This figure includes the invertebrates that are most often returned to the water alive (Shester and Micheli 2011), though this figure can be much larger: in the Saba Bank, 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).

Studies from other lobster fisheries globally have shown that 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 1500 t (SCS 2011)), which equates to >100% of lobsters caught.

With no accurate information available from the Caribbean spiny lobster fishery, the ratio of pounds of bait used to pounds of lobster landed is assumed to be greater than 100%.

Justification:

Bait species in the Caribbean countries are largely unknown, but are likely to be locally caught fish and, in some cases, terrestrial animal carcasses (pers. comm., anonymous). Bait can also include juvenile lobsters (Briones-Fourzan and Lozano-Alvarez 2015).

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.

Criterion 3 Summary

Fishery	Management Strategy	Bycatch Strategy	Research and Monitoring	Enforcement	Stakeholder Inclusion	Score
Fishery 1: Honduras / Caribbean Sea | Diving | Honduras	Ineffective	Highly Effective	NA	NA	NA	Red (1.000)
Fishery 2: Honduras / Caribbean Sea | Pots | Honduras	Ineffective	Moderately Effective	NA	NA	NA	Red (1.000)

The main issues with the Honduras spiny lobster fishery are lack of data and the potential of "high incidence of illegal fishing activities," although management of the spiny lobster fishery in Honduras has been improving recently, particularly with implementation of the FIP and increased regional management.

Management in the past has not been wholly effective at maintaining a stable, abundant population. However, the last published stock assessment and preliminary stock assessment show improvements in the stock {National Fish and Wildlife Foundation 2015} {CLME 2017a} attributed to closed seasons {CLME 2017a}. Despite this, there remain significant data gaps, which undermine understanding regarding the state of the stock and

management measures {CLME 2017a} {Hervas 2016}, in particular, the level of illegal fishing and data from the artisanal fleet {CLME 2017a}.

Traditionally there has been a lack of management measures to protect the stock {MRAG 2011a}. However, in 2009, OSPESCA formed agreements for the following countries under 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 including minimum tail weights, a minimum closed season from 1 March to 30 June, escape gaps in lobster traps, trap limits, and prohibit sale of lobster tail meat without a shell {FAO 2015a}. There is no harvest management plan in place, but the FIP intends to create a plan once current management has been reviewed and the Honduras-Nicaragua stock assessment has been conducted {Fishery Progress 2018c}.

Table 2. Management measures per country

MANAGEMENT	MANAGEMENT STRUCTURE OR MEASURE IN PLACE
Gov. body	DIGEPESCA
Multi/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	1 March to 30 June {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 three 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. Max 35 divers/boat {FAO 2017b}
Level of Illegal, Unregulated and Unreported (IUU) fishing	No estimates available

Criterion 3 Assessment

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.

HONDURAS / CARIBBEAN SEA, DIVING, HONDURAS
HONDURAS / CARIBBEAN SEA, POTS, 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. Regulations existing to protect the stock (Table 2) are compromised by illegal fishing. There is currently no estimate of illegal fishing in Honduras, though previous reports have stated that there is "systematic evidence of non-compliance with lobster regulations" (MRAG 2011b) and recent reports state that there is a "high incidence of illegal fishing activities" (Hervas 2016). Another recent study investigating misreporting in Honduran Atlantic fisheries found large inconsistencies between the Food and Agriculture Organization (FAO) and other datasets with magnitudes of 4.8 to 10, particularly for spiny lobster. Poaching in the industrial lobster catch was estimated at 15% (Funes et al. 2015).

The last stock assessment (National Fish and Wildlife Foundation 2015), and a newer preliminary model (which includes recent biological and fishing data), conclude that fishing pressure should be reduced (CLME 2017a). The closed season has been attributed to reducing fishing pressure, and positively effecting recruitment (CLME 2017a); therefore, management addresses some scientific recommendations. Nonetheless, there are many uncertainties about fishing effort and catch, which undermine the fishing mortality of the stock (National Fish and Wildlife Foundation 2015) (CLME 2017a).

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).

Management effectiveness is unknown as there is a lack of data regarding the stock, there are minimal management measures in place, and there is potentially a high (but unknown level) of illegal fishing. Since there is little management for the stock, management effectiveness is unknown, but the most recent assessments show that the stock is not presenting negative impacts to the stock, Seafood Watch deems the management strategy and implementation as "ineffective."

Justification:

Agencies involved in fisheries management include DIGEPESCA, La Secretaría de Recursos Naturales y Ambiente (SERNA), the Navy, and the Industry, though their remits are unclear. DIGEPESCA is the most instrumental stakeholder in conserving the stock (MRAG 2011b). It is believed that import regulations in the US prohibit much of the illegally-sourced lobsters entering the US. There is currently no conclusive evidence to support this; however, it is possible that the implementation of the Seafood Import Monitoring Program (SIMP) in the US (NOAA 2016) will improve this.

Currently, there is no harvest management plan in place, but the FIP intends to create a plan once current management has been reviewed and the Honduras-Nicaragua stock assessment has been conducted (Fishery Progress 2018c).

Management in the past has not been wholly effective at maintaining a stable, abundant population. The last stock assessment in 2015 showed positive biomass trends, but the stock was undergoing overfishing (National Fish and Wildlife Foundation 2015). Hervas (2016) recommended that the stock assessment is conducted at a regional level. This is particularly important with Nicaragua as the Honduran and Nicaraguan stock are connected (Hervas 2016) (CLME 2017a). Therefore, a preliminary updated stock assessment has shown reductions in estimated fishing mortality, attributable to closed seasons (CLME 2017a). This has resulted in improved recruitment (CLME 2017a). Despite this, there remains significant data gaps that undermine the understanding regarding the state of the stock and management measures (CLME 2017a) (Hervas 2016), in particular, the level of illegal fishing and data from the artisanal fleet (CLME 2017a).

Contrary to the belief 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). However, with increasing numbers of marine reserves, care should be taken to alleviate the socio-economic and environmental impacts caused by displacing the current fishing grounds, which poor communities so heavily rely upon. (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 three days prior to seasonal closures (Table 2).

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.

HONDURAS / CARIBBEAN SEA, DIVING, HONDURAS

Highly Effective

There is no quantitative bycatch data available: bycatch is known to occur; for example, grouper have been recorded as bycatch in spiny lobster dive fisheries in Utila, Honduras (Taylor 2008), but likely result in minimal incidental catch (MRAG 2011a) (Hervas 2016).

Where minimal catch occurs, there is less of a requirement for bycatch management. However, there are very few national management measures in place to reduce the impact of the lobster fishery on bycatch and ETP species. There are some regional measures, such as no catch zones of snapper and grouper in selected marine reserves, e.g., Cayos Cochinos (USAID 2015a); however, there is very little information to show that these measures are effective.

Since there is likely to be very low bycatch and interactions with ETP species, Seafood Watch deems the bycatch strategy as "highly effective."

HONDURAS / CARIBBEAN SEA, POTS, HONDURAS

Moderately Effective

Stakeholder perceptions show that the impact of the fishery on bycatch species and ETP species is minor, although king crabs and some finfish species are likely to be caught (Hervas 2016) (MRAG 2011a). However, there are very little data regarding bycatch studies in Honduras and it is therefore 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 three days prior to seasonal closures (Table 2).

Currently, no estimate is available for the number of ghost traps and their impacts in Honduras (pers. comm. WWF 2018). However, NOAA studies 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 US (Scheld et al. 2016). The impact of ghost fishing may be reduced, since DIGEPESCA require that traps are removed from the water at the end of the lobster fishing season (Table 2).

Some management measures have been implemented to reduce the risk of ghost fishing and interactions with bycatch and ETP species. However, 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 as "moderately effective."

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.

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

Region / Method	Gear Type and Substrate	Mitigation of Gear Impacts	EBFM	Score
Honduras / Caribbean Sea / Pots / Honduras	2	0	Moderate Concern	Yellow (2.449)
Honduras / Caribbean Sea / Diving / Honduras	4	0	Moderate Concern	Green (3.464)

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

HONDURAS / CARIBBEAN SEA, DIVING, HONDURAS

4

In the diving fishery, there is very little or no habitat damage; therefore, a score of 4 is provided to this fishery. In the queen conch fishery, which would present similar effects on the habitat, possible indirect e□ects of anchoring boats that carry the divers/snorkelers to and from the reef were found (CFMC 2014). According to the Caribbean Fishery Management Council (CFMC) (2014, p. 113), the queen conch harvest "is expected to have little to no adverse direct e□ects on the physical environment in general, including *Acropora* species and their designated critical habitat."

HONDURAS / CARIBBEAN SEA, POTS, HONDURAS

2

In Honduras, the spiny lobsters are caught using traps or through hand diving. Spiny lobster is generally found o or wherever protection and shelter can be found (Holthuis 1991). As such, traps and casitas are deployed in a va rocky reefs.

The recent CSA study estimated that the level of interaction between pots and coral reefs "is not high"; however fishing effort; therefore, the spatial impact is considered an important risk in the fishery. The CSA study estimate coral reefs on coastal areas at depths of less than 25 m, and interior continental shelf at depths between 25 and
a low and medium risk, respectively. The impact of traps on seagrass habitats was estimated to be low (Hervas

Since traps can be placed on reefs, Seafood Watch deems physical impact on the habitat a score of 2.

Factor 4.2 - Modifying Factor: Mitigation of Gear Impacts

HONDURAS / CARIBBEAN SEA, DIVING, HONDURAS
HONDURAS / CARIBBEAN SEA, POTS, HONDURAS

0

Very 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 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 (Table 2), and a VMS system to track vessels. However, these measures aren't adequately enforced, there is a high level of IUU fishing, and little evidence to prove the efficacy of measures in place (Hervas 2016) (MRAG 2011b). Therefore, Seafood Watch deems that there be mitigation (a score of 0).

Justification:

To further mitigate the impact of the pot fishery on sensitive habitats, the CSA study recommended that the fishery could use pots that pose a reduced risk to the ecosystem; for example, biodegradable pots, gear marking, and reducing ghost fishing. The study also recommended that monitoring programs should accompany these mitigation measures, along with studies to determine the distribution of corals (Hervas 2017).

Factor 4.3 - Ecosystem-Based Fisheries Management

HONDURAS / CARIBBEAN SEA, DIVING, HONDURAS
HONDURAS / CARIBBEAN SEA, POTS, 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 unknown. Fishing mortality, relative to reference points, is unknown, which increases uncertainty regarding the impact of removal (Higgs 2016). There are insufficient bycatch studies to determine whether exceptional species are caught in the Honduras spiny lobster fishery.

Ecosystem impacts are likely to extend to coral reefs/sensitive habitats, the effects of ghost fishing on habitats and other species, and the volume of lobster removed from the ecosystem.

The ecological role of spiny lobsters is poorly understood and there are some indications that the stock is overfished, exacerbated by issues with IUU fishing. Therefore, the impact of the spiny lobster fishery on the ecosystem is largely unknown and requires study. There is a general lack of spatial management to mitigate the risk to the ecosystem, account for capture species' ecological role, and reduce the risk of invasive species (lionfish), but detrimental food web impacts are not likely. Therefore, Seafood Watch deems Ecosystem-based fisheries management as 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 impacts 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 show that high connectivity exists among Caribbean spiny lobster stocks. This is particularly evident in the Honduras-Nicaraguan stock (Hervas 2016). Therefore, suitable management is required throughout the region to ensure that the whole stock is maintained (Truelove et al. 2015a) (Truelove et al. 2015b). Due to the stock's connectivity, there have been recent 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, though 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).

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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: Extra By Catch Species

SNAPPERS

Factor 2.1 - Abundance

HONDURAS / CARIBBEAN SEA, DIVING, HONDURAS
HONDURAS / CARIBBEAN SEA, POTS, HONDURAS

High Concern

Though species-specific data of snapper bycatch in spiny lobster fisheries are not yet available in Honduras, snapper are considered bycatch in the lobster fisheries (pers. comm., WWF 2018) (MRAG 2011a) (Castro-Perez et al. 2018) and they are increasingly becoming commercially-important species in Honduras (Box and Canty 2011) (FAO 2011a).

Many of the commonly caught snapper species in Honduras (Box and Canty 2011) are deemed data-deficient (e.g.,(Lindeman et al. 2016a) (Lindeman et al. 2016b) (Lindeman et al. 2016c)); however, ETP species can be caught. For example, the status of mutton snapper is "near threatened" (Lindeman et al. 2016d).

Since ETP snapper species may be caught in the lobster fishery, Seafood Watch deems abundance as a "high" concern.

Factor 2.2 - Fishing Mortality

HONDURAS / CARIBBEAN SEA, DIVING, HONDURAS
HONDURAS / CARIBBEAN SEA, POTS, HONDURAS

Low Concern

Snappers may be retained in both the lobster dive and pot fisheries (Box and Canty 2011) (MRAG 2011a). In the absence of fishery specific impacts to this group, the Unknown Bycatch Matrix has been used, which determines the impact of trap and dive fisheries on finfish as a "low" concern.

Factor 2.3 - Discard Rate

HONDURAS / CARIBBEAN SEA, 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 non-targeted species. Even in the areas in which 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 very little incidental catch. Diving requires no bait use and is a very selective fishing method; therefore it receives a factor score of 1.

HONDURAS / CARIBBEAN SEA, POTS, 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%. This figure includes the invertebrates that are most often returned to the water alive (Shester and Micheli 2011), though this figure can be much larger: in the Saba Bank, 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).

Studies from other lobster fisheries globally have shown that 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 1500 t (SCS 2011)), which equates to >100% of lobsters caught.

With no accurate information available from the Caribbean spiny lobster fishery, the ratio of pounds of bait used to pounds of lobster landed is assumed to be greater than 100%.

Justification:

Bait species in the Caribbean countries are largely unknown, but are likely to be locally caught fish and, in some cases, terrestrial animal carcasses (pers. comm., anonymous). Bait can also include juvenile lobsters (Briones-Fourzan and Lozano-Alvarez 2015).

BENTHIC INVERTS

Factor 2.1 - Abundance

HONDURAS / CARIBBEAN SEA, POTS, HONDURAS

Moderate Concern

The status of the populations of finfish and invertebrates caught by the spiny lobster fishery is of "moderate" conservation concern due to the unknown factors surrounding this bycatch group.

Factor 2.2 - Fishing Mortality

HONDURAS / CARIBBEAN SEA, POTS, HONDURAS

Low Concern

Fishing mortality on the unknown invertebrate species is unknown and therefore, is deemed as “low” concern.

Factor 2.3 - Discard Rate

HONDURAS / CARIBBEAN SEA, POTS, 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%. This figure includes the invertebrates that are most often returned to the water alive (Shester and Micheli 2011), though this figure can be much larger: in the Saba Bank, 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).

Studies from other lobster fisheries globally have shown that 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 1500 t (SCS 2011)), which equates to >100% of lobsters caught.

With no accurate information available from the Caribbean spiny lobster fishery, the ratio of pounds of bait used to pounds of lobster landed is assumed to be greater than 100%.

Justification:

Bait species in the Caribbean countries are largely unknown, but are likely to be locally caught fish and, in some cases, terrestrial animal carcasses (pers. comm., anonymous). Bait can also include juvenile lobsters (Briones-Fourzan and Lozano-Alvarez 2015).

CORALS AND OTHER BIOGENIC HABITATS

Factor 2.1 - Abundance

HONDURAS / CARIBBEAN SEA, POTS, HONDURAS

High Concern

Many corals are considered as ETP species in Honduras; these include critically endangered species such as the staghorn coral, *Acropora cervicornis* (Aronson et al. 2008). Corals and other biogenic habitats are assumed to have a high vulnerability and therefore, are deemed as a "high" concern.

Factor 2.2 - Fishing Mortality

HONDURAS / CARIBBEAN SEA, POTS, HONDURAS

Low Concern

According to the Unknown Bycatch Matrix, the impact of traps on corals is scored a "low" concern.

Factor 2.3 - Discard Rate

HONDURAS / CARIBBEAN SEA, POTS, 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%. This figure includes the invertebrates that are most often returned to the water alive (Shester and Micheli 2011), though this figure can be much larger: in the Saba Bank, 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).

Studies from other lobster fisheries globally have shown that 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 1500 t (SCS 2011)), which equates to >100% of lobsters caught.

With no accurate information available from the Caribbean spiny lobster fishery, the ratio of pounds of bait used to pounds of lobster landed is assumed to be greater than 100%.

Justification:

Bait species in the Caribbean countries are largely unknown, but are likely to be locally caught fish and, in some cases, terrestrial animal carcasses (pers. comm., anonymous). Bait can also include juvenile lobsters (Briones-Fourzan and Lozano-Alvarez 2015).

FINFISH

Factor 2.1 - Abundance

HONDURAS / CARIBBEAN SEA, POTS, HONDURAS

Moderate Concern

The status of the populations of finfish caught by the spiny lobster fishery is of "moderate" conservation concern due to the unknown factors surrounding this bycatch group.

Factor 2.2 - Fishing Mortality

HONDURAS / CARIBBEAN SEA, POTS, HONDURAS

Low Concern

The Unknown Bycatch Matrix automatically assumes that the impact of traps on finfish is a "low" concern.

Factor 2.3 - Discard Rate

HONDURAS / CARIBBEAN SEA, POTS, 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%. This figure includes the invertebrates that are most often returned to the water alive (Shester and Micheli 2011), though this figure can be much larger: in the Saba Bank, 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).

Studies from other lobster fisheries globally have shown that 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 1500 t (SCS 2011)), which equates to >100% of lobsters caught.

With no accurate information available from the Caribbean spiny lobster fishery, the ratio of pounds of bait used to pounds of lobster landed is assumed to be greater than 100%.

Justification:

Bait species in the Caribbean countries are largely unknown, but are likely to be locally caught fish and, in

some cases, terrestrial animal carcasses (pers. comm., anonymous). Bait can also include juvenile lobsters (Briones-Fourzan and Lozano-Alvarez 2015).

CHANNEL-CLINGING CRAB

Factor 2.1 - Abundance

HONDURAS / CARIBBEAN SEA, POTS, 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 data-limited indicators, the PSA scores king crab in Honduras as a medium vulnerability species. Since there is no information to determine whether the fishery is overfished and the species has a medium vulnerability, Seafood Watch deems abundance as a "moderate" concern.

Justification:

Productivity-Susceptibility Analysis

PSA score = 2.9757. For this reason, the species is deemed to have medium vulnerability (detailed scoring of each attribute is shown below).

ATTRIBUTES	RESULT	SCORE
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	~4	3
Density dependence (invertebrates only)	No density dependence suggested	2
Quality of habitat	Habitat has been moderately altered by non-fishing 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

P= ((1+2+1+2+3+2+2)/7) = 1.85714286

P^2 = 3.4489796

S = (((3 * 3 * 2 * 3) − 1)/40) + 1

S = ((54-1)/40)+1

S = 2.325

S^2 = 5.405625

V = √ (P^2 + S^2)

V = √ (3.4489796 + 5.405625) = √8.8546046

PSA score = 2.9757 = Medium Vulnerability

Factor 2.2 - Fishing Mortality

HONDURAS / CARIBBEAN SEA, POTS, HONDURAS

Moderate Concern

Since fishing mortality is unknown, Seafood Watch deems fishing mortality as a "moderate" concern.

Factor 2.3 - Discard Rate

HONDURAS / CARIBBEAN SEA, POTS, 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%. This figure includes the invertebrates that are most often returned to the water alive (Shester and Micheli 2011), though this figure can be much larger: in the Saba Bank, 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).

Studies from other lobster fisheries globally have shown that 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 1500 t (SCS 2011)), which equates to >100% of lobsters caught.

With no accurate information available from the Caribbean spiny lobster fishery, the ratio of pounds of bait used to pounds of lobster landed is assumed to be greater than 100%.

Justification:

Bait species in the Caribbean countries are largely unknown, but are likely to be locally caught fish and, in some cases, terrestrial animal carcasses (pers. comm., anonymous). Bait can also include juvenile lobsters (Briones-Fourzan and Lozano-Alvarez 2015).