical miles distant, and the vessel can not return to any point within 5 nautical miles of the location where the by-catch exceeded 1 tonne for a period of at least five days. Vessels catching macrourids may also be required to cease fishing in a small-scale research unit if the catch of macrourids reaches a specified threshold within a given time period.

Each vessel participating in the fishery is required to carry at least two scientific observers, one of whom is appointed in accordance with the CCAMLR Scheme of International Scientific Observation, on board during all fishing activities.

Vessels must also conduct fishery-based research to collect detailed biological data on the target and by-catch species, and to tag and release *Dissostichus* spp. at a specified rate per tonne green weight caught.

Flag States must report catches and fishing effort in accordance with CCAMLR's real-time Catch and Effort Reporting System, and detailed catch and effort data on a haul-by-haul basis. Vessels are tracked using CCAMLR's centralised Vessel Monitoring System, and all transshipments, landings and trade of *Dissostichus* spp. are logged using CCAMLR's Catch Documentation Scheme.

Most toothfish fisheries have also been targeted at various times by IUU fishing activities. IUU fishing undermines CCAMLR's management objectives by threatening the sustainability of toothfish stocks and seabird populations which are prone to IUU activities. In response, CCAMLR has developed a set of integrated measures to combat IUU fishing. These measures include a Catch Documentation Scheme to monitor landings and the global trade of toothfish, strict vessel licensing requirements, at-sea and port vessel inspections, a comprehensive list of IUU vessels and the development of a centralised Vessel Monitoring System (see Conservation Measures 10-01 to 10-09).

CCAMLR reviews the management advice for each fishery annually, and updates the schedule of Conservation Measures in force which regulates fisheries in the CCAMLR Convention Area. The fishery for toothfish in Subarea 88.1 is managed under Conservation Measure 41-09 and associated measures.

## Source of information

The information in this fact sheet is based on the reports of the annual meetings of CCAMLR's Commission and Scientific Committee, Statistical Bulletin and the Schedule of Conservation Measures in Force. These publications are available on the CCAMLR website, see [link](#).

