Fishery Improvement Project Workplan

Ecuador mahi mahi fishery – Longline

(*Coryphaena hippurus)*

Prepared for:

ASOAMAN

by:

Juan Manuel Garcia Caudillo
Ivan Martinez Tovar

Workplan contents

List of tables

Acronyms

ASOAMAN	:	Productive Fishing Association of Vessel Owners from Manta
CICIMAR	:	Interdisciplinary Center for Marine Sciences
CITES	:	Convention on International Trade in Endangered Species of Wild Fauna and Flora
COREMAHI	:	Mahi Regional Committee of Producers and Processors
EPO	:	Eastern Pacific Ocean
ETP	:	Endangered, threatened and protected species
FAO	:	Food and Agriculture Organization of the United Nations
FIP	:	Fishery Improvement Project
HCR	:	Harvest Control Rules
IATTC	:	Inter American Tropical Tuna Commission
IMARPE	:	Peruvian Marine Institute
INCOPESCA	:	Costa Rican Institute of Fisheries and Aquaculture.
IPIAP	:	Public Research Institute of Aquaculture and Fisheries
MAE	:	Ministry of Environment of Ecuador
MSC	:	Marine Stewardship Council
PI	:	Performance Indicator
PRC	:	Pesca Responsible y Comercio Justo
SRP	:	Undersecretary of Fisheries
ULEAM	:	Eloy Alfaro University of Manabi
UNAM	:	National Autonomous University of Mexico
UoA	:	Unit of Assessment

Introduction

Mahi mahi is a migratory pelagic species, which is highly resilient to fishing due to its rapid growth and early maturation. However, despite its high productivity, many regions in the world have reached their maximum levels of catch and have started to suffer from a decrease in levels of production (Anhalzer & Nanninga, 2014). The Eastern Pacific Ocean (EPO) is one of the most productive mahi mahi regions in the world(Aires-da-silva et al., 2016), spreading from the north of Chile to the south of the USA. Within the region, most of the production comes from small-scale or semi-industrial fisheries, so this species represents a crucial source of livelihood and income for fishing communities while posing challenges to sustainable management (Alhanzer & Nanninga, 2014).

Many efforts have been made to enhance the management of mahi fisheries in the EPO. Aalthough the Inter-American Tropical Tuna Commission IATTC is not mandated to manage the mahi mahi, it has provided collaborative research and guidance to conduct an exploratory stock assessment (Aires-da-Silva et al., 2016), an exploratory management strategy evaluation (Valero et al., 2016), potential reference points and harvest control rules (Valero, Aires-da-silva, & Maunder, 2019), and resolution to conduct a stock assessment in 2026 for mahi mahi in the EPO. Moreover, the IATTC is working to improve the data collection concerning endangered,

threatened and protected (ETP) species that interact in large pelagic fisheries (IATTC, 2018). At the national level, relevant countries have adopted local management measures, implemented fishery-specific action plans and developed legal provisions. However, these measures need to be revised to ensure the sustainability of the fishery. On the other hand, the private sector, fuelled mostly by the demand of the US market, has initiated and is currently implementing some Fishery Improvement Projects (FIPs) in the region.

In the case of Ecuador, a mahi mahi FIP led by the processing sector started in 2010. Currently, to boost the leadership and participation of the catching sector in the improvement efforts, including synergies with the efforts made by the processors, the Productive Fishing Association of Vessel Owners from Manta (ASOAMAN) developed a new mahi mahi FIP. It aims to address local sustainable issues related to environmental impacts and national governance. While, for regional issues, the Ecuador Longline mahi mahi FIP (ASOAMAN) will keep working with COREMAHI and other FIPs in the region to address stock status, management, and enforcement issues at EPO level.

FIP Goal:

The goal of the Ecuador Longline mahimahi FIP (ASOAMAN) is to mitigate the fishery impacts on ETP and other species and promote the development of a management plan for the fishery through a participatory and transparent process, to reach, for the fall of 2028, a minimum score of 80 for all the principles performance indicators for the MSC Standard.

Project outcomes for 2028 are:

- To promote the development of a regular stock assessment for mahi mahi.
- To establish a fishery monitoring and data collection program to support with inputs the stock assessment and the evaluation of impacts to biodiversity.
- To develop a strategy to mitigate the fishery impacts on secondary and ETP species.
- To Promote the development and implementation of a harvest strategy and control rules for the fishery.
- To Promote regional coordination for the management of mahi mahi in the Eastern Pacific Ocean (EPO).
- Promote studies to determine the impact of fishing on the ecosystem in order to implement mitigation measures.

Definition of the FIP Unit of Assessment (UoA)

The Ecuadorian producer sector is implementing a Fishery Improvement Project (FIP) for the Mahi-Mahi (*Coryphaena hippurus*) longline fishery. The following information describes the fishery and determines the Unit of Assessment (UoA). The UoA is defined by the target stock(s) combined with the fishing method/gear and practice (including vessel types) targeting that stock and any fleet, group of vessels, individual fishing operators, or other eligible fishers that are included in this assessment. In some fisheries, the UoA may be further defined in specific fishing seasons and/or areas.

Table 1: FIP Unit of Assessment based on MSC definition

Target species (common and scientific names)	Mahi-Mahi, Dolphinfish (*Coryphaena hippurus*)
Stock(s)	Location of FAO 87 fisheries within the Ecuadorian EEZ and beyond national jurisdiction
Fishing method or gear type	Surface longline
Management authority	Ministerio de Producción, Comercio Exterior, Inversiones y Pesca (MPCEIP)
Fishing fleet	ASOMAN fleet composed of 68 motherhips
Type and size of vessel	Fishing unit: Longline vessels with an average carrying capacity of 60 MT, 18-24 m in length. Also called mother vessels, followed by a maximum of 10 smaller vessels, each with its own hook line

Workplan Overview

Workplan Version and Date	V2/October 2024
Start date: October 2021	**End date:** December 2028
FIP Lead: Asociación de Producción Pesquera de Armadores de Manta (ASOAMAN) Francisco Javier Alarcón	**Improvements recommended by:** Pesca Responsable y Comercio Justo
FIP Coordinator: ASOAMAN	**Workplan developed by:** Juan Manuel Garcia Caudillo Iván Martínez Tovar

Workplan

The FIP work plan comprises SIX actions, which are detailed below.

Principle 1: Sustainability of fish stocks

Three actions have been proposed to address issues related to the sustainability of the mahi mahi stock: 1. Define the stock status using a robust assessment methodology (tables 2 and 3); 2. Establish a data collection mechanism to monitor the fishery and assess its impacts on associated species (including ETP) and the ecosystem (tables 4 and 5); and 3. Develop a harvest strategy aligned with Principle 1 of the MSC standard (tables 6 and 7).

Table 2: Details of action 1 of Principle 1

Action number and name	**1. Status of the stock confirmed by a robust assessment methodology**
Goal	Promote the implementation of a robust, transparent and publicly available process to conduct a stock assessment of mahi mahi in the EPO, and promote the use of the results to develop the harvest strategy, including reference points, management objectives, harvest control rules, and management measures.
Description	An interannual depletion model was conducted by IPIAP and IMARPE in 2021. This action aims to update the 2021 binational stock assessment, developing a standardized template to collect data at the regional level, and conducting regular stock assessments.
Expected completion date	January 2026
Priority	High
Responsible parties	IPIAP, IMARPE, INCOPESCA, IATTC, COREMAHI, ASOAMAN.
MSC PI(s) addressed by the action	1.1.1 and 1.2.4

Table 3: Tasks of action 1 of principle 1

Action	Tasks/milestones	Responsible (lead)	Responsible (supporting role)	Starting date
1. Status of the stock confirmed by a robust assessment methodology	1.1 Reduce uncertainties of the stock structure of mahi mahi through a regional tagging study.	IPIAP	ASOAMAN, IMARPE, COREMAHI	December, 2024
	1.2 Reduce uncertainties of the stock structure of mahi mahi through a regional genomic study.	IPIAP	ASOAMAN COREMAHI, CICIMAR, UNAM, IMARPE	December, 2024
	1.3 Update the binational stock assessment (IPIAP – IMARPE) and disseminate the results	IPIAP	ASOAMAN, IMARPE, and COREMAHI	January, 2025

Table 4: Details of action 2 of Principle 1

Action number and name	**2. A harvest strategy is in place and aligned with MSC principle 1.**
Goal	Promote the adoption of an appropriate harvest strategy and the correspondent harvest control rules (HCR).
Description	Once the status of the stocks has been confirmed, a harvest strategy should be developed. Following the national legislation, a management plan aligned with the MSC standard will be developed as the main tool of the harvest strategy.
Expected completion date	August 2026
Priority	High
Responsible parties	IPIAP, SRP, ASOAMAN.
MSC PI(s) addressed by the action	1.2.1 and 1.2.2

Table 5: Tasks of action 2 of Principle 1

Action	Tasks/milestones	Responsible (lead)	Responsible (supporting role)	Starting date
2. A harvest strategy is in place and aligned with MSC principle 1.	2.1 Develop a management plan that includes at least sustainability objectives, reference points, HCRs and management measures. The management plan will be the primary tool of the management strategy. It will be developed based on the the stock assessment (action 1). This management plan will be developed through a participatory and transparent mechanism (see action 5)	SRP	IPIAP, ASOAMAN	June 2025

Principle 2: Minimizing environmental impacts

Table 6: Details of action 3 of Principle 2

Action number and name	**3. Monitoring of the mahi mahi fishery impacts on associated species (including ETP) and the ecosystem.**
Goal	Strengthen the monitoring system and develop a training plan to improve a fleet-based data collection for the mahi mahi fishery and its interactions with associated species and ecosystems.
Description	Although Ecuador has a data collection system, this has several weaknesses and does not produce public information useful for the management of the fishery. For this reason, the ASOAMAN monitoring program to collect information on catch composition, interactions with associated species (including ETP species) and fishing areas will be strengthened. The information will be used to a) monitor with more frequency the fishery (to support the management and harvest control rules associated), b) feed the stock assessment of mahi mahi and secondary species, and c) estimate impacts on species and habitats, and if needed, generate measures to mitigate those impacts.
Expected completion date	August 2028
Priority	High
Responsible parties	IPIAP, ASOAMAN
MSC PI(s) addressed by the action	1.2.3, 2.2.3, 2.3.3 and 2.5.3

Table 7: Tasks of action 3 of Principle 2

Action	Tasks/milestones	Responsible (lead)	Responsible (supporting role)	Starting date
3. **Monitoring mechanism is strengthened to collect data of the mahi mahi fishery and its impacts on associated species (including ETP) and ecosystem impact.**	3.1 Improve the fleet-based monitoring program to collect data of the mahi mahi fishery and its interactions with associated species and ecosystems.	ASOAMAN	IPIAP, SRP	January 2025

Table 8: Details of action 4 of principle 2

One action has been proposed to address issues related to the environmental impacts of the mahi mahi fishery. It is presented below in table 8.

Table 4: Details of action 4 of Principle 2

Action number and name	**4. Fishery impacts on other and ETP species are known and mitigation measures are in place.**
Goal	Strengthen fishers' capacities in good fishing practices to: a) identify mahi mahi fishery impacts on associated species and b) implement effective measures to minimize them.
Description	Develop a training program to teach fishers registration, correct identification, handling, and releasing sea turtles and sharks in the mahi mahi longline fishery. Measures to mitigate negative impacts on associated species will be developed and implemented.
Expected completion date	September 2028
Priority	High
Responsible parties	IPIAP, ASOAMAN, SRP.
MSC PI(s) addressed by the action	2.2.1, 2.2.2, 2.3.1 and 2.3.2

Table 5: Tasks of action 4 of principle 2

Action	Tasks/milestones	Responsible (lead)	Responsible (supporting role)	Starting date
4. Fishery impacts on other species (sharks) and ETP species (turtles) are known, and mitigation measures are in place.	4.1 Implement a training plan for fishers to improve their capacities in data collection, correct identification, handling, and releasing sea turtles and sharks	ASOAMAN	SRP, IPIAP	January, 2025
	4.2 Conduct a l stock assessment for main shark species	IPIAP	ASOAMAN, SRP, MAATE,	January, 2025
	4.3 Develop conservation measures for sharks species	SRP	IPIAP ASOAMAN, MAATE, CITES	January, 2025
	4.4 Implement conservation measures for sharks	ASOAMAN	IPIAP SRP, MAATE, CITES	March, 2025
	4.5 Conservation measures results are evaluated and if needed, improvements are designed.	IPIAP	ASOAMAN, SRP, MAATE, CITES.	January, 2027
	4.6 Analyze interactions with ETP species (using data collected with action 2) and develop conservation measures to mitigate negative impacts.	IPIAP, SRP	ASOAMAN,	March, 2025
	4.7 Implement conservation measures for ETP species	ASOAMAN	IPIAP, SRP MAATE	October, 2025

	4.8 Evaluate conservation measures for ETP species and if needed, implement improvements	IPIAP	ASOAMAN, SRP, MAATE	July, 2027

Table 10: Details of action 5 of Principle 2

Action number and name	**5. Ecosystem impacts are known and mitigation measures are in place.**
Goal	To understand the current and direct impacts of the fishery in the ecosystem. If needed, to develop and implement a mitigation strategy.
Description	Based on the nature of the fishery, some elements of the might be disrupted, including the trophic relationships in the ecosystem, as well as biodiversity, and species distribution (Griffiths et al., 2013). In addition, and considering the fishery's selectivity, the PA reported that is unlikely that the ecosystem structure and function to a point where there would be a serious or irreversible harm, could be achieved by the impacts of the fishery. However, more information and evidence are needed to have a higher level of confidence that it is unlikely to disrupt the elements. It is recommended to use the information collected in previous actions to conduct studies of the pelagic trophic-ecosystem ecology, to determine the relationships and interactions with their associated fauna. The results will inform the need for mitigation measures or a partial strategy that ensure that the UoA does not pose risk or serious or irreversible harm to ecosystem structure and function.
Expected completion date	August 2028
Priority	High
Responsible parties	IPIAP, IATTC, COREMAHI, ASOAMAN.
MSC PI(s) addressed by the action	2.5.1 and 2.5.2

Table 11: Tasks of action 5 of principle 2

Action	Tasks/milestones	Responsible (lead)	Responsible (supporting role)	Starting date
5. Fishery impacts on the ecosystem are known and mitigation measures are in place				
	5.1 Conduct an Ecosystem based assessment using the data to evaluate specific trophic impacts.	IPIAP	ASOAMAN	July, 2027
	5.2 If needed, suggest and implement improvements on	IPIAP, SRP	ASOAMAN,	Sep, 2027

	harvest strategy/measures to mitigate impacts on the ecosystem.			
	5.3 Test the effectiveness of these measures/strategy using the results of the monitoring program in place (see Action 3) and if needed, implement improvements	IPIAP, SRP	ASOAMAN,	Jan, 2028

Principle 3: Effective management

One action and five tasks have been proposed to implement an effective management through a participatory and transparent process (Co-management).

Table 6: Details of action 6 of Principle 3

Action number and name	**6. Develop a fishery management plan through a co-management mechanism for the Ecuador mahi mahi fishery**
Goal	To establish a participatory governance system for the mahi mahi fishery in Ecuador.
Description	Support the formal implementation of the mahi mahi governance system through a co-management mechanism for the mahi mahi fishery. FIP members will participate actively and contribute with information to develop a management plan for the Ecuador mahi mahi fishery.
Expected Completion Date	June 2027
Priority	High
Responsible Parties	IPIAP, ASOAMAN, SRP
MSC PI(s) Addressed by the action	3.1.1, 3.1.2, 3.1.3, 3.2.2 and 3.2.3

Table 7: Tasks of action 6 of Principle 3

Action	Tasks/milestones	Responsible (lead)	Responsible (supporting role)	Starting date
6. A co-management mechanism is implemented in the mahi mahi fishery in partnership with the supply chain stakeholders and the government	6.1 Strengthen the capacities of mahi mahi stakeholders on Fisheries Management to ensure active participation in the governance system.	ASOAMAN	IPIAP, SRP, processor sector.	November, 2024
	6.2 Participate in the mahi mahi governance system and based on the stock assessment and agreements reached at the regional level adopt specific objectives, reference points HCRs and management measures.	SRP	IPIAP, ASOAMAN, processor sector.	June, 2025
	6.3 In coordination with authorities, fishery participants and other interested parties, the management plan is adopted and implemented.	SRP	ASOAMAN, IPIAP, processor sector.	October, 2026
	6.4 Management plan is monitored and evaluated annually.	IPIAP, SRP	ASOAMAN, processor sector.	June, 2027