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IATTC STRATEGIC SCIENCE PLAN, 2019-2023

This document presents the Strategic Science Plan developed by the staff in response to the recommendation by the 8th Meeting of the Scientific Advisory Committee in May 2017. A preliminary draft was presented at the 9th meeting of the SAC in May 2018. The staff's work plans and research projects and proposals that implement the plan are presented in Documents IATTC-93-06b and IATTC-93-06c.

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A. BACKGROUND

1. INTRODUCTION

At its 8th meeting in May 2017, the Scientific Advisory Committee (SAC) made the following recommendation to the Commission**:**

> *"The SAC recommends that the scientific staff prepare a strategic science plan for the 2018-2022 period, which includes clear objectives, specific priorities, strategies, actions, responsibilities, and resources, including a tentative budget."*

In accordance with this recommendation, the staff has developed a Strategic Science Plan (SSP; Section B), which establishes research goals, activities, and priorities for the 2019-2023 period. At its 9th meeting in May 2019, the SAC welcomed the presentation of the first draft of the SSP and, recognizing its importance, asked the scientific staff to circulate the complete plan to CPCs prior to presenting it to the Commission at its annual meeting in August 2018.

Under the SSP, the staff's research activities are no longer structured in accordance with the Commission's

four research programs[1], as in previous years. Instead, they are classified into the SSP's seven main areas of research, called *Themes.* In addition to better accommodating a strategic planning approach, this new structure is intended to foster stronger collaboration among the different programs (recommendation 17 of the 2016 IATTC Performance Review), with researchers from different programs contributing to activities under a common *Theme*. The seven *Themes,* the strategic pillars of the SSP, are the following:

1. Data collection for scientific support of management
2. Life history studies for scientific support of management
3. Sustainable fisheries
4. Ecological impacts of fishing: assessment and mitigation
5. Interactions among the environment, ecosystem, and fisheries
6. Knowledge transfer and capacity building
7. Scientific excellence

Each *Theme* is divided into strategic *Goals*, and the principal tasks that will be carried out to achieve a particular goal within the SSP's five-year window are called *Targets*. The specific activities that the staff will carry out in order to fulfil those tasks are called *Projects*, which are in some cases grouped into *Work Plans* aimed at achieving a broad objective not limited to a particular *Theme* or *Goal*.

When considering the SSP, the following should be taken into account:

a. The general *Themes*, and the more specific *Goals*, constitute the scientific staff's primary responsibilities, and are fundamental to the five-year SSP outlined in Section B below.

b. The SSP's strategic goals are broad, and do not all have clear SMART (Specific-Measurable-Attainable-Relevant-Timely) characteristics; these are reflected in the individual activities (*Work Plans* and *Projects*) that will achieve the strategic goals.

c. The SSP has a five-year time frame, but individual *Projects* are planned with two-year time frames. Thus, in future years, the staff will report on activities during the previous year and present the work plan for the following two years (IATTC-93-06b).

d. The timing and duration of *Projects* should be regarded as indicative, since they are subject to many factors that are sometimes difficult to predict and beyond the staff's control.

e. Not included in IATTC-93-06b are proposals for research that the staff considers necessary to accomplish the SSP's strategic goals, but which require additional human, logistic, and financial resources not currently available. These proposals are summarized in IATTC-93-06c.

A measure of the staff's activities is the presentation of its research and the resulting publications. Presentations and publications from 2017 are listed in IATTC-93-06b.

2. MISSION, VISION, AND VALUES

The scientific staff's mission is "*to undertake state-of-the-art scientific research to inform sound management advice, aiming at the conservation and sustainable use of the marine species and ecosystems covered by the Antigua Convention*".

The scientific staff's vision for this Strategic Science Plan includes the following:

a. The adoption of harvest strategies that are rigorously tested, using Management Strategy Evaluation (MSE), for tuna species, and advancing towards that goal for other species covered by

[1] Stock Assessment; Biology and Ecosystem; Data Collection and Database; Bycatch and International Dolphin Conservation Program (IDCP)

the Antigua Convention.

b. Minimizing mortality of unutilized bycatch species, thus reducing impacts on the ecosystem.
c. Establishing a scientific framework for identifying potentially vulnerable species, so that data collection, scientific research activities, and mitigation measures can be prioritized.
d. Minimizing the impacts of fishing on the integrity and functioning of the ecosystem, while maintaining profitable and sustainable use of target species.
e. Clear and continuous communication with CPCs, resulting in effective management advice.
f. Obtaining sufficient data to undertake sound scientific research as a basis for management advice to the Commission.
g. Hiring, retaining, and training staff who can conduct state-of-the-art scientific research.

The scientific staff's core values are:

a. Conducting unbiased, transparent, and innovative research.
b. Valuing collaboration, within and among IATTC Programs, with experts from CPCs, other t-RFMOs, and stakeholders.
c. Seeking to effectively communicate its research to scientific and non-scientific audiences.
d. Keeping up-to-date with state-of-the-art research methodologies.
e. Being agile, and adapting to changing research needs.
f. Being committed to strengthening the research capacity of the Commission's developing CPCs.

3. SWOT ANALYSIS

The following SWOT[2] analysis by the staff takes into consideration the comments on the IATTC scientific program in the 2016 IATTC performance review.

STRENGTHS:	**WEAKNESSES:**
a. Permanent, high-level, highly-dedicated scientific staff; b. Unique institutional framework: headquarters, several field offices, a field research laboratory; c. Strong science outcomes; d. Successful observer program; e. Collaboration with t-RFMOs, government agencies, universities, and other organizations	a. The IATTC science program could provide even more value; b. Member scientists do not feel adequately connected to or involved in IATTC scientific activities; c. Limited data from longline, small purse-seine, and artisanal fishing vessels.
OPPORTUNITIES:	**THREATS:**
a. Improve scientific work; b. Improve data collection for longline, small purse-seine and artisanal fisheries; c. Improve participation of scientists from CPCs; d. Conduct periodic external peer reviews; e. Develop a strategy to address succession planning and document procedures for key positions.	a. Insufficient financial support relative to mandates; b. A high number of impending retirements present both a risk and an opportunity.

[2] Strengths-Weaknesses-Opportunities-Threats

B. OUTLINE OF THE IATTC STRATEGIC SCIENCE PLAN

This section lists the SSP's broad strategic research *Goals* for 2019-2023, categorized by the Plan's seven overarching *Themes*:

1. Data collection for scientific support of management
2. Life history studies for scientific support of management
3. Sustainable fisheries
4. Ecological impacts of fishing: assessment and mitigation
5. Interactions among the environment, ecosystem, and fisheries
6. Knowledge transfer and capacity building
7. Scientific excellence

Each *Goal* contains a number of *Targets*, which are the principal tasks that will be carried out to achieve a particular goal within the SSP's five-year window. The specific activities that the staff will carry out in order to fulfil those tasks are called *Projects*, whose duration can vary; they are in some cases grouped into *Work Plans* aimed at achieving a broad objective not limited to a particular *Theme* or *Goal*.

1. DATA COLLECTION FOR SCIENTIFIC SUPPORT OF MANAGEMENT

Goal A: Database maintenance, preservation, and access

A.1. Routine work
A.2. Improve internal documentation
A.3. Standardize and automate data submissions

Goal B: Conduct a review of current IATTC/AIDCP data collection programs, identify and prioritize opportunities to improve data quality and expand data types and coverage

B.1. Evaluate and improve data collected by the purse-seine On-Board Observer Program for scientific research
B.2. Expand on-board data collection to small purse seiners
B.3. Evaluate and improve the port sampling data collection program
B.4. Develop and implement a long-term life history data collection program to support scientific research for stock assessment and management

Goal C: Facilitate the improvement of data quality, coverage, and reporting by CPC data collection programs

C.1. Purse-seine fleet
C.2. Longline fisheries
C.3. At-sea transshipments
C.4. Artisanal fisheries (coastal developing CPCs)
C.5. Other fisheries

Goal D: Investigate the use of new technologies to improve data quality

D.1. Evaluate the functionality of electronic data collection and reporting systems
D.2. Evaluate the feasibility of implementing on-board electronic monitoring (EM) systems for data collection purposes

2. LIFE HISTORY STUDIES FOR SCIENTIFIC SUPPORT OF MANAGEMENT

Goal E: Obtain life history and stock structure information for spatially-structured stock assessments for tropical tunas

E.1. Initiate a long-term age and growth data collection and research program for tropical tunas
E.2. Conduct spatiotemporal research on the reproductive biology of tropical tunas

E.3. Analyze historical tagging data to improve the assumptions about movement and stock structure in spatially-structured stock assessments of tropical tunas
E.4. Initiate a multi-year tagging program for tropical tunas
E.5. Conduct genetic studies to improve the assumptions about life history and stock structure in stock assessments of tropical tunas

Goal F: Obtain key life history information for assessment and mitigation of ecological impacts on prioritized species

F.1. Conduct life history studies of dolphins under the AIDCP
F.2. Conduct life history studies of shark species
F.3. Conduct life history studies of prioritized species

Goal G: Investigate the early life history of tunas to improve understanding of recruitment processes to improve assessments and management

G.1. Investigation of the effects of density dependence and the environment on the pre-recruit survival of yellowfin tuna
G.2. Conduct comparative studies of the early life histories of yellowfin and Pacific bluefin tunas
G.3. Develop tools to forecast recruitment

3. SUSTAINABLE FISHERIES

Goal H: Improve and implement stock assessments, based on the best available science

H.1. Undertake the research necessary to develop and conduct at least one benchmark stock assessment for yellowfin and bigeye tunas
H.2. Develop a spatially-structured stock assessment model for bigeye tuna as a basis for management advice, and initiate a similar model for yellowfin tunas
H.3. Develop a benchmark stock assessment for skipjack tuna (conditional on implementation of tagging program (Project E.4)
H.4. Develop update assessment and/or stock status indicators for tropical tunas to ensure that management advice is current
H.5. Undertake the research necessary to develop and conduct data-limited assessments for prioritized species
H.6. Maintain active participation in ISC stock assessments
H.7. Develop conventional stock assessments for data-rich prioritized species and species of specific interest
H.8. Assess the status of dolphin stocks in the eastern tropical Pacific

Goal I: Test harvest strategies using Management Strategy Evaluation (MSE)

I.1. Conduct a comprehensive MSE for bigeye tuna and plan MSEs for the other tropical tuna species, including the multi-species fishery for tropical tunas
I.2. Collaborate with ISC in Pacific-wide MSEs for albacore and Pacific bluefin tunas
I.3. Initiate MSE work to evaluate indicator-based harvest strategies for prioritized species and species of specific interest

Goal J: Improve our understanding of the effects of the operational characteristics of the fishery on fishing mortality, stock assessments, and management advice

J.1. Identify and monitor changes in technology and fishing strategies to improve stock assessments and management advice
J.2. Improve our understanding of the relationship between the operational characteristics of the purse-seine fishery and fishing mortality
J.3. Study the impact of FAD operations on fishing mortality to improve FAD management advice

Goal K: Improve our understanding of the socio-economic aspects of sustainable fisheries for tropical tunas

K.1. Collaborate in socio-economic studies by other organizations

4. ECOLOGICAL IMPACTS OF FISHERIES: ASSESSMENT AND MITIGATION

Goal L: Evaluate the ecological impacts of tuna fisheries

L.1. Develop analytical tools to identify and prioritize species at risk for data collection, research and management

L.2. Conduct ERAs of EPO fisheries to identify and prioritize species at risk

Goal M: Mitigate the ecological impacts of tuna fisheries

M.1. In collaboration with the industry, conduct scientific experiments to identify gear technology that will reduce bycatches and mortality of prioritized species

M.2. In collaboration with the industry, conduct scientific experiments to develop best practices for the release of prioritized bycatch species

M.3. Conduct spatiotemporal analyses to identify areas of high bycatch/catch ratios for potential use in spatial management

M.4. Investigate alternative tools for bycatch mitigation

M.5. In collaboration with the industry, conduct experiments to develop best practices for mitigating the impacts of fishing on habitats in the EPO

5. INTERACTIONS AMONG THE ENVIRONMENT, THE ECOSYSTEM, AND FISHERIES

Goal N: Improve our understanding of the interactions among environmental drivers, climate, and fisheries

N.1. Conduct spatiotemporal analyses to better understand the effect of key environmental drivers on the short-term fluctuations of abundance of tunas and prioritized bycatch species

N.2. Conduct spatiotemporal analyses to better understand the effect of long-term climate drivers (regime shifts) on the abundance of tropical tunas

Goal O: Improve our understanding of the EPO ecosystem

O.1. Conduct trophodynamic studies for defining key assumptions in EPO ecosystem models

O.2. Improve analytical ecological tools to evaluate anthropogenic and climate impacts on the EPO ecosystem

6. KNOWLEDGE TRANSFER AND CAPACITY BUILDING

Goal P: Respond in a timely manner to external requests for information and technical support

P.1. Respond to requests by CPCs

P.2. Respond to requests from other organizations

Goal Q: Provide training opportunities for scientists and technicians of CPCs

Q.1. Host visiting scientists and students from CPCs

Q.2. Implement the IATTC capacity-building scholarship

Q.3. Facilitate training workshops

Goal R: Improve communication of scientific advice

R.1. Improve communication of the staff's scientific work to CPCs

R.2. Participate in global initiatives for the communication of science

Goal S: Facilitate participation of CPCs in the scientific process and in training events

S.1. Improve communication and coordination with the Scientific Advisory Committee and scientific and technical working groups

S.2. Facilitate participation of scientific and technical personnel from developing CPCs at IATTC scientific meetings and training events (IATTC capacity building fund)

7. SCIENTIFIC EXCELLENCE

Goal T: Implement external reviews of the staff's research

T.1. Facilitate external reviews of stock assessments

T.2. Facilitate external reviews of scientific studies

Goal U: Strengthen research at the Achotines Laboratory

Goal V: Recruit and retain highly-qualified personnel

Goal W: Promote training and advancement of scientific staff

Goal X: Promote the advancement of scientific research

X.1. Continue the annual CAPAM workshops