# THE ECOSYSTEM SUBCOMMITTEE'S LONG TERM RESEARCH NEEDS AND PRIORITIES AS OUTLINED IN THE 2015-2020 SCRS SCIENCE STRATEGIC PLAN

Developed with the full participation of the 2016 Ecosystems Subcommittee

*SUMMARY*

*In 2015 the Subcommittee for Ecosystem determined that it must develop a research plan that was consistent with the goals and objectives outlined in the SCRS Science Strategic Plan (SSSP). Elements of the SSSP pertaining to the subcommittee were prioritized and organized into a 3 phase plan involving cooperation from multiple groups and funding from both internal and external sources.*

*RÉSUMÉ*

*En 2015, le Sous-comité des écosystèmes a déterminé qu'il devrait élaborer un plan de recherche conforme aux objectifs et buts définis dans le plan stratégique pour la science du SCRS. Un ordre de priorité des éléments de ce plan relatifs au Sous-comité a été établi et ceux-ci ont été organisés dans un plan en trois phases impliquant la coopération de plusieurs groupes et le financement par des sources tant internes qu'externes.*

*RESUMEN*

*En 2015, el Subcomité de ecosistemas determinó que debía elaborar un plan de investigación que fuera coherente con los objetivos y las metas descritos en el Plan estratégico para la ciencia del SCRS (SSSP). Se establecieron prioridades entre los elementos del SSSP relacionados con el Subcomité y se organizaron en un plan de 3 fases que implicaba la colaboración de múltiples grupos y la financiación a través de fuentes tanto externas como internas.*

*KEYWORDS*

*Ecosystems, EBFM, Research plan, By-catch*

## 1. Introduction

The SCRS adopted the 2015-2020 Science Strategic Plan (Anonymous 2014) for the functioning and orientation of the SCRS at its meeting in 2014. The strategic plan report provides the goals, objectives and strategies for 5 main thematic elements:

1. Data Collection
2. Dialogue and Communication
3. Participation and Capacity Building
4. Research Priorities
5. Stock Assessments and Advice

Language or objectives related to ecosystems is found in 4 of them. In order for the Subcommittee on Ecosystems to achieve the relevant goals and objectives outlined in the report, it must properly evaluate and prioritize each and establish a long term plan. What follows are the goals and objectives related to ecosystems within those 4 thematic elements and the priorities as determined by the Subcommittee. Formation of a long term work plan will guide meeting progress and intersessional work in the years to come.

## 2. Goals and objectives

The themes in which text specific to ecosystems can be found are Data collection, Research priorities, Stock assessments and advice and Communication. The relevant goals and objectives are provided in their entirety in Appendix I. Briefly these are:

1. *Data collection:*
    a) *3.2 Elucidate data needs for Provision of Ecosystem Based Fishery Management Advice*
2. *Research priorities:*
    a) *7.1 Identify and fill knowledge gaps so as to be able to provide scientific advice that includes ecosystem considerations (e.g. assessment of bycatch species, mitigation strategies, environmental effects on population dynamics, fishing impacts on the ecosystem, socio economic aspects, etc.)*
3. *Stock assessments and advice:*
    a) *3.1 Focus on the fishery and its role in the ecosystem, including the commercial and non-commercial species as well as the habitat.*
    b) *3.2 Enhance the Ecosystem Approach to Fisheries Management (EAFM)*
    c) *3.3 Develop short term, medium and long-term objectives to enhance ecosystem based approaches*
4. *Communication:*
    a) *6.1 Work on the Ontology of the durability of tuna fisheries in the epipelagic ecosystem.*

Where the objectives are not explicit, further clarification is provided in the description of strategies suggested to achieve them (**Appendix 1**). Together the objectives and strategies emphasize the need to:

1. Apply integrated ecosystem models to determine the components of the ecosystem we should monitor and hence the data to be collected.

2. Define protocols for gathering socio-economic data from CPCs and upgrade ICCAT database to accept it.

3. Provide advice related to:

    a) Assessment of status of bycatch species

    b) Mitigation strategies to reduce bycatch and incidental mortality

    c) Environmental effects on population dynamics

    d) Fishing impacts on the ecosystem

    e) Socio economic importance of the large pelagic fisheries

    These objectives involve workshops for b) and identifying indicators for a), c), d) and e). The involvement of outside experts is also recommended as well as developing a list of needs and a research plan.

4. Identify major ecosystem drivers of stocks and create testable hypotheses that relate them to various life history parameters like recruitment, growth, migratory patterns, etc.

5. Collaborate with the Commission to establish EBFM goals and objectives.

6. Monitor and quantify forage base.

7. Workshops to review, evaluate, and develop EAFM plans.

8. Establish dialogue with other tRFMOs and access GEF/ABNJ funding.

9. Establish list of relevant ecosystem indicators and formally and explicitly include these indicators into current stock assessments.

10. Management advice considering critical indicators.

11. Apply EBFM to convention area.

12. Ontology of the EBFM mission.

The objectives and strategies represent a fairly long "to do list" with obvious dependencies and a hierarchy that may help to prioritize the work. An effort to disentangle the elements and organize them with respect to priority and timing is given in **Figure 1**. The elements have been organized into 5 major components: Dialogue, Capacity, Data, Indicators and Products. Clearly the products drive the planning so defining these and understanding their data and methodological demands is important to developing the work plan in the short term. But it is also clear that to achieve the work plan objectives requires collaboration and dialogue internally with the Commission, managers and other working groups and externally with other tRFMOs and experts in non-fisheries science disciplines. Finally the catalyst to drive the plan forward will be additional funding, either from member CPCs or externally from groups like GEF/ABNJ which will support workshops, experts and other capacity building initiatives.

While the graphic presented in **Figure 1** indicates the elements that are "in play", and it organizes them to some degree, it in no way represents a plan. How then to proceed?

## 3. Work plan

The following is a proposed plan for achieving the goals and objectives outlined in the SCRS Science Strategic Plan (SSSP) as it pertains to the Subcommittee on Ecosystems.

***Phase 1 proposal***

One goal in the SSSP is to apply an ecosystem based approach to fisheries management in the entire convention area. The elements to be included in the framework need to be identified. The importance of these elements and their data requirements could be identified using ecosystem models; however the exercise of populating the framework itself will also serve to identify data deficiencies. Dialogue with the Commission is required to define the EBFM goals and objectives for each component of the framework but this can be achieved iteratively via a proposition and tweaking process. Defining status and pressure indicators, reference levels and management actions are other features of the framework that must be considered for each component.

This first step should involve the participation of each of the species working groups either from inception or in review of a draft framework. In either case, a week long workshop is recommended.

***Phase 2 proposal***

The draft framework created in phase 1 needs to be operationalized by populating each component with data. This exercise will identify gaps both in terms of data, infrastructure and expertise. Consequently, the work to be completed in this phase will involve collaborating with the Secretariat, other tRFMOs and experts to fill the gaps. To that end emphasis will also be placed on finding the relevant status indicators and ecosystem drivers for each component in the framework and creating testable hypotheses relating the ecosystem drivers to various life history parameters.

To make the content of the EBFM framework accessible and useful, it will be important to generate reports based on it. These reports must summarize the status of each component relative to its reference, relative to similar components, relative to environmental drivers and relative to its dependencies. The entire content and format of the report must be developed as well as the mechanism by which the framework is populated by data and the report generated including the necessary infrastructure that supports it.

Progress in this phase can be expedited by hosting workshops rather than relying on annual Subcommittee meetings. However, even with the extra support, it is likely that this phase will take a number of years to complete due to the dialogue that will be required.

***Phase 3 proposal***

In the last phase, consideration should be given to regionalizing the existing EBFM framework to subareas within the convention area by developing a series of separate EBFM frameworks. Given the volume of work this entails, some consideration needs to be given to scheduling the order in which areas develop an EBFM framework. Completion of this task also depends on consultation with the species working groups, the Secretariat, the Commission, experts and other tRFMOs but could be completed by a contractor using the existing framework as guidance.

***Short and Medium term Objectives identified by the Group***

The Sub-Committee determined that the following ecosystem related activities would be important to complete in the coming years with the full awareness of the other SCRS Working Groups:

*Short Term*

1. To develop an **Ecosystem Report Card** that will be reviewed by the Ecosystems subcommittee in 2017 The purpose is:

    a) Synthesize and summarize multiple and complex information into a smaller number of grades and distinct ecosystem components.
    b) Effectively communicate the status and trends of several ecosystem components to the Commission and other stakeholders.
    c) Engage the Commission and other stakeholders.

2. To request an agenda item in the next Dialogue Meeting between Scientists and Managers (discussed this year by the SCRS).

The purpose is:

a) Present the Ecosystem Report Card and Ecosystem framework.
b) Engage the Commission in the development of Ecosystem Report Card and Ecosystem framework.
c) Increase awareness of the need to account for ecosystem consideration in fisheries management.

3. To implement new mechanisms or improve current mechanisms to effectively coordinate, integrate and communicate ecosystem-relevant research across the ICCAT Species Working Groups and within the SCRS.

The process is:

a) Make accessible relevant data, outputs and products across the groups in a usable format.
b) At the beginning of each meeting provide an update of the main outcomes from the previous year.
    i. Summary of the main outcomes of the last Commission meeting relevant to the activities of the Ecosystems subcommittee.
    ii. Summary of the main outcomes of the last SCRS meeting relevant to the activities of the Ecosystems subcommittee.
    iii. Summary of relevant activities, outputs, initiatives derived from the other Working Groups relevant to the activities of the Ecosystems subcommittee.

c) At the end of the meeting, list any decision, activity, request and product, news that might be relevant to the other Working Groups.

*Medium Term*

1. To develop an **Ecosystem Considerations Report** (or Ecosystem Synthesis Report) to be incorporated in the Ecosystems subcommittee work plan and for inclusion in the ICCAT manual in a section on Ecosystems Based Fisheries Management.

The purpose is:

a) Synthesize and integrate information of the main ecosystem components, processes and interactions in the ICCAT ecosystem using existing analysis and reports to provide an understanding of the ecosystem context in which ICCAT fisheries operate.

b) Provide a guidance document for the Ecosystems subcommittee, and ultimately a guidance document for the Commission to provide an ecosystem context for fisheries management decisions.

c) Provide a living document where ecosystem research, research priorities (long and short), and data gaps are raised and used to updated the work program on a year schedule.

2. To conduct a quantitative **Ecosystem Risk Assessment (ERA)** of the important ecological, human and institutional interactions occurring within ICCAT Ecosystem that could have implications for fisheries management with the input and participation from the main stakeholders/Commission.

The purpose is:

a) Use the ERA as a tool to (a) define potential relevant ecological, human and institutional interactions and (b) assess their likelihood of occurrence and magnitude of their impact (ecological or economic impact), in order to provide general guidance to the Commission about the interactions on which to focus further research and attention.

b) Provide guidance to the Commission about each potential interaction, inform the Commission about what it is already doing to address the impacts and risk identified for each interaction, and identify actions that the Commission could initiate.

c) Establish a risk assessment framework within an ecosystem context to identify preferred actions with respect to management objectives, and act as a tool to make choices or avoid actions –e.g. support ongoing effort to develop MSE for single species with the aim to incorporate ecosystem considerations if needed.

d) Engage the Commission and increase awareness of the need to incorporate ecosystem consideration into decision making.

## 4. Summary

In 2015 the Subcommittee for Ecosystem determined that it must develop a research plan that was consistent with the goals and objectives outlined in the SCRS Science Strategic Plan (SSSP). Elements of the SSSP pertaining to the subcommittee were prioritized and organized into a 3 phase plan involving cooperation from multiple groups and funding from both internal and external sources. While it was recognized that the Subcommittee could contribute to some elements of the plan, the requirement for significant external involvement would mean that the best contribution would be one of oversight and review of the progress on the plan.

## References

Anonymous. 2014. 2015-2020 SCRS science strategic plan http://iccat.int/documents/scrs/strategic-plan_en.pdf.

**Appendix 1**

What follows are portions of the 2015-2020 Science Strategic Plan that pertain directly to the Subcommittee on Ecosystems.

***Data collection***

*GOAL 3 DEVELOP PROGRAMS FOR THE COLLECTION AND COMPILATION OF ADDITIONAL DATA NECESSARY TO IMPROVE THE SCIENTIFIC ADVICE TO THE COMMISSION*

*3.2 Elucidate data needs for Provision of Ecosystem Based Fishery Management Advice*

*Strategies*

*3.2.1 Defining data collection needed for the implementation of EBFM through application of integrated ecosystem models to identify key ecosystem components which need to be monitored in order to more broadly apply EBFM.*

*3.2.2 Include in the national sampling programs the collection of socio-economic information from the large pelagic fisheries by developing protocols for the collection of socio-economic data for large pelagic fisheries and upgrading ICCAT databases to include data other than biological data.*

*Measurable target*

*Development of protocols for the collection of socio-economic data. Application of integrated ecosystem models.*

***Research priorities***

*GOAL 7 COVER RESEARCH NEEDS SO AS TO BE ABLE TO INCLUDE ECOSYSTEM CONSIDERATIONS IN THE PROVISION OF SCIENTIFIC ADVICE*

*7.1 Identify and fill knowledge gaps so as to be able to provide scientific advice that includes ecosystem considerations (e.g. assessment of bycatch species, mitigation strategies, environmental effects on population dynamics, fishing impacts on the ecosystem, socio economic aspects, etc.)*

*Strategies*

*7.1.1 Assessing the adequacy of existing ecosystem indicators in other forums and/or development of new indicators.*

*7.1.2 Subcommittee on Ecosystems and Bycatch to list the specific research needs and develop prioritised research plans.*

*7.1.3 Subcommittee on Ecosystems and Bycatch to organise specific workshops (e.g. on tropical tuna issues including moratorium effects, mitigation aspects, multispecies stock assessments, FAD effects and management plans, etc.).*

*7.1.4 Enhancing participation of researchers from different disciplines (oceanography, climate, socioeconomics, etc.) in the SCRS process (especially on the Subcommittee on Ecosystem and Bycatch) by invitation and appointment of specific tasks.*

*Measurable target*

*Development of WG reports with specific Research Plans.*

*An increasing the number of people by research discipline participating in the SCRS.*

***Stock assessments and advice***

*GOAL 3 ADVANCE ECOSYSTEM BASED FISHERY MANAGEMENT ADVICE*

*3.1 Focus on the fishery and its role in the ecosystem, including the commercial and non-commercial species as well as the habitat.*

*Strategies*

*3.1.1 Through a dialogue with the Commission, determining and making clear the Commission EBFM Goals and Objectives.*

*3.1.2 Identifying the major ecosystem correlates and drivers of the various ICCAT stocks under consideration.*

*3.1.3 Creating testable hypotheses relating these ecosystem drivers to various life history parameters (recruitment, growth, migratory patterns, etc.) for incorporation into stock assessments either directly or indirectly.*

*3.1.4 Creation of a research effort to quantify and monitor in time and space (to the extent possible) the forage base for the various ecosystem functional groups under ICCAT consideration.*

*Measurable target*

*Create a proposal of possible EBFM goals and objectives to the Commission referring to those currently used by other RFMOs that are further along in this process.*

*Support a post-doc or similar position to establish an ecosystem (multi-species, multi-functional group) operating model that can be used to test the aforementioned hypotheses.*

*3.2 Enhance the Ecosystem Approach to Fisheries Management (EAFM)*

*Strategies*

*3.2.1 Organising workshops to review, evaluate, and develop EAFM plans relevant to the tuna fisheries in the ICCAT Convention area.*

*3.2.2 Supporting dialogue on Integrated Ecosystem Assessment approaches within and between the RMFOs.*

*3.2.3 Taking advantage of the GEF/ABNJ funding that ICCAT will receive for this purpose.*

*3.2.4 Defining data collection needed for the implementation of EBFM through application of Integrated ecosystem models to identify key ecosystem components which need to be monitored in order to more broadly apply EBFM.*

*Measurable target*

*Host a workshop and invite outside expertise to collaborate with the Sub-Committee of Ecosystems to determine an effective approach to the creation of an Ecosystem Status Report.*

*In line with other RMFO, compilation of an Ecosystem Status Report that describes the current state and trends in selected ecosystem indicators for communicating this information to participating scientists and managers.*

*3.3 Develop short term, medium and long-term objectives to enhance ecosystem based approaches*

*Strategies*

*3.3.1 Determining a list of relevant ecosystem indicators that could be included in ICCAT stock assessments.*

*3.3.2 Formally and explicitly include these indicators into current stock assessments to the extent they are appropriate and constitute an improvement to the assessment.*

*3.3.3 Developing management advice that incorporates and considers these critical indicators.*

*3.3.4 Applying Integrated Ecosystem Based Approaches to the ICCAT Convention Area.*

*3.3.5 Conducting a meta-analysis of year/area effects on ICCAT species abundance.*

*Measurable target*

*Conduct a meta analysis of year/area effects on ICCAT species abundance with the goal of determining historic and recent changes in the spatial distribution of these species, possible regime shifts in productivity, and other relevant characterisations.*

***Communication***

*GOAL 6 IMPROVE THE MECHANISMS OF COMMUNICATION OF THE SCRS*

*6.1 Work on the Ontology of the durability of tuna fisheries in the epipelagic ecosystem.*

*Strategies*

*6.1.2 It is proposed to set up an ad hoc working group, related to the WGSAM, contracting an expert in ontological engineering (i.e. in graphic or textual representations) to analyse and represent the ontologies of the main SCRS missions (diagnosis and uncertainty, selection process of regulatory measure, an ecosystem approach to fisheries).*

*Measurable target*

*No measurable target has been identified.*

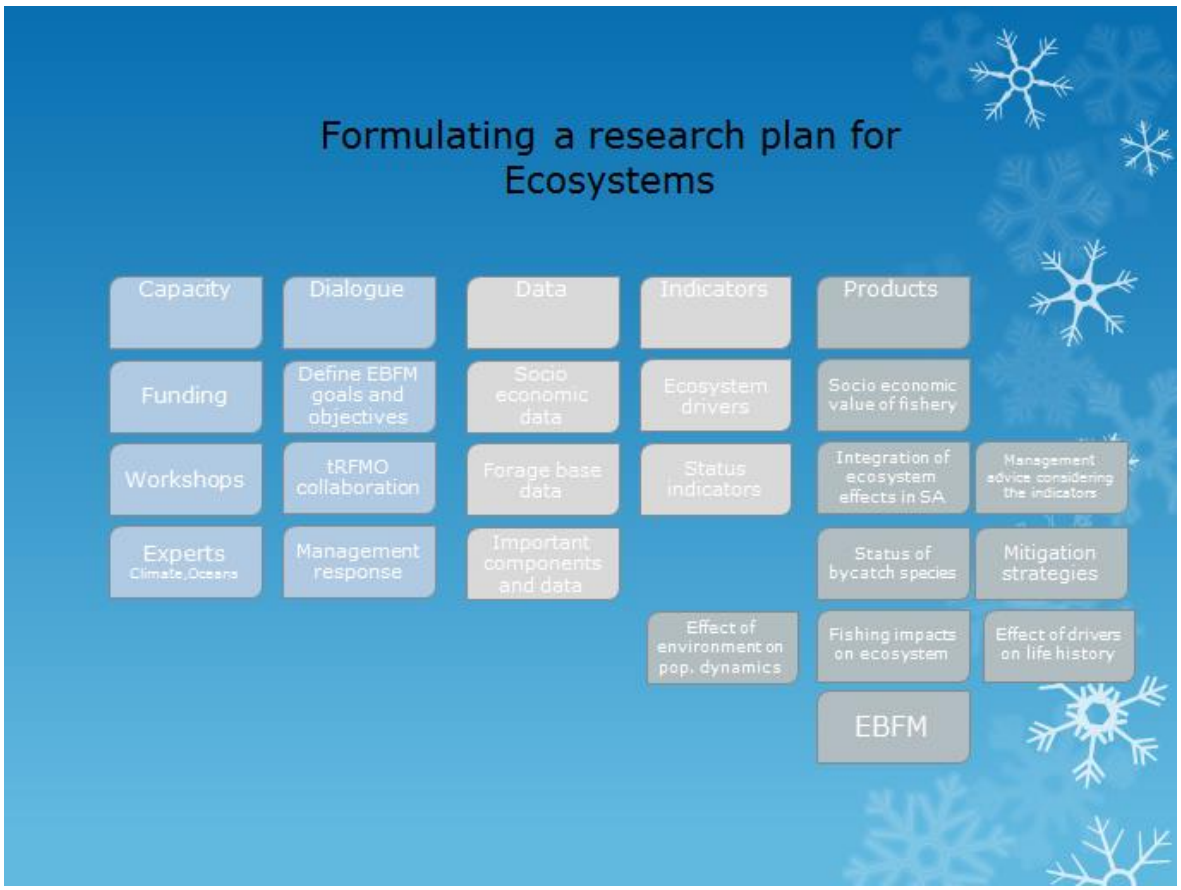


**Figure 1.** Elements of a research plan for the Subcommittee on Ecosystems based on EBFM goals and objectives described in the 2015-2020 SCRS Science Strategic Plan.