California and Caribbean Spiny Lobster

*Panulirus interruptus* and *Panulirus argus*

©B. Guild Gillespie/www.chartingnature.com

**Mexico**

Traps, Casitas with Free Diving and/or Hooks

September 25, 2012
Meghan Sullivan, Consulting Researcher

**Disclaimer**

Seafood Watch® strives to ensure all our Seafood Reports and the recommendations contained therein are accurate and reflect the most up-to-date evidence available at time of publication. All our reports are peer-reviewed for accuracy and completeness by external scientists with expertise in ecology, fisheries science or aquaculture. Scientific review, however, does not constitute an endorsement of the Seafood Watch program or its recommendations on the part of the reviewing scientists. Seafood Watch is solely responsible for the conclusions reached in this report. We always welcome additional or updated data that can be used for the next revision. Seafood Watch and Seafood Reports are made possible through a grant from the David and Lucile Packard Foundation.
Final Seafood Recommendation

This report covers wild-caught California spiny lobster caught by traps and Caribbean spiny lobster caught by casitas in Mexican waters. Both species of lobster are a Best Choice.

<table>
<thead>
<tr>
<th>Stock</th>
<th>Fishery</th>
<th>Impacts on the Stock</th>
<th>Impacts on other Species</th>
<th>Management</th>
<th>Habitat and Ecosystem</th>
<th>Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Rank (Score)</td>
<td>Lowest scoring species</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>California Spiny Lobster</td>
<td>Baja California Trap</td>
<td>Green 5</td>
<td>Cormorants Yellow, 3.05, 2.29</td>
<td>Green 3.46</td>
<td>Green 3.24</td>
<td>BEST CHOICE 3.37</td>
</tr>
<tr>
<td>Caribbean Spiny Lobster</td>
<td>Quintana Roo/Yucatan Casitas</td>
<td>Yellow 2.64</td>
<td>No other main species caught Green 5,5</td>
<td>Green 4</td>
<td>Green 3.24</td>
<td>BEST CHOICE 3.62</td>
</tr>
</tbody>
</table>

Scoring note – scores range from zero to five where zero indicates very poor performance and five indicates the fishing operations have no significant impact.
# Table of Contents

Final Seafood Recommendation ................................................................................................................... 2  
Executive Summary ....................................................................................................................................... 4  
Introduction .................................................................................................................................................. 6  
Analysis ....................................................................................................................................................... 13  
  * Criterion 1: Stock for Which You Want a Recommendation ................................................................. 13  
  * Criterion 2: Impacts on other retained and bycatch stocks ................................................................. 16  
  * Criterion 3: Management Effectiveness ................................................................................................. 19  
  * Criterion 4: Impacts on the Habitat and Ecosystem ............................................................................ 23  
Overall Recommendation ........................................................................................................................... 25  
Acknowledgements ..................................................................................................................................... 26  
About Seafood Watch® ............................................................................................................................... 30  
Guiding Principles ....................................................................................................................................... 31
Executive Summary

The spiny lobster is a widely fished marine invertebrate. There are several distinct species of spiny lobster located in various areas of the world. This report will provide information and recommendations for the California spiny lobster (*Panulirus interruptus*), and the Caribbean spiny lobster (*Panulirus argus*) fished in Mexican waters. The California spiny lobster is found along the western coast of North America from Monterey, California to Manzanillo, Mexico though a small population exists in the Gulf of California. The Caribbean spiny lobster is found and fished within the Gulf of Mexico, the Caribbean Sea, and the along the coast of South America through Brazil. It should be noted that the Caribbean spiny lobster may be composed of genetically distinct stocks in the Caribbean Sea and along the Brazilian coast; however, spiny lobsters with genetic markers from each of these stocks are found within the entire range.

This report will provide recommendations for spiny lobsters fished with traps (California spiny lobster) and casitas (Caribbean spiny lobster) in Mexican waters. Spiny lobster is fished with the use of baited traps, and through free diving with aids of hooks and/or casitas as lobster shelters.

The spiny lobster (all species) has a moderate vulnerability to fishing pressure. They tend to mature fairly quickly (between 2 to 3 years), compared to their life span (approximately 20-30 years). Mature spiny lobsters tend to spawn once a year and females produce upwards of 50,000 eggs which can disperse widely. The impact of the Mexican fishery for California spiny lobster in the Pacific Ocean and the abundance of this stock are of very low conservation concern. In contrast there is moderate concern over the abundance of the Caribbean spiny lobster stock due to uncertainty over population dynamics within the Caribbean Sea. The impact of the Mexican fishery on this stock is of low conservation concern.

The Caribbean spiny lobster fishery in Mexico is a free-dive and hand-harvest fishery with the use of casitas for lobster shelter. 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. Occasionally, fishermen may capture stone crab species for domestic consumption.

The most common non-targeted species caught in the Baja California spiny lobster trap fishery include various finfish and crab species. However, the total discard rate for lobster fisheries is generally between 8% and 15%, but that includes the large number of invertebrates, for example rock crab, kelp crab and sheep crab, which are generally returned alive. As such, it is unlikely any one species comprises more than 5% of the catch. The fishery is also known to interact with cormorants although accurate information about these impacts is unavailable. Seafood Watch recognizes that undersized lobsters are likely to make up the majority of discards, but they are considered under Criterion 1 as they are part of the target species. Additionally, in the absence of a study regarding post-capture release, this analysis assumes 100% mortality for finfish and 50% mortality for invertebrates. Due to the effect of ghost...
fishing by lost traps, the incidence of capture is likely to be higher than known bycatch rates, however, as there is no species specific data on the impacts of ghost fishing in this region, and many species have been observed entering and leaving traps freely, it is not believed that any species will be impacted significantly.

Management of the spiny lobster fisheries in Mexico has been fairly effective at maintaining a relatively stable population for the more frequently captured species. Lobster populations are protected through the use of closed areas, specific seasons to protect breeding females, gear restrictions, and limited entry into the fishery. In addition, gear restrictions are designed to reduce capture of undersized lobsters and other species. Research about the stock and impacts to other species have been limited for California and Caribbean spiny lobsters. While regulations have established methods for enforcement, compliance with the regulations is generally self-enforced by members of the local cooperatives. Overall, the management of the spiny lobster fisheries in Mexico is ranked green.

The spiny lobster fisheries in Mexico are primarily trap based, but some (like the Caribbean spiny lobster fishery) are dived based and utilize casitas as shelters to attract lobsters. Traps and casitas result in some damage to the benthic habitat, but Mexico has regulations protecting important ecological areas as part of the UNESCO Biosphere Reserve Programme. The ecosystem impacts from the trap and casita based fisheries are of moderate conservation concern.
Introduction

Scope of the analysis and ensuing recommendation
The spiny lobster is a widely fished marine invertebrate. There are several distinct species of spiny lobster located in various areas of the world. This report will provide information and recommendations for the California spiny lobster (*Panulirus interruptus*), and the Caribbean spiny lobster (*Panulirus argus*) fished in Mexican waters. The California spiny lobster is found along the western coast of North America from Monterey, California to Manzanillo, Mexico, though a small population exists in the Gulf of California (CDFG 2001, Figure 1). The Caribbean spiny lobster is found and fished within the Gulf of Mexico, the Caribbean Sea, and the along the coast South America through Brazil (Holthuis 1991, Figure 4). It should be noted, the Caribbean spiny lobster may be composed of genetically distinct stocks in the Caribbean Sea and along the Brazilian coast; however, spiny lobsters with genetic markers from each of these stocks are found within the entire range (IBAMA 2008).

This report will provide recommendations for spiny lobsters fished with traps (California spiny lobster) and casitas (Caribbean spiny lobster) in Mexican waters. Spiny lobster is fished with the use of baited traps, and through free diving with aids of hooks and/or casitas as lobster shelters.

![Figure 1: Primary distribution range of the California spiny lobster. Figure from CDFG 2001](#)
Overview of the Species and Management Bodies
The spiny lobster, of the genus Panulirus, contains approximately 20 different species occurring worldwide in tropical and semitropical 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 1 to 90 meters, depending upon the species (Holthuis 1991). Juvenile lobsters usually spend their first few years in nearshore surf grass beds while adults favor rocky substrates and reefs—areas that provide protection (CDFG 2001, GMFMC et al. 2011). Spiny lobsters tend to be nocturnal and migrate among depths depending upon the season, generally moving deeper in winter months (CDFG 2001).

Several different species of spiny lobster support commercial fisheries worldwide. As previously mentioned, this report covers the spiny lobster fisheries in Mexico. The spiny lobster fisheries in Mexico (Caribbean spiny lobster in the Mexican Caribbean and Gulf of Mexico, California spiny lobster along the western coast of the Baja California Peninsula) are regulated by a Mexican Official Norm (NORM-006-PESC-1993) from CONAPESCA (National Commission for
Fisheries and Aquaculture) (SCS 2011). The main regulations include a closed season, a minimum legal size, a prohibition on the landing of berried females, restrictions on gear, and specific closed zones (SCS 2011, Briones-Fourzan and Lozano-Alvarez, 2000). The closed seasons for the various spiny lobster species vary across zones due to variations in the reproductive cycle resulting from latitudinal changes (Briones-Fourzan and Lozano-Alvarez, 2000). Additionally, the spiny lobster fisheries of Mexico are regulated through limited access rights, via concessions or permits that limit the fishing areas and the number of boats and/or traps proposed by the various fishing cooperatives. A portion of the California spiny lobster fishery (from Cedros Island, Baja California through Punta Abreojos, Baja California Sur comprising 80% of the fishery) was certified as sustainable to Marine Stewardship Council standards in 2004 and was recertified in June 2011 (SCS 2011). A small portion of the Caribbean spiny lobster fishery (captured at Bahia de la Ascension and Bahía del Espíritu Santo inside Sian Ka’an and in Banco Chinchorro in the central part of the State of Quintana Roo) was also certified as sustainable to MSC standards in July 2012 (MRAG 2012).

Production Statistics
The production statistics of the various species of spiny lobster captured in Mexico is often difficult to determine given that most government sources provided statistics for lobster (langosta) as a whole. However, CONAPESCA has provided statistics on the landings from each of the various “states” and from this information we can make assumptions about the landings for each species based on distribution. Figures 3 and 4 show the locations of each state and the landed weight of lobster from each state in 2011 (CONAPESCA 2011, Briones-Fourzan and Lozano-Alvarez 2000). Figures 5 and 6 show the trend in landings from the California spiny lobster and the Caribbean spiny lobster fisheries (SCS 2011 and MRAG 2012).
Figure 3. Map of Mexico, showing only the coastal states. Figure from Briones-Fourzan and Lozano-Alvarez 2000.
Figure 4. Landed weight (kg) of lobsters caught in each Mexican coastal state. Figure compiled from CONAPESCA 2011.
Figure 5. Capture ("Captura" in metrics tons, bars) and effort ("Esfuerzo" or number of trap-hauls, line) for California spiny lobster from the central fishing area of Baja California. Figure from SCS 2011 via Vega et al. 2010

Figure 6. Total catch for cooperatives in Quintana Roo and Yucatan. Figure from MRAG 2012
Importance to the US/North American Market
Yucatan spiny lobster fishery products are sold regionally for the tourism sector in Cancún, Playa del Carmen, Cozumel, and other markets in the Yucatán Peninsula. A small percentage is sold across Mexico and exported into the US (MRAG 2012). California spiny lobster is widely distributed throughout various Asian countries (mostly China, Taiwan, Japan and Singapore) and North America. The United States imports a little more than 2% of its spiny lobster from Mexico (NMFS 2012).

Common and Market Names
Spiny lobsters, in general, are also known as rock lobsters. While both species discussed in this report are most commonly known as spiny lobster, there are other less commonly used nomenclatures. The Caribbean spiny lobster is also known as the Bermuda spiny lobster, common spiny lobster, crawfish, Florida spiny lobster, West Indian langouste and West Indian spiny lobster (Holthuis 1991). While the California spiny lobster is also known as California lobster and red lobster (Shaw 1986).

Primary Product Forms
The spiny lobster is marketed whole and sold live, cooked, and/or frozen. Tails are frozen or canned.
Analysis

Scoring guide
- All scores result in a zero to five final score for the criterion and the overall final rank. A zero score indicates poor performance, while a score of five indicates high performance.
- The full Seafood Watch Fisheries Criteria that the following scores relate to are available on our website at www.seafoodwatch.org.

Criterion 1: Stock for Which You Want a Recommendation

Guiding Principles
- The stock is healthy and abundant. Abundance, size, sex, age and genetic structure should be maintained at levels that do not impair the long-term productivity of the stock or fulfillment of its role in the ecosystem and food web.
- Fishing mortality does not threaten populations or impede the ecological role of any marine life. Fishing mortality should be appropriate given current abundance and inherent vulnerability to fishing while accounting for scientific uncertainty, management uncertainty, and non-fishery impacts such as habitat degradation.

Summary

<table>
<thead>
<tr>
<th>Stock</th>
<th>Fishery</th>
<th>Inherent Vulnerability Rank</th>
<th>Stock Status Rank (Score)</th>
<th>Fishing Mortality Rank (Score)</th>
<th>Criterion 1 Rank Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>California Spiny Lobster</td>
<td>Baja California Trap</td>
<td>Medium</td>
<td>Very Low Concern (5)</td>
<td>Very Low Concern (5)</td>
<td>Green 5</td>
</tr>
<tr>
<td>Caribbean Spiny Lobster</td>
<td>Quintana Roo/Yucatan Casitas</td>
<td>Medium</td>
<td>Moderate Concern (3)</td>
<td>Moderate Concern (2.33)</td>
<td>Yellow 2.64</td>
</tr>
</tbody>
</table>
Justification of Ranking

*California spiny lobster*

**Factor 1.1 Inherent Vulnerability**

*Key Relevant Information: Moderate Vulnerability*

According to the Seafood Watch PSA analysis, California spiny lobster appears to be of moderate vulnerability.

**Detailed Rationale:**

<table>
<thead>
<tr>
<th>Factor</th>
<th>Score</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Age at Maturity</td>
<td>2</td>
<td>CDFG 2001, Shaw 1986</td>
</tr>
<tr>
<td>Average Maximum Age</td>
<td>2</td>
<td>CDFG 2001</td>
</tr>
<tr>
<td>Reproductive Strategy</td>
<td>2</td>
<td>SCS 2011</td>
</tr>
<tr>
<td>Density Dependence</td>
<td>-</td>
<td>Behringer and Butler 2006</td>
</tr>
<tr>
<td>Score (mean of factor scores)</td>
<td>2</td>
<td>Medium Vulnerability</td>
</tr>
</tbody>
</table>

**Factor 1.2 Stock Status**

*Key Relevant Information: Very Low Concern*

The most recent biomass assessment for the portion of the fishery located between Cedros Island, Baja California and Punta Abreojos, Baja California Sur indicated biomass is 1.5 times larger than the biomass at maximum sustainable yield (SCS 2011). The biomass for California spiny lobster in Mexico is over its optimum level (SCS 2011).

**Detailed Rationale:**

While the biomass status is based on the central population of the peninsula, it is believed to represent the entire Mexican population status as the remaining Cooperatives are only responsible for 20% of landings (SCS 2011). Based on genetics work, the entire California spiny lobster population along the Eastern Pacific is believed to be of a single stock (García-Rodriguez and Perez-Enriquez, 2006).

**Factor 1.3 Fishing Mortality**

*Key Relevant Information: Very Low Concern*

The same stock assessment that determined biomass was above MSY also found the fishing mortality to be half of $F_{MSY}$ (SCS 2011).
Caribbean spiny lobster

**Factor 1.1 Inherent Vulnerability**

**Key Relevant Information:**
According to the Seafood Watch PSA analysis, Caribbean spiny lobster has a moderate vulnerability to fishing pressure.

**Detailed Rationale:**

<table>
<thead>
<tr>
<th>Factor</th>
<th>Score</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Age at Maturity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lengths at 70-80 mm 2-3 years</td>
<td>2</td>
<td>Ehrhardt 2005</td>
</tr>
<tr>
<td>Average Maximum Age</td>
<td>2</td>
<td>Ehrhardt 2005</td>
</tr>
<tr>
<td>Reproductive Strategy</td>
<td>2</td>
<td>Ehrhardt 2005 SEDAR 2010</td>
</tr>
<tr>
<td>Density Dependence</td>
<td>-</td>
<td>Behringer and Butler 2006</td>
</tr>
<tr>
<td>Score (mean of factor scores)</td>
<td>2</td>
<td>Medium Vulnerability</td>
</tr>
</tbody>
</table>

**Factor 1.2 Stock Status**

**Key Relevant Information:** Moderate Concern
The biomass of the Caribbean spiny lobster in Mexican waters has been fairly stable over the last decade. There are concerns about the Caribbean population on the whole, with various unanswered questions related to stock recruitment dynamics (SEDAR 2010). More locally, there are concerns over differences in biomass between the local subpopulations in the north-central area of the Yucatan peninsula and those along the southern portion of the peninsula (recently certified as sustainable to the Marine Stewardship Council standard) (MRAG 2012). While the local stock appears stable, there are uncertainties due to the wider Caribbean population and the recruitment potential.

**Factor 1.3 Fishing Mortality**

**Key Relevant Information:** Moderate Concern
There is uncertainty related to the fishing mortality currently occurring within the Yucatan and Quintana Roo region, with some sources indicating that mortality is exploited around MSY (FAO 2011) and others indicating that some local populations are overexploited (Chavez 2009).
Criterion 2: Impacts on other retained and bycatch stocks

Guiding Principles

- The fishery minimizes bycatch. Seafood Watch® defines bycatch as all fisheries-related mortality or injury other than the retained catch. Examples include discards, endangered or threatened species catch, pre-catch mortality and ghost fishing. All discards, including those released alive, are considered bycatch unless there is valid scientific evidence of high post-release survival and there is no documented evidence of negative impacts at the population level.
- Fishing mortality does not threaten populations or impede the ecological role of any marine life. Fishing mortality should be appropriate given each impacted species’ abundance and productivity, accounting for scientific uncertainty, management uncertainty and non-fishery impacts such as habitat degradation.

Summary

**Baja California Trap Fishery**

<table>
<thead>
<tr>
<th>Stock</th>
<th>Inherent Vulnerability Rank</th>
<th>Stock Status Rank (Score)</th>
<th>Fishing Mortality Rank (Score)</th>
<th>Subscore</th>
<th>Score (subscore * discard modifier)</th>
<th>Rank (based on subscore)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cormorants</td>
<td>High</td>
<td>Low Concern (4)</td>
<td>Moderate Concern (2.33)</td>
<td>3.05</td>
<td>2.29 Yellow</td>
<td></td>
</tr>
<tr>
<td>Unknown Finfish</td>
<td>Medium</td>
<td>Moderate Concern (3)</td>
<td>Low Concern (3.67)</td>
<td>3.32</td>
<td>2.49 Green</td>
<td></td>
</tr>
<tr>
<td>Unknown Invertebrates</td>
<td>Medium</td>
<td>Moderate Concern (3)</td>
<td>Low Concern (3.67)</td>
<td>3.32</td>
<td>2.49 Green</td>
<td></td>
</tr>
<tr>
<td>California Spiny Lobster</td>
<td>Medium</td>
<td>Very Low Concern (5)</td>
<td>Very Low Concern (5)</td>
<td>5.00</td>
<td>3.75 Green</td>
<td></td>
</tr>
</tbody>
</table>

**Quintana Roo/Yucatan Casitas Fishery**

<table>
<thead>
<tr>
<th>Stock</th>
<th>Inherent Vulnerability Rank</th>
<th>Stock Status Rank (Score)</th>
<th>Fishing Mortality Rank (Score)</th>
<th>Subscore</th>
<th>Score (subscore * discard modifier)</th>
<th>Rank (based on subscore)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Caribbean Spiny Lobster</td>
<td>Medium</td>
<td>Moderate Concern (3)</td>
<td>Moderate Concern (2.33)</td>
<td>2.64</td>
<td>2.64 Yellow</td>
<td></td>
</tr>
<tr>
<td>No other main species caught</td>
<td></td>
<td></td>
<td></td>
<td>5.00</td>
<td>5.00 Green</td>
<td></td>
</tr>
</tbody>
</table>

The Caribbean spiny lobster fishery in Mexico is a free-dive and hand-harvest fishery with the use of casitas for lobster shelter. 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. Occasionally, fishermen may capture stone crab species for domestic consumption. The most common non-targeted species caught in the Baja California spiny lobster trap fishery include various finfish and crab species. However, the total discard rate for lobster fisheries is generally between 8% and 15%, but that includes the large number of invertebrates, for example rock crab, kelp crab and sheep crab, which are generally returned alive. As such, it is unlikely any one species comprises more than 5% of the catch. The fishery is also known to interact with cormorants (SCS 2011; Shester & Micheli 2011) although accurate information about these impacts is unavailable. Seafood Watch recognizes that undersized lobsters are likely to make up the majority of discards, but they are considered under Criterion 1 as they are part of the target species. Additionally, in the absence of a study regarding post-capture release, this analysis assumes 100% mortality for finfish and 50% mortality for invertebrates. Due to the effect of ghost fishing by lost traps, the incidence of capture is likely to be higher than known bycatch rates, however, as there are no species specific data on the impacts of ghost fishing in this region, and many species have been observed entering and leaving traps freely, it is not believed that any species will be impacted significantly.

Justification of Ranking

**Cormorants**
Three species of cormorant occur in the region, the Brandt’s, pelagic and double-crested, and there is potential to interact with the lobster fishery. As information on these interactions is poor, all the species are considered together.

**Factor 2.1 Inherent Vulnerability**

Key Relevant Information: High Vulnerability
Seabirds are considered to have a high vulnerability to fishing pressure (Seafood Watch 2012).

**Factor 2.2 Stock Status**

Key Relevant Information: Low Concern
There are no indications that there are any conservation concerns regarding the cormorant species found in the region of the spiny lobster fishery, and they are not listed as vulnerable, threatened or endangered under national or international legislation.

**Factor 2.3 Fishing Mortality**

Key Relevant Information: Moderate Concern
There is very little data surrounding the interactions of the spiny lobster fishery with cormorants in Mexico; however, there is evidence of interactions in this fishery and data is being gathered as a condition of MSC certification (SCS 2011; Shester and Micheli 2011).
**Unknown finfish and invertebrates**

**Factor 2.1 Inherent Vulnerability**

*Key Relevant Information: Moderate Vulnerability*

Finfish and invertebrates of unknown taxa and species are considered to have a moderate vulnerability to fishing pressure (Seafood Watch 2012).

**Factor 2.2 Stock Status**

*Key Relevant Information: 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 (Seafood Watch 2012).

**Factor 2.3 Fishing Mortality**

*Key Relevant Information: Low Concern*

Fishing mortality on the unknown finfish and invertebrate species is of low conservation concern (Seafood Watch 2012).

**Factor 2.4 Overall Discard Rate**

*Key Relevant Information:*

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, but does not include the bait used. Bait use is generally quite high; 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 for landings of around 1500t (SCS 2011). Currently, bait is restricted to oily fish like sardines, mackerel and bonito and obtained through a processor in Ensenada, Mexico, but in Bahía Tortugas a portion of the bait is actually mixed finfish (barred sand bass and ocean whitefish) caught locally (SCS 2011). Stock assessments are conducted for these bait species, so it is likely the bait use does not exceed biological reference points (SCS 2011). 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).
## Criterion 3: Management Effectiveness

### Guiding Principle

- The fishery is managed to sustain the long-term productivity of all impacted species. Management should be appropriate for the inherent vulnerability of affected marine life and should incorporate data sufficient to assess the affected species and manage fishing mortality to ensure little risk of depletion. Measures should be implemented and enforced to ensure that fishery mortality does not threaten the long-term productivity or ecological role of any species in the future.

### Summary

<table>
<thead>
<tr>
<th>Fishery</th>
<th>Management: Harvest Strategy</th>
<th>Management: Bycatch</th>
<th>Criterion 3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rank (Score)</td>
<td>Rank (Score)</td>
<td></td>
</tr>
<tr>
<td>Baja California Trap</td>
<td>Low Concern (4)</td>
<td>Moderate Concern (3)</td>
<td>Green 3.46</td>
</tr>
<tr>
<td>Quintana Roo/Yucatan</td>
<td>Low Concern (4)</td>
<td>All species retained (N/A)</td>
<td>Green 4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Baja California Trap</td>
<td>No</td>
<td>Highly Effective</td>
<td>Highly Effective</td>
<td>Highly Effective</td>
<td>Highly Effective</td>
<td>Highly Effective</td>
<td>Highly Effective</td>
<td>Highly Effective</td>
<td>Well-managed (4)</td>
</tr>
<tr>
<td>Quintana Roo/Yucatan Casitas</td>
<td>No</td>
<td>Highly Effective</td>
<td>Highly Effective</td>
<td>Highly Effective</td>
<td>Highly Effective</td>
<td>Highly Effective</td>
<td>Highly Effective</td>
<td>Highly Effective</td>
<td>Well-managed (4)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Baja California Trap</td>
<td>No</td>
<td>No</td>
<td>Moderately Effective</td>
<td>Moderately Effective</td>
<td>Highly Effective</td>
<td>Moderately Effective</td>
<td>Moderate (3)</td>
</tr>
<tr>
<td>Quintana Roo/Yucatan Casitas</td>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>All Species Retained (N/A)</td>
</tr>
</tbody>
</table>
Justification of Ranking

Factor 3.1 Management of Fishing Impacts on Retained Species

Key Relevant Information: Low Concern
Management of the spiny lobster fisheries in Mexico has been fairly effective at maintaining a relatively stable population for the more frequently captured species. Lobster populations are protected through the use of closed areas, specific seasons to protect breeding females, gear restrictions, and limited entry into the fishery. In addition, gear restrictions are designed to reduce capture of undersized lobsters and other species. Research about the stock and impacts to other species have been limited for California and Caribbean spiny lobsters. While regulations have established methods for enforcement of existing regulations, compliance with the regulations is generally self-enforced by members of the local cooperatives. Overall, the management of the spiny lobster fisheries in Mexico is ranked green.

Detailed Rationale:
Management Strategy and Implementation: Highly Effective
The primary agency in charge of fisheries regulation is the Secretaría de Agricultura, Ganadería, Desarrollo Rural, Pesca y Alimentación (SAGARPA). Under the SAGARPA, there are two agencies: the National Fisheries Commission (CONAPESCA) and the National Institute of Fisheries (INAPESCA). CONAPESCA is in charge of fisheries regulation and enforcement while INAPESCA provides the science for the management recommendations and fishery indicators. In addition to the management structure at the federal levels, there is local enforcement and management provided through the fishery cooperatives that maintain the majority of lobster fishing permits.

Currently, CONAPESCA regulates the fishery through a decree in the Mexican Official Norm (NOM-006-PESC-1993). This law includes the management regulations for lobster species in the Mexican Caribbean and Gulf of Mexico as well as along the Baja California peninsula and in the Gulf of California (NORM-006-PESC-1993). The law establishes minimum size limits, a regulated fishing season (ranging from early October through mid-March, depending on latitudes) to protect egg-carrying (or berried) females, gear restrictions (destruct devices and escape ports), and a limited entry system (SCS 2011, MRAG 2012).

Over the years, the Mexican Official Standard has been amended several times to better protect the lobster fishery in response to additional scientific information. To date, most changes in the management and regulations in the fishery have occurred based on economic and scientific indicators. With the past decade of fairly stable landings, there have been no significant changes in the management.

Recovery of Stocks of Concern: Highly Effective
Currently, there are no stocks of concern specifically impacted by the lobster fishery as the lobster population itself appears stable and no other species is caught in significant numbers.
**Scientific Research and Monitoring: Highly Effective**
During the last ten years, the fishery has been assessed by technical personnel from INAPESCA, which in turn provides recommendations to the CONAPESCA (SCS 2011). The latest stock assessment for the California spiny lobster, which was used in the Marine Stewardship Council’s certification process, was performed by INAPESCA staff (Vega et al. 2010). Additionally, fishery dependent data is maintained by the government.

**Scientific Advice: Highly Effective**
The various agencies have a process for incorporating the information provided by INAPESCA into the decision making process. Over the years, the Mexican Official Norm has been amended based on scientific advice provided by INAPESCA and other researchers. Changes to minimum legal sizes and seasonal closures are the result of scientific advice.

**Enforcement: Moderately Effective**
The enforcement of management regulations is carried out by the CONAPESCA. Enforcement relies mostly on local self-enforcement by the fishing cooperatives, and the eventual support of the government authorities. Some areas, like the biosphere reserve areas of Sian Ka’an and Banco Chinchorro which were recently certified as sustainable by the Marine Stewardship Council standard, do not have a significant problem with illegal fishing (MRAG 2012). Other areas are different. Despite sanctions, including dispossession of boats and gear, and/or fines, being in place, they are often applied inconsistently (MRAG 2012).

**Track Record: Highly Effective**
The California spiny lobster fishery in Mexico dates from the end of the nineteenth century, while the Caribbean spiny lobster fishery dates from the mid-1950s (Briones-Fourzan and Lozano-Alvarez 2000). Landing data shows significant increases and decreases over time, often coinciding with El Niño and La Niña events (Briones-Fourzan and Lozano-Alvarez 2000). But overall, management measures have resulted in the long-term maintenance of stock abundance and ecosystem integrity.

**Stakeholder Inclusion: Highly Effective**
The management of spiny lobster stock in Mexico is transparent and includes stakeholder input. Regulations are the result of a coordinated effort from all stakeholders, particularly local fishing cooperatives, to discuss issues and concerns at the state level. Local personnel from the Regional Center of Fisheries Research (CRIP) of the INAPESCA will pass comments to the INAPESCA headquarters, which presents final recommendations to CONAPESCA (SCS 2011). CONAPESCA will then update the Carta Nacional Pesquera (CNP, National Fisheries Charter). The CNP is a public document that contains a summary of information regarding the evaluation of fishery activity and constitutes the basis for decision making (MRAG 2012). The CPN is an instrument to make transparent the decision making process by the authority and guarantees that the national interest prevails (MRAG 2012).
Factor 3.2 Management of Fishing Impacts on Bycatch Species

Key Relevant Information:  Moderate Concern
The spiny lobster fisheries in Mexico do not have any specific regulations designed to manage and mitigate the fishing impacts on bycatch species. However, as the total discard rate for the lobster fisheries in Baja California is generally between 8% and 15% it is unlikely any one species comprises more than 5% of the catch and is significantly impacted.

Detailed Rationale:
Management Strategy and Implementation:  Moderately Effective
Currently, the CONAPESCA does not maintain any specific regulations directed at managing and mitigating the impacts on bycatch species. However, lobster traps are required to have escape openings (windows 294 mm long by 58 mm) to minimize the capture of undersize lobsters (NORM-006-PESC-1993). These escape ports can presumably allow other species to escape as well. Additionally, there are regulations regarding how long traps can remain in the water, including the removal at the end of the season to ensure traps do not continue to fish indiscriminately (NORM-006-PESC-1993). There are known interactions with a number of species, the effects of which are unknown (see Criterion 2), which should be considered by management if found to be negative. Casitas allow lobsters free movement and allow hand-picking with no problems of bycatch.

Scientific Research and Monitoring:  Moderately Effective
There is little data aside from landings records related to other retained species.

Scientific Advice:  Highly Effective
Little research has been performed about the impacts of the fishery on other species, but the history of SAGARPA and CONAPESCA to respond to the information that is available indicates they would react to scientific advice and, therefore, this has been scored as highly effective.

Enforcement:  Moderately Effective
The enforcement of management regulations is carried out by CONAPESCA. Additionally, most of the local cooperatives self-enforce the regulations. Beyond this, there is no additional enforcement related specifically to bycatch species.
Criterion 4: Impacts on the Habitat and Ecosystem

Guiding Principles

- The fishery is conducted such that impacts on the seafloor are minimized and the ecological and functional roles of seafloor habitats are maintained.
- Fishing activities should not seriously reduce ecosystem services provided by any fished species or result in harmful changes such as trophic cascades, phase shifts or reduction of genetic diversity.

Summary

<table>
<thead>
<tr>
<th>Fishery</th>
<th>Impact of gear on the substrate</th>
<th>Mitigation of gear impacts</th>
<th>EBFM</th>
<th>Criterion 4</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rank (Score)</td>
<td>Rank (Score)</td>
<td></td>
<td>Rank (Score)</td>
</tr>
<tr>
<td>Baja California Trap</td>
<td>Low Concern (3)</td>
<td>Moderate mitigation (0.5)</td>
<td></td>
<td>Green 3.24</td>
</tr>
<tr>
<td>Quintana Roo/Yucatan</td>
<td>Low Concern (3)</td>
<td>Moderate mitigation (0.5)</td>
<td></td>
<td>Green 3.24</td>
</tr>
</tbody>
</table>

The spiny lobster fisheries in Mexico are primarily trap based, but some (like the Caribbean spiny lobster fishery) are dive based and utilize casitas as shelters to attract lobsters. Traps and casitas result in some damage to the benthic habitat, but Mexico has regulations protecting important ecological areas as part of the UNESCO Biosphere Reserve Programme. The ecosystem impacts from the trap and casita based fisheries are a moderate conservation concern.

Justification

Factor 4.1 Impact of the Fishing Gear on the Substrate

Key Relevant Information: Low Concern
In Mexico, the spiny lobsters fishery is either via trap or through hand diving with the use of casitas as shelters. Spiny lobster is generally found on rocky substrates and reefs, or wherever protection and shelter can be found (Holthuis 1991). As such, traps and casitas are deployed in a variety of habitats including sandy bottoms, seagrass beds, and rocky reefs.

Factor 4.2 Modifying Factor: Mitigation of Fishing Gear Impacts

Key Relevant Information: Moderate Mitigation
Several areas (Sian Ka’an, Banco Chinchorro, Vizcaino and Guadalupe Island) on both the Pacific and Caribbean/Gulf of Mexico coasts have been designated by the Mexican Federal Government as biosphere reserves through UNESCO Man and Biosphere Programme (SCS 2011, MRAG 2012). The reserve areas are protected by the Ley General del Equilibrio Ecológico y la Protección del Ambiente/General law for the ecological equilibrium and the protection to environment (SCS 2011, MRAG 2012). There are also additional regulations related to the reserve management plans designed to protect the reserves.

**Factor 4.3 Ecosystem and Food Web Considerations**

**Key Relevant Information:** Moderate Concern

No exceptional species are caught in any of Mexican lobster fisheries. There are no efforts to fully assess the ecological impacts in the fisheries.
**Overall Recommendation**

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

The overall recommendation for the fishery is calculated as follows:

- **Best Choice** = Final score ≥ 3.2 and scores for Criteria 1, 3 and 4 are all ≥ 2.2 and Criterion 2 subscore ≥ 2.2

- **Some Concerns** = Final score ≥ 2.2 and Criterion 3 ≥ 2.2 and (Final score ≤ 3.2 or scores for Criteria 1 & 4 ≤ 2.2 or Criterion 2 subscore ≤ 2.2)

- **Red** = Final score < 2.2 or score for Criterion 3 < 2.2 or any one criterion has a critical score or two or more of the following are < 2.2: Criterion 1 score, Criterion 2 subscore, Criterion 4 score

<table>
<thead>
<tr>
<th>Stock</th>
<th>Fishery</th>
<th>Impacts on the Stock</th>
<th>Impacts on other Species</th>
<th>Management</th>
<th>Habitat and Ecosystem</th>
<th>Overall Recommendation Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>California Spiny Lobster</td>
<td>Baja California Trap</td>
<td>Green 5</td>
<td>Cormorants Yellow, 3.05, 2.29</td>
<td>Green 3.46</td>
<td>Green 3.24</td>
<td>BEST CHOICE 3.37</td>
</tr>
<tr>
<td>Caribbean Spiny Lobster</td>
<td>Quintana Roo/Yucatan Casitas</td>
<td>Yellow 2.64</td>
<td>No other main species caught Green, 5,5</td>
<td>Green 4</td>
<td>Green 3.24</td>
<td>BEST CHOICE 3.62</td>
</tr>
</tbody>
</table>
Acknowledgements

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.

Seafood Watch® would like to thank two anonymous reviewers for graciously reviewing this report for scientific accuracy.
References


IBAMA 2008. Plano de gestão para o uso sustentável de Lagostas no Brasil


National Marine Fisheries Service. 2012. Personal communication from the National Marine Fisheries Service, Fisheries Statistics Division, Silver Spring, M.
http://www.st.nmfs.noaa.gov/st1/index.html

NOM 006 (1993) with amendments
http://www.conapesca.sagarpa.gob.mx/work/sites/cona/resources/LocalContent/7309/1/006pesc1993LANGOSTA.pdf
http://www.conapesca.sagarpa.gob.mx/work/sites/cona/resources/LocalContent/7309/1/006pesc1993LANGOSTAMODIFICACION97.pdf
http://www.conapesca.sagarpa.gob.mx/work/sites/cona/resources/LocalContent/7309/1/006pesc1993LANGOSTARESOLUCION98.pdf
http://www.conapesca.sagarpa.gob.mx/work/sites/cona/resources/LocalContent/7309/1/Dofmodifnom006langosta070615.pdf


About Seafood Watch®

Monterey Bay Aquarium’s Seafood Watch® program evaluates the ecological 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. Seafood Watch® makes its science-based recommendations available to the public in the form of regional pocket guides that can be downloaded from www.seafoodwatch.org. 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.

Each sustainability recommendation on the regional pocket guides is supported by a Seafood Report. Each report synthesizes and analyzes the most current ecological, fisheries and ecosystem science on a species, then evaluates this information against the program’s conservation ethic to arrive at a recommendation of “Best Choices,” “Good Alternatives” or “Avoid.” The detailed evaluation methodology is available upon request. In producing the Seafood Reports, Seafood Watch® seeks out research published in academic, peer-reviewed journals whenever possible. Other sources of information include government technical publications, fishery management plans and supporting documents, and other scientific reviews of ecological sustainability. Seafood Watch® Research Analysts also communicate regularly with ecologists, fisheries and aquaculture scientists, and members of industry and conservation organizations when evaluating fisheries and aquaculture practices. Capture fisheries and aquaculture practices are highly dynamic; as the scientific information on each species changes, Seafood Watch®’s sustainability recommendations and the underlying Seafood Reports will be updated to reflect these changes.

Parties interested in capture fisheries, aquaculture practices and the sustainability of ocean ecosystems are welcome to use Seafood Reports in any way they find useful. For more information about Seafood Watch® and Seafood Reports, please contact the Seafood Watch® program at Monterey Bay Aquarium by calling 1-877-229-9990.

Disclaimer
Seafood Watch® strives to have all Seafood Reports reviewed for accuracy and completeness by external scientists with expertise in ecology, fisheries science and aquaculture. Scientific review, however, does not constitute an endorsement of the Seafood Watch® program or its recommendations on the part of the reviewing scientists. Seafood Watch® is solely responsible for the conclusions reached in this report.

Seafood Watch® and Seafood Reports are made possible through a grant from the David and Lucile Packard Foundation.
Guiding Principles

Seafood Watch™ defines sustainable seafood as originating from sources, whether fished 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 capture fisheries must possess to be considered sustainable by the Seafood Watch program:

- Stocks are healthy and abundant.
- Fishing mortality does not threaten populations or impede the ecological role of any marine life.
- The fishery minimizes bycatch.
- The fishery is managed to sustain long-term productivity of all impacted species.
- The fishery is conducted such that impacts on the seafloor are minimized and the ecological and functional roles of seafloor habitats are maintained.
- Fishing activities should not seriously reduce ecosystem services provided by any fished species or result in harmful changes such as trophic cascades, phase shifts, or reduction of genetic diversity.

Based on these guiding principles, Seafood Watch has developed a set of four sustainability criteria to evaluate capture fisheries for the purpose of developing a seafood recommendation for consumers and businesses. These criteria are:

1. Impacts on the species/stock for which you want a recommendation
2. Impacts on other species
3. Effectiveness of management
4. Habitat and ecosystem impacts

Each criterion includes:
- Factors to evaluate and rank
- Evaluation guidelines to synthesize these factors and to produce a numerical score
- A resulting numerical score and rank for that criterion

Once a score and rank has been assigned to each criterion, an overall seafood recommendation is developed on additional evaluation guidelines. Criteria ranks and the overall recommendation are color-coded to correspond to the categories on the Seafood Watch pocket guide:

1 “Fish” is used throughout this document to refer to finfish, shellfish and other invertebrates.
**Best Choices/Green:** Are well managed and caught or farmed in environmentally friendly ways.

**Good Alternatives/Yellow:** Buy, but be aware there are concerns with how they’re caught or farmed.

**Avoid/Red:** Take a pass on these. These items are overfished or caught or farmed in ways that harm other marine life or the environment.