Review of t-RFMO Ecosystem Research to Inform a Workplan on EcoCards for the EPO (EB-02-02)

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2a Reunión del Grupo de Trabajo sobre Ecosistema y Captura Incidental - 5-6 de junio de 2024
2nd Meeting of the Permanent Working Group on Ecosystem and Bycatch, 05-06 June 2024
Outline

• Objectives of EB-02-02
• Background on needs for improved communication of ecosystem status
• Harmonizing reporting with other t-RFMOs

Proposed workplan to support implementation of EAFM
  ▪ development of “EcoCards” and “Ecosystem Status Assessments”
Objectives were to:

- Review and summarize available information on ecosystem research by each t-RFMO
- Examine tools that may be considered in developing an *EcoCard*
  - (e.g., indicators, ecosystem models, and spatial units: “ecoregions”)
- To consider this information to propose an IATTC workplan aimed at supporting decision making
  - (to ultimately restructure the EC report)
- Overarching goal:
  - Improve ecosystem-related communication and decision making for IATTC
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• In t-RFMOs, the *EcoCard* concept is in its infancy
  ▪ Candidate indicators have been identified by other t-RFMOs
  ▪ *EcoCard* initiatives have commenced in other t-RFMOs
  ▪ Specific indicators, *EcoCards*, and their spatial extent (“ecoregions”) have not yet been developed or adopted by the Commissions
  ▪ Timely to harmonize efforts to adapt and standardize tools & ecosystem-advice products
Background: Expansion of ecological research (IATTC mandates)

- Under the Antigua convention, the IATTC is responsible for ensuring the “long-term conservation and sustainable use of the stocks of tunas and tuna-like species and other associated species of fish taken by vessels fishing for tunas and tuna-like species in the eastern Pacific Ocean (EPO)”

- Article IV. “Where the status of target stocks or non-target or associated or dependent species is of concern, the members of the Commission shall subject such stocks and species to enhanced monitoring in order to review their status and the efficacy of conservation and management measures. They shall revise those measures regularly in the light of new scientific information available.”

- Article VII. “adopt, as necessary, conservation and management measures and recommendations for species belonging to the same ecosystem and that are affected by fishing for, or dependent on or associated with, the fish stocks covered by this Convention, with a view to maintaining or restoring populations of such species above levels at which their reproduction may become seriously threatened”
Background: Expansion of ecological research (IATTC’s SSP)

- **Data collection for scientific support of management** (n=13)

- **Life-history studies for scientific support of management** (n=12)

- **Sustainable fisheries** (n=33)

- **Ecological impacts of fisheries: assessment and mitigation** (n=23)**

- **Interactions among the environment, the ecosystem and fisheries** (n=13)**

- **Knowledge transfer and capacity building** (n=5)

- **Scientific excellence** (n=4)
Background: Need for improved communication

- **Purpose of Ecosystem Considerations (EC) report:**
  - Broadly describe fisheries impacts on the EPO ecosystem
  - Support EAFM and the decision-making process

- **Consequences of research expansion:**
  - The EC report has increased in length and complexity
  - Report is not optimal for communicating ecosystem status

- **Possible transition to shortened agendas (14th SAC):**
  - Scientific meetings focused on effectively responding to Commission needs
  - Background work related to staff’s recommendations for management
  - New meeting format reduces opportunities for detailed presentations

- **Restructure the EC report to improve communication (ecosystem-advice products):**
  - Indicator-based Ecosystem Report Card or “EcoCard”
  - Ecosystem Status Assessment
Background: The “EcoCard” concept

- What is an “EcoCard”? 
  - Visual tool to support implementation of EAFM
  - Summarized indicator-based “Ecosystem Report Card” to convey a suite of relevant bycatch, ecosystem, and climate indicators, among others, chosen to ‘best’ represent ecosystem status
  - Goal: to visually and succinctly represent ecosystem status and overall trends
Background: the “EcoCard” concept

- SST example [https://ecowatch.noaa.gov/thematic/sea-surface-temperature](https://ecowatch.noaa.gov/thematic/sea-surface-temperature)
Background: the “EcoCard” concept

- SST example https://ecowatch.noaa.gov/thematic/sea-surface-temperature

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**California Current**

Sea surface temperature is defined as the average temperature of the top few millimeters of the ocean. Sea surface temperature monitoring tells us how the ocean and atmosphere interact, as well as providing fundamental data on the global climate system.

**Data Interpretation:**
Time series: The time series shows the integrated sea surface temperature for the California Current region. During the last few years there has been a significant downward trend and values have remained within the 10th and 90th percentiles.

**Indicator and source information:**
The SST product used for this analysis is the NOAA Coral Reef Watch CoralTemp v3.1 SST composited monthly (https://coralreefwatch.noaa.gov/product/5km/Index_5km_sst.php) accessed from CoralWatch (https://coralreefwatch.noaa.gov/visualdisplay/globalcw/CRW.sst_v3.1_monthly.php).

Great Lakes SST data were accessed from (https://coastwatch.glerl.noaa.gov/uo/glts/latest.html).

The data are plotted in degrees Celsius.

**Data background and limitations:**
The NOAA Coral Reef Watch (CRW) daily global Sea Sea Surface Temperature (SST) product, also known as CoralTemp, shows the nighttime ocean temperature measured at the surface. The CoralTemp SST data product was developed from two, related reanalyses (preprocessed) SST products and a near real-time SST product. Monthly composites were used for this analysis.
Background: The “EcoCard” concept

- Example of IOTC’s framework
  - Potential drivers, pressures and ecological states to monitor
  - Depiction of indicator trends is similar to NOAA’s ecowatch
  - Note the operational objective, indicator threshold, management response and confidence

What is an “Ecosystem Status Assessment”?  
- Complementary to the EcoCard  
- Extensive description of a suite of indicators to describe annual status of marine ecosystems  
- Report primarily used for consultation to support the EcoCard  
- Along with the EcoCard, aims to evaluate, monitor, and communicate the state of the ecosystem to inform management advice

Ongoing efforts to develop tools & products to support EAFM

- t-RFMOs have long recognized the need for and importance of implementing EAFM
  - Tangible progress has been limited
  - Lack of long-term plan for operationalizing EAFM
  - Complexity of monitoring climate and ecosystem dynamics (e.g., what elements to include)
Ongoing efforts to develop tools & products to support EAFM

- Emergence of **tools** to support EAFM implementation
  - Development of “ecoregions” (ecologically meaningful and practical, spatial units) (ICCAT, IOTC)
    - To incentivize ecosystem planning, science and the development of advice products
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  - Ecological risk assessments e.g., EASI-Fish (IATTC, WCPFC)
    - To identify and prioritize species most vulnerable to impacts by tuna fisheries
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  - Ecological risk assessments e.g., EASI-Fish (IATTC, WCPFC)
    - To identify and prioritize species most vulnerable to impacts by tuna fisheries
  - Development of ecosystem models and ecological indicators (IATTC, WCPFC, planned for ICCAT, IOTC)
    - To understand and evaluate effects of fishing and climate on ecosystem structure and function
• Emergence of **products** to support EAFM implementation
  ▪ Development of *Ecosystem Considerations* reports (like in IATTC e.g., EB-02-01) & *Ecosystem-fishery* overviews (like those under development by ICCAT)
  ▪ Document the scope of the fishery & its dynamics with the ecosystems
Ongoing efforts to develop tools & products to support EAFM

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    - Document the scope of the fishery & its dynamics with the ecosystems
  - Development of indicator-based *EcoCards* and associated *Ecosystem Status Assessments* (like those under development by SPC-WCPFC)
    - Provide a succinct state of the ecosystem using indicator trends (WCPFC-SC19-2023/EB-WP-01)
Ongoing efforts to develop tools & products to support EAFM

- Tools & products vary in complexity, require different data types, have specific purposes.
- All may be used to connect bycatch, ecosystem and climate considerations into advice for decision making.
Ongoing efforts to develop tools & products to support EAFM

**FIVE MAIN STAGES**
in the development and reporting of the indicator-based EcoCard

- **Purpose** - actions needed for setting the main purpose of EcoCard and selecting successful indicators
- **Production** - essential to generate indicators
- **Permanence** - mechanisms for ensuring EcoCard and indicator continuity

1. Establish the purpose of EcoCard (Vision, goals, objectives)
2. Design the conceptual framework
3. Identifying, selecting and calculating the indicators linked to objectives
4. Interpreting, communicating and reporting the indicators and EcoCard
5. Maintaining, reviewing, refining indicators and EcoCard

Ongoing efforts to develop tools & products to support EAFM

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Development of an indicator-based EcoCard at the Ecoregion level and a complementary Ecosystem Status Assessment to support implementation of EAFM in the EPO

Main goal

Adoption

Components

Purpose of components

Phases and Activities

Legend: box boundary definitions

Involving IATTC staff

Involving IATTC staff, Commission & Stakeholders

Involving Commission
Development of an indicator-based EcoCard at the Ecoregion level and a complementary Ecosystem Status Assessment to support implementation of EAFM in the EPO

**Main goal**

**Adoption**

**Components**

- Adoption of indicators & decision rules
- Management considerations

**Purpose of components**

**Phases and Activities**

- Frameworks
- Tools & Indicators
- Communication tools

Legend: box boundary definitions

- Involving IATTC staff
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- Involving Commission
Proposed EcoCard workplan: flow diagram

Development of an indicator-based EcoCard at the Ecoregion level and a complementary Ecosystem Status Assessment to support implementation of EAFM in the EPO

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    - Management considerations

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  - Frameworks

- **Purpose of components**
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  - Involving IATTC staff, Commission & Stakeholders
  - Involving Commission

- **Phase 1: Review & summarize**
  - current t-RFMO work to harmonize IATTC’s efforts on EcoCards (EB-02-02)

Legend: box boundary definitions

To define objectives & functions of Ecoregions & EcoCards

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**Main goal**

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**Components**

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**Proper** *EcoCard workplan: flow diagram*

**Framework**

**Tools & Indicators**

**Communication tools**

- **Adoption of indicators & decision rules**
- **Management considerations**

**Legend:** box boundary definitions

- Involving IATTC staff
- Involving IATTC staff, Commission & Stakeholders
- Involving Commission

**Phase 1:**

1. **Review & summarize** current t-RFMO work to harmonize IATTC’s efforts on EcoCards (EB-02-02)

2. **Engage with global experts** to determine functions of an EcoCard, scope of work, & frameworks for (1) delineating ecoregions & (2) developing EcoCards at the ecoregion level

**Phase 2:**

- To determine objectives & functions of Ecoregions & EcoCards
- To determine criteria, data quality, & analytical models for guiding ecoregion delineation
- To determine drivers (e.g., fishing, climate) & ecosystem elements to monitor (e.g., state of non-retained species, food webs, habitats)

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Phase 2: EcoCard discussion forums on available tools to establish criteria for (1) delineating ecoregions and (2) selecting, calculating, assessing, validating & interpreting candidate indicators for monitoring ecosystem components; consider strategic & tactical tools in indicator development & defining performance thresholds (e.g., overall trend: increase/decrease/no change; status: above/below/at threshold; confidence: high quality, moderate, low quality)

Legend: box boundary definitions

Involving IATTC staff

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**To determine indicators & performance thresholds that may elicit a management response**

**To determine indicators & decision rules**

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**Phase 3: Use established criteria to (1) draft ecoregions and (2) develop indicators**

Legend: box boundary definitions

Involving IATTC staff

Involving IATTC staff, Commission & Stakeholders

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Development of an indicator-based EcoCard at the Ecoregion level and a complementary Ecosystem Status Assessment to support implementation of EAFM in the EPO

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**Phase 4: Produce recommendations** from strategic & tactical tools and corresponding indicators with performance thresholds for management considerations

Involving IATTC staff

Involving IATTC staff, Commission & Stakeholders

Involving Commission

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**Adoption of indicators & decision rules**

**Management considerations**

**Communication tools**
Proposed EcoCard workplan: flow diagram

Development of an indicator-based EcoCard at the Ecoregion level and a complementary Ecosystem Status Assessment to support implementation of EAFM in the EPO

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To develop indicators while considering available tools (e.g., EASI-Fish, Ecopath); to determine spatial units of an EcoCard

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To determine criteria, data quality, & analytical models for guiding ecoregion delineation

To develop indicators & decision rules

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**Phase 3: Use established criteria to (1) draft ecoregions and (2) develop indicators**

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To determine indicators & performance thresholds that may elicit a management response

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**Phase 4: Develop pilot products (1) EcoCard of ‘key’ indicators chosen to ‘best’ represent ecosystem status at the Ecoregion level (2) Ecosystem Status Assessment of data sources, methodology, interpretation, links to management objectives, associated challenges and uncertainty of all indicators**

To support operationalization of EAFM

To develop communication tools for visualizing progress & constraints

Involving IATTC staff, Commission & Stakeholders

Involving Commission
Proposed EcoCard workplan: flow diagram

**Main goal**

- **Adoption**
  - Adoption of indicators & decision rules
  - Communication tools

**Components**

- **Frameworks**
- **Tools & Indicators**
- **Communication tools**

**Purpose of components**

- **Phases and Activities**

**Development of an indicator-based EcoCard at the Ecoregion level and a complementary Ecosystem Status Assessment to support implementation of EAFM in the EPO**

**Adoption**

**Purpose of components**

**Main goal**

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**Legend: box boundary definitions**

- **Involving IATTC staff**
- **Involving IATTC staff, Commission & Stakeholders**
- **Involving Commission**

**Phase 1: Engage with global experts to determine functions of an EcoCard, scope of work, & frameworks for (1) delineating ecoregions & (2) developing EcoCards at the ecoregion level**

- To define objectives & functions of Ecoregions & EcoCards
- To determine criteria, data quality, & analytical models for guiding ecoregion delineation
- To determine drivers (e.g., fishing, climate) & ecosystem elements to monitor (e.g., state of non-retained species, food webs, habitats)

**Phase 1: Review & summarize current t-RFMO work to harmonize IATTC’s efforts on EcoCards (EB-02-02)**

- Phase 1: Engage with global experts to determine functions of an EcoCard, scope of work, & frameworks for (1) delineating ecoregions & (2) developing EcoCards at the ecoregion level

**Phase 2: EcoCard discussion forums on available tools to establish criteria for (1) delineating ecoregions and (2) developing indicators**

- To develop indicators while considering available tools (e.g., EASI-Fish, Ecopath); to determine spatial units of an EcoCard
- To determine indicators & performance thresholds that may elicit a management response

**Phase 3: Use established criteria to (1) draft ecoregions and (2) develop indicators**

- To determine indicators & performance thresholds that may elicit a management response
- To support operationalization of EAFM

**Phase 4: Develop pilot products (1) EcoCard of ‘key’ indicators chosen to ‘best’ represent ecosystem status at the Ecoregion level (2) Ecosystem Status Assessment of data sources, methodology, interpretation, links to management objectives, associated challenges and uncertainty of all indicators**

- To develop a guidelines document on Ecoregions & EcoCards
- To develop communication tools for visualizing progress & constraints

**Phase 4: Establish guidelines for delineating ecoregions & developing an EPO EcoCard based on the pilot products**

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**Legend: box boundary definitions**

- **Involving IATTC staff**
- **Involving IATTC staff, Commission & Stakeholders**
- **Involving Commission**
### Proposed EcoCard workplan: tentative timeline

<table>
<thead>
<tr>
<th>Phase</th>
<th>Activities</th>
<th>2024</th>
<th>2025</th>
<th>2026</th>
<th>2027</th>
<th>2028</th>
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</thead>
<tbody>
<tr>
<td>1) Planning</td>
<td><strong>Review &amp; summarize</strong> current t-RFMO work to harmonize IATTC's efforts on developing an EcoCard (EB-02-02)</td>
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<td></td>
<td>Draft a proposed workplan to develop EcoCard(s) for the EPO</td>
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<td></td>
<td>Present proposed workplan to the EBWG</td>
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<td></td>
<td><strong>Engage with global experts</strong> to determine functions of an EcoCard, scope of work &amp; frameworks</td>
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<td></td>
<td><strong>Create frameworks</strong> for (1) delineating ecoregions (2) developing EcoCards at the Ecoregion level</td>
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<td>2) Identifying &amp; Prioritizing Issues for Establishing Criteria</td>
<td>Discussion forums on tools to <strong>establish criteria</strong> for (1) delineating ecoregions, (2) developing indicators</td>
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<td>Present progress on EcoCard functions, frameworks and criteria to the EBWG</td>
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<td>3) Development</td>
<td>Use established criteria from Phase 2 to <strong>draft ecoregions</strong></td>
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<td><strong>Q2</strong></td>
<td><strong>Q3</strong></td>
<td><strong>Q4</strong></td>
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<td>Present progress on draft ecoregions and indicators to the EBWG</td>
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<td>4) Management Considerations &amp; Communication</td>
<td><strong>Produce recommendations</strong> from strategic &amp; tactical tools &amp; corresponding indicators for management considerations</td>
<td><strong>Q1</strong></td>
<td><strong>Q2</strong></td>
<td><strong>Q3</strong></td>
<td><strong>Q4</strong></td>
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<td><strong>Develop pilot ecosystem-advice products</strong>: (1) EcoCard of 'key' indicators (2) detailed Ecosystem Status Assessment of all indicators</td>
<td><strong>Q1</strong></td>
<td><strong>Q2</strong></td>
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<td>Present recommendations for decision rules to the Commission</td>
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<td><strong>Establish guidelines</strong> for delineating ecoregions &amp; developing EPO EcoCards at the Ecoregion level, based on the pilot products</td>
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Examples: strategic vs. tactical tools

• To help visualize potential tools & candidate indicators for EPO fisheries:
• We can consider strategic and tactical tools
  ▪ Strategic tools address *what* scientists will do to assess, monitor, and track the performance &/or status of a specific concern
    ▪ e.g., ERA’s used to assess, monitor, and track:
    ▪ relative vulnerability of species to fishing and environmental impacts (EASI-Fish)
Examples: strategic vs. tactical tools

- To help visualize potential tools & candidate indicators for EPO fisheries:
- We can consider strategic and tactical tools
  - Strategic tools address *what* scientists will do to assess, monitor, and track the performance &/or status of a specific concern
    - e.g., EASI-Fish used to reconstruct historical vulnerability status of the spinetail devil ray

*Mobula mobular* (Griffiths and Lezama-Ochoa, 2021)
Examples: strategic vs. tactical tools

- Tactical tools address *how* resource managers will implement management actions for a specific concern:
  - suppose EASI-Fish BRPs are considered a ‘candidate’ indicator,
  - suppose the management objective is to ‘ensure ecological sustainability’
  - if threshold is exceeded (i.e., vulnerability = “most vulnerable”), a tactical tool(s) is needed
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    - e.g., vulnerability of spinetail devil ray classified as ‘most vulnerable’ in recent years

*Mobular mobular*, Griffiths and Lezama-Ochoa, 2021
Examples: strategic vs. tactical tools

- Tactical tools address *how* resource managers will implement management actions for a specific concern:
  - Management action: prioritize research to fill data gaps and reassess through EASI-Fish

  Project F.3.a - Feasibility study to develop a sampling program for updating morphometric relationships and collecting biological samples for priority species in EPO tuna fisheries: Phase 1
Examples: strategic vs. tactical tools

- Tactical tools address *how* resource managers will implement management actions for a specific concern:
  - Management action: implement bycatch mitigation measure
  - (e.g., best handling & release practices)

SAC-15-11
Summary: transitioning to the *EcoCard* concept

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- Develop conceptual framework (what to monitor)

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- Develop Ecosystem-advice products (e.g., indicator-based Ecosystem Report Card)

"EcoCard" concept in its infancy in t-RFMOs
- Candidate indicators proposed in other t-RFMOs
- Not yet directly linked to management

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SAC-15-11

WCPFC-SC19-2023/EB-WP-01
Questions