# SELECTING ECOSYSTEM INDICATORS FOR FISHERIES TARGETING HIGHLY MIGRATORY SPECIES

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## Abstract

Several international instruments have set the minimum standards and key principles to guide the implementation of an ecosystem approach for the management and conservation of marine living resources. While the IOTC Convention Agreement does not make reference to the principles of the precautionary or ecosystem approach, since its creation it has had the ability to assimilate these principles in the form of adoption of formal management measures. Yet these management measures have not provided practical guidance on how to make operational an Ecosystem Approach to Fisheries Management (EAFM) within IOTC. The Specific Contract N$^0$ 2 under the Framework Contract EASME/EMFF/2016/008 provisions of Scientific Advice for Fisheries Beyond EU Waters addresses the current impediments and provides solutions that shall support the implementation of an EAFM through collaboration and consultation with the key tuna RFMOs. This Specific Contract has three main objectives: (1) Provide a list of ecosystem indicators (and guidance for associated reference points) to monitor impacts of fisheries targeting Highly Migratory Species (HMS); (2) Provide criteria and guidelines to choose ecological regions with meaningful ecological boundaries for HMS and its fisheries in order to facilitate the operationalization an EAFM in marine pelagic ecosystems; and (3) Provide guidelines for an EAFM plan using two ecoregions as case studies, one within ICCAT and one within the IOTC convention areas. The results of this contract will be imbedded in the EAFM process that IOTC is carrying out through a close collaboration and communication with the Scientific Committee. Ultimately, the products created throughout this contract will aim to facilitate the linkage between ecosystem science and fisheries management to foster the operationalization of an EAFM.

## Introduction

Several international instruments such as the Convention of Migratory Fish Species and the UN Fish Stocks Agreement have set the minimum standards and key principles to guide the implementation of an ecosystem approach for the management and conservation of marine living resources (Meltzer 2009). Along these lines, within the EU Common Fishery Policy and the Marine Strategy Framework Directive have also stated the need to manage fisheries accounting for ecosystem considerations by operationalizing an ecosystem approach to fisheries management (EAFM). However, both the international and EU instruments have not provided practical guidance on how to make operational an EAFM. Furthermore, ecosystem indicators to monitor the impact of fisheries on marine ecosystems have been mostly developed and tested for the shelf seas or coastal areas, in particular for monitoring demersal fish resources, and little progress has been made for Highly Migratory Species (HMS) in oceanic systems (Lodge et al. 2007). This leaves an opportunity for regional plans to be developed and put into practice to implement an ecosystem approach for HMS under the purview of tuna Regional Fisheries Management Organizations (RFMOs).

While tuna RFMOs are already considering an ecosystem approach, its implementation has been patchy and in absence of a long-term plan, vision and guidance of how to operationalize it (Juan-Jordá et al. 2016). Furthermore, there are also some practical impediments to the operationalization of an ecosystem approach to manage HMS, including (1) the scarcity of ecological indicators (and associated reference points and selection criteria) to track the impacts of HMS on oceanic ecosystems, as most indicators have been developed within the context of coastal fisheries, (2) the lack of defined ecoregions to base a long-term ecosystem management plan with associated indicators to monitor the impacts of fisheries, and (3) the lack of pre-agreed operational objectives or a plan to ensure ecosystem and socio-economic considerations are accounted for management advice and decision making.

The Specific Contract N$^0$ 2 under the Framework Contract EASME/EMFF/2016/008 provisions of Scientific Advice for Fisheries Beyond EU Waters addresses the current impediments and provides solutions that shall support the implementation of an EAFM through collaboration and consultation with the key tuna RFMOs.

## Main objectives

The main purpose of Specific Contract N$^0$ 2 is to provide a list of ecosystem indicators (and guidance for associated reference points) to monitor impacts of fisheries targeting Highly Migratory Species (HMS) and that will cover all ecological components of an Ecosystem Approach to Fisheries Management (EAFM), including target species, bycatch and threatened species, trophic relationships (refer to interactions between components and not a component in itself) and habitats. The study will also provide criteria and guidelines to choose ecological regions with

meaningful ecological boundaries for HMS and its fisheries in order to facilitate the operationalization an EAFM in marine pelagic ecosystems. The study will provide an integrative framework and an EAFM plan using two ecoregions as case studies within the International Commission for the Conservation of Atlantic Tunas (ICCAT) and Indian Ocean Tuna Commission (IOTC) convention areas. This EAFM plan will facilitate the linkage between ecosystem science and fisheries management and will include a selection of indicators and guidance to set reference points to monitor the impacts of fisheries targeting HMS on all ecological components of the ecosystem. It will also suggest potential management actions to be activated when necessary. Finally, this study will provide recommendations to better link ecosystem indicators and management to foster the implementation of an EAFM.

Specifically, this Specific Contract will carry out the following tasks (Figure 1):

- Task 1 – Set the context and scope of this study by examining and analyzing how the EAFM is being implemented around the world at different levels of decision making (e.g. national, regional and high seas)
- Task 2 – Select ecosystem indicators and identify data requirements in the context of fisheries targeting HMS
- Task 3 – Define the geographical scales relevant to use ecosystem indicators and operationalization of an EAFM
- Task 4 – Provide guidance of how reference points should be set for the selected ecosystem indicators, and explore different frameworks to facilitate the link between the ecosystem indicators and management options
- Task 5 – Organize a workshop between DG MARE, EASME and scientists of the EU consortium to choose two case studies, one in ICCAT and one in IOTC, to develop ecosystem plans
- Task 6 –Develop a road map to inform potential ecosystem plans in the two case study regions
- Task 7 – Identify issues and gaps of information, provide recommendations to facilitate the implementation of the EAFM plans for fisheries of HMS and define future activities

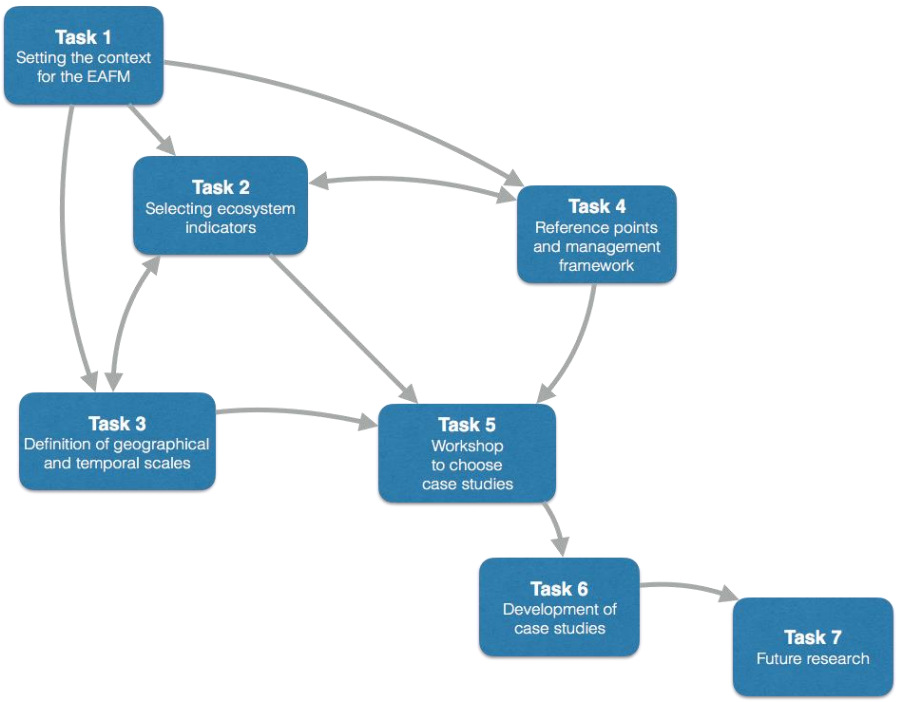


Figure 1. Flow chart of tasks of Specific Contract N$^0$ 2.

**Main partners and timeline**

The Specific Contract, which will last 18 months and started in December 2016, will be conducted by several EU partners (AZTI, CEFAS, IEO, WMR, IPMA, IRD, MRAG), who have been selected based on their skills and profiles to be complementary in the development and implementation process of the contract (Table 1).

Table 1. List of participants on the Specific Contract N$^0$ 2.

| **Participant no.** | **Participant organization name** | **Participant acronym/ short name** | **Country** |
|---|---|---|---|
| 1 (Coordinator) | AZTI | AZTI | Spain |
| 2 | Centre for Environment, Fisheries and Aquaculture Science | CEFAS | United Kingdom |
| 3 | Instituto Español de Oceanografía | IEO | Spain |
| 4 | Wageningen Marine Research (formerly known as Institute for Marine Resources and Ecosystem Studies) | WMR (formerly known as IMARES) | Netherlands |
| 5 | Instituto Português do Mar e da | IPMA | Portugal |

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|---|---|---|---|
| | Atmosfera | | |
| 6 | Institut de recherche pour le développement | IRD | France |
| 7 | MRAG Ltd. | MRAG | United Kingdom |

**Main scientific products**

The Specific Contract will deliver the following main scientific products which aim to create fruitful discussions and provide solutions that shall support the implementation of an EAFM through collaboration and consultation with the key tuna RFMOs.

- List of best practices and lessons from the world examples that could be transferred to inform the science and management in tuna RFMOs
- List of ecosystem indicators with potential to inform the operationalization of an EAFM in tuna RFMOs
- Guidelines and criteria to inform potential discussions on what could be considered ideal versus practical ecoregions that could be used as assessment units to implement an EAFM
- Guidance on how reference points should be set for the selected ecosystem indicators
- A template for an indicator-based ecosystem report card to facilitate the linkage between ecosystem science and fisheries management and advice
- Development of guidelines (road map) to inform EAFM plans in two case study regions, one in the ICCAT Convention Area and one in the IOTC Convention Area.

**Relevance for IOTC process in implementing an EAFM**

While the IOTC Convention Agreement does not make reference to the principles of the precautionary or ecosystem approach, since its creation it has had the ability to assimilate these principles in the form of adoption of formal management measures. Yet these management measures in IOTC have not provided practical guidance on how to make operational an EAFM. The main scientific products and results of this Specific Contract aim to create fruitful discussions and provide solutions that shall support the implementation of an EAFM in the IOTC Convention Area. It is intended that the results of this contract will be imbedded in the EAFM process that IOTC is carrying out through a close collaboration and communication with the Scientific Committee. Ultimately, the products created throughout this contract will aim to facilitate the linkage between ecosystem science and fisheries management to foster the operationalization of an EAFM.

## References

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