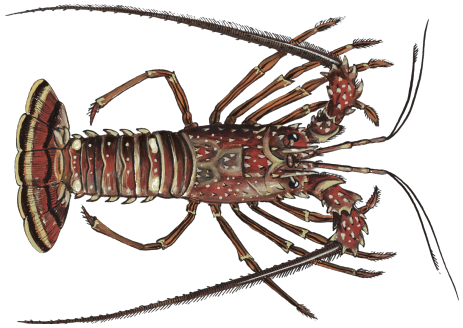
Caribbean spiny lobster

Panulirus argus



Honduras

Diving, Pots

Report ID 27952

June 5, 2023

Seafood Watch Standard used in this assessment: Fisheries Standard v3

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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

The spiny lobster is a commercially fished marine invertebrate. There are several distinct species of spiny lobster located in various areas of the world. This report provides information and recommendations for the Caribbean spiny lobster (*Panulirus argus*) fished in the waters of Honduras with traps and by free and assisted diving.

The spiny lobster is moderately vulnerable to fishing pressure. It tends to mature quickly (between 2 and 3 years), compared to its life span of around 20 years in the Caribbean. Recently matured spiny lobsters tend to spawn once a year, although older lobsters can spawn multiple times per year and females can produce up to 2.5 million eggs, which can disperse widely.

A binational (Honduras–Nicaragua) stock assessment of Caribbean spiny lobster was conducted in 2021 utilizing data from 10 fishing seasons (from 2010–11 to 2019–20). Three abundance indicators show either relatively stable or increasing trends in Honduras and in a binational analysis. But, it is suspected that fishing mortality from all sources (commercial and artisanal) is above a sustainable level that is appropriate for the species, and because of uncertainties in the data and reference points, the overall stock status of the Caribbean spiny lobster in Honduras is ranked Red.

There is a considerable lack of information regarding the impact of the fishery on bycatch and on endangered, threatened, and protected (ETP) species, habitat, and ecosystems. A risk assessment has indicated that the impact of the traps on both bycatch and habitat is not likely to be high. Bycatch likely consists of crabs and finfish (particularly snapper and grouper). Likewise, free-dive and hand-harvest fisheries result in a low incidental catch. Nonetheless, species of concern are caught, such as grouper. The impact on other species is ranked Red for both the Honduran dive and trap fisheries.

Management of spiny lobster has not been effective at avoiding overfishing. The Caribbean spiny lobster regional management body (OSPESCA) and Honduras' management agency (DIGEPESCA) mandate a suite of management measures to control the fishing effort, including a minimum legal size, a closed season, and the type and number of fishing gear. But, there are difficulties in enforcing the regulations, leading to high rates of illegal, unregulated, and unreported (IUU) fishing. There are issues regarding a lack of available robust data and important uncertainties in the data: for example, the most recent stock assessment does not consider illegal fishing or information from the artisanal fleet in Honduras. Bycatch monitoring systems are yet to be implemented, but the Fishery Improvement Project (FIP) has made significant efforts to reduce these data gaps in the trap fishery. Overall, management of the spiny lobster fisheries in Honduras is rated Red.

Traps result in some damage to the benthic habitat. Diving results in minimal impacts to the habitat. The ecosystem impacts from the trap-based fisheries are considered moderate. The impact of the Honduras spiny lobster fisheries on habitats and the ecosystem is ranked Yellow for traps and Green for diving.

The spiny lobster trap fishery in Honduras is engaged in a Fishery Improvement Project (FIP). Engagement in a FIP does not affect the Seafood Watch score because we base our assessments on the current scientific evidence.

Final Seafood Recommendations

SPECIES | FISHERY	C 1 TARGET SPECIES	C 2 OTHER SPECIES	C 3 MANAGEMENT	C 4 HABITAT	OVERALL	VOLUME (MT) YEAR
Caribbean spiny lobster | Caribbean Sea | Atlantic, Western Central | Diving | Honduras	1.526	1.732	1.000	3.464	**Avoid (1.739)**	Unknown
Caribbean spiny lobster | Caribbean Sea | Atlantic, Western Central | Traps | Honduras	1.526	1.299	1.000	2.449	**Avoid (1.484)**	Unknown

Data from FAO production dataset shows landings of 1092mt in 2020, however landings were in the region of 6000mt in the years prior so reduced landings in 2020 may have been the result of the pandemic. Data are for all gears combined.

Summary

Spiny lobster from Honduras receives a recommendation of Avoid, because of concerns regarding stock status and fishing mortality as well as the potential impact on other species harvested alongside lobster, such as snapper and grouper.

Eco-Certification Information

The Caribbean spiny lobster fishery in Honduras is engaged in a Fishery Improvement Project (FIP). Engagement in a FIP does not affect the Seafood Watch score because we base our assessments on the current situation.

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 Concern2, 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 report provides information and a recommendation for the Caribbean spiny lobster (*Panulirus argus*) fished in Honduras. This lobster is fished with traps and by free diving or diving with compressors.

Acronyms

BRP	Biological Reference Point	IUU	Illegal, Unreported, and Unregulated
CAS	Catch-At-Size	MARPLESCA	Manejo Regional de la Pesqueria de la Langosta Espinosa del Caribe
CFMC	Caribbean Fishery Management Council	MPA	Marine Protected Area
CL	Carapace Length	NOAA	National Oceanographic and Atmospheric Administration
CLME	Caribbean Large Marine Ecosystem Project	OSPESCA	Organization of the Fisheries and Aquaculture Sector of the Central American Isthmus
Conapesca	Consejo Nacional de Pesca y Acuicultura	PSA	Productivity-Susceptibility Analysis
CPUE	Catch Per Unit Effort	SERNA	La Secretaría de Recursos Naturales y Ambiente
CRFM	Caribbean Regional Fishery Mechanism	SICA	Central American Integration System
CSA	Consequence Scale Analysis	SIGMEPH	Fishing Vessel Monitoring of Honduras
DIGEPESCA	General Directorate for Fisheries and Aquaculture	SIMP	Seafood Import Monitoring Program
ETP	Endangered, Threatened, and Protected species	TML	Minimum Legal Size
FAO	Food and Agriculture Organization	TRP	Target Reference Point
FIP	Fishery Improvement Project	VMS	Vessel Monitoring System
GIS	Geographic Information System	WECAF	Western Central Atlantic Fishery Commission
IUCN	International Union for the Conservation of Nature		

Species Overview

The spiny lobster, of the genus *Panulirus,* comprises approximately 20 different species occurring worldwide in tropical and subtropical waters (Pollack 1995). The spiny lobster can be easily distinguished by the long, spiny antennae and by the lack of claws on the first four pairs of legs (Holthuis 1991). Spiny lobsters are typically found at depths from 0 to 90 meters (m), depending upon the species (Holthuis 1991). Juvenile lobsters may spend their first few years in nearshore surfgrass or algal beds, while adults favor rocky substrates and reefs—areas that provide protection (GMFMC and SAFMC 2011). Spiny lobsters tend to be nocturnal, and live in shelters during the day (GMFMC and SAFMC 2011). How lobsters migrate is debated: some studies show that spiny lobsters migrate among depths, depending on the season, and generally move deeper in winter months (Holthuis 1991).

The Caribbean spiny lobster is found and fished along the coast of Florida, within the Gulf of Mexico, in the Caribbean Sea, and along the coasts of Central America and South America through Brazil (Figure 1) (Holthuis 1991). Note that the Caribbean spiny lobster may comprise genetically distinct stocks in the Caribbean Sea and along the Brazilian coast, although lobsters with genetic markers from each of these stocks are found within the entire range, indicating mixing (Ehrhardt 2005).

Figure 1: Distribution of *P. argus*. Source: (FAO 2017).

There is a regional management agreement for Caribbean spiny lobster in Central America established by the Organización del Sector Pesquero y Acuícola del Itsmo Centroamericano Agreement OSP-02-09 (OSPESCA) (FAO 2015a), which mandates management measures for Belize, Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, the Dominican Republic, and Panama. The agreement is essentially in accord with the regulations of each country (FAO 2015a). The Honduras stock is likely shared, because currents carry larvae to other countries including Nicaragua, Colombia, and Jamaica (CLME 2017a); however, Colombia and Jamaica are not part of OSPESCA and there is a possibility that the stock is shared with countries outside the OSPESCA system. In addition, research indicates that spiny lobster stocks for Honduras and Nicaragua are likely the same (Sosa-Cordero 2010)(Sánchez 2021).

Several different species of spiny lobster support commercial fisheries worldwide. Thus, there are a variety of management bodies regulating the fisheries. The key management measures for most fisheries include a minimum carapace length (CL), season closures, and various gear restrictions, such as banning the landing of spiny lobster caught in gillnet fisheries. The Honduras fishery includes management regulations intended to limit access and reduce the catch of immature or berried females (e.g., minimum sizes and season closures), closed seasons, escape gaps in traps, removal of traps before season closures, trap limits per boat, maximum number of divers per boat, and license requirements (see Table 4 in Factor 3.1) (FAO 2015a). DIGEPESCA is the government authority in charge of fishery management and regulation in Honduras.

Production Statistics

Spiny lobsters are fished throughout the Caribbean and along the Central and South American coastlines. The main producers of *P. argus* in the Americas are shown in Table 1.

Table 1. Largest producers of *P. argus*. Landings measured in tonnes in 2019 and 2020. Source: (FAO 2022).

LAND AREA	2020 (PRODUCTION TONNES)	2019 (PRODUCTION TONNES)	Gears

Brazil	7,300	7,300	Traps and gillnets (level of gillnet use is unknown and is illegal)
Bahamas	5,966	6,226	Casitas, traps
Nicaragua	4,975	4,975	Traps, free and assisted diving
Cuba	3,957	3,278	Casitas, cages, traps
United States	1,621	1,896	Commercial: Traps, scuba, bully net. Recreational: No traps, scuba diving, free diving, bully net
Dominican Republic	1,554	1,845	Traps, free and assisted diving
Honduras	1,092	6,100	Traps and scuba diving with hooks
Belize	850	800	Traps, casitas, and skin diving

The Caribbean spiny lobster is captured throughout its range. Global capture production has varied widely, with a minimum of ≈3,000 metric tons (MT) in 1950 and a maximum of 42,000 MT in 1995, and trade of Caribbean spiny lobster is worth around USD 900 million annually (FAO 2015a). Production over the last decade has fluctuated between 31,720 MT in 2009 to the highest reported production of 39,326 MT in 2016 (FAO 2022).

Importance to the US/North American market.

The United States imports spiny lobster, including the Caribbean spiny lobster, from several countries in the Caribbean, Central America, and South America. There is a lack of species-specific import data because Caribbean spiny lobster imports can be named "Lobster Rock Caribbean Spiny," "Lobster Rock NSPF Frozen," or terms to that effect. Of the total Caribbean spiny lobster recorded imports to the United States in 2021, ≈21% is from Honduras (NMFS 2022).

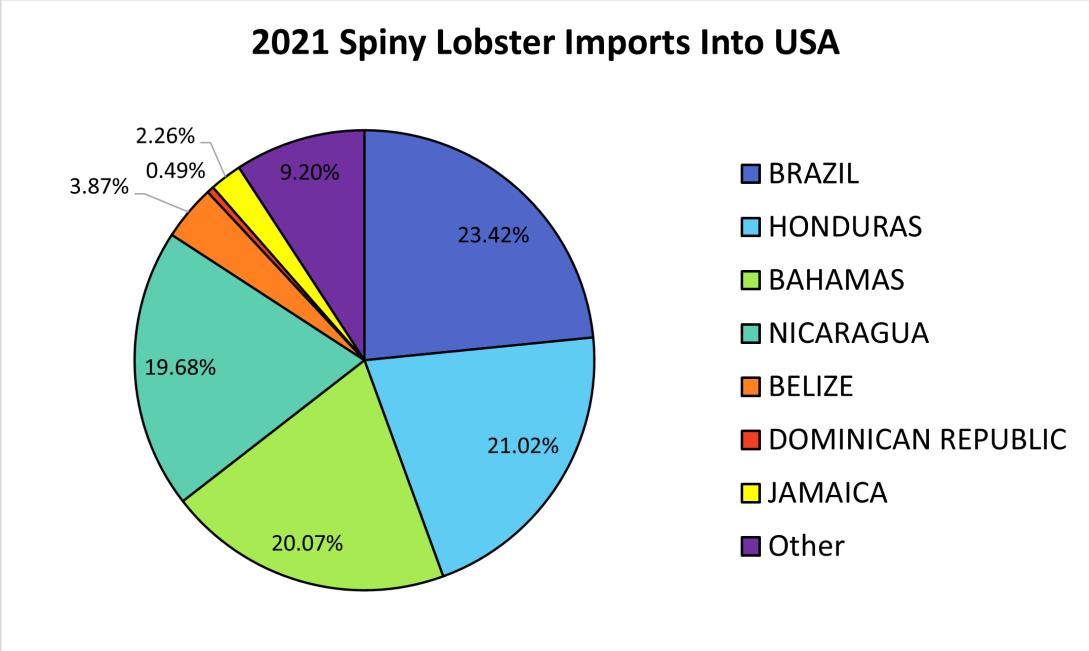

Figure 2: 2021 Caribbean spiny lobster imports into the United States. "Other" includes: Mexico, Colombia, St. Helena, Panama, St. Vincent-Grenadine, Ecuador, Venezuela, Turks & Caicos Is., Haiti, Trinidad & Tobago, Chile, and Guatemala. Source: (NMFS 2022).

Common and market names.

Spiny lobsters are also known as rock lobsters. The Caribbean spiny lobster is also known as Bermuda spiny lobster, common spiny lobster, crawfish, crayfish, Florida (spiny) lobster, bug, West Indian langouste, and West Indian spiny lobster (Holthuis 1991)(NOAA 2023).

Primary product forms

Spiny lobster is sold as fresh or frozen either in the form of raw tails, meat, or whole, and either blanched or fully cooked (Fishchoice 2020).

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

CARIBBEAN SPINY LOBSTER			
REGION / METHOD	**ABUNDANCE**	**FISHING MORTALITY**	**SCORE**
Caribbean Sea | Atlantic, Western Central | Diving | Honduras	2.330: Moderate Concern	1.000: High Concern	Red (1.526)
Caribbean Sea | Atlantic, Western Central | Traps | Honduras	2.330: Moderate Concern	1.000: High Concern	Red (1.526)

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.*

Caribbean spiny lobster

Factor 1.1 - Abundance

Caribbean Sea | Atlantic, Western Central | Diving | Honduras
Caribbean Sea | Atlantic, Western Central | Traps | Honduras

Moderate Concern
A binational (Honduras–Nicaragua) stock assessment of Caribbean spiny lobster was conducted in 2021 utilizing data from 10 fishing seasons (from 2010–11 to 2019–20) (Sánchez 2021). The assessment applied the methodology outlined in the Regional Management Plan for the Caribbean spiny lobster fishery (MARPLESCA Plan), which was developed by OSPESCA and approved in 2018. The assessment was carried out both by country and on a binational scale. Biological reference points (BRPs) have yet to be defined to determine population status; therefore, data-limited indicators have been used to determine a score for abundance. Data-limited indicators include total biomass, catch per unit effort (CPUE), and annual recruitment. The three indicators show either relatively stable or increasing trends in Honduras and when analyzed on a binational scale (Sánchez 2021).

There are at least two appropriate data-limited assessment methods, based on distinct data sources, that suggest that the stock is healthy, with no conflicting indicators; however, the species is highly vulnerable according to the productivity-susceptibility analysis (PSA; see Justification). Therefore, Seafood Watch deems abundance a moderate concern.

Justification:
Biomass: The model indicated that the average total biomass in Honduras has fluctuated during the previous 10 fishing seasons (Sánchez 2021). The highest average biomass occurred in the 2012–13 fishing season, after which a decline was observed until the 2019–20 fishing season, which resulted in a slight recovery. On a binational scale, average biomass values have slightly fluctuated during the previous 10 fishing seasons (Sánchez 2021).

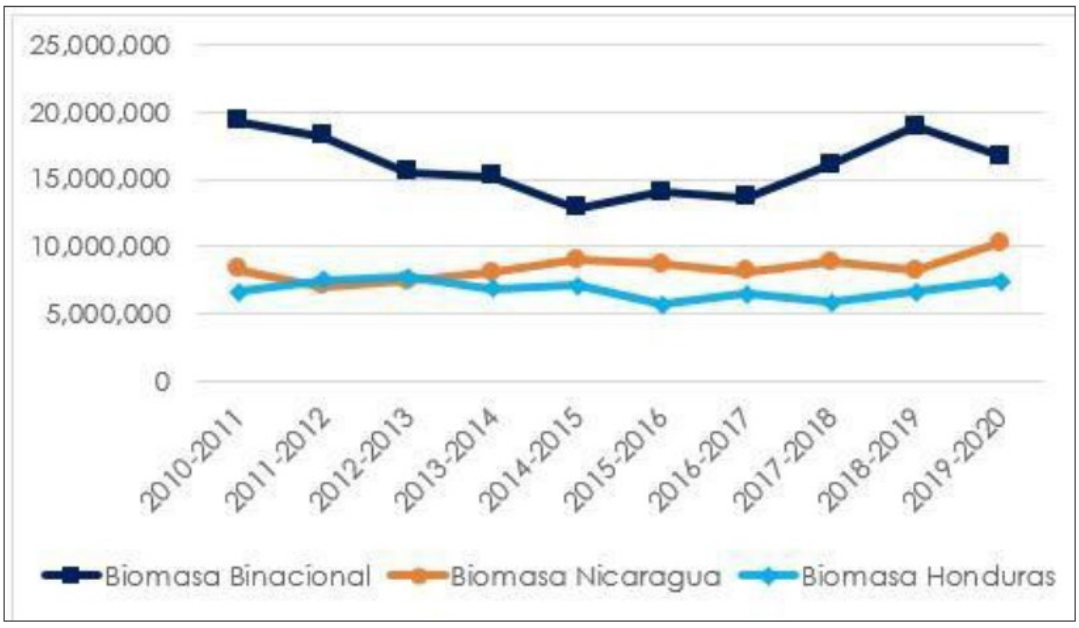

Figure 3: Average biomass (lb. tail) by country and on a binational scale during 10 fishing seasons (Sánchez 2021).

CPUE: CPUE data were calculated separately for each fleet (trap and dive) in Honduras (Sánchez 2021). Both gears showed fluctuating but overall increasing trends during the previous 10 fishing seasons. On a binational scale, overall CPUE has followed a similar trend to that of Honduras, exhibiting fluctuating yet increasing trends (Sánchez 2021).

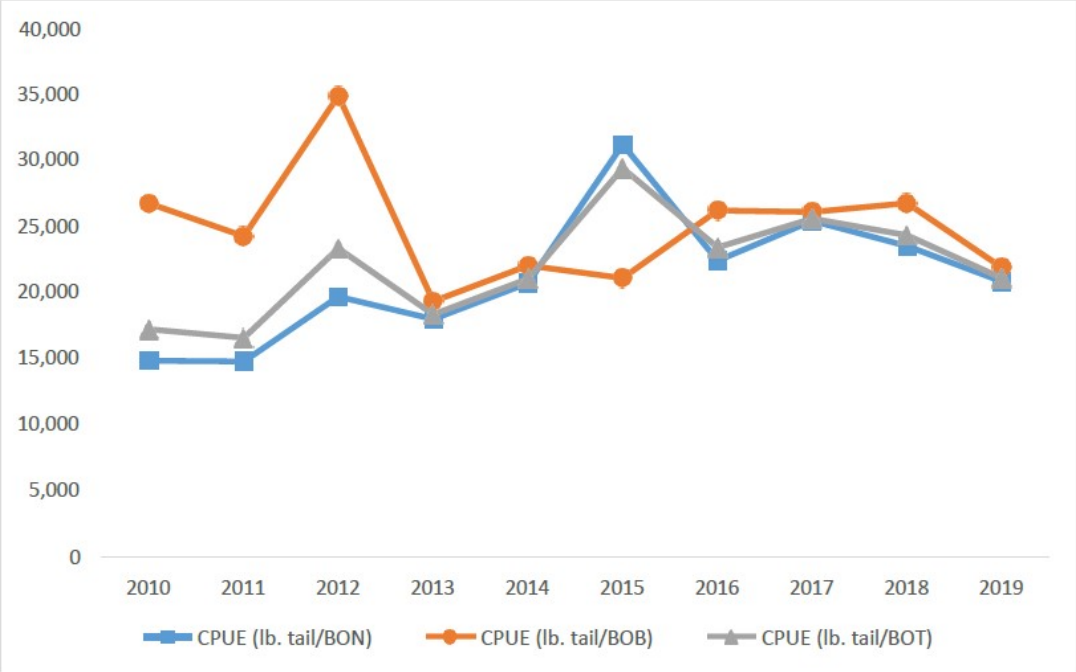

Figure 4: CPUE calculated by gear type and in total in Honduras during 10 fishing seasons (blue: trap; orange: dive; grey: total) (BON: trap boats; BOB: diving boats; BOT: total operating boats in Honduras) (Sánchez 2021).

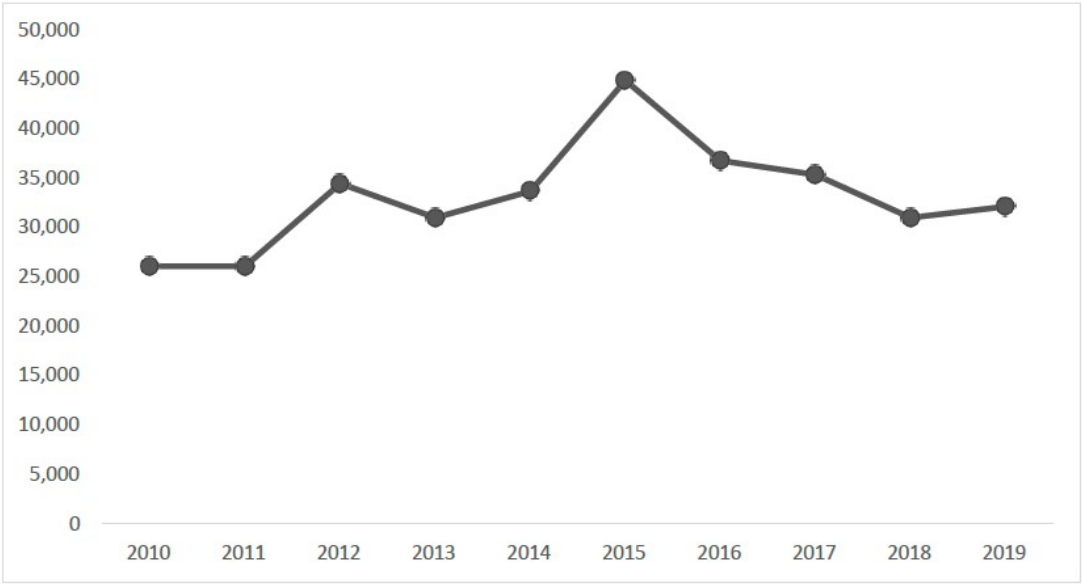

Figure 5: CPUE (boats/lb. tail) at a binational scale during 10 fishing seasons (Sánchez 2021).

Annual recruitment: In Honduras, recruitment was relatively stable, with an average of 5.2 million lobsters during the 10 fishing seasons (Sánchez 2021). Spawning biomass is also relatively stable, showing a slight increase during the same period. On a binational scale, recruitment slightly increased during the 10

fishing seasons (Sánchez 2021).

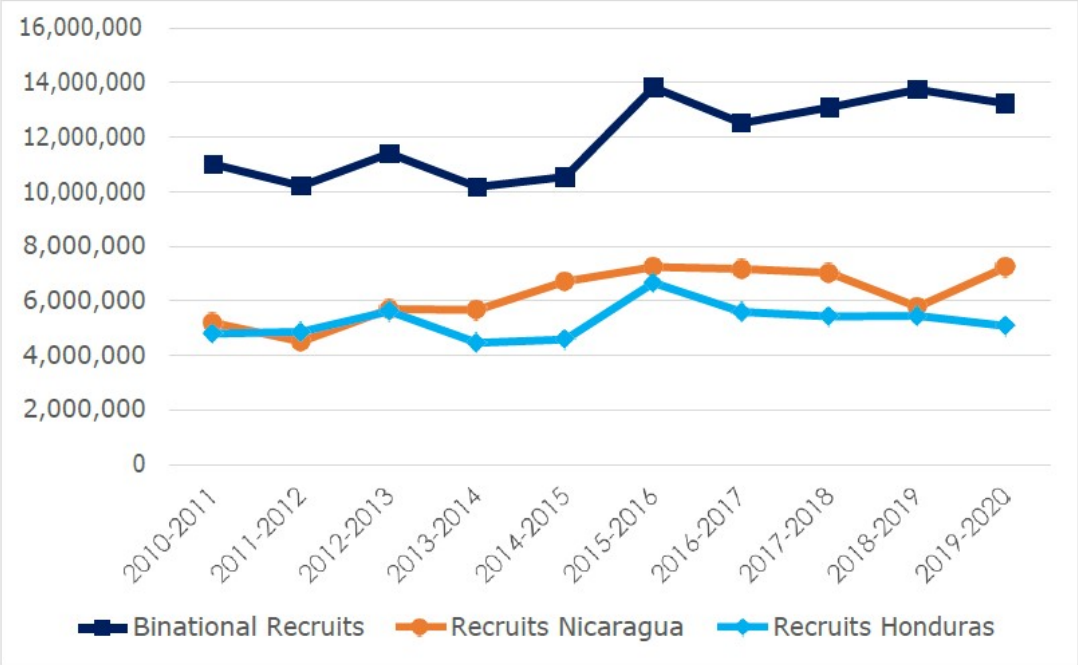

Figure 6: Recruitment (number of individuals) by country and on a binational scale during 10 fishing seasons {Sánchez 2021.

The productivity-susceptibility analysis (PSA) score = 3.45. For this reason, the species is deemed to have high vulnerability (based on the PSA scoring tool). Detailed scoring of each attribute is shown below:

Attribute	Relevant Information	Score (1 = low, 2 = medium, 3 = high)
Productivity Attribute		
Average age at maturity	2–3 years (Ehrhardt 2005)	1
Average maximum age	20 years (Maxwell et al. 2007a)	2
Fecundity	300,000 to 2.5 million eggs (Bertelsen and Matthews 2001)	1
Reproductive strategy	Brooder	2
Trophic level	2.98 (Vidal and Basurto 2003)	2
Density dependence (invertebrates only)	No density dependence suggested, but unknown (Behringer and Butler 2006)	2
Habitat quality	Habitat has been moderately altered by nonfishing impacts: the coral reefs in Honduras "face common anthropogenic threats; for example from fishing, coastal development, pollution and climate change" (Forster et al. 2017)	2
Susceptibility Attribute		
Areal overlap	Default score	3
Vertical overlap	Default score	3

Selectivity of fishery	Species is targeted or is incidentally encountered AND attributes of the fishery (e.g., illegal fishing, issues of restricting catch of undersized lobster), in combination with the species' biology or behavior, increase its susceptibility to the gear (Buesa 2018).	3
Post-capture mortality	Retained species	3

$V = \sqrt{(P^2 + S^2)}$

$P = (1 + 2 + 1 + 2 + 2 + 2 + 2) \div 7 = 1.71$

$P^2 = 2.92$

$S = (3 * 3 * 3 * 3 - 1) \div 40 + 1$

$S = (81 - 1) \div 40 + 1$

$S = 3$

$S^2 = 9$

$V = \sqrt{(P^2 + S^2)}$

$V = \sqrt{(2.92 + 9)}$

$V = \sqrt{11.92}$

PSA score = 3.45 = High Vulnerability

Factor 1.2 - Fishing Mortality

Caribbean Sea | Atlantic, Western Central | Diving | Honduras
Caribbean Sea | Atlantic, Western Central | Traps | Honduras

High Concern

A binational (Honduras–Nicaragua) stock assessment of Caribbean spiny lobster was conducted in 2021 utilizing data from 10 fishing seasons (from 2010–11 to 2019–20) (Sánchez 2021). In Honduras, fishing mortality was calculated for the whole fishery, so this section discusses both the trap and dive fisheries together. Fishing mortality (F) was highest during the 2015–16 and 2016–17 fishing seasons in Honduras (F = 0.65 and 0.54, respectively), and the average fishing morality rate for all 10 seasons was 0.47 (Table 2) (Sánchez 2021). On a binational scale, a relative increase in F has been observed during the 10 fishing seasons, and the average F = 0.47 (Table 3) (Sánchez 2021).

Fishing mortality in Honduras and on a binational scale in the most recent five fishing seasons exceeded the target reference point (TRP) established by Nicaragua ($F_{0.1}$ = 0.51) in every year but one (Honduras: F < TRP in 2019–20; Binational: F < TRP in 2018–19) (Figure 7) (Sánchez 2021). In addition, there are uncertainties in the data that further limit the accuracy of the stock assessment in Honduras. DIGEPESCA catch data did not represent the artisanal fleet's catch, because there is no official information on the number of artisanal vessels (Sánchez 2021).

Because it is suspected that fishing mortality from all sources (commercial and artisanal) is above a sustainable level that is appropriate for the species and there are uncertainties in the data, Seafood Watch

deems fishing mortality a high concern.

Justification:

Table 2. Results of the application of the MARPLESCA model for Honduras (Sánchez 2021).

Results (Variables analyzed)	2010–11	2011–12	2012–13	2013–14	2014–15	2015–16	2016–17	2017–18	2018–19	2019–20	Average
F Honduras	0.43	0.38	0.43	0.38	0.38	0.65	0.54	0.53	0.54	0.44	0.47
Total Average Biomass (lb. tail)	6,570,606	7,489,586	7,674,077	6,867,161	7,054,495	5,670,016	6,467,416	5,839,651	6,583,748	7,375,943	6,759,270
Total Number	11,781,296	12,718,411	13,770,066	11,659,504	11,977,571	12,721,682	12,166,175	11,826,266	12,017,319	12,520,752	12,315,904
Recruits (# ≤ 2.8 YO)	4,796,844	4,859,205	5,611,174	4,453,719	4,575,215	6,656,150	5,590,125	5,424,030	5,440,763	5,073,825	5,248,105
Spawning Biomass # (> 3 YO)	6,984,452	7,859,205	8,158,892	7,205,784	7,402,356	6,065,533	6,576,050	6,402,235	6,576,556	7,446,927	7,067,799

Table 3. Results of the application of the MARPLESCA model at the binational scale (Sánchez 2021).

Results (Variables analyzed)	2010–11	2011–12	2012–13	2013–14	2014–15	2015–16	2016–17	2017–18	2018–19	2019–20	Average
F Binational	0.43	0.38	0.43	0.38	0.38	0.65	0.54	0.53	0.54	0.44	0.47
Total Average Biomass (lb. tail)	6,570,606	7,489,586	7,674,077	6,867,161	7,054,495	5,670,016	6,467,416	5,839,651	6,583,748	7,375,943	6,759,270
Total Number	11,781,296	12,718,411	13,770,066	11,659,504	11,977,571	12,721,682	12,166,175	11,826,266	12,017,319	12,520,752	12,315,904
Recruits (# ≤ 2.8 YO)	4,796,844	4,859,205	5,611,174	4,453,719	4,575,215	6,656,150	5,590,125	5,424,030	5,440,763	5,073,825	5,248,105
Spawning Biomass # (> 3 YO)	6,984,452	7,859,205	8,158,892	7,205,784	7,402,356	6,065,533	6,576,050	6,402,235	6,576,556	7,446,927	7,067,799

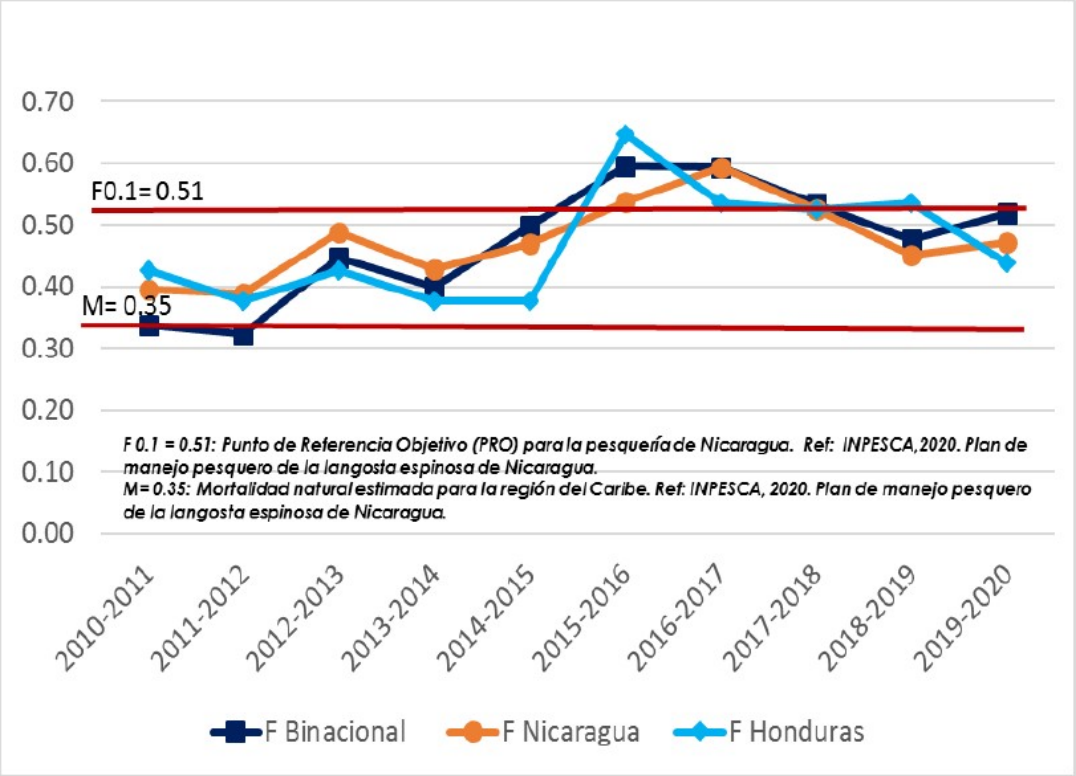

Figure 7: Fishing Mortality (F) for Nicaragua, Honduras, and at the binational scale (Sánchez 2021).

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.

CARIBBEAN SPINY LOBSTER			
REGION / METHOD	**SUB SCORE**	**DISCARD RATE/LANDINGS**	**SCORE**
Caribbean Sea | Atlantic, Western Central | Diving | Honduras	1.732	1.000: < 100%	Red (1.732)
Caribbean Sea | Atlantic, Western Central | Traps | Honduras	1.732	0.750: >= 100%	Red (1.299)

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.

CARIBBEAN SEA | ATLANTIC, WESTERN CENTRAL | DIVING | HONDURAS			
SUB SCORE: 1.732	DISCARD RATE: 1.000	**SCORE: 1.732**	
SPECIES	**ABUNDANCE**	**FISHING MORTALITY**	**SCORE**
Caribbean spiny lobster	2.330: Moderate Concern	1.000: High Concern	Red (1.526)
Grouper (unspecified)	1.000: High Concern	3.000: Moderate Concern	Red (1.732)
Snappers	1.000: High Concern	3.000: Moderate Concern	Red (1.732)

CARIBBEAN SEA | ATLANTIC, WESTERN CENTRAL | TRAPS | HONDURAS			
SUB SCORE: 1.732	DISCARD RATE: 0.750	**SCORE: 1.299**	
SPECIES	**ABUNDANCE**	**FISHING MORTALITY**	**SCORE**
Caribbean spiny lobster	2.330: Moderate Concern	1.000: High Concern	Red (1.526)
Grouper (unspecified)	1.000: High Concern	3.000: Moderate Concern	Red (1.732)
Snappers	1.000: High Concern	3.000: Moderate Concern	Red (1.732)
Corals and other biogenic habitats	1.000: High Concern	5.000: Low Concern	Yellow (2.236)
Channel-clinging crab	2.330: Moderate Concern	3.000: Moderate Concern	Yellow (2.644)
Benthic inverts	2.330: Moderate Concern	5.000: Low Concern	Green (3.413)
Finfish	2.330: Moderate Concern	5.000: Low Concern	Green (3.413)

Species considered in Criterion 2 are either those that are endangered, threatened, or protected (ETP) (using the International Union for Conservation of Nature [IUCN] website), those that represented >5% of the catch (from studies based in Honduras and Nicaragua), or those taxa that are assumed to interact with the trap and dive fishery (according to the Seafood Watch Unknown Bycatch Matrix [UBM]).

There is a lack of documented information on bycatch and ETP species in the Honduran spiny lobster fisheries (Hervás 2016). There is no structured observer program in place (Fishery Progress 2022b) (Hervás 2016), but as of the 2017–18 season, logbooks included a column to address and quantify bycatch species; however, no studies have been conducted to date (Fishery Progress 2022b)(Fishery Progress 2022c). One study was conducted in 2019 on bycatch in the Nicaraguan Caribbean spiny lobster trap fishery, which is known to be similar to the Honduras Caribbean spiny lobster trap fishery (Velásquez 2019) (pers. comm., WWF, 2023). But, this study was deemed not representative of the full fishery because of the low monitoring coverage. Therefore, additional sources were used to assess potential Criterion 2 species. The data sources used to provide information on Criterion 2 species are mainly derived from stakeholder correspondence from the Fishery Improvement Project (FIP) (MRAG 2011a)(Hervás 2016) and from small, one-off studies in certain fishing ports in Honduras (e.g., (Taylor 2008)).

Lobster trap fisheries in Honduras are assumed to be highly selective, and few species are known to be retained (MRAG 2011a)(Hervás 2016)(MRAG 2011b)(Velásquez 2019). But, known retained bycatch include channel-clinging crab (*Maguimithrax spinosissimus*), groupers, and snappers (MRAG 2011a)(Hervás 2016) (pers. comm., WWF, 2018) (Hervás 2020)(Velásquez 2019). Also, taxa assumed to interact with the trap fishery according to the Seafood Watch Unknown Bycatch Matrix include finfish, benthic inverts, and corals and other biogenic habitats. The risk from the Honduras spiny lobster fishery to marine mammals is assumed to be low, because there is no line used in the trap fisheries in the region. Therefore, marine mammals are not assessed in this report.

In dive fisheries, grouper species are known to be caught in some areas of Honduras, but there is limited species-specific information (Taylor 2008). Similarly, fishers who dive for lobster carry spears to shoot large fish, such as snapper and grouper (Box and Canty 2011).

For the trap and dive fisheries in Honduras, grouper and snapper limit the score for Criterion 2 because of their high vulnerability and unknown stock status.

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

Benthic inverts

Factor 2.1 - Abundance

Caribbean Sea | Atlantic, Western Central | Traps | Honduras

Moderate Concern

Because there is a lack of data on benthic invertebrate bycatch in the spiny lobster fishery, Seafood Watch automatically scores abundance of benthic invertebrates a moderate concern.

Factor 2.2 - Fishing Mortality

Caribbean Sea | Atlantic, Western Central | Traps | Honduras

Low Concern

The Unknown Bycatch Matrix (UBM) has been used to determine the impact of pots on benthic invertebrates, and it results in a score of 3.5. Therefore, Seafood Watch deems fishing mortality a low concern.

Channel-clinging crab

Factor 2.1 - Abundance

Caribbean Sea | Atlantic, Western Central | Traps | Honduras

Moderate Concern

King crab, or channel-clinging crab, is estimated to represent over 5% of the catch in the Honduran industrial fleet (SCS 2011)(FAO 2015a). In the absence of a stock assessment or of data-limited indicators, the productivity-susceptibility analysis (PSA) scores king crab in Honduras as having medium vulnerability (see Justification). Because there is no information to determine whether the fishery is overfished, and the species has a medium vulnerability, Seafood Watch deems abundance a moderate concern.

Justification:

Productivity-Susceptibility Analysis

PSA score = 2.98. For this reason, the species is deemed to have medium vulnerability (detailed scoring of each attribute is shown below).

Attribute	Relevant Information	Score (1 = low, 2 = medium, 3 = high)
Productivity Attribute		
Average age at maturity	2 years (NOAA FishWatch 2018)	1
Average maximum age	16 years (NOAA FishWatch 2018)	2
Fecundity	772,415 (NOAA FishWatch 2018)	1
Reproductive strategy	Demersal egg layer (NOAA FishWatch 2018)	2
Trophic level	Approximately 4	3

Density dependence (invertebrates only)	No density dependence suggested	2
Quality of habitat	Habitat has been moderately altered by nonfishing impacts: the coral reefs in Honduras "face common anthropogenic threats; for example from fishing, coastal development, pollution and climate change" (Forster et al. 2017)	2
Susceptibility Attribute		
Areal overlap	Default	3
Vertical overlap	Default	3
Selectivity of fishery	Default	2
Post-capture mortality	Retained species	3

$V = \sqrt{(P^2 + S^2)}$

$P = (1 + 2 + 1 + 2 + 3 + 2 + 2) \div 7 = 1.86$

$P^2 = 3.46$

$S = (3 * 3 * 2 * 3 - 1) \div 40 + 1$

$S = (54 - 1) \div 40 + 1$

$S = 2.33$

$S^2 = 5.43$

$V = \sqrt{(P^2 + S^2)}$

$V = \sqrt{(3.46 + 5.43)}$

$V = \sqrt{8.89}$

PSA score = 2.98 = Medium vulnerability

Factor 2.2 - Fishing Mortality

Caribbean Sea | Atlantic, Western Central | Traps | Honduras

Moderate Concern

Because fishing mortality is unknown relative to reference points, Seafood Watch deems fishing mortality a moderate concern.

Corals and other biogenic habitats

Factor 2.1 - Abundance

Caribbean Sea | Atlantic, Western Central | Traps | Honduras

High Concern

The Mesoamerican Reef (MAR), the largest coral reef system in the Atlantic Ocean, stretches over 1,000 km through the waters of Mexico, Belize, Guatemala, and Honduras (MRAG Americas 2012). Many corals are considered to be endangered, threatened, or protected (ETP) species in Honduras; these include critically endangered species such as the staghorn coral (*Acropora cervicornis*) (Crabbe et al. 2022). Corals and other biogenic habitats are assumed to have a high vulnerability, so they are deemed a high concern" for abundance.

Factor 2.2 - Fishing Mortality

Caribbean Sea | Atlantic, Western Central | Traps | Honduras

Low Concern

In general, lobster traps in the Caribbean region have been found to significantly reduce live coral cover and to damage coral, sponges, and gorgonians in reef habitats and seagrasses (Sheridan et al. 2005){Uhrin et al. 2005}(Lewis et al. 2009). Hurricanes and winter storms cause traps to move over corals, and this causes the greatest impact (Lewis et al. 2009). Ghost traps, which subsequently fragment, may constitute up to one-third of marine debris on reefs, further contributing to the damage of marine communities (Chiappone et al. 2005).

But in Honduras, traps are typically set in the vicinity of corals—not in direct contact with them, which would damage the fishing gear (Hervás 2017). Therefore, utilizing the Seafood Watch Unknown Bycatch Matrix (UBM), the impacts of the trap fishery on corals are considered a low concern.

Finfish

Factor 2.1 - Abundance

Caribbean Sea | Atlantic, Western Central | Traps | Honduras

Moderate Concern

Because there is a lack of data on finfish bycatch in the Caribbean spiny lobster fishery in Honduras, Seafood Watch automatically scores abundance of finfish a moderate concern.

Factor 2.2 - Fishing Mortality

Caribbean Sea | Atlantic, Western Central | Traps | Honduras

Low Concern

The Unknown Bycatch Matrix (UBM) has been used to determine the impact of pots on finfish, and it results in a score of 3.5. Therefore, Seafood Watch deems fishing mortality a low concern.

Grouper (unspecified)

Factor 2.1 - Abundance

Caribbean Sea | Atlantic, Western Central | Diving | Honduras
Caribbean Sea | Atlantic, Western Central | Traps | Honduras

High Concern
Although specific grouper species are not recorded, they have been known to interact with and are considered bycatch in the spiny lobster fishery (MRAG 2011a)(Taylor 2008) (pers. comm., WWF, 2018) (Hervás 2020)(Velásquez 2019). The stock statuses of grouper species are generally unknown in Honduras, although some species, such as red grouper, are listed as "Vulnerable" by the International Union for the Conservation of Nature (IUCN) (Brule et al. 2018). Because many of the potential groupers caught in spiny lobster fisheries have an unknown stock status, and these species are assumed to be of high inherent vulnerability, Seafood Watch automatically considers abundance a high concern.

Factor 2.2 - Fishing Mortality

Caribbean Sea | Atlantic, Western Central | Diving | Honduras
Caribbean Sea | Atlantic, Western Central | Traps | Honduras

Moderate Concern
Groupers may be retained in the pot fisheries (MRAG 2011a) (pers. comm., WWF, 2018) (Hervás 2020) and the dive fisheries (Taylor 2008); however, there is a lack of both species-specific information and catch data for grouper species. Therefore, fishing mortality for grouper by the fisheries is unknown. Because fishing mortality is unknown relative to reference points, Seafood Watch deems fishing mortality a moderate concern.

Snappers

Factor 2.1 - Abundance

Caribbean Sea | Atlantic, Western Central | Diving | Honduras
Caribbean Sea | Atlantic, Western Central | Traps | Honduras

High Concern
Snappers are becoming increasingly important commercial species in Honduras (Box and Canty 2011) (FAO 2011a). They have been known to interact with and are considered bycatch in the spiny lobster fisheries (pers. comm., WWF, 2018) (MRAG 2011a){Castro-Perez et al. 2018}(Hervás 2020)(Velásquez 2019). Although most of the commonly caught snapper species in Honduras are deemed "Data-Deficient" by the IUCN (e.g., dog snapper (Lindeman et al. 2016a), yellowtail snapper (Lindeman et al. 2016b), and queen snapper (Lindeman et al. 2016c)), some are considered ETP species, such as mutton snapper and lane snapper, which are both listed by the IUCN as "Near Threatened" (Lindeman et al. 2016d)(Lindeman et al. 2016e). Because many of the snappers caught in spiny lobster fisheries have an unknown stock status, and these species are assumed to be of high inherent vulnerability, Seafood Watch automatically considers abundance a high concern.

Factor 2.2 - Fishing Mortality

Caribbean Sea | Atlantic, Western Central | Diving | Honduras
Caribbean Sea | Atlantic, Western Central | Traps | Honduras

Moderate Concern
Snappers may be retained in both the spiny lobster dive and pot fisheries (Box and Canty 2011)(MRAG 2011a)(Hervás 2020); however, there is a lack of both species-specific information and catch data for snapper species. Therefore, fishing mortality for snapper by the fisheries is unknown. Because fishing mortality is unknown relative to reference points, Seafood Watch deems fishing mortality a moderate concern.

Factor 2.3 - Discard Rate/Landings

Caribbean Sea | Atlantic, Western Central | Diving | Honduras

< 100%
The free-dive and hand-harvest fisheries, including those that use casitas for lobster shelters, do not result in large numbers of nontargeted species. Even in the areas where casitas are used, animals move freely and are still harvested by hand with the use of nets and/or hooks. As a result, the Caribbean spiny lobster fishery is extremely selective and results in little incidental catch. Diving requires no bait use and is a highly selective fishing method; therefore, it receives a score of 1.

Caribbean Sea | Atlantic, Western Central | Traps | Honduras

>= 100%
Discard and bait information are not yet available for the Honduras spiny lobster fishery. Therefore, studies from other lobster trap fisheries have been used to inform discard and bait rates.

Total discard rates given by Shester and Micheli (2011) for spiny lobster trap fisheries are presented as 15%. Although this study refers to the California spiny lobster (*P. interruptus*) fishery, rather than the Caribbean spiny lobster (*P. argus*) fishery, it is possible that the rates are quite similar. This figure also includes the invertebrates that are most often returned to the water alive (Shester and Micheli 2011), although this figure can be much larger: in the Saba Bank of the Caribbean Netherlands, discards represented ≈50% of the catch (≈20 t of mixed fish were discarded out of 38 t of lobster landed in 2012) (van Gerwen 2013).

Bait species in the Caribbean countries are largely unknown, but are likely to be locally caught fish and, in some cases, curated livestock skin (pers. comm., WWF, 2023). Bait can also include juvenile lobsters (Briones-Fourzan and Lozano-Alvarez 2015). Studies from other lobster fisheries globally have shown that the volumes of bait used regularly exceed the volume of the target species landed {Harnish and Willison 2009}(Waddington and Meeuwig 2009)(SCS 2011). For one season in the Punta Abreojos and Bahia Tortugas cooperatives in Mexico, bait use was equal to approximately 4,500 to 5,000 t, while landings fluctuated around 1,500 t (SCS 2011)), which equates to >100% of the lobsters caught.

With no accurate information available from the Honduras Caribbean spiny lobster fishery, the ratio of pounds of bait used to pounds of lobster landed is assumed to be greater than 100%. Therefore, bait plus discards is scored as greater than or equal to 100%.

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	RESEARCH AND MONITORING	ENFORCEMENT	INCLUSION	SCORE
Caribbean Sea | Atlantic, Western Central | Diving | Honduras	Ineffective	Highly effective	Moderately Effective	Ineffective	Ineffective	**Red (1.000)**
Caribbean Sea | Atlantic, Western Central | Traps | Honduras	Ineffective	Moderately Effective	Moderately Effective	Ineffective	Ineffective	**Red (1.000)**

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 follow scientific 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? How successful are these management measures? To achieve a Highly Effective rating, the fishery must have no or low bycatch, 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

Caribbean Sea | Atlantic, Western Central | Diving | Honduras
Caribbean Sea | Atlantic, Western Central | Traps | Honduras

Ineffective

Management of the spiny lobster fishery in Honduras has significant challenges, including a lack of data to accurately assess the stock and severe limitations in enforcing existing regulations. The fishery has no current harvest strategy, reference points, or clear objectives.

Traditionally, there has been a lack of management measures to protect the stock (MRAG 2011a). But in 2009, OSPESCA formed agreements for the following countries under the Central American Integration System (SICA): Belize, Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, the Dominican Republic, and Panama. The "Regional Regulation of Caribbean Lobster Fishing (*P. argus*)," OSP-02-09, requires that all countries implement a Fishery Management Plan and laws that include minimum tail weights, a minimum closed season from March 1 to June 30, escape gaps in lobster traps, trap limits, and prohibition of the sale of lobster tail meat without a shell (FAO 2015a)(OSPESCA 2009). Regulations existing to protect the stock (Table 4) are compromised by illegal fishing. There is currently no estimate of illegal fishing in Honduras, although previous reports have stated that there is "systematic evidence of noncompliance with lobster regulations" (MRAG 2011b) and recent reports state that there is a "high incidence of illegal fishing activities" (Hervás 2016). Another recent study that investigated misreporting in Honduran Atlantic fisheries found large inconsistencies between the Food and Agriculture Organization (FAO) and other datasets at magnitudes of 4.8 to 10, particularly for spiny lobster (Funes et al. 2015). Poaching in the industrial lobster catch was estimated at 15% (Funes et al. 2015).

The most recent stock assessment showed that the fishery is at the limit of its maximum sustainable yield (MSY), and concluded it necessary that the fishery avoid increasing fishing effort because of the high exertion of fishing pressure on the stock (Sánchez 2021). The closed season has been attributed to reducing fishing pressure and positively affecting recruitment (CLME 2017a)(Sánchez 2021); therefore, management addresses some scientific recommendations. Nonetheless, there are many uncertainties about fishing effort and catch, which undermine the fishing mortality of the stock (Sánchez 2021). DIGEPESCA catch data did not represent the artisanal fleet's catch, because there is no official information on the number of artisanal vessels (Sánchez 2021).

Although not formally related to environmental impacts, lobster diving in Honduras presents detrimental health consequences for fishers, where "at least three out of 10 lobster fishermen become permanently disabled" (USAID 2015a).

Although some management measures are in place (e.g., those established by OSP-02-09), fishing mortality is not being controlled to a sustainable level (Sánchez 2021). Therefore, overall management effectiveness is unknown because there is a lack of data regarding the stock, there are minimal management measures, and there is potentially a high (but unknown level) of illegal fishing. Considering that management effectiveness is unknown and the most recent assessment shows that the fishery is presenting negative impacts to the stock, Seafood Watch deems the management strategy and implementation "ineffective."

Justification:

Agencies involved in fisheries management include DIGEPESCA, La Secretaría de Recursos Naturales y

Ambiente (SERNA), the Navy, and the industry, although their remits are unclear. DIGEPESCA is the most instrumental stakeholder in conserving the stock (MRAG 2011b). Currently, there is no harvest management plan in place, but the FIP intends to create a plan once current management has been reviewed. Although there is currently an advanced draft of the Spiny Lobster Management Plan for Honduras, finalization of the plan has been further delayed by the COVID-19 pandemic, political instability, and a governmental change in January 2022 (Fishery Progress 2022a).

Contrary to the beliefs that management is only successful when implemented on a regional basis and that the success of the population in a country is reliant on its neighbor's spiny lobster stock, recent research suggests that Honduras' marine reserves can directly benefit its own populations. Therefore, where suitable and sufficiently implemented management is employed, Honduras can promote both short- and long-term sustainable spiny lobster populations (Chollett et al. 2016a). But, with increasing numbers of marine reserves, care should be taken to alleviate the socioeconomic and environmental impacts caused by displacing the current fishing grounds, which poor communities rely upon so heavily (Chollett et al. 2016b).

It is likely that some species are retained in the dive fishery: grouper and snapper are the most commercially important finfish exports in Honduras (FAO 2011a), and fishers diving for lobster carry spears to catch large fish (including snapper and grouper) (Box and Canty 2011). Management measures in place to reduce the impact of the fishery on retained species include marine reserves (no catch zones of snapper and grouper in selected marine reserves; e.g., Cayos Cochinos (USAID 2015a)), and trap removal 3 days before seasonal closures (Table 4).

Table 4. Management measures in the Honduras spiny lobster fishery

Management	Management structure or measure in place
Government body	DIGEPESCA
Multispecies/Single species	Unknown
Industrial/Artisanal	Mainly industrial (FAO 2015a)
Fleet size	Industrial vessels: 121; artisanal: 20; small wooden: 25 to 30 (FAO 2015a)
Fishing method	Traps (30%), SCUBA diving with hook (70%) (FAO 2015a)
Quota	No (FAO 2015a)
Size limit (length)	140 mm tail length, 5 oz weight (FAO 2015a)
Closed season	March 1 to June 30 (FAO 2015a)
Closed season length	4 months (FAO 2015a)
Berried females prohibition	Yes (FAO 2017b)
Molting lobsters prohibition	Yes (FAO 2017b)
Other handling laws	Inventory of stock 3 days after start of closed season (FAO 2015a)
SCUBA prohibition	No (FAO 2015a)
Licenses limit	Yes (FAO 2015a)
Escape gap in traps	Yes (FAO 2015a)
Gear regulations	2,500 traps per boat limit. Traps must be removed from the water before season closure (FAO 2015a)
Other	Marine Protected Areas (MPAs) (MRAG 2011b) where no industrial fishing is permitted. Maximum 35 divers/boat (FAO 2017b)
Level of Illegal, Unregulated, and Unreported (IUU) fishing	No estimates available

Factor 3.2 - Bycatch Strategy

Caribbean Sea | Atlantic, Western Central | Diving | Honduras

Highly effective

There is no quantitative bycatch data available in the spiny lobster dive fishery; however, other species such as grouper have been recorded as secondary harvest in the spiny lobster dive fisheries in Utila, Honduras (Taylor 2008). Nevertheless, the potential secondary species harvested in the fishery likely result in minimal incidental catch (MRAG 2011a) (Hervás 2016). Where minimal bycatch catch occurs, there is less of a requirement for bycatch management. There are few national management measures in place to reduce the impact of the spiny lobster fishery on bycatch and ETP species, such as no-catch zones of snapper and grouper in selected marine reserves (e.g., Cayos Cochinos) (USAID 2015a). Because there is likely to be quite low bycatch and there are likely to be minimal interactions with ETP species, Seafood Watch deems the bycatch strategy highly effective.

Caribbean Sea | Atlantic, Western Central | Traps | Honduras

Moderately Effective

Stakeholder perceptions show that the impact of the fishery on bycatch species and ETP species is minor, although channel-clinging crabs (*Mithrax spinossisimus*) and some finfish species are likely to be caught (Hervás 2016)(MRAG 2011a). But, there are little data regarding bycatch studies in Honduras, so it is difficult to determine if management measures are sufficient to reduce bycatch. Management measures to reduce the impact of the lobster fishery on bycatch and ETP species include marine reserves, escape vents, and trap removal 3 days before seasonal closures (see Table 4 in Factor 3.1).

Currently, no estimate is available for the number of ghost traps and their impacts in Honduras (pers. comm., WWF, 2018). But, studies by the U.S. National Oceanic and Atmospheric Administration (NOAA) suggest that annual gear loss represents 10% to 28% of gear deployed when targeting *P. argus* in the Bahamas, Brazil, Cuba, Nicaragua, Honduras, and the United States (Scheld et al. 2016). The impact of ghost fishing may be reduced, because DIGEPESCA requires that traps be removed from the water at the end of the lobster fishing season (Table 4).

Some management measures have been implemented to reduce the risk of ghost fishing and of interactions with bycatch and ETP species. But without bycatch studies, it is difficult to determine if management measures are effective at reducing the spiny lobster fishery's impact on bycatch species. Therefore, the bycatch strategy in Honduras is deemed moderately effective.

Factor 3.3 - Scientific Research And Monitoring

Caribbean Sea | Atlantic, Western Central | Diving | Honduras
Caribbean Sea | Atlantic, Western Central | Traps | Honduras

Moderately Effective

The most recent binational (Honduras–Nicaragua) stock assessment of Caribbean spiny lobster was conducted in 2021 utilizing data from 10 fishing seasons (from 2010–11 to 2019–20) (Sánchez 2021). The assessment applied the methodology outlined in the Regional Management Plan for the Caribbean spiny lobster fishery (MARPLESCA Plan), which was developed by OSPESCA and approved in 2018. Because the Honduran authorities do not routinely produce fishery statistics for spiny lobster, obtaining the database necessary for the model (e.g., commercial landings data) presented various difficulties as a result of the lack of a systematic program in place for fisheries statistical monitoring through DIGEPESCA (Sánchez 2021). Biological reference points (BRPs) have yet to be defined to determine population status; therefore,

data-limited indicators were utilized to conduct the assessment. There are uncertainties in the data that further limit the accuracy of the stock assessment in Honduras. DIGEPESCA catch data did not represent the artisanal fleet's catch, because there is no official information on the number of artisanal vessels (Sánchez 2021). Although data collection has relatively improved through a mandatory vessel monitoring system (VMS) and improved data-collection forms, only fishery-dependent data are collected and an integrated monitoring program has not yet been implemented (Fishery Progress 2022c).

Bycatch and interactions with ETP species are considered to be low in both the trap and dive fisheries (Hervás 2016); therefore, a relatively low amount of bycatch monitoring is required. But, there is a lack of bycatch studies and observer studies in place to confirm that bycatch rates are low, and there have been no studies conducted about ghost traps (pers. comm., WWF, 2018) (Fishery Progress 2022b). As of the 2017–18 lobster season, logbooks incorporate a column to address and quantify bycatch species, but no studies have been conducted to date, so this addition has yet to be proved effective (Fishery Progress 2022b)(Fishery Progress 2022c). A study has estimated the potential risk of the trap fishery on the habitat, but further empirical data are required to determine the true impact (Hervás 2017). In addition, the scale of IUU fishing in the spiny lobster fishery has yet to be studied or quantified, though there are milestones in the FIP to address this information gap that have yet to be completed. Since 2010, DIGEPESCA has required that most industrial vessels use a VMS and a Control and Satellite Monitoring Unit; however, it is unknown if this has improved the monitoring of IUU fishing (MRAG 2011b).

Although the Honduras fishery is data-limited, studies have been conducted to reduce the data gaps (Sánchez 2021). There are uncertainties associated with the most recent stock assessment, but there are ongoing efforts to address them (Sánchez 2021)(Fishery Progress 2022b). Because some data related to stock abundance and health are collected and analyzed, and appropriate data-limited assessment methods and management strategies are used, Seafood Watch deems scientific research and monitoring moderately effective.

Factor 3.4 - Enforcement Of Management Regulations

Caribbean Sea | Atlantic, Western Central | Diving | Honduras
Caribbean Sea | Atlantic, Western Central | Traps | Honduras

Ineffective

Honduras has a weak monitoring, control, and surveillance program, which is attributed to a lack of resources, lack of government control on the size of the fishery, overcapitalization of the fishery, and commercialization of illegal lobster (MRAG 2011b)(Fishery Progress 2022d). Existing enforcement methods are undermined by IUU fishing and poor compliance rates (MRAG 2011b) and there is a "high incidence of illegal fishing activities" (Hervás 2016). There are no current estimates for IUU fishing (National Fish and Wildlife Foundation 2015)(Fishery Progress 2022d), but poaching in the industrial lobster fishery has been estimated at 15% (Funes et al. 2015), and in 2001, an FAO report suggested that up to 60% of landings in some areas are juveniles (Buesa 2018).

Management measures that are consistently violated include the catch of juveniles and berried females, the legislated number of traps per boat, decompression accidents, and the implementation of MPAs (FAO 2011a)(El Heraldo 2013)(Sosa-Cordero 2010)(US Department of Justice 2011). A satellite monitoring system implemented in 2010 by the Control and Satellite Monitoring Unit in DIGEPESCA is expected to alleviate enforcement issues, where a Geographic Information System (GIS) and a Fishing Vessel Monitoring of Honduras (SIGMEPH) will be used as a surveillance tool to monitor fishing practices (Fishery

Progress 2022d). This will likely improve issues with illegal fishing, but a monitoring, compliance, and surveillance assessment is yet to be completed by the FIP (Fishery Progress 2022d). In the 2018 fishing season, DIGEPESCA began to conduct surveillance at sea using patrol vessels with Fuerza Naval Honduras naval officers and began to conduct inspections at the main industrial landing ports, on motherships, and at the major lobster marketing establishments during the closed season (Fishery Progress 2022d). DIGEPESCA is also providing further training for naval officers (Fishery Progress 2022d). But, no studies have been conducted to test the efficacy of these improvement actions. In addition, many improvement tasks have yet to be started in the FIP because of issues caused by the COVID-19 pandemic, political instability, and recent governmental changes (Fishery Progress 2022d).

In both Honduras and Nicaragua, processing exporting plants and fisheries have collaborated recently to standardize producer identification, registration details, and lobster transfer regulations (Sánchez 2021). This enables increased traceability, sanitary standards, monitoring, and enforcement, and thus reduces the likelihood of IUU lobster entering foreign markets (FAO 2015a). But, no studies have been conducted to date to test the efficacy of these actions on IUU fishing. During the FIP, there has been some effort to determine the scale of illegal fishing and a proposal of long-term plans to monitor and minimize illegal fishing of spiny lobster. This includes implementing the Interinstitutional Committee against Illegal, Unreported and Unregulated Fishery to strengthen institutional cooperation (Fishery Progress 2022d). The committee is coordinated by DIGEPESCA, which combines the General Directorate of the Merchant Marine, the Navy, and related nongovernmental organizations (NGOs) (Fishery Progress 2022d). Despite VMS being implemented on most industrial vessels with a "Satellite Monitoring Unit" through DIGEPESCA since 2010, illegal fishing continues because enforcement activities are not fully effective (MRAG 2011a)(FAO 2015a). For example, where licensing is permitted, small-scale fishers cannot afford them, so there are few entry requirements to the fishery.

Illegal fishing is a considerable issue in the fishery, it has not been quantified, and recent management has not proved effective at reducing IUU fishing; therefore, Seafood Watch deems enforcement ineffective.

Factor 3.5 - Stakeholder Inclusion

Caribbean Sea | Atlantic, Western Central | Diving | Honduras
Caribbean Sea | Atlantic, Western Central | Traps | Honduras

Ineffective

Stakeholder inclusion has improved throughout the FIP; however, there are significant issues with multistakeholder decision-making. At the beginning of the FIP, no formal procedures were implemented to ensure that stakeholders had the opportunity to engage in the consultation process (MRAG 2011b)(Fishery Progress 2022e). The FIP pre-assessment concluded that the consultation process is not transparent (MRAG 2011a). Fishers and exporters have made progress in standardizing processes (relating to traceability and sanitary standards in the processing and exporting sector, monitoring of lobster products, and reducing the level of IUU throughout the lobster industry) (FAO 2015a). Because the harvest control rules have not yet been produced, there is little evidence to suggest that stakeholder inclusion has improved, but Hervás (2016) suggests that this is an important objective in the FIP (Hervás 2016).

The new Fisheries and Aquaculture Law requires that a consultation process must be developed, and has established the institutional advisory and coordination body Consejo Nacional de Pesca y Acuicultura (CONAPESCA) and an Advisory Committee (which includes representatives from the fisheries and aquaculture sectors) (La Gaceta 2017)(Fishery Progress 2022e). But, to date, this is the only improvement

action that has been completed, and many other actions (e.g., establishment of a stakeholder working group, implementation of a Consultative Committee to improve transparency) have been delayed by issues related to the COVID-19 pandemic, political instability, and governmental changes (Fishery Progress 2022e).

Because of the lack of formal involvement of a mixture of stakeholders in the decision-making process, stakeholder inclusion is deemed ineffective.

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	SCORE
Caribbean Sea | Atlantic, Western Central | Diving | Honduras	Score: 4	Score: 0	Moderate Concern	**Green (3.464)**
Caribbean Sea | Atlantic, Western Central | Traps | Honduras	Score: 2	Score: 0	Moderate Concern	**Yellow (2.449)**

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 - Impact of Fishing Gear on the Habitat/Substrate

Caribbean Sea | Atlantic, Western Central | Diving | Honduras

Score: 4

Little to no adverse direct effects on the habitat are expected in the lobster dive fishery. But, in the queen conch fishery, which would present similar effects on the habitat to those of the spiny lobster fishery, possible negative indirect effects were found that were caused by anchoring boats that carry the divers to and from the reef (CFMC 2014). Because there is some, but quite little, habitat damage caused by the spiny lobster fishery, Seafood Watch scores the impact of gear on the habitat a 4.

Caribbean Sea | Atlantic, Western Central | Traps | Honduras

Score: 2

Spiny lobster is generally found on rocky substrates and reefs, or wherever protection and shelter can be found (Holthuis 1991). As a result, traps are deployed in a variety of habitats including rocky reefs. A recent consequence scale analysis (CSA) estimated that the level of interaction between traps and coral reefs is not high; however, there is a high level of fishing effort, so the spatial impact is considered an important risk in the fishery (Hervás 2017). The CSA estimated that the impact of traps on coral reefs in coastal areas at depths of less than 25 m and in the interior continental shelf at depths between 25 and 100 m was a low risk and a medium risk, respectively (Hervás 2017). The impact of traps on seagrass habitats was estimated to be low (Hervás 2017). Because the Honduras spiny lobster trap fishery can place traps on reefs, the fishery receives a score of 2.

Factor 4.2 - Modifying Factor: Mitigation of Gear Impacts

Caribbean Sea | Atlantic, Western Central | Diving | Honduras
Caribbean Sea | Atlantic, Western Central | Traps | Honduras

Score: 0

Little data are available regarding the impact of traps on habitat in Honduras. In Honduras, only 3.3% of its territorial area is covered by marine protected areas (MPAs) (World Bank 2015). Some management measures are in place to reduce the impacts of traps on the seabed. OSPESCA requires escape gaps on traps and trap limits; vessels must be licensed, there are closed areas (see Table 4 in Factor 3.1), and there is a VMS to track vessels. But, these measures are not adequately enforced, there is a high level of IUU fishing, and there is little evidence to prove the efficacy of measures in place (Hervás 2016)(MRAG 2011b). To further mitigate the impact of the trap fishery on sensitive habitats, the CSA study recommended that the fishery could use traps that pose a reduced risk to the ecosystem (such as biodegradable pots), gear marking, and reducing ghost fishing (Hervás 2017). The study also recommended that monitoring programs should accompany these mitigation measures, along with studies to determine the distribution of corals (Hervás 2017). But, per the FIP, the implementation of these mitigation measures on habitat impacts has been delayed by issues related to the COVID-19 pandemic, political instability, and recent governmental changes (Fishery Progress 2022f). Therefore, the fisheries receive a score of 0 as a modifying factor for mitigation of gear impacts.

Factor 4.3 - Ecosystem-based Fisheries Management

Caribbean Sea | Atlantic, Western Central | Diving | Honduras
Caribbean Sea | Atlantic, Western Central | Traps | Honduras

Moderate Concern
The ecological role of spiny lobsters has not been studied; therefore, the impacts of the spiny lobster fishery on the ecosystem are largely unknown. Fishing mortality relative to reference points is unknown, which increases the uncertainty regarding the impact of removal (Higgs 2016)(Sánchez 2021)(Fishery Progress 2022a). A scale intensity consequence analysis (SICA) was conducted in 2020 to assess the risk of the impact of the fishery on the ecosystem (Hervás 2020). The high fishing effort exerted on the lobster resource was found to have potential negative impacts on trophic structure—not only from the number of lobsters removed, but also by landing both lobsters below the legal minimum size and berried females (Hervás 2020). Also, impacts on the ecosystem could include discarding and abandoning traps at sea, potentially causing negative impacts to corals and other species (Hervás 2020). Overall, the monitoring of the lobster fishery and the impact of mitigation measures must improve to lessen its impact on the ecosystem. It is intended that the results and recommendations for improvement will be considered in the Honduras Lobster Management Plan, which has yet to be completed (Hervás 2020)(Fishery Progress 2022g).

The ecological role of spiny lobsters is poorly understood, and the high intensive fishing effort exerted on the stock, exacerbated by issues with IUU fishing, could have negative impacts on the trophic structure (Hervás 2020)(Sánchez 2021). There is a general lack of spatial management to mitigate the risk to the ecosystem, to account for capture species' ecological roles, and to reduce the risk of invasive species (e.g., lionfish), but detrimental food web impacts are not likely. Therefore, Seafood Watch deems ecosystem-based fisheries management a moderate concern.

Justification:
There is a lack of data to determine the impacts of lobster fishing in Honduras; however, other Caribbean spiny lobster fisheries show that ghost fishing negatively affects both the stock and other species. For example, in Florida, spiny lobster ghost traps have caused an average mortality of 630,000 spiny lobsters per year (Butler and Mathews 2015). Traps in Florida are now required to have a degradable wooden panel to reduce the risk of ghost fishing on other species and habitats (Briones-Fourzan and Lozano-Alvarez 2015).

Recent research into spiny lobster genetics shows that high connectivity exists among Caribbean spiny lobster stocks. This is particularly evident in the Honduras–Nicaragua stock (Hervás 2016) (Sánchez 2021). Therefore, suitable management is required throughout the region to ensure that the whole stock is maintained (Truelove et al. 2015a)(Truelove et al. 2015b). Because of the stock's connectivity, there have been improvements in transboundary management throughout Caribbean countries: the Caribbean Large Marine Ecosystem Project (CLME) strategy aspires to enhance governance systems for an ecosystem approach in the spiny lobster fisheries. Involved countries have shown improvements in data collection and stock assessments, although recommendations have focused on improving management practices and creating regional standardized assessments through national fishery organizations such as OSPESCA, the Caribbean Regional Fishery Mechanism (CRFM), and WECAFC (FAO 2015b)(FAO 2019).

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Scientific review does 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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Appendix A: Updates to the Honduras Caribbean Spiny Lobster Report

Updates to the December 19, 2018 Honduras Caribbean Spiny Lobster Report were made on May 3, 2023:

The Overall Recommendation for Caribbean spiny lobster caught by pots and diving in Honduras remains unchanged, but one update was made to an individual factor:

- Snappers, in Factor 2.2 (Impacts on Other Capture Species; Fishing Mortality), were downgraded from a low concern to moderate concern for Caribbean spiny lobster caught with traps and diving, because species of snapper are known to be caught in the fisheries. Therefore, the factor is scored per Table 1.2.1 rather than the Unknown Bycatch Matrix in version 3 of the Seafood Watch Fisheries Standard.

Appendix B: Rating Review Summary Table

Criteria	Previous Report (2018; Pots & Diving)	Current Review (2023; Pots & Diving)
Who conducted the stock assessment?	National Fish and Wildlife Foundation; CLME	INPESCA/DIGEPESCA/WWF
When was the stock assessment conducted?	2015	2021
Where/what are the catch composition data source(s)?	Stakeholder correspondence from the FIP and third-party studies	Same as previous
Who manages the fishery?	DIGEPESCA	Same as previous
What is the date of the published management plan?	N/A	Same as previous
Are there any amendments?	N/A	Same as previous