



<b>FIRMS Technical Working Group Meeting</b>
<b>Second Session</b>
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<b>Fisheries module: Design status, outstanding issues and proposals for final design</b>
<b>Author: FSC Secretariat</b>

***Purpose of this document***

*This document summarizes the main assets on the Fishery module consolidated through the [FIGIS-FIRMS Methodological Workshop](#) (July 2002- Rome), the [FIRMS Technical Working Group Meeting - 1st Session](#) (December 2005, Rome) and during the [FIRMS Steering Committee Meeting - 3rd Session](#) (February 2006, Madrid) and the outstanding issues which TWG2 should resolve. This document then develops proposals from the FIRMS Secretariat in response to the outstanding issues concerning the design of Fishery module. For a good understanding of the proposals, the Marine Resource module, including inventory and related fact sheets, is assumed to be known.*

*In the Assets and Outstanding issues sections, references are provided to the above cited meeting reports. Extracts of the concerned parts of these cited documents are compiled in Annex 1.*

*Actions requested from TWG2 are highlighted.*

*It is expected that the revised version of this document as evolving from TWG2 discussions will become part of the FIRMS standards.*

## 1. Definitions

### 1.1 ASSETS

- Working definition for Fishery (in draft IMP guidelines)
- Recognition of the need to expand the “Management Unit” concept to Fisheries (2002 workshop)
- Recognition of multiple approaches to fisheries (2002 workshop, TWG1)
- Recognition of need for partners to provide their own definitions of fisheries (TWG1)
- Recognition that comparisons of fisheries listed in FIRMS would require the development of a method to map each Partner’s set of fishery definitions to an agreed, standard classification (TWG1)

### 1.2 OUTSTANDING ISSUES:

- A. Finalize definition of “Inventory of fisheries”
- B. Propose a method/model to facilitate mapping of each Partner’s set of fishery definitions to an agreed, standard classification

Specific aspects to address

- The hierarchical structure of the inventory, with different levels corresponding to different geographical scales or thematic approaches (as proposed in Draft IMP guidelines), shows its limits: the multifaceted approach require multi-directional and horizontal relationships.

### 1.3 PROPOSALS

Reference is first given to the working definition of a Fishery as endorsed by FIRMS IMP:

*“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”.*

#### **Issue A - Finalize definition of “Fisheries inventory”**

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

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The following paragraphs provide a working definition for Fishery inventory, and examine the key criteria driving the identification of fishery units in an inventory. The elements here presented constitute a fundamental basis for the data model.

**Definition:** “A *Fishery Inventory* is a comprehensive list of fishery units identified at an agreed scale and within a defined scope, including consideration of geo-reporting standpoint, thematic approach, and purpose”.

Geo-reporting standpoint, thematic approach, and purpose are the main criteria driving the identification of fishery units in an inventory.

**Definition:** The *geo-reporting standpoint* refers to the geographic pedestal and associated scale (global, regional, national or sub-national) from which fisheries are considered in an inventory.

The geo-reporting standpoint enables for example to discriminate highly aggregated world marine resources reported by FAO at global level, from Eastern Central Atlantic marine resources reported by CECAF (a Regional Fishery Body) at regional level. Examples of geo-reporting standpoint are Western Central Pacific Ocean (an SPC regional geo-reporting standpoint), Senegal (a national geo-reporting standpoint), or Florida (a USA sub-national geo-reporting standpoint). The geo-reporting standpoint is a key factor of the level of granularity for identification of a fishery.

**Definition:** The *thematic approach* highlights the disciplinary viewpoint prevailing in the identification of fishery units.

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, Jurisdiction, Production system, Fishery Management unit, Métier, 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 fundamental thematic approaches.

**Definition:** The *purpose* puts emphasis on the end-usage of the inventory.

The purpose might be to organise information for input to an analytical process (for example stock assessment, which would eg 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.

### Action requested from TWG2:

TWG2 is requested to discuss and validate the working definitions of Fishery inventory, geo-reporting standpoint, thematic approach and purpose. In doing so, TWG2 should bear in mind that the concepts of “geo-reporting standpoint” and “thematic approach” are already part of FIRMS’ IMP draft guidelines with slightly modified definitions, whereas “purpose” has been added.

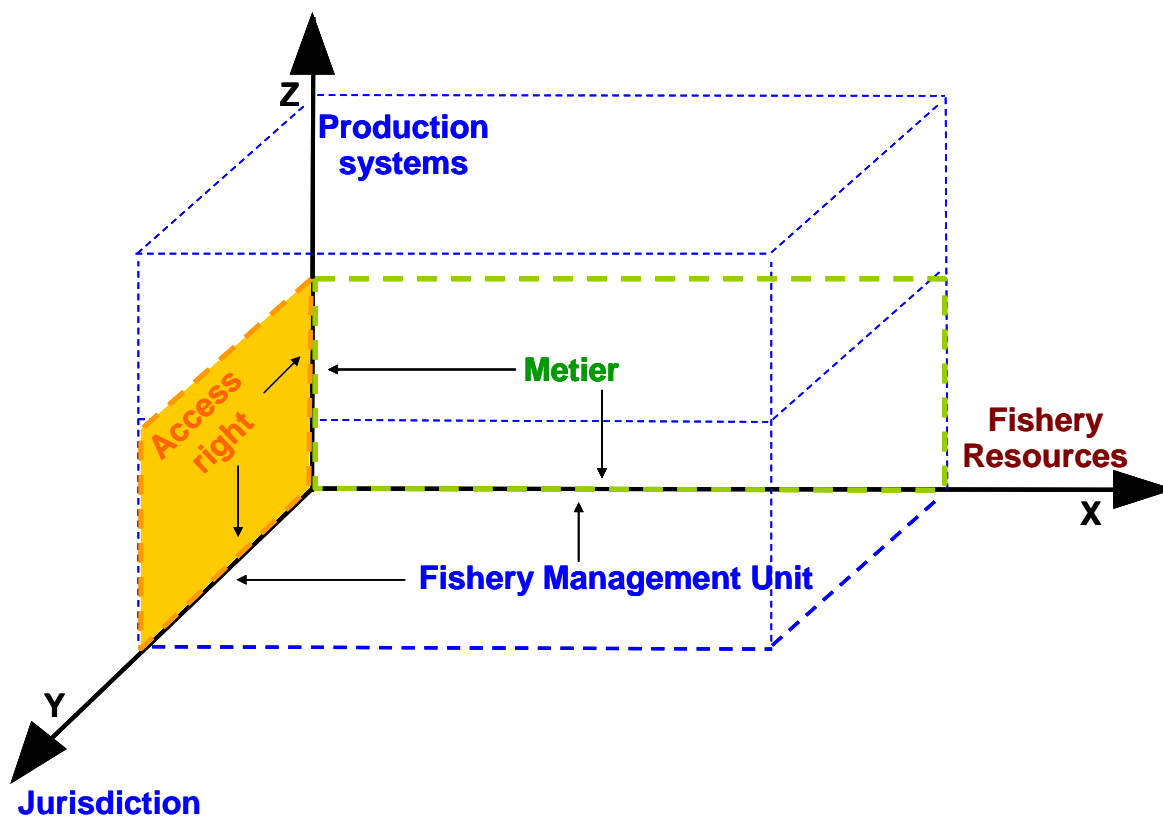
### **Issue B - Finalize concept of “thematic approach”**

#### *1.3.1 Logical conceptual framework for fisheries*

This paragraph makes reference to the concept of thematic approach introduced in the previous section, and proposes definitions for six fundamental approaches.

The Fishery concept is a multifaceted one, and each thematic approach can be understood as reflecting one of its facets. The logical framework presented in Figure 1 based on a three dimensional diagram intends to facilitate this understanding: the fundamental approaches are modelled as axes, and the more complex approaches building from the fundamental ones as plans. Volumes of the cube can be used for representing even more complex fishery views. Fisheries are then positioned in these various dimensions of the cube (axes, plans, volume) according to the approaches followed for their identification. This allows visualizing their role and purpose in the overall system as well as the relationships among them.

Figure 1: Logical conceptual framework for fisheries



### 1.3.2 Definitions for fundamental thematic approaches

Fundamental thematic approaches are represented on the main axes of the cube:

X axis	<p><i>a <b>Fishery Resource approach</b> refers to elements of natural aquatic resources (biotic element) which can be legally caught by fishing;</i></p> <p><u>example</u>: "Deep-sea shrimp fishery", where reference is made to the resources of shrimps in deep-sea waters off Angola</p> <p><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 Tobaggo 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><i>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;</i></p> <p><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 occuring within state territorial waters and managed at state level)</p> <p><u>example</u>: "Alaska fisheries", where reference is made to the USA Alaskan fisheries operated within the NPFMC management system.</p> <p><u>example</u>: "Municipal fishery - Philippines", where reference is made to the Philippines fisheries occuring 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><i>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;</i></p> <p><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</p> <p><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	<i>a <b>Fishery Management Unit</b> approach 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>: " <b>Toothfish – South Georgia Maritime Zone</b>", where reference is made to the harvested toothfish resources under CCAMLR-South Africa joint management responsibilities.</i>
X-Z plan	<i>a <b>Métier</b><sup>1</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; <u>example</u>: " <b>offshore flatfish trammel netting</b>", where reference is made to the fishing practice making use of trammel net for catching flatfish in offshore waters of French continental shelf</i>
Y-Z plan	<i>an <b>Access rights</b> approach identifies Means of production authorized to operate within a jurisdiction; <u>example</u>: " <b>European industrial fisheries</b>", where reference is made to the european fishing fleet authorized to operate in Senegalese waters under Senegal-EU fisheries agreement.</i>

“Local” definitions of fisheries can in turn be positioned in the cube. For example, an advanced concept such as Operational Unit<sup>2</sup> developed by GFCM can be represented by a three dimensional shape: it clearly combines the concepts of Production system (Z axis) and Métier (Z-X plan), and implies the Jurisdictional dimension (Y plan) by pointing out a management objective in the definition.

### **Action requested from TWG2:**

TWG2 is requested to comment on this logical framework, to discuss, validate or amend the proposed thematic approaches definitions as mean to provide general definitions for main classes of fisheries, and as corollary a basis to enable comparison of similar fisheries; and to confirm the idea that mapping local definitions of “Fishery” to one or more thematic approaches will help structuring global reporting on fisheries.

TWG2 should recommend rules that govern provision of partners’ definitions of fisheries.

## **2 Fishery data model: XML Schema and Dictionary**

### **2.1 ASSETS**

Draft guidelines for fishery naming conventions (in draft IMP guidelines).

Two descriptors at least are necessary to identify a fishery, including the geographic dimension (2002 workshop).

<sup>1</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).

<sup>2</sup> The concept of **Operational Unit**: “For the sake of managing fishing effort within a Management Unit, an Operational Unit is the group of fishing vessels practising the same type of fishing operation, targeting the same species or group of species and having a similar economic structure. The grouping of fishing vessels may be subject to changeover time and depends on the management objective to be reached.” (GFCM/SCSA, provisional definition)

Topic trees reviewed and commented with some concerns on structure of “Management”, and “Socio-economic assessment“ topics, which both need validation with more case studies (TWG1).

Need for handling local classifications such as gear types, etc. (TWG1).

Links to other fisheries fall under two categories: sub-fisheries, related fisheries (TWG1).

## 2.2 OUTSTANDING ISSUES:

- C. Keep under review the fishery naming convention
- D. For each thematic approach, finalize the conceptual topic tree structure and semantic of each topic.
  - Validate the key descriptors for each thematic approach;
  - Validate the type of relationships between thematic approaches;
  - Validate the conceptual topic tree structure
  - Validate Fishery XML Metadata dictionary
  - Identify the typology of indicators and their meaning;

Specific aspects to address

- Validate FIRMS-Secretariat proposal for a preliminary simplified use of socio-economic data
- Management section: validate structure, semantic and definition of its sub-elements.
- E. Design an XML based data model (schema) which can address both simplicity of use and provide response to the complexity of the fisheries multifaceted fishery concept

Specific aspects to address

- Verify which partner has a local gear classification that could be presently added in the XML schema (<ForeignID CodeSystem=""..>)

## 2.3 PROPOSALS

Issue D - For each thematic approach, finalize the conceptual topic tree structure and semantic of each topic.

### 2.3.1 *Thematic approaches versus Fishery descriptors*

With reference to the logical conceptual framework presented in paragraph 2.1.B, each thematic approach can be presented (Table 1) by its own core topic possibly completed with core topics of the neighbouring thematic approaches (here called associated topics).

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**Table 1:** Core topic and associated topics presenting each thematic approach

<b>Thematic approach</b>	<b>Core Topic</b>	<b>Associated topic</b>
Fishery Resource	Harvested resource	
Jurisdictional	Jurisdiction	
Production System	Means of production	Fishing activity
Métier	Fishing activity	Harvested resource Means of production
Fishery Management Unit		Jurisdiction Harvested resource
Access Rights	Fishing agreement	Jurisdiction Means of production

Table 2 proposes the required and frequently used descriptors for each thematic approach. These descriptors are grouped according to the Topic (core or associated) which introduces them.

	Fishery descriptor				
	Required descriptors		Frequently used descriptors		
<b>Thematic approach</b>					
core topic					
associated topics					
Fishery Resource Harvested resource	Fishery area				
	Captured species	Target, and/or other species (*)			
Jurisdictional Jurisdiction	Management body Competence Jurisdiction area				
Production System Means of production	Land base Type of Production System		Vessel type	Fleet segment	Fishers community
			Flag State		
Fishing activity			Fishery area		
Métier Fishing activity	Gear type Fishery area		Seasonality		
Means of production	Type of Production System		Vessel type	Fleet segment	Fishers community
			Flag State		
Harvested resource			Target species, and/or other species (*)		
Fishery Management Unit					
Jurisdiction	Management body Competence Jurisdiction area				
Harvested resource	Captured species	Target, and/or other species (*)	Fishery area		
Access Rights	Fishing agreement				
Jurisdiction	Management body Competence Jurisdiction area				
Means of production	Type of production system Flag State		Vessel type	Fleet segment	Fishers community
Fishing activity			Fishery area		

(\*) associated, incidental, discard spp.

### 2.3.2 Relationships among fisheries

Inventories are lead by different teams at different scales and following different thematic approaches. The prospective of being able to relate logically fisheries added in the system by various data owners appears to be one of the strongest benefit and power of information exchange. An information system which will handle these relationships must assist users by indicating the right semantic reflecting these relationships.

This paragraph focuses on the types of relationships among fisheries from a conceptual view point, and proposes labels (ie semantic) which might be displayed to introduce the relationships between 2 fisheries.

There are two types of relationships between fisheries. Relationships between fisheries belonging to the same thematic approach are hierarchical relationships (or vertical relationships), with the notion of sub-component (eg sub-fleet segment). Relationships between fisheries belonging to different thematic approaches are horizontal relationships. In both cases, the semantic of a relationship between two fisheries appears to depend on the pair of thematic approaches concerned, and on the from-to direction (ie standpoint Fishery to target Fishery).

Table 3 proposes the semantic of the relationship between two fisheries. The upper-left triangle of each cell describes the label explaining the relationship from a fishery with thematic approach of the left column, to a fishery with thematic approach of the top row, while the lower-right triangle describes the relationship of the reverse direction.

Approach	Fishery Resource	Jurisdictional	Production System	Métier	Fishery Management Unit	Access Rights
Fishery Resource	has sub-unit is part of	Concerned Jurisdictions Concerned Resources/Stocks	Concerned Fleets Resources exploited	Exploiting métiers Resources harvested	Management units Assessed resource	
Jurisdictional		has sub-jurisdiction co-manages is part of	authorized Fleets operate within jurisdiction	authorized Métiers operate within jurisdiction	governed fisheries jurisdictional framework	fishing agreements jurisdictional framework
Production System			has sub-fleets has fleet segments is part of	Métier operated means of production involved fleet concerned		is authorized under
Métier				has sub-métier is part of	operates within Operating Métiers	is authorized through authorizes
Fishery Management Unit					has sub-unit is sub-unit of	
Access Rights						

### 2.3.3 Fishery conceptual topic structure

This paragraph presents the proposed conceptual structure of the Fisheries domain. It focuses on the highest level of the proposed Fishery topic tree:

Table 4: Fishery high level topic tree

<ul style="list-style-type: none"> <li>▪ <b>Fishery Ident</b> Georeporting standpoint Thematic approach Reference years</li> </ul>	The container for main criteria identifying a fishery
<ul style="list-style-type: none"> <li>▪ <b>Fishery Overview</b> Text, images, tables</li> </ul>	A topic for a short summary of the fishery
<ul style="list-style-type: none"> <li>▪ <b>Fishery history</b> Text, images, tables Fishery ancestor</li> </ul>	A topic enabling the description of a fishery history, including from which ancestor fishery the current fishery evolves
<ul style="list-style-type: none"> <li>▪ <b>Fishery Activity description (Features)</b> Text, images, tables Fishery activity descriptors<sup>(*)</sup> Fishery indicators Related fisheries</li> </ul>	A topic describing the fishery <b>activity</b> (or industry) component of a fishery. It contains the fishery activity descriptors <sup>(*)</sup> , related fishery indicators, relations to other fisheries, and a few additional activity topics.
<ul style="list-style-type: none"> <li>▪ <b>Post Harvest Use</b> Text, images, tables</li> </ul>	A topic describing the <b>post harvest</b> component of a fishery. At this stage, two descriptive sub-topics are suggested.
<ul style="list-style-type: none"> <li>▪ <b>Socioeconomic Assessment</b> Text, images, tables Data Assessment model Scientific advice Overall result Fishery indicator Related fisheries</li> </ul>	A topic describing the <b>assessment</b> of a fishery from a socio-economic view point. Despite limited experience in handling socioeconomic data, it is suggested to structure this topic in a way similar to the Bio Assessment topic of the Marine resource module. An important element of this topic is the generic “Fishery indicator”
<ul style="list-style-type: none"> <li>▪ <b>Ecosystem Assessment</b> Text, images, tables Fishery indicators Overall result Related fisheries</li> </ul>	A topic describing the <b>assessment</b> of a fishery from an ecosystem view point. At this stage, no advanced structure is suggested for this topic. Some obvious elements of the Marine resources / Bio Assessment topic could be reused. An important element is certainly the generic “Fishery indicator”.
<ul style="list-style-type: none"> <li>▪ <b>Management</b> Text, images, tables Jurisdiction<sup>(**)</sup> Management regime Management status</li> </ul>	A topic describing the <b>Management</b> component of a fishery. It contains jurisdictional descriptors. An advanced structure is proposed taking into account various case studies.
<ul style="list-style-type: none"> <li>▪ <b>Fishery Status and Trend</b> Text, images, tables</li> </ul>	A topic summarising the <b>status and trends</b> of a fishery.
<ul style="list-style-type: none"> <li>▪ <b>Issues</b> Text, images, tables</li> </ul>	A topic focussing on textual description of <b>issues</b> for a fishery

(\*) Fishery Activity descriptors

- Fishery Area (Water area)
- Land base (land area)

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- Species (Captured, Target, Associated, Discard, Incidental)
  - Type of production system
  - Fleet segment (vessel type, flag state, gear type)
  - Fishers Community
  - Vessel type
  - Gear type
  - Seasonality
  - (\*\*) Jurisdiction descriptors
    - Management body
    - Competence
    - Jurisdiction area

### 2.3.4 XML based Fishery Metadata dictionary

The XML based Fishery Metadata dictionary proposed in Annex 2 has been built from many elements reused from other FIMES domains, together with newly identified elements. For the later, definitions might come from already approved definitions in the FIRMS IMP, from the FAO Glossaries, or are draft proposals from the FIRMS Secretariat.

#### **Action requested from the FIRMS TWG2:**

This dictionary presents in red fonts those elements which require review and validation from the FIRMS TWG2. (See annex 1, built from: [http://193.43.36.238:8181/fi/figis/firms\\_test/firms\\_schema\\_definitions/fishery\\_schema\\_definitions.xml](http://193.43.36.238:8181/fi/figis/firms_test/firms_schema_definitions/fishery_schema_definitions.xml) )

### 2.3.5 Fishery indicator element

The Fishery Indicator XML element is proposed as a generic way to handle all types of indicators required for the fishery domain. Considering the various inventories and case studies, a preliminary attempt was made by FIRMS Secretariat to structure and handle properly this element. The main proposal is to qualify the fishery indicator through the following attributes: **Class, Type, Measure**, with a fixed list of controlled terms. **Title, Time frame, Value, unit**, enable to enter free values

This 3 levels [**Class, Type, Measure**] structure evolves from the following facts: A Measure, which typically represents basic statistical variables such as number of vessels, might be compiled for different purpose: assessment of *Fishing capacity* in a socio-economic analysis; assessment of *Participation* in a fishery in a stock assessment analysis. The Type attribute designate the purpose for the indicator, while the Class attribute designates the disciplinary view point prevailing in the analysis. The type attribute also drives the label to be displayed for the concerned Fishery indicator element.

It is anticipated that the combination of the three attributes would allow to compare unambiguously Fishery indicator elements found in various fact sheets.

For example,

In a fishery described from a Production system approach (a Fleet), Number of Vessels could be the measure of Fishing Capacity.

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In a fishery described from a Fishery resource view point, Number of Vessels could be the measure of Participation.

Below are some possible values for the attributes of Fishery indicators:

**Class:** Exploitation, Socio-economic, Ecosystem, Management

**Type:** Catch, Effort, Fleet Size, Landing, Participation, Production, Economic Performance, Fishing Capacity

**Measure:** Catch Volume, Gross Value Added, Number of Ports, Landing Volume, Landing Value, Landing Average Price, Landing Global Value, International Market Global Value, Fleet Tonnage, Fleet Power, Number Vessels, Number Fishermen, Number Fishing Unit

**Title:** free value (eg “Purse seine”, “Billfishes”)

**Time frame:** free value (eg 2003 – 2005)

**Value:** free value (eg 5000)

**Unit:** free value (eg tons)

**Action requested from the FIRMS TWG2:**

Assess the proposal, develop lists of indicators with related attribute values.

Issue E - Design an XML based data model (schema)

### ***2.3.6 XML schema proposal***

The schema proposal coping with the above mentioned concepts is available at

[http://figis02:8181/fi/figis/firms\\_test/xml\\_data\\_structure/fi\\_schemaFULL/fi\\_schema.html](http://figis02:8181/fi/figis/firms_test/xml_data_structure/fi_schemaFULL/fi_schema.html) .

All case studies presented in support of this discussion were structured using this schema, and loaded and internally published through the FIRMS Content Management System facilities.

The current version of this schema imposes few data integrity rules with respect to the compulsory descriptors for each approach. A Pro for this design is its simplification. Cons? is that this design assumes that integrity enforcement is to be left to the FIRMS application, and to the data owner who should establish existence of gaps or other anomalies by inspecting consistency of the “At glance” view.

An alternative version for this schema is to have it enforcing data integrity rules with respect to the compulsory descriptors for each approach. This imposes an additional hierarchical level under the Fishery Activity element, consisting of a specific XML element for each thematic approach enabling to specify corresponding compulsory descriptors. Cons are that this additional level is making the structure slightly more complex, and that new rules (hence new thematic approach elements) might become necessary. A Pro is that data integrity is left at schema level.

**Action requested from the FIRMS TWG2:**

Discuss from the point of view of Partner the two fundamental options.

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## 2.4 Fishery Fact Sheets Lay Out

### 2.4 ASSETS

- Approval of the idea of the “at glance” view (TWG1)
- Recognition that there are different views of presentation which depend on individual characteristics of information, tightly related to thematic approaches (TWG1)
- Recommendation that the geographical map should focus on the area where fisheries are conducted (TWG1)

### 2.5 OUTSTANDING ISSUES

- F. Finalize guidelines for changing lay out according different approaches
- G. Finalize guidelines for display and features of maps within fishery fact sheets
- H. Finalize guidelines for “fishery locator”
- I. Develop guidelines for display of information in the Management topic

### 2.6 PROPOSALS

The proposals made in this document are illustrated by about 15 case studies, accessible at [http://193.43.36.238:8181/fi/figis/firms\\_test/firms\\_fs\\_gatewaypage.html#casestudies](http://193.43.36.238:8181/fi/figis/firms_test/firms_fs_gatewaypage.html#casestudies)

#### Issue F - Guidelines for layout change according to different approaches:

A strategic choice is here made to let the use of topics and their ordering in the body of the fact sheet up to data owner. It is here assumed that data owner will structure topics in a meaningful way. Instead, the “at glance” box is used to represent in a standard way the different classes of fisheries, in order to facilitate comparison between fisheries.

#### 2.6.1 *At glance view*

The “at glance” view as proposed at TWG1 intends to display in the header of the fact sheet the main fishery descriptors and the fishery indicators presented in the fact sheet, with links to relevant sections within the fact sheet. At this TWG2 proposal, this idea is maintained but the structure of the At glance view is slightly modified in order to reflect the thematic approach followed for the reported fishery. This structure is as follows: the thematic approach title is presented prominently at the top, and the main descriptors are organized according to the thematic approach underlying data model as presented in table 2.

In this proposal to TWG2, Fishery indicators are added in the At glance view below all core and associated topics, separated from them by a dashed line. When more stringent rules are agreed for Fishery indicators, these could be inserted just below the descriptors as part of the relevant Core/associated grouping topic.

### **2.6.2 Fishery activity topic**

As presented above, this descriptive topic contains the main descriptors of fishery activity (or industry). For consistency, it is suggested that the label introducing this topic changes according to the thematic approach so to better stress (from a semantic view point) this approach. A list of labels including “Harvested resources”, “Fishing activity”, “Means of production” is available (as attribute of this topic) for selection by the data owner as best fits.

### **2.6.3 Related fisheries**

As presented in the paragraph “relationships among fisheries”, it is proposed that the label of this element be determined by the “from-to” pair of thematic approaches concerned by the relationship. Related fisheries accommodates both horizontal relationships (i.e. relationships with fisheries of different approaches) and vertical relationships (i.e. relationships with sub - or parent - fisheries of the same approach)

### **2.6.4 Other relevant rules**

Above are the few aspects which the style sheet will take care of according to the thematic approach. For the rest:

- the first few words of the Fishery overview topic is presented above the “At glance” view if this topic is documented. The text is collapsed after the first few words.
- the other high level topics proposed in the paragraph 2.3.3 “Fishery conceptual topic structure” can be used or not and in data owner’s desired order. Through the case studies, it has been however suggested that these topics are displayed according to a fixed order as proposed in this 2.3.3 paragraph.
- within these main topics, it is assumed that the data owner will organize consistently its fishery report content making use of the available elements according to the required sequence. The style sheet will therefore present the elements according to the sequence found in the document;
- a table view will be offered to improve the presentation of reports containing limited information (as opposed to text heavy information) in the various fields. See an example at [http://193.43.36.238:8181/fi/figis/firms\\_test/fisheries/stf\\_2002\\_kiribati\\_trolling.html](http://193.43.36.238:8181/fi/figis/firms_test/fisheries/stf_2002_kiribati_trolling.html)

## **Issue G - Guidelines for display and features of maps within fishery fact sheets**

### **2.6.5 Display of fishery maps**

A fishery fact sheet is potentially described by a few area descriptors, including the geo-reporting standpoint (compulsory), and depending on the thematic approach one or more of the following types: jurisdiction area, land base, fishery area (ie area where fisheries are conducted). In the left panel of the at-glance view, it is proposed by default to display a map reflecting the geographical descriptors as structured in the at-glance view. The maps could be constructed considering the following options:

- As compulsory element, the geo-reporting standpoint is always represented;
- Only the most significant type of geographic descriptor will be used for representing the fishery, understanding that the most significant type is the first one encountered when reading the at-glance view;

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- The other types of geographic descriptors might be displayed on the map through user interaction, in a pop-up window. Different colour schemes shall in this case be used to represent the different geographical concepts.

In place of this default map, data owner can choose to display an image representing the concerned fishery. The dynamic map could then be accessible through a clickable label.

Finally, in the body of the fact sheet, a map could be displayed everywhere one of the geo-referencing topics is invoked.

#### **Issue H - Guidelines for fishery locator**

##### **2.6.6 Fishery locator**

The fishery locator is a button meant to provide at glance all relationships between the concerned fishery and other fisheries. The fishery locator presented at TWG1 was modelled following the hierarchical relationship logic in place in the Marine resources module. As previously presented, this hierarchical model is too limiting for the fisheries concept which calls for many horizontal relationships. A short term solution for the fishery locator is to have it summarising all “Related fisheries” and “Related resources” relationships scattered in the fact sheet, while exploiting the controlled inventory structure managed by the FIGIS Reference Table Management System (RTMS). A future solution might be to exploit the web-services offered by a fishery ontology server which main role would be to store and capitalise all relationships between fisheries (see document FIRMS TWG2/2008/5).

#### **Issue I - Guidelines for display of information in the Management topic**

##### **2.6.7 Management topic**

As proposed in table 4, the Management topic organizes information according to “Jurisdiction”, “Management regime”, and “Management status” sub-topics. “Management status” presents latest facts and decisions. According to FIGIS-FIRMS 2002 workshop, management decisions should be given prominence in the presentation of information in a fact sheet.

#### **Action requested from the FIRMS TWG2:**

**Make final recommendations regarding fisheries fact sheet layout.**

### 3 Fisheries identification process

#### 3.1 ASSETS

Recognition of a registration step, and a validation step, for the inclusion of a Fishery in a system like FIRMS (2002 workshop).

#### 3.2 OUTSTANDING ISSUES:

- J. Finalize criteria and consolidation steps for inclusion of a Fishery in FIRMS
- K. Formalize a workflow data management proposal for each step
  - Validate attributes list, these attributes are used to uniquely identify and validate a fishery
  - Finalize the “workflow” of Fishery identification and its inclusion in the FIRMS data base

#### 3.3 PROPOSALS

##### Issue J - Finalize criteria and consolidation steps for inclusion of a Fishery in FIRMS

##### *3.3.1 Processes at conceptual level for final inclusion of a fishery in FIRMS*

Inventorying instances of a concept such complex as Fishery is not straightforward. The following paragraphs examine the typical consolidation steps shaping-up the final inventory as available in a system like FIRMS.

The FIGIS-FIRMS 2002 workshop recognized the need for criteria for selection of a fishery, and the existence of two steps for the inclusion of a Fishery in FIRMS (see Annex 1.1). More recent experience drawn from inventorying fisheries as part of FIRMS or of the Global inventory of fisheries (Strategy-STF) suggests that three steps are required: identification, registration and validation.

**Identification process:** The identification process is the initial exercise of drawing-up a list. It is usually conducted by an expert of the sector who will refer to various sources. This process can make use of different disciplinary approaches, and will be influenced by the scale of consideration. It is therefore requested as part of this identification process to classify fisheries according to the “Thematic approach” and the “Geo-reporting standpoint”.

**An agreement or validation process:** The criteria “geo-reporting standpoint”, “thematic approach”, and “purpose” bear in their definition a tight connection with the issue of institutional mandate. Consequently the fisheries classified according to these criteria are expected to be registered under an institutional data ownership. The validation process ensures that the fishery units listed in the inventory are institutionally endorsed, and verified for accuracy and comprehensiveness. In other words, the validation process strives to assign a data ownership to each fishery unit.

The FIGIS-FIRMS 2002 workshop described this process in complementary terms: “Internal harmonization for inclusion rules should be decided at national or regional levels. Such inclusion rules would always include a consensus viewpoint drawn from biological, environmental, economic, social and operational fisheries perspectives”. This source also rightly highlight that “where conflicting views on a Fishery definition occur at a regional level, these must be resolved before inclusion”. In other words, the process encompasses a second validation/consolidation step at regional level.

**Registration process:** This process concerns the final selection of fishery units for inclusion in a system like FIRMS. Fisheries eventually included should enable the data owner to respond to the goal of the system, ie reporting on status and trends in case of FIRMS.

The purpose which prevailed to the identification of the fisheries is therefore an important consideration in the validation step. In case of FIRMS, the “reporting” goal imposes certain constraints such as securing an analytical and review process, ensuring self-contained ness, and minimum temporal stability of the reported unit.

It’s worth noticing that inventories as available in FIRMS-like systems are dynamic structures which may undergo change as new knowledge or needs emerge, and could be completed if/when other principles or approaches are adopted.

#### Issue K - Formalize a workflow data management proposal for each step

### ***3.3.2 Data management workflow for final inclusion of a fishery in FIRMS***

The elements presented in the above paragraph provide bases for data management rules, in a context where besides the FIRMS system fed with regional level fisheries, an increasing number of national level fishery inventories will become progressively available.

**Data management at identification level:** the spread sheet format is convenient for this step. Each row describes a fishery, and fisheries attributes are presented in columns. The inventory is generally presented as a list organizing fishery units in 2 or 3 hierarchical levels, presented with indentations. This format facilitates review since all fishery units are visible at glance. At the end of the identification step, the inventory would not be published since no peer review process has taken place. If its content is loaded in a system such as FIGIS, the tool should offer a security mechanism to keep this content under private access until validation is completed.

**Data management at validation level:** through ownership assignment, this process ensures the necessary internal peer review, which might encompass two validation steps as described above.

At the end of the validation process, inventories might become a public good with consent of data owner. The extensive list of fisheries might be publicly disseminated, according to the two following scenarios:

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Data owner, through its own web dissemination tools, makes available its inventory through browsing of query mechanisms. Interoperability mechanisms with standard protocols are encouraged in order to enable easy access from global systems.

If the inventory is made available through FIGIS infrastructure, it is proposed to publish validated national inventories as part of the Fishery country profiles; this will entail simple conversion from Excel to XML and all fisheries recorded will be accessible through a hierarchy browser. The Excel file remains the master file and should a modification occur, the whole file is reconverted and substitutes the previously published set.

Whatever the scenario, the main feature at this stage is that all validated fisheries are published (provided data owner agrees) regardless of the purpose which prevailed to their identification.

**Data management at registration level:** regarding FIRMS, only those fisheries of the inventory eligible for reporting purpose will be loaded in the system. By doing so, these fisheries are assigned a unique Global identifier. It is data owner's responsibility to maintain the linkages between FIRMS loaded fisheries and the other fisheries of the inventory published as described in the Validation step.

**Outlooks:** the situation described in the above paragraphs highlights two important points: maintaining relationships between fisheries identified for different purpose will be essential in order to explore, understand and be fully informed on the overall context for a fishery. Fishery records will be published on various servers, implying that there will be no easy management of inter-fisheries linkages without a global "unique identifier" protocol enabling all systems to be aware of published fishery records. One can imagine such protocol operating as follows: the data owner of a published fishery record willing to have it registered under the Unique Identifier protocol would submit a request for assignment of such unique identifier. This request would need to document the fishery record with a minimum set of identifiers (typically the content of the Ident block in the FIMES schema). After a verification process from the protocol's administrator, the data owner will be returned a unique identifier which would become part of his fishery record.

**Action requested from the FIRMS TWG2:**

Discuss the above concepts and associated data management rules based on each agency's experience. Consolidate this chapter for inclusion as draft guidelines in FIRMS IMP.

## **Annex I: Record of assets and outstanding issues from previous FIGIS or FIRMS meetings**

### **1. Notes from FIGIS-FIRMS Methodological Workshop, July 2002 Rome**

#### ▪ Stock and Resources

The workshop requested that FIGIS redefine the basic tree structure to originate at a level of *Management Unit* instead of stock. Key fields for defining management units include area of competence and species. This approach recognizes that the basic unit of fisheries and management occurs with the harvesting of fish from single or multiples of species, and not at the stock level. This redefined approach allows incorporation of information on fisheries, which harvest from one or many species or stocks, and thus inclusion of information from a wide variety of sources ranging from well documented commercial fisheries to fisheries where detailed data are not available. The approach also removes the propensity for incorrect use of the standard term 'stock' when referring to what is actually a 'management unit'.

*[Note from FIRMS secretariat: this is being fully formalised as part of the Fisheries module]*

#### ▪ Fishery definition

The fishery concept fundamentally gathers indication of human fishing activity, including from economic, management, biological/environmental and technological viewpoints.

These various view points indicate that there will be a need to deal with multiple sources of information, which sometimes will be in conflict with each other. Thus, a fishery is a convenient place to put alternative views. The tool should assist detecting various opinions where there is overlap.

*[Outstanding Issue: finalize concept of "thematic approach" as providing general definitions for main classes of fisheries, validate the proposed definitions of thematic approaches, and the relationships between thematic approaches and local definitions of "Fishery"]*

#### ▪ Fishery inventory

#### ▪ Fishery Attributes

This issue has been addressed in the Fishery schema by making compulsory some of the XML elements and some attributes of the Identity section.

*[Outstanding Issue: for each approach, finalize Fishery Attributes list, these attributes are used to uniquely identify and validate a fishery.]*

#### ▪ Criteria for selection of a Fishery

- A fishery's start and end date should be part of its attributes. The tracking of a fishery's dynamic change over time - its history - should also be considered in selection criteria.

- 
- Consider grouping of fisheries when the detail is too complex.
  - Include experimental or new fisheries.
  - A fishery should be validated for inclusion, provided that a minimum level of documentation exists about the fishery that justifies its existence, i.e. enough information should be available for others to evaluate appropriateness of inclusion.

*[Outstanding Issue: finalize criteria for selection of a Fishery]*

- Inclusion of a Fishery in FIRMS

Two processes are necessary:

- A registration process: an indication that a fishery exists on a particular species/group and/or in a particular area. This process can make use of different disciplinary approaches.
- An agreement or validation process: internal harmonization for inclusion rules should be decided at national or regional levels. Such inclusion rules would always include a consensus viewpoint drawn from biological, environmental, economic, social and operational fisheries perspectives. However, where conflicting views on a Fishery definition occur at a regional level, these must be resolved before inclusion. Therefore, the tool should offer a security mechanism to keep these inconsistencies under private access (i.e. not public through the FIGIS system) until they are resolved. The notion of risk indicators would be helpful in the process of making information public.

*[Outstanding Issue: finalize the “workflow” of Fishery identification and its inclusion in the FIRMS data base. work out the notion of risk indicator]*

- Fishery topics tree

*[Outstanding Issue: for each thematic approach, finalize the topics tree structure and semantic of each topic. Validate Fishery XML Schema and Dictionary.]*

*[Outstanding Issue: design an XML based data model which can address both simplicity of use and provide response to the complexity of the multifaceted concept.]*

- Fishery topic: Management

This working group examined the structure of the topics trees for Fisheries and Management, and the definition of related terms. The general structure of the stocks-resources, fisheries and management systems topic trees was sound and comprehensive. After having examined with more focus the management section of these trees, the working group found it good but stressed that the management resolution (or decision) would have to be added, and would logically reside in the management system domain. From a practical point of view, management decisions would sit at the top of the tree.

How far down the tree a partner would go, or which part of the tree a partner would use, would depend on the partner’s role in fisheries and management.

*[Outstanding Issue: the management section is a shared element between the Marine Resource and the Fishery module. Validate semantic and structure of its sub elements.]*

The definitions examined were generally found to be adequate. However the working group proposed changes to the definition of ‘*scientific advice*’ and ‘*management advice*’. Within the context of the Stock-Resource object, the working group agreed that scientific advice should be devoid of consideration of management and political issues, as well as socio-economic issues, and the advice should focus on stock status and trends. The definition should also include some measure of risk as required for a precautionary approach. The revised wording for this definition is as follows.

**‘*Scientific advice:*** *Advice provided by assessment. The advice is of strictly scientific nature, focusing on stock status and trends, i.e. separate from any management, socio-economic and political consideration. It may deal with tools to be used, or options available to achieve management objectives with respect to stock recovery, associated...’.* The working group did not develop wording for the risk assessment element of management advice.

The working group revised the use of the phrase ‘*status and trends*’. It was agreed that the term ‘*status*’ is strictly a management term, while the term ‘*trends*’ could be used in both the management context (trends in CPUE) and scientific context (trends in biomass). The working group broadened the definition for management advice as follows.

**‘*Management advice:*** *by contrast ... management advice, by necessity, will take into account a broader spectrum of issues including those recommendations...’.* The working group recognised that the definitions in papers 9 and 10 would need to be extended or revised to reflect the changes and discussion arising from the workshop.

*[Outstanding Issue: validate current definition of Management advice, evaluate the need of having Management Advice Entry.*

- *Management Advice: "Management advice are those recommendations generally evolving from the assessment addressed to management authorities. It evolves from biological scientific advice (found under assessment results) but takes into account a broader spectrum of issues. Advice may be proposed under different management options, each one including a risk assessment element" (FIGIS-FIRMS 2002 workshop).*
- *Scientific Advice: Advice is a container for "scientific advice provided by the scientists at completion of the assessment. The nature of the advice is of strictly scientific nature, ie clean of any management or political consideration. It may deal with the data to be provided, the assessment tools to be used, or the orientations that should be taken to allow a stock to recover, associated with types of measures, or results of simulation" (FIGIS-FIRMS 2002 workshop).]*

- Fishery Metadata Standards

Noting that many information specialists believe that there are too many standards, it is suggested that work begins by creating a glossary of terms based on the assumption that there is no agreement on the definition of them. From that glossary, partners can work to find a consensus of meaning.

*[Outstanding Issue: possible combination of the Fishery Metadata Standards (FIMES) with an Ontology server so as to ease interoperability between systems.]*

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- Information Management Policy

Use quality indicators in metadata.

*[Outstanding Issue: at the moment no quality indicators are utilized.]*

## 2. Notes from FIRMS Technical Working Group Meeting - 1st Session

- Utilization of the Topic tree

The TWG endorsed the general approach outlined in TWG1/2005/4c2, and agreed that each Partner may:

- Define its own set of thematic elements used to classify fisheries; and
- Choose the appropriate spatial scale at which to define and report on its fisheries.

- Fishery definitions

The TWG also recognized that statistical comparisons of fisheries listed in FIRMS would require the development of a method to map each Partner's set of fishery definitions to an agreed, standard classification.

*[Outstanding Issue: propose a method/model to facilitate mapping of each Partner's set of fishery definitions to an agreed, standard classification.]*

*[Outstanding Issue: Finalize the topics tree structure and semantic of each topic. Validate Fishery XML Schema and Dictionary.]*

- Fishery Perspectives or Fishery Thematic Approaches

The TWG noted that reporting perspective for Fishery Fact Sheets would depend on individual characteristics of information, and would result in different views of presentation.

*[Outstanding Issue: finalize guidelines for changing lay out according different approaches.]*

- Area/Map - location of fishery

In order to avoid confusion to readers, the geographical map should focus on the area where fisheries are conducted. The "area for fishery activity" should therefore be the most prominent colour, compared to other areas.

*[Outstanding Issue: finalize guidelines for display and features of maps within fishery fact sheets.]*

- Species

The TWG took note that the Species appearing in the Fact Sheets (FS) are currently linked to information in “FAO-FIGIS Species FS”, which is not under FIRMS. To ensure that the Species FS contain the most up-to-date information available, Partners may send available information on Species to FAO Species Identification and Data Programme (SIDP) in order to properly update the “FAO-FIGIS Species FS”.

*[Outstanding Issue: finalize workflow procedure for Species fact sheets updates. The link to Species fact sheets should simply say “FAO Species fact sheets”.]*

- Fishery Component

This describes the structure of fishery, with possible link to other relevant fishery fact sheet dynamically retrieved as sons from this inventory. Links to other related fisheries should be enabled in a topic called “Related fisheries”.

*[Outstanding Issue: finalize topic structure for Fishery Component and its eventual subtopics, finalize guidelines for “fishery locator”.]*

- Gear

Gears generally refer to the set of gears in the database (which can link to FAO-FIGIS Fishing Gear FS). Local name of gear could also be used, with link to gear in the database – Additional description of the gear can be put as text.

*[Outstanding Issue: verify which partner has a local gear classification that could be presently added in the XML schema (<ForeignID CodeSystem=””..>).]*

- Management

The TWG discussed and agreed that as most of the Partners are RFBs, with management reports already available, and choices/possible solutions for reporting management information include:

- Under the Fishery FS, in the Management Topic
- Separated FS (reporting Management perspective) with link to relevant Fishery FS
- Hyperlink to specific homepage of RFBs (e.g. the commission resolution) and put source of information in the FS.

The TWG also agreed that as there are cases that fisheries management are under both regional (RFB) regulation and national law, options should be available for Partners to use Management “Authority” or Management “Body”.

To describe management in a more detailed, additional fields under “Management System” can be used (although not compulsory), such as “Jurisdiction area”, “Management competence” (or “Role”). Other topics could be added if necessary.

To assist FIRMS to finalize the appropriate structure of information to describe “Management”, NAFO and other Partners with available information could provide case study of Fisheries FS using management system approach.

*[Outstanding Issue: the management section is a shared element between the Marine Resource and the Fishery module. Validate semantic and structure of its sub elements.]*

- Socio-economic data

The TWG took noted that at the current state, only high-level topics for socio-economic data have been created for the FS, without detailed classification. In order to assist FIRMS to finalize the appropriate structure of this, Partners with available socio-economic data (e.g. Eurostat, or small-scale fisheries of SEAFDEC) could start providing case-study information.

*[Outstanding Issue: see FIRMS-Secretariat proposal for a preliminary simplified use of socio-economic data.]*

### 3. Notes from FIRMS Steering Committee Meeting - 3rd Session

Fisheries naming convention revised standards (FSC3/2006/10): this current version is the third revision of that document within one year period. It evolved together with the design of the inventory of fisheries and the fisheries module. This version is the third edition and it will provide guidelines for the next stage of Fishcode-STF inventory of fisheries.

- Decision: this document should be considered as draft guidelines, and will be kept under review as work on the fisheries module progresses; [FIRMSFSC3/2006/10](#).

- Hierarchical organization for structuring an inventory: in many situations, it is also found that different set of criteria might be successively applied to decompose *fisheries* into fisheries of a sub-level: each partitioning stage is usually driven by a distinct *thematic approach* and the resulting set of *fisheries* constituting the inventory is organised in a tree like way, or *hierarchy* (see figure 1).

- └ Fisheries title 1 (Approach: resource)
  - └ Fishery title 2 (Approach: métier)
    - └ Fishery title 3 (Approach: métier)
- └ Fisheries title 4 (Approach: resource)

*Figure 1 – Hierarchy of fisheries identified from different approaches.*

It should be noted that successive partitioning stages driven by distinct thematic approaches would be the cause of overlapping between fisheries, which raises issues of consistency. This issue is addressed by the software application managing the inventory in different ways, making use of knowledge of hierarchical relationships, thematic approach, reporting levels, and consistent names at each level.

*[Outstanding Issue: multifaceted aspects of the Fishery module. Validate approaches list and related components for the compilation of the fishery inventory.]*

- Unequivocal identification of a fishery: In order to name a fishery unequivocally, the two following identifiers should be systematically presented together:

- its Geo-reporting standpoint: it defines the space within which fisheries are identified during an inventory and is critical for the unequivocal identification of a fishery;
- a Title composed with keywords reflecting the key criteria used for the definition of the fishery; *[Outstanding Issue: validate fishery naming convention.]*

## Annex 2: Fisheries domain data dictionary

**Action** (<fi:Action>): *contains information about Fisheries actions.*

**Additional reference data** (<fi:AdditionalRefData>): *contains data found in a Ref block that is not part of the RTMS.*

**Alternative title** (<dcterms:Alternative>): *Any form of the title used as a substitute or alternative to the formal title. This qualifier can include Title abbreviations as well as translations. "Any form of the name used as a substitute or alternative to the formal name of the collection" (Dublin Core Metadata Initiative - DCMI). Typically it is a simplified title for displaying purposes.*

**Aquatic resource** (<fi:AqRes>): *According to the FAO Fisheries Glossary, "Biotic element of the aquatic ecosystem, including genetic resources, organisms or parts thereof, populations, etc. with actual or potential use or value (sensu lato) for humanity. Fishery resources are those aquatic resources of value to fisheries".*

**Aquatic resource reference** (<fi:AqResRef>): *Element used to Refer to an aquatic resource. It contains species and water area domain elements which together enable positive referencing of an aquatic resource.*

**Aquatic resources list** (<fi:AqResList>): *is a container for a list of aquatic resource references with optionally an ad hoc title for the corresponding group.*

**Assessment indicator** (<fi:AssessIndicator>): *Assessment Indicator contains indicator data commonly generated using stock assessment methods (e.g. fishing mortality, biomass, recruitment, abundance index). According to the FAO Fisheries Glossary, an indicator is "a variable, pointer, or index. Its fluctuation reveals the variations in key elements of a system. The position and trend of the indicator in relation to reference points or values indicate the present state and dynamics of the system. Indicators provide a bridge between objectives and action".*

**Assessment summary** (<fi:AssessmentSummary>): xxxxx

Proposed definition: *is a container for summarizing the main results of an assessment. Use AqResRef to link to the corresponding marine resource for which the assessment has been conducted.*

**Associated Species** (<fi:AssociatedSpecies>): xxxxx

Proposed definition: *"Commercial species caught with the main target ones" (Fisheries Inventory: Method and Guidelines. FIRMS, 2007).*

**Background** (<fi:Background>): *contains Background information on Fisheries Topics.*

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**Bibliographic entry** (<fi:BiblioEntry>): *BiblioEntry is a container for elements that define a reference source. It is similar in spirit to the bibliographies found in traditional books. All the fields that would be expected in a Bibliographic Entry are included, as well as the possibility of tagging hyperlinks and adding free text.*

**Bottom environment** (<fi:BottomType>): *Type of bottom environment in which the aquatic resource is distributed.*

**Bottom morphology** (<fi:GeoForm>): xxxxx

Proposed definition: *type of sea floor physiography in which the aquatic resource is distributed.*

**Captured Species** (<fi:CapturedSpecies>): xxxxx

Proposed definition: *is a container for listing all the species caught by a fishery. Use Target species and Associated species to differentiate such catches.*

### **Catch Handling and Processing**

**Equipment** (<fi:CatchHandlingProcEquip>): *is a container to describe the way catches are handled on board and which are the on-board processing facilities (freezer, etc).*

**Chart** (<fi:Chart>): *contains a database link to a chart.*

**Climate environment** (<fi:ClimaticZone>): *Type of climate prevailing in the area of distribution of the aquatic resource.*

**Collection reference** (<fi:CollectionRef>): *contains the elements necessary for positive referencing of a data collection.*

**Competence** (<fi:Competence>): xxxxx

Proposed definition: *is a container to describe the competence or mandatory role of an institution involved in fisheries sector. "Functions fulfilled by management body or authority within its jurisdiction area" (Fisheries Inventory: Method and Guidelines. FIRMS, 2007).*

**Corporate author** (<ags:CreatorCorporate>): *Organization or agency primarily responsible for creating the intellectual content of the resource.*

**Corporate cover page** (<fi:CorporateCoverPage>): *Corporate Cover Page is a container for bibliographic elements commonly found on the cover or inset of a print publication, particularly title , corporate author , series, publisher. It is a mandatory element of fi:ObjectSource and contributes to build the citation of a domain object presented as FIGIS fact sheet or web site. The two required elements are: dc:Title - contributes part or entirety of the title of the web page, and the ags:CreatorCorporate tag.*

**Cover page** (<fi:CoverPage>): *Cover Page is a container for bibliographic elements commonly found on the cover or inset of a print publication, and particularly personal author(s), publication date, and abstract or description. It is an optional element of fi:ObjectSource and contributes to build the citation of a domain object presented as FIGIS fact sheet or web. If there are multiple creators use the ags:CreatorPersonal. dc:Created - this is the date of the creation of the intellectual content of the information resource. Recommended best practice for encoding the date value is defined in a profile of ISO 8601 [W3CDTF] and follows the YYYY-MM-DD format.*

**Date of creation** (<dcterms:Created>): *Date of creation of the information resource's intellectual content.*

**Discard Species** (<fi:DiscardSpecies>): xxxxx  
Proposed definition: *"Non commercial species or size caught with the main target ones" (Fisheries Inventory: Method and Guidelines. FIRMS, 2007).*

**Employment** (<fi:Employment>): *is a container for one or more fi:EmploymentEntry elements.*

**Employment entry** (<fi:EmploymentEntry>): *contains employment information for the container in which it is found. Use the class, type and sector attributes if desired.*

**End markets** (<fi:EndMarket>): *is a container for lists of countries that are the destination markets for a fisheries product or products.*

**Exploitation Unit Reference** (<fi:FishingActivityRef>): *is one of three components defining a fishery. It is a very open Standard containing the Ref elements for gear and vessel types as well as flagstates, handling modes, exploitation forms, and environments. At least one element is required to appear at least one time. If the exploitation unit uses a new kind of geartype not found in any classification system then the user should select fi:Geartype and create a new gear. If the operation is vessel-based and uses a new kind of vessel not found in any classification system then the user should select fi:Vesseltype and create a new vessel.*

**FIGIS identifier** (<fi:FigisID>): *FigisID is the FIGIS generated identification number of the domain element which contains fi:FIGISId.*

**Fish market** (<fi:MarketEntry>): *is a container for information about fishery products marketing. Use containers for more specific information. Use Tradeflow and consumption destination if desired.*

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**Fish markets** (<fi:Markets>): *The markets (national or international) are described in terms of the final destination of the fishery products, by geographical location and type of consumers. National fish markets supplied from imported products should also be described. Price levels in the markets can be provided when available, as well as employment generated, and necessary infrastructures. Use fi:MarketEntry for each instance of a separate market.*

**Fish utilisation** (<fi:FishUtilisation>): *Types of products and commodities derived from the fisheries, and related destinations (human consumption, fishmeal, animal feed). Description of the infrastructures involved in the processes. Use fi:FishUtilisationEntry for individual instances of post-harvest.*

**Fish utilisation entry** (<fi:FishUtilisationEntry>): *is a container for instances of fisheries postharvest information. Use Type to classify the post-harvest type and consumption destination if desired.*

**Fishers community** (<fi:Community>): *is the container for identifying people's communities (fishermen communities, ethnic groups, ...).*

**Fishery** (<fi: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.*

**Fishery ancestor** (<fi:FisheryAncestor>): xxxxx

Proposed definition: *Use FisheryAncestor to refer to a former fishery which originated from the current one.*

**Fishery area** (<fi:FisheryArea>): *FisheryArea is a container for information about the areas in which a fishery operates.*

**Fishery history** (<fi:FisheryHistory>): xxxxx

Proposed definition: *is a container for the historic information about a fishery.*

**Fishery identity** (<fi:FisheryIdent>): *FisheryIdent is a container that uses elements referencing Species, Location, and Exploitation Units to positively identify a fishery. It may contain a title and must contain one or more of each of the following: a species, an area or environment, and an exploitation unit.*

**Fishery indicator** (<fi:FisheryIndicator>): xxxxx

Proposed definition: *Fishery indicator is a container for the description of specific aspects of a fishing activity (e.g. Catch, Effort, Fishing capacity...). Use a combination of its attributes to qualify the indicator.*

**Fishery reference** (<fi:FisheryRef>): *Element used to refer to a fishery domain element. It contains the various domain elements which altogether enable positive Referencing of a Fishery.*

**Fishery status and trends** (<fi:FisheryStatusTrend>): *contains status and trend information about a fishery.*

**Fishery structure** (<fi:FisheryStruct>): *contains text and references to other fishery reference objects.*

**Fishing activity** (<fi:FisheryActivity>): xxxxx

Proposed definition: *is a comprehensive container for the descriptive features of a fishery (e.g. target species, gear type, fleet, seasonality..).*

**Fishing activity entry** (<fi:FisheryActivityEntry>): xxxxx

Proposed definition: *Use one fi:FisheryActivityEntry for each instance of a fishing activity.*

**Fishing technique**

**overview** (<fi:FishTechniqueOverview>): *FishTechniqueOverview contains high-level background information on a single instance of a fishing technique. Please use a new instance of the element for each new fishing technique.*

**Fishing technique reference** (<fi:FishTechniqueRef>): *contains positive ID References to all the domains that together make up the compound domain of Fishing Techniques.*

**FishingGround** (<fi:FishingGround>): *a container for information about the fishing grounds in which a fishery operates.*

**Fleet segment** (<fi:FleetSegment>): *contains information about a segment of a fishing sector's fleet. Select the Key used to organise the segment. Put each instance of a vessel type inside a new fi:VesselTypeOverview tag.*

**Foreign identifier** (<fi:ForeignID>): *Identifier in an external system of the FIGIS domain element which contains fi:ForeignID. Contains two attributes: one is a reference to the foreign system (CodeSystem), one for the identifier in that system (Code).*

**Gear type overview** (<fi:GeartypeOverview>): *GeartypeOverview is a general description of a single fishing gear.*

**Gear type reference** (<fi:GeartypeRef>): *is used for positive gear type identification of existing gear type objects. ISSSCFG or FIES code is required. Select a classification system, and enter the value in 'Code'.*

**Gear types** (<fi:Geartypes>): *Geartypes contains one or more instances of a general descriptions of fishing gears.*

**Geo-reporting standpoint** (<fi:GeoReport>): xxxxx

Proposed definition: *"The geo-reporting standpoint is key information for the identification of a fishery and provides the geographical scope for the identification of fisheries" (FIRMS TWG1, 2005). "Fishery inventories are carried out at different scales (global, regional, national or sub-national), each time from a specific geographic standpoint. In a reporting system like FIRMS, this [scale x geographic] standpoint is herewith defined as the geo-reporting standpoint. Examples of geo-reporting standpoint are Western Central Pacific Ocean (an SPC regional geo-reporting standpoint), Senegal (a national geo-reporting standpoint), or Florida (a USA sub-national geo-reporting standpoint). This geo-reporting standpoint defines the space within which fisheries are identified during an inventory" (FIRMS Information Management Policy).*

**History** (<fi:History>): *Historic information related to the element which contains fi:History. e.g. an historical review of the Stock or Resource exploitation, management regimes over time and their effect, and trends.*

**Horizontal distribution** (<fi:HorizontalDist>): xxxxx

Proposed definition: *inshore to offshore range in which the aquatic resource is distributed (e.g. littoral, neritic, oceanic ...).*

**Image** (<fi:Image>): *Reference to an image, including its meta-data (title, image file name, legend, ...) formatting parameters. An image element may also includes a nested image element (e.g. link to high resolution version of the same image).*

**Incidental Species** (<fi:IncidentalSpecies>): xxxxx

Proposed definition: *"Protected species (marine mammals, seabirds etc.) caught accidentally with the main target ones" (Fisheries Inventory: Method and Guidelines. FIRMS, 2007).*

**Infrastructure** (<fi:Infrastructure>): *contains infrastructure information for the container in which it is found.*

**Issues** (<fi:Issues>): *is a container for information about the fisheries issues with which an organisation is concerned.*

**Jurisdiction area** (<fi:JurisdictionArea>): xxxxx

Proposed definition: *JurisdictionArea is the area on which a management body or authority exerts its competence/mandatory role.*

**Knowledge Object** (<fi:KnowledgeObjRef>): *KnowledgeObjRef contains metadata and a link to a knowledge object.*

**Land area list** (<fi:LandAreaList>): *contains a list of land area references with optionally an ad hoc title for the corresponding group.*

**Legal definition** (<fi:LegalDefinition>): xxxxx

Proposed definition: *use LegalDefinition for defining a fishery in the legal sense.*

**Management** (<fi:Management>): *Information about the management of the fishery or the aquatic resource. This element includes an attribute describing whether Yes or Not the aquatic resource is considered a Management Unit. If Yes, a Jurisdiction area is required as primary or secondary georeferencing system. According to the FAO Fisheries Glossary, Management is "the art of taking measures affecting a resource and its exploitation with a view to achieving certain objectives, such as the maximisation 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".*

**Management advice** (<fi:Advice>): *"Management advice are those recommendations generally evolving from the assessment addressed to management authorities. It evolves from biological scientific advice (found under assessment results) but takes into account a broader spectrum of issues. Advice may be proposed under different management options, each one including a risk assessment element" (FIGIS-FIRMS 2002 workshop).*

**Management entity** (<fi:ManagementEntity>): xxxxx

Proposed definition: *is a container that incorporates the sub-elements management body or authority reference, the competence and the jurisdiction area.*

**Management method entry** (<fi:ManagementMethodEntry>): *Use one fi:ManagementMethodEntry for each instance of a management method.*

**Management methods** (<fi:ManagementMethods>): *Management methods describes the set of methods or measures affecting fisheries, and used to implement management strategies. Use one fi:ManagementMethodEntry for each instance of a measure.*

**Management objectives** (<fi:Objectives>): *are objectives related to missions, outputs, projects, etc. Use one fi:ObjectiveEntry for each instance of an objective. For management systems, description of main goals/objectives which the governing authority wishes to achieve within the system and strategies applied for that purpose. According to the FAO Fisheries Glossary, "a formally established, more or less quantitative target that is actively sought and provides a direction for management action".*

**Management regime** (<fi:ManagementRegime>): xxxxx

Proposed definition: *is a container describing the longstanding management arrangements and features of a fishery.*

**Management resolutions** (<fi:Resolutions>): *It contains management resolutions decided upon by Management authorities.*

**Management strategies** (<fi:Strategies>): *Management Strategies are strategies related to missions, outputs, projects, etc. Use one instance of fi:Strategy for each instance of a Strategy.*

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**Management system reference** (<fi:ManageSystemRef>): *Element used to refer to a Management System domain element. It contains the domain elements such as Management authority, Jurisdiction, Fishery Management Unit, which altogether enable positive Referencing of a Management System.*

**Management unit** (<ManagementUnit>): *An aquatic resource or fishery is declared as [Fishery] Management Unit if it is effectively the focus for the application of selected management methods and measures, within the broader framework of a management system. According to the FAO Glossary for Responsible Fishing, "a Fishery Management Unit (FMU) is a fishery or a portion of a fishery identified in a Fishery Management Plan (FMP) relevant to the FMP's management objectives." FMU's may be organised around fisheries biological, geographic, economic, technical, social or ecological dimensions , and the makeup and attribute of a fishery management unit depends mainly on the FMP's management objectives.*

**Maximum** (<fi:Max>): *contains a numeric maximum value.*

**Methodology** (<fi:Methodology>): *Methodology is the science behind the method: "a description of how the generic method has been applied in the context of the current assessment, considering shortcomings on the available data, expert knowledge, assumptions, ..." (FIGIS-FIRMS 2002 workshop).*

**Minimum** (<fi:Min>): *contains a numeric minimum value.*

**Monitoring system** (<fi:MonitoringSystem>): xxxxx  
 Proposed definition: *"Systematic recording and periodic analysis of information over time" (FAO Aquaculture Glossary). Use one fi:MonitoringSystemEntry for each instance of a monitoring system.*

**Monitoring system entry** (<fi:MonitoringSystemEntry>): xxxxx  
 Proposed definition: *Use one fi:MonitoringSystemEntry for each instance of a monitoring system.*

**Negotiation process** (<fi:NegotiationProcess>): xxxxx  
 Proposed definition: *is a container for describing the process of negotiation on fishery management policy.*

**Objective entry** (<fi:ObjectiveEntry>): *Use one fi:ObjectiveEntry for each instance of an objective. For management systems, description of main goals/objectives which the governing authority wishes to achieve within the system and strategies applied for that purpose.*

**Org reference** (<fi:OrgRef>): *allows for positive referencing of FIGIS institution objects.*

**Origin** (<fi:Origin>): *is a container for lists of countries that are the originator for fisheries products.*

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**Outlook** (<fi:Outlook>): *contains information about Fisheries Topic outlooks.*

**Overview** (<fi:Overview>): *contains high-level information about an instance. Use a new element for each instance.*

**Personal author** (<ags:CreatorPersonal>): *Person primarily responsible for creating the intellectual content of the resource.*

**Ports** (<fi:Ports>): *is a container for the port(s) from which the fleet operates.*

**Post harvest uses** (<fi:PostHarvest>): *is a container for post harvest uses information.*

**Price** (<fi:Price>): *contains information on an object's price.*

**Problem entry** (<fi:ProblemEntry>): *Use one fi:ProblemEntry for each instance of a problem.*

**Problems** (<fi:Problems>): *It contains information about management problems.*

**Projection** (<fi:Projection>): *Projection contains stock projections and policy options.*

**Publisher** (<dc:Publisher>): *An entity responsible for making the resource available, therefore likely to hold copyrights. Examples of a Publisher include a person, an organisation, or a service. Typically, the name of a Publisher should be used to indicate the entity.*

**Range** (<fi:Range>): *contains a range, generally minimum through maximum.*

**Reference point** (<fi:RefPoint>): *Reference Point contains reference point data for a stock or a fishery. According to the FAO Fisheries Glossary, "a reference point indicates a particular state of a fishery indicator 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)".*

**Related fisheries** (<fi:RelatedFisheries>): *xxxxx*

Proposed definition: *is a container for Fishery references. Use the attribute Type to specify which is the relation between fisheries.*

**Related information** (<fi:RelatedResources>): *Literature of papers cited in the source text that may or may not have been used in the construction of the object , and/or are considered as 'suggested additional reading'. It is an element for entering literature info that has no direct relation with the origin of the data in the object: it can be considered as 'additional reading' information.*

*fi:RelatedResources contains a list of fi:BiblioEntry elements, which ARE NOT COLLECTED in the fi:Bibliography element. There can be ONLY ONE fi:RelatedResources in a given object, located at its root (This includes FIGISDoc).*

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**Related observations** (<fi:RelatedObs>): *contains references to Related observations.*

**Reporting year** (<fi:ReportingYear>): *Year, eventually followed by an index (e.g. 1999a), attached to the observation reporting status and trends on a Marine resource or Fishery. Generally year of the latest data available, or for which the latest indicators can be supplied. It is used in the construction of the Title of the observation. Reporting Year should not be confused with the Year of Publication.*  
Proposed definition: *Year, eventually followed by an index (e.g. 1999a), attached to the status and trends report on a Marine resource or Fishery. Use the "Type" attribute to indicate if the reporting year value refers to the "Reference Year", to the "Publication Year", or to the "Last Year of Data". Definition for those three types are: Reference Year: The year in which the scientific meeting (or equivalent scientific validation process) reviewed the status of the stock pertaining to the fact sheet. Publication Year: the year of publication of the scientific report where detailed information on the fact sheet is found. Last Year of Data: the most recent year for which data is available in the assessment pertaining to the fact sheet (FIRMS TWG2, 2008).*

**Resolution entry** (<fi:ResolutionEntry>): *Use one fi:ResolutionEntry for each instance of a resolution.*

**Resources exploited** (<fi:ResourcesExploited>): xxxxx  
Proposed definition: *is a container for documenting or referencing marine resource(s) exploited by the fishery.*

**Results** (<fi:Results>): *Results is a "description of the outputs of assessment at the level of each assessment model/method. It provides quantitative and/or qualitative details for each of the noticeable assessment indicators generated during the assessment" (FIGIS-FIRMS 2002 workshop). "As an overall synthesis of the different models/methods, Results is a description of the outputs of assessment, providing a synthesis embracing the set of assessment indicator values generated during the assessment and found meaningful to contribute to state and trends statement" (FIGIS-FIRMS 2002 workshop).*

**Scientific advice** (<fi:SciAdvice>): *Advice is a container for "scientific advice provided by the scientists at completion of the assessment. The nature of the advice is of strictly scientific nature, ie clean of any management or political consideration. It may deal with the data to be provided, the assessment tools to be used, or the orientations that should be taken to allow a stock to recover, associated with types of measures, or results of simulation" (FIGIS-FIRMS 2002 workshop).*

**Seasonality** (<fi:Season>): *Season is the times of year in which a fishery is active.*

**Series** (<fi:Series>): *Series contains the name of the series of which an information resource is a part.*

**Socioeconomic assessment** (<fi:SocioEconomicAssessment>): xxxxx

Proposed definition: *is a container for describing the socioeconomic assessment of a fishery.*

**Solution** (<fi:Solution>): *contains an instance of a solution.*

**Source of information** (<fi:Sources>): *Sources is a container for biblio entry elements. It is used to identify the source of a piece of data within an object when it is not part of a bibliography. For example, an editor inserting a table of data from a FAO dataset into the middle of an object might cite FAO using fi:Sources. Use an instance of fi:BiblioEntry for each separate citation. Use fi:BiblioEntryLink to point a source citation to an existing fi:BiblioEntry anywhere in the FIGISDoc. fi:Sources contains a list of fi:BiblioEntry. fi:Sources can be found at any level where there is not an fi:ObjectSource.*

**Spatial scale** (<fi:SpatialScale>): *Spatial scale contains a standard term such as Global, Regional (e.g. for the whole Atlantic), sub-regional (e.g. for a part of the Atlantic), national, local (for sub-national levels).*

**Species list** (<fi:SpeciesList>): *contains a list of species references with optionally an ad hoc title for the corresponding group.*

**Species reference** (<fi:SpeciesRef>): *Element used to refer to a Species domain element. It contains various species classification systems (taxonomic, ISSCAAP, ...) and codes (including scientific names) used for positive referencing of a species.*

**Strategy entry** (<fi:StrategyEntry>): *Use one fi:StrategyEntry for each instance of a strategy.*

**Table** (<fi:Table>): *Table formatted in HTML, including meta-data attribute (e.g. title) and formatting parameter.*

**Target Species** (<fi:TargetSpecies>): *contains the species targeted by a gear type, vessel type, technique, fishery or measure.*

**Text block** (<fi:Text>): *Text container, which might include an optional Title, as well as HTML formatting tags within the CDATA text string element.*

**Thematic Approach** (<fi:ThematicApproach>): xxxxx

Proposed definition: *"The thematic approach highlights the disciplinary viewpoint prevailing in the identification of fishery units" (modified from FIRMS Information Management Policy). "The identification of fisheries in an inventory is often the result of successive segmentations driven by different thematic reporting approaches: Resources (primarily for biologists), Métier (primarily for biologists, technologists and socioeconomists), Fishing technique (primarily for technologists), Production system (primarily for socio-economists), Management system (primarily for managers)" (FIRMS TWG2 2008, modified from FIRMS TWG1, 2005).*

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**Title** (<dc:Title>): *Name given to the element which contains dc:Title. The title is sometimes used to search for a FIGIS reference. It is also used in some reports as a paragraph header for the presentation of the content of dc:Title's wrapping element.*

**Trade** (<fi:Trade>): *contains information about fishing trade. Use fi:Tradeflows for import/export text.*

**Tradeflow entry** (<fi:TradeflowEntry>): *contains information about fishing trade flows. Use the Type attribute to delimit the tag.*

**Tradeflows** (<fi:Tradeflows>): *contains information about fishing trade flows. Use fi:TradeflowEntry for individual tradeflows.*

**Trip duration** (<fi:TripDuration>): *"Average duration of fishing trip specifying in which unit it is expressed" (Fisheries Inventory: Method and Guidelines. FIRMS, 2007).*

**Type of Production System** (<fi:TypeofProductionSystem>): xxxxx  
 Proposed definition: *is a container for indicating the scale at which a fishery operates (e.g. Artisanal-Small Scale, Commercial- Small Scale, Semi industrial).*

**Vertical distribution** (<fi:VerticalDist>): xxxxx  
 Proposed definition: *type of vertical distribution in which the aquatic resource is distributed (e.g. demersal, benthic, pelagic...).*

**Vessel type overview** (<fi:VesseltypeOverview>): *VesseltypeOverview contains high-level information about one instance of one vesseltype. Use a new element for each vesseltype.*

**Vessel type reference** (<fi:VesseltypeRef>): *is used to positively identify vessel types. ISSSCFV or FIES code is required. Select a classification system, and enter the value in 'Code'.*

**Vessel types** (<fi:Vesseltypes>): *Vesseltypes contains high-level information about vesseltypes. Use a new Entry element for each vesseltype instance.*

**Water area list** (<fi:WaterAreaList>): *contains a group of water area references with optionally an ad hoc title for the corresponding group.*

**Water area overview** (<fi:WaterAreaOverview>): *"Description of the water area in which the aquatic resource is located, including environmental characteristics, jurisdictional limits, ..." (FIGIS-FIRMS 2002 workshop). Water Area Overview might contain a reference list of areas in which a species or aquatic resource is found or employed.*

**Water area reference** (<fi:WaterAreaRef>): *Element used to refer to a Water Area domain element. It contains water geographic systems and codes (FAO Area, Five Degree Square, ISO country, regional/local codes, water competence zones and environments, ...) used for positive referencing of a water area.*

**Water environment** (<fi:DepthZone>): *Describes, through the use of standard terms, the water environment in which an aquatic resource is distributed.*