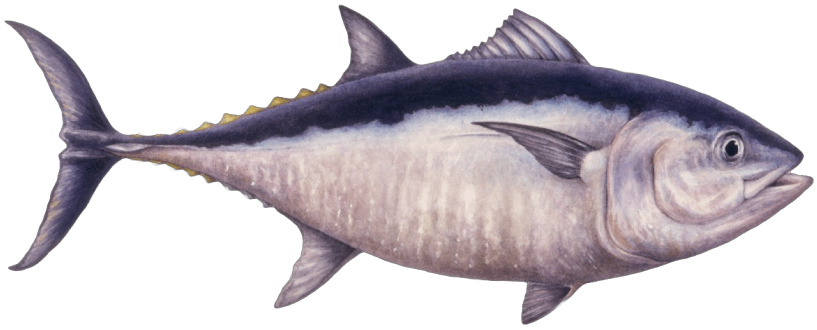
Pacific bluefin tuna

Thunnus orientalis



Eastern Pacific

Unassociated purse seine (non-FAD), Handlines, and hand-operated pole-and-lines

Report ID 28408

October 7, 2024

Seafood Watch Standard used in this assessment: Fisheries Standard v4

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About Seafood Watch

Monterey Bay Aquarium's Seafood Watch program evaluates the environmental sustainability of wild-caught and farmed seafood commonly found in the United States marketplace. Seafood Watch defines sustainable seafood as originating from sources, whether wild-caught or farmed, which can maintain or increase production in the long-term without jeopardizing the structure or function of affected ecosystems. The program's goals are to raise awareness of important ocean conservation issues and empower seafood consumers and businesses to make choices for healthy oceans.

Seafood Watch's science-based ratings are available at www.SeafoodWatch.org. Each rating is supported by a Seafood Watch assessment, in which the fishery or aquaculture operation is evaluated using the Seafood Watch standard.

Seafood Watch standards are built on our guiding principles, which outline the necessary environmental sustainability elements for fisheries and aquaculture operations. The guiding principles differ across standards, reflecting the different impacts of fisheries and aquaculture.

- Seafood rated Best Choice comes from sources that operate in a manner that's consistent with our guiding principles. The seafood is caught or farmed in ways that cause little or no harm to other wildlife or the environment.

- Seafood rated Good Alternative comes from sources that align with most of our guiding principles. However, one issue needs substantial improvement, or there's significant uncertainty about the impacts on wildlife or the environment.

- Seafood rated Avoid comes from sources that don't align with our guiding principles. The seafood is caught or farmed in ways that have a high risk of causing harm to wildlife or the environment. There's a critical conservation concern or many issues need substantial improvement.

Each assessment follows an eight-step process, which prioritizes rigor, impartiality, transparency and accessibility. They are conducted by Seafood Watch scientists, in collaboration with scientific, government, industry and conservation experts and are open for public comment prior to publication. Conditions in wild capture fisheries and aquaculture operations can change over time; as such assessments and ratings are updated regularly to reflect current practice.

More information on Seafood Watch guiding principles, standards, assessments and ratings are available at www.SeafoodWatch.org.

Guiding Principles

Seafood Watch defines sustainable seafood as originating from sources, whether fished[1] or farmed, that can maintain or increase production in the long term without jeopardizing the structure or function of affected ecosystems.

The following guiding principles illustrate the qualities that fisheries must possess to be considered sustainable by the Seafood Watch program (these are explained further in the Seafood Watch Standard for Fisheries):

- Follow the principles of ecosystem-based fisheries management.
- Ensure all affected stocks are healthy and abundant.
- Fish all affected stocks at sustainable levels.
- Minimize bycatch.
- Have no more than a negligible impact on any threatened, endangered, or protected species.
- Managed to sustain the long-term productivity of all affected species.
- Avoid negative impacts on the structure, function, or associated biota of aquatic habitats where fishing occurs.
- Maintain the trophic role of all aquatic life.
- Do not result in harmful ecological changes such as reduction of dependent predator populations, trophic cascades, or phase shifts.
- Ensure that any enhancement activities and fishing activities on enhanced stocks do not negatively affect the diversity, abundance, productivity, or genetic integrity of wild stocks.

These guiding principles are operationalized in the four criteria in this standard.Each criterion includes:

- Factors to evaluate and score
- Guidelines for integrating these factors to produce a numerical score and rating

Once a rating has been assigned to each criterion, Seafood Watch develops an overall recommendation. Criteria ratings and the overall recommendation are color coded to correspond to the categories on the Seafood Watch pocket guides and online guide:

Best Choice/Green: Buy first; they're well managed and caught or farmed responsibly.

Good Alternative/Yellow: Buy, but be aware there are concerns with how they're caught, farmed or managed.

Avoid/Red: Take a pass on these for now; they're caught or farmed in ways that harm other marine life or the environment.

[1] "Fish" is used throughout this document to refer to finfish, shellfish and other invertebrates

Summary

This report focuses on the following fisheries in the Eastern Pacific Ocean: 1) the U.S. coastal, unassociated purse seine fishery opportunistically targeting Pacific bluefin, skipjack, and yellowfin tunas; 2) the Mexican unassociated purse seine fishery targeting Pacific bluefin tuna; and 3) the U.S. handline (hook and line) fishery for Pacific bluefin tuna.

Skipjack and yellowfin tunas have healthy stocks with fishing mortality rates below reference points. Pacific bluefin tuna stock status has recently improved, and the previously overfished stock, according to NOAA, is now rebuilt, but the most recent fishing mortality status relative to a sustainable level is somewhat uncertain.

Unassociated purse seine fisheries typically have relatively lower bycatch compared to associated purse seine fisheries; however, sharks may still be captured in some purse seine fisheries. Bycatch is typically much lower in handline fisheries for pelagic species. The U.S. handline fishery for Pacific bluefin tuna has no significant bycatch.

Tuna, large pelagics, and swordfish in the EPO are managed by the Inter-American Tropical Tuna Commission (IATTC). Tropical tunas (skipjack, yellowfin, bigeye) have reference points and a harvest control rule in place, while Pacific bluefin tuna has a harvest control rule in place that focuses on rebuilding but lacks a long-term harvest strategy or formally adopted target and limit reference points. Although some measures are in place for sharks caught in IATTC fisheries (for example, prohibiting shark finning and prohibiting retention of some species), there are no catch limits in place.

The IATTC takes ecosystem-based fisheries management considerations into account, and measures are in place to minimize adverse impacts to turtles and sharks. But the efficacy of these measures is unknown due to limited observer coverage in some fleets. The IATTC is currently working to improve ecosystem management of longline and purse seine fisheries by developing Ecological Risk Assessments. Purse seine and handline gears typically have little contact with bottom habitats when fishing for pelagic species.

Pacific bluefin tuna caught in the U.S. unassociated purse seine fishery receives a Yellow rating, and bluefin caught in the Mexican purse seine fishery also receives a Yellow rating. Skipjack and yellowfin tunas caught in the U.S. unassociated sets receive Green ratings. Pacific bluefin tuna caught in the U.S. handline fishery also receives a Yellow rating.

Final Seafood Recommendations

SPECIES | FISHERY	C 1 TARGET SPECIES	C 2 OTHER SPECIES	C 3 MANAGEMENT	C 4 HABITAT	OVERALL	VOLUME (MT) YEAR
Pacific bluefin tuna | Eastern Central Pacific | Mexico | Unassociated purse seine (non-FAD) | Bluefin Fishery	2.644	5.000	3.000	3.873	**Good Alternative (3.520)**	3,194
Pacific bluefin tuna | Eastern Central Pacific, Northeast Pacific | United States | Handlines and hand-operated pole-and-lines	2.644	5.000	3.000	3.873	**Good Alternative (3.520)**	149
Pacific bluefin tuna | Eastern Central Pacific, Northeast Pacific | United States | California | Unassociated purse seine (non-FAD) | US coastal purse seine fishery when targeting tuna	2.644	2.236	3.000	3.873	**Good Alternative (2.879)**	198
Skipjack tuna | Eastern Pacific Ocean Stock | Eastern Central Pacific, Northeast Pacific | United States | California | Unassociated purse seine (non-FAD) | US coastal purse seine fishery when targeting tuna	5.000	2.236	3.000	3.873	**Best Choice (3.376)**	0
Yellowfin tuna | Eastern Pacific Ocean Stock | Eastern Central Pacific, Northeast Pacific | United States | California | Unassociated purse seine (non-FAD) | US coastal purse seine fishery when targeting tuna	5.000	2.236	3.000	3.873	**Best Choice (3.376)**	404

The volumes stated in the Introduction are for 2022. Note that skipjack landings for 2022 in U.S. West Coast purse seines are confidential. Also, though Mexican purse seines catch significantly more bluefin than the U.S. fisheries, all of this catch typically goes to ranching activities: since 2007, 100% of the Mexican purse seine catch of Pacific bluefin tuna has been used for ranching.

Summary

This report focuses on the following fisheries in the Eastern Pacific Ocean: 1) the U.S. coastal, unassociated purse seine fishery opportunistically targeting Pacific bluefin, skipjack, and yellowfin tunas; 2) the Mexican unassociated purse seine fishery targeting Pacific bluefin tuna; and 3) the U.S. handline (hook and line) fishery for Pacific bluefin tuna. Pacific bluefin tuna caught in U.S. purse seine fisheries receives a Yellow rating, and Pacific bluefin tuna caught in Mexican purse seines also receives a Yellow rating. Skipjack and yellowfin tunas caught in U.S. unassociated sets receive a Green rating. Pacific bluefin tuna caught in U.S. handlines also receives a Yellow rating.

Scoring Guide

Scores range from zero to five where zero indicates very poor performance and five indicates the fishing operations have no significant impact.

Final Score = geometric mean of the four Scores (Criterion 1, Criterion 2, Criterion 3, Criterion 4).

Best Choice/Green = Final Score >3.2, and no Red Criteria, and no Critical scores

Good Alternative/Yellow = Final score >2.2-3.2, and neither Harvest Strategy (Factor 3.1) nor Bycatch Management Strategy (Factor 3.2) are Very High Concern[2], and no more than one Red Criterion, and no Critical scores

Avoid/Red = Final Score ≤2.2, or either Harvest Strategy (Factor 3.1) or Bycatch Management Strategy (Factor 3.2) is Very High Concern or two or more Red Criteria, or one or more Critical scores.

[2] Because effective management is an essential component of sustainable fisheries, Seafood Watch issues an Avoid recommendation for any fishery scored as a Very High Concern for either factor under Management (Criterion 3).

Introduction

Scope of the analysis and ensuing recommendation

This assessment focuses on unassociated purse seine and handline fisheries for Pacific bluefin tuna (PBF) in the Eastern Pacific Ocean (EPO).

Fisheries

Purse seine fisheries

Two unassociated purse seine fisheries are covered in this report: one from Mexico, and the other from the United States. The Mexican purse seine fishery consists of commercial, primarily large-scale vessels that target bluefin (mostly, if not fully, for ranching purposes) in coastal areas when not fishing for yellowfin in wider IATTC waters, beyond the Mexico exclusive economic zone (EEZ). The U.S. purse seine fishery consists of smaller vessels (Classes 1–5) that opportunistically catch tunas, including bluefin, when not capturing their typical targets of small pelagic species like squid. This U.S. fleet is separate from the larger tropical tuna fishery that operates beyond the U.S. EEZ and uses larger vessels. IATTC-level data cannot be used to characterize the catch in these fisheries, so national-level data from respective management organizations were used instead. National Marine Fisheries Service (NMFS) data indicate that Pacific bluefin, skipjack, and yellowfin tunas are the only species landed in significant quantities. Data from Fideicomiso de Investigación para el Desarrollo del Programa Nacional de Aprovechamiento del Atún y Protección de Delfines y otros en torno a Especies Acuáticas Protegidas (PNAAPD-FIDEMAR) indicate that the only landed species in the Mexican fleet is Pacific bluefin, and there are no species captured and released in significant quantities. See the Criterion 2 Summary for more complete catch data from each country.

Handline fishery

One handline fishery is rated in this assessment: the U.S. handline (hook and line) fishery for Pacific bluefin tuna. This fishery for Pacific bluefin tuna has grown in recent years, consisting primarily of recreational fishers who switch to commercial fishing during the season. Note that this assessment does not provide a rating for any recreational fisheries for Pacific bluefin. While the majority of U.S.-caught Pacific bluefin tuna comes from purse seine fisheries, a growing percentage comes from the handline fishery (Table 1).

Table 1: 2022 U.S. landings of Pacific bluefin tuna by gear type (Data source: PacFIN via NOAA).

Gear	Pacific Bluefin Landings (mt)
Purse Seine	197
Hook and Line	148
Drift Gillnet	20

Species Overview

Skipjack and yellowfin tuna are found in tropical and subtropical waters throughout the Pacific Ocean. There are four populations of yellowfin and five of skipjack as follows: Western and Central Pacific Ocean, EPO, Atlantic (Eastern and Western for skipjack), and Indian Ocean. Juvenile yellowfin tuna tend to form

schools with skipjack tuna, which are mostly found in surface waters. Larger tunas are found in subsurface waters, where they also form schools (ISSF 2017). Globally, purse seines are the primary gear used to capture yellowfin and skipjack tuna (Hall & Ramon 2013). Skipjack and yellowfin tuna catches have all increased substantially over time, peaking in the early 2000s, after which catches stabilized (ISSF 2017).

There are three species and four stocks of bluefin tuna: Atlantic (Eastern/Mediterranean and Western stocks), Pacific, and Southern. Before the 2000s, bluefin stocks were heavily overfished, with all stocks now rebuilding and bluefin tunas making up under 1% of the total global catch in 2022 (ISSF 2024). Bluefins are the largest of the tuna species and have a broader geographic range than other tuna species, though unlike skipjack and yellowfin, bluefins are found in both tropical and temperate waters (ISSF 2024) (WWF 2024). Most Pacific bluefin catch comes from the Western Pacific, in which purse seines are the primary gear type used (ISSF 2024).

The United Nations Straddling and Highly Migratory Fish Stocks Agreement (1995) indicated that the management of straddling and highly migratory fish stocks should be carried out through Regional Fisheries Management Organizations (RFMOs). RFMOs are the legally mandated fishery management bodies on the high seas and within EEZ waters. There are currently 18 RFMOs that cover nearly all of the world's waters. The Inter-American Tropical Tuna Commission (IATTC) is the RFMO responsible for managing the EPO tuna fisheries, though the IATTC and WCPFC jointly manage the shared Pacific bluefin stock. IATTC member countries must abide by the management measures set forth by individual RFMOs in order to fish in their waters. IATTC members include: Belize, Canada, China, Colombia, Costa Rica, Ecuador, El Salvador, European Union, France, Guatemala, Japan, Kiribati, Korea, Mexico, Nicaragua, Panama, Peru, Chinese Taipei, United States, Vanuatu, and Venezuela (IATTC 2018c).

Production Statistics

Total global landings of tuna have been around 5 million metric tons (mt) in recent years. Skipjack and yellowfin tuna dominate those landings (55% and 30% of summed landings 2000–21, respectively), and the three species of bluefin tuna account for around 1% of landings.

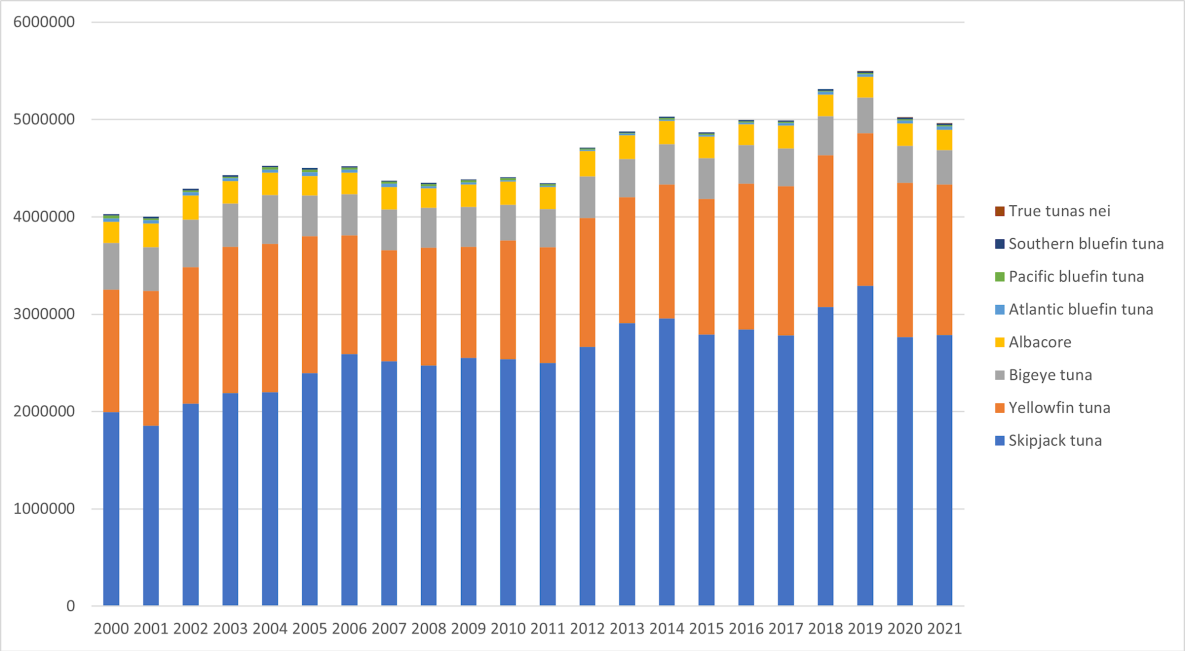

Figure 1: Landings of the major tuna species by year. Data from the UN FAO FishStatJ database (https://www.fao.org/fishery/en/statistics/software/fishstatj).

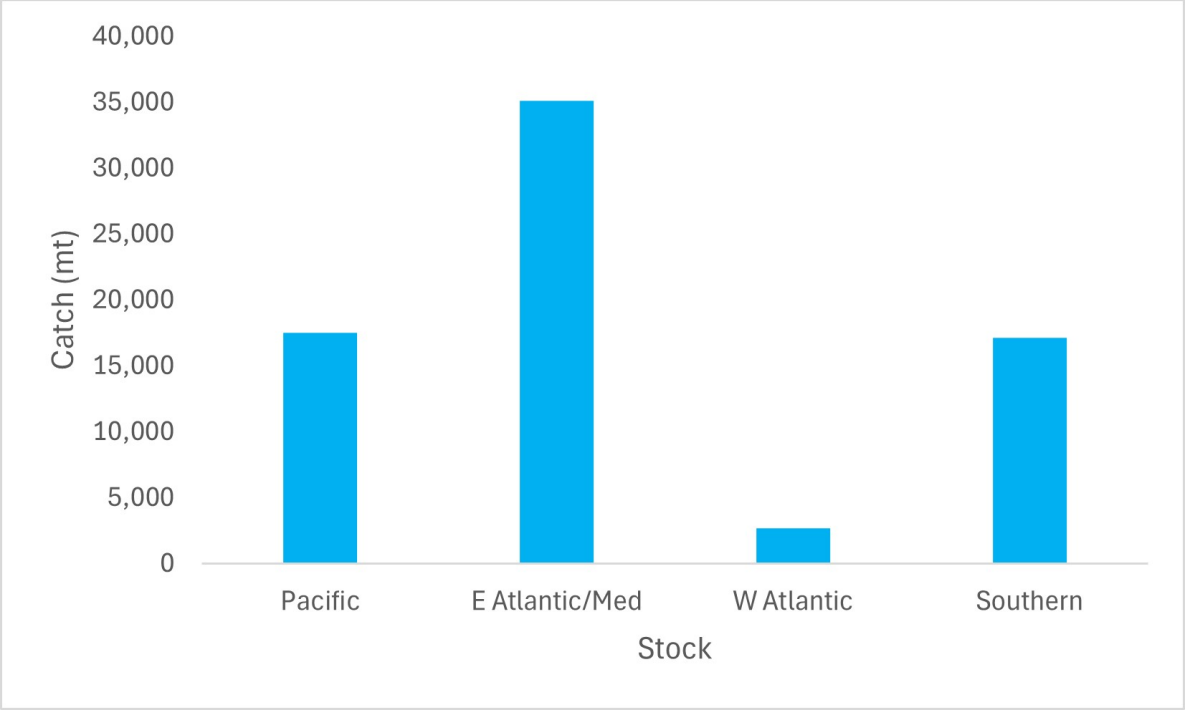

Figure 2: Total catch of each bluefin stock (across gear types) in 2022. Data source: (ISSF 2024).

In the Eastern Pacific Ocean, which is the focus of this Seafood Watch assessment, skipjack, yellowfin, and bigeye tunas dominate landings. The majority of fisheries for these tropical tunas are assessed in a separate SFW assessment, though ratings for skipjack and yellowfin caught in the U.S. coastal purse seine fishery, which targets bluefin opportunistically, are also included here. Virtually all skipjack, and the majority of yellowfin and Pacific bluefin, are caught using purse seines.

Purse seiners can be further separated into set type, which affects the relative catch of tuna and other species. The majority of the Pacific bluefin catch is with unassociated purse seine sets by Mexico, for which—typically—the entire catch is destined to sea ranches for fattening (see Seafood Watch Mexican farmed tuna assessment for more information). Mexico and the United States are the only IATTC members catching Pacific bluefin with purse seine vessels (or other gear types).

Purse seiners also vary in size, from small vessels (Classes 1–2) that are generally confined to coastal areas, to slightly larger vessels (Classes 3–5) that frequently fish on the high seas, to the largest vessels (Class 6) that have a carrying capacity of over 363 mt. Across IATTC fleets, the smaller vessels are often multigear and multispecies, shifting their target among tuna, billfish, sharks, and dorado on a seasonal basis (Griffiths et al 2022). Similarly, the U.S. coastal fleet operating off the coast of Southern California consists of small vessels that typically target small pelagics (squid, sardine, and anchovy) but will target bluefin and other tunas opportunistically (NMFS 2024).

Importance to the US/North American market.

From 2010 to 2022, over 24 million kg (over 22,000 mt) of various bluefin tunas were imported into the U.S., the majority of which were fresh Atlantic and Pacific bluefin, though the U.S. imported from across bluefin species (Pacific, Atlantic, and Southern) (NOAA 2023). Imports overall were both frozen and fresh.

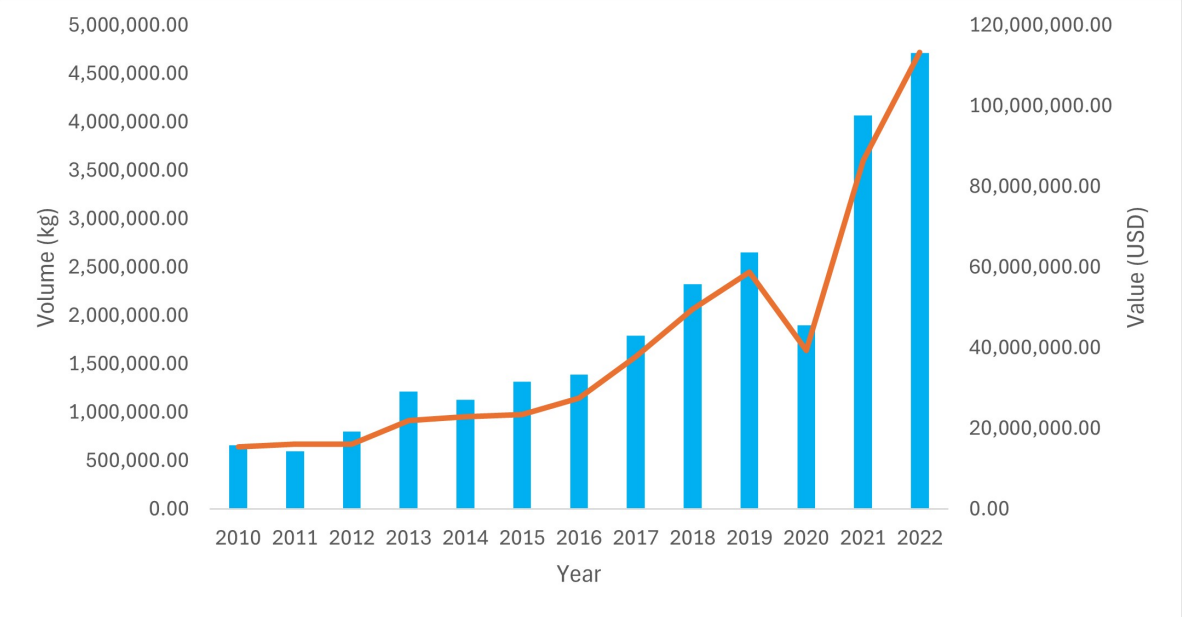

Figure 3: U.S. imports of bluefin tuna (all stocks/import types) from 2010 to 2022. Volume is shown in blue, while value is shown in orange. Data source: (NOAA 2023).

Common and market names.

Species	Common/Market Name
Skipjack tuna	Bonito, lesser tuna, Aku
Bluefin tuna	Bluefin
Yellowfin tuna	Ahi

Source: (FDA 2024). Note that while “bonito” is sometimes used colloquially to refer to skipjack tuna, bonito is, scientifically, a sub-family of Scombridae. Thus, “bonito” as used in management refers to this group and not to skipjack tuna specifically.

Primary product forms

Species	Product forms
Skipjack tuna	Fresh, frozen, canned, fillet, rounds
Bluefin tuna	Fresh, sashimi, frozen, fillet
Yellowfin tuna	Fresh, frozen, canned, fillet, rounds

Assessment

This section assesses the sustainability of the fishery(s) relative to the Seafood Watch Standard for Fisheries, available at www.seafoodwatch.org. The specific standard used is referenced on the title page of all Seafood Watch assessments.

Criterion 1: Impacts on the species under assessment

This criterion evaluates the impact of fishing mortality on the species, given its current abundance. When abundance is unknown, abundance is scored based on the species' inherent vulnerability, which is calculated using a Productivity-Susceptibility Analysis. The final Criterion 1 score is determined by taking the geometric mean of the abundance and fishing mortality scores. The Criterion 1 rating is determined as follows:

- ***Score >3.2=Green or Low Concern***
- ***Score >2.2 and ≤3.2=Yellow or Moderate Concern***
- ***Score ≤2.2 = Red or High Concern***

Rating is Critical if Factor 1.3 (Fishing Mortality) is Critical.

Guiding principles

- *Ensure all affected stocks are healthy and abundant.*
- *Fish all affected stocks at sustainable level*

Criterion 1 Summary

PACIFIC BLUEFIN TUNA			
REGION / METHOD	**ABUNDANCE**	**FISHING MORTALITY**	**SCORE**
Eastern Central Pacific | Mexico | Unassociated purse seine (non-FAD) | Bluefin Fishery	2.330: Moderate Concern	3.000: Moderate Concern	Yellow (2.644)
Eastern Central Pacific, Northeast Pacific | United States | Handlines and hand-operated pole-and-lines	2.330: Moderate Concern	3.000: Moderate Concern	Yellow (2.644)
Eastern Central Pacific, Northeast Pacific | United States | California | Unassociated purse seine (non-FAD) | US coastal purse seine fishery when targeting tuna	2.330: Moderate Concern	3.000: Moderate Concern	Yellow (2.644)

SKIPJACK TUNA			
REGION / METHOD	ABUNDANCE	FISHING MORTALITY	SCORE
Eastern Pacific Ocean Stock | Eastern Central Pacific, Northeast Pacific | United States | California | Unassociated purse seine (non-FAD) | US coastal purse seine fishery when targeting tuna	5.000: Very Low Concern	5.000: Low Concern	Green (5.000)

YELLOWFIN TUNA			
REGION / METHOD	ABUNDANCE	FISHING MORTALITY	SCORE
Eastern Pacific Ocean Stock | Eastern Central Pacific, Northeast Pacific | United States | California | Unassociated purse seine (non-FAD) | US coastal purse seine fishery when targeting tuna	5.000: Very Low Concern	5.000: Low Concern	Green (5.000)

Criterion 1 Assessments

SCORING GUIDELINES

Factor 1.1 - Abundance
Goal: Stock abundance and size structure of native species is maintained at a level that does not impair recruitment or productivity.

- *5 (Very Low Concern) — Strong evidence exists that the population is above an appropriate target abundance level (given the species' ecological role), or near virgin biomass.*
- *3.67 (Low Concern) — Population may be below target abundance level, but is at least 75% of the target level, OR data-limited assessments suggest population is healthy and species is not highly vulnerable.*
- *2.33 (Moderate Concern) — Population is not overfished but may be below 75% of the target abundance level, OR abundance is unknown and the species is not highly vulnerable.*
- *1 (High Concern) — Population is considered overfished/depleted, a species of concern, threatened or endangered, OR abundance is unknown and species is highly vulnerable.*

Factor 1.2 - Fishing Mortality
Goal: Fishing mortality is appropriate for current state of the stock.

- *5 (Low Concern) — Probable (>50%) that fishing mortality from all sources is at or below a sustainable level, given the species ecological role, OR fishery does not target species and fishing mortality is low enough to not adversely affect its population.*
- *3 (Moderate Concern) — Fishing mortality is fluctuating around sustainable levels, OR fishing mortality relative to a sustainable level is uncertain.*
- *1 (High Concern) — Probable that fishing mortality from all source is above a sustainable level.*

Pacific bluefin tuna (Thunnus orientalis)

Factor 1.1 - Abundance

Eastern Central Pacific | Mexico | Unassociated purse seine (non-FAD) | Bluefin Fishery
Eastern Central Pacific, Northeast Pacific | United States | Handlines and hand-operated pole-and-lines
Eastern Central Pacific, Northeast Pacific | United States | California | Unassociated purse seine (non-FAD) | US coastal purse seine fishery when targeting tuna

Moderate Concern

Pacific bluefin tuna is assessed as a single Pacific-wide stock. The most recent stock assessment was conducted in 2024 using data through 2022 (IATTC 2024c)(ISC 2024). The assessors did not present current biomass in relation to B_{MSY}; rather, current biomass is presented as a percentage of unfished biomass ($SSB_{current}/SSB_{F=0}$ = 0.232, or 23.2%). Biomass continues to grow following declines from 1996 to 2010, and it has reached the second rebuilding target laid out by the IATTC and WCPFC (IATTC 2024c)(ISC 2024). There are no formally adopted reference points for Pacific bluefin tuna; however, applying a reference point of 20% of unfished biomass ($SSB_{20\%}$, the second rebuilding target and the biomass-based limit reference point for other tuna species in the Pacific), the bluefin population would no longer be considered overfished and is instead considered rebuilt, and the IATTC does not consider the population to be overfished. Because the stock classified as not overfished and is above a reference point often used as a limit reference point for other tuna species, abundance is considered a moderate concern.

Justification:

Although the stock has reached its rebuilding reference point, this value, $SSB_{20\%}$, cannot be considered a proxy target reference point. $SSB_{20\%}$ is a value often used as a limit reference point for other tuna species, and there is no indication that it is an appropriate long-term target reference point (outside of rebuilding efforts, such as $SSB_{40\%}$ or SSB_{MSY}) for bluefin tuna.

Factor 1.2 - Fishing Mortality

Eastern Central Pacific | Mexico | Unassociated purse seine (non-FAD) | Bluefin Fishery
Eastern Central Pacific, Northeast Pacific | United States | Handlines and hand-operated pole-and-lines
Eastern Central Pacific, Northeast Pacific | United States | California | Unassociated purse seine (non-FAD) | US coastal purse seine fishery when targeting tuna

Moderate Concern

The 2024 assessment did not estimate F_{MSY}; instead, it indicated that recent fishing mortality (2020–22) corresponds to $F_{23.6\%\ SPR}$, which, according to the stock assessment, is below “some commonly used F-based reference points.” Specifically, the 2020–22 fishing mortality rates were lower than the F corresponding to 20% SPR and F_{max} (ISC 2024). Although the current level is

higher than the fishing mortality level in the previous assessment (2018–20 level = $F_{30.7\% SPR}$), fishing mortality from 2020 to 2018 has still allowed the stock to reach its first and second rebuilding targets ahead of schedule. But it is not clear if the reference points cited in the assessment are appropriate for the stock or scientifically recommended for the stock. Though fishing mortality is below some reference points, their appropriateness is not certain, so fishing mortality is considered a moderate concern.

Skipjack tuna (Katsuwonus pelamis)

Factor 1.1 - Abundance

Eastern Pacific Ocean Stock | Eastern Central Pacific, Northeast Pacific | United States | California | Unassociated purse seine (non-FAD) | US coastal purse seine fishery when targeting tuna

Very Low Concern

Skipjack tuna is assessed as a single stock in the EPO. The most recent assessment was completed in 2024 and notes that MSY-based quantities are unreliable for this stock, leading to the use of a proxy target reference point of a spawning biomass ratio (SBR) equal to 0.3 (IATTC 2024b). The assessment found that spawning biomass was above this proxy reference point and the limit reference point (LRP) of an SBR equal to 0.077. The reference model used in the assessment found SBR to be 0.43 (IATTC 2024b). Based on a stock assessment less than 5 years old indicating that biomass is above an appropriate reference point, abundance is considered a very low concern.

Factor 1.2 - Fishing Mortality

Eastern Pacific Ocean Stock | Eastern Central Pacific, Northeast Pacific | United States | California | Unassociated purse seine (non-FAD) | US coastal purse seine fishery when targeting tuna

Low Concern

The 2024 benchmark stock assessment of EPO skipjack tuna did not calculate MSY-based reference points. Relative to the selected reference point, the authors found that the current fishing mortality is below the proxy target reference point ($F_{current}/Fb_{target}$ = 0.87, according to the reference model used in the assessment). Because a stock assessment less than 10 years old indicates that fishing mortality is below a sustainable level, fishing mortality is considered a low concern.

Yellowfin tuna (Thunnus albacares)

Factor 1.1 - Abundance

Eastern Pacific Ocean Stock | Eastern Central Pacific, Northeast Pacific | United States | California | Unassociated purse seine (non-FAD) | US coastal purse seine fishery when targeting tuna

Very Low Concern

Yellowfin tuna is assessed as a single stock in the EPO. The latest stock assessment was a benchmark assessment using data through 2019 (Minte-Vera et al. 2020)(ISSF 2023). The authors calculated an $SSB_{current}/SSB_{MSY}$ ratio of 1.57, with a 12% probability that SSB is below the MSY level. Based on a stock assessment using data less than 5 years old indicating that biomass is above a sustainable level, abundance is considered a very low concern.

Factor 1.2 - Fishing Mortality

Eastern Pacific Ocean Stock | Eastern Central Pacific, Northeast Pacific | United States | California | Unassociated purse seine (non-FAD) | US coastal purse seine fishery when targeting tuna

Low Concern

The latest stock assessment of EPO yellowfin tuna found an $F_{current}/F_{MSY}$ ratio of 0.67 (Minte-Vera et al. 2020)(ISSF 2023). The probability across all models that $F_{current} > F_{MSY}$ is 9%. Based on a stock assessment using data less than 10 years old finding that there is a >50% probability that fishing mortality is below F_{MSY}, fishing mortality is considered a low concern.

Criterion 2: Impacts on Other Species

All main retained and bycatch species in the fishery are evaluated under Criterion 2. Seafood Watch defines bycatch as all fisheries-related mortality or injury to species other than the retained catch. Examples include discards, endangered or threatened species catch, and ghost fishing. Species are evaluated using the same guidelines as in Criterion 1. When information on other species caught in the fishery is unavailable, the fishery's potential impacts on other species is scored according to the Unknown Bycatch Matrices, which are based on a synthesis of peer-reviewed literature and expert opinion on the bycatch impacts of each gear type. The fishery is also scored for the amount of non-retained catch (discards) and bait use relative to the retained catch. To determine the final Criterion 2 score, the score for the lowest scoring retained/bycatch species is multiplied by the discard/bait score. The Criterion 2 rating is determined as follows:

- ***Score >3.2=Green or Low Concern***
- ***Score >2.2 and ≤3.2=Yellow or Moderate Concern***
- ***Score ≤2.2 = Red or High Concern***

Rating is Critical if Factor 2.3 (Fishing Mortality) is Crtitical

Guiding principles

- *Ensure all affected stocks are healthy and abundant.*
- *Fish all affected stocks at sustainable level.*
- *Minimize bycatch.*

Criterion 2 Summary

Criterion 2 score(s) overview

This table(s) provides an overview of the Criterion 2 subscore, discards+bait modifier, and final Criterion 2 score for each fishery. A separate table is provided for each species/stock that we want an overall rating for.

PACIFIC BLUEFIN TUNA			
REGION / METHOD	**SUB SCORE**	**DISCARD RATE/LANDINGS**	**SCORE**
Eastern Central Pacific | Mexico | Unassociated purse seine (non-FAD) | Bluefin Fishery	5.000	1.000: < 100%	Green (5.000)
Eastern Central Pacific, Northeast Pacific | United States | Handlines and hand-operated pole-and-lines	5.000	1.000: < 100%	Green (5.000)
Eastern Central Pacific, Northeast Pacific | United States | California | Unassociated purse seine (non-FAD) | US coastal purse seine fishery when targeting tuna	2.236	1.000: < 100%	Yellow (2.236)

SKIPJACK TUNA			
REGION / METHOD	**SUB SCORE**	**DISCARD RATE/LANDINGS**	**SCORE**
Eastern Pacific Ocean Stock | Eastern Central Pacific, Northeast Pacific | United States | California | Unassociated purse seine (non-FAD) | US coastal purse seine fishery when targeting tuna	2.236	1.000: < 100%	Yellow (2.236)

YELLOWFIN TUNA			
REGION / METHOD	**SUB SCORE**	**DISCARD RATE/LANDINGS**	**SCORE**
Eastern Pacific Ocean Stock | Eastern Central Pacific, Northeast Pacific | United States | California | Unassociated purse seine (non-FAD) | US coastal purse seine fishery when targeting tuna	2.236	1.000: < 100%	Yellow (2.236)

Criterion 2 main assessed species/stocks table(s)

This table(s) provides a list of all species/stocks included in this assessment for each 'fishery' (as defined by a region/method combination). The text following this table(s) provides an explanation of the reasons the listed species were selected for inclusion in the assessment.

EASTERN CENTRAL PACIFIC | MEXICO | UNASSOCIATED PURSE SEINE (NON-FAD) | BLUEFIN FISHERY			
SUB SCORE: 5.000	DISCARD RATE: 1.000		**SCORE: 5.000**
SPECIES	**ABUNDANCE**	**FISHING MORTALITY**	**SCORE**
Pacific bluefin tuna	2.330: Moderate Concern	3.000: Moderate Concern	Yellow (2.644)

EASTERN CENTRAL PACIFIC, NORTHEAST PACIFIC | UNITED STATES | CALIFORNIA | UNASSOCIATED PURSE SEINE (NON-FAD) | US COASTAL PURSE SEINE FISHERY WHEN TARGETING TUNA			
SUB SCORE: 2.236	DISCARD RATE: 1.000		SCORE: 2.236
SPECIES	**ABUNDANCE**	**FISHING MORTALITY**	**SCORE**
Sharks	1.000: High Concern	5.000: Low Concern	Yellow (2.236)
Pacific bluefin tuna	2.330: Moderate Concern	3.000: Moderate Concern	Yellow (2.644)
Skipjack tuna	5.000: Very Low Concern	5.000: Low Concern	Green (5.000)
Yellowfin tuna	5.000: Very Low Concern	5.000: Low Concern	Green (5.000)

EASTERN CENTRAL PACIFIC, NORTHEAST PACIFIC | UNITED STATES | HANDLINES AND HAND-OPERATED POLE-AND-LINES			
SUB SCORE: 5.000	DISCARD RATE: 1.000		SCORE: 5.000
SPECIES	**ABUNDANCE**	**FISHING MORTALITY**	**SCORE**
Pacific bluefin tuna	2.330: Moderate Concern	3.000: Moderate Concern	Yellow (2.644)

Mexican purse seine

The IATTC requires 100% observer coverage for large purse seiners (Class 6, >363 mt) (Griffiths et al 2022). The bluefin unassociated purse seine fishery in Mexico consists of commercial purse seiners that target yellowfin when not fishing for bluefin, and the fishery is 100% observed using IATTC and FIDEMAR observers (IMIPAS and FIDEMAR 2024). Generally, the majority (49 of 53) of Mexico's purse seines have a capacity of over 400 mt, making them Class 6 vessels. Observer data from the Mexican fleet indicate that no other main species are captured in this fishery. From 2021 to 2022, a total of three blue sharks were incidentally captured and a total of four sunfish were incidentally captured (see Figures 4–5). The catch of both species is therefore considered negligible in comparison to the >6,000 mt of Pacific bluefin tuna landed in the fishery from 2021 to 2022.

U.S. coastal purse seine fishery when targeting tuna

This California fishery usually targets small pelagic species like sardine, anchovy, and market squid, but will target Pacific bluefin and other tunas when they are available (PFMC 2023)(pers. comm., PFMC staff April 2023). The U.S. coastal fleet contains small-scale vessels (Classes 1–5) and has no observers. Bycatch is assumed to be low based on logbooks and anecdotal reports (PFMC 2023). The limited observer programs that are in place for smaller IATTC vessels do suggest that many of the same taxa are caught in these fleets (see Table L-8 in (IATTC 2022c)). This information is used to characterize catch and bycatch in the U.S. fishery, in the absence of more specific data. IATTC data also suggest that U.S.-flagged purse seines generally capture some sharks. The Mexican purse seine fleet's bycatch data are not used here to characterize the U.S. fleet's potential bycatch, because the Mexican fishery solely lands bluefin but the U.S. fishery also lands tropical tunas. The fishery is considered a Category III fishery under the MMPA, with a remote likelihood of and no known incidental death or serious injury of marine mammals (PFMC 2023)(NOAA 2022a).

Bluefin handline

Although handlines are rare under IATTC management, there is a growing commercial handline fishery for U.S. fishers targeting Pacific bluefin tuna. Many of these fishers also fish recreationally for bluefin. While the majority of U.S. Pacific bluefin catch comes from purse seines, a growing percentage is stemming from handlines. But because of the nature of how bluefin is targeted and the selectivity of handlines, there are no other species caught in significant quantities in this growing fishery; thus, the only main species in this fishery is Pacific bluefin (see the "hook and line" fishery in (PSMFC 2024)). Discards in pelagic handline fisheries have also been shown to be minimal (Kelleher 2005).

Determining which species to include in the assessment of each fishery

The Criterion 2 score is determined by the lowest-scoring C2 species and the discard and bait use rate in each fishery. The species included in C2 are determined via main species determinations. A species is a main species if it meets any of the following conditions ("catch" here includes landings plus discards):

- A common component of the catch (as guidance, >5% of the catch in most cases), or
- Overfished, endangered, threatened, undergoing overfishing, or otherwise a species of concern, where catch occurs regularly and may significantly contribute to the conservation concern (i.e., more than a negligible and/or sporadic level of catch). As guidance, the mortality of the species caused by this fishery is >5% of a sustainable level, or
- The fishery under assessment is one of the main sources of fishing mortality for the species, including bait species if known (as guidance, approximately 20% or more of total fishing mortality), and
- In fisheries that use bait, the bait species should be treated as a bycatch species if it meets the main species criteria outlined above. If the species used as bait are unknown but together account for >5% of the catch and no other main species have been identified, then add "unknown finfish" with abundance and fishing mortality both scored a moderate concern.

Tunas and billfishes

Landings in the U.S. coastal, unassociated, small (Classes 1–5) purse seine fishery are found in HMS landings records (PacFIN 2023). These records indicate that bluefin, skipjack, and yellowfin each made up >5% of total landings from 2017 to 2022, though bluefin data were confidential during two of these years and yellowfin data were confidential during one.

Species	Landings (mt)
Yellowfin	5436.19
Skipjack	1333.76
Bluefin	901.99
Albacore	0
Bigeye	0
Bigeye Thresher Shark	0
Blue Shark	0
Common Thresher Shark	0
Dorado	0
Pelagic Thresher Shark	0
Shortfin Mako Shark	0
Striped Marlin	0
Swordfish	0
Unsp. Tuna	0

Figure 4: Landings of HMS species in the U.S. coastal purse seine fishery from 2017 to 2022, aggregated. Note that bluefin landings were confidential (thus not included above) in 2020 and 2021, and yellowfin landings were confidential in 2021. Data source: (PacFIN 2023).

Landings in the U.S. handline fishery are primarily bluefin tuna, with quite small amounts of other species also landed. Although yellowfin is just over 5% of the catch, there are many instances of confidential data in this dataset (for tunas, large fish, and sharks, but not for yellowfin tuna). Thus, it is unlikely that yellowfin would meet this threshold with the inclusion of these confidential data. Therefore, Pacific bluefin tuna is the only tuna included in this fishery. For both of the U.S. fisheries in this assessment, data from an extra year (2017) were included in the catch composition tables to make up for the missing confidential data.

Species	Landings (mt)
Bluefin	435.89
Yellowfin	26
Dorado	11.26
Common Thresher Shark	7.84
Swordfish	6.68
Shortfin Mako Shark	5.07
Skipjack	0.68
Albacore	0
Bigeye	0
Bigeye Thresher Shark	0
Blue Shark	0
Pelagic Thresher Shark	0
Striped Marlin	0
Unsp. Tuna	0

Figure 5: Landings of HMS species in the U.S. handline fishery from 2017 to 2022, aggregated. Note that there are multiple instances of confidential data, so the dataset is incomplete for some species (skipjack, common thresher shark, blue shark, bigeye, and dorado). Source: (PacFIN 2023).

Landings for the Mexican Pacific bluefin tuna purse seine fleet are available via observer data and Mexico's annual reports to ISC. Observer data (from 100% of vessels) indicate that no other target tunas (or other large pelagics) are captured, and only two bycatch species (blue shark and sunfish) are captured in very small quantities. Therefore, no other species are included in this fishery. Bycatch data can be found in Figure 6.

Set Number	Total (Number of Individuals)	Species Code	Scientific Name
6	1	BSH	Prionace glauca
1	3	MOX	Mola mola
5	1	BSH	Prionace glauca
1	1	BSH	Prionace glauca
2	1	MOX	Mola mola

Figure 6: Bycatch in the Mexican Pacific bluefin tuna purse seine fishery from 2021 to 2022. Data provided by FIDEMAR.

Sharks and large fish

The IATTC provides shark catch data for purse seines at both the set-type level and flag state level (though not together), and these data indicate that U.S. and flagged vessels (as well as unassociated vessels generally) caught hundreds of sharks from 2018 to 2022 (IATTC 2024d). It is unknown what size class these vessels were, nor where they were fishing. As a precautionary measure, a general “sharks” category is included in the U.S. purse seine fishery. Though this fishery is operating only within the U.S. EEZ, it is capturing tropical tuna species that may associate with sharks. While these data also indicate that Mexican-flagged vessels catch sharks, the above observer data show that sharks are not caught specifically in the Pacific bluefin tuna purse seine fishery, aside from negligible numbers of blue shark.

There is no observer program for the U.S. purse seine fishery, although limited observer data from other IATTC Classes 1–5 purse seine vessels can help to characterize bycatch in the U.S. fleet. These data indicate that minimum catches of sharks, large fishes, and small fishes in the smaller, unassociated purse seine fleets in 2022 were less than one, and minimum catches of pelagic stingray and spinetail mobula were five and eight, respectively (see (IATTC 2023a) Table J-8a). Based on these quite low numbers, and the previously mentioned logbook and anecdotal evidence from the U.S. coastal purse seine fleet, bycatch is thought to be minimal (PFMC 2023). But as noted, a “sharks” category is included in this fishery as a result of the incomplete bycatch data for this specific fishery.

There is also no observer program for the U.S. handline fishery. The catch composition table (see Figure 5) indicates that, although common thresher and shortfin mako sharks have been landed in the fishery, these landings make up less than 5% of the MSY for each stock, so these shark species are not included as main species (ISC 2018b)(Teo et al 2018). Generally, discards are thought to be low in global tuna handline fisheries (Kelleher 2005). Therefore, no other species are included in this fishery.

Criterion 2 Assessment

SCORING GUIDELINES

Factor 2.1 - Abundance
(same as Factor 1.1 above)

Factor 2.2 - Fishing Mortality
(same as Factor 1.2 above)

Factor 2.3 - Modifying Factor: Discards and Bait Use
Goal: Fishery optimizes the utilization of marine and freshwater resources by minimizing post-harvest loss. For fisheries that use bait, bait is used efficiently.

Scoring Guidelines: The discard rate is the sum of all dead discards (i.e. non-retained catch) plus bait use divided by the total retained catch.

Ratio of bait + discards/landings	Factor 2.3 score
<100%	1
>=100	0.75

Sharks (Selachimorpha)

Factor 2.1 - Abundance

Eastern Central Pacific, Northeast Pacific | United States | California | Unassociated purse seine (non-FAD) | US coastal purse seine fishery when targeting tuna

High Concern

A number of different shark species and categories are recorded in U.S. (Class 6) purse seine catch data from the IATTC, including sharks (various), thresher sharks (species not specified), specific hammerhead species, oceanic whitetip shark, and blacktip shark. Shark catches specifically in the U.S. purse seine fishery that is included in this assessment are unknown, so a catch-all “sharks” category has been used here. Although some shark species in Southern California waters have healthy populations (e.g., shortfin mako), others do not, and the lack of observer data creates uncertainty around which shark species may be incidentally captured and then discarded in the U.S. coastal purse seine fleet. Sharks as a species group are considered highly vulnerable species by Seafood Watch, so abundance is considered a high concern.

Factor 2.2 - Fishing Mortality

Eastern Central Pacific, Northeast Pacific | United States | California | Unassociated purse seine (non-FAD) | US coastal purse seine fishery when targeting tuna

Low Concern

Sharks are recorded in IATTC catches from purse seines across flag states, including those flagged to the U.S. Although some sharks are identified to the species level, others are not, and U.S.-flagged Class 6 purse seines captured a number of shark species from 2018 to 2022. Species of sharks captured specifically in U.S. unassociated purse seines (and further, in the bluefin-targeting unassociated purse seines that are part of the coastal, small class-size fleet) are unknown. But in general, the number of sharks captured in U.S. purse seines is significantly lower than the number of sharks caught across IATTC longline vessels (IATTC 2024d). Based on the differences in these catch numbers, U.S. purse seines are unlikely to be substantial contributors to fishing mortality for shark species, so fishing mortality is considered a low concern.

Factor 2.3 - Discard Rate/Landings

Eastern Central Pacific | Mexico | Unassociated purse seine (non-FAD) | Bluefin Fishery
Eastern Central Pacific, Northeast Pacific | United States | California | Unassociated purse seine (non-FAD) | US coastal purse seine fishery when targeting tuna
Eastern Pacific Ocean Stock | Eastern Central Pacific, Northeast Pacific | United States | California | Unassociated purse seine (non-FAD) | US coastal purse seine fishery when targeting tuna

< 100%

Purse seine fisheries have an average discard rate of just under 5% (Pérez Roda et al 2019); however, discard rates vary by gear type and have decreased moderately in more recent years. Floating object associated sets have the highest discard rate (≈6.4%), followed by school sets (≈2%) and dolphin sets (0.3%) during 1993–2017 (IATTC 2019f). Therefore, tuna unassociated purse seine fisheries receive a score of <100% for the discard rate versus landings.

Eastern Central Pacific, Northeast Pacific | United States | Handlines and hand-operated pole-and-lines

< 100%

The average discard rate in tuna pole and line fisheries worldwide is 0.1% (Kelleher 2005). Pole and line fisheries depend heavily on the use of baitfish (most often coming from other fisheries) to lure the tuna. The amount of tuna caught is typically much greater than the amount of baitfish used, with a tuna to bait ratio of around 30 to 1 (Gillett 2012). Therefore, bait and discards are thought to be <100% of landings.

Criterion 3: Management Effectiveness

Five factors are evaluated in Criterion 3: Management Strategy and Implementation, Bycatch Strategy, Scientific Research/Monitoring, Enforcement of Regulations, and Inclusion of Stakeholders. Each is scored as either 'highly effective', 'moderately effective', 'ineffective,' or 'critical'. The final Criterion 3 score is determined as follows:

- *5 (Very Low Concern) — Meets the standards of 'highly effective' for all five factors considered.*
- *4 (Low Concern) — Meets the standards of 'highly effective' for 'management strategy and implementation' and at least 'moderately effective' for all other factors.*
- *3 (Moderate Concern) — Meets the standards for at least 'moderately effective' for all five factors.*
- *2 (High Concern) — At a minimum, meets standards for 'moderately effective' for Management Strategy and Implementation and Bycatch Strategy, but at least one other factor is rated 'ineffective.'*
- *1 (Very High Concern) — Management Strategy and Implementation and/or Bycatch Management are 'ineffective.'*
- *0 (Critical) — Management Strategy and Implementation is 'critical'.*

The Criterion 3 rating is determined as follows:

- ***Score >3.2=Green or Low Concern***
- ***Score >2.2 and ≤3.2=Yellow or Moderate Concern***
- ***Score ≤2.2 = Red or High Concern***

Rating is Critical if Management Strategy and Implementation is Critical.

Guiding principle

- The fishery is managed to sustain the long-term productivity of all impacted species.

Five factors are evaluated in Criterion 3: Management Strategy and Implementation, Bycatch Strategy, Scientific Research/Monitoring, Enforcement of Regulations, and Inclusion of Stakeholders. Each is scored as either 'highly effective', 'moderately effective', 'ineffective,' or 'critical'. The final Criterion 3 score is determined as follows:

Criterion 3 Summary

FISHERY	MANAGEMENT STRATEGY	BYCATCH STRATEGY	DATA COLLECTION AND ANALYSIS	ENFORCEMENT	INCLUSION	SCORE
Eastern Central Pacific | Mexico | Unassociated purse seine (non-FAD) | Bluefin Fishery	Moderately Effective	Highly effective	Highly effective	Highly effective	Moderately Effective	**Yellow (3.000)**

Eastern Central Pacific, Northeast Pacific | United States | California | Unassociated purse seine (non-FAD) | US coastal purse seine fishery when targeting tuna	Moderately Effective	Moderately Effective	Moderately Effective	Highly effective	Moderately Effective	**Yellow (3.000)**
Eastern Central Pacific, Northeast Pacific | United States | Handlines and hand-operated pole-and-lines	Moderately Effective	Highly effective	Moderately Effective	Highly effective	Moderately Effective	**Yellow (3.000)**

The IATTC is responsible for the management of fishery impacts on tuna and tuna-like species, associated species, and their ecosystems throughout the Eastern Pacific Ocean from Alaska to Chile. It does this through the adoption of Resolutions, which CPCs are expected to implement for their fisheries (the acronym “CPC” is used by the IATTC to refer collectively to both members and cooperating nonmembers).

The current members of the IATTC are: Belize, Canada, China, Colombia, Costa Rica, Ecuador, El Salvador, European Union, France, Guatemala, Japan, Kiribati, Korea, Mexico, Nicaragua, Panama, Peru, Chinese Taipei, United States, Vanuatu, and Venezuela. Cooperating non\members of the IATTC are Bolivia, Chile, Honduras, Indonesia, and Liberia. The latter are bound by the same obligations as members regarding measures adopted by the Commission.

In the United States, national-level management is the responsibility of NOAA, and in Mexico, national-level management is the responsibility of CONAPESCA, with aid from IMIPAS and FIDEMAR for scientific advice and data.

Criterion 3 Assessment

SCORING GUIDELINES

Factor 3.1 - Management Strategy and Implementation

Considerations: What type of management measures are in place? Are there appropriate management goals, and is there evidence that management goals are being met? Do manages followscientific advice? To achieve a highly effective rating, there must be appropriately defined management goals, precautionary policies that are based on scientific advice, and evidence that the measures in place have been successful at maintaining/rebuilding species.

Factor 3.2 - Bycatch Strategy

Considerations: What type of management strategy/measures are in place to reduce the impacts of the fishery on bycatch species and when applicable, to minimize ghost fishing? Howsuccessful are these management measures? To achieve a Highly Effective rating, the fishery must have no or lowbycatch, or if there are bycatch or ghost fishing concerns, there must be effective measures in place to minimize impacts.

Factor 3.3 - Scientific Research and Monitoring

Considerations: How much and what types of data are collected to evaluate the fishery's impact on the species? Is there adequate monitoring of bycatch? To achieve a Highly Effective rating, regular, robust population assessments must be conducted for target or retained species, and an adequate bycatch data collection program must be in place to ensure bycatch management goals are met.

Factor 3.4 - Enforcement of Management Regulations

Considerations: Do fishermen comply with regulations, and how is this monitored? To achieve a Highly Effective rating, there must be regular enforcement of regulations and verification of compliance.

Factor 3.5 - Stakeholder Inclusion

Considerations: Are stakeholders involved/included in the decision-making process? Stakeholders are individuals/groups/organizations that have an interest in the fishery or that may be affected by the management of the fishery (e.g., fishermen, conservation groups, etc.). A Highly Effective rating is given if the management process is transparent, if high participation by all stakeholders is encouraged, and if there a mechanism to effectively address user conflicts.

Factor 3.1 - Management Strategy And Implementation

Eastern Central Pacific | Mexico | Unassociated purse seine (non-FAD) | Bluefin Fishery

Moderately Effective

The main retained species in the Mexican unassociated purse seine fishery is Pacific bluefin tuna. IATTC has implemented a rebuilding plan for Pacific bluefin tuna that includes first/initial and subsequent/second target rebuilding reference points. There is no adopted limit reference point. The current harvest control rules allowed for increases or decreases in fishing mortality in the longer term to ensure that the preceding goals are being met, based on frequent evaluation by ISC (Resolution C-23-01 2023). This resolution also establishes, among other things, HCRs for the second rebuilding period and the period after the second objective is met, and sets over- and under-harvest limits and rules for applying them to the next fishing season. The IATTC is developing a long-term harvest strategy with Management Strategy Evaluation (MSE) and is expected to update this harvest strategy in coming years. The IATTC typically makes the harvest strategy operational through a two-year resolution that specifies quotas for Mexico and the United States (see (Resolution C-21-05 2021)). At the national level, the Comision Nacional de Acuacultura y Pesca (CONAPESCA) and the Instituto Mexicano de Investigacion en Pesca y Acuacultura Sustenables (IMIPAS) are responsible for tuna management. IMIPAS notes that, while yellowfin tuna is the primary target species for Mexican purse seine vessels, bluefin catches have slightly increased in recent years, though they are below historic highs (IMIPAS and FIDEMAR 2024). Mexican authorities manage bluefin tuna based on IATTC requirements and have not implemented further regulations or restrictions. Based on the lack of a long-term harvest strategy, with precautionary reference points for Pacific bluefin tuna, management strategy and implementation is considered moderately effective.

Justification:

IATTC has adopted rebuilding targets for Pacific bluefin tuna as follows:

“The Commission recognizes that the management objective of the IATTC is to maintain or restore fish stocks at levels capable of producing MSY, and shall implement a provisional rebuilding plan in part by adopting: (1) an initial (first) rebuilding target of $SSB_{med,\ 1952–2014}$ (the median point estimate for 1952–2014) to be achieved by 2024 with at least 60% probability; and (2) a second rebuilding target of 20% $SSB_{F\ =\ 0\ 1}$ to be achieved within 10 years of reaching the initial rebuilding target or by 2034, whichever is earlier, with at least 60% probability” (Resolution C-21-01 2021) (Resolution C-23-01 2023). The initial target translates to 6.7% of biomass in the absence of fishing ($SSB_{F\ =\ 0}$) (ISSF 2024).

In 2024, the ISC reported that these rebuilding targets have been met (ISC 2024). The current resolution (C-21-05) is guided by the harvest strategy in Resolution C-23-01 and is expected to be updated with a comprehensive long-term harvest strategy in the coming years (Joint Working Group on the Management of Pacific Bluefin Tuna 2024). In the absence of that long-term harvest

strategy, there are currently no formal regulations to ensure that fishing mortality stays at or below a sustainable level, thus minimizing management's ability to effectively ensure that the stock remains healthy.

Eastern Central Pacific, Northeast Pacific | United States | California | Unassociated purse seine (non-FAD) | US coastal purse seine fishery when targeting tuna

Moderately Effective

The main retained species in the U.S. coastal unassociated purse seine fishery are Pacific bluefin tuna, skipjack tuna, and yellowfin tuna. IATTC has implemented a rebuilding plan for Pacific bluefin tuna that includes first/initial and subsequent/second target rebuilding reference points. There is no adopted limit reference point. The current harvest control rules allowed for increases or decreases in fishing mortality in the longer term to ensure that the preceding goals are being met, based on frequent evaluation by ISC (Resolution C-23-01 2023). This resolution establishes, among other things, HCRs for the second rebuilding period and the period after the second objective is met, and sets over- and under-harvest limits and rules for applying them to the next fishing season. The IATTC is developing a long-term harvest strategy with Management Strategy Evaluation (MSE) and is expected to update this harvest strategy in the coming years. The IATTC typically operationalizes the harvest strategy through a two-year resolution that specifies quotas for Mexico and the United States (see (Resolution C-21-05 2021)). Tropical tunas have limit and target reference points in place, as well as an appropriate harvest control rule. Although some precautionary management measures are in place, the lack of sufficient precaution for the rebuilding thresholds and the lack of long-term precautionary harvest strategy and reference points for Pacific bluefin result in management strategy and implementation being considered moderately effective.

Justification:

Tropical Tunas

Reference points

Target and limit reference points are in place for the main stocks retained by the purse seine fleet in the EPO (yellowfin, skipjack, and bigeye) (Resolution C-16-02 2016) as replaced by (Resolution C-23-06 2023);(IATTC 2019a). The target reference points are spawning biomass at MSY (S_{MSY}) and fishing mortality rate at MSY (F_{MSY}), or proxies where MSY cannot be reliably estimated (Resolution C-23-06 2023). For bigeye and yellowfin, S_{MSY} is around 21% and 27% of B_0, respectively (using a conservative assumption of stock-recruitment relationship [steepness, or h = 0.75]) (p. 40 in (Valero et al 2017)). The limit reference points are based on the equilibrium spawning biomass and fishing mortality corresponding to that which produces a 50% reduction in recruitment from the unfished level (referred to as $F0.5_{R0}$ and $S0.5_{R0}$) (Resolution C-23-06 2023). This corresponds to a spawning biomass that is about 8% of the unfished level (IATTC 2019a)(p. 41 in (Valero et al 2017)).

Harvest control rules

There is an HCR in place for these stocks for the purse seine fishery based on the previous reference points (Resolution C-23-06 2023). The HCR requires measures to be in place to prevent

fishing mortality from exceeding F_{MSY} for the tropical tuna stock (i.e., yellowfin, bigeye, or skipjack) that requires the strictest management. The HCR requires the establishment of additional management measures if there is a greater than 10% probability of the limit reference points being exceeded. But the HCR is not explicit regarding the measures that must be put into place, or the timeline for doing so ("…as soon as is practical management measures shall be established…") (Resolution C-23-06 2023).

Management measures

The main measures currently in place to manage fisheries for yellowfin, bigeye, and skipjack in the EPO include time and area closures for the purse seine fishery; full retention of all yellowfin, bigeye, and skipjack by purse seiners; and limits on the number of FADs vessels can carry and when they can be deployed (Resolution C-21-04 2021)(ISSF 2023). An analysis of the limits in place 2018–22 suggests that the limits were set above then-current activity levels, do not reduce FAD use, and would actually allow the average vessel to increase its FAD use (Gershman et al 2019). Resolution C-21-04 increasingly limits the number of active FADs over the years 2022 to 2024.

Effectiveness of measures

Efforts to assess the effectiveness of the current management regime through Management Strategy Evaluation have been underway since 2019 (Resolution C-19-07 2019). The most recent meeting of the working group was in December 2022, with MSE results expected in 2024 (Valero and Aires-da-Silva 2022). The stock status is not of particular concern for any of the three stocks, which suggests that management has been effective at maintaining fishing mortality at a sustainable level.

Bluefin Tuna

IATTC has adopted rebuilding targets for Pacific bluefin tuna as follows:

"The Commission recognizes that the management objective of the IATTC is to maintain or restore fish stocks at levels capable of producing MSY, and shall implement a provisional rebuilding plan in part by adopting: (1) an initial (first) rebuilding target of $SSB_{med,\ 1952–2014}$ (the median point estimate for 1952–2014) to be achieved by 2024 with at least 60% probability; and (2) a second rebuilding target of $20\%SSB_{F\ =\ 0\ 1}$ to be achieved within 10 years of reaching the initial rebuilding target or by 2034, whichever is earlier, with at least 60% probability" (Resolution C-21-01 2021){Resolution C-23-01 2023}. The initial target translates to 6.7% of biomass in the absence of fishing ($SSB_{F\ =\ 0}$) (ISSF 2024).

In 2024, the ISC reported that these rebuilding targets have been met (ISC 2024). The current resolution (C-21-05) is guided by the harvest strategy in Resolution C-23-01 and is expected to be updated with a comprehensive long-term harvest strategy in the coming years (Joint Working Group on the Management of Pacific Bluefin Tuna 2024). In the absence of that long-term harvest strategy, there are currently no formal regulations to ensure that fishing mortality stays at or below a sustainable level, thus minimizing management's ability to effectively ensure that the stock remains healthy. Sharks are also captured but are required to be released from purse seine vessels, so sharks are not considered in this factor (IATTC 2006b).

Eastern Central Pacific, Northeast Pacific | United States | Handlines and hand-operated pole-and-lines

Moderately Effective

The only retained species in this fishery is Pacific bluefin tuna. IATTC has implemented a rebuilding plan for Pacific bluefin tuna that includes first/initial and subsequent/second target rebuilding reference points. There is no adopted limit reference point. The current harvest control rules allowed for increases or decreases in fishing mortality in the longer term to ensure that the preceding goals are being met, based on frequent evaluation by ISC (Resolution C-23-01 2023). This resolution also establishes, among other things, HCRs for the second rebuilding period and the period after the second objective is met, and sets over- and under-harvest limits and rules for applying them to the next fishing season. The IATTC is developing a long-term harvest strategy with Management Strategy Evaluation (MSE) and is expected to update this harvest strategy in coming years. The IATTC typically operationalizes the harvest strategy through a two-year resolution that specifies quotas for Mexico and the United States (see (Resolution C-21-05 2021)). Although a (thus far successful) rebuilding plan is in place, management lacks long-term precautionary components, such as a long-term harvest strategy and an adopted LRP; thus, management strategy and implementation is considered moderately effective.

Justification:

IATTC has adopted rebuilding targets for Pacific bluefin tuna as follows:

"The Commission recognizes that the management objective of the IATTC is to maintain or restore fish stocks at levels capable of producing MSY, and shall implement a provisional rebuilding plan in part by adopting: (1) an initial (first) rebuilding target of $SSB_{med,\ 1952–2014}$ (the median point estimate for 1952–2014) to be achieved by 2024 with at least 60% probability; and (2) a second rebuilding target of 20%$SSB_{F = 0\ 1}$ to be achieved within 10 years of reaching the initial rebuilding target or by 2034, whichever is earlier, with at least 60% probability" (Resolution C-21-01 2021) (Resolution C-23-01 2023). The initial target translates to 6.7% of biomass in the absence of fishing ($SSB_{F = 0}$) (ISSF 2024).

In 2024, the ISC reported that these rebuilding targets have been met (ISC 2024). The current resolution (C-21-05) is guided by the harvest strategy in Resolution C-23-01 and is expected to be updated with a comprehensive long-term harvest strategy in the coming years (Joint Working Group on the Management of Pacific Bluefin Tuna 2024). In the absence of that long-term harvest strategy, there are currently no formal regulations to ensure that fishing mortality stays at or below a sustainable level, thus minimizing management's ability to effectively ensure that the stock remains healthy.

Factor 3.2 - Bycatch Strategy

Eastern Central Pacific | Mexico | Unassociated purse seine (non-FAD) | Bluefin Fishery

Highly effective

Though bycatch of species of concern (e.g., sharks, rays) is an issue in unassociated purse seine fisheries in general, the Mexican PBF unassociated purse seine fishery has almost no bycatch, with quite small amounts of blue shark and sunfish captured in the fishery (see the Criterion 2 Summary). Because this fishery's bycatch is <5% of total catch, the bycatch strategy is highly effective.

Eastern Central Pacific, Northeast Pacific | United States | California | Unassociated purse seine (non-FAD) | US coastal purse seine fishery when targeting tuna

Moderately Effective

The main bycatch concern in the U.S. purse seine fishery is sharks. IATTC has generally implemented measures to reduce bycatch rather than avoid it (such as retention bans rather than closed areas or bycatch caps), and questions remain over the effectiveness of such measures because post-release mortality is poorly understood. These "remediation" approaches are often considered more cost-effective and therefore easier to implement than "avoidance" policies such as closed areas and hard caps on bycatch mortality (Cronin et al. 2022).

While some management measures are in place, there are no catch limits for the majority of shark bycatch species in unassociated purse seines, though this gear type is likely to have less of an impact on sensitive populations than longlines and FAD fisheries. Because measures are focused on avoidance rather than limitations, their effectiveness is uncertain, and bycatch strategy is considered moderately effective.

Justification:

Sharks

IATTC has adopted a number of measures that apply to the purse seine fleets:

- A 5% shark fin rule, meaning that shark fins can weigh no more than 5% of the total sharks onboard (Resolution C-05-03 2005). This rule was updated in 2023 to include a requirement that all sharks be landed with fins naturally attached (Resolution C-23-07 2023).
- A retention and transshipment ban for oceanic whitetip shark (Resolution C-11-10 2011).
- A requirement for safe handling techniques to be deployed, and that those are aligned with specific best-handling and release practices, and a requirement for the IATTC to create additional safe handline guidelines in 2024 (Resolution C-16-05 2016)(Resolution C-23-07 2023).
- A retention and transshipment ban for white shark (Resolution C-19-06 2019).
- A retention and transshipment ban for silky shark, with the exclusion of vessels under 12 m in length using manually operated fishing gear (Resolution C-21-06 2021)(Resolution C-23-08 2023).

Shark at-vessel and subsequent discard mortality rates are quite high, suggesting that retention bans (even when married to safe handling techniques) may not be as effective a measure for

reducing shark mortality as releasing the sharks alive while still free swimming (Hutchinson et al 2023).

But the U.S. fleet also operates under U.S.-specific regulations for highly migratory species (HMS) fisheries. These regulations include further prohibitions on specific shark species (e.g., great white shark). Other sharks—shortfin mako, common thresher, and blue shark—are managed under the general HMS management plan that is used to manage U.S. West Coast tuna fisheries.

Eastern Central Pacific, Northeast Pacific | United States | Handlines and hand-operated pole-and-lines

Highly effective

There is no evidence to suggest that bycatch is a concern in this fishery, and bycatch/discards in handline fisheries are often quite low (Kelleher 2005). Although there is no onboard observer program, catch is recorded in captain's logbooks, which do not indicate that there are significant numbers of incidentally captured species in the fishery, because the fishing method for bluefin typically prevents incidental capture of other species. Because bycatch in this fishery is likely very low (<5%) and no species of concern are incidentally captured, bycatch strategy is considered highly effective.

Factor 3.3 - Scientific Data Collection and Analysis

Eastern Central Pacific | Mexico | Unassociated purse seine (non-FAD) | Bluefin Fishery

Highly effective

Stock assessment

Pacific bluefin tuna is regularly assessed by the ISC, and ISC assessments are reviewed by both the IATTC and WCPFC. Both fishery-dependent and fishery-independent data are collected for this stock. A variety of information including catch and effort data, size (for some species), and biological information is included in tuna assessments, although high levels of uncertainty are problematic for all species caught in the EPO tuna purse seine fishery. The IATTC also strives to assess the sustainability of primary bycatch species when there are sufficient data, including a recent review of silky shark and a developing ecological risk assessment for mobulid ray (IATTC 2018b)(IATTC 2019e)(IATTC 2018e).

Observer coverage

Large purse seine vessels (Class 6, carrying capacity of greater than 363 mt) must carry an observer (Resolution C-09-04). In 2023, 49 of 53 total Mexican purse seines were Class 6 vessels (in this case, having a capacity >400 mt). Mexico's purse seine vessels fishing for Pacific bluefin are meeting this observer coverage requirement, because IMIPAS notes that all PBF catch by Mexico is monitored "by 100%…observer coverage" via IATTC and national-level observers (IMIPAS and FIDEMAR 2024). All PBF catches in this fleet are reported to both Mexican and IATTC authorities (IMIPAS and FIDEMAR 2024).

Other sources of information on catch composition include logbook records, cannery unloading records, and port sampling by IATTC field office staff. These focus solely on tuna species. Efforts are underway by IATTC staff to investigate the value and effectiveness of electronic monitoring systems, mainly in the poorly observed small vessel fleets but also for supplementing human observer coverage (Román et al 2020). Logbook data are available for all purse seine class sizes, with about 80–90% coverage of all trips in recent years (Román et al 2016), and data are available from the IATTC port sampling program, but these sources contain little information on bycatch or discards (Román et al 2020).

In the Mexican bluefin fleet, the catch composition is well understood based on 100% observer coverage, and the target tuna species is consistently assessed through a peer-reviewed process, so scientific data collection and analysis is considered highly effective.

Eastern Central Pacific, Northeast Pacific | United States | California | Unassociated purse seine (non-FAD) | US coastal purse seine fishery when targeting tuna

Moderately Effective

The target tunas in this fishery—Pacific bluefin, yellowfin, and skipjack—are all regularly assessed through a peer-reviewed process. In the Eastern Pacific, U.S. purse seines are part of a small-scale coastal fleet, which exerts less fishing effort than the U.S. large-scale fleet operating in the WCPO. The EPO fleet collects data through logbooks submitted to NOAA or the IATTC and landings submitted by canneries or fish purchasers (NMFS 2024). IATTC requires observers to be present on large-scale, but not small-scale, EPO purse seine vessels. Though stock assessments for tunas are consistently performed, the lack of any recent objective information on catch composition in the fishery (i.e., no observers) makes scientific data collection and analysis moderately effective.

Justification:

Stock assessment

This California fishery usually targets small pelagic species like sardine, anchovy, and market squid, but will target Pacific bluefin and other tunas when they are available (PFMC 2023)(pers. comm., PFMC staff April 2023). Pacific bluefin, yellowfin, and skipjack are all regularly assessed. A variety of information including catch and effort data, size (for some species), and biological information is included in tuna assessments, although high levels of uncertainty are problematic for all species caught in the EPO tuna purse seine fishery. In addition, the IATTC is starting a process to advance a Management Strategy Evaluation (MSE) for tropical tunas, in working toward a more comprehensive harvest strategy (Valero and Aires-da-Silva 2019). Pacific bluefin tuna is regularly assessed by the ISC, and ISC assessments are reviewed by both the IATTC and WCPFC. Both fishery-dependent and fishery-independent data are collected for this stock.

Observer coverage

The U.S. coastal purse seine fleet consists of smaller, unassociated purse seine vessels. There are no requirements for observer coverage on smaller (Classes 1–5) vessels except in specific situations (Griffiths et al 2022)(IATTC 2023b). Of the 75 registered Classes 1–5 vessels in operation in 2021, only 10 (13.7%) had an observer. But the U.S. fleet specifically has no observer

program and was not included in this limited observer coverage. IATTC staff have recently recommended that IATTC establish a nonvoluntary, fleet-wide observer program for Classes 1–5 vessels, with a sampling coverage of at least 20% (IATTC 2023b).

Other sources of information on catch composition include logbook records, cannery unloading records, and port sampling by IATTC field office staff. These focus solely on tuna species. Efforts are underway by IATTC staff to investigate the value and effectiveness of electronic monitoring systems, mainly in the poorly observed small vessel fleets, but also for supplementing human observer coverage (Román et al 2020). Logbook data are available for all purse seine class sizes, with about 80–90% coverage of all trips in recent years (Román et al 2016), and data are available from the IATTC port sampling program, but these sources contain little information on bycatch or discards (Román et al 2020).

Bycatch is assumed to be low based on logbook and anecdotal reports (PFMC 2023). The fishery is considered a Category III fishery under the Marine Mammal Protection Act (MMPA), with a remote likelihood of and no known incidental death or serious injury of marine mammals (PFMC 2023)(NOAA 2022a). But the lack of observer data makes it difficult to fully determine the catch and bycatch composition in this fishery.

Eastern Central Pacific, Northeast Pacific | United States | Handlines and hand-operated pole-and-lines

Moderately Effective

Pacific bluefin tuna is regularly assessed by the ISC, and ISC assessments are reviewed by both the IATTC and WCPFC. Both fishery-dependent and fishery-independent data are collected for this stock. But there is no observer program in place for smaller fleets such as the U.S. bluefin handline fishery. Although bycatch is considered minimal to negligible (based on logbooks and personal communication with fishers), occasional sampling, observer use, or electronic monitoring use and data availability on handline vessels would help to confirm this. Though the gear is selective, and data collection is thorough for the target species, a lack of independent monitoring leads scientific data collection and analysis to be considered moderately effective.

Factor 3.4 - Enforcement of and Compliance with Management Regulations

Eastern Central Pacific | Mexico | Unassociated purse seine (non-FAD) | Bluefin Fishery

Highly effective

The IATTC has a Committee for the Review of Implementation of Measures Adopted by the Commission that collects compliance information. The Committee receives compliance reports and uses them to identify potential compliance issue areas and improvement suggestions/incentives. Under Resolution C-11-07, CPCs with compliance issues must create plans of actions to improve compliance (Belmontes 2022). In 2022, the Committee held a workshop in which it identified several compliance issues seen in the purse seine fleets in 2021

(Belmontes 2022). But the primary issues during 2021 dealt with interactions with sea turtles and sharks, and the Mexican Pacific bluefin fishery has no sea turtle interactions and very few shark interactions. While the committee also identified some issues with transshipment vessels, these are not relevant for the Mexican fleet, because it transfers its catch to net pens for ranching. Further, the fleet is 100% observed and maintains its catch within IATTC-stipulated catch limits (IMIPAS and FIDEMAR 2024). The latest compliance information available from the IATTC indicates that Mexico's compliance report was completed and only identified one potential issue where no data were available for C-03-05. But the 100% observer coverage in the fishery ensures that all relevant catch information is collected and reported to the appropriate authorities. Based on full observer coverage and no major compliance issues reported for the Mexican Pacific bluefin tuna fishery, enforcement and compliance is considered highly effective.

Eastern Central Pacific, Northeast Pacific | United States | California | Unassociated purse seine (non-FAD) | US coastal purse seine fishery when targeting tuna

Highly effective

The IATTC has a Committee for the Review of Implementation of Measures Adopted by the Commission that collects compliance information. The Committee receives compliance reports and uses them to identify potential compliance issue areas and improvement suggestions/incentives. Under Resolution C-11-07, CPCs with compliance issues must create plans of actions to improve compliance (Belmontes 2022). In 2022, the Committee held a workshop in which it identified several compliance issues seen in the purse seine fleets in 2021 (Belmontes 2022). The primary issues during 2021 dealt with interactions with sea turtles and sharks; however, the U.S. fishery is not likely to interact with tropical sea turtles and operates under stricter shark laws than other IATTC fisheries. While the committee also identified some issues with transshipment vessels, these are not relevant for the small U.S. coastal fleet. The latest compliance information available from the IATTC indicates that the United State's compliance report was completed and did not identify any potential issues (NMFS 2024). Regulations for the U.S. fleet are handled between the IATTC, NMFS, and state-level management agencies in California, making enforcement capacities appropriate to the scale of the fishery. Further, a fisheries management plan stipulates management procedures for the purse seine fishery, which are implemented by the Pacific Fisheries Management Council (PFMC) (PFMC 2023). Based on the capacity of enforcement agencies and the lack of compliance issues reported for U.S. fisheries, enforcement and compliance is considered highly effective.

Eastern Central Pacific, Northeast Pacific | United States | Handlines and hand-operated pole-and-lines

Highly effective

The majority of IATTC and WCPFC resolutions are focused on purse seines and, to a lesser extent, longlines, with no resolutions created for handline fisheries at the RFMO level and very few handline catches reported to IATTC. But a required logbook program is in place at the state level, and NOAA's Pacific Fishery Management Council (PFMC) has a highly migratory species fishery management plan in place that includes Pacific bluefin (PFMC 2023). But specifics for commercially caught bluefin in this plan are primarily focused on the coastal purse seine fishery,

because it has historically accounted for almost all U.S. landings of Pacific bluefin. The plan also includes specifics for the recreational Pacific bluefin handline fishery. NOAA sets catch limits for its bluefin fisheries based on IATTC catch limits, as well as seasonal trip limits (NOAA Fisheries 2024). While there is no observer program in place, enforcement is appropriate to the smaller scale of the handline fishery, and no compliance issues such as catch limit overages have been noted by PFMC, so enforcement and compliance is considered highly effective.

Factor 3.5 - Stakeholder Inclusion

Eastern Central Pacific | Mexico | Unassociated purse seine (non-FAD) | Bluefin Fishery
Eastern Central Pacific, Northeast Pacific | United States | Handlines and hand-operated pole-and-lines
Eastern Central Pacific, Northeast Pacific | United States | California | Unassociated purse seine (non-FAD) | US coastal purse seine fishery when targeting tuna

Moderately Effective

The IATTC allows outside accredited observers, which can comprise scientists, NGOs, or other interested parties, to attend and present at meetings. In addition, individual country delegations have representatives from various stakeholders, including NGOs, governments, producers, suppliers, and exporters (Koehler 2013). Also, the IATTC will conduct a series of Management Strategy Evaluations going forward and is actively seeking input from interested stakeholders to inform the process (IATTC 2018d). Decisions regarding newly passed resolutions or meeting outcomes are posted on the IATTC website and are publicly available, though compliance reports are only seen by IATTC staff and approved meeting observers. In addition, NGOs are excluded from IATTC private sessions (Fischer 2022). In a 2015 evaluation of RFMO transparency, IATTC scored very well (top 3) (Clark et al 2015). But many of IATTC's decisions are guided by assessments and scientific advice from the International Scientific Committee for Tuna and Tuna-like Species in the North Pacific Ocean (ISC), an independent body that conducts stock assessments for Pacific bluefin and other species. ISC does not allow observers into species working-group meetings, through which scientific advice for IATTC is created and stock assessment results are discussed and finalized. Overall, IATTC is generally transparent in its processes and seeks input from all relevant stakeholders, but not all stakeholders are able to participate in the assessment process as a result of the lack of transparency at ISC, so stakeholder inclusion is considered moderately effective.

Criterion 4: Impacts on the Habitat and Ecosystem

This Criterion assesses the impact of the fishery on seafloor habitats, and increases that base score if there are measures in place to mitigate any impacts. The fishery's overall impact on the ecosystem and food web and the use of ecosystem-based fisheries management (EBFM) principles is also evaluated. Ecosystem Based Fisheries Management aims to consider the interconnections among species and all natural and human stressors on the environment. The final score is the geometric mean of the impact of fishing gear on habitat score (factor 4.1 + factor 4.2) and the Ecosystem Based Fishery Management score. The Criterion 4 rating is determined as follows:

- ***Score >3.2=Green or Low Concern***
- ***Score >2.2 and ≤3.2=Yellow or Moderate Concern***
- ***Score ≤2.2 = Red or High Concern***

Guiding principles

- Avoid negative impacts on the structure, function or associated biota of marine habitats where fishing occurs.
- Maintain the trophic role of all aquatic life.
- Do not result in harmful ecological changes such as reduction of dependent predator populations, trophic cascades, or phase shifts.
- Ensure that any enhancement activities and fishing activities on enhanced stocks do not negatively affect the diversity, abundance, productivity, or genetic integrity of wild stocks.
- Follow the principles of ecosystem-based fisheries management.

Rating cannot be Critical for Criterion 4.

Criterion 4 Summary

FISHERY	FISHING GEAR ON THE SUBSTRATE	MITIGATION OF GEAR IMPACTS	ECOSYSTEM-BASED FISHERIES MGMT	FORAGE SPECIES?	SCORE
Eastern Central Pacific | Mexico | Unassociated purse seine (non-FAD) | Bluefin Fishery	Score: 5	Score: 0	Moderate Concern		**Green (3.873)**
Eastern Central Pacific, Northeast Pacific | United States | California | Unassociated purse seine (non-FAD) | US coastal purse seine fishery when targeting tuna	Score: 5	Score: 0	Moderate Concern		**Green (3.873)**
Eastern Central Pacific, Northeast Pacific | United States | Handlines and hand-operated pole-and-lines	Score: 5	Score: 0	Moderate Concern		**Green (3.873)**

Criterion 4 Assessment

SCORING GUIDELINES

Factor 4.1 - Physical Impact of Fishing Gear on the Habitat/Substrate

Goal: The fishery does not adversely impact the physical structure of the ocean habitat, seafloor or

associated biological communities.

- *5 - Fishing gear does not contact the bottom*
- *4 - Vertical line gear*
- *3 - Gears that contacts the bottom, but is not dragged along the bottom (e.g. gillnet, bottom longline, trap) and is not fished on sensitive habitats. Or bottom seine on resilient mud/sand habitats. Or midwater trawl that is known to contact bottom occasionally. Or purse seine known to commonly contact the bottom.*
- *2 - Bottom dragging gears (dredge, trawl) fished on resilient mud/sand habitats. Or gillnet, trap, or bottom longline fished on sensitive boulder or coral reef habitat. Or bottom seine except on mud/sand. Or there is known trampling of coral reef habitat.*
- *1 - Hydraulic clam dredge. Or dredge or trawl gear fished on moderately sensitive habitats (e.g., cobble or boulder)*
- *0 - Dredge or trawl fished on biogenic habitat, (e.g., deep-sea corals, eelgrass and maerl) Note: When multiple habitat types are commonly encountered, and/or the habitat classification is uncertain, the score will be based on the most sensitive, plausible habitat type.*

Factor 4.2 - Modifying Factor: Mitigation of Gear Impacts
Goal: Damage to the seafloor is mitigated through protection of sensitive or vulnerable seafloor habitats, and limits on the spatial footprint of fishing on fishing effort.

- *+1 —>50% of the habitat is protected from fishing with the gear type. Or fishing intensity is very low/limited and for trawled fisheries, expansion of fishery's footprint is prohibited. Or gear is specifically modified to reduce damage to seafloor and modifications have been shown to be effective at reducing damage. Or there is an effective combination of 'moderate' mitigation measures.*
- *+0.5 —At least 20% of all representative habitats are protected from fishing with the gear type and for trawl fisheries, expansion of the fishery's footprint is prohibited. Or gear modification measures or other measures are in place to limit fishing effort, fishing intensity, and spatial footprint of damage caused from fishing that are expected to be effective.*
- *0 —No effective measures are in place to limit gear impacts on habitats or not applicable because gear used is benign and received a score of 5 in factor 4.1*

Factor 4.3 - Ecosystem-Based Fisheries Management
Goal: All stocks are maintained at levels that allow them to fulfill their ecological role and to maintain a functioning ecosystem and food web. Fishing activities should not seriously reduce ecosystem services provided by any retained species or result in harmful changes such as trophic cascades, phase shifts or reduction of genetic diversity. Even non-native species should be considered with respect to ecosystem impacts. If a fishery is managed in order to eradicate a non-native, the potential impacts of that strategy on native species in the ecosystem should be considered and rated below.

- *5 — Policies that have been shown to be effective are in place to protect species' ecological roles and ecosystem functioning (e.g. catch limits that ensure species' abundance is maintained at sufficient levels to provide food to predators) and effective spatial management is used to protect spawning and foraging areas, and prevent localized depletion. Or it has been*

scientifically demonstrated that fishing practices do not have negative ecological effects.

- *4 — Policies are in place to protect species' ecological roles and ecosystem functioning but have not proven to be effective and at least some spatial management is used.*
- *3 — Policies are not in place to protect species' ecological roles and ecosystem functioning but detrimental food web impacts are not likely or policies in place may not be sufficient to protect species' ecological roles and ecosystem functioning.*
- *2 — Policies are not in place to protect species' ecological roles and ecosystem functioning and the likelihood of detrimental food impacts are likely (e.g. trophic cascades, alternate stable states, etc.), but conclusive scientific evidence is not available for this fishery.*
- *1 — Scientifically demonstrated trophic cascades, alternate stable states or other detrimental food web impact are resulting from this fishery.*

Factor 4.1 - Physical Impact of Fishing Gear on the Habitat/Substrate

Eastern Central Pacific | Mexico | Unassociated purse seine (non-FAD) | Bluefin Fishery
Eastern Central Pacific, Northeast Pacific | United States | Handlines and hand-operated pole-and-lines
Eastern Central Pacific, Northeast Pacific | United States | California | Unassociated purse seine (non-FAD) | US coastal purse seine fishery when targeting tuna

Score: 5

Surface gears such as those used to catch tunas and large pelagics are unlikely to touch the seafloor (Hall & Ramon 2013)(DFO 2019)(PFMC 2023). Because these gears do not contact the bottom, physical impact is scored 5.

Factor 4.2 - Modifying Factor: Mitigation of Gear Impacts

Eastern Central Pacific | Mexico | Unassociated purse seine (non-FAD) | Bluefin Fishery
Eastern Central Pacific, Northeast Pacific | United States | Handlines and hand-operated pole-and-lines
Eastern Central Pacific, Northeast Pacific | United States | California | Unassociated purse seine (non-FAD) | US coastal purse seine fishery when targeting tuna

Score: 0

This factor is not applicable because the gear used is benign and the fishery received a score of 5 for Factor 4.1.

Factor 4.3 - Ecosystem-based Fisheries Management

Eastern Central Pacific | Mexico | Unassociated purse seine (non-FAD) | Bluefin Fishery

Moderate Concern

The only main, retained species in this fishery is Pacific bluefin tuna, which is a high trophic-level species. According to IATTC staff (Griffiths and Fuller 2019), the Commission has explicitly defined an ecosystem-based approach to the management of tuna fisheries, as required by the Antigua Convention thus: “adopt, as necessary, conservation and management measures and recommendations for species belonging to the same ecosystem and that are affected by fishing for, or dependent on or associated with, the fish stocks covered by this Convention, with a view to maintaining or restoring populations of such species above levels at which their reproduction may become seriously threatened” (IATTC 2018c). Many efforts have been taken to date to understand

the ecological impacts of EPO fisheries on target and nontarget species, including stock assessments and vulnerability analyses. In addition, staff have developed an ecosystem model of the tropical EPO that allows for improved understanding of complex predator-prey relationships and other elements of the marine ecosystem, and facilitates the forecasting of the impacts from specific perturbations such as fishing and climate change (Griffiths and Fuller 2019). But Pacific bluefin tuna lacks a long-term harvest strategy that focuses on protecting its ecosystem role, so as a species, it lacks a specific ecosystem-based management plan.

Although some effort has been put into creating EBFM policies and HCRs at the RFMO level, the ecological role of Pacific bluefin is not fully protected by current management measures, so ecosystem-based fisheries management is considered a moderate concern.

Eastern Central Pacific, Northeast Pacific | United States | California | Unassociated purse seine (non-FAD) | US coastal purse seine fishery when targeting tuna

Moderate Concern

The U.S. coastal purse seine fleet retains Pacific bluefin, skipjack, and yellowfin tunas. While it may incidentally capture shark species, which are considered top predators in many ecosystems, it does not retain these species. But tunas like bluefin are also high trophic-level species.

According to IATTC staff (Griffiths and Fuller 2019), the Commission has explicitly defined an ecosystem-based approach to the management of tuna fisheries, as required by the Antigua Convention thus: “adopt, as necessary, conservation and management measures and recommendations for species belonging to the same ecosystem and that are affected by fishing for, or dependent on or associated with, the fish stocks covered by this Convention, with a view to maintaining or restoring populations of such species above levels at which their reproduction may become seriously threatened” (IATTC 2018c). Many efforts have been taken to date to understand the ecological impacts of EPO fisheries on target and nontarget species, including stock assessments and vulnerability analyses (see Criterion 1 and Criterion 2). In addition, staff have developed an ecosystem model of the tropical EPO that allows for an improved understanding of complex predator-prey relationships and other elements of the marine ecosystem, and facilitates the forecasting of the impacts from specific perturbations such as fishing and climate change (Griffiths and Fuller 2019). At the national level, the PFMC also has developed a Pacific Coast Fishery Ecosystem Plan that allows management to incorporate ecosystem considerations. Harvest control rules that are in place for tropical tunas may protect their ecosystem roles, though the rules do not explicitly focus on these roles, so there is a lack of established protection for the ecosystem function of Pacific bluefin tuna.

Although some effort has been put into creating EBFM policies and HCRs at the RFMO level, the ecological roles of large tunas are not fully protected by current management measures, so ecosystem-based fisheries management is considered a moderate concern.

Eastern Central Pacific, Northeast Pacific | United States | Handlines and hand-operated pole-and-lines

Moderate Concern

The PFMC has developed a Pacific Coast Fishery Ecosystem Plan (FEP) that was adopted in 2013 and updated in 2022. The FEP includes a variety of ecosystem information and considerations that can be taken into account by the Council as it amends and updates fisheries management plans (PFMC 2022). The U..S pole and line HMS fishery uses bait species that may be considered “exceptional species.” Bait fisheries are managed off the U.S. West Coast by the PFMC, and they are also considered under the FEP. While several EBFM initiatives have been completed by the PFMC to date, none focused specifically on tuna’s ecological roles.

According to IATTC staff (Griffiths and Fuller 2019), the Commission has explicitly defined an ecosystem-based approach to the management of tuna fisheries, as required by the Antigua Convention thus: “adopt, as necessary, conservation and management measures and recommendations for species belonging to the same ecosystem and that are affected by fishing for, or dependent on or associated with, the fish stocks covered by this Convention, with a view to maintaining or restoring populations of such species above levels at which their reproduction may become seriously threatened” (IATTC 2018c). Many efforts have been taken to date to understand the ecological impacts of EPO fisheries on target and nontarget species, including stock assessments and vulnerability analyses (see Criterion 1 and Criterion 2). In addition, staff have developed an ecosystem model of the tropical EPO that allows for improved understanding of complex predator-prey relationships and other elements of the marine ecosystem, and facilitates the forecasting of the impacts from specific perturbations such as fishing and climate change (Griffiths and Fuller 2019).

Although progress is being made on the international and national level with respect to EBFM, ecosystem impacts based on target catch and bait use are possible (though not likely given the small scale of this fishery), and these species’ ecological roles are not fully protected by current management plans, so ecosystem-based fisheries management is considered a moderate concern.

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Scientific reviewdoes not constitute an endorsement of the Seafood Watch® program, or its seafood recommendations, on the part of the reviewing scientists. Seafood Watch® is solely responsible for the conclusions reached in this report.

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