

# PILOT PHASE FOR THE MAHI TAGGING PROJECT IN THE EASTERN PACIFIC OCEAN

## INTRODUCTION

The Eastern Pacific Ocean (EPO) is one of the most productive mahi regions globally (Aires-da-Silva et al., 2016), with the majority of mahi production coming directly from small-scale or semi-industrial fisheries that represent a crucial source of income and livelihood for fishing communities (Alhanzer & Nanninga, 2014). However, due to the migratory nature of this species, there are significant gaps in knowledge about mahi and the EPO fishery that are critical for adequate fisheries management (Valero et al., 2016). Further challenges include limited engagement with artisanal fishers in the decision-making process for sustainable management of the fishery.

To address these knowledge gaps and promote co-management of the fishery, in 2019, the [Regional Committee of Producers and Processors \(COREMAHI\)](#) supported the development of a regional scientific plan, to

improve knowledge of the mahi stock structure and status (COREMAHI, 2019).

The final proposal was developed by the two research institutions – the Public Institute of Aquaculture and Fisheries of Ecuador ([IPIAP](#)) and the Peruvian Sea Institute ([IMARPE](#)) – who presented the regional scientific plan for mahi at the 12th Meeting of the Scientific Advisory Committee of the Inter-American Tropical Tuna Convention IATTC in 2021 (IATTC, 2021a). The scientific plan included a tagging project to learn more about horizontal and vertical mahi movements around the region. Such information provides insight on aspects such as typical life cycles, mortality rates, population size, and behavioral attributes (IATTC, 2021b).

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## OBJECTIVES:

- 🎯 Identify the needs, risks, and opportunities to develop and implement a regional tagging project.
- 🎯 Train researchers and commercial and recreational fishers on the proper techniques for tagging mahi.
- 🎯 Improve knowledge on local and regional mahi movements in the EPO to develop better management measures.



*Pilot Phase for the Mahi Tagging Project in the Eastern Pacific Ocean 1*

## CHALLENGES

The challenges of tagging marine species include access to the species and their habitats, climatic and logistical conditions, costs, availability of experts, and the success of the catches (Merten et al., 2022). In the case of mahi, these challenges are even more notable because the species is commercially caught by artisanal and semi-industrial fleets in the Global South, which results in the following obstacles:

- 1.** Most vessels do not have the facilities to deploy experts who can conduct tagging procedures. Additionally, mahi are increasingly moving away from the coast as they are attracted to fish aggregating devices (FADs). As a result, the duration of fishing trips often exceeds 20 days, which further limits the availability of experts who can embark on extended research trips (Martínez-Ortiz, Aires-da-Silva, Lennert-Cody, & Maunder, 2015).
- 2.** The mahi fishery in the EPO is not managed by a Regional Fisheries Management Organization (RFMO). In many cases, RFMOs may provide support to lead, coordinate, and implement a tagging project and tag-recovery campaign.
- 3.** State research institutions lack funding for this type of project. Generally, tagging activities are carried out with support from NGOs that focus on species that are protected or threatened, such as sharks (Merten et al., 2022). The lack of state-operated tagging programs has limited the development of local technical capacity for the design and implementation of mahi tagging projects.



## IMPLEMENTATION

To explore mahi tagging in the EPO, IPIAP and IMARPE garnered support from [Sustainable Fisheries Partnership](#) (SFP) to coordinate a pilot phase that can address the challenges described above. With SFP's support, a multi-sector approach was developed involving both of the research institutions, supply chain actors, and artisanal fishers, who contributed to the pilot through the following actions:

### STEP 1. Identify and implement a tagging methodology

SFP engaged the [Dolphinfish Research Program](#) (DRP) to implement its methodology, which involves sport fishers in a citizen science capture–mark–recapture program with conventional and satellite tags (Merten et al., 2022).



Satellite tags



Conventional tags

Two fishing tournaments, in [Costa Rica](#) and [Ecuador](#)<sup>1</sup> were identified to implement the pilot activities. In Ecuador, researchers from IPIAP, IMARPE, SFP, and the DRP tagged two mahi specimens (a 47" female and a 48" male) with satellite tags (mrPAT) and four individuals with conventional spaghetti tags. To date, two recovered conventional tags have been reported. One satellite tag reported horizontal movement information 15 days post-tagging before being harvested, while the second satellite tag was not yet recovered.

<sup>1</sup> The sports fishing tournament in Ecuador was suspended due to COVID-19. However, the researchers used two boats (Amanacer and Titagao) courtesy of captains Alejandro Moya, Humberto Moya and Ernesto Lingen from Salinas Yacht Club.



### STEP 2. Regional coordination for project implementation

Three regional frameworks were key to the implementation of this project. The [Binational Agreement between IPIAP and IMARPE](#) provided the foundation necessary for the coordinated implementation of the pilot activities. The Regional Committee of Mahi Producers and Processors ([COREMAHI](#)) provided the needed support from the mahi catching and processing sector. And, a Memorandum of Understanding ([MoU](#)) signed between [COREMAHI](#) and the [Inter-American Tropical Tuna Commission \(IATTC\)](#) enabled the commission's support with the dissemination of information for reporting recovered tags.

### STEP 3. Financing

Understanding mahi stock structure and status in the EPO is a high priority for the private sector, as the stock health (whose correct evaluation rests on the knowledge of the stock structure) can potentially impact the international markets for mahi. Several companies from [SFP's Global Mahi Supply Chain Roundtable \(SR\)](#) and one retail partner provided financing to cover part of the cost of this pilot phase. Likewise, members of COREMAHI, such as the company [MARTEC](#), financed part of the exploratory phase in Costa Rica. Artisanal fishers were also engaged in the project and contributed to the research. For example, the fishing cooperative Asociación de Producción Pesquera de Armadores de Manta ([ASOAMAN](#)) provided its vessels and resources to tag mahi with conventional tags. Uncovered costs in Peru were complemented with philanthropic funding.



### STEP 4. Capacity building

In Ecuador, researchers from IPIAP, IMARPE, and SFP learned the DRP's methodology to tag and recover conventional and satellite tags. In turn, this allowed researchers to train local fishing associations in Ecuador and Northern Peru to recover and report conventional tags.

Additionally, SFP and IPIAP conducted a training workshop to present the tagging and recapture methodology to fishers from ASOAMAN. ASOAMAN fishers received 20 conventional tagging kits consisting of an average of 25 tags, a tag applicator device, a guide for tagging or recapturing mahi, and a data sheet to record the size and location of the captures. To date, 64 tags have been deployed by ASOAMAN members.



## CONCLUSIONS AND RECOMMENDATIONS

At the end of this pilot phase, we can conclude that:

- 1** The methodology implemented and the public-private partnerships generated in this pilot phase will allow scaling-up of the tagging project to involve more fishers and fishing sites.
- 2** Regional cooperation between IPIAP and IMARPE is crucial to address knowledge gaps in the stock structure of mahi. Research institutes have in-house knowledge and capacity to upscale training to fishers and implement a larger-scale tagging project if funding is available.
- 3** Artisanal fishers are a unique source of information when they effectively engage in data collection for scientific purposes. Their participation strengthens their commitment to sustainability and facilitates the further development of co-management arrangements. It is recommended to continue providing feedback to improve the tagging technique and create incentives for them to continue with this effort.
- 4** Companies supporting fishery improvement projects (FIPs) were involved in the funding of this regional initiative as its completion aids improvements within different management units of the same mahi fishery (Peru and Ecuador) that are not being addressed by individual FIPs. Further involvement of the industry in a scale-up phase should be pursued as it shows suppliers' commitment to sustainability.
- 5** It is important to implement a large-scale communications campaign for tag recovery.

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Implemented by:



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## BIBLIOGRAPHY

- Aires-da-silva, A., Valero, J. L., Maunder, M. N., Minte-Vera, C., Lennert-Cody, C., Román, M. H., ... Carranza, M. N. (2016). *Exploratory stock assessment of dorado (Coryphaena hippurus) in the Southeastern Pacific Ocean*. (i), 89. Retrieved from [https://www.iattc.org/Meetings/Meetings2016/SAC-07/PDFs/Docs/\\_English/SAC-07-06a\(i\)-Dorado-assessment.pdf](https://www.iattc.org/Meetings/Meetings2016/SAC-07/PDFs/Docs/_English/SAC-07-06a(i)-Dorado-assessment.pdf)
- Anhalzer, G., & Nanninga, R. (2014). *Application of Global Value Chains to Seafood Sustainability: Lessons from the mahi-mahi industries of Ecuador and Peru*.
- COREMAHI. (2019). *Reporte del taller de trabajo sobre la pesquería de mahi mahi en el océano Pacífico Oriental*. Retrieved from <https://www.coremahi.org/documentos/>
- IATTC. (2021a). *REPORT OF THE 12th MEETING OF THE SCIENTIFIC ADVISORY COMMITTEE*.
- IATTC. (2021b). *SAC-12 INF-D Proposal for a regional scientific plan for dorado (Coryphaena hippurus) INTER-AMERICAN TROPICAL TUNA COMMISSION SCIENTIFIC ADVISORY COMMITTEE 12 TH MEETING DOCUMENT SAC-12 INF-D*.
- Martínez-Ortiz, J., Aires-da-Silva, A. M., Lennert-Cody, C. E., & Maunder, M. N. (2015). *The Ecuadorian Artisanal Fishery for Large Pelagics: Species Composition and Spatio-Temporal Dynamics*. <https://doi.org/10.1371/journal.pone.0135136>
- Merten, W., Appeldoorn, R., Latour, J., Glaser, C., Becker, E., & Hammond, D. (2022). A citizen science approach to enhance dolphinfish (*Coryphaena hippurus*) data collection to improve species management. *Fisheries Management and Ecology*, (September 2021), 1–14. <https://doi.org/10.1111/fme.12555>
- Valero, J. L., Aires-Da-Silva, A., Maunder, M. N., Minte-Vera, C., Martínez-Ortiz, J., Torrejón-Magallanes, J., & Carranza, M. N. (2016). *Exploratory management strategy evaluation (MSE) of Dorado (Coryphaena hippurus) in the Southeastern Pacific ocean*. (May), 18. Retrieved from [https://www.iattc.org/Meetings/Meetings2016/SAC7/PDFfiles/SAC-07-06a\(ii\)-MSE-for-dorado.pdf](https://www.iattc.org/Meetings/Meetings2016/SAC7/PDFfiles/SAC-07-06a(ii)-MSE-for-dorado.pdf)