

Seafood Watch

Seafood Report



MONTEREY BAY AQUARIUM®

Caribbean Spiny Lobster

(Panulirus argus)



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United States, Brazil, Bahamas

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About Seafood Watch® and the Seafood Reports

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 the Internet (seafoodwatch.org) or obtained from the Seafood Watch® program by emailing seafoodwatch@mbayaq.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® Fisheries 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 (831) 647-6873 or emailing seafoodwatch@mbayaq.org.

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Executive Summary

Spiny lobsters are typically found on the seafloor in tropical, semitropical and temperate waters, hiding among rocks, kelp and coral. Most commonly sold just for their tails, the majority of spiny (or “rock”) lobsters in the U.S. market are sourced from the Caribbean, Brazil, and Florida. Vast differences exist amongst these fisheries. While the Florida fishery is characterized by strict guidelines, attentive management and extensive scientific assessment, spiny lobster fisheries in the Bahamas and Brazil are plagued with the opposite. Lobster in these regions are overfished, captured before they reach reproductive maturity or caught illegally. Additionally, limited data about population health are available to determine wise management practices. Therefore, spiny lobster is a “Best Choice” when sourced from Florida, a “Good Alternative” when from the Bahamas, but is best “Avoided” when imported from Brazil.


Table of Sustainability Ranks

Sustainability Criteria	Conservation Concern			
	Low	Moderate	High	Critical
Inherent Vulnerability	√ (All)			
Status of Stocks		√ (FL, Bahamas)	√ (Brazil)	
Nature of Bycatch	√ (FL, Bahamas)	√ (Brazil)		
Habitat Effects	√ (FL, Bahamas)	√ (Brazil)		
Management Effectiveness	√ (US)	√ (Bahamas)		√ (Brazil)


About the Overall Seafood Recommendation:

- A seafood product is ranked **Avoid** if two or more criteria are of High Conservation Concern (red) OR if one or more criteria are of Critical Conservation Concern (black) in the table above.
- A seafood product is ranked **Good Alternative** if the five criteria “average” to yellow (Moderate Conservation Concern) OR if the “Status of Stocks” and “Management Effectiveness” criteria are both of Moderate Conservation Concern.
- A seafood product is ranked **Best Choice** if three or more criteria are of Low Conservation Concern (green) and the remaining criteria are not of High or Critical Conservation Concern.

Overall Seafood Recommendation for Caribbean Spiny Lobster:

Best Choice 

Florida

Good Alternative 

Bahamas

Avoid 

Brazil

Introduction

Spiny and rock lobsters of the genus *Panulirus* are distributed throughout the world's tropical and semitropical waters. The genus *Jasus* is found in temperate waters of the Southern Hemisphere [Bliss, 1982]. Adults of both genera dwell on the seafloor, often hiding among rocks, kelp and coral [Bliss, 1982].

Figure 1: Worldwide Distribution of Spiny and Rock Lobsters.

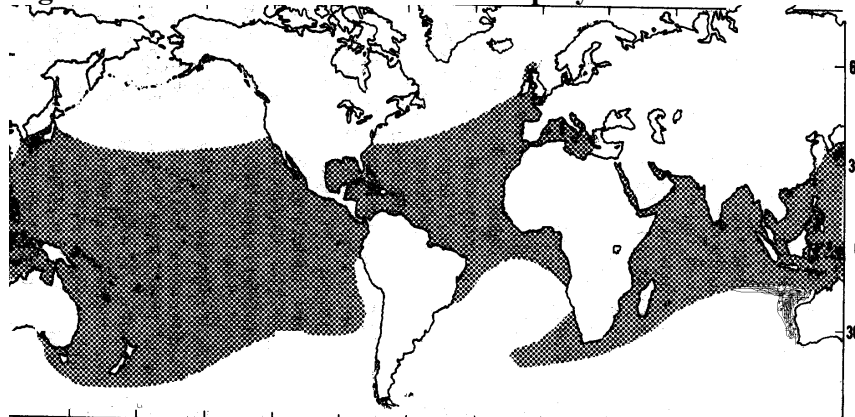


Figure 1. From Bliss, 1982, after Chace and Dumont.

Availability of Science

Market Availability

General Market Information:

The world's largest suppliers of spiny and rock lobster are Australia, Brazil, and the Caribbean countries (led by Cuba and Nicaragua) [SimplySeafood.com, 2003]. While there are domestic fisheries in Florida and California (and Hawaii's fishery is expected to resume when populations recover), the United States imports about 87% of its spiny/rock lobster.

Three species of spiny and rock lobster make up most of the catch found on the U.S. mainland market. These are the Caribbean spiny lobster (*Panulirus argus*), South African rock lobster (*Jasus lalandii*), and Western Australian rock lobster (*Panulirus cygnus*) [NMFS Stats, 2003]. California spiny lobster is seen in West Coast markets, although most of the California catch is now sold overseas [CA DFG, 2001]. Even when sold as tails, spiny lobster species can be distinguished by an educated eye. In addition to the four main species noted above, small amounts of three South American spiny lobsters (*Panulirus inflatus*, *P. laevicauda*, and *P. gracilis*) enter U.S. markets [Bliss, 1982; Raymond, 2004].

Common and market names: Spiny lobster; rock lobster, warmwater lobster, Florida spiny lobster; Caribbean spiny lobster [Bliss, 1982; Raymond, 2004]; also known in the U.S. Gulf states as "crawfish" [FDACS, 2003].

Seasonal availability: Spiny/rock lobster are available year-round.

Product forms:

In all spiny and rock lobsters, the tail is the part sought for the table. The rest of the animal is often discarded before it is marketed (or even before the fishing boat reaches land). The tails are most commonly available frozen [SimplySeafood.com, 2003]. In the U.S. market, spiny and rock lobster tails are sometimes subdivided into “warmwater” and “coldwater” tails, depending upon the species/fishery of origin [SimplySeafood.com, 2003]. Warmwater tails come from the tropical fisheries of the Caribbean, California and both coasts of Central and South America. Coldwater tails come from the temperate-water fisheries of Australia, New Zealand and South Africa [SimplySeafood.com, 2002; Bliss 1982]. In their frozen state, they can be told apart by the simple fact that warmwater tails are coated with a glaze of ice, while coldwater tails are frozen without a glaze [SimplySeafood.com, 2003]. Seafood marketers consider tails removed from live lobsters superior to those collected after the animal’s death; therefore, premium lobster tails are trap- or diver-caught, not spearfished [SimplySeafood.com, 2003].

Coldwater tails are considered superior in flavor and texture to warmwater tails, and their costs reflect this; a five-to-six-ounce Australian coldwater tail will retail for \$20-\$25, while the same-size warmwater tail from Brazil might cost \$15-\$20 [SimplySeafood.com, 2003].

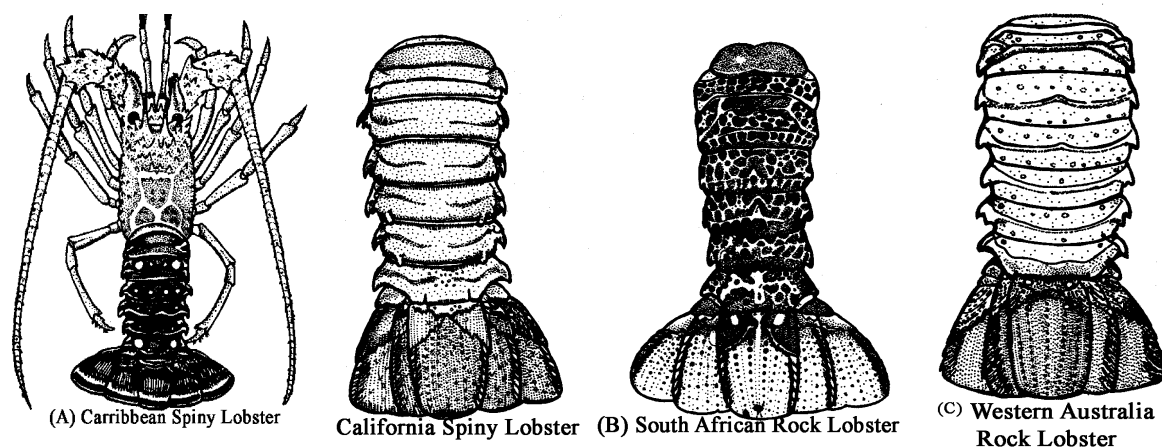


Figure 3. Telling Tails: Identifying the Primary Spiny/Rock Lobster Species in U.S. Markets From Bliss, 1982, after Manning.

Import and export sources and statistics:

The Caribbean spiny lobster is fished throughout its range. About 65% of the spiny lobster on the U.S. market is Caribbean spiny lobster. Major commercial fisheries have existed for several decades on Florida’s east coast and in the Florida Keys [Bliss, 1982]. Other major commercial fisheries supplying Caribbean spiny lobster to the U.S. exist in the Bahamas, Nicaragua, Honduras, and Brazil [Bliss, 1982; NMFS Stats 2003]. Small amounts of Caribbean spiny lobster also enter the U.S. from Belize, Columbia, Jamaica, Panama and Mexico’s Gulf region [NMFS Stats, 2003; Raymond, 2004]. There are also local fisheries that supply mainly local markets,

including that of Bermuda [Bliss, 1982] and those in the U.S. Virgin Islands and Puerto Rico [CFMC, 1990].

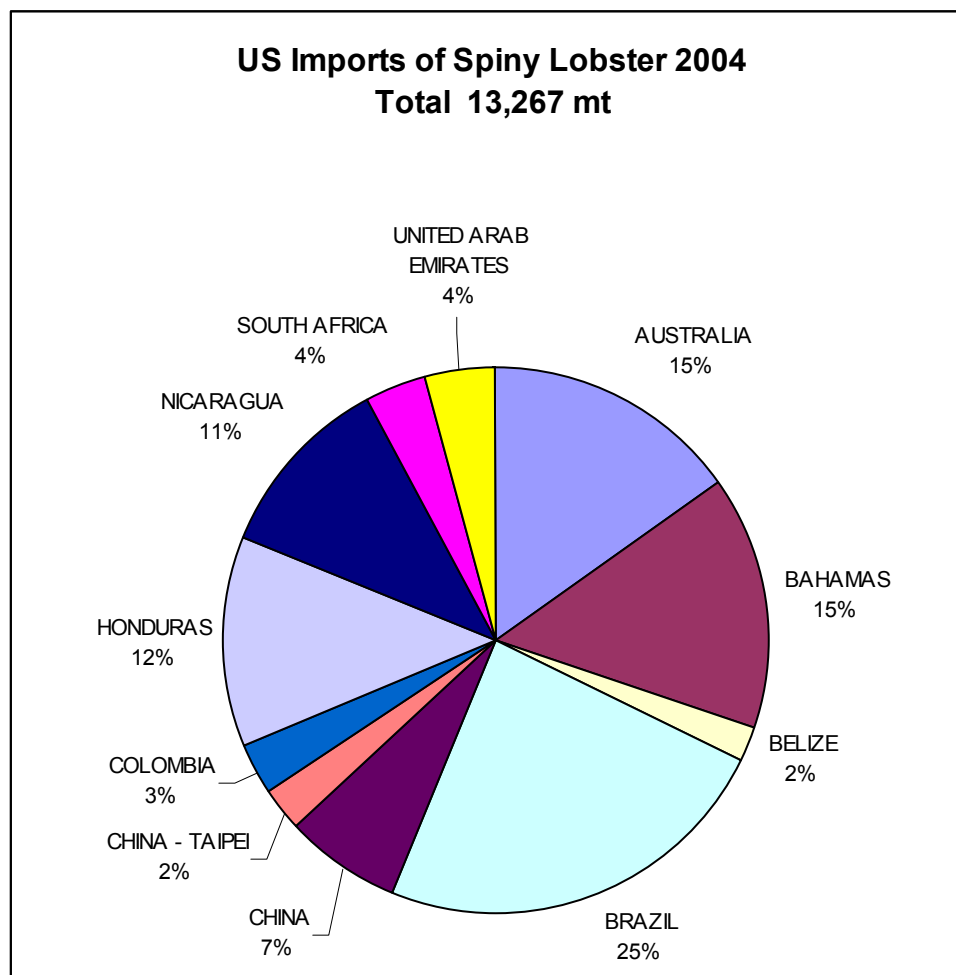


Figure 4. Imports of spiny lobster (“rock lobster”) into the U.S., 2004 Data (NMFS 2005).

Analysis of Seafood Watch® Sustainability Criteria for Wild-caught Species

Criterion 1: Inherent Vulnerability to Fishing Pressure

Life History:

Spiny lobsters begin life as fertilized eggs, carried under the female's abdomen until they hatch [Bliss, 1982]. Unlike more “primitive” crustaceans, lobster larvae undergo their first two molts (into the nauplius and postnauplius forms) while still within the egg. From the eggs hatch pelagic larvae called phyllosoma, which have long feathery legs and a leaflike head and thorax to facilitate their life as planktonic drifters. The phyllosoma drift with the plankton for four to eleven months [Cobb & Wang, 1986]. After several molts, changing shape as they grow, the larvae attain the “puerulus” stage, a near-copy of the adult body form [Bliss, 1982]. Puerulus juveniles settle to the bottom to begin the life of scavenging and hunting they will lead from then on. The transparent shell of the puerulus gradually gets harder and more opaque as mineral salts are deposited. Growth of rock lobster pueruli may be very slow; in the laboratory, a one-inch-

long *Jasus lalandii* puerulus grew only about a quarter of an inch in two years of observation [Bliss, 1982]. All rock and spiny lobsters are omnivores, scouring the seafloor for food. Although they scavenge any available animal material and may occasionally eat seaweed, their strong mandibles are specially adapted to crack open mollusk shells [Bliss, 1982]. Maximum lifespan for most species is unknown, but laboratory-raised *J. lalandii* lived as long as ten years [Bliss, 1982].

The sexes are separate in lobsters. Male and female lobsters find each other via chemical attractants released into the water with the animals' urine [Bliss, 1982]. Among the spiny lobsters, females can mate only immediately after they have shed their old shell, while their new exoskeleton is still soft [Bliss, 1982]. In mating, the male lobster uses specially modified pleopods (abdominal "feet") to transfer a spermatophore (sperm packet) to the female; depending upon the species, he may slip the spermatophore into her genital pore, in which case the eggs are fertilized before they are laid, or may attach a spermatophore to the outside of her shell, in which case the female scratches the spermatophore open to release sperm just as her eggs emerge [Bliss, 1982]. Regardless of the system of sperm delivery, female lobsters store sperm (inside or outside their bodies) until conditions are right for "spawning", or fertilization. The female then retains the fertilized eggs on her abdomen for weeks or months until they hatch [Bliss, 1982]. Females bearing fertilized eggs are called "berried lobsters" or said to be "in berry" [Bliss, 1982].

Spiny and rock lobsters are highly fecund. One study reports that Caribbean spiny lobsters produce 1-2 million eggs per spawning [Lyons et al., 1981]. Another study found 300,000 – 800,000 eggs per spawning, depending on the size of the female [Bertelson & Matthews, 1981]. A more recent study reported that clutch sizes from 300,000 to 2,000,000 in the Tortugas reserve and 40,000 – 900,000 in the Florida Keys [Bertelsen and Cox, 2001]. All spiny/rock lobsters spawn at least once a year; some spawn twice a year, and one species (*P. homarus*, which supports a minor fishery near South Africa) spawns four times a year [Cobb & Wang, 1986]. Different populations of Caribbean spiny lobsters spawn at different times of year, depending upon water temperature [Cobb & Wang, 1985]. In very warm areas, such as around Honduras, spawning may take place year-round [Raymond, 2004]. The time of spawning may be related to the size of females [Cox, 2004].

Larger females produce considerably more eggs than smaller ones---60% of eggs in the Upper Keys were produced by the largest females (85 mm carapace length or larger), which make up less than 20% of the female population [Lyons et al., 1981]. While smaller females breed only once a year, larger females may breed more than once a year [Lyons et al., 1981, p. 25; Cox, 2004], further increasing their importance to population growth. The eggs are incubated in the mother's care for a relatively short period---18 days to 1 month, depending on water temperature (warmer water means faster embryonic development) [Lyons et al., 1981].

The prolonged pelagic stage of spiny/rock lobster larvae means that, in most of the commercially-important species, larvae can disperse over unusually wide areas. Larvae of several species have been documented at distances greater than 1,000 miles from their spawning sites and larval *J. lalandii* have dispersed as far as 4,000 miles [Cobb & Wang, 1986]. This somewhat confounds efforts to relate spawning success to fishery success in the same area [Cobb & Wang, 1986]. Only in a few isolated areas has adult spawning success been correlated at

all with fishery success in the parent population [Cobb & Wang, 1986]. This has profound implications for spiny lobster management, i.e., the management of a fishery in one country can have significant effects on lobster populations in another country [Raymond, 2004].

As with other crustaceans, it is impossible to accurately age a wild-caught lobster [Cobb & Wang, 1986]. Therefore, estimates of “age at maturity” are replaced by “size at maturity”. However, size at maturity can vary quite a bit within the same species. In Panama, female *P. argus* first bear eggs at about 69 mm carapace length (CL). The same species first bears eggs at about 80 mm CL in Florida and Bimini; at 85-90 mm CL in Bermuda, and at 95 mm CL in Jamaica [Cobb & Wang, 1986]. It is estimated that 50% of females are mature at 1 year, 77% at 2 years, 100% at 3 years [Stock Assessment Update, 2000].

The smallest egg-bearing females recorded were 57 mm CL in the Florida Keys and 70 mm CL in the Florida Dry Tortugas reserve [Bertleson and Cox, 2001]. One Florida study found that sublegal-sized females were 21.6% of “bred” females (spermatophore-bearing), implying at least some breeding before females become vulnerable to the fishery [Lyons et al., 1981]. Lobsters reach legal size for the fishery at about age 2 [Stock Assessment Update, 2000].

Growth rates are only imperfectly known for any spiny/rock lobster. This, too, appears to vary quite a bit within the same species, depending upon water temperature, food availability, and perhaps other ecological factors such as crowding of juvenile lobsters [Cobb & Wang, 1986].

It is possible to tell the sex of a spiny lobster by the shape of its pleopods (abdominal appendages), something that can be useful in management enforcement and market identification, even of frozen lobster tails. In males, all pleopods are tipped with a single leaflike segment. In females, the pleopods closest to the tail have two segments at the tip—a leaflike one for swimming and a rodlike one for attachment of eggs [Bliss, 1982].

Like other crustaceans, larval survival is heavily influenced by oceanographic conditions. Managers track ocean temperatures and see them reflected in catch rates two years later [Stock Assessment Update, 2000, page 9].

Range, Caribbean Spiny Lobster

Panulirus argus is found in near shore habitats: on and around coral reefs, in rocky rubble fields, and in and around sea grass beds [Caribbean EFH, 1998; FMRI, 2001]. The Caribbean spiny lobster is native to the warm waters of the Caribbean and occurs “from Bermuda to Brazil” [FMRI, 2001]. It is found along the Atlantic coast of South America as far south as Rio de Janeiro, Brazil [Bliss, 1982]. While the northernmost boundary of its range lies near Beaufort, North Carolina [Bliss, 1982], U.S. commercial landings originate almost entirely in the Florida Keys [FMRI, 2001].

This species exhibits a curious migration behavior: every autumn, beginning roughly in October, adults march single-file along the seafloor in long lines, antenna to tail, moving from nearshore areas to deeper waters where they spend the winter [Cobb & Wang, 1985]. The return migration has not been observed [Cobb & Wang, 1985]. The migrating adults are not in breeding

condition; it is speculated that the purpose of the migration is to avoid the stress of overwintering in storm-prone shallow areas [Cobb & Wang, 1985].

There is some genetic variability between the Brazilian and the Gulf-of-Mexico populations of this wide-ranging lobster [Cobb & Wang, 1985], but, because the pelagic lobster larvae disperse very widely, most scientists consider the stocks of the Caribbean basin (including the stocks fished in Florida, the Bahamas, Nicaragua, and Honduras) to comprise a single metapopulation [Cobb & Wang, 1985; Lopuch, 2003; Muench, 2003]. This has profound implications for spiny lobster management, i.e., the management of a fishery in one country can have substantial effects on lobster populations in another country [Raymond, 2004].

Table 1. Life history characteristics of Caribbean Spiny Lobster (*Puanulirus argus*)

Intrinsic Rate of Increase (r)	Age at Maturity	Growth Rate	Max Age	Max Size	Fecundity	Species Range	Special Behaviors	Sources
Unknown	1-3 years; 65-95 mm	Unknown	Unknown	45 cm	300,000-2 million eggs per spawning	Semi-tropical and tropical waters of Atlantic Ocean, Caribbean Sea, and Gulf of Mexico	The Caribbean spiny lobster undergoes mass migrations in winter	Bliss 1982; Cobb and Wang 1986

Synthesis

Caribbean spiny lobster is a quickly maturing, highly fecund species that is inherently resilient to fishing pressure.

Inherent Vulnerability Rank:



Neutral 

Vulnerable 

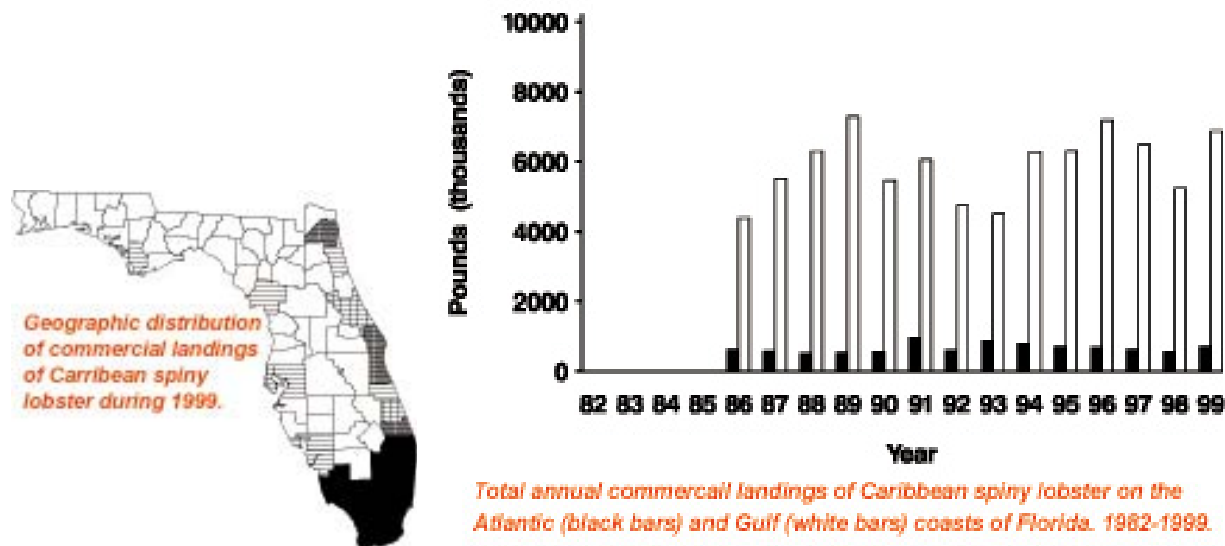
Criterion 2: Status of Wild Stocks

Florida

In 2002, the last year for which data are complete, U.S. Florida landings of Caribbean spiny lobster were 4,476,643 pounds, or 2030.6 metric tons [NMFS Stats 2003]. This means that Florida spiny lobster supplies about 11% of the total U.S. spiny lobster market [NMFS Stats 2003]. A typical tail weight from a legal-sized lobster is 5 – 6 ounces [Raymond, 2004].

Small amounts of spiny lobster are also taken in the Puerto Rico and the U.S. Virgin Islands, but this lobster is consumed locally and does not enter the wider U.S. market. The stock status and fishery in these areas is said to mirror the Florida situation [CFMC, 1990; Caribbean EFH, 1998; Caribbean EIS, 1998].

Approximately 90% of Florida landings take place on the “west coast” of Florida (mainly in the Florida Keys), with just 10% landed on the Atlantic coast [NMFS stats 2003]. The peninsula of South Florida is at the northern end of the species’ range; lobsters are more abundant in the Florida Keys [FMRI, 2001; Stock Assessment Update2000; Raymond, 2004].



Source: FMRI, 2001

According to Bliss (1982), Florida’s west-coast fishery supplied lobster mainly for local markets during the 1970’s and early ‘80s, but, in recent decades, lobster fishing has expanded throughout the Gulf region. Spiny lobster is now Florida’s second-most-valuable fishery, surpassed in economic importance only by shrimp [Swingle et al., 2001]. It should be noted that the recreational take of Florida spiny lobster is typically 20-25% of each year’s commercial take [FMRI, 2001; Hunt, 2000].

NMFS considers U.S. Caribbean spiny lobster stocks to be “not overfished”. This includes both the Florida stocks covered under the Gulf of Mexico/South Atlantic Spiny Lobster FMP and the Puerto Rico/U.S. Virgin Islands stocks covered under the Caribbean FMP [NMFS 2002 Report to Congress, 2003]. The National Marine Fisheries Service rates Gulf of Mexico and South Atlantic spiny lobster stocks “not overfished” with “no overfishing occurring” [NMFS 2002 Report to Congress, 2003].

Since the 1970s, the Florida fishery has depended on new recruits: most newly-matured lobsters are caught in their first year of maturity [Stock Assessment, 1999]. Despite this, the population appears to have held relatively steady: the Florida fishery “continues to fluctuate without trend, as it has done for 30 years” [Stock Assessment Update2000].

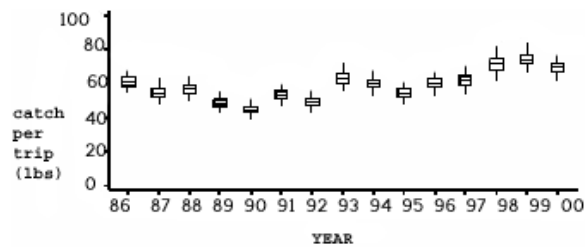
Raymond cautions that Florida’s spiny lobster stocks may draw larvae from parental stocks from the waters of Honduras, Nicaragua, and Cuba [2004]. Therefore, declines in those stocks due to poor management and overfishing may affect the abundance of Florida’s population [Raymond, 2004].

Recent models show the population at about 81% of BMSY [Stock Assessment Update, 2000].

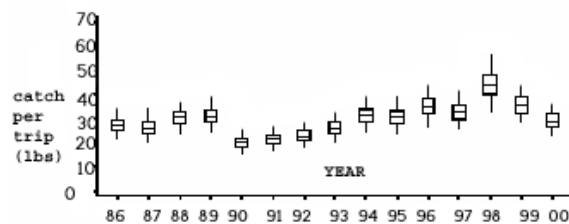
Spawning Potential Ratio (SPR) was about 30% of unfished biomass in 1999/2000 [FMRI, 2001] (between 29% and 32% of unfished biomass, depending upon modeling assumptions) [Stock Assessment Update, 2000]. SPRs have ranged around this 30% value, trendless, for 13 years (since 1987) [Stock Assessment Update, 2000]. For lobsters aged 2 to 7 years, the population has been steady since the 1994/95 fishing year [Stock Assessment Update, 2000].

The population has remained relatively flat at a low-to-moderate level of abundance since the first FMP [Spiny Lobster FMP/EIS, 1982; Spiny Lobster FMP Amendment 1, 1987; Spiny Lobster FMP Regulatory Amendment 2, 1993; Spiny Lobster FMP Final Amendment 4, 1994; Stock Assessment, 1999; Stock Assessment Update, 2000]. Managers consider the fishery overcapitalized and have been recommending trap reduction measures since this 1981 FMP. A trap-reduction program was finally put into effect in 1992.

Overall recruitment is up in the last few years [Stock Assessment Update, 2000]. Abundance of females went up sharply in 1993-94 after a trap-reduction program was put in place, although it has not increased further since then [Stock Assessment Update, 2000]. As can be seen from the graphs below, standardized measures of fishing effort indicate a relatively flat trend, 1986-2000 [Stock Assessment Update, 2000; FMRI, 2001]. Standardized measures of fishing effort indicate a small upswing in CPUE over the ten-year period beginning 1993---with small declines in 1999 and 2000 [Stock Assessment Update, 2000; FMRI, 2001].



Annual standardized commercial catch rates (pounds) for Florida spiny lobster, 1986-2000
Top: Atlantic coast
Bottom: Gulf coast Source: FMRI, 2001



The fishery is considered overcapitalized, with too many traps [FMRI, 2001]. Fishing mortality has been at or slightly above the target mortality level $F=0.28$ for many seasons: in 1993/94, $F = 0.47$; in 1995/96, $F=0.39$ [FMRI, 2001]. The latest Stock Assessment [Stock Assessment Update, 2000] found fishing mortality to be 1.02% of F_{MSY} .

Sex distribution is believed to be functionally normal; size distribution is slightly skewed because the fishery takes most lobsters before they can reach the largest size classes [Stock Assessment Update, 2000]. Abundance of females increased after the 1992 trap-reduction program [FMRI, 2001].

Robust and reliable stock assessments and long-term fishery data are both available.

Brazil

Panulirus argus occurs along the northwest coast of Brazil, reaching the southern limit of its range near the city of Ilheus [Fontales-Filho, 2000]. Brazil is considered to have just one stock of spiny lobsters [Fontales-Filho, 2000]. Larval dispersal is thought to connect the population genetically across long distances [Fontales-Filho, 2000], although genetic studies are lacking [Chafee, 2003]. Brazil produces the world's second-largest catch of warm-water lobster [Fontales-Filho, 2000]. Government policy currently allows largely-uncontrolled exploitation to feed the large "industrial" lobster fishing and processing concerns, which are important sources of employment and national income [Chafee, 2003; Fontales-Filho, 2000]. *Panulirus argus* makes up by far the majority of Brazil's catch, but two other spiny lobsters (*Panulirus laevicaudus* and *P. echinatus*) and a slipper lobster (*Scyllarides brazilensis*) are taken in the same fishery [Fontales-Filho, 2000]. The minimum size limits for *P. laevicaudus*, the green or Cape Verde spiny lobster, are different than that for *P. argus*; however, the two species are marketed interchangeably from the Brazilian fishery, with no enforcement of the species-specific size rule [Raymond, 2004].

In 2002, the last year for which figures are available, Brazil was the source of approximately 21% of the spiny lobster on the U.S. [NMFS Stats, 2003].

In 2001, the artisanal lobster fishery of the town of Prainha do Canto Verde applied for MSC certification. This fishery supplies approximately 0.004% of the spiny lobster landed in Brazil. MSC began an evaluation of the fishery but was forced to discontinue the process when it became clear that the overall stock status of Brazil's spiny lobster was too poor to meet MSC's criteria for stock abundance [Samudra, 2001a and 2001b; Chafee, 2003].

Although the population is not "classified" this way under Brazilian law, senior scientists and managers agree that the stock is overfished and in decline. A major scientific conference, held in 2000 and attended by Chet Chafee of MSC, resulted in near-unanimous conclusion by scientists and managers that the resource is overfished [Chafee, 2003]. The reason the stock is not "classified" appropriately is the Brazilian government's general pro-extraction policy toward natural resources as sources of income [Chafee, 2003].

Stock assessments have been conducted by University-affiliated scientists in Brazil, and show steep declines in spawning biomass since the 1970s [Chafee, 2003; Fontales-Filho, 2000].

Since commercial exploitation began in 1955, the fishery has a history of depleting lobsters in nearshore areas and moving further and further off-shore [Fontales-Filho, 2000]. Fontales-Filho (2000) states that the population has "stabilized" at about 85% of B_{MSY} , but this is based solely on production (catch) data---in a fishery where fishing is expanding continually into new

“virgin” fishing grounds. Catch has been steady at about 8,150 mt/year (15% below the MSY of 9,589 mt/year) for some time.

During the 1999 MSC certification process in Prainha do Canto Verde, certifiers discovered that hookah divers take a substantial amount of spiny lobster (Lopuch, 2003). The number of boats fishing with hookah equipment is increasing all the time [Schärer, 2005]. Their CPUE and total landings were unknown to Brazilian authorities [Lopuch, 2003]. Thus, their impact on the stocks could not be assessed by scientists [Lopuch, 2003]. Artisanal fishers and NGOs took the MSC preliminary report to the government to press for participation in state and federal management groups. While they are now well-represented in the CGSL (Management Committee for the Sustainable Lobster fishery, created by the President of Ibama), practical results are slow to emerge [Schärer, 2005].

Since 1967, sampling for size, sex ratio, spawning age and condition, and other measures of population biology have been conducted on lobsters landed at the lobster center of Forteleza [Fontales-Filho, 2000]. The population seems to be functionally normal [Fontales-Filho, 2000].

Brazil’s leading marine biologists are in scientific consensus that stocks are overfished [Chafee, 2003]. Amalgamated data on population composition, age, size, maturity, etc. have been collected yearly since 1962 [Fontales-Filho, 2000].

Bahamas

Panulirus argus is at the heart of its range around the islands of the Bahamas [Cox, 2003]. The species reaches its greatest abundance, fastest growth, and greatest fecundity in these waters [Cox, 2003]. The spiny lobster fishery is extremely important to the economy of the Bahamas, bringing in about 2% of Bahamian GNP and 94% of the total value of fisheries exports from this small, island-based nation [CRFM Bahamas, 2003]. At one time, fishermen from the United States took major amounts of spiny lobster from Bahamian waters [Spiny Lobster FMP/EIS, 1982]. In 1975, the Bahamas closed its EEZ to foreign fishermen and began to develop a spiny lobster fishery of its own [Hunt, 2000]. The fishery is mostly artisanal, and the main capture method is spearfishing by breath-hold divers. A small amount of the catch is taken via traps. Scuba gear and spear guns are not allowed [Cox, 2004].

In 2002, the last year for which figures were available, the Bahamas were the source of approximately 12% of the spiny lobster on the U.S. market [NMFS Stats, 2003].

The Bahamian division of fisheries has not developed a stock assessment for spiny lobsters. Catches are recorded, but effort and trends in effort are unknown. The stocks are considered “threatened” by scientists with The Biodiversity Project, a research effort of the American Museum of Natural History, in which U.S. scientists are conducting basic life-history research on Bahamian marine species [Muench, 2003]. However, other scientists familiar with the Bahamian lobster fishery believe that, while management definitely lags, the stocks are not *currently* in danger. “It’s my gut feeling that they are not overfished, because it’s not a mechanical fishery. They’ve got a lot of lobsters, and a lot of big lobsters, which is why a breath-hold, dive fishery can supply 12% of the U.S. market per year!” [Cox, 2003]. Hunt [2003] concurs that the stocks are probably not currently overfished, thanks to the high reproductive potential of lobsters in

Bahamian waters and the low-tech fishery that currently pursues them. However, he notes that increased use of a recently-introduced method to aggregate lobsters for spearing (the “casita”) may have major effects on the population in the near future, given that management is very lazzais-faire [Hunt, 2003].

Table x. Stock status of Caribbean Spiny Lobster (*Puanulirus argus*)

Stock	Classification Status	B/B _{MSY}	F/F _{MSY}	Abundance Trends/CPUE	Age/Size/Sex Distribution	Degree of Uncertainty in Stock Status	Sources
Florida	Not overfished; No overfishing occurring	Recent models show the population at about 81% of BMSY		The population has remained relatively flat at a low-to-moderate level of abundance	Normal	Low	NMFS 2002 Report to Congress 2003
Brazil	Overfished	Unknown		Population has been in steep decline since the 1970s	Normal	Low	Fonteles-Filho 2000; Chafee 2003
Bahamas	Not overfished	Unknown		Unknown	Normal	High	Cox 2003; Hunt 2003

Synthesis

While Brazil’s spiny lobster stocks is overfished, both the Florida and Bahamas spiny lobster stocks are not overfished, and no overfishing is occurring. Therefore, the stock status of the Brazil stock is ranked “Poor”, and thus a High Conservation Concern while stock status of Bahamas and Florida is ranked a Moderate Conservation Concern.

Status of Wild Stocks Rank:



Criterion 3: Nature and Extent of Bycatch

Seafood Watch® defines sustainable wild-caught seafood as marine life captured using fishing techniques that successfully minimize the catch of unwanted and/or unmarketable species (i.e., bycatch). Bycatch is defined as species that are caught but subsequently discarded (injured or dead) for any reason. Bycatch does not include incidental catch (non-targeted catch) if it is utilized, accounted for and/or managed in some way.

Florida

Bycatch is generally low in this trap fishery, and does not include species of special concern [Spiny Lobster FMP/EIS, 1982; Stock Assessment, 1999]. Most “bycatch” in this trap fishery is undersized spiny lobsters [Stock Assessment Update, 2000]. Many of these “shorts” are traditionally retained for use as live bait in the fishery. Shorts are the most effective bait yet found for this fishery [Heatwole, 1988, as cited in Hunt, 2000]. For decades, managers have had concerns that using immature lobsters in this way increases juvenile mortality, with a subsequent depression of spawning potential [Hunt, 2000]. Indeed, about ¼ of shorts used as bait were found to die as a result of their confinement in traps, from some combination of handling effects and malnourishment [Hunt et al., 1986; Hunt, 2000]. However, a series of studies in the early 1990s concluded that, at the then-current level of exploitation, the gain in catch rate to fishermen using shorts was greater than the gain to be expected if shorts were not used as bait and allowed to grow bigger [Ehrhardt et al, 1991 and Lyons & Hunt, 1992, as cited in Hunt, 2000]. A “trap-certification program” reducing the total number of traps was put into place in 1992 [Hunt, 2000], and measures to cut the take and use of shorts—including requirements for “escape gaps” to allow undersized lobsters out of traps---were implemented in subsequent years [Stock Assessment Update, 2000]. Currently, Florida fishing regulations stipulate that shorts to be used as bait must be kept in live wells; no more than 50 total shorts, or one per trap when traps are being moved onboard, are allowed [Cox, 2004].

Hunt et al. (1986) found relatively high mortality for *Panulirus argus* brought on deck, even after release. DiNardo et al. (2002) found handling mortalities of 24.1% for *P. argus* held on deck for 1-4 hours. DiNardo concludes that managers may best preserve spiny lobster populations by moving to “retain-all” fishing practices, in which all lobsters brought on deck are counted as part of the dead catch, instead of assuming that lobsters released alive continue to live and breed [DiNardo et al., 2002].

The stone crab (*Menippe* spp.), now a popular seafood in its own right, was originally taken as bycatch in the Florida Keys spiny lobster fishery [Swingle et al., 2001]. Stone crabs are still taken incidentally in Gulf blue crab and spiny lobster trap fisheries; Florida permits lobster and blue-crab fishermen to purchase an endorsement and legally market this incidental catch [Swingle et al., 2001].

Brazil

This is primarily a trap fishery, although the recent “lobster rush” has seen an increase in the use of gill nets and hookah diving [Fonteles-Filho, 2000]. Traps are deployed by boats of different sizes, from small sailboats (jangadas) to large ships. With decreasing catches steel hull vessels

with high operating costs have been eliminated from the fishery for economical reasons and are rusting away in several ports along the coastline.

Studies note the problem of bycatch such as rays, (*Gimnura micrura*) sharks (*Rhinobatos percellus*), triggerfish (*Balistes vetula*), lane snapper (*Lutjanus sinagri*) and others [Paiva et al, 1973]. Lobster fishers report substantial bycatch (snappers, trigger fish, rays, sharks and mackerels) from the gillnets in Ceará, Pará, Maranhão, Bahia and Espírito (Ivo, 1996).

Bycatch (fish and endangered sea turtles) is moderate to high in the Brazilian fisheries, which use traps, gillnets, and hookah dive gear. Habitat effects are moderate, with traps and gill nets set in sea grass, calcareous algae and close to coral reefs. Management is minimal and enforcement is notably poor. Management authorities have not considered bycatch an issue, except for turtle bycatch in 2004. [Schärer, 2005] Special concern comes from the bycatch of Hawksbill *Eretmochelys imbricate*, Green turtles *Chelonia mydas* and also some isolated Leatherbacks *Dermochelys coriacea* and Loggerheads *Caretta, caretta* [Sales/Lima, 2002]. Industrial and commercial fishers (motorized vessels) discard lobster heads, while artisanal fishers (sailboats) land live and/or whole lobsters, heads and distribute them to the population for consumption [Schärer/Aragão, 2004]. Hookah boat divers also harpoon considerable amounts of groupers, snappers including the protected giant grouper [Schärer, 2005].

Hookah divers suffer severe injuries and death. The Brazilian navy operates only one decompression chamber for over 2,000 miles of coastline. Widows and orphans have no social protection, because of the illegality of divers [Schärer, 2005].

The quality of Brazilian lobsters from the motorboat fishery is poor and getting worse because of increased use of gillnets and poor infrastructure for conservation on board. Again in 2005 FDA inspectors have refused several containers from Brazil exporters. Also exporters use a network of intermediaries, which makes the control of origin and quality difficult. [Schärer, 2005].

Government managers have repeatedly ignored scientists' advice to curb the fishery, which is currently open-access. Instead, through a fuel subsidy, government policy is still encouraging expansion of Brazil's spiny lobster fisheries as an important source of foreign revenue.

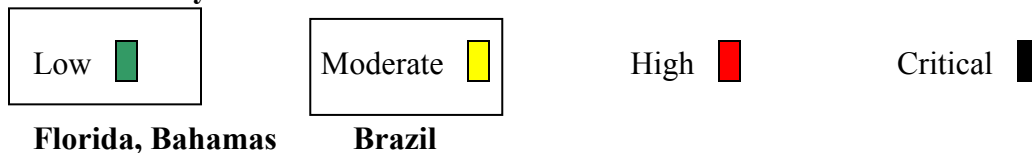
What is worrying coastal community leaders is that the government is under pressure from commercial interests to exclude artisanal fishers from the lobster fishery. They claim that sailboat fishers work in the coastal area where juvenile lobsters are abundant. NGOs and community leaders argue that the sail-fleet is not causing the excessive fishing effort, since their traps represent less than 1.5% of total effort, but there is an opportunity for co-management in marine protected areas in the coastal zone. They believe that consumers prefer lobsters of the best quality, with a certificate of origin from the artisanal fishery [Schärer, 2005].

Bahamas

The Bahamian spiny lobster fishery is mostly artisanal, and the main capture method is spear fishing by breath-hold divers. A small amount of the catch is taken via pole-spearing, where the fisherman does not dive, but walks or sculls along in the shallows. Scuba gear, traps, and hookah

gear are not allowed [Cox, 2003]. Very recently, Bahamian fishers have begun to use “casitas” to aggregate lobsters for spearing (a method developed in the Cuban lobster fishery) [Hunt, 2003]. Spear fishing is a low-bycatch method, with a caveat of interest to the sustainability of the lobster stock itself: egg-bearing females may be accidentally speared, because the fisherman cannot see a lobster’s tail when it is speared inside its den [Cox, 2003].

Nature of Bycatch Rank:



Criterion 4: Effect of Fishing Practices on Habitats and Ecosystems

Florida

In the Florida commercial fishery, lobsters are captured in traps. As noted above, small live lobsters are often placed in the traps as attractants for other lobsters. However, baits ranging from fish or meat scraps to cowhide, cat food and government surplus cheese are occasionally seen in the fishery [Cox, 2004]. Although most commercial operators fish traps individually when in State waters, and pull the traps once a week or less [Cox, 2004], some commercial fishermen string together “lines” of up to several hundred individual traps and re-bait traps every other day [GoM FMC, 1999]. Recreational divers are forbidden to use traps [Cox, 2004], but are permitted to harvest lobsters by hand [GoM FMC, 1999].

Traps are usually considered a sustainable fishing method, although NMFS authorities caution that traps can damage seafloor habitat, especially live coral and manatee grass beds [Swingle et al., 2001]. A study by Tom Matthews and others is currently underway to quantify damage to benthic habitat from lobster traps [Cox, 2004]. Excessive numbers of trap buoys and ropes have been known to impede navigation, interfere with shrimp trawling, and increase problems with shoreline debris as lost gear washes ashore (particularly after hurricanes) [Swingle et al., 2001]. There has also been a recent increase in the number of commercial divers illegally placing artificial habitat (casitas) on the seafloor to attract lobsters [Cox, 2004]. New regulations are being formulated to regulate this relatively new sector of the commercial spiny lobster fishery [Cox, 2004].

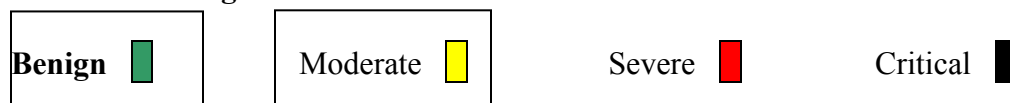
Interviews with 239 Florida crab fishers found that stone crab fishing is significantly related to spiny lobster fishing along the southern coast [Johnson & Orbach, 1995]. In other words, many trap fishermen take part in more than one fishery. Many trap fishermen target spiny lobster for part of the year, stone crab the rest [Swingle et al., 2001]. Up to 73% of Florida spiny lobster fishermen also fish for stone crabs [Swingle et al., 2001].

Brazil

As noted above, this is primarily a trap fishery, although the recent “lobster rush” has seen an increase in the use of gill nets and hookah diving [Fonteles-Filho, 2000]. Traps are deployed by boats of different sizes, from small sailboats (jangadas) to large ships. The traps are deployed in strings of few or many traps, depending on boat size. There is some damage to seafloor habitat from gill nets, hookah divers (who use nets to gather lobsters on the seafloor before hauling the catch on board) and to some extent traps on sea grass beds and calcareous algae [Fonteles-Filho, 2000].

Bahamas

In addition to spear fishing by breath-hold divers and pole-spearing, very recently Bahamian fishers have begun to use “casitas” to aggregate lobsters for spearing (a method developed in the Cuban lobster fishery) [Hunt, 2003]. Casitas are small, permanent concrete structures that offer shelter to lobsters; they are sometimes called “artificial dens”. Once in place on the seafloor, they are not moved, and have less habitat impact than traps [Hunt, 2003].

Effect of Fishing Practices Rank:

Florida, Bahamas

Brazil

Criterion 5: Effectiveness of the Management Regime**Florida**

In federal waters, spiny lobsters are managed by NMFS’ Tampa-based Gulf of Mexico Fishery Management Council (GMFMC), which covers the fisheries of Texas, Louisiana, Mississippi, Alabama and the west coast of Florida [GoM FMC, 1999], and by the Charleston-based South Atlantic Fishery Management Council, covering fisheries throughout the South Atlantic states. Fisheries in federal waters are regulated under the Fishery Management Plan for the Spiny Lobster Fishery of the Gulf of Mexico and South Atlantic (commonly referred to as the Spiny Lobster FMP). The spiny lobster fishery in Florida waters is regulated by the Florida Fish and Wildlife Conservation Commission (FWC). In federal waters (outside of 3 miles on the Atlantic side of the Keys, and outside of 9 miles on the Gulf of Mexico side of the Keys), the fishery is regulated by the respective NMFS fishery management councils. However, NMFS usually changes their regulations to reflect the management decisions of the FWC [Cox, 2004].

Regulations in place to protect the lobster population include catch limits, size limits, limitations on the numbers of traps each fisherman can deploy, and requirements that traps contain escape holes for undersized animals and include degradable sections to prevent “ghost fishing” by lost traps [GoM FMC, 1999]. The minimum size for legal spiny lobster is 3 inches carapace length or 5.5 inches tail length [Raymond, 2004]; minimum size was one of the first management measures introduced, in the early 1970s [Spiny Lobster FMP/EIS, 1982].

Florida state authorities monitor the spiny lobster fishery via dockside inspections, at-sea checks of traps and buoys, collection of trip tickets from wholesale seafood dealers, and random sampling of product at “Fish Houses” (lobster dealer/processors) [Stock Assessment Update 2000; Swingle et al., 2001].

Management has steadily implemented scientific advice since the first Spiny Lobster FMP was implemented in 1982 [Spiny Lobster FMP/EIS, 1982]. Minimum size limits, trap reduction programs, and gear and effort restrictions protecting juvenile lobsters have all resulted from management implementing advice of scientific advisors (though it may be noted that management action often lagged scientific consensus by several year) [Hunt 2000; Spiny Lobster FMP/EIS, 1982; Spiny Lobster FMP Amendment 1, 1987; Spiny Lobster FMP Regulatory Amendment 2, 1993; Spiny Lobster FMP Final Amendment 4, 1994; Stock Assessment 1999; Stock Assessment Update 2000].

Though the Florida spiny lobster population hovers near its overfishing threshold, it has been hovering at that same population threshold for 30 years [Stock Assessment Update, 2000]. Likewise, although the fishery depends on new recruits, it has been so structured since the early 1970s [First FMP, 1981; Stock Assessment Update, 2000]. Management has kept the fishery productive and taken steps to ensure long-term sustainability, including introduction of minimum size limits; rules to protect reproductive females; introduction of escape vents to minimize bycatch of undersized lobsters; limits on the number of juveniles that can be taken as live bait; handling rules to maximize survival of juveniles that *are* used for live bait; and, most recently, trap reduction programs [Stock Assessment, 1999; Stock Assessment Update, 2000].

Brazil

Brazil’s spiny lobster fisheries are managed by a body whose name translates as “Institute for the Environment and Renewable Natural Resources”, whose acronym is IBAMA. While heavy commercial exploitation of spiny lobster began in 1962 [Fontales-Filho, 2000], management regulations were first put into place in 1975 [Fontales-Filho, 2000]. Current regulations include a minimum legal size of 65 mm CL; a closed season of 120 days, January 1-April 30. Prohibition on take of egg-bearing females was lifted in 1986, and the bottom gill nets prohibition was lifted in 1992. Hookah diving is prohibited for being unselective and because of death and injuries caused by the unsafe equipment and conflicts for the resource [Schärer, 2005].

Brazil’s lobster fishery is open-entry [Fontales-Filho, 2000]. The prohibition on commercial diving is widely ignored and the fishery is in the midst of “what might be called a lobster rush” [Fontales-Filho, 2000], because the national need for income and employment overshadows ecological concerns [Fontales-Filho, 2000; Chaffee, 2003]. Pro-industry and pro-employment government policies offer economic subsidies (discount on fuel in spite of the excessive fleet) to the large industrial fishery and lobster-processing concerns, even when operating costs outweigh profits [Fontales-Filho, 2000].

Brazil’s fishery is unlike most other Caribbean lobster fisheries in that it is legal to “tail” the lobsters on board ship and land the tails only [Fontales-Filho, 2000]. Unfortunately, this practice decreases the quality of the finished product and its consequent value on the U.S. market [Fontales-Filho, 2000]. There have been efforts to improve the economic return of the fishery by

equipping boats to land lobsters alive, allowing for a higher-value finished product, but these improvements have not been adopted and there is no marketing effort to export live lobsters even though artisanal sail boat fishers land live lobsters [Fonteles-Filho, 2000].

Brazil's management laws are not very progressive, consisting only of basic conservation measures such as size limits, closed season and mesh sizes [Schärer, 2005]. However, outside observers note that enforcement appears almost nil [Fonteles-Filho, 2000; Samudra, 2001a; Chafee, 2003; Raymond, 2003]. There is a great deal of unlicensed fishing: even in the Prainha do Canto Verde artisanal group that sought MSC certification, approximately 60 of 200 fishers were unlicensed [Schärer, 2005]. The situation is exacerbated because there are currently two Brazilian federal agencies in a "power struggle" for control of the fishery [Samudra, 2001a].

Since 2001 fishing sector stakeholders and researchers have advocated prohibition of gillnets, which has contributed to the excessive fishing effort (together with hookah operating vessels). But fishing industry interests then changed their minds and started to lobby the Ibama President to allow gillnets in the fishery. The government decided to allow the continued use of gillnets under political pressure despite a majority vote by the members of the National Stakeholders Management Group for sustainable Lobster Fishery (CGSL Comité de Gestão para Pesca Sustentável da Lagosta) to prohibit gillnets indefinitely [Schärer, 2005].

The hookah fishery is also of great concern because of conflicts with artisanal fishers over the resource and the many, often fatal accidents, to divers. Hookah diving and gillnets are very efficient capture methods and fishers estimate that they represent 90% of fishing effort - a deadly combination for a resource in serious trouble. There is no political will to solve the problem [Schärer, 2005].

The lobster fishery is going through a process of re-artesanalization. After the government financed surge by the industrial/commercial fishery from 1967 to 1988 (Government Decree No.221/67), all industrial vessels have abandoned the fishery in the last few years and fishing industries limit themselves to buy catches from the small scale fishery [Diegues, 2004].

Undersized lobster traffic is a very lucrative business (see table, below). The profit of US\$ 15,000 per container does not include bribes to inspectors and enforcement agents within Brazil. Companies which export undersized lobsters use this profit to drive up the price paid to producers for legal size lobsters, trying to drive competitors out of the market. There is one criminal case being investigated by police in Fortaleza about a known lobster exporter who was shot to death in December of 2004. Three more people were assassinated since then in what police believe to be "*queima de arquivo*" elimination of witnesses or killers. The State Attorney of Ceará is investigating a document which ties three more lobster exporters to the case.

Exporters have become extremely creative when it comes to getting around the law to export undersized lobsters. One shipment to Miami was stopped by Ibama inspectors (July 2005) who were looking for adulterated lobsters. With an incision at the end of the tail the lobsters instantly "grow" by 1 to 2 cm with careful stretching. The adulteration is very hard to discover and was only possible due to insider information. It seems that some honest enforcement agents from Ibama are catching up with the exporters. They seized 1,250 kgs of undersized lobsters and are preparing the case for prosecution of federal crimes. Cooperation of artisanal fishers,

communities and NGO's has helped Ibama enforcement agents with insider information to increase apprehension over the last three years.

An industry source that does not export undersized lobsters has made the following calculation of the profit potential per container exported*:

PRODUCT	PURCHASE COST. **	US\$ PRIZE	SALE REVENUE	MARKETING EXPORT COSTS	PROFIT
10,000 KG UNDERSIZE LOBSTER	R\$ 200,000 R\$ 20.00/kg US\$ 100,000	18.00	US\$ 180,000	US\$ 22,700	US\$ 57,300
10,000 KG LEGAL SIZE LOBSTER	R\$ 630,000 R\$ 63.00/kg US\$ 315,000	32.40	US\$ 324,000	US\$ 22,700	LOSS US\$ 13,700***

* Source of information known to Scharer (2005).

** Exchange rate US\$ 1.00 – R\$ 2.00 (2001)

*** Exporters (who work within the law) say that they loose a small amount on lobster exports, but compensate this with profits from shrimp exports!

As noted by MSC during its preliminary certification process [Samudra, 2001a], the artisianal Prainha do Canto Verde fishery has good local management control. However, federal management by IBAMA has been quite ineffective and has not taken action to slow or reverse stock declines---only to subsidize and expand the fishery [Samudra, 2001a; Chaffee, 2003].

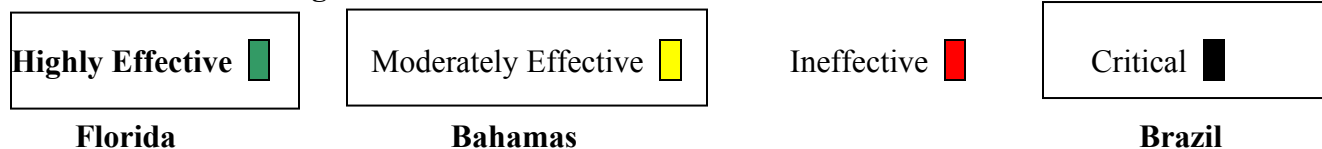
In early 2004, NOAA and the state of Florida seized 30,000 undersized lobster tails originating from Brazil. These 3-ounce tails convert to lobsters that were taken when below Brazil's minimum legal size of 13 cm [Raymond, 2004].

Bahamas

The Bahamas are part of an international management group, the Caribbean Regional Fisheries Mechanism (CFRM), which has, as its stated goal, the “sustainable use” of the region's fishery resources [CFRM, 2003]. The CFRM has science and policy units [CFRM, 2003]. However, U.S. scientists who have worked in the Bahamas note that participation in such bodies is generally a matter of meetings that do not translate into management action [Hunt, 2003]. Hunt notes that several region-wide management agencies (CARICOM, Government of Caribbean Fisheries) have been attempted before the CFRM, but tend to fail to produce action, because of a lack of economic resources and a region-wide lasiez-faire attitude toward fisheries management [Hunt, 2003]. The national government of the Bahamas began minimal management of their lobster stocks in the 1980s, after foreign fishers were banned from the Bahamian EEZ [Cox, 2003]. Management regulations include lobster-fishing seasons, gear restrictions, no take of egg-bearing females, and a minimum size of 3-1/2 inches carapace length and 5.5 inches tail length [Cox, 2003; Raymond, 2004]. The Bahamian fisheries director works closely with NOAA's enforcement agents, and violations of its management law in lobster imported to the U.S. are relatively rare [Raymond, 2004]. The Bahamian government has expressed support for the creation of a network of marine reserves, but this is still in the planning stages [CRFM Bahamas, 2003]. The first stock assessment of Bahama's lobsters is planned, but the basic population

research needed is just beginning and it will be several years before this stock assessment can be published [Muench, 2003].

Effectiveness of Management Rank:



Overall Evaluation and Seafood Recommendation

The Florida spiny lobster fishery is strictly managed and scientifically well-assessed. Conversely, the spiny lobster fisheries in the Bahamas and Brazil are poorly managed and understood. Lobster from these regions are captured before they reach reproductive maturity or caught illegally and limited data about population health are available to determine wise management practices. Spiny lobster, therefore, is a “Best Choice” when sourced from Florida, a “Good Alternative” when from the Bahamas, but is best “Avoided” when imported from Brazil.

Table of Sustainability Ranks

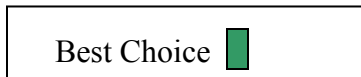
Sustainability Criteria	Conservation Concern			
	Low	Moderate	High	Critical
Inherent Vulnerability	√ (all)			
Status of Stocks		√(FL, Bahamas)	√ (Brazil)	
Nature of Bycatch	√(FL, Bahamas)	√ (Brazil)		
Habitat Effects	√(FL, Bahamas)	√ (Brazil)		
Management Effectiveness	√ (US)	√ (Bahamas)		√ (Brazil)

About the Overall Seafood Recommendation:

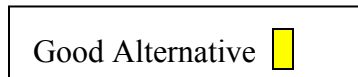
- A seafood product is ranked **Avoid** if two or more criteria are of High Conservation Concern (red) OR if one or more criteria are of Critical Conservation Concern (black) in the table above.
- A seafood product is ranked **Good Alternative** if the five criteria “average” to yellow (Moderate Conservation Concern) OR if the “Status of Stocks” and “Management Effectiveness” criteria are both of Moderate Conservation Concern.

- A seafood product is ranked **Best Choice** if three or more criteria are of Low Conservation Concern (green) and the remaining criteria are not of High or Critical Conservation Concern.

Overall Seafood Recommendation for Caribbean Spiny Lobster:



Florida



Bahamas



Brazil

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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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