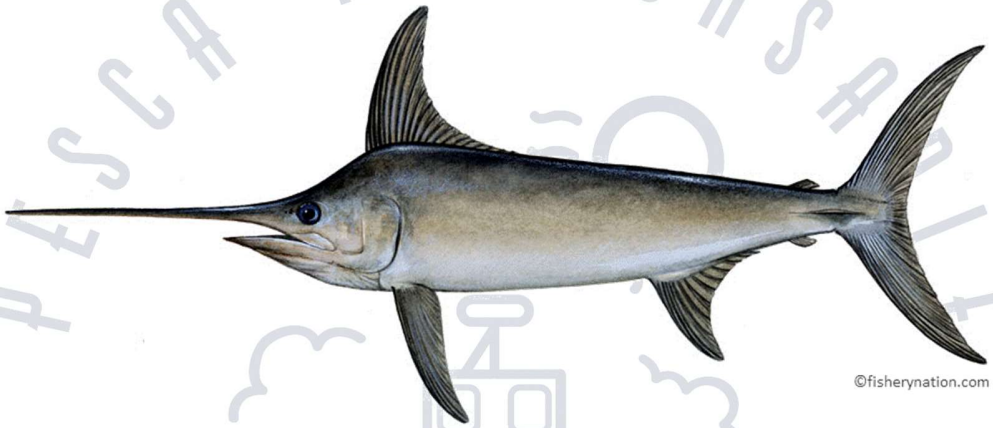
# Assessment of the MSC Principle 2 using the OSMI Environmental Rapid Assessment tool for the:
# Mexican Longline Swordfish Fishery

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## For:

Cámara Nacional de la Industria Pesquera y Acuícola

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# Executive summary

This report serves as an environmental assessment of the indicators related to the Principle 2 of the MSC standard for the industrial longline fishery targeting swordfish in the Mexican Pacific coast. For the Unit of Assessment (UoA), we focused specifically on the 52 fishing vessels based in  Ensenada, BC. Mexico. The information regarding catch composition was provided by the client as part of data collection system in place that is required by the Mexican legislation. In addition, some specifics tasks were started as part of the implementation of a Fishery Improvement Plan (FIP).

As a result, the data allowed to define those species that are considered bycatch and were categorized based on their proportion in the most recent fishing season. Overall, only two species, Blue shark and Shortfin mako shark reached the secondary main category and these species were used to score the appropriate PIs. No primary main species were found and those PIs were score properly. Finally, despite the fact that longlines in some more tropical waters have been recognized as fishing gears with some level of impacts on ETP species. The information collected by the Mexican fishery as well as the US fishery, report that interactions with species at risk are rare. It is recommended that a continuous monitoring system is in place to guarantee that these tendencies remain, and the fishery do not pose a risk on all the associated species.

# Abbreviations

| | |
|---|---|
| **CITES** | Convention on International Trade in Endangered Species of Wild Fauna and Flora |
| **cm** | Centimeter |
| **CPUE** | Catch Per Unit Effort |
| **EBFM** | Ecosystem Based Fisheries Management |
| **EEZ** | Exclusive Economic Zone |
| **ERA** | Environmental Rapid Assessment |
| **ETP** | Endangered,Threatened or Protected |
| **FAC** | Fisheries Advisory Council |
| **FAO** | Food and Agriculture Organization [of the United Nations] |
| **FCR** | Fisheries Certification Requirements [for MSC] |
| **FIP** | Fishery Improvement Project |
| **$F_{MSY}$** | fishing mortality consistent with achieving maximum sustainable yield |
| **IUCN** | International Union for Conservation of Nature |
| **km** | kilometers |
| **m** | meters |
| **MBA SFW** | Monterey Bay Aquarium Seafood Watch |
| **MCS** | Monitoring, Control and Surveillance |
| **MFMP** | Marine Fisheries Management Plan |
| **mm** | millimeter |
| **MSC** | Marine Stewardship Council |
| **MSY** | maximum sustainable yield |
| **PI** | performance indicator |
| **PRI** | Point of recruitment impairment |
| **PSA** | Productivity Susceptibility Analysis |
| **RBF** | Risk Based Framework |
| **SG** | Scoring Guidepost |
| **SICA** | Scale Intensity Consequence Analysis |
| **TAC** | Total Allowable Catch |
| **TAE** | Total Allowable Effort |
| **TOPS** | Threatened or Protected Species |
| **UoA** | Unit of Assessment |
| **VME** | Vulnerable marine ecosystem |

# Methodology background

The Environmental Rapid Assessment (ERA) Tool was co-developed by Ocean Outcomes (O2), World Wildlife Fund (WWF) US, and the Sustainable Fisheries Partnership. It is based on Marine Stewardship Council (MSC) performance indicators (PIs) and draws concepts/definitions from both the MSC and Monterey Bay Aquarium Seafood Watch (MBA SFW) standards, specifically the MSC Fisheries Certification Requirements Version 2.0 and the MBA SFW Standard for Fisheries Version 3.2. This assessment is designed to present key information about the fishery and identify major deficiencies in ecological sustainability, for general scoping or to facilitate movement of a fishery into an improvement project. The assessment can also be used to post a basic or prospective fishery improvement project profile on www.fisheryprogress.org. Version 1.0 of the tool is available here: https://fisheryprogress.org/resources/launching-fip

For this assessment we used Version 2.0 of the Rapid Assessment methodology, which primarily differs from Version 1.0 with its inclusion of scoring categories in the 0 to 59 range of the MSC 100 point scale (see scoring definitions in Table 1). Guidance for the lower scoring ranges was partly developed by the Marine Resources Assessment Group Americas for the Certification and Ratings Group, as described in the unpublished document "Lower range assessment of fishery performance: guidance document" (September 2018 version). The intent of incorporating these lower scoring ranges into the assessment tool is to allow for measurement of performance and fishery improvement progress below the MSC 60 level, which is applicable to many fisheries around the world, especially those that do not have long-established, formal fisheries management systems.

In keeping with standard pre-assessment protocols, we assigned a likely scoring range to each PI using a red-yellow-green traffic light system (Table 1). 'Default priority' refers to the general importance of addressing the identified deficiency; priority levels may be adjusted depending on the specific circumstances of the UoA fishery.

Table 1. ERA scoring ranges.

| Score range | Default priority | General definition of management performance |
|---|---|---|
| <20 | High | • No management system or strategy exist, and no control over the fishery is exercised or planned. Fishery may be completely open access with no framework with which to develop management.<br>• No information on stock status exists, nor is there information to evaluate productivity or susceptibility of target species. There is no proposed program to collect data. |
| 20-39 | | • Management is very poor and/or critically flawed due to a lack of resources or lack of political will. |

| | | |
|---|---|---|
| | | • Poor information is available on impacts to target stocks and other species, and it suggests overfishing or high susceptibility. There is no basis on which to develop reference points. |
| 40-59 | | • Key aspects of management remain insufficient or ineffective, likely due to a lack of resources but not lack of will or framework.<br>• Generic stock reference points are available, but available information suggests that stocks are overfished and that fishing activity causes some impact to the habitat and ecosystem.<br><br>Relation to MSC assessment: this PI is likely to fail |
| 60-79 | Medium | • Some important management aspects may be lacking, but none are sufficient to prevent a passing rating by themselves. Monitoring and enforcement is in place and believed effective.<br>• Information is available to estimate fishing mortality and effects on non-target and ETP species, and the fishery is unlikely to hinder ETP recovery. Habitat and ecosystem impacts are possible, though the fishery is unlikely to cause serious or irreversible harm.<br><br>Relation to MSC assessment: a condition may be needed for this PI |
| ≥80 | Low | • Management measures in place are expected to be effective, and precaution is accounted for.<br>• Stock-specific reference points are available and show that biomass is highly likely above a limit and is fluctuating around a target (normally MSY). Information is available to assess fishing mortality and impacts on non-target and ETP species. There is strong evidence that the fishery is not causing serious harm to habitats or ecosystems.<br><br>Relation to MSC assessment: an unconditional pass for this PI appears likely |

# Basic fishery information and landings

| | |
|---|---|
| **Target species** | Scientific name: *Xiphias gladius*<br>Common names: Swordfish |
| **Stock** | Northeastern Pacific |
| **Fishery location** | 33 vessels with fishing license for swordfish in the Mexican Pacific |
| **Gear type(s)** | Longline |
| **Catch quantity (weight)** | ~680 MT |
| **Management authority** | CONAPESCA / IATTC |

Table 3. Total swordfish captures in the Eastern Pacific Ocean (EPO) over time by longlines. Data source: IATTC, CONAPESCA and NMFS.

| Year | North EPO | Mexican fleet |
|---|---|---|
| 2013 | 2,900 | 643 |
| 2014 | 3,600 | 1,309 |
| 2015 | 2,900 | 665 |
| 2016 | 2,000 | 459 |
| 2017 | 3,000 | 688 |

## Unit of Assessment (UoA)

Under MSC guidance, UoAs may be defined by the target stock(s) combined with the fishing method/gear and practice (including vessel type/s) pursuing that stock, and any fleets , or groups of vessels, or individual fishing operators or other eligible fishers that are included in the assessment. We have initially defined the UoAs based on the target species and the most common fishing gear used. The UoAs can be re-defined at later stages, e.g. for development of a fishery improvement project, if stakeholders decide to focus on specific components of the fishery.

## Scoring summary

| Principle | Component | PI # | Performance Indicator | Scoring category |
|---|---|---|---|---|
| 2 | Primary species | 2.1.3 | Primary species information | 80+ |
| | | 2.1.1 | Primary species outcome | 80+ |
| | | 2.1.2 | Primary species management | 80+ |
| | Seconday species | 2.2.3 | Secondary species information | 60-79 |
| | | 2.2.1 | Secondary species outcome | 60-79 |
| | | 2.2.2 | Secondary species management | 60-79 |
| | ETP species | 2.3.3 | ETP species information | 60-79 |
| | | 2.3.1 | ETP species outcome | 80+ |
| | | 2.3.2 | ETP species management | 80+ |

# Ecosystem impacts - Principle 2

Information on all of the species caught in the fishery and their catch quantities is necessary for scoring many of the indicators under this principle. If such data are lacking, collection of catch data may be one of the first areas a fishery will need to address when entering an improvement project. The PIs are presented here in a slightly different order than they are in the MSC standard. Principle 2 includes multiple components, each of which has three indicators: outcome, management, and information. In this methodology, we score the information indicator first for each component, because the level of information affects ability to score outcome and also relates to management. For example, if there is no qualitative or quantitative information on habitat impacts from the fishery, then we know that habitat impacts outcome cannot be scored, and habitat impacts management will not receive an 80+ score. This allows the assessment to be conducted more efficiently. The ERA report template is organized with the typical MSC ordering of PIs.

Under the MSC standard, non-ETP (endangered, threatened, or protected) Principle 2 species are classified as either ‘primary’ or ‘secondary.’ Primary species have management objectives (e.g. reference points) and stock status monitoring in place, whereas secondary species do not. Version 1.0 of the ERA did not distinguish between primary and secondary species for the following reasons:

- The primary/secondary terminology is specific to MSC, and the terms may be misinterpreted outside of the MSC context;
- Basic FIPs are likely to be in fisheries with less management capacity and data, so there

may be no primary species;
- Reducing the number of indicators saves time and effort on scoring.

The 0-60 Fisheries Assessment Tool also does not make a distinction between primary and secondary species. However, because the FisheryProgress reporting platform is based on the MSC standard, it requires users to provide inputs for both primary and secondary species PIs. Thus Version 2.0 of the ERA accommodates these terms. Where both primary and secondary species exist in a fishery, both components should be scored. For data-limited fisheries that have no primary species, the secondary species PIs (2.2.1, 2.2.2, 2.2.3) will need to be evaluated, while the primary species PIs will receive 80+ scores by default, since the fishery does not impact primary species (following SA3.2.1, MSC FS v.2.01). In the less common circumstance where there are primary species but no secondary species, the converse will apply, with primary species PIs being evaluated and secondary species PIs receiving 80+ scores by default.

## *Important definitions used in Principle 2*

For the purposes of scoring P2 indicators, we use the following MSC definitions.

**Bycatch** - unwanted catch, or catch that the fisher did not intend to catch but could not avoid, and did not want or chose not to use.

We use **non-target** as a general term to refer to primary and secondary species, which are defined as follows:

- **Primary species** - Species where management tools and measures are in place, intended to achieve stock management objectives reflected in either limit or target reference points.
- **Secondary species** – Species that are not considered primary or ETP species.

Definitions for management measures and strategy terms:

- **Measures** - actions or tools in place within the management system that either explicitly manage impacts on the component or indirectly contribute to management of the component under assessment having been designed to manage impacts elsewhere.
- **Partial strategy** - a cohesive arrangement which may comprise one or more measures, an understanding of how it/they work to achieve an outcome and an awareness of the need to change the measures should they cease to be effective. It may not have been designed to manage the impact on that component specifically.
- **Strategy or full strategy** - a cohesive and strategic arrangement which may comprise one or more measures, an understanding of how it/they work to achieve an outcome and which should be designed to manage impact on that component specifically. A strategy needs to be appropriate to the scale, intensity, and cultural context of the fishery and should contain mechanisms for the modification of fishing practices in light of identification of unacceptable impacts.

**Exempt gear**, as defined in the 0-60 Fisheries Assessment Tool:
Certain gear types used around the world have been shown to have little or no bycatch

associated with them. These include pelagic trawl and seines targeting schooling small pelagics, harpoons, jig fishing (in many circumstances), hand rakes etc. Chuenpagdee et al. 2003,[1] Fuller et al. (2008),[2] and the Safina Center Fishing Gear 101 blog series offer useful guidance on this topic. Gears generally known to produce little bycatch include:

- Harpoon
- Hand or mechanical jigging (for catching squid)
- Hand rake
- Diver/hand harvest
- Pelagic purse seine and mid-water trawl (when used in mid water to target schooling small pelagics)

These gears also typically have minimal risk of impacting habitats. This list is not comprehensive and may be added to as more information becomes available. Also, some fisheries that appear on this list may have bycatch associated with them, so justification for the scores associated with exempt gears should still be provided in the rationale text. Where possible, data and analysis from the fishery being analyzed is always preferred.

**Similar fisheries**, as defined in the 0-60 Fisheries Assessment Tool:
Often direct information or data from the fishery and gear are not publicly available for the fishery under assessment. Rather than always assigning a low score in such cases, information from a similar fishery in the region may be used. Examples include Barents Sea and Icelandic capelin, where one fishery is information rich while the other has little data available. Both operate on the same species using the same gear in adjacent areas, often by the same vessels. It is up to the assessor to decide if a potentially similar fishery is a) close enough geographically to the fishery being scored, b) is targeting the same or very similar species with closely similar habits, c) if they are using the same or closely similar gear, and d) if there any other substantial differences between the fishery to be scored and the similar fishery. Justification for using a similar fishery should be provided in the rationale text.

Some of the scoring guidance for PIs 2.4.1 and 2.5.1 refers to **best available information**, defined as the most credible, relevant, and unbiased information of what is available. Peer-reviewed scientific papers and peer-reviewed official government reports are considered to be most credible; NGO and industry reports, fishery-dependent data, and non-peer reviewed scientific or government reports should also be considered but weighted less heavily. Analyses based on the specific fishery in question are considered the most relevant, analyses based on very similar fisheries (i.e. same gear type, same region, etc.) are the second best option, while very general assessments (e.g., global overarching conclusions about a type of gear) are the least relevant, and can still be considered but should be weighted less heavily.

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[1] Chuenpagdee, R., Morgan, L.E., Maxwell, S.M., Norse, E.A. and Pauly, D. 2003. Shifting gears: assessing collateral impacts of fishing methods in US waters. Frontiers in Ecology and the Environment, 1(10), pp.517-524.

[2] Fuller, S.D., Picco, C., Ford, J., Tsao, C.F., Morgan, L.E., Hangaard, D., and Chuenpagdee, R. 2008. How We Fish Matters: Addressing the Ecological Impacts of Canadian Fishing Gear.

## Catch composition

In Mexico, targeting swordfish for commercial purposes is allowed after the 50 nm from the coast and within those 50 nm only sport fishing activities are allowed. According to the National Fisheries Chart, in 2012 only 40 vessels were actively participating in the fishery (DOF 2012). A variety of species are susceptible to being caught incidentally in the Swordfish fishery's gear. Some have economic value and can be retained, and other might be discarded because they have little economic value locally. For this report, the data logs of eleven vessels were available to analyze from the 2010 to the 2021 seasons. Based on the available quantitative information and qualitative information, several species were identified to potentially being impacted by the fishery. Among these, the most important are the other targeted species Blue shark (*Prionace glauca*), and the Shortfin mako shark (*Isurus oxyrinchus*), Common thresher (*Alopias vulpinus*), and Hammerhead species (*Sphyrna spp*). In similar fisheries in the Atlantic and Indian Ocean, bycatch and associated mortality of a number of species groups include billfish, undersized swordfish, and sea turtles has been a particular concern. The analysis for P2 was made considering that the UoA is defined as Mexican fleet that targets swordfish longline targeting swordfish within the Mexican EEZ. The client provided fish log data from 12 longline vessels from 2010 to 2021. The data included the number of individuals (not catch volumes) for all species noted by producers in during the 2010 to 2021 period. To facilitate the development of catch tables an estimation of species-specific relative percent catch values, catch in numbers of individuals was normalized between the number of sets that were reported.

The Mexican swordfish fishery captured ~12 known species and recorded another 5 taxa where ID was not confirmed to the species level (see Table 5). The fishery has no main primary species, but 5 minor secondary species that are either tuna or marlin caught in very small quantities (<0.6% of total observed catch). There is one main secondary species, short-finned mako shark, and 25 minor secondary species comprised of finfish and shark caught in small quantities (<2% of total observed catch). Bait usage associated with the UoA was not provided, and for longline fisheries bait typical constitutes a considerable quantity which will reduce the species-specific relative percentages provided in Table 5. Considering the collective data and taking into consideration the reports of similar fisheries, we selected the following species as potential species presented as bycatch. No primary species were designated; none of the listed P2 species have in place a full stock assessment, a scientifically established TAC or known reference points. Finally, the selected bycatch species were classified as secondary species.

Table 5. 2010-2021 average estimated catch from the commercial fishery that targets swordfish with longlines. 'Main' species are those that comprise at least 5% of the total catch by weight.

| Common name | Scientific name | Relative percent | Classification |
|---|---|---|---|
| Blue shark | *Prionace glauca* | 40% | Secondary main |
| Shortfin mako shark | *Isurus oxyrinchus* | 3.9% | Secondary main |
| Common thresher | *Alopias vulpinus* | 1.6% | Secondary minor |
| Bigeye thresher | *Alopias superciliosus* | 1.2% | Secondary minor |
| Hammerhead sharks | *Sphyrna spp* | 1% | Secondary minor |
| Bluefin tuna | *Thunnus orientalis* | 0.6% | Secondary minor |

## Primary main species information (2.1.3)

| Scoring category | 80+ |
|---|---|

Rationale:

Based on the available information, none of the species that are captured as part of the UoAs fall in the category of primary species. Following the guidance of the ERA methodology this PI as well as the 2.1.1 and 2.1.3. will be scored as green (80+).

## Primary main species outcome (2.1.1)

| Scoring category | 80+ |
|---|---|

Rationale:

There are no main primary species so the fishery passes at SG 80.

## Primary main species management (2.1.2)

| Scoring category | 80+ |
|---|---|

Rationale:

There are no main primary species so the fishery passes at SG 80.

## Secondary main species information (2.3.3)

| Scoring category | 60-79 |
|---|---|

Rationale:

This PI focused in part to evaluate whether information on the nature and amount of main non-target species taken is adequate to determine the risk posed by the UoA, and the effectiveness of the strategy to manage the non-target species. As part of the licenses systems that the fleet has in place, one requirement is to have in place a data log that aims to identify the catch composition. The client provided data from the 2010 season until the 2021. The information is considered adequate to measure the vulnerability of other species to fishing, where qualitative

information as well as quantitative data will be used to estimate productivity and susceptibility attributes for main non-target species, and evaluate support measures to manage them. A refined amount of data will allow to support a more robust strategy that will increase the chances to effectively mitigate impacts on non-target species impacts. Based on these reasons, this PI is scored as yellow under the ERA methodology (60-79).

## Secondary main species outcome (2.2.1)

| | |
|---|---|
| Blue shark | 80+ |
| Shortfin mako | 60-79 |

Rationale:

Based on the catch composition information available, only two species reached the category of secondary main species based on the categorization system from the ERA. Blue shark, which represented an average of 40% of the bycatch species, and Shortfin mako shark which has a 3.9% representation. Despite the fact that its proportion is <5%, we decided to include it based on its low resilience and status by the IUCN. Below, we used the available information to score this PI for these secondary main species.

### *Secondary main species*

Blue shark

Blue sharks are pelagic, oceanic sharks occurring in both temperate and tropical waters but preferring cooler waters of between 12-20° C. It is found from the surface to depths of about 350 m and often at greater depths in tropical waters. It occasionally occurs close inshore where the continental shelf is narrow. Blue sharks are relatively fast-growing and fecund, maturing in 4-6 years for males and 5-7 years for females. The most recent assessment of the stock status of Blue shark was developed by the ISC- SWG using the Stock Synthesis modelling platform in 2017[3]. Two assessments of the northern stock of blue shark were considered. One was based on a Bayesian Surplus Production model (BSP) and one on a Stock Synthesis analysis (SS). The results indicated that, relative to MSY, the reference case and the majority of models run with input parameter values considered most probable based on the biology of blue sharks support the conclusion that the North Pacific blue shark stock was likely to be not overfished ($B_{2011}>B_{MSY}$) and overfishing was likely to not be occurring ($F_{2011}<F_{MSY}$). However, substantial uncertainties were recognized to be present by the researches. But overall, the available evidence was used to concluded that the stock was likely to be above the level required to sustain recent catches

[3] http://isc.fra.go.jp/pdf/ISC17/ISC17_Annex13-Stock_Assessment_and_Future_Projections_of_Blue_Shark.pdf

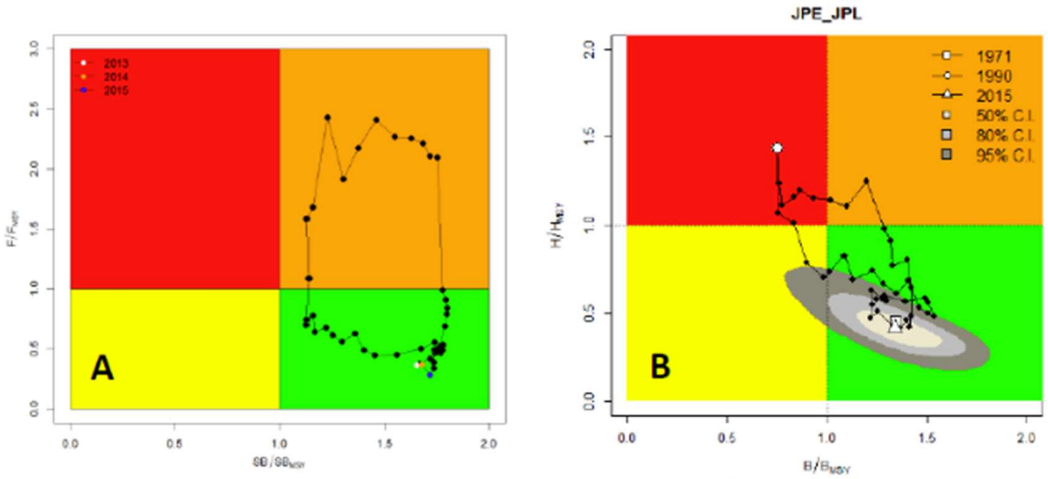


Figura 1. Kobe plots of the trends in estimates of relative fishing mortality and biomass of North Pacific blue shark between 1971-2015 for the reference case of (A) the SS stock assessment model, and (B) the BSSPM stock assessment model. (from ISC 2017[4]).

In relation to fishing mortality, the main source of blue shark is oceanic longline fisheries targeting swordfish and tuna, including mostly shallow-set longline fisheries in temperate waters (SFW 2020). The 2016 assessment, estimated that fishing mortality rates were well below levels needed to produce the maximum sustainable yield (F2012-2014/FMSY was approximately 37%) (ISC 2017). Based on the information, overfishing was likely not occurring. The information available allows to adequate assess the impact of the UoA and support a partial strategy to manage it. For these reasons, this PI is scored as green for the species.

Shortfin mako

Shortfin mako are large pelagic sharks with a wide geographical range, occurring in the Atlantic, Pacific, and Southern Oceans, although most often between 50° N and 50° S (ICCAT, 2010). Very little is known about the biology of this species, but some updated biological information became available in the early and mid-2000s (Simpfendorfer et al, 2008). Female shortfin mako have a low growth rate, mature at 18.5 years, a maximum lifespan of 32 years with a reproductive period of 3 years producing small litters of 12.5 pups, and an intrinsic rate of increase of 0.014 (Simpfender et al., 2008)

The north Pacific stock of blue shark was assessed in 2018 by the ISC shark working group of the WCPO (ISC 2018). In the report, the status of the stock was reported in relation to MSY. The researchers estimated recruitment to be 1.1 million age-0 sharks during the modeling timeframe (1975-2016) with a spawning abundance (SA) of 910,000 (mature females), which was higher than the estimated SA at MSY ($SA_{MSY}$). The results from the base case model showed that, relative to MSY, the stock of Shortfin mako in the NPO is likely (>50%) not in an overfished condition and overfishing was likely (>50%) not occurring[5].

[4] http://isc.fra.go.jp/pdf/ISC17/ISC17_Annex13-Stock_Assessment_and_Future_Projections_of_Blue_Shark.pdf

[5] https://www.iucnredlist.org/species/pdf/2903170/attachment

| Region | GL (years) | Data length (years) | PA weighting | Median change | LC | NT | VU | EN | CR | Likely status |
|---|---|---|---|---|---|---|---|---|---|---|
| Atlantic[1] | 25 | 68 | 0.29 | -60.0 | 0 | 0.1 | 9.9 | **90.0** | 0 | **EN** |
| N. Pacific[2] | 24 | 42 | 0.31 | -36.5 | 20.9 | 15.6 | **43.3** | 20.3 | 0 | **VU** |
| S. Pacific[3] | 24 | 19 | 0.22 | +35.2 | **69.4** | 4.2 | 9.0 | 13.4 | 3.9 | **LC** |
| Indian[4] | 24 | 45 | 0.18 | -47.9 | 4.5 | 7.6 | **44.3** | **43.6** | **0** | **VU** |
| **Global** | — | — | — | **-46.6** | 22.5 | 7.2 | 26.1 | **43.3** | **0.9** | **EN** |

Figure 2. Rigby et al (2018) categorization shortfin mako. Population change (%) and posterior probabilities for changes falling within the IUCN Red List categories Least Concern (LC), Near Threatened (NT), Vulnerable (VU), Endangered (EN), and Critically Endangered (CR); the "likely status" based on criteria A2–4 is assigned based on the category containing the highest posterior probability, with the exception that VU is also selected where LC obtained the highest probability, but it is < 50% (Source Rigby et al 2018[3]).

Overall, there is enough qualitative information that is adequate to estimate the impact of the UoA on Shortfin mako with respect to status, and this Information is adequate to support measures to manage the species. However, due to the uncertainties of its status this PI is scored as yellow for the species (60-79).

## Secondary main species management (2.2.2)

| | |
|---|---|
| Blue shark | 60-79 |
| Shortfin mako | 60-79 |

Rationale:

The fishery is managed in Mexico, by the National Fisheries Commission (CONAPESCA). The organism has in place some management measures aiming to control impacts on sharks species. For example, in 2006, the Mexican Official Norm 029 (NOM-029-PESC-2006) was enacted and include measures that aim to regulate the impacts on shark species within the EEZ. The main measures in place include:

- Ban on less resilient or identified as ETP shark and ray species (e.g. whale shark *Rhincodon typus*).
- All sharks catch by all the authorized fishers should be landed with attached fins and all shark species need to be reported at landing site.
- On and off seasons for the shark species will be announced by managers.

- All fishing activities that aim to target sharks and rays has to be developed under a licensed that is granted by managers. Technical studies are used to manage the number of licenses.
- Designated areas to protect spawning, nursery as well as aggregation zones are designed by managers.
- Finally, some gears such as gillnets and longlines are prohibited in certain areas during some periods during the year.

The measures in place for the UoA, are expected to maintain or to not hinder rebuilding of main non-target species, and are considered likely to work, based on plausible argument. In addition, based on the legislation and enforcement, it is likely that shark finning is not taking place. Finally, this fishery target highly migratory species that have a range spanning into international waters. These targeted species are managed at the international level through Regional Fisheries Management Organizations, specifically the Western and Central Pacific Fisheries Commission (WCPFC) in the WCPO and the Inter-American Tropical Tuna Commission (IATTC) in the eastern Pacific Ocean. Mexico must abide by the management measures set forth by the WCPFC and IATTC because the country is member of the IATTC and cooperative non-member of the WCPFC. For these reasons, this PI scores as yellow (60-79) for both species, considering that some more specific evidence that the measures are being implemented successfully and a regular review of the effectiveness and practicality of alternative measures to minimize UoA-related mortality of unwanted catch of main non-target species, and they are implemented as appropriate is needed.

## ETP species information (2.3.3)

| Scoring category | 60-79 |
|---|---|

Rationale:

This PI evaluates whether adequate relevant information is collected to support management of UoA impacts on ETP species. When data on fishery impacts on ETP species are limited, the methodology suggest focused on the availability of information regarding the species' susceptibility to fishing-related mortality. Qualitative and quantitative information about fishery impacts on ETP species can include local knowledge from fishers, government agencies, research scientists, or environmental NGOs; plausible arguments based on knowledge or studies of the fishing gear; fisher or observer logbooks with records of ETP species encounters.

Using the data collected by clients fish logs, interactions with ETP species were not reported, the quantitative information did not include details about the efforts that are in place to collect or record this type on information. In addition to this source of data, we used findings from a similar fishery in the region that were reported by Hanan & Hinton (2020)[6] on the US Swordfish fishery in the Pacific West. The results presented to the National Marine Fisheries Service (NMFS)

[6] https://www.pcouncil.org/documents/2020/05/informational-report-11-preliminary-report-on-the-2019-swordfish-longline-efp-fishery-captains-david-haworth-and-john-gibbs.pdf/

contained the analyzes of the fishing operations for swordfish off southern California. In the study, longline sets were launched 50 miles of the coastline but within the US-exclusive economic zone (EEZ). The catch composition was analyzed and researchers divided it into three categories: target, incidental catch (species that are not targeted but which we kept for market; and bycatch (species that were discarded or kept for personal use). The authors, identified 28 species, were shortfin mako shark and blue sharks were among the most abundant (similar to the fishery under this assessment). In relation to ETP species, the researchers mentioned putting in place seabird and sea turtle mitigation techniques practiced in the Hawaiian longline fishery, but reported not catching any birds, sea turtles, or marlin, although reported catching two California sea lions (Hanan & Hinton 2002).

The fisher's logs from the whole fleet could provide corroboration of the current data and would help to reduce uncertainty in the estimates. Current levels of qualitative or quantitative information are adequate to estimate the impact of the UoA on ETP species and support measures to manage impacts on those species. It is recommended to improve reporting by the commercial fleet that would enhance the confidence in the data and the ability to detect any increase in risk to ETP species. Quantitative analyses of available data could also be conducted to determine if there is evidence of an observer effect. Lack of evidence will not prove there is no observer effect, but it should enhance confidence in estimates of sea turtle and marine mammal interactions based on observer data. Based on this we granted this PI a yellow scoring (60-79).

## ETP species outcome (2.3.1)

| | |
|---|---|
| Scoring category | 80+ |

Rationale:

Based on the information available, the interactions of the UoA with ETP species are non-existent (based on fish data logs) or rare (Hanan & Hinton 2020)[7]. Based on the combination of both quantitative and qualitative information available, the known direct effects of the UoA are likely to not hinder recovery of ETP species. Finally, the indirect effects that include competition for resources, pollution, and habitat loss, are thought to be highly likely not to create unacceptable impacts do to the nature of the gear. For these reasons, this PI is scored as green (80+).

## ETP species management (2.3.2)

| | |
|---|---|
| Scoring category | 80+ |

[7] https://www.pcouncil.org/documents/2020/05/informational-report-11-preliminary-report-on-the-2019-swordfish-longline-efp-fishery-captains-david-haworth-and-john-gibbs.pdf/

Rationale:

On a national level, Mexican legislation has in place the Mexican Official Norm 059-SEMARNAT, that includes several species within the ETP category. Among these, all marine turtles, as well as marine mammals are included. The NOM-059, prohibit the use, collection or possession on any of the species. In addition, there is the NOM-029-PESC, which has in place measures to protect shark species that are known to be vulnerable to high levels of fishing pressure. The NOM-029 has in place several measures to protect vulnerable species of sharks and rays (e.g. white shark or whale shark), in addition, shark finning is prohibited (WPRFMC 2009b) and there are sea turtle handling guidelines (WPRFMC 2009b). These measures aim to conserve ETP species and therefore constitute a strategy, although there do not appear to be specific objectives or recovery targets for these species.

Considering that the fishery targets highly migratory species, which are managed at the international level by the Western and Central Pacific Fisheries Commission (WCPFC) and the InterAmerican Tropical Tuna Commission (IATTC) in the eastern Pacific Ocean. Mexico must abide by the management measures set forth by the WCPFC and IATTC because it is a member of both. Currently, based on the available information, the current measures in place seem to be appropriate in particular dur to the levels of interactions. These are expected to ensure the UoA does not hinder the recovery of ETP species, and are considered likely to work, based on the fact that interactions are non-reported. Although it is unclear if there is a review of the potential effectiveness and practicality of alternative measures to minimize UoA-related mortality of ETP species. For these reasons, we are scoring this PI as green (80+).

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# Appendix

## Scoring definitions

This assessment methodology uses the following definitions for indicator scoring categories. The color scheme follows that used by MSC and on FisheryProgress.org, with green denoting good to exemplary practice (MSC score 80 or greater), yellow denoting acceptable practice with room for improvement (MSC 60 to 79), and red denoting weak practice (less than MSC 60).

| Numeric scoring range | General definition of management performance |
|---|---|
| <20 | • No management system or strategy exist, and no control over the fishery is exercised or planned. Fishery may be completely open access with no framework with which to develop management.<br>• No information on stock status exists, nor is there information to evaluate productivity or susceptibility of target species. There is no proposed program to collect data. |
| 20-39 | • Management is very poor and/or critically flawed due to a lack of resources or lack of political will.<br>• Poor information is available on impacts to target stocks and other species, and it suggests overfishing or high susceptibility. There is no basis on which to develop reference points. |
| 40-59 | • Key aspects of management remain insufficient or ineffective, likely due to a lack of resources but not lack of will or framework.<br>• Generic stock reference points are available, but available information suggests that stocks are overfished and that fishing activity causes some impact to the habitat and ecosystem. |
| 60-79 | • Some important management aspects may be lacking, but none are sufficient to prevent a passing rating by themselves. Monitoring and enforcement is in place and believed effective.<br>• Information is available to estimate fishing mortality and effects on non-target and ETP species, and the fishery is unlikely to hinder ETP recovery. Habitat and ecosystem impacts are possible, though the fishery is unlikely to cause serious or irreversible harm. |
| 80+ | • Management measures in place are expected to be effective, and precaution is accounted for.<br>• Stock-specific reference points are available and show that biomass is highly likely above a limit and is fluctuating around a target (normally MSY). Information is available to assess fishing mortality and impacts on non-target and ETP species. There is strong evidence that the fishery is not causing serious harm to habitats or ecosystems. |

## Scoring tables for PSA

PSA scoring tables (PF4 and PF5) from the MSC Fisheries Standard are provided below. For MSC pre-assessments, only a PSA is required to score PI 1.1.1. However, in a full assessment, a Consequence Analysis would be applied in addition to the PSA, through which stakeholder input would be used to complement available fishery-specific data and scientific literature when determining scores.

Table PF4: PSA Productivity attributes and scores

| Productivity determinant | High productivity (Low risk, score=1) | Medium productivity (medium risk, score=2) | High productivity (high risk, score=3 |
|---|---|---|---|
| Average age at maturity | <5 years | 5-15 years | >15 years |
| Average maximum age | <10 years | 10-25 years | >25 years |
| Fecundity | >20,000 eggs per year | 100-20,000 eggs per year | <100 eggs per year |
| Average maximum size (not to be used when scoring invertebrate species) | <100 cm | 100-300 cm | >300 cm |
| Average size at maturity (not to be used when scoring invertebrate species) | <40 cm | 40-200 cm | >200 cm |
| Reproductive strategy | Broadcast spawner | Demersal egg layer | Live bearer |
| Trophic Level | <2.75 | 2.75-3.25 | >3.25 |
| Density dependence ‼ (to be used when scoring invertebrate species only) | Compensatory dynamics at low population size demonstrated or likely | No depensatory or compensatory dynamics demonstrated or likely | Depensatory dynamics at low population sizes (Allee effects) demonstrated or likely |

Table PF5: PSA Susceptibility attributes and scores

| Susceptibility attribute | Low susceptibility (Low risk, score=1) | Medium susceptibility (medium risk, score=2) | High susceptibility (high risk, score=3 |
|---|---|---|---|
| Areal overlap (availability) Overlap of the fishing effort with a species concentration of the stock | <10% overlap | 10-30% overlap | >30% overlap |
| Encounterability The position of the stock/species within the water column relative to the fishing gear, and the position of the stock/species within the habitat relative to the position of the gear | Low overlap with fishing gear (low encounterability) | Medium overlap with fishing gear | High overlap with fishing gear (high encounterability) Default score for target species (P1) |
| Selectivity of gear type Potential of the gear to retain species | a Individual < size at maturity are rarely caught | a Individuals < size at maturity are regularly caught | a Individuals < size at maturity are frequently caught |
| | b Individuals < size at maturity can escape or avoid gear | b Individuals < half the size at maturity can escape or avoid gear | b Individuals < half the size at maturity are retained by gear |
| Post-capture mortality (PCM) The chance that, if captured, a species would be released and that it would be in a condition permitting subsequent survival | Evidence of majority released postcapture and survival | Evidence of some released postcapture and survival | Retained species or majority dead when released Default score for retained species (P1 or P2) |