



## **SFP Global Sustainability Overview of Pacific Ocean Fisheries that Supply Mahi Mahi**

**May 2013**

This briefing represents the first edition of Sustainable Fisheries Partnership's (SFP's) Pacific Ocean sustainability overview of fisheries that supply mahi mahi (*Coryphaena hippurus*, also called mahi, dolphinfish, or dorado). This overview is based on information from [FishSource.com](http://FishSource.com), a program of SFP.

Based on limited available information, the prevailing understanding is that Pacific mahi stocks are in good condition. This assessment is based, in part, on the species' very low susceptibility to overexploitation due to its life history characteristics (e.g., high fecundity, fast growth rate, early age of maturity, short lifespan) and possible stock structure (circumtropical distribution, large population, high dispersion, gene flow, low population structure). Available information on trends in nominal CPUE (catch per unit of effort) for mahi in both the eastern and the western and central Pacific Ocean regions suggests that abundance is stable, with no indication of declines. However, changes in fishing gear, methods, and grounds, as well as in environmental conditions could have occurred. Ecological Risk Assessments and gap analyses for the Ecuador, Peru, Panama, and Guatemala mahi fisheries concluded that there was a medium-level risk for this species (MRAG Americas, 2012); additional and global-scale analyses are therefore warranted to determine with higher certainty whether there have been temporal trends in relative (local) and absolute (total) mahi abundance of Pacific Ocean stocks.

There is high uncertainty in the status of Pacific mahi stocks, in part, because stock-wide assessments have not been conducted. Additionally, uncertainty over mahi stock structure in the Pacific contributes to the lack of confidence in information on the health of mahi in this region and worldwide.<sup>1</sup> There is some evidence supporting the existence of separate eastern and western Pacific mahi stocks; this report separates FishSource profiles for fisheries that catch mahi in the eastern Pacific from those catching mahi in the western and central Pacific Ocean.

Neither of the two Pacific tuna regional fisheries management organizations (RFMOs) – the Inter-American Tropical Tuna Commission, with a convention area covering the eastern Pacific, and the Western and Central Pacific Fisheries Commission, covering the western and central Pacific – have mahi conservation and management harvest control measures in

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<sup>1</sup> A stock assessment was published in 1991 using Ecuadorian fishery-dependent data, with uncertainty in findings, and is now outdated (Patterson and Martinez, 1991). Studies on mahi population structure have conflicting findings, e.g., Diaz-Jaimes et al. (2010) find little genetic divergence between mahi populations globally, while Rocha-Olivares et al. (2006) results for the Pacific suggest genetic differences even for localities as close as Hawaii and the Mexican coast.

place. However, both RFMOs have input controls for purse seine tuna fisheries, and output controls for other pelagic species for pelagic longline fisheries. Mahi is a target species in some fisheries, and an incidental retained and discarded species in others.

There is nominal problematic bycatch in troll, handline, and pole-and-line fisheries that supply mahi. However, problematic bycatch of vulnerable species groups (seabirds, sea turtles, marine mammals, and sharks and their relatives) can occur in gillnet, purse seine, and pelagic longline fisheries that supply mahi. There is concern that artificial fish aggregating devices used in some purse seine and other pelagic fisheries that supply mahi cause broad, community-level effects (e.g., altering the spatial distribution of pelagic species that aggregate at the artificial floating objects).

## Assessment Criteria

Table 1 reports scores resulting from an evaluation of two stock-level (high-level, including all gears and sources of product) and 15 daughter-level (lower-level, focusing on particular sources, gears, or a combination of them, nested to the respective stock) fisheries when assessed against five FishSource criteria on management quality and stock status. The five FishSource criteria are:

- Score 1 - Is management precautionary?
- Score 2 - Do fishery managers follow scientific advice?
- Score 3 - Do fishers comply?
- Score 4 - Is the stock biomass healthy?
- Score 5 - Will the stock be healthy in the future?

The criteria are scored on a scale of 0 to 10, with 0 being the lowest and 10 the highest score possible. For all of the mahi fisheries included in Table 1, qualitative scores were employed because a lack of information made calculating quantitative scores impossible.<sup>2</sup> Preserving comparability with quantitative scores, qualitative scores are obtained by using the cut-off points as used in applications of the Marine Stewardship Council fishery assessment method: “< 6” → high-risk condition, indicating a negative assessment finding when assessed against that criterion; “≥ 6” → medium-risk condition, indicating that improvements are required for that criterion; and “≥ 8” → low-risk condition, indicating that the fishery meets the criterion conditions.

FishSource scores are used to place fisheries into one of three ranked categories (A, B, and C). The categorizations are based on the quality of management (scores 1 to 3) and status of the stock (scores 4 and 5). While not used in making the categorizations, FishSource fishery profiles also capture information on ecosystem effects, but information on ecosystem effects is incomplete for most of the mahi fisheries included in this report. Categories A, B, and C are defined as follows:

- A – Very well managed fisheries that score 8 and above across all FishSource scores.
- B – Well managed fisheries that score 6 and above across all FishSource scores.
- C – Poorly managed fisheries where at least one FishSource score is below 6.

## Results

An increasing temporal trend occurred in mahi catch levels in the eastern Pacific between 1982 and 2010 (see Figure 1) and an increasing temporal trend in mahi reported landings occurred in the western and central Pacific between 1991 and 2010 (see Figure 2). The

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<sup>2</sup> Find more about the FishSource methodology in the FishSource [FAQ section](#).

level of accuracy of the data presented in Figures 1 and 2 is unknown. Only data on *reported landings* were available for western and central Pacific mahi (FAO, 2013); data on total catch levels (retained and discarded mahi) were not found (e.g., WCPFC, 2012). As a result, the data presented in Figure 2, even if accurate, may not provide a correct indication of temporal trends in total mahi fishing mortality in this region.

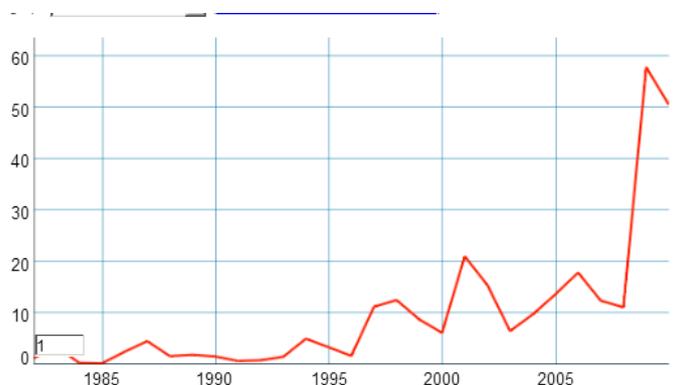


Figure 1. Temporal trends in total catch (tonnes, retained and discards) of mahi (common dolphinfish) combined, eastern Pacific Ocean, 1982 to 2010, based on catch from purse seine, longline and other fleets operating in the eastern Pacific Ocean. Catches for 2010 are provisional (IATTC, 2012).

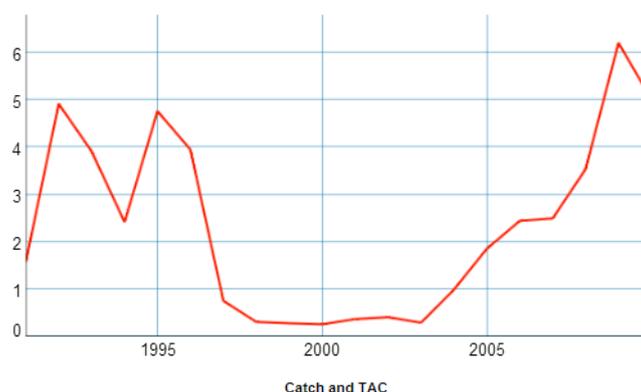


Figure 2. Temporal trends in reported landings (tonnes) (no information on total catch was found) of mahi (common dolphinfish), western and central Pacific Ocean, 1991-2010 (FAO, 2013).

Score 1: Profiles in both the eastern and western Pacific Ocean received scores of <6 (see Table 1) because the management strategy was determined to not be precautionary as there are no defined stock management objectives, including a lack of adoption of target, limit or other biological reference points, and because the stock is not managed through harvest control measures designed to meet stock management objectives.

Score 2: Profiles received scores of <6 because stock assessments have not been conducted for Pacific mahi stocks, there are no plans to conduct stock assessments in the near future (within one year), and there has been no scientific advice on stock status.

Score 3: Profiles received scores of <6 because the stock is not managed through input, output or other harvest control measures, the status of Pacific mahi stocks is not well understood, and there is a substantial level of unreported catch, both retained and discarded.

Scores 4 and 5: Profiles were assigned scores of  $\geq 6$  because, while biomass estimates (or equivalent) (for Score 4) and current estimates of fishing mortality (Score 5) are not available

as they have not been estimated from stock assessments, best available information, which is extremely limited and based on life history characteristics of mahi, suggest that mahi is of low vulnerability to overexploitation.

## **Conclusions and Recommendations**

Based on limited, publicly available information, all Pacific mahi fisheries are poorly managed, as indicated by their inclusion in Category C, and only two Fishery Improvement Projects at country-levels are public and underway (Table 1). Due to a dearth of information on management and stock status, SFP urges commercial buyers of Pacific mahi to take the following actions:

- Encourage management authorities to invest in relevant research to improve the knowledge of the stock and population structure of Pacific mahi. Because mahi is a highly migratory species, regional-scale research is required.
- Request national and regional management authorities to conduct stock assessments and establish reference points and harvest control rules for Pacific mahi stocks.
- Call upon companies in the supply chains of all fisheries that supply mahi for which fishery improvement projects (FIPs) are needed (Table 1) to publicly establish improvement projects and begin to make progress in addressing deficits in fishing practices and governance systems.
- Encourage those fisheries that supply mahi that are already in FIPs to ensure continuous progress in achieving priority improvements and to publicly report on this progress.
- Ask fisheries management authorities for fisheries that supply mahi to gradually incorporate ecosystem-based elements. This is applicable for both rudimentary and more advanced local and regional management systems.

Table 1. Evaluation summaries of two stock-level (bolded) and 15 fishery-level (indented) profiles that supply Pacific mahi, derived from an assessment against criteria used in SFP's FishSource ([www.fishsource.com](http://www.fishsource.com)) assessment methodology.

Fishery name	Scientific advice precautionary	Managers compliance	Fishers compliance	Relative Biomass	Fishing Mortality	A-C category (2012) <sup>1</sup>	Latest catches ('000 t)	Year of catch	FIP Status
<b>Mahi mahi - Eastern Pacific stock-level profile</b>	< 6	< 6	< 6	≥ 6	≥ 6	C	50.62 <sup>2</sup>	2010	Not applicable
Fishery: Costa Rica eastern Pacific drifting longlines	< 6	< 6	< 6	≥ 6	≥ 6	C	NA <sup>3</sup>	-	In development
Fishery: Costa Rica eastern Pacific hand-operated and mechanized handline and pole-and-line	< 6	< 6	< 6	≥ 6	≥ 6	C	NA	-	None
Fishery: Costa Rica eastern Pacific hooks and lines	< 6	< 6	< 6	≥ 6	≥ 6	C	NA	-	None
Fishery: Ecuador eastern Pacific hand-operated and mechanized handline and pole-and-line	< 6	< 6	< 6	≥ 6	≥ 6	C	NA	-	None
Fishery: Ecuador eastern Pacific drifting longlines	< 6	< 6	< 6	≥ 6	≥ 6	C	NA	-	Making progress
Fishery: Guatemala eastern Pacific drifting longlines	< 6	< 6	< 6	≥ 6	≥ 6	C	NA	-	In development
Fishery: Nicaragua eastern Pacific hand-operated and mechanized handline and pole-and-line	< 6	< 6	< 6	≥ 6	≥ 6	C	NA	-	FIP needed
Fishery: Nicaragua eastern Pacific drifting longlines	< 6	< 6	< 6	≥ 6	≥ 6	C	NA	-	FIP needed
Fishery: Panama eastern Pacific drifting longlines	< 6	< 6	< 6	≥ 6	≥ 6	C	NA	-	Making progress
Fishery: Panama eastern Pacific hand-operated and mechanized handline and pole-and-line	< 6	< 6	< 6	≥ 6	≥ 6	C	NA	-	None
Fishery: Peru eastern Pacific drifting longlines	< 6	< 6	< 6	≥ 6	≥ 6	C	NA	-	Not public
<b>Mahi mahi - Western and Central Pacific Ocean stock-level profile</b>	< 6	< 6	< 6	≥ 6	≥ 6	C	5.01 <sup>4</sup>	2010	Not applicable
Fishery: Indonesia western and central Pacific drifting longlines	< 6	< 6	< 6	≥ 6	≥ 6	C	NA	-	FIP needed
Fishery: Taiwan western and central Pacific drifting longlines	< 6	< 6	< 6	≥ 6	≥ 6	C	NA	-	FIP needed
Fishery: US Hawaii western and central Pacific drifting longlines	< 6	< 6	< 6	≥ 6	≥ 6	C	NA	-	FIP needed
Fishery: Vietnam western and central Pacific drifting longlines	< 6	< 6	< 6	≥ 6	≥ 6	C	NA	-	FIP needed

Notes: <sup>1</sup> Category A = all 5 scores ≥8; B = all 5 scores ≥6; C = one or more of 5 scores <6; <sup>2</sup> Preliminary 2010 total catch (retained and discarded) for multiple gear types (IATTC, 2012). <sup>3</sup> Data not available at the fishery resolution level. <sup>4</sup> Reported landings (no information available on total catch) for multiple gear types (FAO, 2013).

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