Final Amendment 11

to the Fishery Management Plan for Spiny Lobster in the Gulf of Mexico and South Atlantic

Final Supplemental Environmental Impact Statement

April 2012

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Final Amendment 11 to the Fishery Management Plan for Spiny Lobster in the Gulf of Mexico and South Atlantic Regions

INCLUDING A FINAL SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT (FSEIS), REGULATORY IMPACT REVIEW (RIR), AND REGULATORY FLEXIBILITY ACT ANALYSIS (RFAA)

Proposed actions: Establish trap line marking requirements and closed areas to protect *Acropora* spp. coral species.

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SEIS - NOAA Fisheries Service

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Abstract

The Gulf of Mexico and South Atlantic Fishery Management Councils (Councils) jointly manage the spiny lobster fishery. NOAA Fisheries Service, in collaboration with the Councils, has developed this FSEIS to describe and analyze management alternatives to address the requirements of the Endangered Species Act. Two actions are being considered in Amendment 11: 1) closing areas to either all spiny lobster fishing or lobster trap fishing to protect threatened corals and 2) requiring markings for spiny lobster trap lines to allow identification of trap lines entangling protected species.

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Abbreviations and Acronyms used in this Document

APA	Administrative Procedure Act
B_{MSY}	biomass at MSY
Bi Op	biological opinion
CEA	Cumulative Effects Analysis
CEQ	Council on Environmental Quality
CFMC	Caribbean Fishery Management Council
CFR	Code of Federal Regulations
Councils	Gulf of Mexico Fishery and South Atlantic Management Councils
CPUE	catch per unit effort
CZMA	Coastal Zone Management Act
DNA	deoxyribonucleic acid
DQA	Data Quality Act
EEZ	Exclusive Economic Zone
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
EJ	Environmental Justice
EO	Executive Order
ESA	Endangered Species Act
FAC	Florida Administrative Code
FIS	Fishery Impact Statement
FKNMS	Florida Keys National Marine Sanctuary
FMP	fishery management plan
ft	feet
FTT	Florida trip ticket
FWC	Florida Fish and Wildlife Conservation Commission
FWS	United States Fish and Wildlife Service
GC	general counsel
GMFMC	Gulf of Mexico Fishery Management Council
Gulf	Gulf of Mexico
ITS	incidental take statement
lb	pounds
M	instantaneous natural mortality rate
m	meters
Magnuson-Stevens Act	Magnuson-Stevens Fishery Conservation and Management Act
MMPA	Marine Mammal Protection Act
mp	million pounds
MRIP	Marine Recreational Information Program
MSY	maximum sustainable yield
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NOAA Fisheries	Same as NMFS
OMB	Office of Management and Budget
PRA	Paperwork Reduction Act

RFAA	Regulatory Flexibility Act Analysis
RIR	regulatory impact review
RO	Research Only area
RPM	reasonable and prudent measure
SAC	Sanctuary Advisory Council
SAFMC	South Atlantic Fishery Management Council
SBA	Small Business Administration
Secretary	Secretary of Commerce
SEDAR	Southeast Data Assessment Review (stock assessment)
SEFSC	Southeast Fisheries Science Center of NMFS
SEIS	Supplemental Environmental Impact Statement
SoVI	Social Vulnerability Index
SPA	Sanctuary Preservation Area
SSC	Scientific and Statistical Committee
T/Cs	terms and conditions
UV	ultra-violet
VEC	valued environmental component
ww	whole weight

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List of Preferred Alternatives

Action 1: Limit Spiny Lobster Fishing in Certain Areas in the Exclusive Economic Zone (EEZ) off the Florida Keys to Protect Threatened Staghorn (*Acropora cervicornis*) and Elkhorn (*Acropora palmata*) Corals

Preferred Alternative 3: Create new closed areas in the EEZ off the Florida Keys with identified *Acropora* spp. colonies inside straight-line boundaries.
Preferred Option a. In the closed areas, spiny lobster trapping would be prohibited.

Action 2: Require Gear Markings for Spiny Lobster Trap Lines in the EEZ off Florida.

Preferred Alternative 1: No Action – do not require markings for spiny lobster trap lines.

What is a Council preferred alternative?

By using alternatives, fishery managers can weigh the pros and cons of different solutions and select the approach that best meets the need for the action. The preferred alternatives listed above are the Gulf of Mexico and South Atlantic Fishery Management Councils' choices after reviewing public comment.

Executive Summary

The Gulf of Mexico and South Atlantic Fishery Management Councils (Councils) jointly manage the Fishery Management Plan for the Spiny Lobster Fishery in the Gulf of Mexico and South Atlantic (Spiny Lobster FMP). The purpose of this amendment is to consider changes to the Spiny Lobster FMP to address the requirements of a biological opinion prepared under the Endangered Species Act. The regulations are expected to be implemented in 2012.

BACKGROUND

What Actions Are Being Proposed?

The Councils considered the following:

- Closing areas to either all spiny lobster fishing or lobster trap fishing to protect threatened corals.
- Requiring markings for spiny lobster trap lines to allow identification of trap lines entangling protected species.

Where is the Project Located?

Management of the federal spiny lobster fishery is located in the South Atlantic and Gulf of Mexico in the U.S. Exclusive Economic Zone (EEZ). The EEZ is 3-200 nautical miles off most states, but 9-200 nautical miles off Florida's west coast and Texas.

Who is Proposing the Action?

The Councils are proposing the actions. The Councils develop amendments and submit them to NOAA Fisheries Service who ultimately approves, disapproves, or partially approves the actions in the amendment on behalf of the Secretary of Commerce. NOAA Fisheries Service is an agency in the National Oceanic and Atmospheric Administration.

Gulf of Mexico & South Atlantic Fishery Management Councils

- Responsible for conservation and management of fish stocks
- Consist of 13-17 voting members who are appointed by the Secretary of Commerce
- Responsible for developing fishery management plans and recommend regulations to NOAA Fisheries Service for implementation

NOAA Fisheries Service

- Responsible for preventing overfishing while achieving optimum yield
- Approves, disapproves, or partially approves recommendations of the Councils
- Implements regulations

Why did the Councils Consider Action?

- The purpose of this amendment is to implement conservation measures to help protect threatened and endangered species in a manner that complies with measures established in the 2009 biological opinion on the spiny lobster fishery.
- The need for the proposed actions is to aid in the protection and recovery of endangered and threatened species.

There are two actions in Amendment 11 to address the purpose and need.

MANAGEMENT MEASURES

Action 1: Limit Spiny Lobster Fishing in Certain Areas in the Exclusive Economic Zone (EEZ) off the Florida Keys to Protect Threatened Staghorn (*Acropora cervicornis*) and Elkhorn (*Acropora palmata*) Corals

Alternative 1: No Action – do not limit spiny lobster fishing in the EEZ off the Florida Keys in areas where threatened staghorn and elkhorn corals (*Acropora* spp.) occur.

Alternative 2: Close all known hardbottom in the EEZ off the Florida Keys where *Acropora* spp. occur and in water depths less than 30 meters (approximately 98 feet).

Option a. In the closed areas, spiny lobster trapping would be prohibited.

Option b. In the closed areas, <u>all</u> spiny lobster fishing would be prohibited.

Preferred Alternative 3: Create new closed areas in the EEZ off the Florida Keys with identified *Acropora* spp. colonies inside straight-line boundaries.

Preferred Option a. In the closed areas, spiny lobster trapping would be prohibited.

Option b. In the closed areas, <u>all</u> spiny lobster fishing would be prohibited.

Note: Areas under Alternatives 2 and 3 are all south of US 1, between Key Biscayne and Key West. See Figures 2.1.1-13 for maps of the locations of proposed and existing closed areas and Appendix A for coordinates of each proposed closed area in Alternative 3. Transit would be allowed for vessels traveling through a closed area. The term "transit" is defined as on a direct and continuous course through a closed area.

Overview

The Endangered Species Act (ESA) requires analyses to determine whether, and to what extent, fishing operations impact threatened species including threatened staghorn and elkhorn corals (*Acropora* spp.). The 2009 ESA biological opinion on the spiny lobster fishery requires NOAA Fisheries Service and the Councils to work together to protect areas of staghorn and elkhorn coral by expanding existing or creating new closed areas for lobster trap fishing where colonies of these threatened species are present. Closure of areas to lobster fishing using all gear would further protect coral colonies from damage.

Traps are generally not set directly on corals; instead, they are frequently placed on seagrass and sand bottom. For this reason, movement of traps during storms poses the greatest threat to corals. Therefore, some buffer is needed between the coral colonies and placement of traps. Staff from the Councils and NOAA Fisheries Service worked with various stakeholders to develop the proposed closed areas in **Preferred Alternative 3** of this action. Areas were chosen to protect colonies with high conservation value and areas of high coral density.

Biological Impacts
Alternative 1 would not provide any additional biological benefit to *Acropora spp.* because it would perpetuate the existing level of risk of interaction between these species and the fishery. **Alternative 2** would provide the greatest biological benefit to *Acropora* spp., other coral species, and attached organisms associated with hardbottom habitat. **Preferred Alternative 3, Option a** would reduce the risk of trap damage to *Acropora* spp. by prohibiting the use of traps near areas of high *Acropora* spp. density, established areas used to raise coral for restoration purposes (i.e., coral nurseries), or coral colonies with high conservation value. **Option b** under each alternative would provide greater benefits to the biological environment than **Preferred Option a** because all potential damage from fishing would be reduced.

Economic Impacts
The Atlantic EEZ off Florida (Key Biscayne to Key West) encompasses approximately 60 mi^2 which could support threatened Acropora spp., and this area is being considered for closure to fishing for spiny lobster under **Alternative 2**. **Alternative 2**, **Option b**, would reduce commercial landings of spiny lobster of 274,000 lbs (landings by all gear) and trip gross revenue for spiny lobster ($1.629 million) by 15% to 28%. **Alternative 2, Option a**, is estimated to reduce commercial landings of spiny lobster of 269,000 lbs (landings by traps only) and trip gross revenue ($1.585 million) by 15% to 28%. The reductions in trip gross revenue for either option represent the economic impacts, approximately 1.9% to 3.6% of total gross revenue for all species landed by affected vessels, not enough to change their economic behavior.

Preferred Alternative 3 would create smaller closed areas bound by straight-line boundaries of 5.9 mi^2, which contain identified *Acropora spp*. colonies. This is 9.8% of the area for **Alternative 2** (60 mi^2), and the 9.8% can be applied to the pounds and value data for **Alternative 2** to estimate the economic effect of **Preferred Alternative 3**.

Alternative 3, Option b (all gear), would reduce commercial landings of spiny lobster by 4,042 lbs to 7,544 lbs, and reduce trip gross revenue by $94,482, which represents 0.18% - 0.34% of the vessel gross revenue of $13.0 million for 152 affected vessels. **Preferred Alternative 3, Option a** (trap gear only), would reduce spiny lobster landings by 3,968 lbs - 7,406 lbs, and reduce trip gross revenue for spiny lobster by $23,379 - $43,379. The foregone trip gross revenue represents 0.19% - 0.35% of the vessel gross revenue of $12.511 million for 128 affected vessels.

Social Impacts
In general, positive social benefits from the proposed closed areas under **Alternative 2** and **Preferred Alternative 3** are associated with the biological benefits of protecting the elkhorn and staghorn coral. Corals are part of the ecosystem in which spiny lobster live and are important components of the marine environment. Protection of the corals is expected to contribute to an overall healthy ecosystem and would also contribute to a healthy spiny lobster stock, which would be expected to result in positive social effects for the commercial fishermen as well as broader positive social effects (in terms of the general public) associated with healthy marine ecosystems.

Some general negative social impacts from spatial closures come from limiting or removing fishing opportunities within the

closed areas, which may impact income for commercial fishermen who use the closed areas for harvest. In regards to the options under **Alternative 2** and **Preferred Alternative 3**, prohibiting all fishing, **Option b,** would be expected to impact more fishermen than **Option a**, which would impact only trap fishermen.

Administrative Impacts
Alternatives that create new closed areas would increase the administrative burden over the current level due to changes in maps, outreach and education, and greater enforcement needs. **Alternative 2** would require enforcement over the largest area. **Preferred Alternative 3** would require specification of coordinates because most areas would not be marked. Law enforcement officials have stated **Option b** would be easier to enforce than **Preferred Option a** because any boat in a closed area with lobster on board would be in violation of regulations.

Action 2: Require Gear Markings for Spiny Lobster Trap Lines in the EEZ off Florida

Preferred Alternative 1: No Action – do not require markings for spiny lobster trap lines.

Alternative 2: Require all spiny lobster trap lines in the EEZ off Florida to have a white marking along its entire length, such as an all white line or a white tracer throughout the line. The marking must be visible at all times when traps are in use. All gear must comply with marking requirements no later than August 6, 2017.

Alternative 3: Require all spiny lobster trap lines in the EEZ off Florida to have a permanently affixed white marking at least 4-inch wide spaced at least every 15 ft along the trap line, or at the midpoint if the line is less than 15 ft. The marking must be visible at all times when traps are in use. All gear must comply with marking requirements no later than August 6, 2017.

Note: The white line or line with white tracer proposed under Alternative 2 would also be valid under Alternative 3.

Overview

Trap lines or rope are consistently found as marine debris and most frequently recovered without the buoys or traps still attached. These conditions cause significant difficulty when determining if line found in the environment, or entangling protected species, originated from the spiny lobster trap fishery. A lack of uniquely identifiable markings also makes monitoring incidental take in the fishery, as required by the ESA, difficult. Trap line marking requirements would allow greater accuracy in identifying fishery interaction impacts to benthic habitats and protected species, leading to more targeted measures to reduce the level and severity of those impacts.

Biological Impacts

Preferred Alternative 1 would not provide any additional biological benefit for protected species. **Alternative 2** could have more of an indirect biological benefit than **Alternative 3**, because it requires markings along the entire length of trap lines, minimizing the likelihood that a portion of a spiny lobster trap line is recovered without an identifiable mark. Trap marking requirements would provide better understanding of the frequency of interactions between these species and the fishery. This information could benefit protected species by providing for more targeted management of fishing activities that have the greatest impact on their protection. These requirements could also help rule out the spiny lobster fishery as a potential source of entanglement with protected species.

Economic Impacts

Alternative 2 and **Alternative 3** would have an upper-end economic impact of $383,465, though the economic impact could be much lower, perhaps closer to zero. More information and research is needed to refine this estimate and differentiate the effect of the two alternatives. The upper-end estimate of economic impact, $383,465, represents 8.5% of the trip gross revenue for 271 vessels that land spiny lobster from the EEZ off Florida. This represents the

increase in cost of trap rope replacement, which goes from $510,835 (13.1% of trip gross) to $894,300 (22.9% of trip gross), excluding the cost of labor and other components to make traps usable (traps, buoys, bridles) and it excludes any change in on-vessel equipment. This translates into a 15-year cost of $5.75 million for the EEZ off Florida.

Social Impacts
Overall, **Preferred Alternative 1** would likely have fewer social impacts than **Alternatives 2** and **3. Alternatives 2** and **3** would require some type of marking on trap lines which could resolve any future problems with identification of trap lines interacting with protected species. Marking trap lines could have significant effects on the social environment as it may impose substantial costs to modify the gear compared to **Preferred Alternative 1**. Additionally, the proposed measures under **Alternatives 2** and **3** may generate negative public perception of coral conservation.

Administrative Impacts
Alternatives 2 and **3** would increase the need for enforcement to check if trap lines are properly colored or marked compared to **Preferred Alternative 1**. However, impacts may increase under **Preferred Alternative 1** if new regulations must be imposed on the spiny lobster fishery because of the inability to assign interactions with protected species to another fishery.

Chapter 1. Introduction

This Final Supplemental Environmental Impact Statement (FSEIS) for Amendment 11 to the Fishery Management Plan for Spiny Lobster in the Gulf of Mexico and South Atlantic (Spiny Lobster FMP) would implement measures to protect threatened and endangered species. The Gulf of Mexico (Gulf) and South Atlantic Fishery Management Councils (Councils) jointly manage the Spiny Lobster FMP.

The Councils and NOAA Fisheries Service considered alternatives to address the requirements of the biological opinion (Bi Op) in Amendment 10 to the Spiny Lobster FMP; however, they chose to take no action at that time to allow for additional stakeholder input. The Councils and NOAA Fisheries Service made clear they intend to quickly develop Amendment 11 to put these measures into place as required by the Bi Op on the continued authorization of the Gulf of Mexico and South Atlantic spiny lobster fishery (NMFS 2009, http://sero.nmfs.noaa.gov/sf/pdfs/Spiny_Lobster_10_Appendix%20I.pdf).

1.1 Background

The Endangered Species Act (ESA) of 1973 (16 U.S.C. Section 1531 et seq.) requires that federal agencies ensure actions they authorize, fund, or carry out are not likely to jeopardize the continued existence of threatened or endangered species, or the habitat designated as critical to their survival and recovery. The ESA requires NOAA Fisheries Service to consult with the appropriate administrative agency (itself for most marine species and the U.S. Fish and Wildlife Service for all remaining species) when proposing an action that may affect threatened or endangered species or adversely modify critical habitat. Consultations are necessary to determine the potential impacts of the proposed action. Formal consultations are required when proposed actions may affect and are "likely to adversely affect" threatened or endangered species or adversely modify designated critical habitat. The result of a formal consultation is a Bi Op.

Who's Who?

- NOAA Fisheries Service Protected Resources Division – analyzed data and drafted the biological opinion (Bi Op)
- NOAA Fisheries Service and Council staffs – developed alternatives based on guidance from the Councils, and analyzed the environmental impacts of those alternatives
- Gulf and South Atlantic Councils – determined the range of actions and alternatives, and recommends action to NOAA Fisheries Service
- Secretary of Commerce – Will approve, disapprove, or partially approve the amendment as recommended by the Councils

To satisfy the ESA consultation requirements, NOAA Fisheries Service completed a formal consultation and resulting Bi Op on the spiny lobster fishery in 2009. When making determinations on FMP actions, not only are the effects of the specific proposed actions analyzed, but also the effects of all discretionary fishing activity under the affected FMPs. Thus, the Bi Op analyzed the potential impacts to ESA-listed species from the continued authorization of the federal spiny lobster fishery. The species considered included: ESA-listed marine mammals, Gulf sturgeon, sea turtles, smalltooth sawfish, and elkhorn and staghorn coral. Potential impacts to the designated critical habitat for elkhorn and staghorn corals were also

Purpose for Action

The purpose of this amendment is to implement conservation measures to help protect endangered and threatened species in a manner that complies with measures established in the 2009 biological opinion on the spiny lobster fishery.

Need for Action

The need for the proposed actions is to aid in the protection and recovery of endangered and threatened species.

considered. The Bi Op conducted a step-wise analysis of the fishery and its potential to adversely affect these species. Below is a summary of those steps; the 2009 Bi Op discusses in far greater detail these steps and the how conclusions were reached. During the first step, the Bi Op evaluated whether interactions between federal spiny lobster fishing gear and protected species were likely based on parameters such as species' range and areas of fishery operation. Following the first analysis, the Bi Op concluded that no spiny lobster gear type (i.e., traps, bully nets, or commercial/recreational diving) was likely to adversely affect ESA-listed marine mammals, Gulf sturgeon, or elkhorn and staghorn critical habitat, and they were not discussed further in the Bi Op.

The second step of the analysis identified those species that would likely be adversely affected by the continued authorization of the fishery. The Bi Op concluded that interactions between spiny lobster trap gear and sea turtles, smalltooth sawfish, and elkhorn or staghorn coral were possible. After identifying those species potentially affected, the Bi Op evaluated the likelihood of interactions between these species and each fishing gear/technique (i.e., traps, bully nets, or commercial/recreational diving) based on a number of factors. At the conclusion of the first two analyses, the Bi Op ultimately concluded that only commercial trap gear was likely to adversely affect and "take" sea turtles, smalltooth sawfish, and elkhorn and staghorn corals. However, those adverse affects were not likely to jeopardize the continued existence of those species.

To "take" a listed species means to "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage" in any of those activities [ESA Section 3(19)]. Under the ESA, takes of most listed species are prohibited by law. Some take of ESA-listed species can be authorized following the completion of a Bi Op, which issues an incidental take statement (ITS). An ITS allows a specific number of takes to lawfully occur if the takes are incidental to otherwise legal fishing, and if certain measures meant to minimize the impacts from and monitor the frequency of those incidental takes are followed.

The 2009 Bi Op issued an ITS authorizing a specific number of incidental takes of green, hawksbill, Kemp's ridley, leatherback, and loggerhead sea turtles, smalltooth sawfish, and elkhorn and staghorn coral. Reasonable and prudent measures to minimize and monitor the impact of these incidental takes were specified, along with terms and conditions to implement them. Specific terms and conditions required to implement the prescribed reasonable and prudent measures include, but are not limited to, creating new or expanding existing closed areas to protect coral and implementing trap line-marking requirements. The actions proposed in this amendment are being considered to implement the terms and conditions of the Bi Op.

Once considered dominant reef building species, elkhorn and staghorn corals underwent precipitous declines in the early 1980s throughout their ranges and this decline has continued (*Acropora* BRT 2005). Because of their once vast abundance on Caribbean reefs prior to the early 1980s, researchers/divers rarely took time to collect information on such a common species. As a result little quantitative data on changes to distribution and abundance are currently available. However, in the few locations where quantitative data are available (e.g., Florida Keys, Dry Tortugas, Belize, Jamaica, and the U.S.V.I.), declines in abundance (coverage and colony numbers) are estimated at approximately 97% of historic levels (*Acropora* BRT 2005). Although this decline has been documented as on-going during the late 1990s, and even in the past five years in some locations, local extinctions (i.e., at the island or country scale) have not been rigorously documented (*Acropora* BRT 2005).

The branching morphology of elkhorn and staghorn corals causes colonies of any size to be susceptible to fragmentation/breakage and abrasion from fishing activity. Creating closed areas would reduce the likelihood of commercial spiny lobster traps coming into contact with colonies even if they are moved by storms. Trap line marking requirements would allow greater accuracy in identifying fishery interactions with protected species and improve the capability for monitoring incidental take as required under the ESA.

1.2 Management History

The Fishery Management Plan for Spiny Lobster in the Gulf of Mexico and the South Atlantic largely extended Florida's rules regulating the fishery to the exclusive economic zone (EEZ) throughout the range of the fishery, i.e., North Carolina to Texas. The FMP regulations were effective on July 2, 1982 (47 FR 29203). A complete history of amendments to the FMP can be found in Amendment 10 to the FMP.

Amendment 10, with Environmental Impact Statement, effective January 3, 2012, made the following changes in the management regime:

- Removed four species of lobster from federal management
- Established an annual catch limit, annual catch target, and accountability measure for Caribbean spiny lobster
- Required fishermen with tailing permits to land spiny lobster all whole or all tailed, and requires applicants for a tailing permit to possess either a federal spiny lobster permit or the Florida permits required for commercial lobster fishermen
- Allows retention of up to 50 Caribbean spiny lobsters under the minimum size limit and one per trap
- Provides authority to Florida to remove derelict spiny lobster traps in federal waters under the state trap clean-up program
- Revises the protocol for cooperation with Florida and the framework procedure
- Revises how maximum sustainable yield, overfishing threshold and overfished threshold are calculated

The actions in this amendment were also in Amendment 10; however, the Councils decided to develop Amendment 11 to allow more time for stakeholder input. Scoping for Amendment 10

covered these issues. Summaries of the scoping and public hearing meetings can be found in Appendix F of Amendment 10 (http://sero.nmfs.noaa.gov/sf/SpinyLobsterAmendment.htm). The following is a list of the changes made to the two actions originally contained in Amendment 10.

- For Action 1, **Alternatives 1** and **2** cover the range of alternatives, from no additional closures to closing all hardbottom, and are the same in this amendment as Amendment 10.
- For Action 1, **Alternative 3** is based on additional data and stakeholder input not available during the development of Amendment 10. The alternatives no longer include small, medium, and large closed areas because the alternative results in an adequate buffer between the corals and fishing activity.
- For Action 1, **Option a** and **Option b** are the same in this amendment as Amendment 10.
- For Action 2, the alternatives are essentially the same except the phase-in period has been extended from 2014 to 2017 and the rope color has been designated as white.

The Secretary of Commerce approved Amendment 10 on November 17, 2011. The final rule published in the *Federal Register* on December 2, 2011, and was effective January 3, 2012.

Chapter 2. Management Alternatives

2.1 Action 1: Limit Spiny Lobster Fishing in Certain Areas in the Exclusive Economic Zone (EEZ) off the Florida Keys to Protect Threatened Staghorn (*Acropora cervicornis*) and Elkhorn (*Acropora palmata*) Corals

Alternative 1: No Action – do not limit spiny lobster fishing in the EEZ off the Florida Keys in areas where threatened staghorn and elkhorn corals (*Acropora* spp.) occur.

Alternative 2: Close all known hardbottom in the EEZ off the Florida Keys where *Acropora* spp. occur and in water depths less than 30 meters (approximately 98 feet).

Option a. In the closed areas, spiny lobster trapping would be prohibited.

Option b. In the closed areas, <u>all</u> spiny lobster fishing would be prohibited.

Preferred Alternative 3: Create new closed areas in the EEZ off the Florida Keys with identified *Acropora* spp. colonies inside straight-line boundaries.

Preferred Option a. In the closed areas, spiny lobster trapping would be prohibited.

Option b. In the closed areas, <u>all</u> spiny lobster fishing would be prohibited.

Note: Areas under Alternatives 2 and 3 are all south of US 1, between Key Biscayne and Key West. See Figures 2.1.1-13 for maps of the locations of proposed and existing closed areas and Appendix A for coordinates of each proposed closed area in Alternative 3. Transit would be allowed for vessels traveling through a closed area. The term "transit" is defined as on a direct and continuous course through a closed area.

Discussion: The 2009 biological opinion on the spiny lobster fishery (Bi Op) requires NOAA Fisheries Service and the Gulf of Mexico (Gulf) and South Atlantic Councils (Councils) to work together to protect areas with staghorn and elkhorn corals (*Acropora* spp.) by expanding existing or creating new closed areas for lobster trap fishing where colonies of these threatened species are present (NMFS 2009, http://sero.nmfs.noaa.gov/sf/pdfs/Spiny_Lobster_10_Appendix%20I.pdf).

During the development of this amendment, maps with the locations of hardbottom habitat and threatened coral colonies (i.e., elkhorn and staghorn) were developed with help from state and federal agencies as well as other groups including: Florida Fish and Wildlife Research Institute, Florida Keys National Marine Sanctuary, Mote Marine Laboratory, The Nature Conservancy, University of North Carolina at Wilmington, and the Coral Restoration Foundation. Data from individual research scientists were also included. More information about the methods used to establish the baseline maps can be found in Appendix G. The resulting dataset used in this amendment contained 6,853 identified *Acropora* spp. colonies.

After the baseline maps were created, the following six general criteria (in no particular order) were used as guidance to develop the proposed areas for closure in this amendment: 1) protect all

elkhorn coral because of their relative rarity in the Florida Keys; 2) protect areas where elkhorn and staghorn corals co-occur; 3) distribute areas throughout the Florida Keys (to the greatest extent practicable); 4) select areas that not only protect elkhorn and staghorn coral, but may also protect seven species of corals currently proposed for listing under the Endangered Species Act (ESA); 5) include *Acropora* coral nurseries[1] if possible; and 6) protect the largest colonies with the greatest sexual reproductive potential (i.e., "super colonies ").

The general criteria used for site selection were developed with stakeholder input. Protection of all elkhorn corals was recommended because the species is relatively rare in the Florida Keys, and recovery of the species in the area will require protection of the remaining colonies. Providing protection for areas where elkhorn and staghorn corals co-occur was recommended because such areas are relatively rare in the Florida Keys and the conservation benefits of such area closures are maximized by providing protection for both species. Distributing area closures throughout the Florida Keys was recommended to reduce disproportionate effects to the industry, particularly in the Upper Keys where bathymetry and existing area closures have already reduced fishable habitat. Stakeholders also recommended trying to select areas for potential closure that may also provide protection to seven species of coral currently being reviewed by NOAA Fisheries Service for listing under the ESA. However, point location data were not available for all species proposed for listing. The species for which point location data were available did not co-occur with elkhorn and staghorn corals. Therefore, protecting all seven species of coral proposed for listing would require the creation of additional closed areas and would be outside the scope of this amendment.

Stakeholders also recommended considering area closures for *Acropora* coral nurseries because these areas are susceptible to the same trap impacts.[1] Based on that input, five coral nurseries are proposed for inclusion in area closures. These nurseries are areas whose sole purpose is to legally collect *Acropora* spp. coral fragments, raise them to a transplantable size, and then use these colonies in restoration efforts throughout the Florida Keys. All coral nursery operators working with *Acropora* spp. in the Florida Keys have a permit from the Florida Keys National Marine Sanctuary (FKNMS) to collect and grow *Acropora* spp. and their activities have undergone ESA consultation through NOAA Fisheries Service. The nursery areas are sited on sandy bottom areas approved by FKNMS staff.

Protecting the largest colonies was also recommended because of their reproductive value. Elkhorn and staghorn corals can reproduce both sexual and asexually (Aronson and Precht 2001), but successful sexual reproduction will likely need to play a major role in elkhorn and staghorn coral recovery (Bruckner 2002). Because the sizes of elkhorn and staghorn corals are directly proportional to their fecundity, large "super colonies" represent an essential source of gamete production. Elkhorn corals with a living tissue surface area of 1,000 cm^2 could be considered "super colonies" (M. Chiappone, pers. comm.). A similar distinction could be made for staghorn corals with a living tissue surface area of 500 cm^2 (M. Chiappone pers. comm.). Some researchers have suggested colony dimensions would be a better metric for defining a

[1] *Acropora* spp. coral nurseries are permitted locations used for proactive conservation activities. At these field sites, small fragments of *Acropora* spp. colonies are grown to sizes large enough to be transplanted safely in support of restoration/recovery activities. For further discussion of *Acropora* spp. nurseries in the Florida Keys, see http://coralrestoration.org/CRF/index.php?option=com_content&view=category&layout=blog&id=49&Itemid=91.

"super colony" rather than the area of live tissue. Given the information available at the time of the development of this amendment, super colonies were defined based on the live tissue approach described previously.

The FKNMS has designated 15 Research Only (RO) and Sanctuary Preservation Areas (SPAs) in federal waters where all fishing is prohibited [15 CFR 922.164(d)(iii)]. *Acropora* spp. occur at relatively high densities in many of these areas. Of the 6,853 colonies identified, 3,747 are already protected by these areas. However, a number of *Acropora* spp. colonies, some in high density with great conservation value, exist outside these closed areas. Creating new closed areas would reduce the likelihood of interactions between spiny lobster traps and coral colonies not currently inside an existing closed area. If all lobster fishing is prohibited, even greater protection to coral colonies could be realized.

More information about the Florida Keys National Marine Sanctuary can be found at http://floridakeys.noaa.gov/regs/welcome.html

The areas proposed in this amendment do not include the already existing FKNMS areas. Creating buffers around the FKNMS SPAs or ROs would not include many additional colonies of high density and great conservation value. Further, law enforcement officials have indicated buffers are difficult to enforce because buffers by definition are not closed areas, but areas to protect closed areas. Therefore, fishing in buffer areas may not be viewed as a violation. Concurrent to the development of this amendment, FKNMS is conducting an independent evaluation of its existing management areas and the activities authorized or prohibited in those zones (i.e., commercial fishing, recreational fishing/diving, research, etc.). After that evaluation is complete, FKNMS may choose to implement new regulations or modify the existing regulations on the activities allowed or prohibited in those management areas. One possible outcome could be a prohibition of all diving and trapping for spiny lobster inside some or all management zones. Regardless of the actions taken by the Councils, FKNMS is likely to proceed with the independent evaluation of their existing management zones.

Any actions taken by the Councils will not affect existing FKNMS regulations or management zones. Once FKNMS' comprehensive review and re-zoning is complete, NOAA Fisheries Service and the Councils may work with FKNMS to review all areas closed to lobster fishing to determine if the existing closed areas are still meeting the conservation goals, or whether changes should be recommended. The ESA requires the status of each listed species be reviewed periodically; reviews are generally conducted every five years. A five-year review is an assessment using the most recent information on a listed species to determine whether its status has changed since the time of its listing such that it should be delisted or reclassified. Because five-year reviews consider the most recent information on a species, NOAA Fisheries Service and the Councils may wish to conduct periodic reviews of proposed closed areas to coincide with the five-year status reviews for *Acropora* spp.

Transit would be allowed through lobster closed areas under the same conditions as for other closed areas. Transit is defined as on a direct and continuous course through a closed area. This transit provision is necessary because most lobster fishermen set traps seaward of the reef tract

and vessels must cross the reef tract to return to port. In some areas, avoiding closed areas would require vessels to travel miles out of their way, potentially compromising safety at sea. Thus, fishers would be allowed to possess spiny lobster when transiting a closed area.

> From the Bi Op: NMFS, in cooperation with the Florida Keys National Marine Sanctuary, Gulf of Mexico and South Atlantic Fishery Management Councils, must work to establish new closed areas or expand the size of existing closed areas in waters under their jurisdiction where *Acropora* spp. are present to prohibit spiny lobster trap fishing. This will reduce the likelihood of spiny lobster traps affecting *Acropora* spp.

The Councils chose to take no action on this issue in Amendment 10 to consider additional data and to allow more time for input from stakeholders regarding which areas to close. The intent was to provide the greatest protection to *Acropora* spp. while leaving as much area open to fishing as possible. The Councils and NOAA Fisheries Service indicated they would quickly develop Amendment 11 to address this issue. On July 12-13, 2011, the Florida Keys Commercial Fishermen's Association held a meeting to provide stakeholder input on the location of the proposed closed areas to protect *Acropora* spp. Entities involved in this meeting included experts from the FKNMS, the Florida Fish and Wildlife Conservation Commission, the Florida Keys Commercial Fishermen's Association, the FKNMS Sanctuary Advisory Council (SAC), and environmental organizations.

Alternative 1 would not meet the requirement established under the Bi Op. If the Councils had decided to take no action, NOAA Fisheries Service would have determined if implementing these measures under Magnuson-Stevens Fishery Conservation and Management Act or ESA authority was necessary. **Alternative 1** would not provide any additional biological benefit to *Acropora* spp., because it would perpetuate the existing level of risk of interaction between these species and the fishery. **Alternative 1** would not close any new areas; therefore, it would not have any near-term economic impact, but it could have an economic impact over the long term, if more extensive closures than in **Alternative 2** and **Preferred Alternative 3** were required in the future.

Alternative 2 would provide the greatest biological benefit to *Acropora* spp., other coral species, and attached organisms on hardbottom habitat. **Alternative 2** would prohibit spiny lobster trapping (**Option a**) or all spiny lobster fishing (**Option b**) on all hardbottom areas in the Florida EEZ south of US 1, from Key Biscayne to Key West, that support *Acropora* spp. Essentially, every identified threatened coral colony on the map would be protected under this alternative[2], as well as those that have not been identified. This alternative would reduce the likelihood of interactions between spiny lobster gear in this area and *Acropora* spp. **Alternative 2** would close approximately 60 mi^2 of the Florida EEZ from approximately Key West to Key Biscayne. Closing all hardbottom areas to trapping would reduce the area available to trapping and may make trapping impractical and would result in negative social and economic impacts. Although spiny lobster fishermen do not deliberately set traps on corals, they do set them very near the colonies.

[2] Some identified colonies in Figures 2.1.1-13 may appear to be sited outside the hardbottom areas due to a lack of resolution during the mapping of the hardbottom. However, these colonies are by definition on hardbottom and would be protected under regulations prohibiting lobster fishing on "all known hardbottom."

The primary challenge with selecting closed areas is balancing benefits to the fishery and impacts to the environment. Relative to **Alternative 2**, **Preferred Alternative 3** would be less biologically beneficial to *Acropora* spp. colonies, but would be less restrictive to fishermen. This alternative provides a reasonable buffer around *Acropora* spp. colonies without closing large areas of bottom suitable for lobster trapping. The amount of area is based on protecting colonies from movement of traps. Non-tropical storm systems can move traps 100 ft from their original locations (Lewis et al. 2009). However, stronger storms (i.e., tropical systems) can move traps many times farther.

Preferred Alternative 3 would establish straight-line boxes around identified *Acropora* spp. colonies or groups of colonies that includes approximately 500 ft of area between the colonies and where traps could be set. The boundaries of all the closed areas usually form right angles to improve compliance and support enforcement. In general, boxes were drawn around clusters of colonies, and oriented along the reef tract to reduce the amount of non-hardbottom (fishable) areas closed to fishing (see Appendix G for more detailed discussion of methods). Originally, 56 closed areas were created covering 6.7 mi^2; however, in response to an industry request, three of those areas were split into smaller areas to reduce the amount of fishable bottom that would be closed. As a result, **Preferred Alternative 3** would close 60 areas covering approximately 5.9 mi^2, approximately 2.4 mi^2 of which is anticipated to be fishable (i.e., non-hardbottom) habitat.

This alternative would encompass 3,044 identified colonies; combined with colonies already protected by FKNMS closed areas, approximately 6,791 of the identified *Acropora* spp. colonies (99%) would be protected in the Florida Keys. It is important to note that identified colonies are colonies that have been visually identified during sampling. Colony density estimates by site and habitat, together with mapping information on the total amount of habitat available, can be used to derive estimates of total colony abundance. This approach was used to estimate the number of colonies for the entire Florida Keys, even in locations where no sampling had been conducted. Because the assessment was able to estimate colonies in non-sampled locations, it concluded a far greater number of colonies may exist than those identified during sampling. Specifically, the assessment estimated up to 13 million staghorn colonies, and as many as 1.6 million elkhorn colonies may exist in the region. However, the assessment estimated most staghorn colonies (approximately 75%) were small, between 0.1 in^2 and 5 in^2 (0-150 cm^2) (Miller et al. 2008a). Elkhorn colonies were far less common, but slightly larger. The majority of elkhorn colonies (approximately 69%) ranged in size from 0.1 in^2 to 9 in^2 (0-500 cm^2) (Miller et al. 2008a).[3] In corals, the chance of survival is closely related to colony size; the smaller the colony, the less likely it is to survive (Hughes and Jackson 1985; Babcock 1991; Vermeij and Sandin 2008; Albright et al. 2010). The stock assessment (i.e., Miller et al. 2008) indicates the majority of the colonies that may occur in the Florida Keys are small with a lower chance of survival.

Option b under each alternative would provide slightly more biological benefit to *Acropora* spp. colonies than **Preferred Option a** because it would prohibit all fishing for spiny lobster in the proposed closed areas. Although the impacts to *Acropora* spp. from diving for spiny lobster are unknown, various studies throughout the Caribbean and Indo-Pacific show that other types of diving and associated anchoring adversely affect corals. This literature indicates that

[3] For reference, a U.S. dollar bill is approximately 15 in^2 (101 cm^2).

recreational divers targeting spiny lobster and commercial lobster divers could have negative impacts to coral and the surrounding habitat; therefore, **Option b** would provide additional benefits because it would reduce the likelihood that adverse effects from diving and anchoring could occur. The overall size of the proposed closed areas is less relevant when discussing the impacts from diving because divers must be in very close proximity to colonies to impact them. Thus, simply prohibiting the practice of diving for spiny lobster inside the proposed closed areas would help minimize any potential threat. However, the Bi Op concluded that only commercial trap gear was likely to adversely affect and "take" sea turtles, smalltooth sawfish, and elkhorn and staghorn corals. Therefore, **Option a** meets the recommendations of the Bi Op.

Although the FKNMS management zone review is unrelated to this amendment, the FKNMS SAC is aware of the actions proposed here, and has discussed this amendment during SAC meetings. As a result of those discussions, the SAC passed a resolution on August 16, 2011, regarding their preference on which alternative they would like to see selected for this action. Specifically, the resolution asked the FKNMS Superintendent to convey to the Councils and NOAA Fisheries Service that the SAC would prefer the alternative that creates new or expands existing closed areas in which all spiny lobster fishing is prohibited (**Option b**). The SAC is an advisory body to the FKNMS superintendent, and the opinions and findings of the resolution do not necessarily reflect the position of FKNMS or NOAA Fisheries Service.

Figures 2.1.1-13 show the proposed closed areas for **Preferred Alternative 3** from west to east. Blue dots ● represent identified *Acropora* spp. colonies; hash-marked boxes show the proposed straight-line closed areas. In addition, hardbottom areas that would be closed under **Alternative 2** are shown on each map. Coordinates for the proposed closed areas under **Preferred Alternative 3** are in Appendix A. The maps can also be viewed at http://gulfcouncil.org/resources/Spiny_Maps.php

FKNMS SPAs and RO areas are shown in the figures. These areas are not being created by this amendment, but are existing areas that provide protection to *Acropora* spp.

With certain exceptions, the following activities are prohibited in SPAs:

- Discharging any matter except cooling water or engine exhaust.
- Fishing by any means; removing, harvesting, or possessing any marine life. Catch and release fishing by trolling is allowed in Conch Reef, Alligator Reef, Sombrero Reef, and Sand Key SPAs only.
- Touching or standing on living or dead coral.
- Anchoring on living or dead coral or any attached organism.
- Anchoring when a mooring buoy is available.
- Bait fishing is allowed in SPAs by Florida Keys National Marine Sanctuary permit.

Similarly the following activities are prohibited in RO Areas:

- Entry or activity without a Florida Keys National Marine Sanctuary permit.
- Discharging any matter except cooling water or engine exhaust.
- Fishing by any means; removing, harvesting, or possessing any marine life.
- Touching or standing on living or dead coral.
- Anchoring on living or dead coral, or any attached organism.

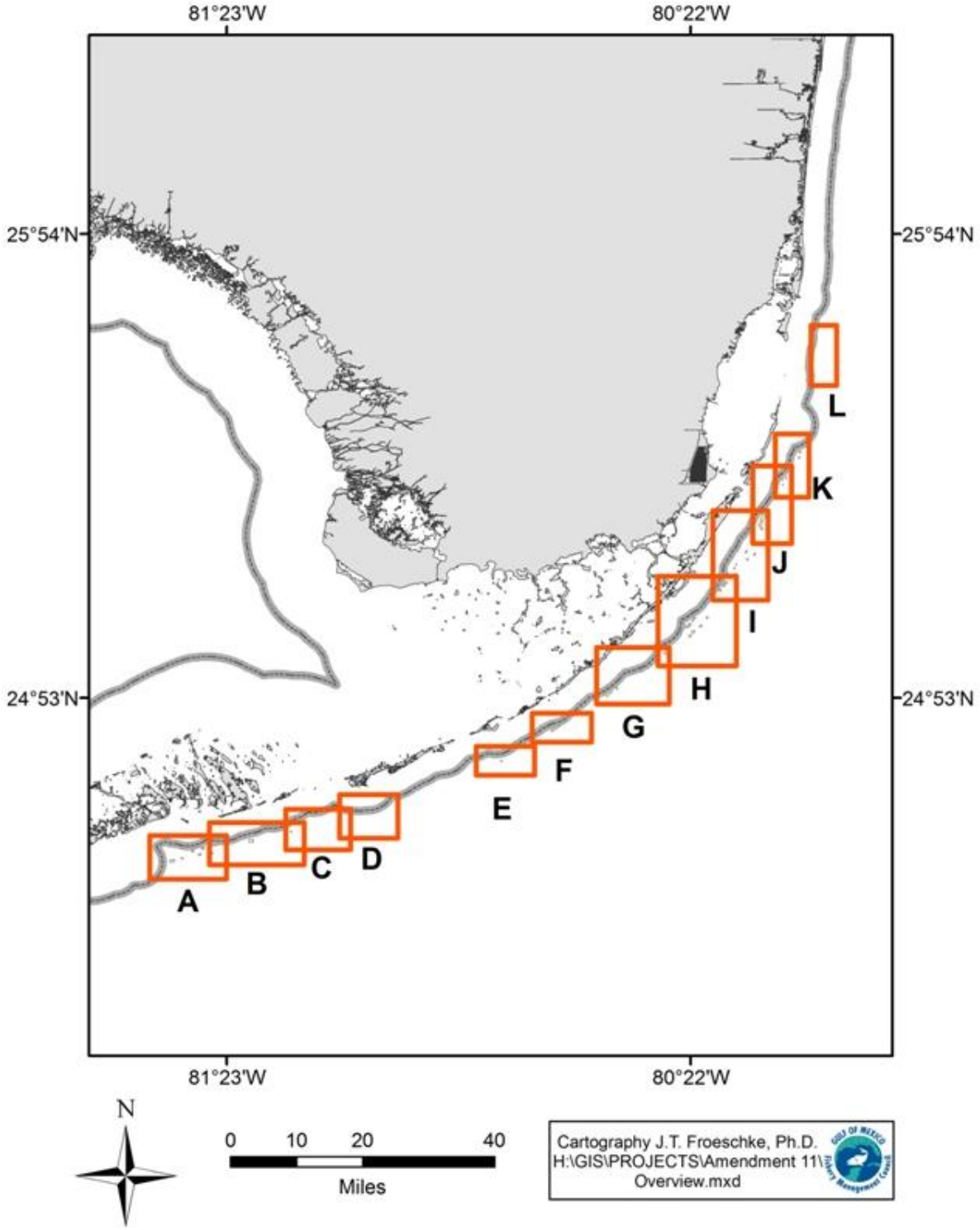

Figure 2.1.1. Overview of Florida Keys and maps showing proposed closed areas.

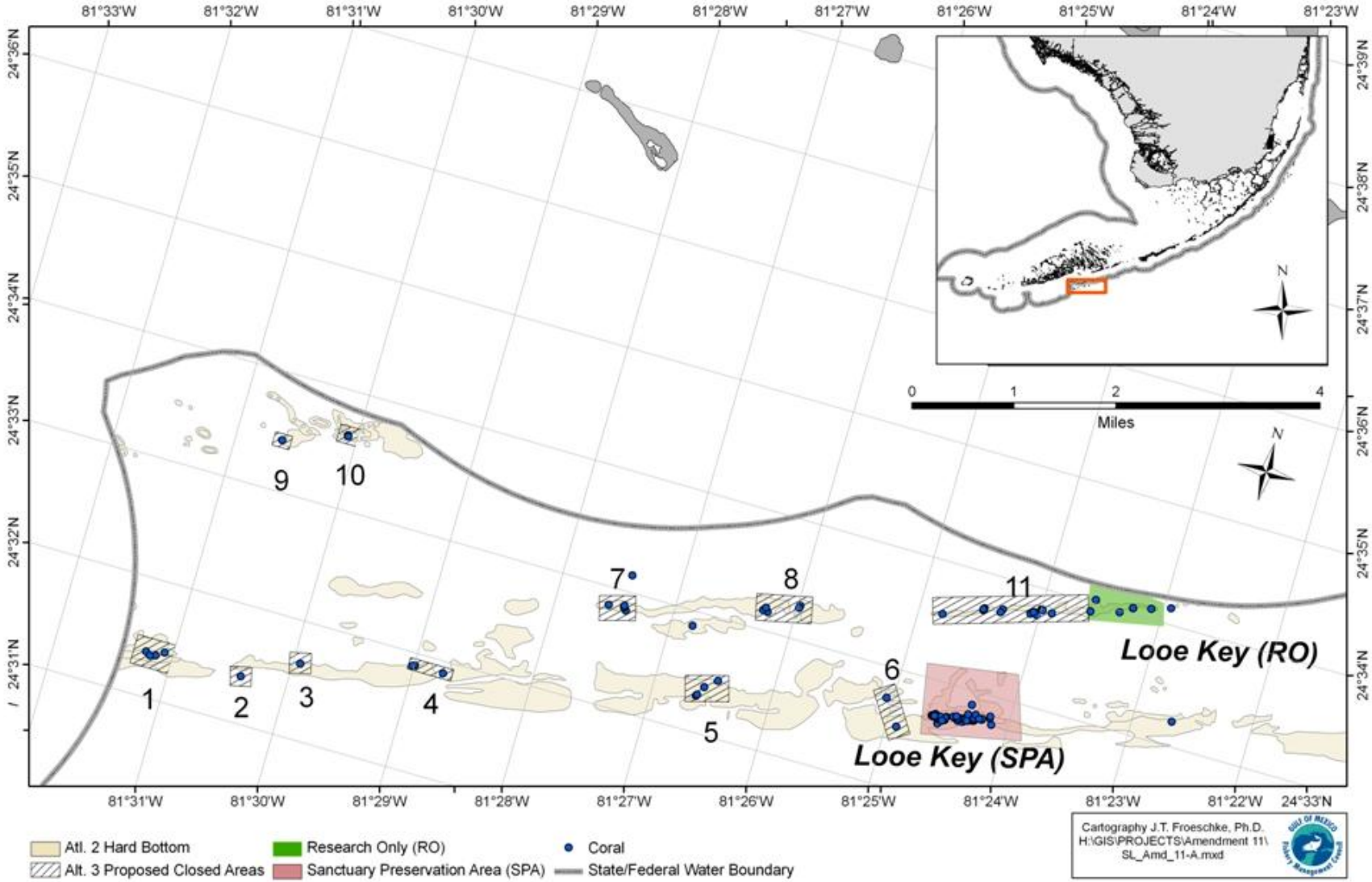

Figure 2.1.2. Map A showing proposed closed areas.

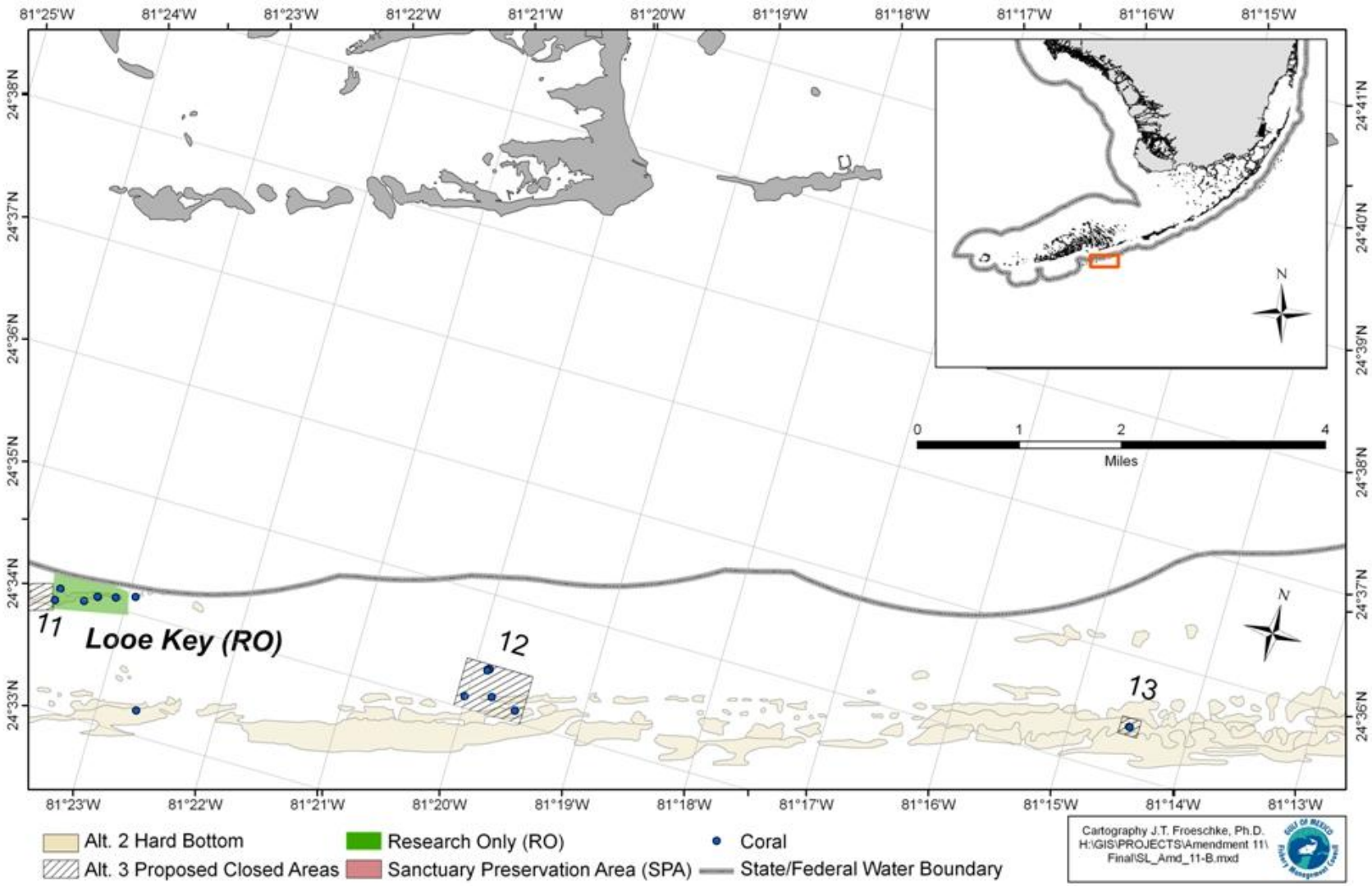

Figure 2.1.3. Map B showing proposed closed areas.

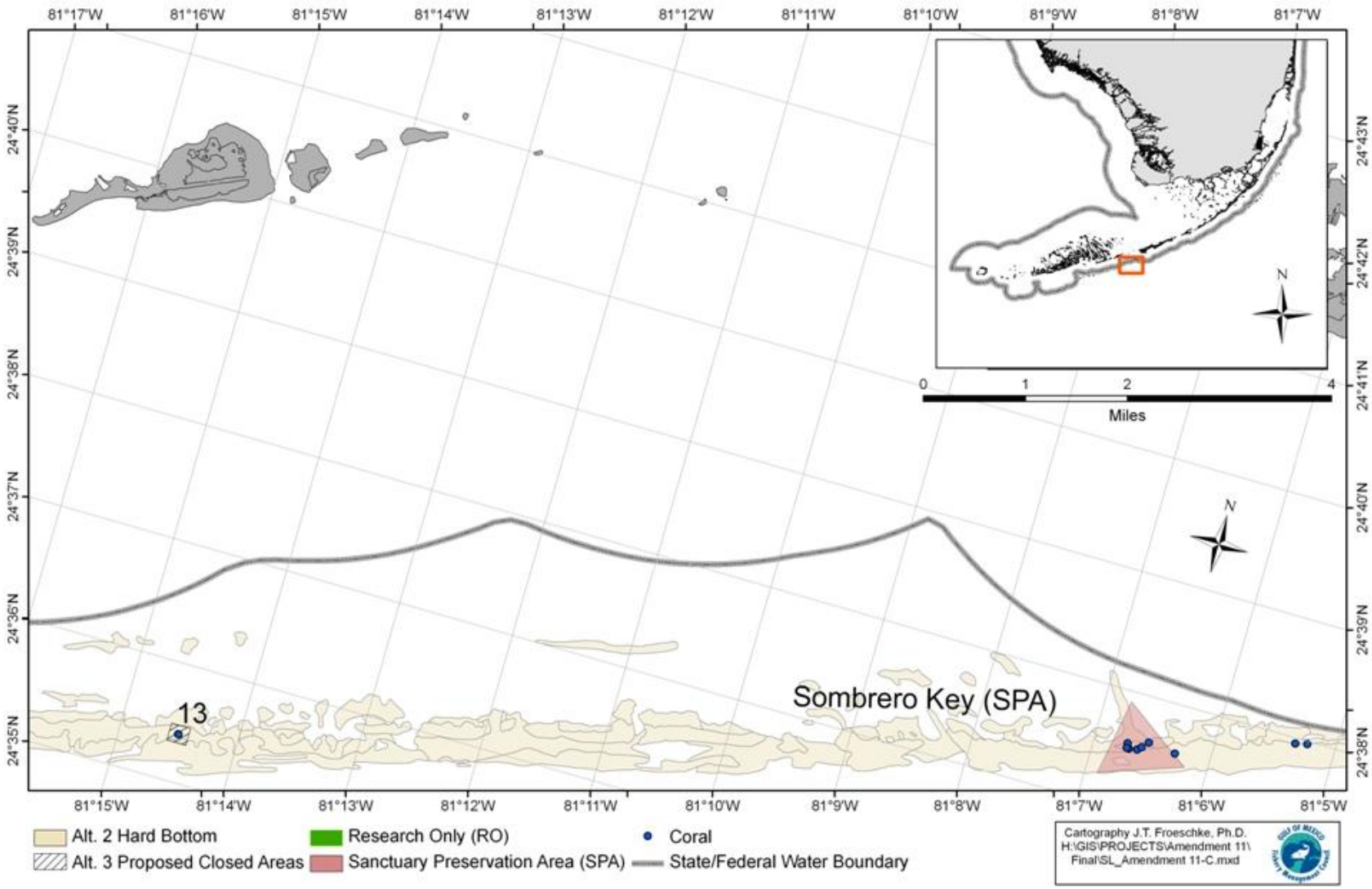

Figure 2.1.4. Map C showing proposed closed areas.

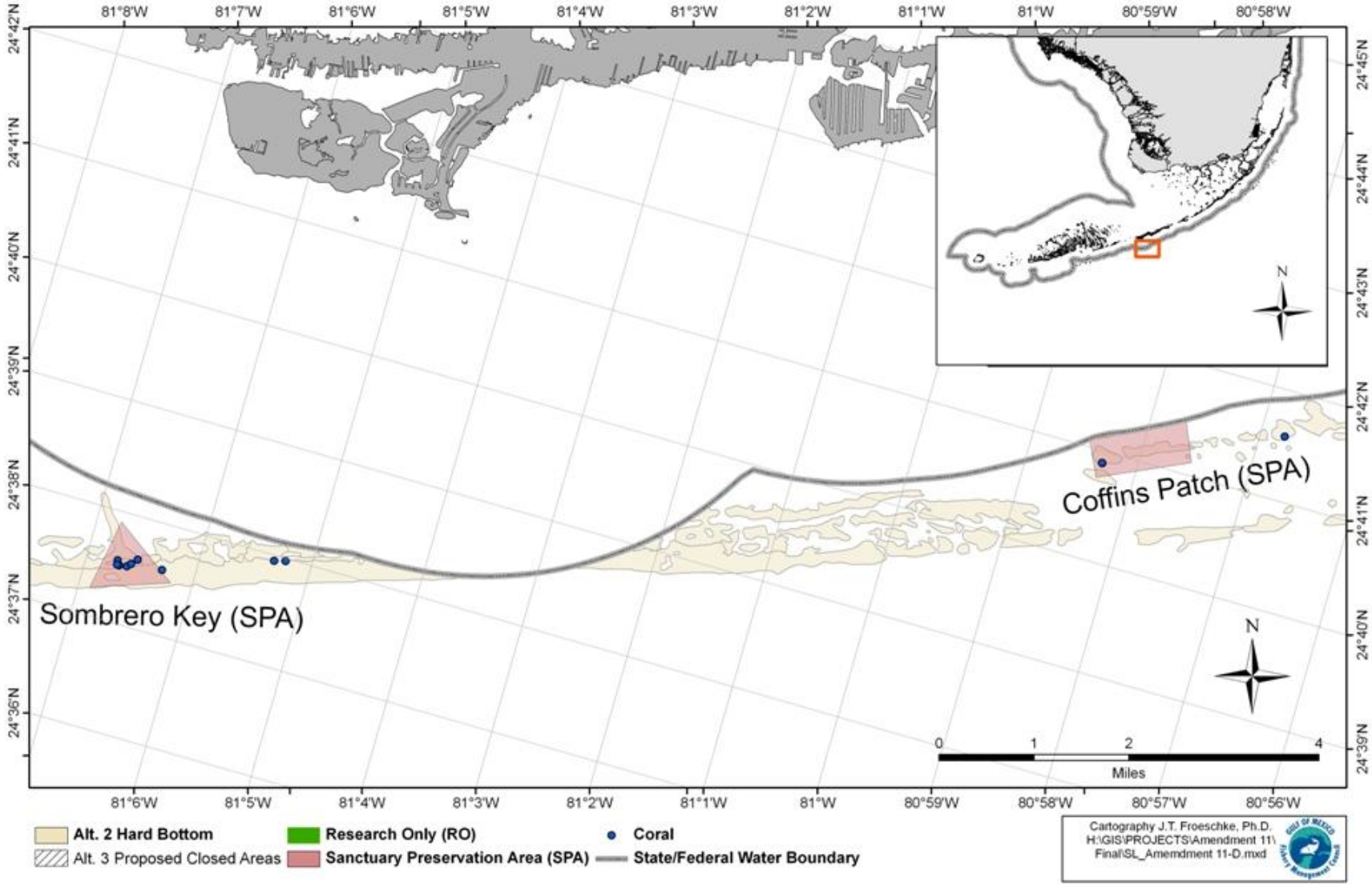

Figure 2.1.5. Map D showing proposed closed areas.

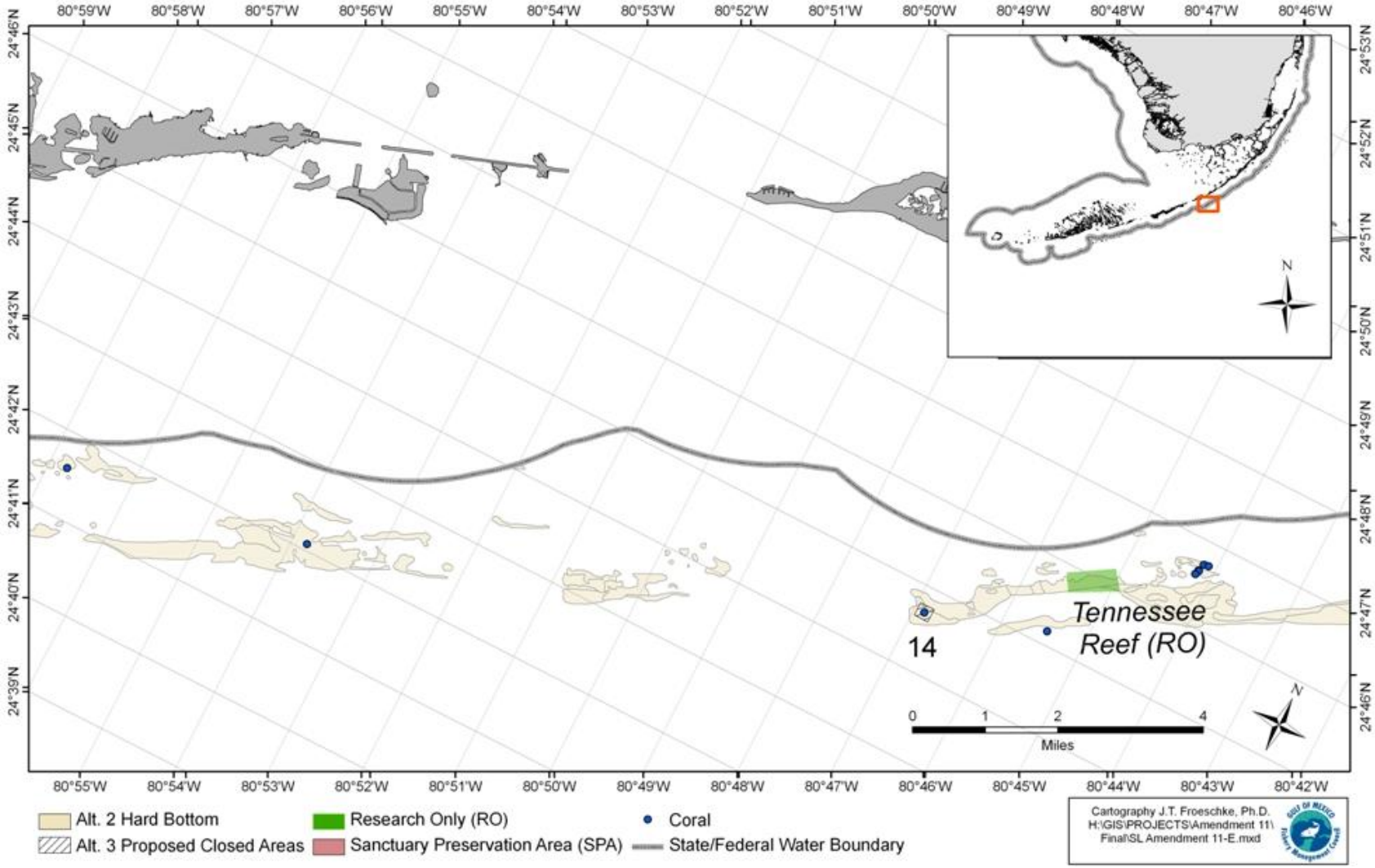

Figure 2.1.6. Map E showing proposed closed areas.

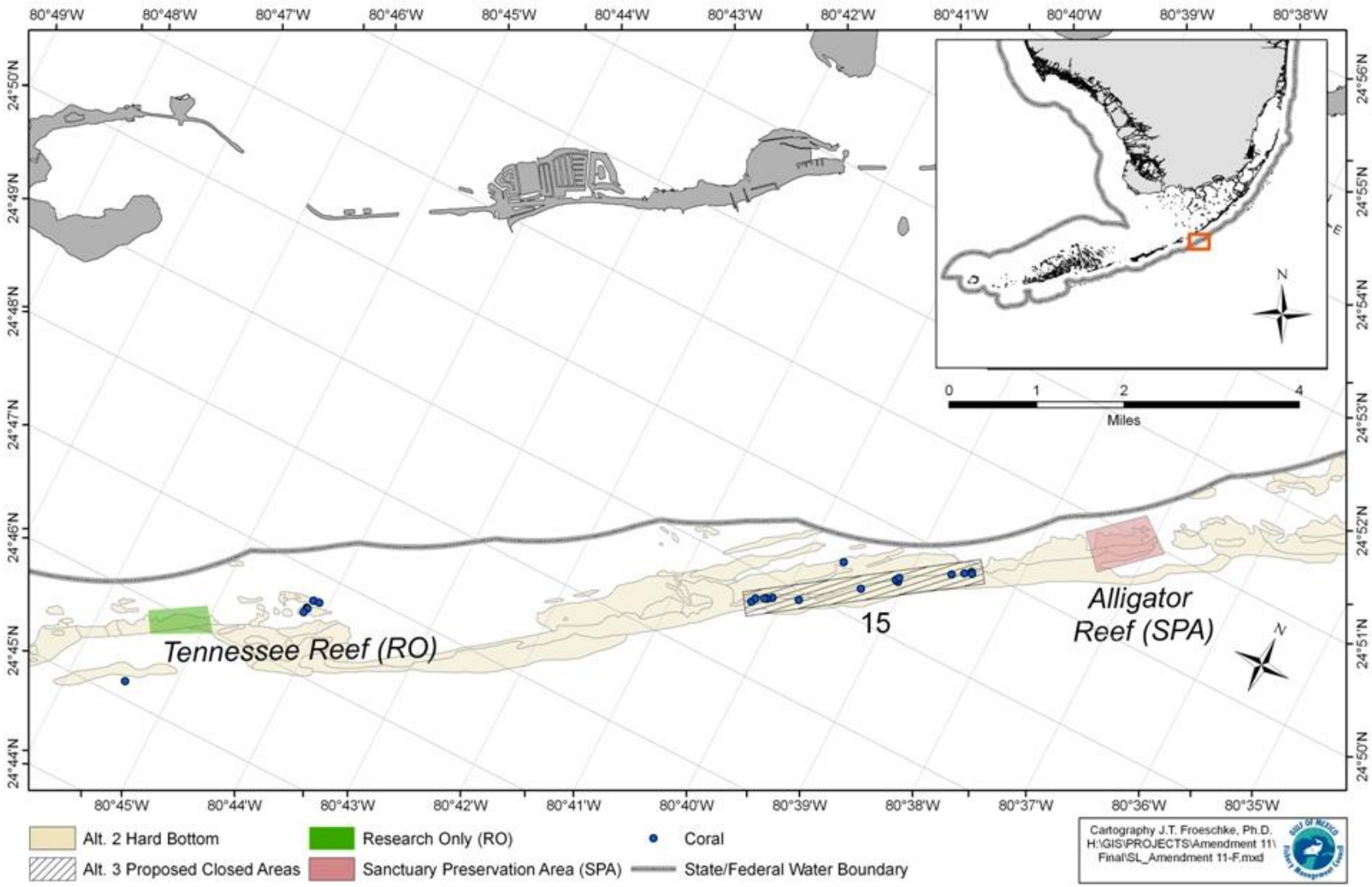

Figure 2.1.7. Map F showing proposed closed areas.

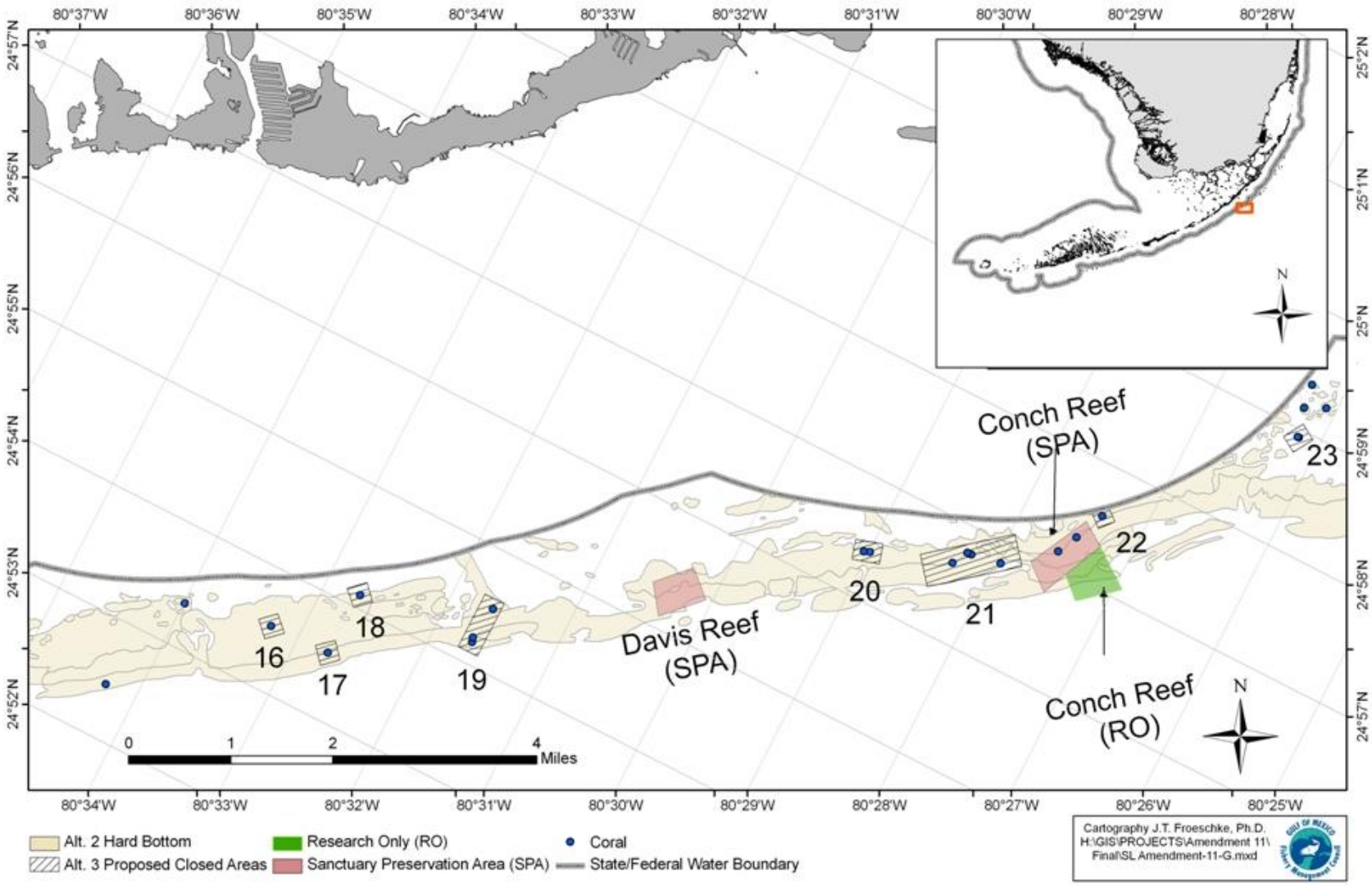

Figure 2.1.8. Map G showing proposed closed areas.

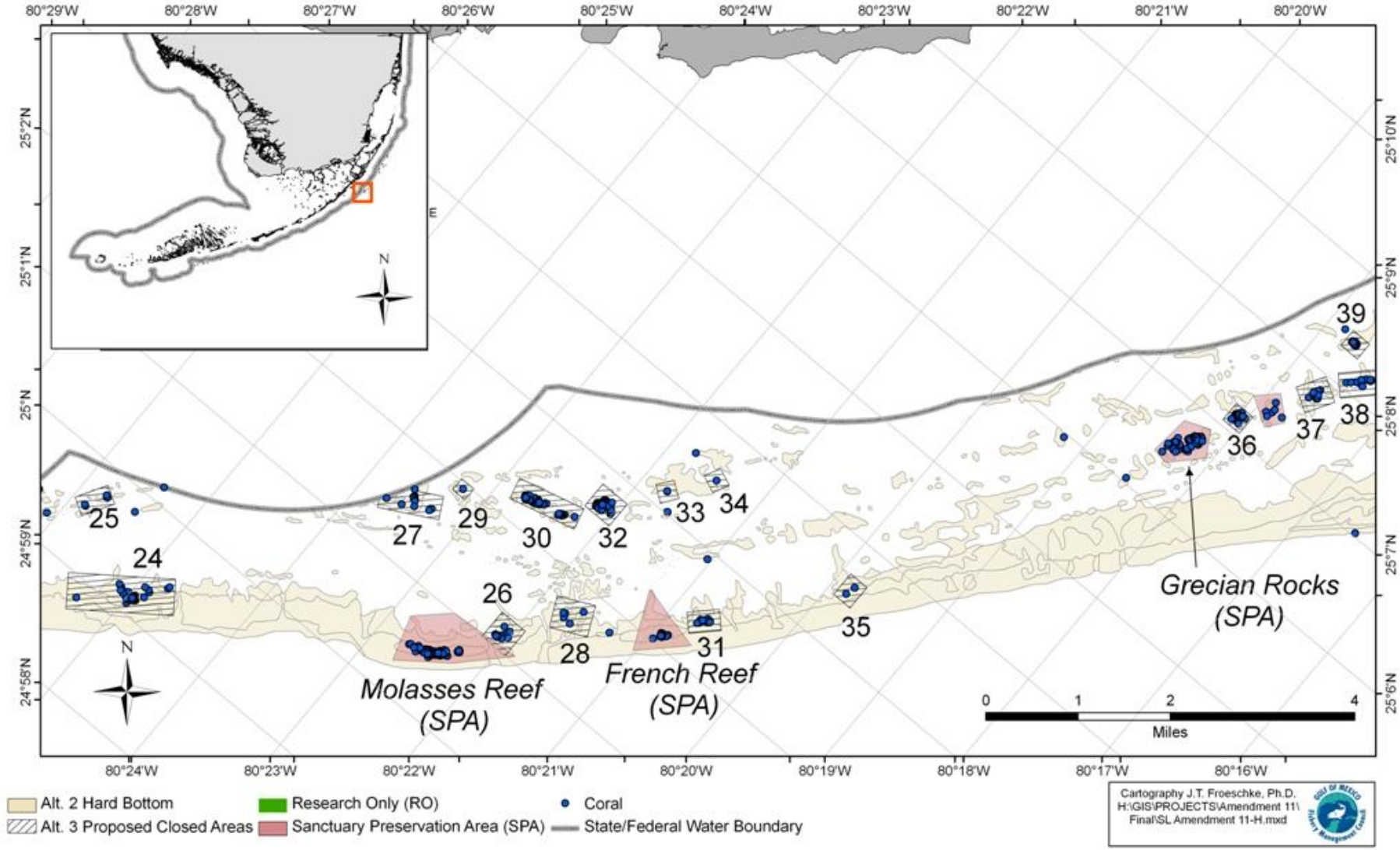

Figure 2.1.9. Map H showing proposed closed areas.

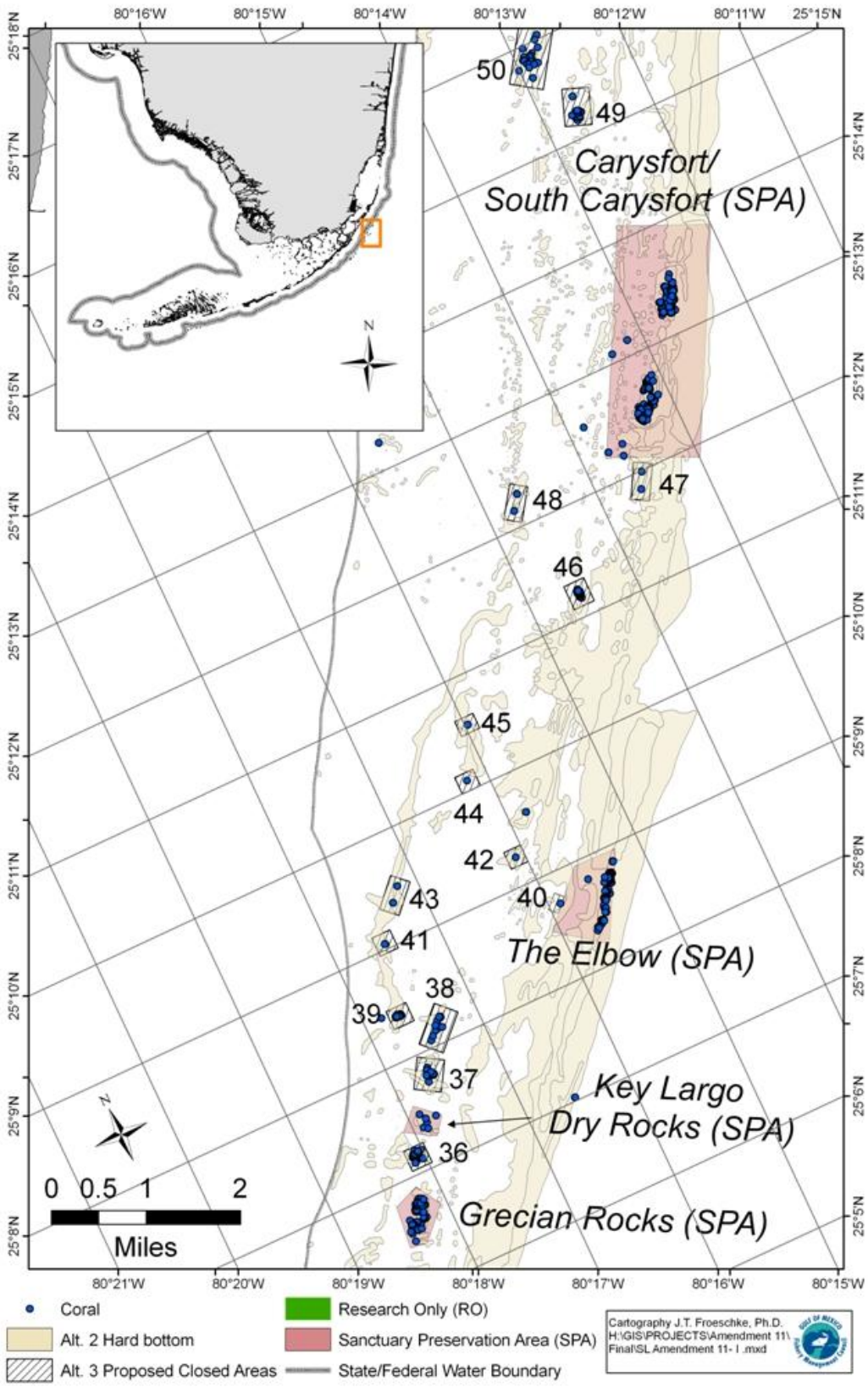

Figure 2.1.10. Map I showing proposed closed areas.

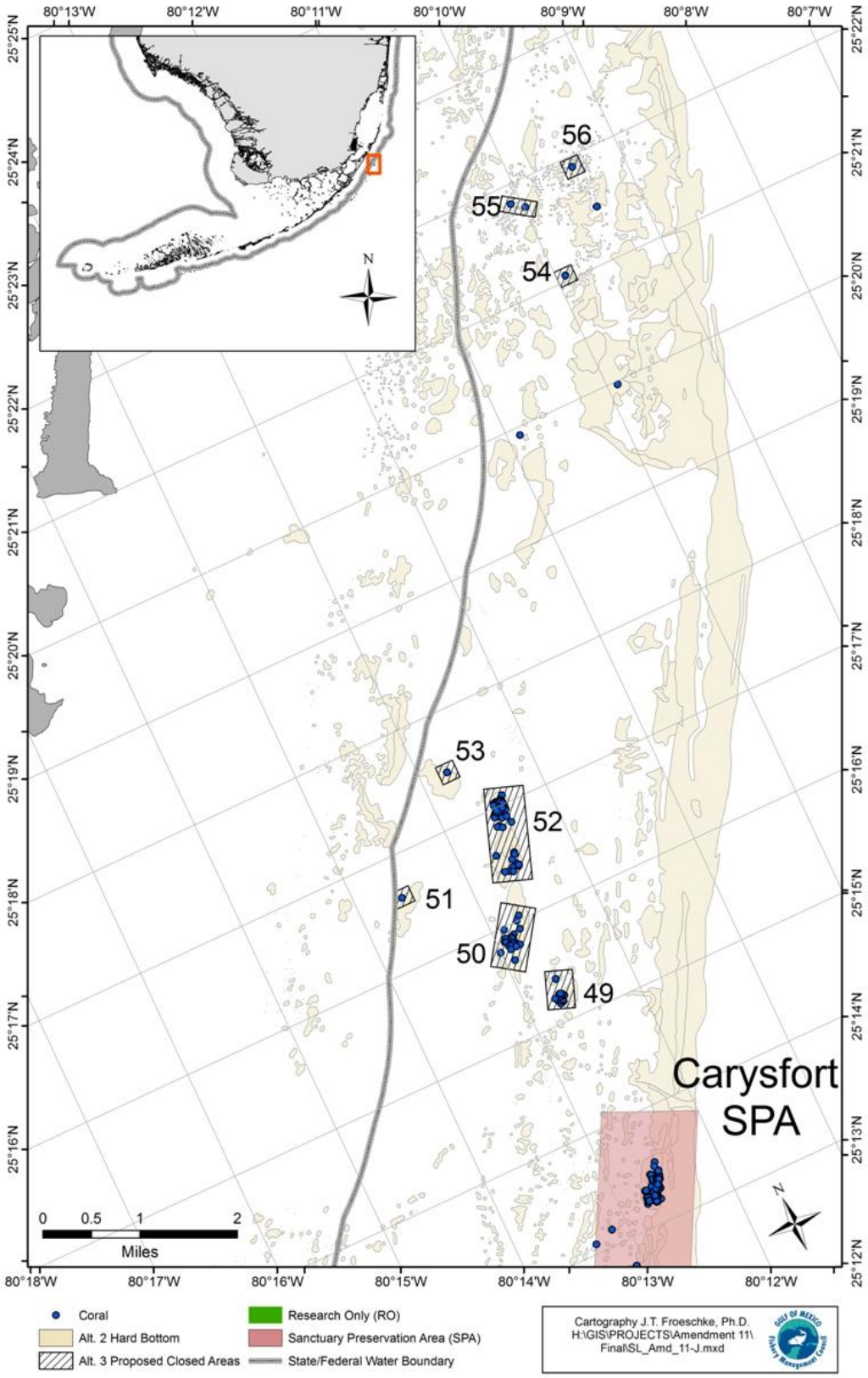

Figure 2.1.11. Map J showing proposed closed areas.

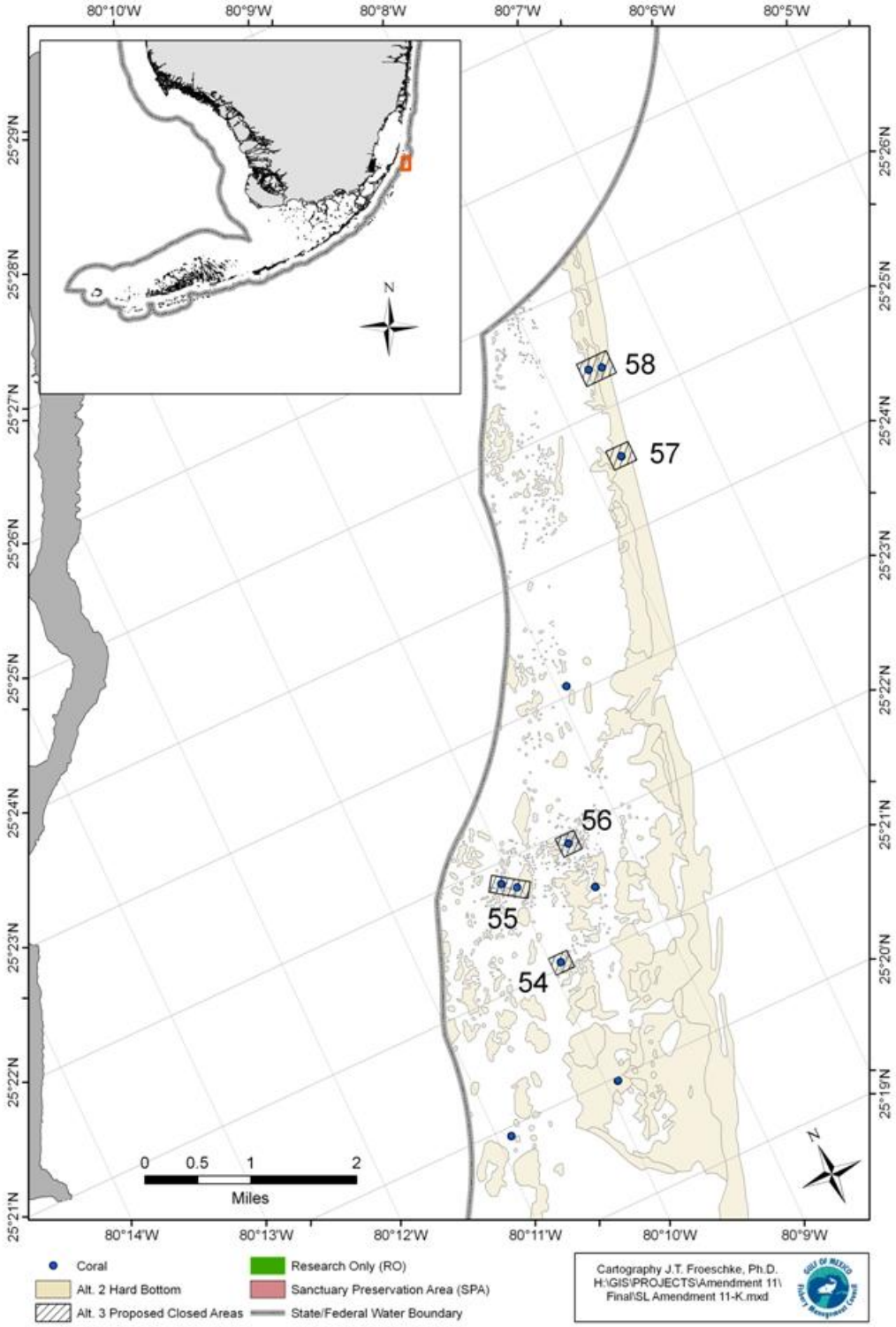

Figure 2.1.12. Map K showing proposed closed areas.

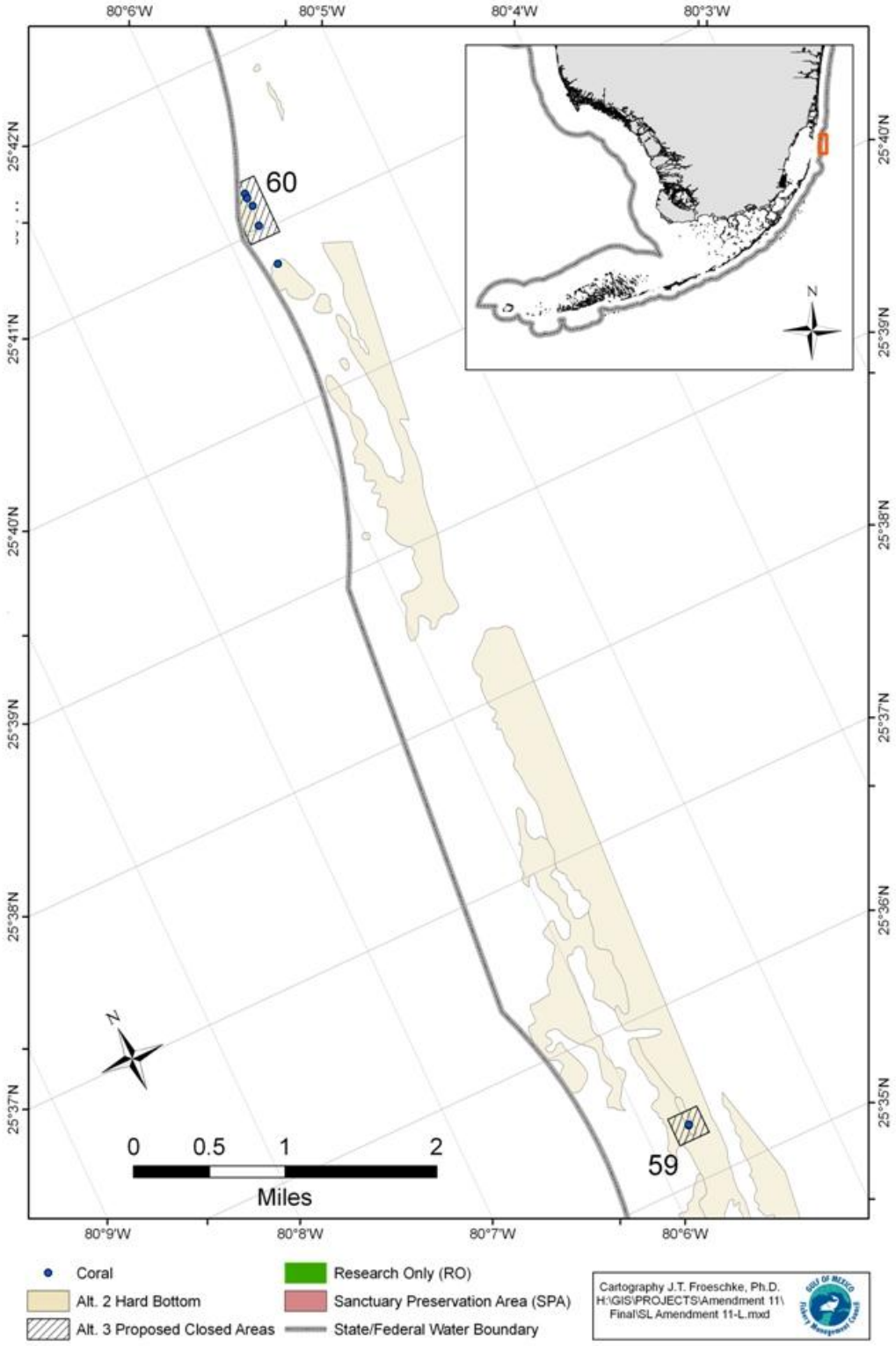

Figure 2.1.13. Map L showing proposed closed areas.

2.2 Action 2: Require Gear Markings for Spiny Lobster Trap Lines in the EEZ off Florida

Preferred Alternative 1: No Action – do not require markings for spiny lobster trap lines.

Alternative 2: Require all spiny lobster trap lines in the EEZ off Florida to have a white marking along its entire length, such as an all white line or a white tracer throughout the line. The marking must be visible at all times when traps are in use. All gear must comply with marking requirements no later than August 6, 2017.

Alternative 3: Require all spiny lobster trap lines in the EEZ off Florida to have a permanently affixed white marking at least 4-inch wide spaced at least every 15 ft along the trap line, or at the midpoint if the line is less than 15 ft. The marking must be visible at all times when traps are in use. All gear must comply with marking requirements no later than August 6, 2017.

Note: The white line or line with white tracer proposed under Alternative 2 would also be valid under Alternative 3.

Discussion: Currently, all spiny lobster traps fished in the EEZ off Florida must follow the gear marking requirements established by Florida at 68B-24 in the Florida Administrative Code (FAC). Those regulations require a buoy or a time-release buoy to be attached to each spiny lobster trap or at each end of a weighted trap trotline. Each buoy must be a minimum of six inches in diameter and constructed of Styrofoam, cork, molded polyvinyl chloride, or molded polystyrene [FAC 68B-24.006(3)]. Additionally, each trap and buoy used must have the fishers' current lobster license or trap number permanently affixed in legible figures. On each buoy, the affixed lobster license or trap number shall be at least two inches high [FAC 68B-24.006(4)].

Lines are consistently found as marine debris and most frequently recovered without the buoys or traps still attached. Miller et al. (2008b) reported lost pot/trap gear was the second most prevalent type of marine debris in the Florida Keys and the most damaging to benthic habitat. In all cases, lines were without buoys. Buoys are frequently dislodged from lines and the lines used in the spiny lobster trap fishery are also used in other fisheries, often for other purposes. These conditions cause extreme difficulty when determining if line found in the environment, or entangling protected species, originated from the spiny lobster trap fishery. A lack of uniquely identifiable markings also makes monitoring incidental take in the fishery, as required by the ESA, difficult. Trap line marking requirements would allow greater accuracy in identifying fishery interaction impacts to benthic habitats and protected species, leading to more targeted measures to reduce the frequency and/or severity of those impacts.

From the Bi Op: NMFS must work with the Gulf of Mexico and South Atlantic Fishery Management Councils, and the State of Florida, to implement measures requiring that all spiny lobster trap rope be a specific color or have easily identifiable patterns/markings, not currently in use in other fisheries, along its entire length. This will ensure any trap rope affects can be attributed to the appropriate fishery (e.g., stone crab, spiny lobster, or blue crab fisheries). Easily identifiable ropes must be phased into the federal fishery no later than five years after the finalization of this biological opinion.

The Bi Op on the spiny lobster fishery mandated the establishment of trap line marking requirements no later than five years after its completion, which was August 2014. In a memo dated September 2, 2011, the Regional Administrator for the Southeast Region of NOAA Fisheries Service amended the terms and conditions of the Bi Op to extend that deadline to August 6, 2017. This new date was based on the presumption that a rule to implement management measures in this amendment would be in place by the beginning of the 2012 fishing year. August 6, 2017, would be five years from the expected implementation of the requirement. Fishermen have indicated trap lines last five to seven years before needing to be replaced. The five-year time line would allow fishermen to replace worn trap lines with marked lines as they wear out, and thereby spread the cost and labor of compliance across multiple years.

The federal South Atlantic/Gulf of Mexico spiny lobster fishery has three management areas: the EEZ off Gulf states other than Florida (Texas, Louisiana, Mississippi and Alabama), the EEZ off Florida, and the EEZ off southern Atlantic states other than Florida (Georgia, South Carolina, and North Carolina). Because little spiny lobster trap fishing occurs outside Florida, the Bi Op determined trap impacts were extremely unlikely to occur to protected species anywhere else. Therefore, all measures required under the Bi Op only apply to spiny lobster trap fishing occurring in the EEZ off Florida.

Other fisheries in other regions have trap line marking requirements. Under the Atlantic Large Whale Take Reduction Plan, trap/pot fisheries in the Northeast and Mid-Atlantic regions must use red, orange, or black markings on their gear depending on the fishery. The spiny lobster Bi Op requires that trap line markings "not currently in use in other fisheries" be implemented. As with other trap line marking requirements, the intention of the requirement in the Bi Op is to ensure that any marking scheme selected will improve the accuracy of distinguishing similar looking gears from one another. Because color marking schemes using red, orange, and black are currently in use, those colors are not considered in this amendment. Additionally, the color black is also not considered here because black lines are used in other trap fisheries, such as the stone crab fishery. It is not clear how implementing a requirement to use black line for spiny lobster traps would improve the accuracy of differentiating between other trap fisheries.

Figure 2.2.1. Example of a color tracer line (orange) woven along the entire length of a black trap line. In the image, the trap line is coiled.

Requiring a white line or a colored tracer in the line (**Alternative 2**) would meet the requirements of the Bi Op (see Figure 2.2.1 for an example of a tracer). Spiny lobster industry representatives have indicated that the use of colors other than black, or the use of a line with a tracer, would significantly reduce trap -line life in the spiny lobster fishery, given the effect of ultraviolet light (UV) degradation in waters off Florida. Red and yellow may be the worst colors in terms of trap rope life (Ornitz 2011).

Spiny lobster industry members requested colors that were not likely to attract sea turtles be considered for gear marking requirements. Most sea turtles appear to have at least some color vision and most are able to see a color spectrum similar to what humans observe (Liebman and Granda 1971; Granda and O'Shea 1972; Liebman and Granda 1975; Levenson et al. 2004; Mäthger et al. 2007). Limited research has not yet identified any particular color that would be less likely to attract sea turtles. A study of loggerhead sea turtles in the Adriatic Sea looked at the type and color of marine debris in the stomachs of stranded turtles and turtles that were incidentally caught and were dead (Lazar and Gračan 2011). Stomach analysis showed turtles did not seem to discriminate among different colored objects. Anecdotal evidence from sea turtle rehabilitation suggests that bright colors such as pinks, yellows, and bright greens can capture their attention (S. Schaf, Florida FWC, pers. comm.). Scientific literature and sea turtles experts indicated that white is unlikely to be any more attractive to sea turtles than black.

Public comments received during the development of Amendment 10 and from the South Atlantic Spiny Lobster Advisory Panel recommended black for the line marking requirements (but only as a second choice to no marking requirement); however, other fisheries use black line. The second most available line is white which is used in the spiny lobster "trawl" fishery. The term "trawl" refers to a string of traps attached to one another, with a vertical line and buoy on each end of the line. One supplier indicated that the "sinking" trap line they sell to fishermen for trawl lines is white, contains dealer-specific additional coloring, and costs more per foot than "floating" black vertical line. Black line is more likely to be used in shallower water, such as are under state jurisdiction, whereas heavier and more expensive white line is more likely to be used in deeper water in the EEZ.

Figure 2.2.2. Examples of satisfactory gear markings for trap lines in the Northeast Region.

Alternative 3 does not specify a particular method for marking trap lines, only the minimum specifications for the markings. The intent under **Alternative 3** is to allow the greatest flexibility to fishermen in terms of determining which method would be best for each of them. Three methods for marking gear were tested and found to work satisfactorily in the Northeast Region under normal conditions (e.g., water temperature, trap weight, etc). However, they have not

been tested in the spiny lobster fishery, which involves warmer water and more exposure to damaging UV light. At the top of Figure 2.2.2, colored twine is seized around the line and woven between the strands. In the center, the line was spray-painted; this method requires that the line be dry. At the bottom, colored electrical tape was wrapped in one direction and then back over itself to form two layers. These marking techniques are simply examples of those used successfully in other fisheries that would also meet the requirements proposed in **Alternative 3**. However, they have not been tested in the spiny lobster fishery, which involves warmer water, more exposure to damaging UV light, and hydraulic trap retrieval equipment that is expected to remove surface paint and tape. Other techniques not specifically mentioned here would also be acceptable under **Alternative 3** so long as they meet the specific marking requirements. Further, all white line or line with a white tracer, as required under **Alternative 2**, would also be allowed under **Alternative 3** because both would meet the minimum requirements.

Florida could greatly improve the efficacy of gear marking requirements for spiny lobster gear fished in the EEZ off Florida by creating compatible gear marking requirements for spiny lobster trap gear in state waters. The selection of a gear marking scheme does not preclude non-spiny lobster fishers from using the same color. Florida could further improve the efficacy of gear marking requirements proposed under this action by instituting gear marking requirements for other state water trap fisheries (i.e., blue crab and stone crab).

Preferred Alternative 1 would provide no additional benefit to protected species and would not satisfy the trap line marking requirements of the Bi Op. This alternative is unlikely to have any social or economic impact. The Councils chose to take no action on this issue in Amendment 10 to allow more time for input from stakeholders on the most appropriate and cost-effective ways to mark lines. However, the Councils indicated they would quickly develop Amendment 11 to address this issue. The Councils again chose **Alternative 1** as the preferred alternative after the Florida Fish and Wildlife Conservation Commission (Florida FWC) indicated they would not implement compatible regulations in state waters. Further, no markings are required for stone crab trap lines, and many spiny lobster fishermen also participate in that fishery and exchange gear. The Councils were concerned that if stone crab fishermen used gear with markings similar to those required in the spiny lobster fishery then the ability to differentiate between the gear types would be lost, and the objective of the Bi Op would not be met. Another major concern was that marking techniques have not been tested, and it is unclear if any of those used in other fisheries would be appropriate in the spiny lobster fishery, given line fouling and retrieval methods. For this reason, the Councils decided requiring trap line markings in the spiny lobster fishery at this time would impose an excessive financial and labor burden on fishermen with little assurance that spiny lobster trap line could be distinguished from other trap lines when entangling protected species. Staff from Florida FWC have started a study on line marking methods for spiny lobster traps (see Appendix K). The Councils intend to revisit this issue when the results of that study are available.

On July 12-13, 2011, the Florida Keys Commercial Fishermen's Association held a meeting to provide stakeholder input on the location of closed areas proposed in Action 1. Although some discussion was held on line marking techniques, no specific recommendations were made. Some participants did indicate they would prefer white line or line markings under **Alternatives 2** and

3, if black was not an option. In a letter to the South Atlantic Council dated September 11, 2011, the association stated that white line is the second most preferable color to black because of its similar life expectancy and availability. However, because white lines are frequently used in deeper water, the similar life expectancies may be a result of less UV exposure.

Industry provided information indicating that most commercial spiny lobster fishermen use black polyethylene rope for lobster trap lines because it is most resistant to UV degradation (W. Kelly, FKCFA, pers.comm.). The addition of pigment to black rope keeps UV light from penetrating very deep into the fibers and restricts degradation to the surface of the rope. White rope is currently used by "trawl" fishermen who string multiple lobster traps together, generally in deeper water, therefore federal waters. Because white line is used in deeper waters (< 100 ft) there is typically less UV light exposure. It is unclear what the degradation rate and durability of white rope would be relative to black rope if it received more UV exposure. Polyester rope is generally clear, so both black and white rope require the addition of pigment, making white rope "almost as good as black rope for long-term use" (see All About Rope, http://www.mapability.com/ei8ic/contest/rope.php).

Marine debris surveys in the Florida Keys documented that 21% of trap lines found were less than 15 ft long, approximately 53% were between 15 and 45 ft in length, and the remainder were longer than 50 ft (Miller et al. 2008b). The average length of line encountered was approximately 35 ft (Miller et al. 2008b). Requiring marks along the entire length of the line (**Alternative 2**) or at least every 15 ft (**Alternative 3**) improves the likelihood that line found in the environment can be identified properly.

The costs associated with **Alternative 2** would depend on how many fishermen fishing in the EEZ currently use white line. White line is used by trawl fishermen, who fish in the deeper water of the EEZ. Trip ticket data do not distinguish landings between vertical lines and "trawl" trap lines; therefore, **Alternative 2** and **Alternative 3** would have an upper-end economic impact of $383,465 for vessels fishing for spiny lobster in the EEZ, though the economic could be much lower, perhaps closer to zero. More information and research is needed to refine this estimate and differentiate the effect of the two alternatives. The upper-end estimate of economic impact, $383,465, represents 8.5% of the trip gross revenue for 271 vessels that land spiny lobster from the EEZ off Florida. This represents the increase in cost of trap rope replacement, which goes from $510,835 (13.1% of trip gross) to $894,300 (22.9% of trip gross), excluding the cost of labor and other components to make traps usable (traps, buoys, bridles) and it excludes any change in on-vessel equipment. This translates into a 15-year cost of $5.75 million for the EEZ off Florida.

An assessment of the financial implications of trap line replacement (Adams 2011) was based on the use of a blue tracer in black line. This is similar to **Alternative 2**, which requires the use of a white tracer. Adams (2011) indicates that because the tracer would degrade quicker than the rest of the line, the life expectancy of the line would be only around three years. In addition, the line with a blue tracer costs more than solid black line. Cost estimates to the entire fishery (i.e., state and federal waters) over a 15-year period were $8,577,000 ($571,800 annually) more for the line with the blue tracer than the solid black line, due to a higher line price and more frequent replacement. Adams (2011) based the calculations on the total number of traps owned by

fishermen in Florida. This amendment only addresses trap line markings for traps fished in the EEZ, which is less than half of the traps. As noted above, the Florida FWC has indicated they are opposed to trap line markings at this time.

Both labor and costs could be less under **Alternative 3** than **Alternative 2**. **Alternative 3** would allow fishermen to keep using the black polyethylene trap line, but would require a white mark be applied to lines. Markings could be made in a number of ways, based on what would work best for the individual fisher. Trap lines marked under the Atlantic Large Whale Take Reduction Plan are coiled and then spray-painted over a section. This method is quick and economical as it does not require the purchase of a different color solid rope or rope with a tracer, but the durability of the marking may be less under spiny lobster fishing conditions. Markings must be spaced at least every 15 ft, but could be closer, so exact measurements would not be necessary. Likewise each mark must be at least four inches, but could be larger. Because of this, any line marking viable under **Alternative 2** would also be viable under **Alternative 3**. The Councils have suggested research on the labor, costs, and durability of various line markings could take place during the five-year implementation period.

The economic assessment in Section 4.2.2 incorporates data from Adams (2011) and other sources, including Florida Trip Ticket data; it shows estimates on an annual basis for vessels fishing in the EEZ off Florida. Analysis in Section 4 is based on the number of traps "that could be fished" in the EEZ, and the estimated effect of different assumptions about the price of trap lines, replacement intervals, numbers of traps, and line length. Assuming a five-year replacement interval for 1,320 traps per vessel and 113 ft lines at 9¢ / ft, the estimated annual cost of trap replacement would be $2,685 per vessel for 271 vessels or $462,055 total (see Tables 4.2.1.1 and 4.2.1.2) for **Preferred Alternative 1**. Based on data in Adams (2011) and deducting the estimated annual cost of trap line replacement for **Preferred Alternative 1** ($462,055), the annual economic impact of **Alternative 2** would be $265,580 for vessels in the EEZ off Florida. If current line can be marked under **Alternative 3**, there may be a relatively small economic impact from this alternative.

Chapter 3. Affected Environment

A more complete description of the affected environment can be found in Amendment 10 to the Fishery Management Plan for Spiny Lobster in the Gulf of Mexico and South Atlantic (Spiny Lobster FMP), Section 3. That description is summarized here.

3.1 Description of the Fishery

The Caribbean spiny lobster fishery in the U.S. Exclusive Economic Zone (EEZ) of the Atlantic Ocean and Gulf of Mexico (Gulf) is jointly managed by the South Atlantic and Gulf of Mexico Fishery Management Councils (Councils) through the Spiny Lobster FMP. The Caribbean Fishery Management Council manages the fishery in the U.S. EEZ of the Caribbean Sea surrounding Puerto Rico and the U.S. Virgin Islands through a separate FMP. In the Gulf and South Atlantic, the commercial fishery, and to a large extent the recreational fishery, occurs off South Florida, primarily in the Florida Keys. To streamline a management process that involves both state and federal jurisdictions, the FMP basically extends the Florida Fish and Wildlife Conservation Commission (FWC) rules regulating the state fishery to the southeastern U.S. EEZ from North Carolina to Texas.

The commercial and regular recreational spiny lobster seasons start August 6 and ends March 31. The Florida recreational spiny lobster fishing season has two parts: a two-day sport season that occurs before commercial spiny lobster fishers place their traps in the water, and a regular season that coincides with the commercial fishing season. No person can harvest, attempt to harvest, or have in his possession, regardless of where taken, any spiny lobster during the closed season of April 1 through August 5 of each year, except during the two-day sport season, for storage and distribution of lawfully possessed inventory stocks, or by special permit issued by the Florida FWC. During the two-day sport season, no person can harvest spiny lobster by any means other than by diving or with the use of a bully net or hoop net.

According to 50 CFR 640.4, anyone who sells, trades, or barters or attempts to sell, trade, or barter Caribbean spiny lobster harvested or possessed in the EEZ off Florida, or harvested in the EEZ other than off Florida and landed in Florida must have licenses and certificates specified to be a commercial harvester, as defined in the Florida Administrative Code. Similarly, for any person who sells, trades, or barters or attempts to sell, trade, or barter a Caribbean spiny lobster harvested in the EEZ other than off Florida, a federal vessel permit must be issued and on board the harvesting vessel.

In 2010, Florida issued 1,286 commercial spiny lobster permits and 293 commercial dive permits. As of December 13, 2011, NOAA Fisheries Service listed 201 valid federal spiny lobster permits. Florida has a variety of permits that allow recreational fishers to take spiny lobster. In 2010, the state issued 129,865 annual or five-year crawfish permits; in addition, they issued 36,030 other permits, such as Sportsman Gold or Saltwater Lifetime permits, that also allow holders to take spiny lobster. NOAA Fisheries Service does not require a permit for recreational fishing in the EEZ. Landings over the recent five years have averaged around five million pounds (Table 3.1.1). Landings began to decrease in the early 2000s. Most commercial landings are

from trapping; other gears include diving and bully nets. The proportion of landings from recreational fishing has remained fairly constant, around 20-25% over time.

Table 3.1.1. Florida landings of spiny lobster, by sector and gear (thousand pounds, ww).

Fishing year	Directed commercial landings by gear					Recreational		Total	Bait
	Traps	Diving	Other	Total	% of total	Pounds	% of total		
85/86	5,146	150	68	5,363	79%	1,432	21%	6,796	646
86/87	5,150	130	90	5,370	79%	1,454	21%	6,824	784
87/88	5,330	77	22	5,428	75%	1,797	25%	7,225	392
88/89	7,001	125	37	7,163	78%	2,033	22%	9,196	351
89/90	7,617	157	66	7,839	79%	2,061	21%	9,900	526
90/91	5,899	98	49	6,046	77%	1,821	23%	7,867	744
91/92	6,602	192	43	6,836	82%	1,477	18%	8,312	427
92/93	5,125	223	20	5,368	80%	1,352	20%	6,721	352
93/94	5,109	176	22	5,308	74%	1,883	26%	7,191	237
94/95	6,895	253	27	7,175	79%	1,906	21%	9,082	310
95/96	6,682	308	25	7,015	78%	1,931	22%	8,945	306
96/97	7,363	334	45	7,742	80%	1,923	20%	9,665	360
97/98	7,168	426	47	7,641	77%	2,304	23%	9,945	405
98/99	5,052	375	22	5,448	81%	1,303	19%	6,751	188
99/00	7,005	631	33	7,669	76%	2,462	24%	10,131	368
00/01	4,874	673	23	5,570	74%	1,949	26%	7,519	288
01/02	2,619	450	11	3,081	71%	1,251	29%	4,332	234
02/03	3,987	563	25	4,574	76%	1,455	24%	6,030	259
03/04	3,684	453	24	4,162	75%	1,411	25%	5,573	231
04/05	5,096	314	35	5,445	81%	1,273	19%	6,718	244
05/06	2,678	270	17	2,965	72%	1,131	28%	4,096	147
06/07	4,489	259	51	4,799	79%	1,305	21%	6,103	160
07/08	3,439	296	47	3,782	76%	1,215	24%	4,997	185
08/09	2,987	250	34	3,271	72%	1,264	28%	4,535	98
09/10	4,132	162	64	4,358	79%	1,127	21%	5,484	139
5-yr avg	3,545	248	42	3,835	76%	1,208	24%	5,043	146

Note: Five year average is for 05/06-09/10. This table updates and replaces Table 4.3.1.1 in Amendment 10.
Sources: Commercial landings, 97/98 onward, NMFS, SEFSC, FTT, as of 02Sep11, methods in Vondruska 2010a. Commercial landings through 96/97, estimated mortality associated with use of bait (under-sized lobster in traps) and recreational landings, all years, SEDAR 8 update 2010 (01Dec10). Landings for "other" commercial gear estimated from unrounded data used in this table. Recreational landings from 92/93 are estimated using surveys of recreational lobster permit holders and represent combined landings during the special 2-day sport season and from opening day of the regular season (Aug. 6) through Labor Day. The Gulf Council's Standing and Special Spiny Lobster SSC estimated the recreational landings for 04/05. Grand total excludes estimated fishing mortality for bait. Underlying data may differ among sources.

3.2 Physical Environment

The Gulf has a total area of approximately 600,000 mi^2 (1.5 million km^2), including state waters (Gore 1992). The South Atlantic continental shelf off the southeastern U.S., extending from the Dry Tortugas to Cape Hatteras, encompasses an area in excess of 100,000 km^2 (Menzel 1993).

The final environmental impact statement for the Gulf Council's Generic Essential Fish Habitat Amendment (GMFMC 2004) and the South Atlantic Council's Fishery Ecosystem Plan (SAFMC 2009) contain detailed descriptions of the physical environments related to the spiny lobster fishery.

The Deepwater Horizon MC252 oil spill in 2010 affected more than one-third of the Gulf area from western Louisiana east to the panhandle of Florida and south to the Campeche Bank in Mexico. The impacts of the oil spill on the physical environment are expected to be significant and may be long-term. However, the oil remained outside most of the area where this species is abundant. Oil was dispersed on the surface, and because of the heavy use of dispersants, oil was also documented as being suspended within the water column, some even deeper than the location of the broken wellhead. Floating and suspended oil washed onto shore in several areas of the Gulf, as well as non-floating tar balls. Whereas suspended and floating oil degrades over time, tar balls are persistent in the environment and can be transported hundreds of miles. Oil on the surface of the water could restrict the normal process of atmospheric oxygen mixing into and replenishing oxygen concentrations in the water column. In addition, microbes in the water that break down oil and dispersant also consume oxygen, which could lead to further oxygen depletion. Zooplankton that feed on algae could also be negatively impacted, thus allowing more of the hypoxia-fueling algae to grow.

3.3 Biological Environment

3.3.1 Caribbean Spiny Lobster

The Caribbean spiny lobster is widely distributed throughout the western Atlantic Ocean as far north as North Carolina to as far south as Brazil including Bermuda, the Bahamas, Caribbean, and Central America (Herrnkind 1980; Figure 3.3.1). Analyses of DNA indicate a single stock structure for the Caribbean spiny lobster throughout its range (Lipcius and Cobb 1994; Silberman and Walsh 1994; Hunt et al. 2009). This species inhabits shallow waters, occasionally as deep as 295 ft (90 m), possibly even deeper. Caribbean spiny lobster can be found among rocks, on reefs, in seagrass beds or in any habitat that provides protection. This species is gregarious and migratory.

Figure 3.3.1. Distribution of Caribbean spiny lobster (in red).
Source: FAO Fisheries Synopsis 1991

Maximum total body length recorded is 18 in (45 cm), but the average total body length for this species is 8 in (20 cm; FAO Fisheries Synopsis 1991).

Distribution and dispersal of Caribbean spiny lobster is determined by the long planktonic larval phase, called the puerulus, during which time the infant lobsters are carried by the currents until they become large enough to settle to the bottom (Davis and Dodrill 1989). As the lobsters begin metamorphosis from puerulus to the juvenile form, the ability to swim increases and they move into shallow, nearshore environments to grow and develop.

Young benthic stages of Caribbean spiny lobster typically inhabit branched clumps of red algae (*Laurencia sp*.), mangrove roots, seagrass banks, or sponges where they feed on invertebrates found within the microhabitat. In contrast to the social behavior of their older counterparts, juvenile lobsters are solitary and show aggressive behavior to ensure they remain solitary. Individuals two to four years of age show nomadic behavior, emigrating out of the shallows and moving to deeper, offshore reef environments. In the adult phase, Caribbean spiny lobsters tend to aggregate in enclosed dens. Shelter environments may include natural holes in a reef, rocky outcrops, or artificially created environments (Lipcius and Cobb 1994).

Given its wide distribution, a definitive stock structure is hard to determine for this species. A multitude of currents and other factors influence the movement of water throughout their range. The long time lobsters spend in the larval stage traveling by currents leads scientists to suspect recruits in the U.S. come from many other areas (Hunt et al. 2009). Silberman et al. (1994) and Hunt et al. (2009) concluded Caribbean spiny lobster is a single stock from Brazil to Bermuda, and throughout the Caribbean. More recent genetic studies have shown almost all recruits in U.S. waters are from elsewhere in the Caribbean. However, other studies have shown that the presence of local gyres or loop currents in certain locations could influence the retention of locally spawned larvae. In addition, benthic structures such as coral reef may disturb the flow of water and lead to the settlement of larvae in a particular location (Lee et al. 1994).

3.3.2 Protected Species

Thirty-two species of marine mammals may occur in the EEZ of the Gulf of Mexico, South Atlantic, and Caribbean. All 32 species are protected under the Marine Mammals Protection Act and six are also listed as endangered under the Endangered Species Act (ESA). A spatial/temporal analysis of entanglement data from 2002-2010 indicated that spiny lobster trap gear was a plausible cause of four bottlenose dolphins entanglements. During that period, an additional eight bottlenose dolphins in Florida were discovered with entangling trap/pot. The type of gear could not be definitively linked to a target species or specific fishery. No confirmed interactions between ESA-listed marine mammals and the spiny lobster fishery have ever been documented.

Other species protected under the ESA occurring in the Gulf and South Atlantic include five species of sea turtle (green, hawksbill, Kemp's ridley, leatherback, and loggerhead); the smalltooth sawfish, and two coral species (elkhorn, *Acropora palmate*, and staghorn, *A. cervicornis*). A discussion of these species can be found in Amendment 10. Two distinct population segments (DPS) of Atlantic sturgeon (the

South Atlantic and Carolina DPSs) were listed under the ESA, effective April 6, 2012, and also occur in the South Atlantic region. Designated critical habitat for the North Atlantic right whale also occurs within the South Atlantic region.

Elkhorn and staghorn corals were listed as threatened under the ESA on May 9, 2006. The Atlantic *Acropora* Status Review (*Acropora* BRT 2005) presents a summary of published literature and other currently available scientific information regarding the biology and status of both elkhorn and staghorn corals. The following discussion summarizes some of the pertinent information on the biology and threats to elkhorn and staghorn corals.

Elkhorn Coral (*Acropora palmata*)
Photo Credit: W. Jaap

Elkhorn coral is one of the major reef-building corals in the wider Caribbean. Historically, this species formed dense thickets at shallow (<5 m) and intermediate (10-15 m) depths in many reef systems, including some locations in the Florida Keys and Caribbean. Early descriptions of Florida Keys reefs referred to reef zones, of which the elkhorn zone was described for many shallow-water reefs (Jaap 1984; Dustan 1985; Dustan and Halas 1987). However, the structural and ecological roles of elkhorn coral in the wider Caribbean are unique and cannot be filled by other reef-building corals in terms of accretion rates and the formation of structurally complex reefs (Bruckner 2002).

Staghorn Coral (*A. cervicornis*)
Photo Credit: W. Jaap

Staghorn coral is also one of the major reef-building corals in the wider Caribbean. Early descriptions of Florida Keys reefs referred to reef zones, of which the staghorn zone was described for many shallow-water reefs (Jaap 1984; Dustan 1985; Dustan and Halas 1987). Like elkhorn coral, the structural and ecological roles of staghorn are unique and cannot be filled by other reef-building corals (Bruckner 2002). Historically, staghorn coral was also the primary constructor of mid-depth (10 to 15 m) reef terraces in the western Caribbean (Adey 1978).

All *Acropora* species require near-oceanic salinities (34-37 ppt). Typical water temperatures for elkhorn and staghorn coral range from 21-29°C, although colonies in the U.S. Virgin Islands have been known to tolerate short-term temperatures around 30°C without obvious bleaching. Jaap (1979) and Roberts et al. (1982) note an upper temperature tolerance of 35.8°C for elkhorn coral. All *Acropora* species are susceptible to bleaching due to adverse environmental conditions (Ghiold and Smith 1990; Williams and Bunkley-Williams 1990). The maximum range in depth reported for elkhorn coral is less than1 m to

30 m; staghorn is less than 1 m to 60 m (Goreau and Goreau 1973). However, both species are currently believed to be found no deeper than 30 m (98 ft).

The preferred habitat of elkhorn coral is the seaward face of a reef (turbulent shallow water), including the reef crest, and the shallow spur-and-groove zone (Figure 3.3.2) (Shinn 1963; Cairns 1982; Rogers et al. 1982). Colonies are occasionally exposed during low tide. Colonies of elkhorn coral often grow in nearly monospecific (made up of only one species), dense stands and form interlocking frameworks, known as thickets, in fringing and barrier reefs (Jaap 1984; Tomascik and Sander 1987; Wheaton and Jaap 1988). The predominance of elkhorn coral in shallow reef zones is related to the degree of wave energy. In areas with strong wave energy conditions only isolated colonies may occur, while thickets may develop in areas of intermediate wave energy conditions (Geister 1977). Storm-generated fragments are often found occupying back reef areas immediately landward of the reef flat/reef crest, while colonies are rare on lagoonal patch reefs (Dunne and Brown 1979). Although considered a turbulent water species, elkhorn coral is sensitive to breakage by wave action and is often replaced by coralline algae in heavy surf zones (Adey 1977).

Staghorn colonies have been common in back- and patch-reef habitats (Figure 3.3.2) (Gilmore and Hall 1976; Cairns 1982). Although staghorn coral colonies are sometimes found interspersed among colonies of elkhorn coral, they are generally in deeper water or seaward of the elkhorn zone and, hence, more protected from waves. Like elkhorn corals, staghorn corals throughout much of the wider Caribbean, were so dominant on the reef within the 7 to 15-m depth that the area became known as the staghorn zone (Figure 3.3.2). Studies of historical distribution and abundance patterns focus on percent coverage, density, and relative size of the elkhorn and staghorn corals during three periods: pre-1980, the 1980-1990 decades, and recent (since 2000). Few data are present before 1980, likely due in part to researchers' tendencies to neglect careful measurement of abundance for ubiquitous species (*Acropora* BRT 2005).

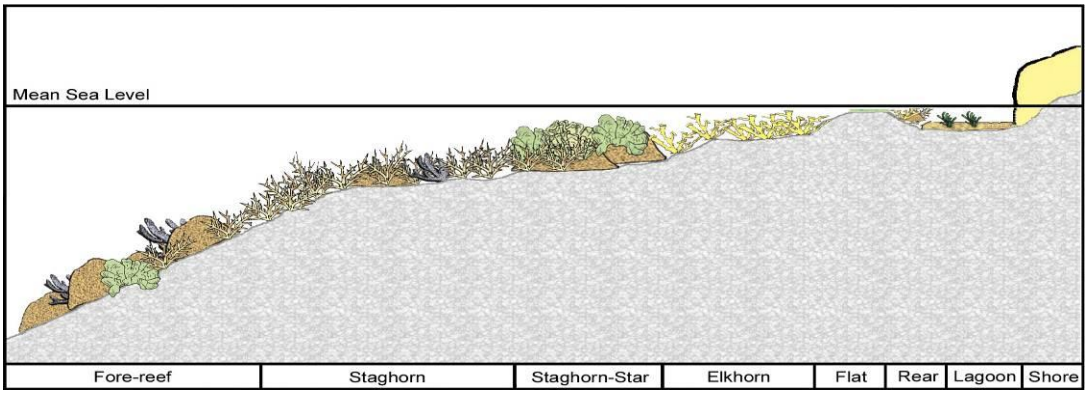

Figure 3.3.2. Reef zonation schematic
Modified from: Goreau 1959, Kinzie 1973, Bak et al. 1977

Both species underwent precipitous declines in the early 1980s throughout their ranges and this decline has continued. Although quantitative data on former distribution and abundance are scarce, in the few locations where quantitative data are available (e.g., Florida Keys, Dry Tortugas, Belize, Jamaica, and the U.S.V.I.), declines in abundance (coverage and colony numbers) are estimated at greater than 97%. Although this decline has been documented as on-going during in the late 1990s, and even in the past five years in some locations, local extirpations (i.e., at the island or country scale) have not been rigorously documented (*Acropora* BRT 2005).

Figure 3.3.3 shows the abundance trends of specific locations throughout the Caribbean where quantitative data exist, illustrating the overall trends of decline for elkhorn corals since the 1980s. It is important to note that the data are from the same geographic area, not repeated measures at an exact reef/site that would indicate more general trends (*Acropora* BRT 2005).

Few data on the genetic population structure of elkhorn and staghorn coral exist; however, due to recent advances in technology, the genetic population structure of the current, depleted population is beginning to be characterized (Baums et al. 2005; Vollmer and Palumbi 2007). Results indicate that elkhorn populations in the eastern Caribbean (St. Vincent and the Grenadines, U.S. Virgin Islands, Curacao, and Bonaire) have experienced little or no genetic exchange with populations in the western Caribbean (Bahamas, Florida, Mexico, Panama, Navassa, and Mona Island). Mainland Puerto Rico is an area of mixing where elkhorn populations show genetic contribution from both regions, though it is more closely connected with the western Caribbean. Within these regions, the degree of larval exchange appears to be asymmetrical, with some locations being entirely self-recruiting and some receiving immigrants from other locations within their region (*Acropora* BRT 2005).

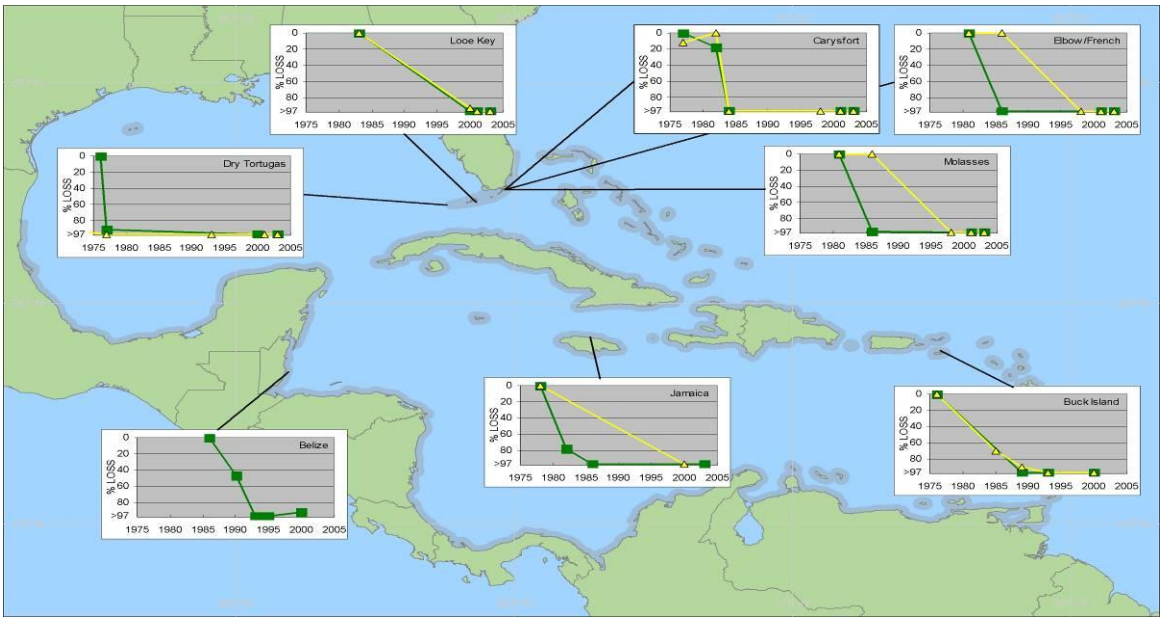

Figure 3.3.3. Percent loss of staghorn coral (green squares) and elkhorn coral (yellow triangles) throughout the Caribbean for all locations where quantitative trend data exist.
Source: *Acropora* BRT 2005.

3.4 Economic Environment

3.4.1 Commercial Sector

Commercial fishing for Caribbean spiny lobster in Florida was affected by national economic conditions in the last few years. At $3.31 per pound (ww), 2009/2010 ex-vessel prices were at their lowest since the early 1960s. In 2010/2011, ex-vessel prices increased. Fuel prices rose sharply during 2008/2009, falling later (Table 3.4.1.1; Vondruska, 2010a). Economic conditions for commercial fishing would have been worse without long-term reductions in fishing effort, which are attributable in large part to Florida's Trap Reduction Program. Productivity in terms of average vessel and trip landings exhibited flat to upward trends since the early 1990s.

Vondruska (2010a), Vondruska (2010b), and Amendment 10 contain descriptions of commercial fishing for Caribbean spiny lobster, and are incorporated herein by reference. Select summary statistics for commercial fishing are provided in Tables 3.4.1.1 and 3.4.1.2, and estimates of economic impacts are provided in Table 3.4.1.3.

By virtue of their timing during the season, some hurricanes affected commercial fishing, including most recently, George 1998, and Katrina, Rita, and Wilma in 2005; these storms damaged or destroyed large proportions of the traps (Shivlani 2009).

Table 3.4.1.1. Florida commercial fishing statistics for Caribbean spiny lobster.

Fishing year (July-June)	Thousand pounds	Thousand[1]	Lb[1]	Vessels	Lbs / vessel	Trips	Lbs / trip
86/87	5,351	$27,015	$5.05	1,377	3,886	30,696	174
87/88	5,417	$35,812	$6.61	2,046	2,648	34,005	159
88/89	7,154	$33,374	$4.66	2,087	3,428	36,021	199
89/90	7,830	$38,141	$4.87	2,244	3,489	39,934	196
90/91	6,044	$35,510	$5.88	2,301	2,627	40,194	150
91/92	6,834	$43,769	$6.40	2,201	3,105	45,276	151
92/93	5,367	$31,894	$5.94	1,702	3,153	35,387	152
93/94	5,309	$27,576	$5.19	1,536	3,457	31,283	170
94/95	7,181	$48,179	$6.71	1,411	5,090	32,093	224
95/96	7,017	$45,983	$6.55	1,419	4,945	32,546	216
96/97	7,748	$41,491	$5.36	1,968	3,937	32,591	238
97/98	7,641	$46,059	$6.03	1,382	5,529	33,906	225
98/99	5,448	$30,121	$5.53	1,342	4,060	26,012	209
99/00	7,669	$49,002	$6.39	1,260	6,086	27,947	274
00/01	5,570	$37,318	$6.70	1,259	4,424	26,111	213
01/02	3,081	$21,566	$7.00	1,047	2,943	19,528	158
02/03	4,574	$29,681	$6.49	1,141	4,009	23,972	191
03/04	4,162	$24,083	$5.79	1,003	4,149	22,096	188
04/05	5,445	$30,916	$5.68	928	5,868	20,308	268

Fishing year (July-June)	Thousand pounds	Thousand[1]	Lb[1]	Vessels	Lbs / vessel	Trips	Lbs / trip
05/06	2,965	$17,177	$5.79	815	3,638	14,921	199
06/07	4,799	$31,021	$6.46	780	6,152	18,184	264
07/08	3,782	$29,183	$7.72	803	4,710	18,858	201
08/09	3,271	$19,281	$5.89	773	4,232	15,239	215
09/10	4,358	$14,443	$3.31	711	6,129	14,347	304
10/11	5,830	$37,050	$6.36	808	7,215	18,125	322
5-yr avg	3,835	$22,221	$5.84	776	4,972	16,310	237

Note: Five-year average for 05/06-09/10. This table updates and replaces Table 3.4.1.1 in Amendment 10. [1]Data in 2010 dollars. Source: NMFS, SEFSC, FTT data as of 02Sep11, methods in Vondruska 2010a.

Table 3.4.1.2. Five-year average performance statistics for the commercial sector of the Caribbean spiny lobster fishery.

	Vessels	Total Lobster Ex-vessel Value[2] (millions)	Total All Species Ex-vessel Value[2] (millions)	Average Ex-vessel Value per Vessel
2005-2010 Average[1]	781	$22,227	$23,399	$29,960

Note: This table updates and replaces Table 3.4.1.2 in Amendment 10. [1]Data shown are 5-year average for 05/06-09/10. [2]Data in 2008 dollars, obtained from data in 2010 dollars (Tables 3.4.1 and 4.2.1), using the ratio 190/184.73. Source: Florida Trip Ticket System, as of 02Sep11.

Table 3.4.1.3. Average annual economic activity associated with the Caribbean spiny lobster fishery.

	Average Ex-vessel Value[1] (millions)	Total Jobs	Harvester Jobs	Output (Sales) Impacts (millions)	Income Impacts (millions)
Spiny Lobster	$22.855	4,342	597	$301.472	$128.924
- All Species[2]	$37.861	7,193	989	$499.410	$213.372

Note: This table updates and replaces Table 3.4.1.3 in Amendment 10. [1]Ex-vessel revenues and economic activity associated with the harvests of all species harvested by vessels that harvested spiny lobster.

3.4.2 Recreational Sector

Sharp et al. (2005) estimated the number of permit holders that fished during the special two-day sport season from 1993 through 2002 ranged from approximately 32,500 to approximately 57,000, and the number of permit holders that fished at some time during the first month of the regular season ranged from approximately 49,000 to 78,000 over those same years.

Estimated recreational landings for Caribbean spiny lobster in Florida were lower in 2001/2002 onward than in the 1990s (Table 3.1.1). In the last five years, they averaged 1.208 mp (ww). The effects of weakened national economic conditions

in the last few years help explain reduced effort (person-days), and a fall off in the number of recreational licensed purchased (SEDAR 8, 2010 update). In the mid-2000s, at least three hurricanes occurred when recreational fishing would otherwise be expected to be seasonally high. In contrast with declining effort and increased productivity for commercial fishing, recreational fishing effort has remained relatively flat during the last twenty years, along with productivity (number of lobsters landed per person-day).

Recreational spiny lobster fishing is important to Monroe County. Almost 230,000 person-days of recreational lobster fishing occurred that year in Monroe County. Of those person-days, approximately 75% were during the regular season, and the remaining person-days were during the two-day sport season. Approximately 79% of those person-days were attributed to visitors of Monroe County and the remaining 21% to residents (Table 3.4.2.1). Average expenditures per person-day are higher for visitors.

Visitors spend substantially more per person-day than residents of Monroe County, and visitors spend slightly more during the two-day sport season than regular season (Table 3.4.2.1). Sharp et al. (2005) estimate approximately $24 million was spent on recreational lobster fishing in the Florida Keys from the opening of the recreational season through the first Monday in September in 2001. Fishers who resided outside the Keys accounted for about 92% of the total monies spent on recreational lobster fishing in the Keys.

Table 3.4.2.1. Average expenditures per person-day in Monroe County for recreational fishing in 2001.

Season	Person Days			Avg. Exp. Per Person-Day		Total Expenditures (Million 2001$)		
	Resident	Visitor	Total	Resident	Visitor	Resident	Visitor	Total
Two-Day	12,306	45,962	58,268	$33.99	$129.41	$0.418	$5.948	$6.366
Regular	36,966	134,161	171,127	$42.83	$122.35	$1.583	$16.415	$17.998
Total	49,272	180,123	229.395	$40.61	$124.15	$2.001	$22.362	$24.363

Source: Sharp et al. 2005. Leeworthy [circa 2005] provides additional information on economic impacts (jobs, 469, output, $26.4 million, and income, $8.4 million), which may or may not be comparable with what is shown in Table 3.4.3 for commercial fishing for spiny lobster in Florida.

3.5 Social Environment

The commercial sector of the spiny lobster fishery is one of the most economically important commercial fisheries in Florida (see Table 3.4.1.3). Approximately 90-95% of commercially caught spiny lobster is landed in the Florida Keys annually, and the trap fishery has been established communities since at least the 1950s. In recent decades, tourism has become the primary economic driver in the Florida Keys, but commercial fishing has a deeply rooted sociocultural tie to the communities in the Florida Keys. Intergenerational fishing families are common and in communities such as Marathon, the industry is an important part of economy and social environment of the towns. Some long-term commercial fishermen are regarded as community leaders and are actively involved. Overall, the commercial sector of

the spiny lobster fishery is significant to the Florida Keys communities economically, but likely more so because of its social, cultural and historical value to the area. The demographic description of the social environment is presented primarily at the county level for south Florida and can be found in detail in Amendment 10. The focus on south Florida is due to the nature of the fishery (both commercial and recreational) which is prosecuted primarily in Miami-Dade and Monroe Counties. Communities were chosen for more detailed description based on their ranking within their "regional quota" (rq), the proportion of landings and value of community landings out of total landings for the region. Those communities where the "rq" was very low were not considered for further description. This excluded communities from other states as their landings were well below the top fifteen communities, which is further evidence of a highly localized fishery. Although the most recent estimates of census data have been used, many of the statistics related to the economic condition of counties or communities do not capture the recent downturn in the economy which may have significant impacts on current employment opportunities and business operations. Therefore, in the descriptions of both counties and communities, it should be understood that in terms of unemployment, the current conditions could be worse than indicated by the estimates.

Marine Related Employment

Other county level summaries are of marine related employment within the coastal counties of South Florida. These estimates provide the number of sole proprietors and the number of employed persons for various sectors associated with employment in the marine environment. While these estimates do not encompass all employment related to fishing and its support activities, they do provide some estimate of the amount of activity associated with employment related to both recreational and commercial fishing.

Social Vulnerability

Each county was geocoded with regard to social vulnerability as measured by Social Vulnerability Index (SoVI). The Index was created by the Hazards Research Lab at the University of South Carolina (Cutter et al. 2003) to understand how places that are susceptible to coastal hazards might also exhibit vulnerabilities to social change or disruptions. These vulnerabilities may come in the form of high unemployment, high poverty rates, low education and other demographic characteristics. Although the SoVI was created to understand social vulnerability to coastal environmental hazards, it can also be interpreted as a general measure of vulnerability to other social disruptions, such as adverse regulatory change or manmade hazards. This does not mean adverse effects will occur, only that there may be a potential for adverse effects under certain circumstances. Fishing communities in vulnerable counties may have more difficulty adjusting to regulatory changes if impacts affect employment or other critical social capital. This concept is closely tied to environmental justice.

Recreational Fishing Communities

Recreational fishing communities can be evaluated by their ranking on a number of criteria, including number of charter permits per thousand population and available recreational fishing infrastructure, as listed under the Marine Recreational Information Program (MRIP) survey identified within each community (Table 3.5.1). Because the recreational sector of the lobster fishery is such an important part of the Florida Keys economy, almost every Keys community

might be considered a recreational fishing community. This list of recreational fishing communities is not exhaustive and should be considered a guide to areas where substantial recreational fishing activity may occur.

Table 3.5.1. Recreational fishing communities along Florida's east coast.

Rank	Community
1	Islamorada
2	Cudjoe Key
3	Key West
4	Tavernier
5	Little Torch Key
6	Ponce Inlet
7	Marathon
8	Sugarloaf Key
9	Palm Beach Shores
10	Big Pine Key
11	Saint Augustine
12	Key Largo
13	Summerland Key
14	Sebastian
15	Cape Canaveral

Environmental Justice (EJ)

Executive Order 12898 requires federal agencies to identify and address, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations. As mentioned, EJ is related to the idea of social vulnerability; however, no thresholds exist with regard to social vulnerability as with EJ. Thresholds for poverty and number of minorities have been established for EJ and those areas that exceed such thresholds were identified in Amendment 10.

Although impacts of this amendment may affect communities with EJ concerns, impacts would not discriminate against any group and this action should not disproportionately affect low-income or minority populations and trigger any EJ concerns. In reviewing thresholds for minorities among the coastal counties involved, Miami-Dade and Broward Counties in Florida exceed the threshold for minorities, while only Miami-Dade County exceeds the poverty threshold. Again, as illustrated by the SoVI, EJ is closely tied to social vulnerability as most of the counties that do not meet these thresholds are also considered medium high or highly vulnerable. The impacts from the following management actions may impact minorities and the poor, but not through discriminatory application of these regulations. However, while Monroe County does not exceed any of the EJ thresholds, nor is it classified as being vulnerable in terms of social vulnerability, there are processes that affect working waterfronts and therefore commercial and charter fishermen through the process of gentrification. While the regulatory actions within this amendment in and of themselves may not precipitate social change or disruptions, in combination with these and other outside factors, working waterfronts may be negatively affected.

3.6 Administrative Environment

3.6.1 Federal Fishery Management

Federal fishery management is conducted under the authority of the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act), originally enacted in 1976. The Magnuson-Stevens Act claims sovereign rights and

exclusive fishery management authority over most fishery resources within the EEZ, an area extending 200 nautical miles from the seaward boundary of each of the coastal states, and authority over US anadromous species and continental shelf resources that occur beyond the EEZ.

Responsibility for federal fishery management decision-making is divided between the Secretary of Commerce (Secretary) and eight regional fishery management councils that represent the expertise and interests of constituent states. Regional councils are responsible for preparing, monitoring, and revising management plans for fisheries needing management within their jurisdiction. The Secretary is responsible for promulgating regulations to implement proposed plans and amendments after ensuring management measures are consistent with the Magnuson-Stevens Act and with other applicable laws summarized in Appendix F. In most cases, the Secretary has delegated this authority to NOAA Fisheries Service.

The Gulf and South Atlantic Councils are responsible for fishery resources in federal waters of their respective regions. These waters extend to 200 nautical miles offshore from the nine-mile seaward boundary off Texas and Gulf side of Florida, and the three-mile seaward boundary off the Atlantic side of Florida and Alabama, Georgia, Louisiana, Mississippi, North Carolina, and South Carolina.

The Councils consist of public members appointed by the Secretary, one member from the fishery agencies of each state, and a member from NOAA Fisheries Service.

The public is also involved in the fishery management process through participation on advisory panels and through council meetings that, with few exceptions for discussing personnel matters and litigation, are open to the public. The regulatory process is also in accordance with the Administrative Procedures Act, in the form of "notice and comment" rulemaking, which provides extensive opportunity for public scrutiny and comment, and requires consideration of and response to those comments.

NOAA's Office for Law Enforcement, the U.S. Coast Guard, and various state authorities enforce regulations contained within FMPs. To better coordinate enforcement activities, federal and state enforcement agencies have developed cooperative agreements to enforce the Magnuson-Stevens Act.

3.6.2 State Fishery Management

The purpose of state representation at the Council level is to ensure state participation in federal fishery management decision-making and to promote the development of compatible regulations in state and federal waters. The state governments have the authority to manage their respective state fisheries. Each of the states exercises legislative and regulatory authority over their state's natural resources through discrete administrative units. Although each agency is the primary administrative body with respect to the states' natural resources, all states cooperate with numerous state and federal regulatory agencies when managing marine resources.

Chapter 4. Environmental Consequences

4.1 Action 1: Limit Spiny Lobster Fishing in Certain Areas in the Exclusive Economic Zone (EEZ) off the Florida Keys to Protect Threatened Staghorn (*Acropora cervicornis*) and Elkhorn (*Acropora palmata*) Corals

Alternative 1: No Action – do not limit spiny lobster fishing in the EEZ off the Florida Keys in areas where threatened staghorn and elkhorn corals (*Acropora* spp.) occur.

Alternative 2: Close all known hardbottom in the EEZ off the Florida Keys where *Acropora* spp. occur and in water depths less than 30 meters (approximately 98 feet).

Option a. In the closed areas, spiny lobster trapping would be prohibited.

Option b. In the closed areas, <u>all</u> spiny lobster fishing would be prohibited.

Preferred Alternative 3: Create new closed areas in the EEZ off the Florida Keys with identified *Acropora* spp. colonies inside straight-line boundaries.

Preferred Option a. In the closed areas, spiny lobster trapping would be prohibited.

Option b. In the closed areas, <u>all</u> spiny lobster fishing would be prohibited.

Note: Areas under Alternatives 2 and 3 are all south of US 1, between Key Biscayne and Key West. See Figures 2.1.1-13 for maps of the locations of proposed and existing closed areas and Appendix A for coordinates of each proposed closed area in Alternative 3. Transit would be allowed for vessels traveling through a closed area. The term "transit" is defined as on a direct and continuous course through a closed area.

4.1.1 Direct and Indirect Effect on the Physical and Biological/Ecological Environments

Spiny lobster traps are generally deployed on seagrass, rubble, or sandy habitats because these areas are less likely to damage traps (Hill et al. 2003). Traps also appear to move less on these substrates (Uhrin et al. 2005). The biological opinion on the spiny lobster fishery (Bi Op) determined the deployment and retrieval of traps during normal fishing operations had little impact to *Acropora* spp. relative to traps moved from their original locations during storms.

Lewis et al. (2009) analyzed impacts to benthic habitat in the Florida Keys of trap movement during storms. The study documented the distance traps moved during non-tropical storm events. Buoyed traps moved an average of 15 ft during each storm and as much as 98 ft from their original location (Lewis et al. 2009). The movement of buoyed spiny lobster traps following a tropical storm or hurricane has never been measured during a trap impact study, because those traps moved so far from their original locations that they were never recovered. However, anecdotal evidence indicates that fishermen have found traps several miles from their original location after tropical storms or hurricanes (Florida FWC unpublished data).

The movement of traps during storms poses the greatest threat to *Acropora* spp. Because of the branching morphology, *Acropora* spp. colonies of any size are susceptible to fragmentation/breakage and abrasion from traps and trap lines. Even traps initially placed by fishermen in locations devoid of corals can be moved by storms into reef habitats and cause damage. Abrasion can reduce scour tissue away leaving the colony vulnerable to disease. The success of coral fragments is highly dependent upon the substrate upon which it lands. If it does not land or hardbottom free of macroalgae/sediment or other *Acropora* corals, the fragment's likelihood of survival is very low.

Creating closed areas would reduce the likelihood of traps contacting colonies, even if they are moved by storms, by creating buffers between the closest traps and *Acropora* spp. colonies. Based on the information provided in Lewis et al. (2009), closed areas approximately 200 ft or more across would likely be sufficient to protect coral colonies from trap movements occurring during typical non-tropical storm conditions; however, larger areas would be needed to account for traps moved by tropical storms. Additionally, *Acropora* spp. commonly reproduce asexually via fragmentation, meaning pieces of a single colony can break off and establish new colonies nearby. Thus, a single point location may not capture the location of colonies that have fragmented from a parent colony and are now located nearby. This complicates the efforts to determine appropriate sized buffers. For example, if fragmented colonies are transported some distance from parent colonies and are able to become re-established, the buffer zone appropriate for the parent colony may no longer be appropriate for the new colony as well. Selecting a 500-ft buffer provides some additional assurances that even in the case of fragmented colonies an appropriate conservation buffer can be maintained. Additionally, no global positioning system (GPS) is completely accurate, and differences in the equipment used by fishermen and researchers/divers providing colony location data further increases that inaccuracy. Using a minimum of a 500-ft buffer ensures that even with the potential for new colonies and inaccuracies in GPS systems, trap can be set nearby these areas while still achieving the goal of protecting *Acropora* spp.

Where they do occur, fisheries could cause fragmentation or abrasion resulting from: 1) fishing gear/marine debris, 2) damaging fishing practices, 3) vessel groundings, 4) anchoring, and 5) diver/snorkeler interactions (Acropora Biological Review Team 2005).

Non-trap gear is less likely to impact protected species, although fishermen can still impact coral during fishing. Bully nets require an active fishing technique that is only effective when target prey can be seen. The reliance upon visual contact with a target species greatly improves a fisher's ability to avoid contacting *Acropora* spp., and in fact, these fishers would prefer to avoid entangling their gear. Divers can impact corals through contact and breakage. Novice snorkelers/divers may stand on or kick *Acropora* spp. causing breakage, although research on impacts from recreational divers is minimal and at this time there have been no studies that document the frequency of this damage in the Florida Keys (NMFS 2009). Various studies throughout the Caribbean and Indo-Pacific have documented impacts of recreational divers on coral reefs (Hawkins et al. 1999; Barker and Roberts 2004; Uy et al. 2005; Guzner et al. 2010; Poonian et al. 2010). Some studies have documented recreational divers directly impacting coral habitat (Barker and Roberts 2004; Uy et al. 2005; Poonian et al. 2010); whereas, other studies

determined recreational divers indirectly impact corals by inducing stress thereby making them more susceptible to diseases and predation (Hawkins et al. 1999; Guzner et al. 2010).

A study on coral reefs in St. Lucia documented 74% of divers made contact with the reef during their dive and that these contact rates were significantly different based on the topography of high-relief compared to low-relief corals (Barker and Roberts 2004). Further, three studies determined the primary impact from recreational divers on coral was with their fins accounting for the greatest proportion of damage and re-suspension of sediment (Barker and Roberts 2004; Uy et al. 2005; Poonian et al. 2010). Other diver related impacts include damage by touching and holding onto the reef, and incidences of coral contact increased with divers wearing gloves (Barker and Robers 2004; Uy et al. 2005; Poonian et al. 2010).

The previous studies were based on recreational divers alone, without documentation of other potential impacts to the surrounding coral and sediment that may occur during lobster diving. The previously described literature indicates that recreational divers targeting spiny lobster and commercial lobster divers could have negative impacts to coral and the surrounding habitat; however, without definitive documentation these interactions can only be speculated at this time. Regulations for Florida Keys National Marine Sanctuary (FKNMS) prohibit damaging, breaking, cutting, or otherwise disturbing *Acropora* spp. inside the sanctuary's boundaries [15 CFR 922.163(a)(2)]. Likewise, FKNMS regulations prohibit taking or possessing wildlife protected under the Endangered Species Act (ESA) [15 CFR 922.163(a)(10)]. Mooring buoys have also been deployed throughout the FKNMS, reducing boaters' need to anchor.

Alternative 1 would provide no additional biological benefit to *Acropora* spp. because it would perpetuate the existing level of risk of interaction between these species and the fishery. A discussion of the interactions between spiny lobster traps and corals can be found in the Bi Op (http://sero.nmfs.noaa.gov/sf/pdfs/Spiny_Lobster_10_Appendix%20I.pdf). **Alternative 1** would not meet the requirement established under the Bi Op. The potential for damage to *Acropora* spp. as described above would have a higher probability of continuing.

Alternative 2 would provide the greatest biological benefit to *Acropora* spp. and other hardbottom /coral resources. **Alternative 2** would prohibit trapping or all lobster fishing on all hardbottom in the Florida EEZ south of US 1, from Key Biscayne to Key West, which could support *Acropora* spp. This would reduce the likelihood of interactions between spiny lobster fishing gear in this area and *Acropora* spp. more than the other alternatives because presumably all 6,853 identified *Acropora* spp. colonies would be encompassed by this area. The vast majority of *Acropora* spp. colonies in the Florida EEZ occur in waters within the South Atlantic Council's jurisdiction. Although areas of hardbottom habitat in the Florida EEZ fall under the jurisdiction of the Gulf Council, the water quality in these areas is generally too poor to sustain *Acropora* spp. colonies. However, if water quality improves these areas would likely support *Acropora* spp. **Alternative 2** would give the greatest protection to *Acropora* spp., but may be overly restrictive to fishermen.

Preferred Alternative 3 was developed primarily to protect *Acropora* spp. colonies, using the six general criteria discussed in Section 2.1 as guidelines. Because elkhorn corals are relatively rare in the Florida Keys protecting this species was an important consideration in developing this

alternative. **Preferred Alternative 3** also provides protection for areas where elkhorn and staghorn corals co-occur, which has great biological benefit for both species because not only are such areas relatively rare in the Florida Keys, the conservation benefit of such area closures is maximized by providing protection for both species. **Preferred Alternative 3** also protects many of the largest colonies with the greatest reproductive potential, as well as many areas of high *Acropora* spp. density. Elkhorn corals with a living tissue surface area of 1,000 cm^2 could be considered "super colonies." A similar distinction could be made for staghorn corals with a living tissue surface area of 500 cm^2 (M. Chiappone, pers. comm.). Colonies of this size are also exceedingly rare. Sampling conducted by the University of North Carolina-Wilmington at over 1,000 locations throughout the Florida Keys and the Dry Tortugas identified only 15 super colonies (6 staghorn colonies and 9 elkhorn colonies). The same level of sampling has also identified 32 sexually mature staghorn colonies (i.e., 100 cm^2-999 cm^2) and 30 sexually mature elkhorn colonies (100 cm^2-499 cm^2). Sixty-one sexually immature colonies (58 staghorn colonies and 3 elkhorn colonies) were also identified with this level of sampling (M. Chiappone, pers. comm. 2010). **Preferred Alternative 3** would also likely provide some additional indirect biological benefit by protecting *Acropora* spp. coral nurseries. Including coral nurseries in the proposed closed areas helps ensure that colonies being grown for restoration efforts are not damaged by spiny lobster fishing.

Option b would provide greater biological benefits than **Preferred Option a**. The impacts from trapping, diving, and anchoring, as described above, would all be reduced under **Option b**. Under **Preferred Option a** only the impacts of trapping would be reduced.

4.1.2 Direct and Indirect Effect on the Economic Environment

For purposes of assessing economic impacts, the extent of commercial fishing for spiny lobster in cartographically specific areas being considered for closure (Figures 2.1.1-2.1.13) must be estimated using fisher-supplied Florida Trip Ticket (FTT) data for broader water-body areas (Table 4.1.2.1; water bodies listed in footnote). Possible effects on recreational fishing are discussed qualitatively. The areas being considered for closure are less than 100 ft deep, and in the Atlantic EEZ off Monroe County (Keys EEZ).

Table 4.1.2.1. Spiny lobster commercial fishing in the Florida Keys: landings and ex-vessel value, effort, trip gross revenue and vessel gross revenue for Monroe County, and for selected areas of capture, selected gear, and selected depths.

Annual averages for fishing years 2005/2006 - 2009/2010, or percentiles	Landings in Monroe County	Landings by area of capture, Keys EEZ			
		Atlantic and Gulf		Atlantic, < 100 ft	
		All depths	< 100 ft	All gear, Alt 2b & Alt 3b	Traps only, Alt 2a & Alt 3a
Landings, thousand pounds (ww)	3,435	685	525	274	269
Thousand 2010$	$19,776	$3,662	$2,789	$1,600	$1,565
Trip gross, thousand 2010$	$20,755	$3,938	$2,979	$1,629	$1,585
Vessel gross, thousand 2010$	$30,974	$20,597	$18,998	$13,008	$12,511
%, trip gross / vessel gross	67%	19%	16%	13%	13%
Trips landing spiny lobster	13,877	1,786	1,543	1,073	1,007
Pounds (ww) / trip	249	380	334	259	271
Average depth fished (feet)	30	59	45	48	49
Depth, 90th percentile	65	110	72	72	72
Depth, 99th percentile	141	207	91	91	91
Vessels landing spiny lobster	588	209	192	152	128
Pounds (ww) / vessel	5,889	3,274	2,689	1,780	2,082
Vessel gross, 2010$ / vessel	$52,378	$98,901	$99,022	$85,668	$98,845

Source: NMFS, SEFSC, FTT (02Sep11), methods in Vondruska 2010a. "Gross" is the ex-vessel value in 2010$ of all FTT-reported landings for vessels or trips with landings of spiny lobster. Trip data (spiny lobster trip landings > 1 lb, ww) are used to specify vessels that land spiny lobster; however, vessel gross includes all FTT-reported landings of spiny lobster and other species (landings > 0 lb, ww). Statistics are computed separately for each variable. FTT water body codes for Atlantic, federal waters off Key West through Key Biscayne, include 19 (Key West vicinity), 7489 (Marathon), and 7449 (Miami). Traps refer to spiny lobster traps only. A depth of 30 m is approximately 98 ft.

Alternative 1 would not address the ESA concerns for *Acropora* spp. The Bi Op (NMFS 2009) requires NOAA Fisheries Service and the Gulf of Mexico and South Atlantic Fishery Management Councils (Councils) to work together to protect areas of staghorn and elkhorn coral by expanding existing closed areas or creating new closed areas for lobster trap fishing where *Acropora* spp. are present. Economic conditions for **Alternative 1** are depicted in Table 4.1.2.1 and they are used as a basis for determining the estimated economic impacts of **Alternatives 2** and **3**. While no economic impacts are indicated, failure to address ESA concerns for *Acropora* spp. could result in the requirement for more severe regulation of the spiny lobster fishery to protect these species under a yet-future Bi Op.

Alternatives 2 and **3** would preclude all or some of the fishing for spiny lobster associated with hardbottom area in the Atlantic EEZ off the Florida Keys that could support threatened *Acropora*

spp., which covers approximately 60 mi^2 out to a depth of 100 ft (Key Biscayne to Key West; Figures 2.1.1 – 2.1.13). Under **Alternative 2**, all 60 mi^2 would be closed to fishing, whereas under **Alternative 3**, 5.9 mi^2 would be closed to fishing (5.9/60 ~ 9.8% of the 60 mi^2). Area in square miles is used for purposes of analysis, because it is the only metric available for distinguishing the amount of fishing activity associated with **Alternatives 2** and **3**. Although none of these areas is homogeneous in terms of fishable area, as indicated in the next paragraph, all are assumed to be homogenous, because of the nature of available data. With similar caveats, data on distribution of traps (and thereby fishing activity) from the next paragraph are used as well.

Spiny lobsters are reported to inhabit mostly shallow water, occasionally as deep as 295 ft (100 m), and most fishermen appear to deploy traps out to a depth of about 100 ft, close to, but not intentionally on hard-bottom lobster habitat areas (see Amendment 10, Section 3.3.1 and Section 4.9). When foraging at night, lobsters move horizontally outward from their dens in coral or other protective habitat. Sheridan et al. (2005) used several methods to locate traps and assess habitat damage from traps in Atlantic waters off the Florida Keys (Atlantic waters off Florida, Middle, Upper and Lower Keys, from the shoreline to the last visible trap buoy offshore, which may reach 60–80 m in depth). According to the method with greatest resolution (video cameras), few of the traps were found on coral; 61% of the area where traps were found consisted of seagrass; 9%, coral; 1%, sponge /gorgonian; 18%, bare substrate; and 11%, macroalgae. Habitat damage was observed in only a few instances where contact with traps occurred, but it was not quantified (damage meaning loss to live tissue or fragmentation). Using similar data from another source, the Bi Op (Section 5.5.2.1; Table 5.10) indicates that traps in coral and hardbottom areas may impact *Acropora* spp., and that such areas account for 15% of the observed traps. While the breakouts are not quite the same, it appears that such areas may account for 28% of the traps observed according data in Sheridan et al. (2005). Stating it conversely, 72% to 85% of traps observed occurred on habitat types other than coral and hardbottom (Sheridan et al. 2005; Bi Op, 2009). Based on these data, 15% to 28% of fishing activity depicted in Table 4.1.2.1 would be affected by closing the area of 60 mi^2 to lobster fishing (e.g., 15% to 28% of the landings of 0.274 mp and the $1.629 million in trip gross revenue for all gear, Table 4.1.2.1).[4]

Under the Florida Trap Certificate Program, which is one of the oldest limited access systems in the country, commercial fishermen have come to have an economic interest in protecting the habitat that supports the lobsters they catch. According to survey-based studies, these fishermen tend to have long experience and knowledge of the areas they fish, and they depend substantially on fishing for their income (Murray 2005; Shivlani et al. 2005). As indicated in Section 4.2.2, the investment (asset) in traps, the cost of trap certificates, and the repair costs for traps are significant in fishing for spiny lobster. To operate effectively in the deeper waters of the EEZ and minimize trap loss, fishermen are likely to use heavier "sinker" trap line, spiny lobster trawls, and added weights to reduce horizontal movement of traps associated with the stronger current. It may not be possible, however, to find and haul traps that become entangled in coral

[4] These percentages should be viewed as approximations. By way of comparison, a similar percentage is obtained as follows: the 60 mi^2 (that could support Acropora spp. and would be closed to fishing under **Alternative 2**) is part of and represents 24% of the Atlantic EEZ from Key Biscayne to Key West out to a depth of 100 ft covers, an estimated 250 mi^2.

via horizontal movement during storms. As indicated in Section 4.1.1, Lewis et al. (2009) analyzed the impacts to benthic habitat in the Florida Keys of trap movement during storms. The study documented the distance traps moved during non-tropical storm events. Buoyed traps moved an average of 15 ft during each storm and as much as 98 ft from their original location. The movement of buoyed spiny lobster traps following a tropical storm (hurricane) has never been measured during a trap impact study, largely because those traps move so far from their original locations that they are rarely, if ever, recovered. Perhaps, one-fourth to one-third or more of all spiny lobster traps in the Florida Keys were tangled, lost, or destroyed by Hurricane Katrina in 2005, implying under-water habitat damage from lost and tangled trap gear, and a substantial replacement cost for fishermen.[5]

Table 4.1.2.2. Estimated effects of Action 1, Alternatives 2 and 3, commercial fishing.

		All gear, Alt. 2b and 3b			Trap gear only, Alt. 2a and 3a		
Alt.	% of fishing activity	Pounds	Trip gross revenue (2010$)	Vessel gross %	Pounds	Trip gross revenue (2010$)	Vessel gross %
Alt. 1	100%	274,000	1,629,000	100%	269,000	1,585,000	100%
	15%	41,100	244,350	1.88%	40,350	237,750	1.90%
Alt. 2	28%	76,720	456,120	3.51%	75,320	443,800	3.55%
% of Alt. 2		9.83%		na	9.83%		na
		4,042	24,028	0.18%	3,968	23,379	0.19%
Alt. 3		7,544	44,852	0.34%	7,406	43,640	0.35%

Data in first row from Table 4.1.2.1; vessel gross for all gear is $13.008 million in 2010$; vessel gross for trap gear only is $12.511 million. **Under Alternative 2,** the area is 60 mi^2, and under **Alternative 3** it is 5.9 mi^2 (5.9/60 ~ 9.83%).

Alternative 2, Option b, would close approximately 60 mi^2 to fishing for spiny lobster, referring to all gear and to both recreational and commercial fishing, whereas **Alternative 2, Option a**, which is discussed next, would impact commercial fishing by traps only. Quantitative information to assess the economic impact is available only for commercial fishing, and effects on the two sectors are discussed in qualitative terms at the end of this section. Compared with **Alternative 1**, it is estimated that **Alternative 2, Option b**, would reduce commercial landings of spiny lobster by 41,100 – 76,720 lbs and reduce the associated trip gross revenue by $0.244 - $0.456 million (15% - 28% of the landings of 0.274 mp and trip gross revenue of $1.629 million, Tables 4.2.1.1 – 4.1.2.2). The loss in trip gross revenue represents the economic impact, 1.9% - 3.5% of the total for vessel gross revenue of $13.0 million, not enough to suggest much change in fishing behavior for the 152 affected vessels. The vessel gross revenue of $13.0 million includes $8.6 million (67%) for spiny lobster, with $1.6 million (12%) for spiny lobster from the specified part of the EEZ. The remaining gross revenue for these vessels comes from stone crab (19%), snapper-grouper (7%), king and Spanish mackerel (5%), and other species (2%).

[5]Eugene H. Buck. 2005. "Hurricanes Katrina and Rita: fishing and aquaculture industries—damage and recovery," Congressional Research Service, Library of Congress, CRS Report for Congress, RS22241, updated October 13, 2005, 6 p. Buck indicated a loss of one-fourth to one-third of all traps. A larger estimated loss of 300,000 traps, with replacement cost at $25 - $41 per trap is indicated by Cammy Clark, "Lobster fishermen stake it all on a 2006 season," Miami Herald, August 7, 2006. A replacement cost of $25 - $41 per trap for 300,000 traps translates into $7.5 million to $12.3 million, and this represents a substantial part of the gross revenue for vessels landing spiny lobster in Monroe County, $31 million in 2010 dollars, the average for 05/06 – 09/10 (Table 4.1.2.1).

The economic impact on commercial fishing would be a bit less for **Alternative 2, Option a**, than for **Alternative 2, Option b**, because it would only impact commercial trappers. Compared with **Alternative 1**, it is estimated that **Alternative 2, Option a**, would reduce commercial landings of spiny lobster by 40,350 – 75,320 pounds and reduce the associated trip gross revenue $0.238 - $0.444 million (15% - 28% of the landings of 0.269 mp and trip gross revenue of $1.585 million, Tables 4.1.2.1 – 4.1.2.2). The loss in trip gross revenue represents the economic impact, 1.9% - 3.6% of the total for vessel gross revenue of $12.511 million, not enough to suggest much change in fishing behavior for the 128 affected vessels. The relatively small difference in landings for the two options is attributable to gear other than traps, notably diving.

Under **Alternatives 2** and **3, Option a**, there is a caveat to the extent that landings by commercial and recreational divers could increase in the absence of fishing with traps. Little, if any increase seems likely for commercial divers, because their landings have been decreasing because daily trip limits for diving in south Florida and a diving permit moratorium have been in place since 2005. Based on FTT data for the Atlantic EEZ for waters less than 100 ft deep, the estimated landings with diving gear decline far more sharply than for traps as the commercial season progresses from August through March; landings by diving occur predominantly in August. The annual total for diving fell from a peak of 83,703 lbs (381 lbs / trip) in 2000/2001 to 1,643 lbs (61 lbs / trip) in 2010/2011, and the latter represents a fraction of the overall total for commercial diving from all areas off the coast of Florida.[6] However, divers may shift effort to the closed areas if they considered them more productive.

Preferred Alternative 3 would close a total of 5.9 mi^2 compared with 60 mi^2 that would close under **Alternative 2**. The 5.9 mi^2 contains identified *Acropora* spp. colonies enclosed within straight-line boundaries (Figures 2.1.1-2.1.13). Applying the same percentage for purposes of comparison with **Alternative 1**, **Preferred Alternative 3, Option b,** could reduce commercial landings of spiny lobster by 4,042 – 7,544 lbs (5.9/60 ~ 9.8% of the amounts for **Alternative 2b**). The associated economic effects, as measured by forgone trip gross revenues, would be $24,028 - $44,852 (9.8% of the amounts for **Alternative 2, Option b),** or 0.18% – 0.34% of the vessel gross revenue of $13.0 million for 152 vessels (Tables 4.1.2.1 4.1.2.2). Compared with **Alternative 1**, **Preferred Alternative 3, Option a,** could reduce commercial landings of spiny lobster slightly less than **Alternative 3, Option b**, because it would only impact commercial trappers. Commercial landings would be reduced by 3,968 – 7,406 lbs (9.8% of the amounts for **Alternative 2, Option a**). The economic impact is estimated at $23,379 - $43,640 or 0.19% - 0.35% of the vessel gross revenue of $12.511 million for the 128 vessels.

In comparing the effect of **Alternatives 2** and **3, Option a** (traps only) with **Alternatives 2** and **3, Option b** (all gear), it is noted that the latter includes recreational fishing for spiny lobster, which involves far more individuals than commercial fishing for spiny lobster, and no limitation on effort. Commercial fishing in Atlantic waters of the EEZ (Key Biscayne to Key West) that are less than 100 ft deep is depicted in Table 4.1.2.1, but the extent of recreational fishing would require assessment by the Florida FWC, if available survey data could be used to delineate recreational fishing for spiny lobster in portions of the EEZ. Arguably, disallowing commercial

[6]Landings via commercial diving in the Atlantic EZZ less than 100 ft averaged 5,167 lbs compared with 248,000 lbs for all EEZ and state waters off Florida, 05/06-09/10 averages, or 2% of the total.

fishing with traps under **Alternatives 2** and **3, Option a** (but not all commercial fishing gear and all recreational fishing gear in contrast with **Alternatives 2** and **3, Option b**) could increase availability of lobsters for recreational fishing, possibly adding to consumer surplus for the recreational fishermen and increasing economic activity for for-hire vessels. Amendment 10 provides data and analysis for both sectors of the fishery. Briefly, since the inception of the Florida Trap Certificate Program in the early 1990s, effort in the commercial sector has decreased, including the number of traps, trips, and time fished, while the catch per unit effort (CPUE) has increased. On the other hand, the number of permits for individual recreational fishers is not limited under Florida law, and it is approximately 140,000, compared with about 1,400 commercial fishermen (captain and crew). In the past few years, the number of recreational permits appears to have been affected by weakened economic conditions, and growth may be expected to resume as the economy improves. Compared with commercial fishing effort, recreational fishing effort has not declined much since the early 1990s, although it has been volatile, and the CPUE has remained relatively stable. Recreational fishing for spiny lobster occurs largely in waters off Monroe County in the first month or so of the fishing year, and it is attributed largely to visitors (not Monroe County residents), who are likely to have less individual economic interest in protecting coral and other habitat than commercial fishermen, notwithstanding a wealth of instruction from for-hire vessel captains and crew on diving, safety, lobster measurement, bag limits, habitat protection, and other matters.

4.1.3 Direct and Indirect Effect on the Social Environment

Closure of fishing areas is often a controversial management strategy and can have numerous direct and indirect effects to the social environment. In general, positive social effects from the proposed closed areas will be associated with the biological benefits of protecting the elkhorn and staghorn coral. Corals are part of the ecosystem in which spiny lobster live and are important components of the marine environment. Protection of the corals is expected to contribute to an overall healthy ecosystem and would also contribute to a healthy spiny lobster stock, which would be expected to result in positive social effects for the commercial fishermen as well as broader positive social effects for the general public associated with healthy marine ecosystems.

There are some negative social impacts from spatial closures that come from limiting or removing fishing opportunities within the closed areas, which may impact income for commercial fishermen who use the proposed closed areas for harvest. Additionally, if important fishing grounds are no longer available due to closures, there may be crowding and user conflict. In the Florida Keys there are numerous closed areas established throughout the FKNMS and Dry Tortugas National Park, which has already impacted the lobster trap fishery by limiting fishing areas.

Some of the most significant social effects from area closures come from perceptions by stakeholders, including the need and effectiveness of closed areas to protect the resource, specifically in designating closed areas that actually help achieve management goals of protecting elkhorn and staghorn coral. If proposed areas are not spatially appropriate (e.g., do not protect substantial colonies through which the *Acropora* spp. populations could be maintained and increased) or do not protect corals from other impacts (e.g., recreational

fishermen and boaters, water quality issues), then perceptions of the meaningfulness of the proposed actions would likely be negative, and in turn result in broader negative social effects. Thus, it is important that any management actions that will close areas to fishing be appropriate and well planned, and that stakeholders be engaged in the entire process.

Alternative 1 would not allow for closed areas to be established through the Council process, under which the requirement in the Bi Op would not be met. **Alternative 1** would be expected to produce few social effects; positive and negative impacts would be minimal or none. **Alternative 2** would designate the largest closed area (approximately 60 mi^2) and would be expected to result in more significant negative impacts on the fishermen compared to **Alternative 3**. **Alternative 2, Option a** would be expected to generate negative social impacts on the commercial trap fishermen only by eliminating present and potential fishing grounds, which may impact fishing businesses and also may contribute to crowding or gear conflict. **Alternative 2, Option b** expands the prohibition to include all spiny lobster fishing, thus would include other commercial gear (dive and bully nets) and recreational divers, and would generate an even more substantial social impact by limiting fishing areas for the entire commercial lobster fishery and the recreational fishery.

The estimated total area closed under **Preferred Alternative 3** is 5.9 mi^2. As in the options in **Alternative 2**, adverse impacts on the commercial trap fishery would be expected from a prohibition for traps only (**Preferred Option a**), and these impacts would extend into the rest of the commercial fishery and recreational fishery with **Option b**.

For **Alternative 2** and **Preferred Alternative 3**, broader positive social effects, in terms of benefits of a healthy public marine resource, would likely be generated, dependent on the degree of impact to the corals by the lobster fishery relative to other factors that affect the marine environment in the Florida Keys. Otherwise, prohibitions on lobster fishing areas would have no significant effect on the population of the *Acropora* spp., and there would be no broad positive social effects that are associated with protection of a threatened species and the overall health of the coral ecosystem.

4.1.4 Direct and Indirect Effect on the Administrative Environment

Alternative 1 could change the administrative environment from the current situation. The Bi Op issued an Incidental Take Statement (ITS), which authorizes a limited number of incidental takes of ESA-listed species. The ITS provides an exemption from the ESA's Section 9 take prohibitions. However, that exemption only applies if certain Reasonable and Prudent Measures (RPMs) and implementing Terms and Conditions (T/Cs) are met. By selecting **Alternative 1** one of the RPMs and T/Cs outlined in the Bi Op will not be met. Since the RPMs and T/Cs have not been fully implemented the take exemption provided by the ITS will not apply. Without that exemption any incidental taking of an ESA-listed species by the commercial spiny lobster trap fishery would be a violation of the ESA. Issuing ESA violations could also increase the administrative burden on the agency. Additionally, since **Alternative 1** does not implement RPMs and T/Cs prescribed in the Bi Op NOAA Fisheries Service and the Councils could be subject to litigation, which would result in a significant administrative burden on the agency.

Any alternative that creates new closed areas would increase the administrative burden over the current level due to changes in maps, outreach, and education of the public, and greater enforcement needs. **Alternative 2** may require more time in outreach and education than **Preferred Alternative 3** because large areas traditionally fished for spiny lobster would be closed. **Option b** compared to **Preferred Option a** would likely create a larger administrative burden because the recreational and commercial sectors would be impacted, whereas under **Option a**, only the commercial spiny lobster trap fishery would be impacted. However, enforcement would be easier if all lobster fishing was prohibited.

4.1.5 Council Conclusions

The Councils chose **Preferred Alternative 3** because the proposed closures would best meet the requirements of the Bi Op while minimizing impacts to the extent possible on the spiny lobster trap fishery. Additionally, the proposed closed areas were selected in coordination with industry representatives. The Councils selected **Preferred Alternative 3, Option a** because it would satisfy the requirements of the Bi Op in regards to damage by trap movement. The Councils did not feel that prohibition of spiny lobster harvest by commercial and recreational divers was necessary at this time because there was not adequate information on the impact of diving to the threatened *Acropora* spp. corals, and that additional enforcement would be required to monitor all harvest in the closed areas, specifically marking the areas to alert divers to harvest prohibitions. Additionally, the Councils felt that the upcoming zoning plan review by the Florida Keys National Marine Sanctuary would be more appropriate to address comprehensive closed areas that may include prohibiting spiny lobster harvest from divers.

4.2 Action 2: Require Gear Markings for Spiny Lobster Trap Lines in the EEZ off Florida

Preferred Alternative 1: No Action – do not require markings for spiny lobster trap lines.

Alternative 2: Require all spiny lobster trap lines in the EEZ off Florida to have a white marking along its entire length, such as an all white line or a white tracer throughout the line. The marking must be visible at all times when traps are in use. All gear must comply with marking requirements no later than August 6, 2017.

Alternative 3: Require all spiny lobster trap lines in the EEZ off Florida to have a permanently affixed white marking at least 4-inch wide spaced at least every 15 ft along the trap line, or at the midpoint if the line is less than 15 ft. The marking must be visible at all times when traps are in use. All gear must comply with marking requirements no

Note: The white line or line with white tracer proposed under Alternative 2 would also be valid under Alternative 3.

4.2.1 Direct and Indirect Effect on the Physical and Biological/Ecological Environments

Trap lines are consistently found as marine debris and most frequently without buoys or traps still attached. These conditions create significant difficulty in determining if line found in the environment or entangling protected species originated from the spiny lobster fishery. A lack of uniquely identifiable markings also makes monitoring incidental take by the fishery difficult. Trap line marking requirements would allow for greater accuracy in identifying fishery interactions with protected species, leading to more targeted measures to reduce the level and severity of those impacts. Trap line marking requirements would allow for greater accuracy in determining, or ruling out, fishery-based sources of marine debris.

NOAA Fisheries Service completed a formal consultation, and resulting Bi Op, on the continued authorization of the Gulf of Mexico and South Atlantic spiny lobster fishery in 2009. The Bi Op stated the fishery was not likely to adversely affect ESA-listed marine mammals, Gulf sturgeon, or designated critical habitat for elkhorn and staghorn corals. However, the Bi Op determined that the trap sector of the spiny lobster fishery would adversely affect sea turtles, smalltooth sawfish, and elkhorn and staghorn corals. Further, the Bi Op discussed ways the commercial spiny lobster trap fishery may affect these species. The Bi Op indicated that commercial lobster traps can adversely affect sea turtles and smalltooth sawfish via entanglement and/or forced submergence. Entangled sea turtles can be released alive or can be found dead upon retrieval of the gear as a result of forced submergence. Sea turtles and smalltooth sawfish that do not die from their wounds may suffer impaired swimming or foraging abilities, altered migratory behavior, and altered breeding or reproductive patterns. The Bi Op also discussed impacts to *Acropora* spp. stating traps and/or trap lines can adversely affect *Acropora* spp. via fragmentation or abrasion. Traps may also damage *Acropora* spp. during trap deployment/retrieval or if they are moved by storms and ultimately collide with colonies.

Ultimately, the Bi Op concluded these adverse affects would "take" listed species but would not jeopardize the continued existence of any of those species. An incidental take statement was issued for green, hawksbill, Kemp's ridley, leatherback, and loggerhead sea turtles, smalltooth sawfish, and both species of coral.

Under the ESA, "takes" of most listed species are prohibited by law. To "take" a listed species means to "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage" in any of those activities [ESA Section 3(19)]. The adverse affects to sea turtles, smalltooth sawfish, and *Acropora* spp. from spiny lobster fishing described in the 2009 Bi Op are considered takes. However, some take of ESA-listed species can be authorized following the completion of a Bi Op and the associated ITS. When an ITS is issued, it allows for a specific number of takes to lawfully occur, so long as the takes are incidental to otherwise legal fishing. However, unless certain measures meant to minimize the impacts from and monitor the frequency of those incidental takes are followed, the protections afforded by the ITS do not apply.

No data collection programs (e.g., observer programs) are currently in place to specifically monitor interactions between the spiny lobster fishery and protected species, and the ability to monitor the authorized incidental takes is otherwise limited. Due to this paucity of data, sea turtle stranding and incidental capture records from the Sea Turtle Stranding and Salvage Network were used in the Bi Op to estimate the number of interactions in the federal spiny lobster fishery. The analysis used those data to estimate the total number of sea turtle interactions with the Gulf and South Atlantic spiny lobster fishery in the EEZ (Table 4.2.1.1). In the analysis, a sea turtle take rate per trap soak day was calculated, then multiplied by the number of traps in the federal spiny lobster fishery, to estimate the number of sea turtle interactions occurring in federal waters. The number of mortalities occurring as a result of those interactions was also calculated by species. The Bi Op outlines in detail the steps used in these calculations. Because of the great limitations on monitoring incidental take, the Bi Op required measures to improve those monitoring capabilities. Without the ability to monitor future incidental take, all of the measures prescribed the Bi Op to minimize the impacts from and monitor the frequency of incidental takes may not be met. Further, without a means of definitively identifying which interactions are attributable to the spiny lobster fishery, the fishery could potentially be held responsible for interactions that are attributable to other fisheries. This may result in unnecessary restrictions on the trap sector of the spiny lobster fishery.

Table 4.2.1.1. Estimated three-year takes of protected species from the Bi Op for the commercial spiny lobster fishery.

Species	Lethal and Non-lethal	
Loggerhead	3	
Green	3	
Hawksbill/Leatherback/Kemp's ridley	1*	
	Lethal	Non-lethal
Smalltooth sawfish	0	2
	Area Affected	
Staghorn coral *(Acropora cervicornis)*	482.09 m^2	
Elkhorn coral *(Acropora palmata)*	7.41 m^2	

*The take for these species is in combination, not one per each species.

Industry representatives have expressed concern that colored line may actually attract sea turtles and cause more interactions. Most sea turtles appear to have at least some color vision and most are able to see a color spectrum similar to what humans observe (Liebman and Granda 1971; Granda and O'Shea 1972; Liebman and Granda 1975; Levenson et al. 2004; Mäthger et al. 2007). Research on sea turtle vision shows that green and loggerhead sea turtles have peak sensitivity in the yellow range (around 580 nanometers), and sensitivity drops drastically above 650 nanometers and below 510 nanometers (Levenson et al. 2006). Leatherback sea turtles were shown to have peak sensitivity in the green range (Eckert et al. 2006). Few studies have been conducted on the attraction of sea turtles to colored objects. Bait (mackerel and squid) that were dyed blue did not attract turtles at a higher rate than non-dyed bait (Yokoto et al. 2009, Swimmer et al. 2006). Juvenile sea turtles were attracted to green, blue, and yellow light sticks, but only when they were lit (Lohmann et al. 2006).

A study of loggerhead sea turtles in the Adriatic Sea looked at the type and color of marine debris in the stomachs of stranded turtles or turtles that were incidentally caught and were dead (Lazar and Gračan 2011). Stomach analysis showed 35.2% of turtles had debris, and 42.1% of turtles with debris had rope of some sort. Of all turtles with ingested debris, 52.6% had white or translucent items; 31.6% had green, black, red, or brown items; and 15.8% had a mixture. Anecdotal evidence from sea turtle rehabilitation suggests that bright colors such as pinks, yellows, and bright greens can capture their attention (S. Schaf, Florida FWC, pers. comm.).

Preferred Alternative 1 would have no benefit for habitat or protected species. **Alternatives 2** and **3** would have the same positive impacts on the biological environment in that they would both allow for greater accuracy in identifying fishery impacts to benthic habitats and protected species, leading to more targeted measures to reduce the level and severity of those impacts. **Alternative 2** would potentially have greater benefits because the line would be marked along its entire length, allowing any size piece to be identified. A quantitative measurement of these differing impacts would be speculative because it is a data-collection step that may (or may not) affect the regulation of this fishery in the future.

4.2.2 Direct and Indirect Effect on the Economic Environment

The proposed regulation would require markings and/or colors on trap lines that are unique to fishing for spiny lobster in the EEZ to be in place no later than August 6, 2017. This would allow determination of whether separated trap rope (trap rope without buoys or traps that have mandatory owner-specific identification tags) is for the spiny lobster fishing in the EZZ in accord with the Bi Op (NMFS 2009). Allowing for caveats, an upper-end estimate of economic impact is $383,465 per year for the EEZ off Florida for **Alternative 2** or **Alternative 3**, and this represents 8.6% of trip gross, $4.5 million, enough to affect fishermen's decisions about fishing in the EEZ, as explained later (trip gross revenue in Table 4.1.2.1, last column).

Table 4.2.2.1. Spiny lobster commercial fishing in Florida (all, state waters, and EEZ), landings and ex-vessel value, effort, trip gross revenue, and vessel gross revenue.

Annual averages for fishing years 2005/06 - 2009/10, or percentiles	Landings, Florida	Landings in Florida by area of capture	
		State waters	EEZ, Alternatives 1-3
Landings, thousand pounds (ww)	3,835	3,109	726
Percentage of Florida landings	100%	81%	19%
Thousand 2008$ for spiny lobster	$22,221	$18,321	$3,900
Trip gross, thousand 2010$	$23,545	$19,137	$4,459
Vessel gross, thousand 2010$	$36,811	$33,466	$22,634
%, trip gross / vessel gross	64%	55%	20%
Trips with landings of spiny lobster	16,310	14,205	2,112
Landings, pounds (ww) / trip	237	219	339
Average depth fished (feet)	34	29	65
Depth, 25th percentile	15	15	33
Depth, 90th percentile	72	65	113
Depth, 99th percentile	148	102	206
Vessels with landings of spiny lobster	776	708	271
Pounds (ww) / vessel	4,972	4,413	2,695
2010$ / vessel, average	$28,489	$25,725	$14,387
2010$ / vessel, median	$6,708	$7,161	$2,997
Vessel gross, 2010$ / vessel	$47,274	$47,115	$83,460
Traps "that could be fished"	416,722	375,427	157,410
Traps / vessel, 25th percentile	136	154	132
Traps / vessel, average	537	532	574
Traps / vessel, 90th percentile	1,120	1,080	1,460

Source: NMFS, SEFSC, FTT (02Sep11), methods in Vondruska 2010a. Some vessels fish in both in Florida waters and the EEZ off Florida, meaning that the respective column totals for vessel gross, the number vessels with landings, and "traps that could be fished" in Table 4.2.2.1 are not mutually exclusive, and they cannot be added to obtain the totals for Florida as a whole. Gross revenue is the ex-vessel value in 2010$ of all FTT-reported landings for vessels or trips with spiny lobster (sl) landings. Selected trip data are used (trips are selected if sl landings > 1 lb, ww) to compute statistics for trips and vessels with sl landings. Vessel gross revenue includes the value for all FTT-reported landings of spiny lobster (spiny lobster landings > 0 lb, ww) and other species.

Caveats

For purposes of analysis, there is a need for more information and applied research on the characteristics, serviceable life, and practicable use of some possible specifications for trap lines when fishing for spiny lobster in waters off Florida. Some vessels fish for spiny lobster in the EEZ and state waters, and engage in fishing for other species seasonally, including stone crab, for which other traps are used, possibly with the same trap line. Fishermen report the use of both white and black trap lines in fishing for spiny lobster, apparently with the same serviceable life, 5-7 years. They use spiny lobster traps, each attached to a black vertical "floater" line in shallower water, and they may use multiple-trap trawls (spiny lobster trawls) in deeper water,

possibly with added, horizontal white "sinker" lines, as explained later. Some trap line in current use may comply with the proposed regulations, but the possible use of "tracers" (**Alternative 2**) or "markings" (**Alternative 3**), especially with some colors, could substantially increase the cost of trap line replacement under actual fishing conditions in Florida. Some colors could attract turtles, fish or other sight-capable mobile species (see Section 4.1.1). Besides color, other factors affect serviceable trap line life, such as the frequency of trap pulls, the weight of traps and line being pulled, depth and clarity of the water, amount of UV exposure (which is affected by depth of deployment, and other factors), and degree of fouling (Adams 2011). The hydraulic trap-retrieval equipment has a large "V-trough" pulley which cleans the fouled trap line, removing algae and other things, given the soak time, approximately ten days in the relatively warm water off Florida. This line cleaning method is expected to remove fisher-applied surface markings (paint or electrical tape), adding to labor costs. Such transverse markings have been used under other circumstances in the New England and Middle Atlantic regions, but not tested in the Florida spiny lobster fishery (Section 2.2; Figure 2.2.2).[7]

Manufactured trap rope is used in the spiny lobster fishery, including rope with woven-in "tracers" ("linear marking," **Alternative 2**), but informed sources report that manufactured rope with woven-in transverse markings (at least 4 inches in length) is not available and could be prohibitively costly to produce (**Alternative 3**). Data are not available for estimating the economic impact of fisher-applied transverse markings (paint or tape). The methods for estimating the economic impact of **Alternatives 2** and **3** (including work by Adams 2011), as detailed later in this section, assume that the economic impact to fishermen occurs in terms of added out-of-pocket expense because of expected changes in the price and life of manufactured trap rope. Shorter life for manufactured rope, perhaps 2-3 years rather than 5-7 years, implies additional labor input for more frequent replacement, but recurring application of tape or paint during each fishing season implies even more labor input that could affect the economics of fishing in terms of reducing the CPUE, and this could reverse the upward trend in CPUE that has characterized the fishery (Vondruska 2010a).

Fishery Analysis

Using a proxy for purposes of analysis, the number of "traps that could be fished" in Florida is estimated to be 416,722 traps (Table 4.2.2.1), a lower-end approximation for the number of Florida Trap Certificates, 488,072 (as of November 30, 2010, Brenda Brand, pers. comm., Florida FWC). It is estimated that 157,410 of the "traps that could be fished," 38% of the total, were used in the EEZ off Florida, an area that accounts for 19% of the Florida landings (Table 4.2.2.1). As a whole, the vessels that fish in the EEZ tend to be larger, and the average depth fished is greater than for state waters, but some fish in both in state and EEZ waters off Florida,

[7]The Atlantic Large Whale Take Reduction Plan affects several fisheries mostly in waters off the northeast U.S. coast, including those for American lobster (*Homarus americanus*), and blue crab, among those with pots or traps, and gillnet and shark fisheries. For lobster pot (trap) buoy lines, colored markings appear to have been required since January 1, 1998, including red and blue, or red and green, depending on location, and it is required that "all buoy lines are composed of sinking line" (FR, 62 39185, July 22, 1997). To avoid interaction with whales, the lines must be sinker lines, kept near the sea floor, and they must have weak links and other provisions for break away. The transverse markings were initially specified to be 4 in long, with 6 in between marks of different color (e.g., red and blue). Later, with the addition of other geographic areas, there appear to new sets of colors: red, black, black and red, and orange and black (FR 72 57110, October 5, 2007).

judging by data on total gross revenue. As a whole, the 271 vessels that landed spiny lobster from the EEZ off Florida had vessel gross revenue for all species landed of $22.6 million in 2010 dollars (Table 4.2.2.1). This includes $12.86 million (57%) for spiny lobster, of which $3.9 million is for spiny lobster from the EEZ. Other sources of vessel gross revenue include landings of stone crab (22%), snapper-grouper (or reef fish) (9%), king and Spanish mackerel (5%), shrimp (4%), and other species (3%). Because some vessels fish in both EEZ and state waters off Florida, the respective column totals for vessel gross, the number vessels with landings, and "traps that could be fished" in Table 4.2.2.1 are not mutually exclusive, and they cannot be added to obtain the totals for Florida as a whole. However, the amounts for the Florida EEZ and Florida as a whole are not affected.

Selected FTT-based data on the number of traps per vessel and the depth of fishing for the Florida EEZ from Table 4.2.2.1 are used in Table 4.2.2.2, along with other information on trap line prices and replacement intervals to estimate the cost per vessel to replace trap lines.[8]

Table 4.2.2.2. Spiny lobster fishing, Florida EEZ, estimated trap line replacement costs.

Trap line, $ / ft	Estimated annual cost of trap line per vessel							
	574 traps / vessel, 65 ft trap lines. Replace in (years):				1,460 traps / vessel, 113 ft trap lines. Replace in (years):			
	1 yr	3 yrs	5 yrs	7 yrs	1 yr	3 yrs	5 yrs	7 yrs
$0.04	$1,492	$497	$298	$213	$6,599	$2,200	$1,320	$943
$0.05	$1,866	$622	$373	$267	$8,249	$2,750	$1,650	$1,178
$0.06	$2,239	$746	$448	$320	$9,899	$3,300	$1,980	$1,414
$0.07	$2,612	$871	$522	$373	$11,549	$3,850	$2,310	$1,650
$0.08	$2,985	$995	$597	$426	$13,198	$4,399	$2,640	$1,885
$0.09	$3,358	$1,119	$672	$480	$14,848	$4,949	$2,970	$2,121
$0.10	$3,731	$1,244	$746	$533	$16,498	$5,499	$3,300	$2,357

Source: NMFS, SEFSC, FTT (02Sep11), methods based on Vondruska 2010a. Data are for trips for which spiny lobster landings exceed 1 pound. Statistics are computed separately for each variable. Averages and 90th percentiles for the Florida EEZ from Table 4.2.1 are used for depth fished and traps "that could be fished." A depth of 98 ft is approximately 30 m.

Table 4.2.2.2 suggests wide variation in annual cost of replacing manufactured (purchased) line, depending on assumed values for four variables, the price of trap line, length of line, number traps per vessel, and replacement intervals, irrespective of the possible reasons for differences in trap line price and serviceable life. To obtain the annual cost per vessel in Table 4.2.2.2, it is assumed that fishermen replace trap lines in equal annual increments over 3-year, 5-year, and 7-year intervals. Apparently, fishermen currently replace both white and black line at 5-7 year intervals. The per-vessel annual cost estimates assume that fishermen replace their own lines; the estimates do not include labor, buoys, traps, or other necessary items for trap use. Lighter, black "floater" vertical lines (5/16 inch or 3/8 inch in diameter) are widely used. Spiny lobster

[8]Prices and other information were obtained from the following sources: Adams, 2011; Cudjoe Sales, pers. comm., Aug-Dec, 2011 (22536 Overseas Highway, Cudjoe Key, FL 33042); W. Kelly (letter from FKCFA); Nylon Net Company (PO Box 592, Memphis, TN 38101-0592), website and pers. comm., Aug-Dec, 2011; Ornitz, 2011; and Bob Mueller, and John Hunt, Florida Fish and Wildlife Research Inst., pers. comm., 30Dec11.

trawls (multiple-trap trawls) with horizontal, "sinker" lines, and separate weights are used in deeper water to reduce movement along the ocean floor, and possible trap gear loss during normal fishing conditions, including storms (excluding hurricanes, also called tropical storms).[9] Craig (1974) conducted research on single-trap and multi-trap trawls (when the latter were relatively new in fishing for spiny lobster off Florida). Both configurations are used in the American lobster fishery in the northeast, and sinker line is mandatory. The term spiny lobster trawl refers to the use of one or two vertical lines, with each vertical line being attached to a surface buoy, and with the other end of each vertical line being attached to bridles, which in turn are attached to lines for individual traps. The trawl may also consist of a "U-shaped" horizontal line, with attached traps. One supplier indicated that the "sinker" trap line they sell to fishermen for spiny lobster trawls is white, contains dealer-specific additional coloring (in tracers), and costs much more per foot than "floater" black vertical line (approximately, 8¢/ft rather than 4¢/ft, more or less, depending on specifications). This is not "leaded" line, which costs far more (approximately, more than 40¢/ft for 5/16 inch line; Nylon Net Company, Memphis, TN, website).

These data in Table 4.2.2.2 may or may not reflect actual costs for trap lines for any one vessel. According to survey data, the fisher-reported costs for traps (traps, lines, buoys, and other components) represent a significant part of capital (investment) cost and repair cost in fishing for spiny lobster. For example, Shivlani et al. (2005) indicate an average per-vessel value (investment or asset value) for lobster traps of approximately $29,000, and $107,430 for the vessel, along with $6,000 for annual trap repairs (2001/2002 survey data for multi-species vessels landing in South Florida ports, dollar values not adjusted to 2010 levels). They report an average life span of four years for traps, with 25% of the traps being replaced each year, and the use of 1,463 traps per vessel in the 2001/2002 season. In a separate study for the Dry Tortugas region, the averages are higher, and include an investment of $406,925 for the vessel, $45,923 for spiny lobster traps at 1,746 traps per vessel, and annual trap maintenance of $22,080 (Murray 2005; multi-species vessels fishing in 2004-2005).

Based on the discussion provided above, evaluation of the expected economic effects of the alternatives considered centers on the effect of the alternative on the cost of replacement line, replacement labor, and line longevity. As previously described, Table 4.2.2.2 includes the estimated annual trap line replacement costs for several possible scenarios, referring to out-of-pocket expense for manufactured (purchased) trap line. The results in Table 4.2.2.2 can be easily expanded for additional cost scenarios because the cost changes from one line price to the next in fixed amounts. For example, under the 1,460 trap/3-year replacement cycle, each $0.01 increase in the line price increases the annual replacement cost by $550. For the same number of traps and a 5-year replacement cycle, the incremental change is $330.

[9]These measures would not preclude the loss and destruction of a majority of the traps, resulting marine debris, most often reported to be traps and buoys, such as occur during major tropical storms (hurricanes), mostly recently with the hurricanes of 2005 (Section 4.1.2, footnote; Donahue et al. 2008). Hurricanes could account for separated trap rope (trap rope without buoys or traps), the identification of which is the concern of Action 2, but causality is not clear (Section 2.2).

Estimated Economic Impacts

Starting with an estimate for **Preferred Alternative 1**, as used in the next paragraph, the annual cost per vessel for ongoing trap line replacement in the EEZ off Florida is $1,885, assuming 113 ft of line for each trap, 1,460 traps per vessel, 7-year replacement intervals, and a trap line price of 8¢/ft. This estimate is used as a baseline to assess the added cost of trap line replacement under **Alternatives 2** and **3**; it is assumed to represent an upper-end cost estimate for ongoing trap line replacement for vessels fishing for spiny lobster in the EEZ off Florida. It is assumed that 8¢/ft reflects the use of heavier (thicker) vertical line, and/or sinker line to withstand fishing conditions in the EEZ, though lighter (thinner) line is available for as little as 4¢/ft. The assumptions for trap rope length, 113 ft, and the number of traps per vessel, 1,460 traps, are based on the 90th percentiles for observed values for trips (FTT data in Table 4.2.2.1). By way of comparison, Adams (2011) assumed 90-ft trap lines for all spiny lobster fishing in waters off Florida (for 484,500 traps), a price of 8.8¢/ft for the heavier line used in spiny lobster trawls (for 48,500 traps, 10% of the total), and a price of 7.7¢/ft for the lighter line used in vertical trap lines (for 436,000 traps), and a 7-year life.

For 271 vessels, the average number fishing in the Florida EEZ, the postulated annual cost for on-going trap replacement is $510,835[10] under **Preferred Alternative 1**, or 11% of trip gross revenue, $4.459 million (trip gross in Table 4.2.1, last column). The approximate counterpart for **Preferred Alternative 1** based on Adams (2011) appears to be lower.[11] It should be clearly noted, however, that these costs, regardless of the estimate or methodology used, represent current costs and would, therefore, be unaffected by this proposed regulatory action.

Fishermen's economic rationale for the continued use of black or white line is based on their experience-based estimates of serviceable life and perceptions of effects on protected resources (**Preferred Alternative 1**). It is assumed for purposes of analysis that **Alternative 2** implies the use of a white tracer along a black line's entire length (perhaps as in Figure 2.2.1), or the use of white line. For reasons of identifying what they sell to fishermen, suppliers are reported to employ tracers of different color than the line (whether or not as in Figure 2.2.1). **Alternative 3** would require that all spiny lobster trap lines in the EEZ off Florida to have white (or other color) transverse markings on black rope at least 4-inch wide spaced at least every 15 ft along the trap line, or at the midpoint if the line is less than 15 ft (perhaps as in Figure 2.2.2). As indicated earlier in this section under caveats, manufactured rope with such transverse markings is not available. The practicable use of fisher-applied tape or paint has not been established for spiny lobster fishing, though such methods have been used in the northeast under other conditions, and data are not available to estimate the economic effect on fishing for spiny lobster. However, the specifications of each alternative overlap because the use of either a white tracer on black line or white line, as specified in **Alternative 2**, would satisfy the intended requirements of **Alternative**

[10]Based on the postulated annual cost per vessel of $1,885 (assuming 1,460 traps per vessel, 113-ft trap lines @ 8 ¢/ft, 7-yr replacement intervals) and 271 vessels ($1,885 x 271 = $510,835).

[11]For **Preferred Alternative 1** the 15-year cost for replacing all vertical and spiny lobster trawl lines in Florida is $10,216,800 or $681,120 per year (Adams 2011, Tables 2). The EEZ share computed using landings data from Table 4.2.2.1 (where 726 / 3835 ~ 19%) is $129,413. The EEZ share is computed using trap data from Table 4.2.2.1 (where 157,410 / 416,722 ~ 38%) is $258,826.

3. Marking options would not be limited under **Alternative 3** and fishermen would be free to identify and use the method that worked best for all of them.

It is estimated that **Alternative 2** or **Alternative 3** could increase the annual (out-of-pocket) cost of trap line replacement compared with **Preferred Alternative 1**; i.e., as an upper-end estimate the annual cost of trap line replacement goes from $510,835 (11% of trip gross) to $894,300[12] (20% of trip gross), with a difference of $383,465, which is the estimated economic impact. The approximate counterpart for economic impact based on Adams (2011) is less.[13] It should be noted that the economic impact for **Alternative 2** or **Alternative 3** of $383,465 assumes a 5-year replacement schedule and $0.10 per foot compared to 7 years and $0.08 per foot under **Preferred Alternative 1**.

At 8.5% of trip gross revenue, the upper-end estimate of economic impact of **Alternative 2** or **Alternative 3**, $383,465, could affect fishing for spiny lobster in the EEZ by some of the 271 vessels doing so under **Preferred Alternative 1**. Pending further information and research, the economic impact could be less, perhaps closer to $0 than to the upper-end estimate of $383,465. Trip vessel gross revenue is used in this comparison to suggest possible effects on fishermen's decisions to fish for spiny lobster in the EEZ. The relative effect on (potential loss of) vessel gross revenue would be less (1.7%) for the 271 vessels as a whole, and fishermen would be expected to continue to fish. However, fishing for all of the species that contribute to their vessel gross revenue is governed by state and federal regulations, and a vessel may or may not be able to land more of these species, without purchasing access rights from other fishermen. Vessels may differ in their fishing activity. Perhaps some of the 271 vessels that would be affected could turn to more fishing in Florida waters with their existing limited-access Florida Trap Certificates for spiny lobster.

Long-term Effects and Resource Protection

The discussion above covers short-term and recurrent costs. An additional consideration is the economic effect associated with the potential to increase protection of habitat from marine debris and reduction of entanglement of protected species. The alternative marking requirements are proposed to facilitate the ability to associate separated trap rope (rope without buoys or traps that have mandatory, owner-specific identification) with the spiny lobster fishery in the EEZ (not state waters). In turn, this would facilitate timely adoption of appropriate corrective measures to protect the different resources. The proposed alternatives may differ in their ability to help identify entangled trap line; hence, they may differ in the likelihood that potentially harsher restrictions, with more severe economic consequences to the spiny lobster fishermen and

[12]Assuming 5-year replacement intervals for 1,460 traps per vessel and 113 ft lines @ 10¢/ft, the estimated annual cost of trap replacement is obtained as follows: $3,300 per vessel for 271 vessels ($3,300 x 271 = $894,192).

[13]For Florida as a whole, Adams (2011) estimated a 15-year economic impact of $8,577,000. This translates into $577,180 per year. Adams assumed no addition to price for rope for spiny lobster trawls (**Preferred Alternative 1** with black line or **Alternative 2** with black line and blue tracer for replacement at 8.8¢/ft), an addition to price for rope for spiny lobster vertical lines (a price of 8.6¢/ft rather than 7.7¢/ft), but shorter life for trap line under **Alternative 2** (replacement every 3 yrs rather than every 7 yrs). Arguably, the EEZ share may be estimated using landings data from Table 4.2.2.1, 726 / 3835 ~ 19%, and $577,180 x 0.19 = $108,642. If the EEZ share is be estimated using trap data, it is $219,328 (157,410 / 416,722 ~ 38%, and $577,180 x 0.38 = $219,328).

industry, will be required. Neither the degree of enhanced identification nor the effects of subsequent action can be forecast with available data. Nevertheless, from these perspectives, absent current use of white line or appropriately identifiable line by all current fishermen, **Preferred Alternative 1** would not provide enhanced protection to the resources and would be expected to more likely require future restriction with more severe economic consequences than the other alternatives. Because the identifying marking would cover the entire length of the line, **Alternative 2** would be expected to result in the greatest protection for the potentially affected resources and the least likelihood of more severe restrictions and associated economic consequences. The effects of **Alternative 3** would be intermediate to those of **Preferred Alternative 1** and **Alternative 2**, though these effects would be expected to be much closer to those of **Alternative 2** than **Preferred Alternative 1**.

The discussion above applies to the expected economic effects of the proposed alternatives on spiny lobster fishing in the EEZ, consistent with the scope of this amendment. If one of the proposed alternatives is implemented, then NOAA Fisheries Service would ask Florida to implement compatible regulations for spiny lobster fishing in state waters. Although Adams (2011) evaluated the expected economic effects of trap line conversion on all fishing for spiny lobster in waters off Florida, comparable estimates of the effects of **Alternatives 2** and **3** on spiny lobster fishing in state waters have not been developed. The interested reader can generate such estimates using the information provided in Tables 4.2.2.1 and 4.2.2. Key attention should be placed in any assessment, however, on the number of traps, line length, expected line life, and line price used in a state-water analysis because the assumptions used for fishing in the EEZ may not be appropriate for fishing in state waters. Consideration that some vessels may fish in both state waters and the EEZ would also be appropriate. Regardless of the estimates generated, or assumptions utilized, the ranking of the alternatives in terms of economic effects would not be likely be affected; assuming some line conversion would be required, both **Alternatives 2** and **3** may be more costly than **Preferred Alternative 1** (if white or tracer line is more expensive or less durable than line currently used), **Alternative 3** may allow for lower cost options than **Alternative 2**, and **Alternative 2** may afford better protection than **Alternative 3** to potentially affected resources and reduce the likelihood of the need for more severe restrictions in the future.

4.2.3 Direct and Indirect Effect on the Social Environment

The proposed action to require markings on trap lines is required by the Bi Op as a means to identify ropes from the lobster trap fishery and measure the impacts on protected species. In general, positive social effects would be associated with biological benefits of improved monitoring of trap line interaction with protected species. Negative social effects would likely be tied to economic impacts on the commercial trap fishermen by the additional costs required to modify gear and the potential changes in long-term costs to replace line. Additional negative social effects are likely to result if stakeholders do not perceive the proposed measure as a necessary and effective means to protect sea turtles, smalltooth sawfish, and elkhorn and staghorn corals.

Preferred Alternative 1 would not require any markings on the lobster trap line, and would not be expected to result in any effects on the social environment. No social benefits linked to the biological benefits would result, nor would negative impacts associated with additional costs for

fishermen or negative perceptions of the proposed actions. **Alternatives 2** and **3** both require some type of marking on the trap lines, which in some capacity likely result in negative social impacts due to additional costs for trap fishermen, as discussed in Section 4.2.2. There is a phase-in period for the requirements, which will help mitigate the negative impacts associated with additional costs.

Implementation of an identifying color on lobster trap line (**Alternatives 2** and **3**) should improve monitoring of fishery interactions with sea turtles, *Acropora* spp., and other protected resources and this information will help focus future actions toward the appropriate fishery (spiny lobster or another trap fishery). This likely would result in positive social benefits for the general public and for resource users, as it would be expected to improve the coral ecosystem health in the Florida Keys. However, at this time there is little evidence that requiring gear markings has helped improve monitoring programs in other regions, which will likely lead to negative social impacts due to unclear outcomes of the proposed actions in **Alternatives 2** and **3**. Additionally, negative effects on the social environment may result due to changes in perception of meaningful application of the provisions of the ESA that are intended to help protect threatened and endangered species. Specifically with the proposed action for trap line markings, it may not be clear to stakeholders and the general public why gear markings were required, instead of other actions that would potentially be more effective in the protection of *Acropora* spp., such as implementing outreach and education programs for recreational divers and boaters, or improving enforcement to minimize lobster trap damage and theft that can result in cut lines and other debris.

4.2.4 Direct and Indirect Effect on the Administrative Environment

Preferred Alternative 1 could change the administrative environment from the current situation. The Bi Op issued an ITS, which authorizes a limited number of incidental takes of ESA-listed species. The ITS provides an exemption from the ESA's Section 9 take prohibitions. However, that exemption only applies if certain RPMs and implementing T/Cs are met. By selecting **Preferred Alternative 1** one of the RPMs and T/Cs outlined in the Bi Op may not be met. If the RPMs and T/Cs have not been fully implemented by 2017, the take exemption provided by the ITS would not apply. Without that exemption, any incidental take of an ESA-listed species during commercial spiny lobster trap fishing would be a violation of the ESA that could result in enforcement action. These enforcement actions could increase the administrative burden on the agency. Additionally, since **Preferred Alternative 1** would not implement the RPMs and T/Cs prescribed in the Bi Op NOAA Fisheries Service and the Councils could be subject to litigation, which would result in a significant administrative burden on the agency.

To ensure compliance with the RPMs and T/Cs, NOAA Fisheries Service could implement trap line marking regulations through alternate avenues, which would also result in an increased administrative impact on the agency. **Alternatives 2** and **3** would increase the need for enforcement to check if trap lines are properly colored or marked. NOAA Fisheries Service Office for Law Enforcement has expressed issues with trap line marking requirements because of the effort required to make reasonably sure every float encountered in the EEZ has marked line beneath it. The at-sea officer and/or agent would need to pull the entire length of line to determine if the line marked actually matches the gear/trap at the other end. Therefore,

enforcing line markings would require a significant amount of enforcement resources. On the other hand, the ability to identify lines entangled with endangered species would reduce the difficulty in determining assignment of incidental take to a particular fishery by NOAA Fisheries Service Protected Resources Division. In general, neither of the alternatives to mark lines would be more or less burdensome than the other.

4.2.5 Council Conclusions

The Councils chose **Preferred Alternative 1** to allow more time for industry representatives to work with NOAA Fisheries Service and FWC staff to determine appropriate and cost-effective ways to mark lines. Staff from Florida FWC have begun a study to test the effectiveness of different methods of trap line marking (see Appendix K). The Councils intend to revisit this issue when the results of that study are available. Because the revised Bi Op requires implementation by August 6, 2017, the Councils would have time to develop new regulations if necessary.

4.3 Cumulative Effects Analysis (CEA)

As directed by the National Environmental Policy Act (NEPA), federal agencies are mandated to assess not only the indirect and direct impacts, but cumulative impacts of actions as well. The NEPA defines a cumulative impact as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time" (40 CFR 1508.7). Cumulative effects can either be additive or synergistic. A synergistic effect occurs when the combined effects are greater than the sum of the individual effects.

This section uses an approach for assessing cumulative effects based upon guidance offered by the Council on Environmental Quality (CEQ) publication "Considering Cumulative Effects" (1997). The report outlines 11 items for consideration in drafting a CEA for a proposed action.

1. Identify the significant cumulative effects issues associated with the proposed action and define the assessment goals.
2. Establish the geographic scope of the analysis.
3. Establish the timeframe for the analysis.
4. Identify the other actions affecting the resources, ecosystems, and human communities of concern.
5. Characterize the resources, ecosystems, and human communities identified in scoping in terms of their response to change and capacity to withstand stress.
6. Characterize the stresses affecting these resources, ecosystems, and human communities and their relation to regulatory thresholds.
7. Define a baseline condition for the resources, ecosystems, and human communities.
8. Identify the important cause-and-effect relationships between human activities and resources, ecosystems, and human communities.
9. Determine the magnitude and significance of cumulative effects .

10. Modify or add alternatives to avoid, minimize, or mitigate significant cumulative effects .
11. Monitor the cumulative effects of the selected alternative and adapt management.

1. Identify the significant cumulative effects issues associated with the proposed action and define the assessment goals.

The CEQ cumulative effects guidance states this step is accomplished through three activities as follows:

I. The direct and indirect effects of the proposed actions (Section 4);
II. Which resources, ecosystems, and human communities are affected (Section 3); and
III. Which effects are important from a cumulative effects perspective (information revealed in this CEA).

Valued ecosystem components (VECs) are "any part of the environment that is considered important by the proponent, public, scientists, and government involved in the assessment process. Importance may be determined on the basis of cultural values or scientific concern" (CEAA 1999). The important VECs for this analysis are as follows:

1. Managed Resource
2. Habitat
3. Protected Resources
4. Human Communities

2. Establish the geographic scope of the analysis.

The immediate areas affected by this action and analyzed in this CEA are the federal waters of the Gulf and South Atlantic. These waters extend from the seaward side of the state waters of Texas, Louisiana, Mississippi, Alabama, Florida, Georgia, South Carolina, and North Carolina to 200 miles. In practice, the waters off south Florida are the primary area where this species is fished in the U.S. and that would be affected by actions in this amendment. Other affected VECs including non-target species, habitat, and protected species are also within this geographic scope. The human community includes the fishing community, which coincides with the managed species' geographic range, as well as the areas where processing, importing, and shipping of lobster tails takes place.

3. Establish the timeframe for the analysis

The temporal scope of impacts of past and present actions for managed resources, non-target species, habitat, and human communities is primarily focused on actions that have occurred after implementation of the Spiny Lobster FMP (GMFMC and SAFMC 1982). The most recent spiny lobster stock benchmark assessment was SEDAR 8 (2005). An update to that assessment was conducted in 2010; however, the Review Panel rejected the update. The update included data for analysis of stock status from the 1985/1986 season to the 2009/2010 season for commercial and recreational landings. The next SEDAR benchmark assessment is scheduled for 2014.

The actions in Amendment 11 were also included in Amendment 10 to the Spiny Lobster FMP; however, the Councils and NOAA Fisheries Service deferred action to allow more time for stakeholder input. This amendment is expected to be completed before the beginning of the 2012 fishing season. Regardless of the alternative selected under Action 2, the biological

opinion requires that some sort of trap line marking be implemented by the beginning of the 2017 spiny lobster fishing season. Therefore, the timeframe for this CEA is 1982-2017.

4. Identify the other actions affecting the resources, ecosystems, and human communities of concern.

a. Past federal actions affecting the spiny lobster fishery are summarized in Section 1.4 of Amendment 10 to the FMP. The following list identifies more recent actions.

- The Tortugas South marine reserve (60 nautical mi^2) was sited in the Gulf EEZ to encompass a spawning aggregation site for mutton snapper. The Tortugas North marine reserve (120 nautical mi^2) included part of the fishery jurisdiction of the FKNMS, Dry Tortugas National Monument, Gulf EEZ, and Florida, and was cooperatively implemented by these agencies. Both of these marine reserves encompass spiny lobster habitat.
- Amendment 9-CEB-1 (SAFMC 2010; SAMFC 2009) provided a presentation of spatial information for essential fish habitat (EFH) and EFH-Habitat Areas of Particular Concern designations for species in the Spiny Lobster FMP.
- Amendment 10 revised the lobster species contained within the fishery management unit; revised definitions of management thresholds; established an acceptable biological catch control rule, an annual catch limit, and an annual catch target for Caribbean spiny lobster; revised the federal spiny lobster tail-separation permitting requirements; revised the regulations specifying the condition of spiny lobster landed during a fishing trip; modified the undersized attractant regulations; modified the framework procedures; and gave Florida the authority to remove derelict spiny lobster traps within the EEZ off Florida under their trap cleanup program.

b. The following are recent Florida actions important to the spiny lobster fishery.

- The trap certificate reduction program was implemented in 1992 as part of the limited access program that used transferable trap certificates for the spiny lobster trap fishery. The first reduction was "active," in which 10% of certificates held by each fisherman were reverted back to the state. There were additional active 10% reductions in 1995, 1996, and 1999. Starting in 2002, "passive" reductions became the primary mechanism to reduce effort in the fishery, in which 25% of certificates transferred in a sale from one fisherman to another would be reverted back to the state. Passive reductions occurred through 2005 along with a 10% active reduction that incorporated the number of certificates reverted due to nonpayment of fees (i.e., if 5% of certificates were reverted to the state due to nonpayment, there was a 5% active reduction of held certificates). In 2009, Florida FWC reinstated a 10% reduction on all non-family transfers until the number of certificates reaches 400,000, the first time that a target number was established for the program (Rule 68B-24.009, FAC., Trap Reduction Schedule).
- As of January 1, 2005, and until July 1, 2015, no new commercial dive permits will be issued and no commercial dive permit will be renewed or replaced except those that were active during the 2004/2005 fishing season.
- In 2010, new regulations were enacted to remove latent trap certificates. Prior to the 2010/2011 season, any certificate for which the fee was not paid for three years shall be considered abandoned, revert to the state, and become permanently unavailable. Beginning

with the 2010/2011 season, reversion will occur if the fee is not paid for two consecutive years.

c. The following are non-FMP actions that can influence the spiny lobster fishery.

- A naturally occurring, pathogenic virus, PaV1, infects juvenile Caribbean spiny lobsters. This virus is lethal to lobsters. Infection is highest in smaller juveniles; mortality occurs after larval settlement but before recruitment to the fishery. PaV1 was first detected in the U.S. spiny lobster population around 1996. No evidence shows PaV1 has increased in prevalence or virulence since around 2000, so mortality from PaV1 may explain why landings declined beginning about that time while the post-larval recruitment index remained steady.
- The Deepwater Horizon MC252 oil spill affected more than one-third of the Gulf from western Louisiana east to the panhandle of Florida and south to the Campeche Bank in Mexico. The impacts of the oil spill on the physical and biological environment are expected to be significant and may be long-term. However, the oil remained outside most of the area where spiny lobsters are abundant. Oil on the surface has largely evaporated or been removed. Heavy use of dispersants resulted in oil suspended within the water column, in some cases even deeper than the location of the broken well head. Floating and suspended oil has washed onto shore in several areas of the Gulf as non-floating tar balls. Whereas suspended and floating oil degrade over time relatively quickly, tar balls are more persistent in the environment and can be transported hundreds of miles. Information on the effects of the oil on the spiny lobster fishery is incomplete and unavailable at this time.
- The hurricane season is from June 1 to November 30, and accounts for 97% of all tropical activity affecting the Atlantic Basin (NOAA 2007). Hurricanes, although unpredictable in their annual occurrence, can devastate areas when they occur. Direct losses to the fishing industry and businesses supporting fishing activities included: substantial loss of traps, loss of vessels, loss of revenue due to cancelled fishing trips, and destruction of marinas and other fishery infrastructure (Walker et al. 2006; Shivlani 2009). However, while these effects may be temporary, those fishing-related businesses whose profitability is marginal may go out of business if a hurricane strikes.
- Because of the continuing rise in the cost of fishing, including increases in the cost of fuel and insurance, along with other increases in operating costs, more fishermen are having difficulty making a living fishing. For example, fuel prices have increased more than 2.2 times since January 2000 according to the U.S. Department of Energy. Communities dependent on jobs that support the spiny lobster fishery could also be negatively impacted. This in turn may impact businesses dependent on commercial and recreational spiny lobster fishing because of fewer days to sell charter services, ice, fuel, tackle, hotel rooms, and other services to people participating in the fishery.
- How global climate changes will affect Gulf and South Atlantic fisheries is unclear. Climate change can impact marine ecosystems through ocean warming by increased thermal stratification, reduced upwelling, and sea level rise; and through increases in wave height and frequency, loss of sea ice, and increased risk of diseases in marine biota. Decreases in surface ocean pH due to absorption of anthropogenic CO^2 emissions may impact a wide range of organisms and ecosystems, particularly organism that absorb calcium from surface waters, such as corals and crustaceans (IPCC 2007, and references therein).

5. Characterize the resources, ecosystems, and human communities identified in scoping in terms of their response to change and capacity to withstand stress.

This step should identify the trends, existing conditions, and the ability to withstand stresses of the environmental components. According to the CEQ guidance describing stress factors, two types of information are needed: the socioeconomic driving variables identifying the types, distribution, and intensity of key social and economic activities within the region; and the indicators of stress on specific resources, ecosystems, and communities.

Caribbean Spiny Lobster

Trends in landings and the status of Caribbean spiny lobster are summarized in Section 3.1 and 3.4. The Caribbean spiny lobster stock is not considered to be undergoing overfishing and the overfished status is unknown. Amendment 10 redefined the overfished and overfishing thresholds, so both Councils would use the same definition. The maximum fishing mortality threshold was specified as the overfishing limit set by the Gulf Council's Scientific and Statistical Committee, which equals 7.90 mp. Landings have not exceeded this level since the 1999/2000 fishing year. The minimum stock size threshold was established as (1-M) x B_{MSY} , where M is natural mortality and B_{MSY} is the biomass at maximum sustainable yield or the appropriate proxy. However, an estimate of Caribbean spiny lobster biomass is not possible without a pan-Caribbean assessment, so the overfished status remains unknown.

Ecosystem

Changes in the spiny lobster fishery are not likely to create additional stress on the environment. Traps and trap lines can damage habitat through snagging or entanglement. Changes in the population size structure as a result of shifting spiny lobster fishing selectivity and changes in stock abundance could lead to changes in the abundance of other species that compete with spiny lobster for shelter and food. Predators of spiny lobster could increase if spiny lobster abundance increased, and species competing for similar resources as spiny lobster could potentially decrease in abundance if less food and/or shelter are available. If spiny lobster abundance decreased, the opposite effects would take place. Efforts to model these interactions are still being developed, so predicting possible stresses on the ecosystem in a meaningful way is not possible at this time.

Spiny Lobster Fishery (Human Community)

Florida trip ticket data used to monitor commercial spiny lobster effort include the number of vessels with landings, the number of trips taken, and trip duration. Trends are described in Sections 3.1 and 3.4, and briefly summarized here.

Florida commercial landings of Caribbean spiny lobster increased from the late 1940s then decreased from 2001 onward (Vondruska 2010a). The estimated number of traps used for commercial fishing for Caribbean spiny lobster in Florida approximately doubled every 10 years during 1950-1990, reached nearly a million traps in the early 1990s, and was reduced to less than a half million traps by the late 2000s. These declines can largely be credited to the trap limitation program, which began in 1993. Commercial diving landings increased rapidly in the first decade of the trap limitation program and then declined thereafter (Table 3.1.1). Estimated recreational landings of Caribbean spiny lobster and fishing effort in Florida (based on surveys of recreational permit holders) were more consistently low from 2001/2002 onward than in the 1990s (Table 3.1.1).

Other reasons for the decline in effort include increases in fishing costs, increases in harvesting efficiency, and even improvements in the stock status. However, data currently available are inadequate to determine which of these factors may have contributed to the decline in fishing effort.

6. Characterize the stresses affecting these resources, ecosystems, and human communities and their relation to regulatory thresholds.

This section examines whether resources, ecosystems, and human communities are approaching conditions where additional stresses could have an important cumulative effect beyond any current plan, regulatory, or sustainability threshold (CEQ 1997). Sustainability thresholds, which are levels of impact beyond which the resources cannot be sustained in a stable state, can be identified for some resources. Other thresholds are established through numerical standards, qualitative standards, or management goals. The CEA should address whether thresholds could be exceeded because of the contribution of the proposed action to other cumulative activities affecting resources.

Caribbean Spiny Lobster

Maximum sustainable yield (MSY) is unknown but the landings data from 1991/1992-2009/2010 fishing years (Table 3.1.1) can be used to provide an indication of the productivity of the portion of the stock within the area of the Spiny Lobster FMP. Total landings provide an index of MSY and have ranged from a high of 10.1 mp in 1999/2000 to a low of 4.1 mp in 2005/2006, with an average of 7.0 mp.

Caribbean spiny lobster were not undergoing overfishing based on the SEDAR 8 (2005) benchmark assessment. The 2010 assessment update reached the same conclusion; however, the Review Panel rejected the assessment update because they felt the model used was not appropriate. Because of the long planktonic larval stage for this species and hydrodynamic characteristics of the Gulf, South Atlantic, and Caribbean basins, Caribbean spiny lobsters in the U.S. fishery are believed to originate from spawning stocks outside of the U.S. Thus stressors on the population include fishing and other human activities outside the jurisdiction of the U.S. If the majority of recruitment is from areas outside of NOAA Fisheries Service authority, then fishing levels in this country may have no effect on stock biomass.

Ecosystems

In the Bi Op, NOAA Fisheries Service determined the spiny lobster trap fishery, as it currently operates (e.g., number of traps, fishing techniques, gear types, etc.), may adversely affect the green, hawksbill, Kemp's ridley, leatherback, or loggerhead sea turtles, *Acropora* spp., or smalltooth sawfish, but is not likely to jeopardize their continued existence. The current cap on the number of traps available to the fishery [FAC. 68B-24.009(1)] is extremely unlikely to increase over the next three years. Additionally, an action to increase the number of traps available in the fishery would represent a modification to the fishery regulations and an ESA section 7 consultation may need to be reinitiated to evaluate any new risks to protected species not previously considered.

The Bi Op stated that it is reasonable to assume the estimated level of take over the 2004/2005-2006/2007 fishing seasons is likely to continue into the future. Therefore, the Bi Op anticipated that, over any consecutive three-year period, spiny lobster trap fishing would incidentally take up to three loggerhead, three green sea turtles, and one hawksbill, Kemp's ridley, or leatherback sea turtle; two smalltooth sawfish (non-lethal); and 482.09 m^2 of *A. cervicornis* and 7.41 m^2 of *A. palmata*.

Spiny Lobster Fishery (Human Community)

Commercial fishing for Caribbean spiny lobster in Florida has been affected by sharply lower prices in the last two years and by landings that have been the lowest since the early 1960's. Decreased landings are likely due to the increased cost of fuel and decreased prices are likely due to the depressed economy in recent years. There was an estimated 2.8% of the population in the civilian force unemployed in Monroe County in 2007, which was quite a bit lower than the state's unemployment rate of 6.4%. Economic conditions would have been worse without long-term reductions in fishing effort and consequent increases in vessel and trip productivity. Average vessel and trip landings have exhibited flat to upward trends since the early-1990s. The number of permits may suggest an upward trend in recreational fishing activity, at least through 2007/2008, but landings and effort have been mostly lower in 2001/2002 onward than in the 1990s. These indicators reflect weakened national economic conditions in the last two to three years.

7. Define a baseline condition for the resources, ecosystems, and human communities.

The purpose of defining a baseline condition for the resource and ecosystems in the area of the proposed action is to establish a point of reference for evaluating the extent and significance of expected cumulative effects .

Although the Review Panel rejected the 2010 assessment update, the assessment report shows trends in biomass and fishing mortality dating to the 1985/1986 fishing season. Within this time, spiny lobster were not considered to have been undergoing overfishing. Because spawning stock biomass cannot be determined without a Caribbean-wide assessment, the overfished condition could not be determined. These results are consistent with SEDAR 8 (2005).

The spiny lobster fishery was primarily a bait fishery (Labisky et al. 1980), until the development of freeze processing enabled the expansion of the retail market in the 1940's. The development of SCUBA further expanded the commercial fishery as well as the recreational fishery in the 1960's. Baseline information is lacking on the social environment of these fisheries, although some economic data are available. Ex-vessel revenues and numbers of traps in the water are available dating to the early 1960s. For further details on the history of the spiny lobster fishery, please see Section 3.0 of this amendment and Amendment 10.

8. Identify the important cause-and-effect relationships between human activities and resources, ecosystems, and human communities.

Table 4.3.1. The cause and effect relationship of fishing and regulatory actions for Caribbean spiny lobster within the time period of the CEA.

Time period	Cause	Observed and/or expected effects
1970's-80's	Increased number of traps in the water	Increased user conflicts on the water, excessive mortality of shorts, declining yield per trap
1988	Requirement and specification of live wells for holding undersized attractants	Reduced mortality of undersized attractants from 26% to 10%
1993	Florida implemented the spiny lobster Trap Certificate Program	Reduction from 750,326 traps in 1993 to 492,253 traps in 2010
1993	Florida implemented the restricted species endorsement	Limited the number of commercial spiny lobster fishermen
1993	Bag limit for recreational spiny lobster fishery	Reduced impacts of recreational divers on the lobster stock, particularly during the two-day sport season in July
2012	Restrictions on issuance of spiny lobster tailing permits	Reduced take of undersized lobster or lobster caught using spear guns

9. Determine the magnitude and significance of cumulative effects.

The objective of this amendment and associated supplemental environmental impact statement is to implement management actions consistent with reasonable and prudent measures to protect threatened and endangered species established under the Bi Op. The short- and long-term direct and indirect effects of each these actions are provided in Section 4.

To examine the magnitude and significance of the cumulative effects, important VECs were identified for the overall action to be taken with this amendment. For purposes of this analysis, four categories of VECs were identified (Table 4.3.2), and the consequences of each alternative proposed in this amendment on each VEC were evaluated. Some of these VECs were combined because the impacts of many of the past and current actions were similar.

Table 4.3.2. Evaluated VECs considered for further analysis and VECs consolidated for analysis.

VECs considered for further evaluation	VECs consolidated for further evaluation
Managed resource	Adult Caribbean spiny lobsters Sub-legal Caribbean spiny lobsters
Habitat	Hard bottom EFH
Protected resources *Acropora* spp. Endangered/threatened species	Marine mammals Sea turtles Sawfish
Human communities	Commercial harvesters Recreational harvesters Dealers Fishing communities

The following discussion refers to the effects of past and present actions on the various VECs.

Managed Resources

SEDAR 8 (2005) found the Caribbean spiny lobster stock was not undergoing overfishing, but the overfished status could not be determined. However, much evidence exists that recruitment is almost entirely from outside of the U.S. To obtain a true estimate of spawning stock biomass, a Caribbean-wide assessment is needed. Further, management and harvest practices in other countries may have a substantial impact on recruitment to the U.S. fishery. New import size restrictions (Amendment 8; CFMC, GMFMC and SAFMC 2008) may increase the size of the spawning stock in countries that previously harvested lobsters at or below reproductive size.

Non-fishing activities are likely to adversely affect spiny lobster stocks. Products from the Deepwater Horizon MC252 oil spill could potentially make their way into spiny lobster habitat in the Florida Keys. Effects could be minimal because of weathering, or effects could be more detrimental, especially impacting reproductive output and larval survival. These impacts may or may not influence the Caribbean spiny lobster stock, as most of the larvae produced in the Keys are believed to be lost to the population. Global warming could also have a detrimental effect on spiny lobsters; however, those effects cannot be quantified at this time.

Habitat

The Gulf Council's Generic Essential Fish Habitat Amendment (GMFMC 2004) and the South Atlantic Council's Fishery Ecosystem Plan (SAFMC 2009) define EFH. Sections 3.2 and 3.3 of this amendment summarize the physical environment inhabited by Caribbean spiny lobsters. In general, Caribbean spiny lobsters can be found among rocks, on reefs, in grass beds or in any habitat that provides protection. A planktonic larval stage lives in the water column for six to seven months and feeds on zooplankton and phytoplankton. Young benthic stages of Caribbean spiny lobster will typically inhabit branched clumps of red algae, mangrove roots, seagrass banks, or sponges where they feed on invertebrates found within the microhabitat. Individuals two to four years show nomadic behavior, emigrating out of the shallows and moving to deeper, offshore reef environments.

The most detrimental effects to the environment from fishing are caused by traps. Deployment of traps and movement of traps can damage both soft and hard bottom habitats. The development of marine reserves around the Dry Tortugas and the FKNMS has helped protect some critical habitat. Florida's Trap Certificate Program has substantially reduced the number of traps that may be used by fishermen. Derelict traps may also impact habitat. Florida has a trap clean-up program in state waters that can be extended to federal waters under authority implemented through Amendment 10 (GMFMC and SAFMC 2011). Hurricanes are not uncommon in the Florida Keys where most of the lobster population lives. Storms can move both active and derelict traps over sensitive habitat even more than under normal conditions.

Although impacts to habitat are less for fishermen using gears other than traps, damage can still be done. Boats carrying recreational or commercial divers may drive through sea grass beds creating the ubiquitous prop scars visible in the Keys. Boats are sometimes anchored over hard bottom, and inexperienced recreational divers sometimes stand on or grab bottom structures with living organisms. The illegal use of casitas by commercial divers, artificial dens to attract lobsters, can damage or alter bottom structure. For commercial diving, state daily trip limits and a diving permit moratorium (in place since 2005) have reduced fishing effort. There is, however, no such limit for recreational fishing, and, consequently, a relatively large number of state-permitted recreational divers (Shivlani et al, 2005).

The Bi Op determined the spiny lobster fishery is not likely to adversely affect *Acropora* spp. critical habitat. The physical feature essential to the conservation of *Acropora* spp. critical habitat (typically referred to as the essential feature) is substrate of suitable quality and availability to support larval settlement and recruitment, as well as reattachment and recruitment of asexual fragments. Effects to the essential feature from bully netting and diving for spiny lobster either do not occur or occur so rarely they are discountable. Commercial trapping may affect *Acropora* spp. critical habitat, but any affects will be temporary and insignificant. Traps do not cause consolidated hardbottom to become unconsolidated, nor do they cause growth of macroalgae or increased sedimentation.

EFH, particularly coral reefs, sea grasses, and algae, is susceptible to non-fishing activities. Anything that suspends sediments, such as tropical storms, can block sunlight and decrease photosynthesis. Dramatic climate change in the future could alter temperatures to an extent to exceed the viable range for the organisms that make up these habitats.

<u>Protected Resources</u>

Acropora spp.

Commercial and recreational bully net use is not likely to adversely affect *Acropora* spp., based on the low likelihood of interactions between these species and this gear type. The reliance upon visual contact with a target species reduces the potential for fragmentation or abrasion of *Acropora* spp. caused by bully nets. *Acropora* spp. are extremely unlikely to occur on the seagrass and mud flats where the vast majority of bully nets are used.

Commercial and recreational diving for spiny lobster is not likely to adversely affect *Acropora* spp. *Acropora* spp. occur only rarely and in discrete locations within the Gulf and South Atlantic

regions, and are not found in the Gulf portion of the Florida Keys. Where they do occur, fisheries could cause fragmentation or abrasion resulting from: 1) fishing gear/marine debris, 2) damaging fishing practices, 3) vessel groundings, 4) anchoring, and 5) diver/snorkeler interactions (*Acropora* BRT 2005).

Traps may affect *Acropora* spp. via fragmentation and abrasion if they become mobilized during storm events and collide with colonies. The deployment of spiny lobster traps may adversely affect *Acropora* spp. as traps drop toward the sea floor or when traps are retrieved and pulled to the surface. Abrasion may occur when traps or trap lines contact *Acropora* spp. during storm events or normal fishing activities. However, *Acropora* spp. are only rarely, if ever, observed in the Gulf off south Florida where the majority of trap fishing occurs because of relatively poor water quality. For this reason, any adverse affects from abrasion/fragmentation due to interactions with commercial spiny lobster trap gear are only likely to occur in the South Atlantic waters off south Florida. The Florida Trap Certificate Program substantially reduced the number of traps by Florida fishermen. Fewer traps in the water reduce the likelihood of *Acropora* spp. suffering adverse impacts.

Localized adverse affects on *Acropora* spp. in the action area have resulted from many of the same stressors affecting *Acropora* spp. throughout its range, namely breakage by humans, disease, and intense weather events (i.e., hurricanes and extreme cold-water disturbances). These stressors have led to declines of *Acropora* spp. in the action area commensurate with declines seen elsewhere in the species' range (*Acropora* BRT 2005). Stresses associated with climate change have been documented worldwide and are expected to increase. For example, increased temperatures can lead to bleaching (loss of algal symbionts). Bleaching can also lead to increased disease in elkhorn corals (Muller et al. 2008). Researchers predict bleaching threshold temperatures will be exceeded at least once per year on the majority of the world's coral reefs by 2030-2050 (IPCC 2007).

Increases in atmospheric carbon dioxide (CO_2) can also affect *Acropora* spp. corals. Atmospheric CO_2 has increased from about 280 parts per million (ppm) in the early 1800s to current levels of about 380 ppm (Prentice 2001). As atmospheric CO_2 is dissolved in surface seawater, it becomes more acidic, shifting the balance of inorganic carbon away from CO_2 and carbonate (CO_3^{-2}) toward bicarbonate (HCO_3^{-1}). These changes affect corals' ability to create new skeletal material because corals are thought to use CO_3^{-2} as the source of carbonate to build their aragonite ($CaCO_3$) skeletons. Kleypas et al. (1999) calculated that coral calcification rates could be reduced by 30% in the tropics by the middle of the 21st century. Corals grown during laboratory experiments that doubled atmospheric CO_2 manifested an 11-37% reduction in calcification (Gattuso et al. 1999; Langdon 2003; Marubini et al. 2003).

Rapid rises in sea level will likely affect *Acropora* spp. corals by both submerging them below their preferred depth range and by degrading water quality through coastal erosion or enlargement of lagoons and shelf areas. Sea-level change is unlikely to lead to extinction in the next several hundred years by this process because sea level is not predicted to rise that rapidly in the near future (Church and Gregory 2001).

Acropora spp. corals would likely be affected by decreased water quality because of shoreline erosion and flooding of shallow banks and lagoons caused by sea-level rise. Where topography is low and/or shoreline sediments are easily eroded, corals may be stressed by degrading water quality as sea-level rise proceeds. Flooded shelves and banks at higher latitudes (higher than 15°N) may alter the temperature or salinity of seawater to extremes that can then affect corals during offshore flows. Although this process could be widespread, there will be many areas, particularly on the windward side of rocky islands, where erosion and lagoon formation will be minimal (*Acropora* BRT 2005).

The impacts of global climate change on the severity and frequency of tropical weather events (e.g., typhoons and hurricanes) are currently being debated. The Intergovernmental Panel on Climate Change stated that, based on a range of models, it was likely that future tropical weather events will become more intense, with larger peak wind speeds and more heavy precipitation associated with ongoing increases of tropical sea surface temperatures (IPCC 2007). However, a statement on tropical cyclones and climate change developed by the participants of the World Meteorological Organization states that while "there is evidence both for and against the existence of a detectable anthropogenic signal in the tropical cyclone climate record to date, no firm conclusion can be made on this point" (WMO 2006).

Sea Turtles and Smalltooth Sawfish

Commercial and recreational bully net use is not likely to adversely affect sea turtles or smalltooth sawfish based on the low likelihood of interactions between these species and this gear type. Bully nets require an active fishing technique that is only effective when target prey can be seen and the net is tended constantly. Thus, sea turtles or smalltooth sawfish are extremely unlikely to become entangled in these gears.

The distribution of spiny lobster diving effort overlaps spatially with areas inhabited by sea turtles and smalltooth sawfish. However, divers only occasionally encounter sea turtles and rarely encounter smalltooth sawfish, if at all.

Sub-adult and adult loggerhead sea turtles are primarily coastal dwelling and typically prey on benthic invertebrates such as mollusks and decapod crustaceans in hardbottom habitats. As such, loggerhead sea turtles may be attracted to spiny lobster traps when lobsters are inside. They are also known to feed on epibionts growing on traps, trap lines, and floats and may be attracted to spiny lobster traps for this reason as well (NMFS and USFWS 1991). Commercial lobster traps may adversely affect sea turtles via entanglement and forced submergence. Sea turtles released alive may later succumb to injuries sustained at the time of capture. Of the entangled sea turtles that do not die from their wounds, some may suffer impaired swimming or foraging abilities, altered migratory behavior, or altered breeding or reproductive patterns. Smalltooth sawfish feed primarily on fish, such as mullet, jacks, and ladyfish (Simpfendorfer 2001). No data are currently available on the attraction of smalltooth sawfish to spiny lobster trap gear.

There is a large and growing body of literature on past, present, and future impacts of global climate change exacerbated and accelerated by human activities. Some of the likely effects commonly mentioned are sea level rise, increased frequency of severe weather events, and change in air and water temperatures. NOAA's climate information portal provides basic

background information on these and other measured or anticipated effects (see http://www.climate.gov).

Impacts on sea turtles currently cannot, for the most part, be predicted with any degree of certainty; however, significant impacts to the hatchling sex ratios of loggerhead sea turtles may occur (NMFS and USFWS 2007). In marine turtles, sex is determined by temperature in the middle third of incubation with female offspring produced at higher temperatures and males at lower temperatures within a thermal tolerance range of 25-35°C (Ackerman 1997). Increases in global temperature could potentially skew future sex ratios toward higher numbers of females (NMFS and USFWS 2007). Modeling suggests an increase of 2°C in air temperature would result in a sex ratio of over 80% female offspring for loggerheads nesting near Southport, North Carolina. The same increase in air temperatures at nesting beaches in Cape Canaveral, Florida, would result in close to 100% female offspring. More ominously, an air temperature increase of 3°C is likely to exceed the thermal threshold of most clutches, leading to death (Hawkes et al. 2007).

Warmer sea surface temperatures have been correlated with an earlier onset of loggerhead sea turtle nesting in the spring (Weishampel et al. 2004, Hawkes et al. 2007), as well as short inter-nesting intervals (Hays et al. 2002) and shorter nesting season (Pike et al. 2006). The effects from increased temperatures may be exacerbated on developed nesting beaches where shoreline armoring and construction have denuded vegetation. Erosion control structures could potentially result in the permanent loss of nesting beach habitat or deter nesting females (NRC 1990). Alternatively, females may nest on the seaward side of the erosion control structures, potentially exposing them to repeated tidal overwash (NMFS and USFWS 2007). Sea level rise from global climate change is also a potential problem for areas with low-lying beaches where sand depth is a limiting factor, as the sea may inundate nesting sites and decrease available nesting habitat (Daniels et al. 1993, Fish et al. 2005, Baker et al. 2006). The loss of habitat because of climate change could be accelerated due to a combination of other environmental and oceanographic changes such as an increase in the frequency of storms and/or changes in prevailing currents, both of which could lead to increased beach loss via erosion (Antonelis et al. 2006, Baker et al. 2006).

Other changes in the marine ecosystem caused by global climate change (e.g., salinity, oceanic currents, dissolved oxygen levels, nutrient distribution, etc.) could influence the distribution and abundance of phytoplankton, zooplankton, submerged aquatic vegetation, crustaceans, mollusks, forage fish, etc., which could ultimately affect the primary foraging areas of loggerhead sea turtles.

Human Communities

Adverse or beneficial effects of actions to vessel owners, captains, crew, and associated shoreside businesses are tied to the ability of individuals to earn income and pursue traditional and culturally significant livelihoods. In commercial fisheries, income benefits are usually derived in terms of shares awarded after fishing expenses are accounted for. The greater the difference between expenses and payment for fish caught, the greater will be the revenue generated by the fishing vessel. For the for-hire sector, revenues are generated by the number of

trips sold for charter businesses, and by the number of paying passengers for headboat businesses.

Fishing communities include infrastructure, which refers to fishing-related businesses and includes marinas, rentals, snorkel and dive shops, boat dockage and repair facilities, tackle and bait shops, fish houses, and lodgings related to recreational fisheries industry. This infrastructure is tied to the commercial and recreational fisheries and can be affected by both adverse and beneficial economic conditions in those fisheries. Therefore, the effects of past and present actions on communities should reflect responses by the fisheries to these actions.

Current management measures have had a negative, short-term impact on the commercial fishery. Both the trap limitation program and the moratorium on commercial dive permits restricted access to this fishery. On the other hand, Amendment 8 established a minimum size limit for imported spiny lobster that should, in the long run, improve the status of the domestic and foreign stocks and the associated economic benefits. The restrictions are expected to affect people who were damaged economically by the illegal importation of Caribbean spiny lobster, particularly in Florida, Puerto Rico, and the U.S. Virgin Islands.

Non-management stressors can have large effects on fishing communities. Although the Deepwater Horizon MC252 oil spill did not directly impact south Florida, fishermen and dealers may have experienced hardship from reduced consumer confidence in seafood from the region. Because of the continuing rise in the cost of fishing, including increases in the cost of fuel and insurance, making a living through fishing has become increasingly difficult.

Tropical storms can have both positive and negative economic impacts on spiny lobster fishermen, especially those that use traps. The beneficial impact is that a storm can cause lobsters to move and enter traps, which increases landings. However, the negative impacts include damages to and losses of traps, other gear, and vessels and associated losses of landings and revenues. The 2005 hurricane season was one of the worst on record. Of the storms that hit the coast of Florida, Dennis (July), Katrina (August), Rita (September), and Wilma (October) had a significant adverse impact on spiny lobster trap fishers. In the Florida Keys, one-fourth to one-half of all commercial spiny lobster traps were estimated as tangled or destroyed by the passage of Katrina alone (Buck 2005).

10. Modify or add alternatives to avoid, minimize, or mitigate significant cumulative effects.

The cumulative effects of the actions in this amendment on the biological/ecological, physical, social, and economic environments would be positive because they would ultimately protect endangered and threatened species. However, short-term negative impacts on the social and economic environment may occur to the fishery due to loss of fishing area and the cost of trap line replacement. NOAA Fisheries Service and Council staffs worked with stakeholders to minimize closure of fishable areas without *Acropora* spp. and to determine low-cost line marking techniques. If further significant effects are identified after this document is completed, or if new information becomes available, an additional amendment could be developed under the framework procedure to achieve the goals in the purpose and need.

11. Monitor the cumulative effects of the selected alternatives and modify management as necessary.
The effects of the proposed actions are, and will continue to be, monitored through stock assessments and stock assessment updates, life history studies, economic and social analyses, and other scientific observations.

Monitoring and tracking the level of take of protected species by the spiny lobster fishery is imperative. NOAA Fisheries Service must ensure that measures to monitor and report any sea turtle or smalltooth sawfish encounters, or any *Acropora* spp. interactions: 1) detect any adverse effects resulting from the spiny lobster fishery; 2) assess the actual level of incidental take in comparison with the anticipated incidental take; and 3) detect when the level of anticipated take is exceeded.

No data collection programs are currently in place to specifically monitor interactions between the spiny lobster fishery and protected species. Due to this paucity of data, sea turtle stranding and incidental capture records from the Sea Turtle Stranding and Salvage Network (STSSN) were used in the Bi Op to estimate the number of interactions in the federal spiny lobster fishery. Under the no action alternative, NOAA Fisheries Service would continue to monitor the impacts of the fishery on ESA-listed species as it currently does. NOAA Fisheries Service would continue to monitor reports submitted to the STSSN for incidences of spiny lobster gear entanglement with sea turtles. NOAA Fisheries Service would continue to review *Acropora* survey data for evidence of spiny lobster trap damage to these species. Smalltooth sawfish interactions with spiny lobster trap gear would be monitored by NOAA Fisheries Service by periodic review of the National Sawfish Encounter Database. The number of interactions between ESA-listed species and commercial spiny lobster trap gear would be monitored against the ITS issued with the biological opinion. If the ITS is exceeded, the ESA section 7consultation on the entire fishery must be reinitiated.

4.4 Other Effects

4.4.1 Unavoidable Adverse Effects

Limiting spiny lobster fishing in areas to protect *Acropora* spp. would necessarily reduce the open fishing area. The requirement to mark trap lines would incur costs to fishermen, although NOAA Fisheries Service and Council staffs have worked with industry representatives to determine methods that would be less expensive. If trap line marking requirements are implemented, fishermen would have until 2017 to comply, before which time many trap lines would need to be replaced anyway. Both of these actions are required by the Bi Op and are therefore unavoidable.

Actions considered in this amendment should not adversely affect public health or safety because these measures should not alter fishing practices in a substantial way. Unique characteristics of the geographic area are highlighted in Section 3.2 of Amendment 10. Adverse effects of fishing activities on the physical environment are described in detail in Sections 4.1-4.2. These sections conclude little adverse impact on the physical environment should occur from actions proposed

in this document. Uncertainty and risk associated with the measures, as well as assumptions underlying the analyses, are described in detail in the same sections.

4.4.2 Relationship Between Short-Term Uses and Long-Term Productivity

The objectives of this amendment are to consider measures established under a Bi Op to protect endangered species. In achieving these objectives, the fishery may encounter short-term economic impacts, such as reduced catch or increased costs, but experience long-term economic productivity due to protection of the resources, as discussed in previous sections.

The process of managing the spiny lobster stock is expected to have a negative short-term effect on the social and economic environment, and would create a burden on the administrative environment. No alternatives are being considered for Action 1 that would avoid these negative effects because they are a necessary cost associated with managing this stock. For Action 2, the Councils' current preferred alternative (no action) would not impose these burdens. The ranges of alternatives have varying degrees of economic costs and administrative burdens. Some alternatives have relatively small short-term economic costs and administrative burdens, but would also provide smaller and more delayed long-term benefits. Other alternatives have greater short-term costs, but provide larger and more immediate long-term benefits. Therefore, mitigating these measures would be difficult, and managers must balance the costs and benefits when choosing management alternatives for the fishery.

4.4.3 Mitigation, Monitoring, and Enforcement Measures

Data are not available to determine if environmental justice considerations, and the resulting need for special mitigation measures, are triggered. Nevertheless, the proposed actions would apply equally to all fishery participants regardless of minority or income status, and no information has been identified that would indicate differential costs on or benefits to minority or low income persons distinct from those expected to accrue to other constituencies involved in the fishery. Therefore, no environmental justice issues have been identified and no mitigation measures in response to environmental justice issues have been considered.

The jeopardy analyses for sea turtles, smalltooth sawfish, and *Acropora* spp. are based on the assumption that the frequency and magnitude of adverse effects that occurred in the past will continue into the future. If estimates regarding the frequency and magnitude of incidental take prove to be underestimated, the potential adverse effects to sea turtles, smalltooth sawfish, and *Acropora* spp. may be greater than previously thought. NOAA Fisheries Service developed RPMs, and implementing T/Cs, to not only help monitor future incidental takes, but also to help minimize the impacts of those takes (NMFS 2009). The RPMs and T/Cs ensure NOAA Fisheries Service can: 1) detect any adverse effects resulting from the spiny lobster fishery; 2) assess the actual level of incidental take in comparison with the anticipated incidental take documented in the Bi Op; and 3) detect when the level of anticipated take is exceeded. See Sections 9.3 and 9.4 of the Bi Op for the specific RPMs and T/Cs. NOAA Fisheries Service and other government agencies also support research on this species by federal, state, academic, and private research entities.

Current spiny lobster regulations can be labor intensive for law enforcement officials. NOAA Fisheries Service law enforcement officials work cooperatively with other federal and state agencies to keep illegal activity to a minimum. Violators are penalized, and for commercial operators, permits required to operate in their respective fisheries can be sanctioned.

4.4.4 Irreversible and Irretrievable Commitments of Resources

No irreversible or irretrievable commitments of agency resources are proposed herein. The actions are readily changeable by the Councils and NOAA Fisheries Service in the future. No irreversible or irretrievable commitment of natural resources is anticipated.

4.5 Any Other Disclosures

CEQ guidance on environmental consequences [40 CFR 1502.16] indicates the following elements should be considered for the scientific and analytic basis for comparisons of alternatives. These are:

a) Direct effects and their significance.
b) Indirect effects and their significance.
c) Possible conflicts between the proposed action and the objectives of federal, regional, state, and local (and in the case of a reservation, Indian tribe) land use plans, policies and controls for the area concerned.
d) The environmental effects of alternatives including the proposed action.
e) Energy requirements and conservation potential of various alternatives and mitigation measures.
f) Natural or depletable resource requirements and conservation potential of various alternatives and mitigation measures.
g) Urban quality, historic and cultural resources, and the design of the built environment, including the reuse and conservation potential of various alternatives and mitigation measures.
h) Means to mitigate adverse environmental impacts.

Items a, b, d, e, f, and h are addressed in Sections 2, 3, and 4. Items a, b, and d are directly discussed in Sections 2 and 4. Item e is discussed in the economic analyses. Alternatives that encourage fewer fishing trips would conserve energy. Item f is discussed throughout the document, as spiny lobster stocks are a natural and depletable resource. Mitigation measures are discussed in Section 4.4.3. Because this amendment concerns the management of spiny lobster stocks, it is not in conflict with the objectives of federal, regional, state, or local land use plans, policies, and controls (Item c).

Urban quality and the design of the built environment, including the reuse and conservation potential of various alternatives and mitigation measures (Item g), are not factors in this amendment. The actions taken in this amendment would affect a marine stock and its fishery, and should not affect land-based, urban environments. The proposed actions are not expected to result in substantial impacts to unique or ecologically critical areas.

In the South Atlantic, several notable shipwrecks can be found along the southeast coast in federal and state waters including Lofthus (eastern Florida), SS Copenhagen (southeast Florida), Half Moon (southeast Florida), Hebe (Myrtle Beach, South Carolina), Georgiana (Charleston, South Carolina), Monitor (Cape Hatteras, North Carolina), Huron (Nags Head, North Carolina), and Metropolis (Carolla, North Carolina). In the Gulf, the U.S.S. Hatteras isolated in federal waters off Texas and is listed in the National Register of Historic Places. Shipwrecks in the Florida Keys and Dry Tortugas include USCG Cutter Duane, USS Alligator, San Pedro, Windjammer, and Bird Key. Fishing activity already occurs in the vicinity of these sites; but actions within this amendment would have no additional impacts on the above listed historic resources, nor would they alter any regulations intended to protect them.

With respect to the ESA, fishing activities pursuant to the spiny lobster fishery should not affect endangered and threatened species or critical habitat in any manner not considered in prior consultations on this fishery. The Bi Op stated the fishery was not likely to adversely affect ESA-listed marine mammals, Gulf sturgeon, or designated critical habitat for elkhorn and staghorn corals. However, the Bi Op determined the spiny lobster fishery would adversely affect sea turtles, smalltooth sawfish, and elkhorn and staghorn corals, but would not jeopardize their continued existence. An incidental take statement was issued for green, hawksbill, Kemp's ridley, leatherback, and loggerhead sea turtles, smalltooth sawfish, and both species of coral. Reasonable and prudent measures to minimize the impact of these incidental takes were specified, along with terms and conditions to implement them.

With respect to the Marine Mammal Protection Act (MMPA), fishing activities conducted under the Spiny Lobster FMP should have no adverse impact on marine mammals. The 2012 List of Fisheries (76 FR 73912; November 29, 2011) lists the Florida Spiny Lobster Trap/Pot fishery as a Category III Fishery under the MMPA. This classification indicates the annual mortality and serious injury of a marine mammal stock resulting from any fishery is less than or equal to 1% of the maximum number of animals, not including natural mortalities, that may be removed from a marine mammal stock, while allowing that stock to reach or maintain its optimum sustainable population. The proposed actions are not expected to alter existing fishing practices in such a way as to alter the interactions with marine mammals.

Because the proposed actions are directed towards the management of naturally occurring species, the introduction or spread of non-indigenous species should not occur.

Chapter 5. Fishery Impact Statement (FIS)

The Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) requires a FIS be prepared for all amendments to Fishery Management Plans (FMPs). The FIS contains an assessment of the likely biological and socioeconomic effects of the conservation and management measures on: 1) fishery participants and their communities; 2) participants in the fisheries conducted in adjacent areas under the authority of another Council; and 3) the safety of human life at sea.

Amendment 11 consists of two management actions in response to the 2009 biological opinion on the spiny lobster fishery. The first action would create new closed areas in federal waters to protect threatened corals and the second action analyzes various methods to mark lobster trap lines. The Gulf of Mexico and South Atlantic Fishery Management Councils (Councils) have chosen to create 60 new closed areas in federal waters off the Florida Keys (i.e., Key Biscayne to Key West) with identified elkhorn and staghorn coral colonies. The proposed closed areas are enclosed within straight-line boundaries that aim to protect threatened staghorn and elkhorn coral colonies that have been identified using criteria developed with the spiny lobster fishing industry and other stakeholder input. The Councils chose to close these proposed areas to spiny lobster trapping only, which is needed to meet the requirements of the biological opinion. The added protection of the colonies is expected to contribute to an overall healthy ecosystem and would also contribute to a healthy spiny lobster stock, which would be expected to result in positive social effects for the commercial fishermen as well as broader positive social effects associated with healthy marine ecosystems.

Although establishment of closed areas is commonly controversial and in most cases the fishermen are not in favor of fishing prohibitions, the process of identifying the locations of the closed areas in Amendment 11 included a workshop with commercial spiny lobster trap fishermen and other stakeholders. By incorporating input from industry, development of the proposed closed areas achieved two important outcomes. First, the fishermen who would be most affected by the proposed closures were included in the process, and second, the fishermen's local knowledge of the marine environment was integrated into selection of the most important colonies for protection. There may be some negative social effects due to additional closures in the Florida Keys where there are already numerous closed areas established through the Florida Keys National Marine Sanctuary and the Dry Tortugas Reserves, because these closures have already impacted the lobster trap fishery by limiting fishing areas. In addition, new closed areas that would be created upon implementation of this regulatory action may result in adverse economic effects for the commercial spiny lobster fishery. These negative economic effects, which are attributable to anticipated revenue losses, could range from $23,400 to $43,600. Restricting the use of lobster traps is anticipated to benefit the recreational sector by increased lobster availability for recreational fishers in areas closed to commercial traps, resulting in increased consumer surplus and thus, economic benefits.

The second action would have required commercial spiny lobster fishers to mark their trap line gear. Although accurate identification of gear that is entangling protected resources (i.e., corals, sea turtles, and smalltooth sawfish) would improve monitoring and the future benefit of the resource, the gear marking requirements would likely add to the operation and labor costs for the

commercial spiny lobster trap fishermen. This management action was analyzed with a range of alternatives that would meet the requirements of the biological opinion; however, the Councils have currently selected not to require trap line marking; therefore, no social effects are expected. Any future benefits to the protected resources from establishing a trap line marking regulation for the commercial spiny lobster fishery would not apply under the current preferred alternative. Immediate economic effects are not expected to result from the Councils' decision to not require trap line markings, but long-term economic costs to the fishery could occur if harsher measures are deemed necessary in the future.

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NMFS = National Marine Fisheries Service, SAFMC = South Atlantic Fishery Management Council, GMFMC = Gulf of Mexico Fishery Management Council, SF = Sustainable Fisheries Division, PR = Protected Resources Division

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GC = General Counsel, SERO=Southeast Regional Office, NEPA =National Environmental Policy Act, HC = Habitat Conservation, SEFSC=Southeast Fisheries Science Center, OLE=NOAA Fisheries Service Office for Law Enforcement

Chapter 7. List of Agencies, Organizations and Persons to Whom Copies of the Statement are Sent

Department of Commerce Office of General Counsel
Texas Parks and Wildlife Department
Alabama Department of Conservation and Natural Resources/Marine Resources Division
Louisiana Department of Wildlife and Fisheries
Mississippi Department of Marine Resources
Florida Fish and Wildlife Conservation Commission
Georgia Department of Natural Resources/Coastal Resources Division
South Carolina Department of Natural Resources/Marine Resources Division
North Carolina Division of Marine Fisheries
Florida Keys Commercial Fishermen's Association
National Marine Fisheries Service Office of General Counsel
National Marine Fisheries Service Office of General Counsel Southeast Region
National Marine Fisheries Service Southeast Regional Office
National Marine Fisheries Service Southeast Fisheries Science Center
National Marine Fisheries Service Silver Spring Office
National Marine Fisheries Service Office of Law Enforcement
United States Coast Guard
United States Fish and Wildlife Services

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Appendix A. Coordinates of Proposed Closed Areas Under Action 1, Alternative 3.

(i) Lobster Trap Gear Closed Area 1.

Point	North Lat.	West Long.
A	24°31'15.002"	81°31'00.000"
B	24°31'15.002"	81°31'19.994"
C	24°31'29.999"	81°31'19.994"
D	24°31'29.999"	81°31'00.000"
A	24°31'15.002"	81°31'00.000"

(ii) Lobster Trap Gear Closed Area 2.

Point	North Lat.	West Long.
A	24°31'20.205"	81°30'17.213"
B	24°31'17.858"	81°30'27.700"
C	24°31'27.483"	81°30'30.204"
D	24°31'29.831"	81°30'19.483"
A	24°31'20.205"	81°30'17.213"

(iii) Lobster Trap Gear Closed Area 3.

Point	North Lat.	West Long.
A	24°31'42.665"	81°30'02.892"
B	24°31'45.013"	81°29'52.093"
C	24°31'34.996"	81°29'49.745"
D	24°31'32.335"	81°30'00.466"
A	24°31'42.665"	81°30'02.892"

(iv) Lobster Trap Gear Closed Area 4.

Point	North Lat.	West Long.
A	24°31'50.996"	81°28'39.999"
B	24°31'50.996"	81°29'03.002"
C	24°31'56.998"	81°29'03.002"
D	24°31'56.998"	81°28'39.999"
A	24°31'50.996"	81°28'39.999"

(v) Lobster Trap Gear Closed Area 5.

Point	North Lat.	West Long.
A	24°32'20.014"	81°26'20.390"
B	24°32'13.999"	81°26'41.999"
C	24°32'27.004"	81°26'45.611"
D	24°32'33.005"	81°26'23.995"
A	24°32'20.014"	81°26'20.390"

(vi) Lobster Trap Gear Closed Area 6.

Point	North Lat.	West Long.
A	24°32'30.011"	81°24'47.000"
B	24°32'23.790"	81°24'56.558"
C	24°32'45.997"	81°25'10.998"
D	24°32'52.218"	81°25'01.433"
A	24°32'30.011"	81°24'47.000"

(vii) Lobster Trap Gear Closed Area 7.

Point	North Lat.	West Long.
A	24°32'46.834"	81°27'17.615"
B	24°32'41.835"	81°27'35.619"
C	24°32'54.003"	81°27'38.997"
D	24°32'59.002"	81°27'21.000"
A	24°32'46.834"	81°27'17.615"

(viii) Lobster Trap Gear Closed Area 8.

Point	North Lat.	West Long.
A	24°33'10.002"	81°25'50.995"
B	24°33'04.000"	81°26'18.996"
C	24°33'17.253"	81°26'21.839"
D	24°33'23.254"	81°25'53.838"
A	24°33'10.002"	81°25'50.995"

(ix) Lobster Trap Gear Closed Area 9.

Point	North Lat.	West Long.
A	24°33'22.004"	81°30'31.998"
B	24°33'22.004"	81°30'41.000"
C	24°33'29.008"	81°30'41.000"
D	24°33'29.008"	81°30'31.998"
A	24°33'22.004"	81°30'31.998"

(x) Lobster Trap Gear Closed Area 10.

Point	North Lat.	West Long.
A	24°33'33.004"	81°30'00.000"
B	24°33'33.004"	81°30'09.998"
C	24°33'41.999"	81°30'09.998"
D	24°33'41.999"	81°30'00.000"
A	24°33'33.004"	81°30'00.000"

(xi) Lobster Trap Gear Closed Area 11.

Point	North Lat.	West Long.
A	24°33'50.376"	81°23'35.039"
B	24°33'27.003"	81°24'51.003"
C	24°33'40.008"	81°24'54.999"
D	24°34'03.382"	81°23'39.035"
A	24°33'50.376"	81°23'35.039"

(xii) Lobster Trap Gear Closed Area 12.

Point	North Lat.	West Long.
A	24°34'00.003"	81°19'29.996"
B	24°34'00.003"	81°20'04.994"
C	24°34'24.997"	81°20'04.994"
D	24°34'24.997"	81°19'29.996"
A	24°34'00.003"	81°19'29.996"

(xiii) Lobster Trap Gear Closed Area 13.

Point	North Lat.	West Long.
A	24°35'19.997"	81°14'25.002"
B	24°35'19.997"	81°14'34.999"
C	24°35'29.006"	81°14'34.999"
D	24°35'29.006"	81°14'25.002"
A	24°35'19.997"	81°14'25.002"

(xiv) Lobster Trap Gear Closed Area 14.

Point	North Lat.	West Long.
A	24°44'37.004"	80°46'47.000"
B	24°44'37.004"	80°46'58.000"
C	24°44'47.002"	80°46'58.000"
D	24°44'47.002"	80°46'47.000"
A	24°44'37.004"	80°46'47.000"

(xv) Lobster Trap Gear Closed Area 15.

Point	North Lat.	West Long.
A	24°49'53.946"	80°38'17.646"
B	24°48'32.331"	80°40'15.530"
C	24°48'44.389"	80°40'23.879"
D	24°50'06.004"	80°38'26.003"
A	24°49'53.946"	80°38'17.646"

(xvi) Lobster Trap Gear Closed Area 16.

Point	North Lat.	West Long.
A	24°53'32.085"	80°33'22.065"
B	24°53'38.992"	80°33'14.670"
C	24°53'31.673"	80°33'07.155"
D	24°54'24.562"	80°33'14.886"
A	24°53'32.085"	80°33'22.065"

(xvii) Lobster Trap Gear Closed Area 17.

Point	North Lat.	West Long.
A	24°53'33.410"	80°32'50.247"
B	24°53'40.149"	80°32'42.309"
C	24°53'32.418"	80°32'35.653"
D	24°54'25.348"	80°32'43.302"
A	24°53'33.410"	80°32'50.247"

(xviii) Lobster Trap Gear Closed Area 18.

Point	North Lat.	West Long.
A	24°54'06.317"	80°32'34.115"
B	24°53'59.368"	80°33'41.542"
C	24°54'06.667"	80°33'48.994"
D	24°54'13.917"	80°32'41.238"
A	24°54'06.317"	80°32'34.115"

(xix) Lobster Trap Gear Closed Area 19.

Point	North Lat.	West Long.
A	24°54'06.000"	80°31'33.995"
B	24°54'06.000"	80°31'45.002"
C	24°54'36.006"	80°31'45.002"
D	24°54'36.006"	80°31'33.995"
A	24°54'06.000"	80°31'33.995"

(xx) Lobster Trap Gear Closed Area 20.

Point	North Lat.	West Long.
A	24°56'21.104"	80°28'52.331"
B	24°56'17.012"	80°29'05.995"
C	24°56'26.996"	80°29'08.996"
D	24°56'31.102"	80°28'55.325"
A	24°56'21.104"	80°28'52.331"

(xxi) Lobster Trap Gear Closed Area 21.

Point	North Lat.	West Long.
A	24°56'53.006"	80°27'46.997"
B	24°56'21.887"	80°28'25.367"
C	24°56'35.002"	80°28'36.003"
D	24°57'06.107"	80°27'57.626"
A	24°56'53.006"	80°27'46.997"

(xxii) Lobster Trap Gear Closed Area 22.

Point	North Lat.	West Long.
A	24°57'35.001"	80°27'14.999"
B	24°57'28.011"	80°27'21.000"
C	24°57'33.999"	80°27'27.997"
D	24°57'40.200"	80°27'21.106"
A	24°57'35.001"	80°27'14.999"

(xxiii) Lobster Trap Gear Closed Area 23.

Point	North Lat.	West Long.
A	24°58'58.154"	80°26'03.911"
B	24°58'48.005"	80°26'10.001"
C	24°58'52.853"	80°26'18.090"
D	24°59'03.002"	80°26'11.999"
A	24°58'58.154"	80°26'03.911"

(xxiv) Lobster Trap Gear Closed Area 24.

Point	North Lat.	West Long.
A	24°59'17.009"	80°24'32.999"
B	24°58'41.001"	80°25'21.998"
C	24°58'57.591"	80°25'34.186"
D	24°59'33.598"	80°24'45.187"
A	24°59'17.009"	80°24'32.999"

(xxv) Lobster Trap Gear Closed Area 25.

Point	North Lat.	West Long.
A	24°59'44.008"	80°25'38.999"
B	24°59'27.007"	80°25'48.997"
C	24°59'32.665"	80°25'58.610"
D	24°59'49.666"	80°25'48.612"
A	24°59'44.008"	80°25'38.999"

(xxvi) Lobster Trap Gear Closed Area 26.

Point	North Lat.	West Long.
A	25°01'00.006"	80°21'55.002"
B	25°01'00.006"	80°22'11.996"
C	25°01'18.010"	80°22'11.996"
D	25°01'18.010"	80°21'55.002"
A	25°01'00.006"	80°21'55.002"

(xxvii) Lobster Trap Gear Closed Area 27.

Point	North Lat.	West Long.
A	25°01'34.997"	80°23'12.998"
B	25°01'18.010"	80°23'44.000"
C	25°01'22.493"	80°23'46.473"
D	25°01'36.713"	80°23'37.665"
E	25°01'46.657"	80°23'19.390"
A	25°01'34.997"	80°23'12.998"

(xxviii) Lobster Trap Gear Closed Area 28.

Point	North Lat.	West Long.
A	25°01'38.005"	80°21'25.998"
B	25°01'28.461"	80°21'46.158"
C	25°01'45.009"	80°21'53.999"
D	25°01'54.553"	80°21'33.839"
A	25°01'38.005"	80°21'25.998"

(xxix) Lobster Trap Gear Closed Area 29.

Point	North Lat.	West Long.
A	25°01'53.001"	80°23'08.995"
B	25°01'53.001"	80°23'17.997"
C	25°02'01.008"	80°23'17.997"
D	25°02'01.008"	80°23'08.995"
A	25°01'53.001"	80°23'08.995"

(xxx) Lobster Trap Gear Closed Area 30.

Point	North Lat.	West Long.
A	25°02'20.000"	80°22'11.001"
B	25°02'10.003"	80°22'50.002"
C	25°02'22.252"	80°22'53.140"
D	25°02'32.250"	80°22'14.138"
A	25°02'20.000"	80°22'11.001"

(xxxi) Lobster Trap Gear Closed Area 31.

Point	North Lat.	West Long.
A	25°02'29.503"	80°20'30.503"
B	25°02'16.498"	80°20'43.501"
C	25°02'24.999"	80°20'52.002"
D	25°02'38.004"	80°20'38.997"
A	25°02'29.503"	80°20'30.503"

(xxxii) Lobster Trap Gear Closed Area 32.

Point	North Lat.	West Long.
A	25°02'34.008"	80°21'57.000"
B	25°02'34.008"	80°22'14.997"
C	25°02'50.007"	80°22'14.997"
D	25°02'50.007"	80°21'57.000"
A	25°02'34.008"	80°21'57.000"

(xxxiii) Lobster Trap Gear Closed Area 33.

Point	North Lat.	West Long.
A	25°03'11.294"	80°21'36.864"
B	25°03'02.540"	80°21'43.143"
C	25°03'08.999"	80°21'51.994"
D	25°03'17.446"	80°21'45.554"
A	25°03'11.294"	80°21'36.864"

(xxxiv) Lobster Trap Gear Closed Area 34.

Point	North Lat.	West Long.
A	25°03'30.196"	80°21'34.263"
B	25°03'39.267"	80°21'29.506"
C	25°03'35.334"	80°21'19.801"
D	25°03'26.200"	80°21'24.304"
A	25°03'30.196"	80°21'34.263"

(xxxv) Lobster Trap Gear Closed Area 35.

Point	North Lat.	West Long.
A	25°03'26.001"	80°19'43.001"
B	25°03'26.001"	80°19'54.997"
C	25°03'41.011"	80°19'54.997"
D	25°03'41.011"	80°19'43.001"
A	25°03'26.001"	80°19'43.001"

(xxxvi) Lobster Trap Gear Closed Area 36.

Point	North Lat.	West Long.
A	25°07'03.008"	80°17'57.999"
B	25°07'03.008"	80°18'10.002"
C	25°07'14.997"	80°18'10.002"
D	25°07'14.997"	80°17'57.999"
A	25°07'03.008"	80°17'57.999"

(xxxvii) Lobster Trap Gear Closed Area 37.

Point	North Lat.	West Long.
A	25°07'51.156"	80°17'27.910"
B	25°07'35.857"	80°17'37.091"
C	25°07'43.712"	80°17'50.171"
D	25°07'59.011"	80°17'40.998"
A	25°07'51.156"	80°17'27.910"

(xxxviii) Lobster Trap Gear Closed Area 38.

Point	North Lat.	West Long.
A	25°08'12.002"	80°17'09.996"
B	25°07'55.001"	80°17'26.997"
C	25°08'04.998"	80°17'36.995"
D	25°08'22.000"	80°17'20.000"
A	25°08'12.002"	80°17'09.996"

(xxxix) Lobster Trap Gear Closed Area 39.

Point	North Lat.	West Long.
A	25°08'18.003"	80°17'34.001"
B	25°08'18.003"	80°17'45.997"
C	25°08'29.003"	80°17'45.997"
D	25°08'29.003"	80°17'34.001"
A	25°08'18.003"	80°17'34.001"

(xl) Lobster Trap Gear Closed Area 40.

Point	North Lat.	West Long.
A	25°08'45.002"	80°15'50.002"
B	25°08'37.999"	80°15'56.998"
C	25°08'42.009"	80°16'00.995"
D	25°08'48.999"	80°15'53.998"
A	25°08'45.002"	80°15'50.002"

(xli) Lobster Trap Gear Closed Area 41.

Point	North Lat.	West Long.
A	25°08'58.007"	80°17'24.999"
B	25°08'58.007"	80°17'35.999"
C	25°09'09.007"	80°17'35.999"
D	25°09'09.007"	80°17'24.999"
A	25°08'58.007"	80°17'24.999"

(xlii) Lobster Trap Gear Closed Area 42.

Point	North Lat.	West Long.
A	25°09'10.999"	80°16'00.000"
B	25°09'10.999"	80°16'09.997"
C	25°09'20.996"	80°16'09.997"
D	25°09'20.996"	80°16'00.000"
A	25°09'10.999"	80°16'00.000"

(xliii) Lobster Trap Gear Closed Area 43.

Point	North Lat.	West Long.
A	25°09'28.316"	80°17'03.713"
B	25°09'14.006"	80°17'17.000"
C	25°09'21.697"	80°17'25.280"
D	25°09'36.006"	80°17'12.001"
A	25°09'28.316"	80°17'03.713"

(xliv) Lobster Trap Gear Closed Area 44.

Point	North Lat.	West Long.
A	25°10'00.011"	80°16'06.000"
B	25°10'00.011"	80°16'17.000"
C	25°10'09.995"	80°16'17.000"
D	25°10'09.995"	80°16'06.000"
A	25°10'00.011"	80°16'06.000"

(xlv) Lobster Trap Gear Closed Area 45.

Point	North Lat.	West Long.
A	25°10'29.002"	80°15'52.995"
B	25°10'29.002"	80°16'04.002"
C	25°10'37.997"	80°16'04.002"
D	25°10'37.997"	80°15'52.995"
A	25°10'29.002"	80°15'52.995"

(xlvi) Lobster Trap Gear Closed Area 46.

Point	North Lat.	West Long.
A	25°11'05.998"	80°14'25.997"
B	25°11'05.998"	80°14'38.000"
C	25°11'20.006"	80°14'38.000"
D	25°11'20.006"	80°14'25.997"
A	25°11'05.998"	80°14'25.997"

(xlvii) Lobster Trap Gear Closed Area 47.

Point	North Lat.	West Long.
A	25°12'00.998"	80°13'24.996"
B	25°11'43.008"	80°13'35.000"
C	25°11'48.007"	80°13'44.002"
D	25°12'06.011"	80°13'33.998"
A	25°12'00.998"	80°13'24.996"

(xlviii) Lobster Trap Gear Closed Area 48.

Point	North Lat.	West Long.
A	25°12'18.343"	80°14'32.768"
B	25°12'02.001"	80°14'44.001"
C	25°12'07.659"	80°14'52.234"
D	25°12'24.001"	80°14'41.001"
A	25°12'18.343"	80°14'32.768"

(xlix) Lobster Trap Gear Closed Area 49.

Point	North Lat.	West Long.
A	25°15'23.998"	80°12'29.000"
B	25°15'04.676"	80°12'36.120"
C	25°15'09.812"	80°12'50.066"
D	25°15'29.148"	80°12'42.946"
A	25°15'23.998"	80°12'29.000"

(l) Lobster Trap Gear Closed Area 50.

Point	North Lat.	West Long.
A	25°16'01.997"	80°12'32.996"
B	25°15'33.419"	80°12'52.394"
C	25°15'44.007"	80°13'08.001"
D	25°16'12.585"	80°12'48.597"
A	25°16'01.997"	80°12'32.996"

(li) Lobster Trap Gear Closed Area 51.

Point	North Lat.	West Long.
A	25°16'33.006"	80°13'30.001"
B	25°16'33.006"	80°13'41.001"
C	25°16'34.425"	80°13'41.026"
D	25°16'41.850"	80°13'37.475"
E	25°16'42.001"	80°13'30.001"
A	25°16'33.006"	80°13'30.001"

(lii) Lobster Trap Gear Closed Area 52.

Point	North Lat.	West Long.
A	25°17'04.715"	80°12'11.305"
B	25°16'17.007"	80°12'27.997"
C	25°16'23.997"	80°12'47.999"
D	25°17'11.705"	80°12'31.300"
A	25°17'04.715"	80°12'11.305"

(liii) Lobster Trap Gear Closed Area 53.

Point	North Lat.	West Long.
A	25°17'23.008"	80°12'40.000"
B	25°17'23.008"	80°12'49.997"
C	25°17'33.005"	80°12'49.997"
D	25°17'33.005"	80°12'40.000"
A	25°17'23.008"	80°12'40.000"

(liv) Lobster Trap Gear Closed Area 54.

Point	North Lat.	West Long.
A	25°20'57.996"	80°09'50.000"
B	25°20'57.996"	80°10'00.000"
C	25°21'07.005"	80°10'00.000"
D	25°21'07.005"	80°09'50.000"
A	25°20'57.996"	80°09'50.000"

(lv) Lobster Trap Gear Closed Area 55.

Point	North Lat.	West Long.
A	25°21'45.004"	80°09'51.998"
B	25°21'38.124"	80°09'56.722"
C	25°21'49.124"	80°10'12.728"
D	25°21'56.004"	80°10'07.997"
A	25°21'45.004"	80°09'51.998"

(lvi) Lobster Trap Gear Closed Area 56.

Point	North Lat.	West Long.
A	25°21'49.000"	80°09'21.999"
B	25°21'49.000"	80°09'31.996"
C	25°21'58.998"	80°09'31.996"
D	25°21'58.998"	80°09'21.999"
A	25°21'49.000"	80°09'21.999"

(lvii) Lobster Trap Gear Closed Area 57.

Point	North Lat.	West Long.
A	25°24'31.008"	80°07'36.997"
B	25°24'31.008"	80°07'48.999"
C	25°24'41.005"	80°07'48.999"
D	25°24'41.005"	80°07'36.997"
A	25°24'31.008"	80°07'36.997"

(lviii) Lobster Trap Gear Closed Area 58.

Point	North Lat.	West Long.
A	25°25'14.005"	80°07'27.995"
B	25°25'14.005"	80°07'44.001"
C	25°25'26.008"	80°07'44.001"
D	25°25'26.008"	80°07'27.995"
A	25°25'14.005"	80°07'27.995"

(lix) Lobster Trap Gear Closed Area 59.

Point	North Lat.	West Long.
A	25°35'13.996"	80°05'39.999"
B	25°35'13.996"	80°05'50.999"
C	25°35'24.007"	80°05'50.999"
D	25°35'24.007"	80°05'39.999"
A	25°35'13.996"	80°05'39.999"

(lx) Lobster Trap Gear Closed Area 60.

Point	North Lat.	West Long.
A	25°40'57.003"	80°05'43.000"
B	25°40'57.003"	80°05'54.000"
C	25°41'06.550"	80°05'53.980"
D	25°41'18.136"	80°05'49.158"
E	25°41'18.001"	80°05'43.000"
A	25°40'57.003"	80°05'43.000"

Appendix B. Alternatives Considered but Rejected

Action 1: Limit Spiny Lobster Fishing in Certain Areas in the Exclusive Economic Zone (EEZ) off Florida to Protect Threatened Staghorn (*Acropora cervicornis*) and Elkhorn (*Acropora palmata*) Corals

Alternative 4: Create new closed areas of the EEZ off the Florida Keys consisting of identified *Acropora* spp. colonies with a 500 ft buffer surrounding each colony.

Option a. In the closed areas, spiny lobster trapping would be prohibited.

Option b. In the closed areas, <u>all</u> spiny lobster fishing would be prohibited.

Alternative 4 would establish 500-ft diameter buffers around identified *Acropora* spp. colonies. Each colony would be designated by a single point, and fishermen would be responsible for remaining 500 ft from that point. This alternative was included because some fishermen indicated they would find it easier to enter the points in their navigation units than to keep track of boxes, as in **Alternative 3**. The area closed would be approximately 6.6 mi^2; all identified colonies would be protected, but unidentified colonies would not. Because some colonies are closer to each other than 500 ft, overlap of the buffers will occur. This overlap may cause some confusion to fishermen trying to determine what area is closed. In addition, enforcement officials have indicated that **Alternative 4** would be more difficult to enforce than **Alternative 3**. NOAA Fisheries Service Office for Law Enforcement has stated that buffers serve little regulatory purpose other than to provide a warning of a potential or imminent violation if a behavior is not changed. Representatives for the U.S. Coast Guard have expressed similar reservations with **Alternative 4**. For these reasons, the Councils removed this alternative from Action 1.

Appendix C. Regulatory Impact Review (RIR)

1. Introduction

The NOAA Fisheries Service requires an RIR for all regulatory actions that are of public interest. The RIR does three things: 1) provides a comprehensive review of the level and incidence of impacts associated with a proposed or final regulatory action; 2) provides a review of the problems and policy objectives prompting the regulatory proposals and an evaluation of the major alternatives that could be used to solve the problem; and, 3) ensures that the regulatory agency systematically and comprehensively considers all available alternatives so that the public welfare can be enhanced in the most efficient and cost-effective way. The RIR also serves as the basis for determining whether the proposed regulations are a "significant regulatory action" under the criteria provided in Executive Order (E.O.) 12866 and provides information that may be used in conducting an analysis of impacts on small business entities pursuant to the Regulatory Flexibility Act. This RIR analyzes the expected effects that this action would be expected to have on the Gulf of Mexico and South Atlantic spiny lobster fishery. Additional details on the expected economic effects of the various alternatives in this action are included in Section 4.

2. Problems and Objectives

The purpose and need, issues, problems, and objectives of this amendment are presented in Section 1. In summary, the purpose of this amendment is to implement conservation measures to help protect endangered and threatened species in a manner that complies with measures established in the 2009 biological opinion on the spiny lobster fishery. The need for this amendment is to aid in the protection and recovery of endangered and threatened species.

3. Description of the Fishery

A description of the Caribbean spiny lobster fishery in the exclusive economic zone (EEZ) of the Atlantic Ocean and Gulf of Mexico is contained in Section 3.

4. Effects of Management Measures

4.1 Limit Spiny Lobster Fishing in Certain Areas in the EEZ off the Florida Keys

A detailed analysis of the expected economic impacts of alternatives considered for this action is contained in Section 4.1.2. **Alternative 3, Option b** would prohibit all lobster fishing in the closed areas. Economic losses under **Alternative 3, Option b** are estimated to range from $24,000 to $44,800, approximately. It is anticipated that the added long term protection to threatened corals more than offsets estimated maximum revenue losses. **Preferred Alternative 3, Option a**, which would only prohibit spiny lobster trapping in the closed areas, would be expected to result in revenue losses estimated between $23,400 and $43,600, approximately. **Alternative 2** (**Options a** and **b**), which would close 60 mi^2 of hardbottom, would be expected to result in adverse economic ranging from $238,000 to $456,000, approximately.

4.2 Require Gear Markings for Spiny Lobster Trap Lines in the EEZ off Florida

A detailed analysis of the expected economic impacts of alternatives considered for this action is contained in Section 4.2.2. **Preferred Alternative 1** would not require gear markings for spiny lobster trap lines in the EEZ off Florida. Therefore, **Preferred Alternative 1** is not expected to improve the accuracy in identifying fishery impacts to benthic habitats and protected species. Short term economic effects are not expected to be associated with **Preferred Alternative 1.** However, the limited accuracy in identifying fishery impacts may warrant more stringent corrective measures in the future, resulting in potential adverse indirect economic effects in the long run. Adverse economic effects expected to result from **Alternatives 2** or **3** due to increased trap line replacement costs are estimated at $383,500, approximately. Long term potential economic benefits associated with better targeted protection for habitats and resources could also result from **Alternatives 2** or **3.**

5. Public and Private Costs of Regulations

The preparation, implementation, enforcement, and monitoring of this or any Federal action involves the expenditure of public and private resources which can be expressed as costs associated with the regulations. Costs associated with this amendment include:

Council costs of document preparation, meetings, public hearings, and information dissemination……...…….. $200,000

NOAA Fisheries administrative costs of document preparation, meetings, and review $50,000

TOTAL $250,000

The Council and federal costs of document preparation are based on staff time, travel, printing, and any other relevant items where funds were expended directly for this specific action. There are no permit requirements proposed in this amendment. In addition, under a fixed budget, any additional enforcement activity due to the adoption of this amendment would likely mean a redirection of resources to enforce the new measures rather than an expenditure of new funds.

6. Determination of Significant Regulatory Action

Pursuant to E.O. 12866, a regulation is considered a “significant regulatory action” if it is expected to result in: 1) an annual effect of $100 million or more or adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or State, local, or tribal governments or communities; 2) create a serious inconsistency or otherwise interfere with an action taken or planned by another agency; 3) materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights or obligations of recipients thereof; or 4) raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in this executive order. Based on the information provided above, this regulatory action would not meet the first

criterion. Therefore, this regulatory action is determined to not be economically significant for the purposes of E.O. 12866.

Appendix D. Regulatory Flexibility Act Analysis (RFAA, economic impacts of proposed regulatory actions)

1. Introduction

The purpose of the Regulatory Flexibility Act (RFA) is to establish a principle of regulatory issuance that agencies shall endeavor, consistent with the objectives of the rule and of applicable statutes, to fit regulatory and informational requirements to the scale of businesses, organizations, and governmental jurisdictions subject to regulation. To achieve this principle, agencies are required to solicit and consider flexible regulatory proposals and to explain the rationale for their actions to assure such proposals are given serious consideration. The RFA does not contain any decision criteria; instead the purpose of the RFA is to inform the agency, as well as the public, of the expected economic impacts of various alternatives contained in the FMP or amendment (including framework management measures and other regulatory actions) and to ensure the agency considers alternatives that minimize the expected impacts while meeting the goals and objectives of the FMP and applicable statutes.

The RFA requires agencies to conduct a Regulatory Flexibility Act Analysis (RFAA) for each proposed rule. The RFAA is designed to assess the impacts various regulatory alternatives would have on small entities, including small businesses, and to determine ways to minimize those impacts. An RFAA is conducted to primarily determine whether the proposed action would have a "significant economic impact on a substantial number of small entities." The RFAA provides: 1) A description of the reasons why action by the agency is being considered; 2) a succinct statement of the objectives of, and legal basis for, the proposed rule; 3) a description and, where feasible, an estimate of the number of small entities to which the proposed rule will apply; 4) a description of the projected reporting, record-keeping, and other compliance requirements of the proposed rule, including an estimate of the classes of small entities which will be subject to the requirements of the report or record; 5) an identification, to the extent practicable, of all relevant federal rules, which may duplicate, overlap, or conflict with the proposed rule; 6) a description and estimate of the expected economic impacts on small entities; and 7) an explanation of the criteria used to evaluate whether the rule would impose "significant economic impacts."

2. Statement of the need for, objectives of, and legal basis for the rule

A discussion of the need for and objectives of this action is provided in Section 1.1 of this document. The Magnuson-Stevens Fishery Conservation and Management Act provides the statutory basis for this proposed rule.

3. Description and estimate of the number of small entities to which the proposed action would apply

This proposed action would apply to all fishing that is managed under the Fishery Management Plan for Spiny Lobster in the Gulf of Mexico and South Atlantic. However, landings of spiny lobster occur predominantly in the Florida Keys (Monroe County) and elsewhere in south Florida. Relatively small amounts have been reported for other states since 1977. Fishing for

spiny lobster in Florida is managed cooperatively by the Gulf of Mexico and South Atlantic Fishery Management Councils (Councils) and the State of Florida, which collects the data used to analyze the fishing activity. Commercial and for-hire fishing vessels that fish for spiny lobster in state and federal waters off Florida must have Florida permits/licenses. On average in the last 5 years, 776 vessels landed spiny lobster commercially in Florida, and they averaged $47,274 per vessel in gross revenue for all species landed, with $28,498 being for spiny lobster. Among the 776 vessels, 271 landed spiny lobster from the EEZ; they averaged $83,460 in gross revenue, with $47,435 being for spiny lobster (from both EEZ and state waters), including $14,387 for spiny lobster from the EEZ, with the rest being for other species.

While the number of for-hire vessels that fish for spiny lobster in the EEZ off Florida is not known, it is likely less than 1,330 vessels that have the necessary Florida permits/licenses to engage in for-hire fishing for spiny lobster in state and federal waters. These vessels target other species as well because recreational landings of spiny lobster occur predominantly in late July through the first week of September. The for-hire fleet is comprised mostly of charter boats, which charge a fee on a vessel basis, and a much smaller number of head boats, which charge a fee on an individual angler (head) basis. The charter boat annual average gross revenue is estimated to range from approximately $62,000-$84,000 in Florida. For head boats, the corresponding estimates are $170,000-$362,000 in Florida.

The Small Business Administration has established size criteria for all major industry sectors in the U.S. including fish harvesters. A business involved in commercial shellfish harvesting is classified as a small business if it is independently owned and operated, is not dominant in its field of operation (including its affiliates), and has combined annual receipts not in excess of $4.0 million (NAICS code 114112, shellfish fishing) for all its affiliated operations worldwide. A for-hire business involved in fish harvesting is classified as a small business if it is independently owned and operated, is not dominant in its field of operation (including its affiliates), and has combined annual receipts not in excess of $7.0 million (NAICS code 713990, recreational industries). Based on the average revenue estimates provided above, all commercial and for-hire fishing vessels expected to be directly affected by this proposed rule are determined for the purpose of this analysis to be small business entities.

4. Description of the projected reporting, record-keeping and other compliance requirements of the proposed rule, including an estimate of the classes of small entities which will be subject to the requirement and the type of professional skills necessary for the preparation of the report or records

This proposed rule would not establish any new reporting, record keeping, or other compliance requirements.

5. Identification of all relevant federal rules, which may duplicate, overlap or conflict with the proposed rule

No duplicative, overlapping, or conflicting federal rules have been identified.

6. Significance of economic impacts on small entities

Substantial number criterion
This proposed rule, if implemented, would be expected to affect all vessels that engage in fishing for spiny lobster in certain parts of the EEZ off Florida, as managed under the Fishery Management Plan for Spiny Lobster in the Gulf of Mexico and South Atlantic.

Significant economic impacts
The outcome of "significant economic impact" can be ascertained by examining two factors: Disproportionality and profitability.

Disproportionality: Do the regulations place a substantial number of small entities at a significant competitive disadvantage to large entities?

All entities expected to be directly affected by the measures in this proposed rule are determined for the purpose of this analysis to be small business entities, so the issue of Disproportionality does not arise in the present case.

Profitability: Do the regulations significantly reduce profits for a substantial number of small entities?

The proposed regulation, if implemented, would not be expected to significantly reduce profits for a substantial number of small entities. The proposed regulation would prohibit commercial fishing using lobster traps in certain areas of the Atlantic EEZ off Florida (off Monroe County) to protect threatened species of coral; it would reduce estimated trip gross revenue by $23,000 - $43,600, or 0.19% to 0.35% of the gross revenue for the 128 affected vessels. Commercial fishing for spiny lobster with other gear, notably diving gear, would not be prohibited; this activity been substantially reduced under Florida law, and landings are estimated to be relatively low in the affected areas. For-hire fishing for spiny lobster in the affected areas of the EEZ has not been quantified; however, this activity would not be prohibited by the proposed regulation, and perhaps could increase in the absence of commercial trap fishing.

7. Description of significant alternatives to the proposed action and discussion of how the alternatives attempt to minimize economic impacts on small entities

This proposed action, if implemented, would not be expected to have a significant direct adverse economic effect on the profits of a substantial number of small entities. As a result, the issue of significant alternatives is not relevant.

Appendix E. Bycatch Practicability Analysis

Bycatch is defined as fish harvested in a fishery, but not sold or retained for personal use. This definition includes both economic and regulatory discards and excludes fish released alive under a recreational catch-and-release fishery management program. Economic discards are generally undesirable from a market perspective because of their species, size, sex, and/or other characteristics. Regulatory discards are fish required by regulation to be discarded, but also include fish that may be retained but not sold.

Agency guidance provided at 50 CFR 600.350(d)(3) identifies ten factors to consider in determining whether a management measure minimizes bycatch or bycatch mortality to the extent practicable. These are:

1. Population effects for the bycatch species;
2. Ecological effects due to changes in the bycatch of that species (effects on other species in the ecosystem);
3. Changes in the bycatch of other species of fish and the resulting population and ecosystem effects;
4. Effects on marine mammals and birds;
5. Changes in fishing, processing, disposal, and marketing costs;
6. Changes in fishing practices and behavior of fishermen;
7. Changes in research, administration, and enforcement costs and management effectiveness;
8. Changes in the economic, social, or cultural value of fishing activities and non-consumptive uses of fishery resources;
9. Changes in the distribution of benefits and costs; and
10. Social effects.

The Councils are encouraged to adhere to the precautionary approach outlined in Article 6.5 of the Food and Agriculture Organization of the United Nations Code of Conduct for Responsible Fisheries when uncertain about these factors.

The Caribbean spiny lobster fishery is concentrated off south Florida and the Florida Keys. The commercial component of the fishery is prosecuted primarily by traps, but some commercial fishers harvest Caribbean spiny lobster by SCUBA diving and a small percentage (1-2%) use bully nets or hoop nets, primarily in state waters. The recreational component of the fishery harvests Caribbean spiny lobster by SCUBA diving typically using allowable equipment, such as tickle sticks and hand nets.

The bycatch practicability analysis for Amendment 10 to the Spiny Lobster FMP discussed studies on bycatch in the trapping and diving sectors of this fishery; that discussion is incorporated here by reference. Grunts as well as stone crab, and spider crabs dominate bycatch in traps. In general, bycatch of commercially valuable fish species (e.g., snappers and groupers) is very low, and mortality is extremely rare (Matthews and Donahue 1997). Bycatch relative to diving involves catch and release of undersized lobsters. These lobsters may be injured and experience increased predation and mortality as a result (Parsons and Eggleston 2006).

The Bi Op discussed ways commercial spiny lobster trap fishing may affect protected species. It indicated commercial lobster traps can adversely affect sea turtles and smalltooth sawfish via entanglement and/or forced submergence. Entangled sea turtles can be released alive or can be found dead upon retrieval of the gear. Sea turtles and smalltooth sawfish that do not die from their wounds may suffer impaired swimming or foraging abilities, altered migratory behavior, and altered breeding or reproductive patterns. The Bi Op also discussed impacts to *Acropora* spp. stating traps and/or trap lines can adversely affect *Acropora* spp. via fragmentation or abrasion. Traps may also damage *Acropora* spp. during trap deployment and retrieval or if they are moved by storms and collide with colonies. Ultimately, the Bi Op concluded these adverse affects would not jeopardize the continued existence of any of those species.

A spatial/temporal analysis of entanglement data from 2002-2010 indicated that spiny lobster trap gear was a plausible cause of four bottlenose dolphins entanglements. During that period, an additional eight bottlenose dolphins in Florida were discovered with entangling trap/pot line. The type of gear could not be definitively linked to a target species or specific fishery.

1. Population effects for the bycatch species

The population effects of bycatch from the commercial trap sector of the fishery are expected to be minimal to none. Studies documented low bycatch and bycatch mortality of finfish by the commercial trap sector of the fishery for both wooden and plastic traps. Most of the finfish caught in commercial spiny lobster traps are juveniles and all escape within 48 hours (Matthews and Donahue 1997). Stone crabs were by far the most dominant species caught in two studies of lobster traps (Matthews et al. 1994, Matthews and Donahue 1997). Most lobster fishermen retain stone crabs caught in lobster traps. Stone crabs are predators on mollusks, and changes in stone crab populations would affect mollusk populations. In the recreational sector of the fishery, bycatch primarily consists of undersized Caribbean spiny lobsters. Because the gear types used by SCUBA divers and snorkelers targeting spiny lobster are considered highly selective for spiny lobster, very little bycatch of non-target species is expected in the recreational sector of the Caribbean spiny lobster fishery. Bycatch mortality is incorporated in assessments of finfish stocks if estimates are available; however, little is known about the status of many finfish and invertebrate species that are bycatch in lobster traps in the greatest numbers.

In the Bi Op, NOAA Fisheries Service determined the spiny lobster trap sector of the fishery as it currently operates may adversely affect the green, hawksbill, Kemp's ridley, leatherback, or loggerhead sea turtles, *Acropora* spp., or smalltooth sawfish, but is not likely to jeopardize their continued existence. This amendment contains an action to create protected areas for *Acropora* spp. corals in the South Atlantic within which deployment of spiny lobster traps and potentially all lobster fishing would be prohibited. Protected areas should be established before the beginning of the 2012 fishing season and are likely to reduce the incidence of fishery interactions with protected species.

2. Ecological effects due to changes in bycatch of lobster species

Currently, as many as 50 undersized Caribbean spiny lobsters and one per trap may be retained aboard a vessel, provided they are held in a live well. When in a trap, these "shorts" are used to

attract legal-sized lobsters for harvest. Undersized lobster used as attractants are kept for personal use as bait under 50 CFR 640.21(c) and therefore meet the definition of bycatch in the Magnuson-Stevens Act. Fishermen release shorts alive after using them as bait, and about 1% per night escape from traps (J. Hunt and W. Sharp, pers. comm.). Shorts that were held in live wells and confined in traps showed a mortality rate of around 10% (Hunt et al. 1986, Matthews 2001).

Experiments have shown that traps baited with shorts catch approximately three times more lobster than traps baited with any other method (Heatwole et al. 1988). Further, traps using non-lobster bait catch fewer lobsters than unbaited traps, probably because the bait attracted stone crabs, which lobsters avoid. Traps using non-lobster bait or no bait take two to three times longer to harvest the same amount of lobsters as traps using lobster bait. This increase in effort may actually increase bycatch of other species. Increased soak time (time traps are left in the water before being serviced) may also increase bycatch mortality. Therefore, allowing use of shorts is practicable from both an enforcement and biological aspect.

3. Changes in bycatch of other species and resulting population and ecosystem effects

If affected finfish prey on lobster, reductions in finfish bycatch may result in increased predation on the lobster population. Gray triggerfish and octopus are suspected predators of lobsters, and lobster fishermen will often kill and discard these species (Matthews et al. 1994). Changes in the bycatch of non-lobster invertebrates (e.g., crustaceans and mollusks) also could have ecosystem effects. These species have ecological functions in addition to serving as prey for other invertebrates and fishes. For example, some species, like barnacles and hydrozoans, which are often attached to traps, provide a growing surface for other organisms or contribute to the bioturbation of bottom sediments. Depending on behavior of the fishermen, many of these organisms are crushed or die of exposure when traps are brought on deck (Matthews et al. 1994). The closed areas proposed in this amendment would reduce impacts of traps or all fishing on *Acropora* spp. The following six general criteria were used as guidance to develop the proposed areas for closure and address population and ecosystem effects:

- Protect all elkhorn coral – this species is relatively rare in the Florida Keys and recovery will require protection of the remaining colonies.
- Protect areas where elkhorn and staghorn corals co-occur – not only are such areas also relatively rare in the Florida Keys, the conservation benefit of such area closures are maximized by providing protection for both species.
- Distribute areas throughout the Florida Keys (to the greatest extent practicable) – to distribute the impacts among user groups.
- Select areas that not only protect elkhorn and staghorn coral, but may also protect seven other species of corals – these species are currently proposed for listing under the ESA.
- Include *Acropora* coral nurseries if possible – these are permitted locations where small fragments of colonies are grown to sizes larger enough that they are suitable for transplanting in support of restoration/recovery activities and are susceptible to the same trap impacts.
- Protect the largest colonies – these colonies have the greatest sexual reproductive potential.

The requirements for trap line marking would not prevent or reduce interactions with protected species, but would allow determination if entangling line was from the spiny lobster fishery. The most common species to experience entanglement in lines are sea turtles and corals. Determining which fishery the line is from would allow for more specified responses to reduce such interactions in the future.

4. Effects on marine mammals and birds

Bycatch of marine mammals and seabirds is not considered to be a problem in the spiny lobster fishery and actions evaluated in this amendment are not expected to significantly affect interactions with these animals. The Florida spiny lobster trap fishery is listed as a Category III Fishery under the MMPA, meaning the annual mortality and serious injury of a stock resulting from the fishery is less than or equal to 1% of the maximum number of animals, not including natural mortalities, that may be removed from a marine mammal stock while allowing that stock to reach or maintain its optimum sustainable population (76 FR 73912; November 29, 2011). Matthews et al. (1994) observed five dead cormorants (*Phalacrocorax auritus*) in 21,309 traps. Presumably these birds were attempting to remove bait or bycatch from the traps and became entangled. No information indicates marine mammals and birds rely on Caribbean spiny lobster for food.

The requirement for trap line markings would not prevent or reduce interactions with marine mammals or birds, but would allow determination if the line was from the spiny lobster fishery if any entanglements did occur. These determinations would allow more specified responses to reduce such interactions in the future.

5. Changes in fishing, processing, disposal, and marketing costs

The annual cost per vessel for ongoing trap line replacement in the EEZ off Florida is $1,885, assuming 113 ft of line for each trap, 1,460 traps per vessel, 7-year replacement intervals, and a trap line price of 8¢/ft. For 271 vessels, the average number fishing in the Florida EEZ, the postulated annual cost for on-going trap replacement is $510,835. As an upper-end estimate, the annual cost of trap line replacement for these 271 vessels goes up $383,465 if trap line markings are required. Marking the line, in lieu of conversion to either white or tracer line, may be a cost effective option for smaller lobster fishing operations but less cost effective for fishing operations with 10 to 20 sets per trip.

6. Changes in fishing practices and behavior of fishermen

Closing areas to fishing could cause a shift of effort to other areas, if the closed areas were previously used for fishing. However, most fishermen deploy traps near but not on hardbottom or coral areas. As such, closing hardbottom or coral areas may result in little change in fishing behavior.

The requirement for trap line marking in this amendment applies only to traps fished in federal waters. The Florida FWC has indicated they are not in favor of this requirement, and are unlikely to implement compatible regulations in Florida state waters. Because of potential costs

and labor involved in marking trap lines, some fishermen may choose to forego fishing in federal waters and shift all their effort to state waters.

7. Changes in research, administration, and enforcement costs and management effectiveness

Proposed actions that will affect bycatch are not expected to significantly impact research costs. Any alternative that creates new closed areas would increase the administrative burden over the current level due to changes in maps, outreach, and education of the public, and greater enforcement needs. Line marking requirements would increase the need for enforcement to check if trap lines are properly colored or marked. On the other hand, the ability to identify lines entangled with endangered species would reduce the difficulty in determining assignment of incidental take to a particular fishery by NOAA Fisheries Service Protected Resources Division.

8. Changes in the economic, social, or cultural value of fishing activities and non-consumptive uses of fishery resources

Although fishermen may experience a loss of revenue from fishing in closed areas, those loses are expected to be minimal because of current fishing practices. Most fishermen set traps near to but not on coral colonies because lobsters shelter in the coral but leave to forage. Thus, protection of corals also protects lobster habitat, providing long-term benefits to the lobster fishery. Many other species also depend on coral colonies for habitat. The aesthetic value of the resulting coral ecosystem attracts numerous visitors to the Florida Keys, making tourism a large part of the Keys economy.

9. Changes in the distribution of benefits and costs

If closed areas are applied only to trap fishing, only commercial trap fishermen would be affected and incur the costs. Several user groups have indicated that protection of *Acropora* spp. should cover all lobster fishing, because commercial and recreational divers can also impact corals. If only trapping is prohibited, divers may benefit from having access to less fished areas.

10. Social effects

Social impacts from spatial closures include limiting or removing fishing opportunities within the closed areas, which may impact income for commercial fishermen who use the closed areas for harvest. Additionally, if important fishing grounds are no longer available due to closed areas, there may be some issues with crowding and user conflict. In the Florida Keys there are numerous closed areas established through the FKNMS and Dry Tortugas National Park, and have already impacted lobster trap fishermen by limiting fishing areas. However, the areas proposed for closure may not currently be used for fishing and, therefore, may have little or no impact on the fishery.

Social effects from trap line marking requirements would likely be tied to economic impacts on the commercial trap fishermen by the additional costs required to modify gear and the potential changes in long-term costs to replace line. Additional negative social effects are likely to result

if stakeholders do not perceive the proposed measure as a necessary and effective means to protect sea turtles, Gulf sturgeon, smalltooth sawfish, and elkhorn, and staghorn corals.

Conclusion

This section evaluates the practicability of taking additional action to minimize bycatch and bycatch mortality in the Gulf and South Atlantic Caribbean spiny lobster fishery by using the ten factors provided at 50 CFR 600.350(d)(3)(i). In summary, the action to close areas to lobster trapping or all lobster fishing should reduce bycatch of protected species. The action to require trap line markings would not reduce bycatch, but would help determine assignment of takes of protected species to the proper fishery. Therefore, the Councils concluded that current and proposed management measures minimize bycatch and bycatch mortality to the extent practicable in the Caribbean spiny lobster fishery.

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Appendix F. Other Applicable Laws

The Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) (16 U.S.C. 1801 et seq.) provides the authority for U.S. fishery management. But fishery management decision-making is also affected by a number of other federal statutes designed to protect the biological and human components of U.S. fisheries, as well as the ecosystems within which those fisheries are conducted. Major laws affecting federal fishery management decision-making are summarized below.

Administrative Procedures Act (APA)

All federal rulemaking is governed under the provisions of the APA (5 U.S.C. Subchapter II), which establishes a "notice and comment" procedure to enable public participation in the rulemaking process. Under the APA, NOAA Fisheries is required to publish notification of proposed rules in the Federal Register and to solicit, consider and respond to public comment on those rules before they are finalized. The APA also establishes a 30-day wait period from the time a final rule is published until it takes effect. This procedure will be followed when developing proposed and final rules to implement actions in this amendment.

Coastal Zone Management Act (CZMA)

The CZMA of 1972 (16 U.S.C. 1451 et seq.) encourages state and federal cooperation in the development of plans that manage the use of natural coastal habitats, as well as the fish and wildlife those habitats support. When proposing an action determined to directly affect coastal resources managed under an approved coastal zone management program, NOAA Fisheries Service is required to provide the relevant state agency with a determination that the proposed action is consistent with the enforceable policies of the approved program to the maximum extent practicable at least 90 days before taking final action. NOAA Fisheries Service will provide the appropriate Gulf and South Atlantic state agencies with such a determination.

Data Quality Act (DQA)

The DQA (Public Law 106-443), which took effect October 1, 2002, requires the government for the first time to set standards for the quality of scientific information and statistics used and disseminated by federal agencies. Information includes any communication or representation of knowledge such as facts or data, in any medium or form, including textual, numerical, cartographic, narrative, or audiovisual forms (includes web dissemination, but not hyperlinks to information that others disseminate; does not include clearly stated opinions).

Specifically, the DQA directs the Office of Management and Budget (OMB) to issue government wide guidelines that "provide policy and procedural guidance to federal agencies for ensuring and maximizing the quality, objectivity, utility, and integrity of information disseminated by federal agencies." Such guidelines have been issued, directing all federal agencies to create and issue agency-specific standards to 1) ensure Information Quality and develop a pre-dissemination review process; 2) establish administrative mechanisms allowing affected persons to seek and obtain correction of information; and 3) report periodically to OMB on the number and nature of complaints received.

Scientific information and data are key components of fishery management plans and amendments, and the use of best available information is the second national standard under the

Magnuson-Stevens Act. To be consistent with the Act, fishery management plans (FMPs) and amendments must be based on the best information available, properly reference all supporting materials and data, and should be reviewed by technically competent individuals. With respect to original data generated for FMPs and amendments, it is important to ensure that the data are collected according to documented procedures or in a manner that reflects standard practices accepted by the relevant scientific and technical communities. Data should also undergo quality control prior to being used by the agency.

Endangered Species Act (ESA)

The (ESA of 1973 (16 U.S.C. Section 1531 et seq.) requires that federal agencies use their authorities to conserve endangered and threatened species, and that they ensure actions they authorize, fund, or carry out are not likely to harm the continued existence of those species or the habitat designated to be critical to their survival and recovery. The ESA requires NOAA Fisheries Service, when proposing a fishery action that "may affect" critical habitat or endangered or threatened species, to consult with the appropriate administrative agency (itself for most marine species, the U.S. Fish and Wildlife Service for all remaining species) to determine the potential impacts of the proposed action. Consultations are concluded informally when proposed actions "may affect but are not likely to adversely affect" endangered or threatened species or designated critical habitat. Formal consultations, resulting in a biological opinion, are required when proposed actions may affect and are "likely to adversely affect" endangered or threatened species or designated critical habitat. If jeopardy or adverse modification is found, the consulting agency is required to suggest reasonable and prudent alternatives.

On August 27, 2009, formal consultation was completed on the continued authorization of the spiny lobster fishery in the South Atlantic and Gulf of Mexico (NMFS 2009). The biological opinion concluded the fishery would not affect ESA-listed marine mammals, or adversely affect Gulf sturgeon and *Acropora* spp. critical habitat. The biological opinion determined the continued authorization of the fishery was likely to adversely affect sea turtles, smalltooth sawfish and *Acropora* spp., but is not likely to jeopardize the continued existence of these species. An incidental take statement authorizing a limited amount of take for these species was issued.

National Marine Sanctuaries Act

Under the National Marine Sanctuaries Act (also known as Title III of the Marine Protection, Research and Sanctuaries Act of 1972), as amended, the Secretary of Commerce is authorized to designate National Marine Sanctuaries to protect distinctive natural and cultural resources whose protection and beneficial use requires comprehensive planning and management. NOAA's National Ocean Service administers the National Marine Sanctuaries. The Act provides authority for comprehensive and coordinated conservation and management of these marine areas. The National Marine Sanctuary System currently comprises 13 sanctuaries around the country, including sites in American Samoa and Hawaii. These sites include significant coral reef and kelp forest habitats, and breeding and feeding grounds of whales, sea lions, sharks, and sea turtles. A complete listing of the current sanctuaries and information about their location, size, characteristics, and affected fisheries can be found at http://www.sanctuaries.nos.noaa.gov/oms/oms.html.

Executive Orders

E.O. 12866: Regulatory Planning and Review

Executive Order 12866, signed in 1993, requires federal agencies to assess the costs and benefits of their proposed regulations, including distributional impacts, and to select alternatives that maximize net benefits to society. To comply with E.O. 12866, NOAA Fisheries Service prepares a Regulatory Impact Review (RIR) for all fishery regulatory actions that either implement a new fishery management plan or significantly amend an existing plan. Regulatory Impact Reviews provide a comprehensive analysis of the costs and benefits to society associated with proposed regulatory actions, the problems and policy objectives prompting the regulatory proposals, and the major alternatives that could be used to solve the problems. The reviews also serve as the basis for the agency's determinations as to whether proposed regulations are a "significant regulatory action" under the criteria provided in E.O. 12866 and whether proposed regulations will have a significant economic impact on a substantial number of small entities in compliance with the RFA. A regulation is significant if it is likely to result in an annual effect on the economy of at least $100,000,000 or has other major economic effects. The proposed regulations associated with the actions in this amendment are not expected to be significant.

E.O. 12630: Takings

The Executive Order on Government Actions and Interference with Constitutionally Protected Property Rights, which became effective March 18, 1988, requires that each federal agency prepare a Takings Implication Assessment for any of its administrative, regulatory, and legislative policies and actions that affect, or may affect, the use of any real or personal property. Clearance of a regulatory action must include a takings statement and, if appropriate, a Takings Implication Assessment. Management measures limiting fishing seasons, areas, quotas, fish size limits, and bag limits do not appear to have any taking implications. There is a takings implication if a fishing gear is prohibited, because fishermen who desire to leave a fishery might be unable to sell their investment, or if a fisherman is prohibited by federal action from exercising property rights granted by a state. The actions in this amendment are not expected to have takings implications.

E.O. 13089: Coral Reef Protection

The Executive Order on Coral Reef Protection (June 11, 1998) requires federal agencies whose actions may affect U.S. coral reef ecosystems to identify those actions, utilize their programs and authorities to protect and enhance the conditions of such ecosystems; and, to the extent permitted by law, ensure that actions they authorize, fund or carry out not degrade the condition of that ecosystem. By definition, a U.S. coral reef ecosystem means those species, habitats, and other national resources associated with coral reefs in all maritime areas and zones subject to the jurisdiction or control of the United States (e.g., federal, state, territorial, or commonwealth waters). Actions in this amendment are expected to enhance protection to coral reefs.

E.O. 13112: Invasive Species

The Executive Order requires agencies to use authorities to prevent introduction of invasive species, respond to and control invasions in a cost effective and environmentally sound manner, and to provide for restoration of native species and habitat conditions in ecosystems that have been invaded. Further, agencies shall not authorize, fund, or carry out actions that are likely to cause or promote the introduction or spread of invasive species in the U.S. or elsewhere unless a determination is made that the benefits of such actions clearly outweigh the potential harm; and

that all feasible and prudent measures to minimize the risk of harm will be taken in conjunction with the actions. The actions undertaken in this amendment will not introduce, authorize, fund, or carry out actions that are likely to cause or promote the introduction or spread of invasive species in the U.S. or elsewhere.

E.O. 13132: Federalism

The Executive Order on federalism requires agencies in formulating and implementing policies that have federalism implications, to be guided by the fundamental federalism principles. The Order serves to guarantee the division of governmental responsibilities between the national government and the states that was intended by the framers of the Constitution. Federalism is rooted in the belief that issues that are not national in scope or significance are most appropriately addressed by the level of government closest to the people. This Order is relevant to FMPs and amendment given the overlapping authorities of NOAA Fisheries Service, the states, and local authorities in managing coastal resources, including fisheries, and the need for a clear definition of responsibilities. It is important to recognize those components of the ecosystem over which fishery managers have no direct control and to develop strategies to address them in conjunction with appropriate state, tribes and local entities (international too). The proposed management measures in this amendment to the Spiny Lobster FMP have been developed with the local and federal officials.

E.O. 13158: Marine Protected Areas

Executive Order 13158 (May 26, 2000) requires federal agencies to consider whether their proposed action(s) will affect any area of the marine environment that has been reserved by federal, state, territorial, tribal, or local laws or regulations to provide lasting protection for part or all of the natural or cultural resource within the protected area.

E.O. 12898: Environmental Justice (EJ)

This Executive Order mandates that each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations in the United States and its territories and possessions. Federal agency responsibilities under this Executive Order include conducting programs, policies, and activities that substantially affect human health or the environment, in a manner that ensures that such programs, policies, and activities do not have the effect of excluding persons from participation in, denying persons the benefit of, or subjecting persons to discrimination under, such, programs policies, and activities, because of their race, color, or national origin. Furthermore, each federal agency responsibility set forth under this Executive Order shall apply equally to Native American programs.

Specifically, federal agencies shall, to the maximum extent practicable; conduct human health and environmental research and analysis; collect human health and environmental data; collect, maintain and analyze information on the consumption patterns of those who principally rely on fish and/or wildlife for subsistence; allow for public participation and access to information relating to the incorporation of EJ principals in federal agency programs or policies; and share information and eliminate unnecessary duplication of efforts through the use of existing data systems and cooperative agreements among federal agencies and with state, local, and tribal governments. The proposed actions would be applied to all participants in the fishery, regardless of their race, color, national origin, or income level, and as a result are not considered

discriminatory. Additionally, none of the proposed actions are expected to affect any existing subsistence consumption patterns. Therefore, no EJ issues are anticipated and no modifications to any proposed actions have been made to address EJ issues.

Marine Mammal Protection Act (MMPA)

The MMPA established a moratorium, with certain exceptions, on the taking of marine mammals in U.S. waters and by U.S. citizens on the high seas. It also prohibits the importing of marine mammals and marine mammal products into the United States. Under the MMPA, the Secretary of Commerce (authority delegated to NOAA Fisheries Service) is responsible for the conservation and management of cetaceans and pinnipeds (other than walruses). The Secretary of the Interior is responsible for walruses, sea otters, polar bears, manatees, and dugongs.

In 1994, Congress amended the MMPA, to govern the taking of marine mammals incidental to commercial fishing operations. This amendment required the preparation of stock assessments for all marine mammal stocks in waters under U.S. jurisdiction; development and implementation of take-reduction plans for stocks that may be reduced or are being maintained below their optimum sustainable population levels due to interactions with commercial fisheries; and studies of pinniped-fishery interactions. The MMPA requires a commercial fishery to be placed in one of three categories, based on the relative frequency of incidental serious injuries and mortalities of marine mammals. Category I designates fisheries with frequent serious injuries and mortalities incidental to commercial fishing; Category II designates fisheries with occasional serious injuries and mortalities; and Category III designates fisheries with a remote likelihood or no known serious injuries or mortalities. To legally fish in a Category I and/or II fishery, a fisherman must obtain a marine mammal authorization certificate by registering with the Marine Mammal Authorization Program (50 CFR 229.4), they must accommodate an observer if requested (50 CFR 229.7(c)), and comply with any applicable take reduction plans.

The 2011 List of Fisheries (LOF) classifies the Florida spiny lobster trap/pot fishery as a Category III fishery (75 FR 68468; November 8, 2010). The 2011 LOF also classifies the bully net and commercial dive portions of the fishery (called the "Atlantic Ocean, Gulf of Mexico, Caribbean shellfish dive, hand/mechanical collection" fishery) as a Category III because there has never been a documented interaction with marine mammals.

Paperwork Reduction Act (PRA)

The PRA of 1995 (44 U.S.C. 3501 et seq.) regulates the collection of public information by federal agencies to ensure that the public is not overburdened with information requests, that the federal government's information collection procedures are efficient, and that federal agencies adhere to appropriate rules governing the confidentiality of such information. The PRA requires NOAA Fisheries Service to obtain approval from OMB before requesting most types of fishery information from the public. Neither action in this amendment imposes a paperwork burden on the public.

Small Business Act

The Small Business Act of 1953, as amended, Section 8(a), 15 U.S.C. 634(b)(6), 636(j), 637(a) and (d); Public Laws 95-507 and 99-661, Section 1207; and Public Laws 100-656 and 101-37 are administered by the Small Business Association (SBA). The objectives of the Act are to foster business ownership by individuals who are both socially and economically disadvantaged; and to promote the competitive viability of such firms by providing business development assistance

including, but not limited to, management and technical assistance, access to capital and other forms of financial assistance, business training and counseling, and access to sole source and limited competition federal contract opportunities, to help the firms to achieve competitive viability. Because most businesses associated with fishing are considered small businesses, NOAA Fisheries Service, in implementing regulations, must make an assessment of how those regulations will affect small businesses. Implications to small businesses are discussed in the RIR herein (Section 7).

Magnuson-Stevens Act Essential Fish Habitat (EFH) Provisions

The Magnuson-Stevens Act includes EFH requirements, and as such, each existing, and any new, FMPs must describe and identify EFH for the fishery, minimize to the extent practicable adverse effects on that EFH caused by fishing, and identify other actions to encourage the conservation and enhancement of that EFH. Spiny lobster EFH, in both the Gulf of Mexico and South Atlantic, was identified and described for the Caribbean spiny lobster (*Panulirus argus*). The Councils and NOAA Fisheries Service have determined there are no adverse effects to EFH that may occur as a result of the actions proposed in this amendment as discussed in the Environmental Consequences section (Section 4).

Appendix G. Summary of cartography and spatial analyses.

Introduction

The Endangered Species Act (ESA) of 1973 (16 U.S.C. Section 1531 et seq.) requires that federal agencies ensure actions they authorize, fund, or carry out are not likely to jeopardize the continued existence of threatened or endangered species, or the habitat designated as critical to their survival and recovery. The ESA requires NOAA Fisheries Service to consult with the appropriate administrative agency (itself for most marine species and the U.S. Fish and Wildlife Service for all remaining species) when proposing an action that may affect threatened or endangered species or adversely modify critical habitat. Consultations are necessary to determine the potential impacts of the proposed action. Formal consultations are required when proposed actions may affect and are "likely to adversely affect" threatened or endangered species or adversely modify designated critical habitat. The result of a formal consultation is a biological opinion (Bi Op).

To satisfy the ESA consultation requirements, NOAA Fisheries Service completed a formal consultation and resulting Bi Op on the spiny lobster fishery in 2009. When making determinations on fishery management plan FMP actions, not only are the effects of the specific proposed actions analyzed, but also the effects of all discretionary fishing activity under the affected FMPs. Thus, the Bi Op analyzed the potential impacts to ESA-listed species from the continued authorization of the federal spiny lobster fishery. The Bi Op stated the fishery was not likely to adversely affect ESA-listed marine mammals, Gulf sturgeon, or designated critical habitat for elkhorn and staghorn corals. However, the Bi Op determined the spiny lobster trap fishery would adversely affect sea turtles, smalltooth sawfish, and elkhorn and staghorn corals, but would not jeopardize their continued existence.

An incidental take statement was issued for green, hawksbill, Kemp's ridley, leatherback, and loggerhead sea turtles, smalltooth sawfish, and both species of coral. Reasonable and prudent measures to minimize the impact of these incidental takes were specified, along with terms and conditions to implement them. Specific terms and conditions include, but are not limited to creating new or expanding existing closed areas to protect coral and implementing trap line-marking requirements. The branching morphology of elkhorn and staghorn corals causes colonies of any size to be susceptible to fragmentation/breakage and abrasion from fishing activity. Creating closed areas would reduce the likelihood of traps contacting colonies even if they are moved by storms. Trap line marking requirements would allow greater accuracy in identifying fishery interactions with protected species, leading to more targeted measures to reduce the level and severity of those impacts.

The purpose of this amendment is to comply with measures to protect endangered species established under Bi Op. The need for the proposed actions is to aid in the protection and recovery of endangered and threatened species. Specifically, this document will serve as a description of the data sources and methodology employed to develop and analyze management alternatives for Action 1 in Spiny Lobster Amendment 11.

Action 1: Limit Spiny Lobster Fishing in Certain Areas in the Exclusive Economic Zone (EEZ) off the Florida Keys to Protect Threatened Staghorn (*Acropora cervicornis*) and Elkhorn (*Acropora palmata*) Corals

Alternative 1 is the no action alternative. Alternative 1 would not affect existing management or reduce existing risk for threatened species. No new closed areas would result from Alternative 1 thus, no additional analyses are necessary (Table 1).

Alternative 2 would prohibit spiny lobster fishing on all hard bottom areas in the Florida EEZ south of US 1, from Key Biscayne to Key West in water depths less than 30 meters (98 feet) (Figure 1). To estimate the size and extent of affected areas, hard bottom habitat in the Florida Keys was digitized from aerial photos (1991-1992, 1995) of south Florida including Florida Keys National Marine Sanctuary. Hard bottom was subset to only areas in the EEZ using the clip feature in ArcGIS 9.3.1. Total area affected by this closure is 71.1 mi^2 in the EEZ.

Alternative 3 would create new closed areas. Initially, known locations of *Acropora* were received from the NOAA *Acropora palmata* and *A. cervicornis* Inventories, databases maintained by FWRI staff. The NOAA *Acropora* Inventories are ArcGIS geodatabases built to provide a mechanism to view the locations of *Acropora palmata* and *A. cervicornis*. These data were provided by FWRI staff on June 6, 2011 (*A. palmata*) and June 15, 2011(*A. cervicornis*). In addition, 12 smaller datasets (Table 2) received directly from coral researchers and divers with significant knowledge of *Acropora* locations were included. The aggregate database was mapped by NMFS-SERO staff using ArcGIS and included 8,178 locations for coral colonies. However, this total included colonies 1,325 colonies in state waters that were removed from the aggregate database leaving a total of 6,853 locations with noted *Acropora* colonies. A 500 ft. buffer was superimposed over each colony using the buffer feature in ArcGiS. Using the six criteria (Table 3) proposed as guidelines for site selection, NMFS-SERO staff identified areas for proposed closure and drew straight line boundary closures. Closed areas were designed to encompass known *Acropora* spp. colonies and the 500 ft. buffer.

The proposed closed areas were then presented to stakeholders for feedback and comment during an industry sponsored meeting. Feedback received during that meeting indicated the *Acropora* coral nurseries should be protected. Stakeholders also provided input on ways that the proposed closed areas could be oriented to reduce potential impacts to the fishing industry and potentially increase compliance, while still achieving the conservation goal.

Following the meeting, information provided by stakeholders was addressed and incorporated into the proposed closed areas. Specifically, five coral nurseries were added to sites requiring protection, and the orientation of several or sites were changed. Overall, 60 closed areas are proposed and enclose approximately 5.9 mi^2 (Appendix 4), form only right angles (four closed areas were modified slightly so as not to extend into Florida state waters), and are drawn parallel to the reef tract to the extent possible.

Corner coordinates (i.e., latitude and longitude) of each closed area were calculated using the polygon to point function in the ET Geowizards add-on in ArcMap 9.3.1. These data are provided in Appendix A. The total area of the proposed closures was calculated by determining

the area of each polygon in a geographic information system (GIS) and summing the total area of the 60 individual closed areas.

Tables

Table 1. Alternatives currently under consideration in Amendment 11 to the Fishery Management Plan for Spiny Lobster in the Gulf of Mexico and South Atlantic: Summary of cartography and spatial analyses.

Alternative 1: No Action – do not limit spiny lobster fishing in the EEZ off the Florida Keys in areas where threatened staghorn and elkhorn corals (Acropora spp.) occur.

Alternative 2: Close all known hardbottom in the EEZ off the Florida Keys where Acropora spp. occur and in water depths less than 30 meters (approximately 98 feet).

Option a. In the closed areas, spiny lobster trapping would be prohibited.

Option b. In the closed areas, all spiny lobster fishing would be prohibited.

Preferred Alternative 3: Create new closed areas in the EEZ off the Florida Keys with identified *Acropora* spp. colonies inside straight-line boundaries.

Preferred Option a. In the closed areas, spiny lobster trapping would be prohibited.

Option b. In the closed areas, <u>all</u> spiny lobster fishing would be prohibited.

Table 2. Sources of *Acropora* spp. information used to evaluate management alternatives under consideration. FWRI (Fish and Wildlife Research Institute), TNC (The Nature Conservancy), UNCW (University of North Carolina, Wilmington), MML (Mote Marine Laboratory), FKNMS (Florida Keys National Marine Sanctuary).

no.	Species	Source	No. Locations	No. Locations (EEZ only)
1	*A. cervicornis*	FWRI: June 15, 2011	2,782	1,781
2	*A. palmata*	FWRI: June 6, 2011	5,048	4,932
3	*A. cervicornis*	TNC: July 29, 2011	124	28
4	*Acropora spp.*	TNC: July 29, 2011	11	4
5	*A. palmata*	TNC: July 12, 2011	10	1
6	*A. palmata*	UNCW: July 19, 2011	13	9
7	*A. cervicornis*	UNCW: July 19, 2011	14	13
8	*A. cervicornis*	K. Neidmeyer: June 24, 2011	50	33
9	*A. cervicornis*	MML: July 14, 2011	34	16
10	*A. palmata*	MML: July 14, 2011	18	7
11	*A. cervicornis*	FKNMS: July 27, 2011	4	3
12	*A. palmata*	FNKMS: July 27, 2011	6	6
13	*Acropora spp.*	K. Neidmeyer: June 26, 2011	4	4
14	*A. cervicornis*	TNC: July 12, 2011	60	16
		Total	8,178	6,853

Table 3. Criteria used for site selection for potential closed areas (Alternative 3) in Spiny Lobster Amendment 11 to the Fishery Management Plan.

General Criteria Used as Guidelines
The areas proposed for closure in this amendment were chosen using six general criteria as guidelines: 1) protect all elkhorn coral because of their relative rarity in the Florida Keys, 2) protect areas where elkhorn and staghorn corals co-occur, 3) distribute areas throughout the Florida Keys (to the greatest extent practicable), 4) select areas that not only protect elkhorn and staghorn coral but may also protect seven species of corals currently proposed for listing under the ESA, 5) include coral nurseries if possible, and 6) protect the largest colonies with the greatest sexual reproductive potential (i.e., "super colonies"). The general criteria used for site selection were developed with the help of stakeholder input. Protection of all elkhorn corals was recommended because the species is relatively rare in the Florida Keys, and recovery of the species in the area will require protection of the remaining colonies. Providing protection for areas where elkhorn and staghorn corals co-occur was recommended because not only are such areas also relatively rare in the Florida Keys, the conservation benefit of such area closures are maximized by providing protection for both species. Distributing area closures throughout the Florida Keys was recommended to reduce disproportionate effects to the industry, particularly in the Upper Keys where bathymetry and existing area closures have already reduced fishable habitat. Stakeholders also recommended trying to select areas for potential closure that may also provide protection to seven species of coral currently being reviewed by NOAA Fisheries for listing under the ESA. Data available for those seven species generally indicated little co-occurrence between those species, elkhorn and staghorn corals. Stakeholders also recommended considering area closures for "*Acropora* coral nurseries" because these areas are susceptible to the same trap impacts. Based on that input, five coral nurseries are proposed for inclusion in area closures. These nurseries are areas whose sole purpose is to take legally collected *Acropora* coral fragments, raise them to a transplantable size, and then use these corals in restoration efforts throughout the Florida Keys. All coral nurseries working with *Acropora* in the Florida Keys have prior permission for their activities from FKNMS and their activities have undergone ESA consultation. Protecting the largest colonies was also recommended because of their reproductive value. Elkhorn and staghorn corals can reproduce both sexually and asexually (Aronson and Precht 2001), but successful sexual reproduction will likely need to play a major role in elkhorn and staghorn coral recovery (Bruckner 2002). Because the sizes of elkhorn and staghorn corals are directly proportional to their fecundity, large super colonies represent an essential source of gamete production. Elkhorn corals with a living tissue surface area of 1,000 cm^2 could be considered "super colonies" (M. Chiappone, pers. comm. 2010). A similar distinction could be made for staghorn corals with a living tissue surface area of 500 cm^2 (M. Chiappone, pers. comm.).

Figures

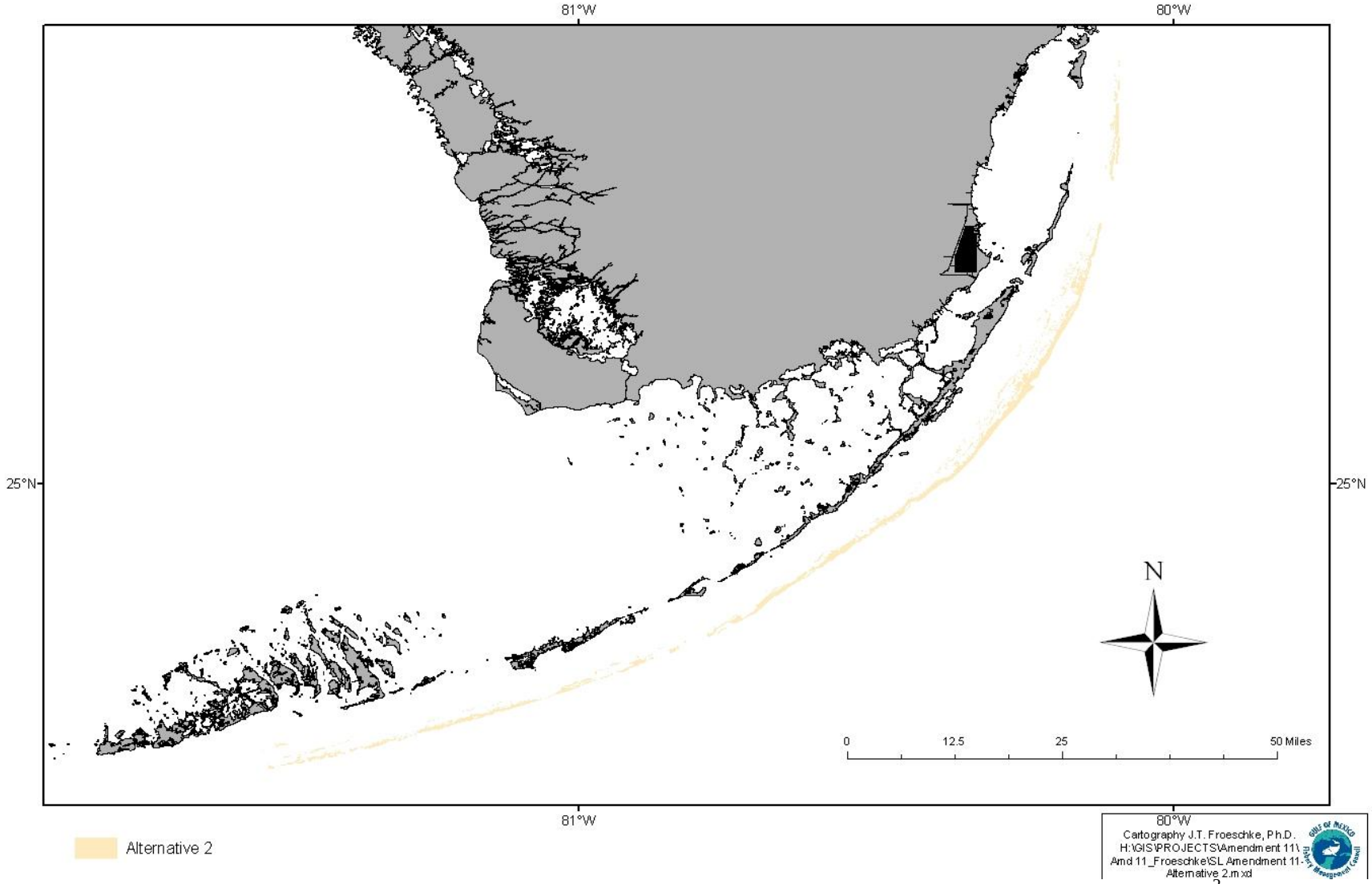

Figure 1. Alternative 2, hard bottom habitat (beige) that would be closed to spiny lobster fishing encompassing 60 mi^2.

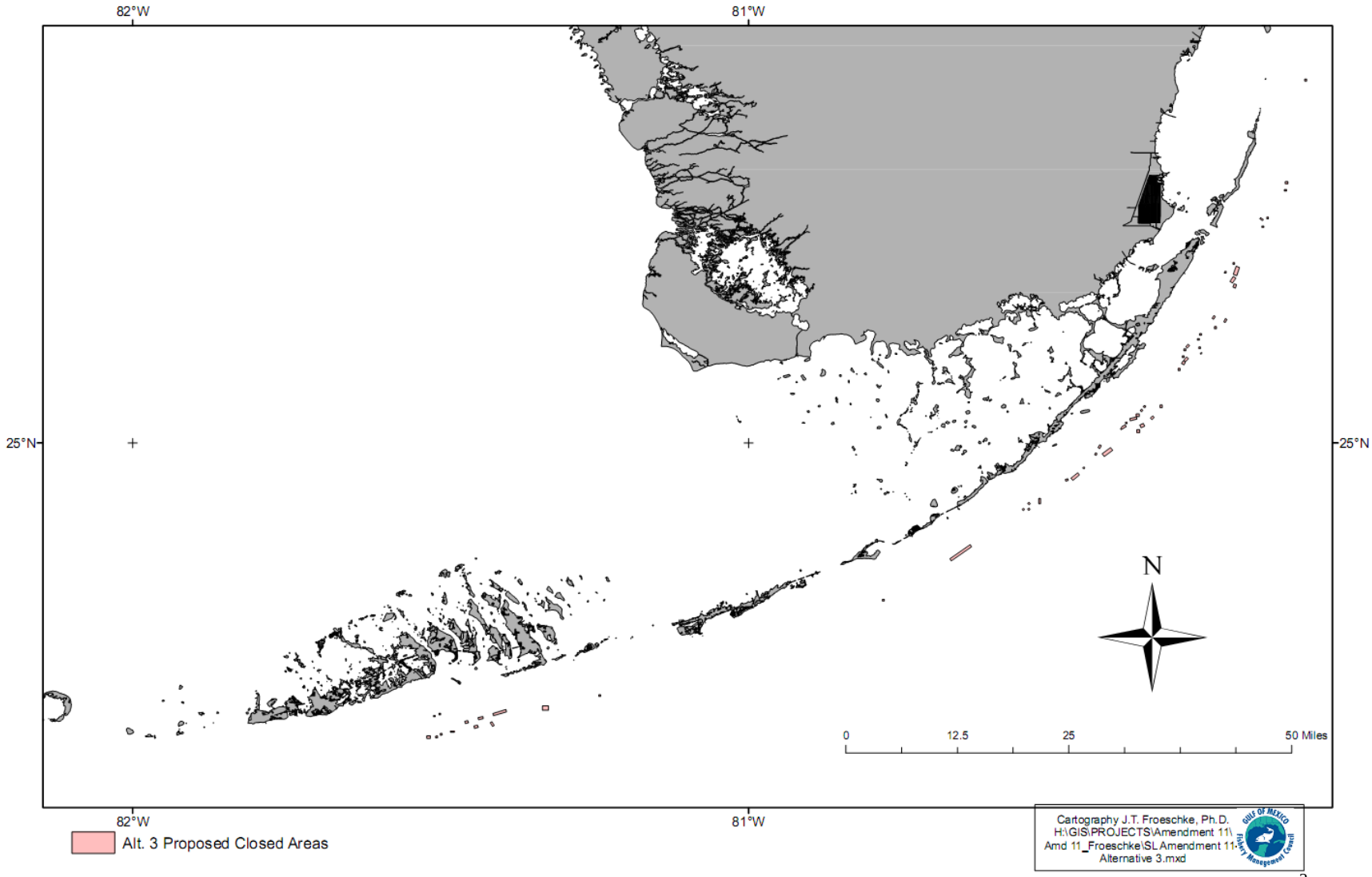

Figure 2. Alternative 3, proposed hard closed areas (n = 60) that would be closed to spiny lobster fishing encompassing 5.9 mi^2.

Appendix H. Public Hearing Summaries

Summary of the Public Hearing on
Spiny Lobster Amendment 11
Marathon, FL
January 23, 2012

Council/Staff:
Carrie Simmons
Emily Muehlstein

15 members of the public in attendance

Bill Kelly - Florida Keys Commercial Fishermen's Association (FKCFA)
The association supports the proposed closed areas with exceptions of sites 2, 15, and 30, which should be amended into smaller units. For example, site 2 only protects two coral colonies and closes an area that is 1600' X 3500'; it should be made into 2 smaller closed areas. Similarly, site 15 should be broken into 3 new areas and site 30 should be split into two smaller areas. This would make a total of 60 closed areas.

He says trap line marking is an example of government overregulation. The line marking serves no biological propose and causes unnecessary economic and labor burden to the spiny lobster fishery. He is willing to help protect species if measures are not labor intensive or economically intensive.

Chris Bergh - Nature Conservancy and recreational spiny lobster fisherman
He has worked to identify some of the good areas to limit spiny lobster fishing to protect corals. He commends fishermen for being proactive in identifying areas to protect throughout this process. The Nature Conservancy is behind the proposed closed areas with the exception of the lack of inclusion of closing areas to all spiny lobster fishing. It does not make sense to protect the corals from traps but not from lobster diving (anchoring, touching, etc). If this law passes, it will cause effort shift and divers will target the closed areas knowing that commercial fishing is restricted in those areas. The Sanctuary Advisory Council has taken the position that all spiny lobster fishing should be closed in these areas.

Edward Cordova- Organized Florida Fishermen
The proposed closed areas 2, 15, and 30 are way too big for the corals that are protected within them. He would like to see the sites split to protect the coral heads without limiting fishing in such large areas.
He supports the Councils preferred 'no action' alternative because trap line marking requirements would cost him thousands of dollars and lots of labor.

The meeting was adjourned at 7:30 p.m.

Members of the public who did not speak:
Doug Gregory - Florida Sea Grant agent

Russell Moore
Pedro Gonzalez - One Seafood
Orelia Gonzalez - One Seafood
Jose Olivera
Martin Moe
Alfredo Cresto Jr. - Organized Florida Fishermen
Scott Jones - F.V. Angus Inc.
Ronnie Boggess - F.V. Angus Inc
Edward Cordova - Organized Florida Fishermen

Summary of the Public Hearing on
Spiny Lobster Amendment 11
Key West, FL
January 24, 2012

Council/Staff:
Carrie Simmons
Emily Muehlstein

12 members of the public in attendance

George Niles - Commercial Fishermen and FKCFA (past president)
Supports the proposed closed areas with the exception of areas 2, 15, and 30, which could be made into smaller area. He would like the proposed closed areas to be closed to all fishing because he believes divers would shift their efforts to the areas closed to commercial fishing. The divers certainly cause harm to the protected corals when anchoring and touching the coral while searching for lobster.

He believes that the trap line marking requirements are absurd. It would cost the industry 19 million dollars to replace those lines and that is unreasonable.

Billy Niles - FKCKA board of directors
He has been trap fishing for 60 years. He stated that, in his experience, gear lines with tracers are weaker and degrade quicker. He has seen one turtle entangled in all his years of fishing and it was released alive; he has never seen a smalltooth sawfish. If the government is willing to pay for the replacement ropes it may be a more reasonable request, otherwise, it will put many people out of business.

Doug Gregory - FL Sea Grant agent/member of the Gulf Council's SSC
He stated the data used in this amendment has not been reviewed by the Scientific and Statistical Committee in accordance with the Magnuson-Sevens Act and the Council SOPPs. The underlying information in Amendment 11 should be reviewed by the SSC for adequacy so the Council can make the most informed management decisions.

Peter Bacle – Owner, Stock Island Lobster Co.
Served on the Gulf Council's lobster Advisory Panel the first year the Council was formed. He also served with Florida Wildlife Conservation and after 35 years of participation in the process he has come to the conclusion that it is a waste of time. He believes there is a hidden agenda that fishermen don't know about.

He sees nothing wrong with the proposed closed areas in the preferred alternative since he has no interest in setting traps in on coral anyhow. He is concerned that these regulations will not stop here. In years of dealing with the fishing bureaucracy, he has watched the Florida Keys National Marine Sanctuary expand. In themselves, the proposed closed areas don't harm the fishery and are good for the environment, but he believes this is just the tip of the iceberg.

Trap line marking requirements came out of nowhere and must be part of an agenda to eliminate lobster traps. He supports the Council's no action alternative because trap line markings serve no function beyond eliminating the fishery.

He stated that there were so few people here tonight for an issue that effects so many. In his fish house alone there are 100 people that are directly impacted by the proposed regulations. People are discouraged by the process because they don't believe that anything they say will make a difference. They are inundated with new regulations and new rules, and every day in his office he receives emails and faxes about hearings asking input and feedback. The bureaucracy is ridiculous and impossible to keep up with. There is a page and a half of acronyms in Amendment 11 that fishermen cannot understand. The Councils and NOAA Fisheries are supposed to promote healthy sustainable fisheries, but it seems like they are only promoting more bureaucracy. It is extremely frustrating to have to deal with this every day, and we can't be expected to be able to comment effectively and give input into the process. Until the bureaucracy is improved people will not participate in the process.

Daniel Padron - Board of directors, FKCFA
He wants the Council to separate sites 2, 30, and 15 so that corals can be protected without limiting fishing. He believes the areas should be closed to all fishing. The recreational fishery and commercial divers should be limited because they cause just as much damage to corals as the trap fishery.

Trap line markings are a terrible idea. Tracers compromise the integrity of the rope and are pointless. A line wrapped around a protected species is still a line wrapped around a protected species with or without a tracer. He does not want to take the time to mark the lines even if the government funds him to do so, it would still be an unnecessary labor intensive requirement.

Mitchell Gale- Vice President, FKCFA
He has been a full time fisherman for over 30 years. He supports the proposed closed areas to protect staghorn and elkhorn corals. He would like sites 2, 15, and 30 split into smaller spaces. Most trappers don't place traps on hardbottom, it is not their intent. For example, site 2 includes lots of sand bottom and the area should be separated to protect corals and allow for trapping on the surrounding sand bottom.

The trap line marking is an idea that has no use in his industry. He would be in favor of the proposed markings if he owned a rope industry, but as it stands it is not a good idea.

Viki Gale - FKCFA
Traps are not placed on coral intentionally and fishers today have good depth finders and can tell what the bottom looks like. The closed areas should be closed to all fishing, not just commercial trapping. She would like areas 2, 15, and 30 divided into smaller areas.

Trap line markers are not feasible and not even worth talking about.

Elizabeth Prieto - Commercial lobster fisher
In 1969 her grandparents moved her to Marathon to fish, and over the years regulations have increased to protected endangered species. She believes the next endangered species will be commercial fishermen.

The price of rope has increased and she believes that trap line requirements would increase the price even further as demand goes up and a monopoly is created. This would harm the industry and trickle down to deck hands and fish houses. Let the fishermen do what they do best and don't tell them how to fish their traps.

She agrees with the proposed closed areas. Areas 2, 15, and 30, need to be split to protect the corals without limiting fishing areas. Protecting the corals is great because the lobster need them. If areas are going to be closed to traps they should also be closed to divers. Otherwise, effort will shift and possibly increase in the closed areas causing damage to the corals by recreational fishermen and commercial divers.

The meeting was adjourned at 7:30 p.m.

Members of the public who did not speak:
Bill Kelly
Thomas Rossano

Summary of the Public Hearing on
Spiny Lobster Amendment 11
Key Largo, FL
January 30, 2012

Three people provided public testimony on Spiny Lobster Amendment 11 at the public hearing in Key Largo. All were members of Florida Keys Commercial Fishermen's Association and one was also a member of Organized Fishermen of Florida. One individual commented on Amendment 11 at the Cocoa Beach Hearing.

Written comments included correspondence from Congresssman Bill Posey.

Action 1:
- Two commenters in support of the proposed closed areas in Preferred Alternative 3, and commented on that they appreciated industry involvement in the process.
- All commenters noted that anchors and recreational divers also have a significant impact on the corals, and the Council should look at that also.
- Commenters recommended modifying the following areas:
- Site 14- modify in order to set a depth line of 45ft to inshore, because over 45 ft is a sand lake. This is a very productive area and would cause crowding in other areas.
- Site 15- split up.
- Site 30- it is a long piece of bottom and not all needs to be closed off; consider splitting in half.
- Commenters with recommendations for the above changes noted that in the Upper Keys they have many closed areas including Everglades National Park closed areas, Biscayne National Park closed areas, and Pennekamp State Park, and they are already squeezed for fishing grounds, so would like to find ways to protect the coral while leaving the most available area for the traps.
- One commenter opposed closed areas unless the proposed closures were developed and supported by industry members.
- One commenter opposed any additional closed areas.

Action 2:
- All commenters in support of the Preferred Alternative 1, and noted that requiring a trap line marking would be very expensive and time-consuming for the fishermen.

Joint Amendment 11 – Spiny Lobster
Summary of Written Comments provided by the Gulf of Mexico Fishery Management Council.

(Received between November 1, 2011 and January 30, 2012)

No comments received.

**The full text of written public comments, including comments that were received after the final submission date, can be found at:

http://gulfcouncil.org/fishery_management_plans/Public%20Comment/Spiny%20Amendment%2011/SL%2011.pdf

Appendix I. EPA Comment Letter

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 4
ATLANTA FEDERAL CENTER
61 FORSYTH STREET
ATLANTA, GEORGIA 30303-8960

March 19, 2012

Dr. Roy E. Crabtree
Regional Administrator
Southeast Regional Office
National Oceanic and Atmospheric Administration
263 13th Avenue South
St. Petersburg, Florida 33701

Subject: EPA NEPA Review Comments on NOAA's DSEIS for "Amendment 11 to the Fishery Management Plan for Spiny Lobster in the Gulf of Mexico and South Atlantic"; CEQ #20120026

Dear Dr. Crabtree:

The U.S. Environmental Protection Agency (EPA) has reviewed the subject National Oceanic and Atmospheric Administration (NOAA) Draft Supplemental Environmental Impact Statement (DSEIS) in accordance with our responsibilities under Section 102(2)(C) of the National Environmental Policy Act (NEPA) and Section 309 of the Clean Air Act. EPA understands that the spiny lobster fishery management plan (FMP) is the jointly managed by the Gulf of Mexico and South Atlantic Fishery Management Councils (Councils). EPA previously provided comments on the DEIS and FEIS for Amendment 10 of the spiny lobster fishery management plan (FMP). EPA understands that NOAA chose to postpone decisions on two actions proposed in Amendment 10 related to protection of elkhorn and saghorn corals, and Amendment 11 provides follow-up on these actions.

The purpose and need for Amendment 11 is to implement measures to protect threatened and endangered elkhorn and staghorn corals in the U.S. Exclusive Economic Zone (EEZ) and to aid in their recovery. EPA also understands that NOAA completed a formal consultation and resulting biological opinion in 2009 which identified some of the proposed actions identified in this Amendment. Furthermore, the proposed actions in Amendment 11 are being proposed to meet the requirements of the Endangered Species Act (ESA).

It is our understanding that NOAA proposes two actions within the DSEIS which include: 1) limit spiny lobster fishing in certain areas in the EEZ off the Florida Keys to protect elkhorn and staghorn corals, and 2) require gear markings for spiny lobster trap lines in the EEZ off Florida, which would allow greater accuracy in identifying fishery

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interaction impacts to benthic habitats and protected species, leading to more targeted measures to reduce the level and severity of those impacts.[1]

EPA has the responsibility to review and comment on major Federal actions significantly affecting the quality of the human environment, including FMPs and FMP Amendments (Amendments) as developed, approved, and implemented under the MSA where those Plans and Amendments are subject to the EIS requirement of NEPA, but it should be clear that we defer to NOAA and the Councils as to the development of fishery statistics and the relative importance of the commercial and recreational fisheries for each species.

EPA commends NOAA's efforts to provide additional time for stakeholder involvement in addressing the actions proposed in Amendment 11 (previously proposed under Amendment 10). EPA also appreciates that several alternatives for proposed actions were presented and that preferred alternatives were identified in the DSEIS. Based on our review, we offer the following comments for the preferred alternatives for the two actions covered within the DSEIS.

Actions and Alternatives:

Action – 1: Limit Spiny Lobster Fishing in Certain Areas in the Exclusive Economic Zone (EEZ) off the Florida Keys to Protect Threatened Staghorn (*Acropora cervicornis*) and Elkhorn (*Acropora palmata*) Corals

EPA Comments

- Overall, EPA is more supportive of the Alternative 2 because it closes more area to spiny lobster fishing and is more protective of the elkhorn and staghorn corals. However, we understand NOAA's position of balancing the protection of the coral species while trying to minimize economic impact to the fishing and recreation industries.
- In discussing the differences between Alternatives 2 and 3 and Options A and B, it would be beneficial to provide additional background with regard to the suggested minimum level of protection needed for the elkhorn and staghorn corals identified in the 2009 biological opinion (if available). For example, did the biological opinion identify that the subject corals needed to be protected from traps only or a combination of traps, diving activities and boat anchoring? The DSEIS provides information on studies related to the potential for these activities to impact the corals but what is the position taken in the biological opinion? Expanding on this discussion would provide better insight into why NOAA selected Alternative 3 – Option B as the preferred alternative for Action 1.
- EPA recommends additional discussion on NOAA's process for expanding protection areas in the future in the event of new discoveries of elkhorn and staghorn coral colonies not identified in this EIS.

[1] p. x and xiii

Action – 2: Require Gear Markings for Spiny Lobster Trap Lines in the EEZ off Florida

EPA Comment

- The DSEIS provides lengthy discussion on UV degradation of trap lines for different color lines, line marking strategies, and the economic impact on the fishing industries. Since the no action alternative was selected for this action and the 2009 biological opinion requires implementation of trap line marking measures, we remain unclear on how the preferred alternative meets the requirements of the 2009 biological opinion. EPA recommends that NOAA further expand on potential future actions that could be taken to meet the 2009 biological opinion trap line markings requirement in the FSEIS. Based on our review, it would appear that additional research related to UV degradation of trap lines and the potential economic impact on the fishing industry may be needed. Please clarify if NOAA plans to study these issues further (provide timeline if available) and if NOAA plans to address this action in a future Amendment.

EPA DEIS Rating:

Although we offer some clarifying comments on this DSEIS, EPA generally supports NOAA on Amendment 11 and gives deference to their fishery expertise. Therefore, EPA rates this DSEIS as "LO" (Lack of Objections). Nevertheless, we request that NOAA respond to our comments in a dedicated section of the FSEIS.

EPA appreciates the opportunity to review this DSEIS. Should NOAA have questions regarding our comments on the Amendment actions, please feel free to contact Dan Holliman at 404/562-9531 or holliman.daniel@epa.gov of my staff.

Sincerely,

Heinz J. Mueller
Chief, NEPA Program Office
Office of Policy and Management

3

Appendix J. Draft Supplemental Environmental Impact Statement Comments and Responses

Including comments from the Environmental Protection Agency, five comments were received from individuals and organizations during the 45-day comment period on the DSEIS. The following is a response to these comments. The EPA classified the DSEIS and proposed actions as "LO" (Lack of Objections) and will publish these findings in the *Federal Register*. The following are responses to the public comments received. All comments received were posted to Federal e-Rulemaking Portal (http://www.regulations.gov, docket number: **NOAA-NMFS-2011-0223**).

Comment 1: Traps and the ropes entangle and destroy sea life. We should eliminate any traps that are used around reef structures, and there should be areas designated where lobsters can only be taken by divers and not traps.

Response: Amendment 11 proposes closing areas to lobster trap fishing near elkhorn and staghorn coral. Lobster fishermen do not deliberately set traps on coral, but storms can move traps into coral areas. The closed areas would help protect threatened species of coral and improve their chance of recovery. The areas were chosen to provide benefit to those species. Closing additional areas would impose an unnecessary restriction on lobster trap fishing.

Comment 2: There has been a noticeable decline in the lobster population over the past 5 to 7 years, between Fort Pierce and Port Canaveral. Two things have changed: an increase in pressure, and a dramatic increase in the Goliath grouper population.

Response: Amendment 11 contains an action that would reduce the impact of the spiny lobster fishery on protected species. Amendment 10, effective January 2012, set an annual catch limit and accountability measure to prevent overfishing of the spiny lobster resource. Further, the Florida trap limitation program and permit requirements prevent an increase in effort. The comment relative to Goliath grouper does not address the actions in the amendment.

Comment 3: Amendment 11 was never reviewed by the Gulf Council's SSC and thus has not been properly prepared relative to the requirements of the Magnuson-Stevens Act. Amendment 11 contains biological and economic analyses provided by industry as well as staff and NMFS scientists that have not been peer reviewed by the Gulf Council SSC.

Response: NMFS disagrees that Amendment 11 does not comply with the Magnuson-Stevens Act because it was not reviewed by Gulf Council's SSC. First, this is a joint amendment developed by both the Gulf and South Atlantic Councils, and was reviewed by the South Atlantic Council's SSC. Second, the Magnuson-Stevens Act does not require that an SSC review every fishery management plan amendment developed by its Council. The Magnuson-Stevens Act mandates participation by an SSC in specified circumstances. For example, a Council may not exceed the fishing level recommendations of its SSC when developing annual catch limits [Section 302(h)(6)]. The Magnuson-Stevens Act provision cited by the commenter does not create a similar requirement with respect to general SSC review of plan amendments. An SSC is established to "assist" in the development, collection, evaluation and peer review of scientific

information "as is relevant" to its Council's development of an amendment to any fishery management plan [Section 302(g)(1)(A]). Accordingly, an SSC provides its Council ongoing scientific advice for fishery management decisions [as required by section 302(g)(1)(B)] that its Council determines is necessary to assist in the development of a plan or amendment. The Gulf Council determined that it did not require the assistance of its SSC to develop Amendment 11.

Response to EPA comments

Action 1
In discussing the differences between Alternative 2 and 3 and Options a and b, it would be beneficial to provide additional background with regard to the suggested minimal level of protection needed for the elkhorn and staghorn corals identified in the 2009 biological opinion.

Response: Language was added to discussion of Options a and b (p. 11) indicating the Biological Opinion concluded only traps would have an adverse impact on protected species. This is also reflected in the Council Conclusions section (p. 54).

EPA recommends additional discussion NOAA's process for expanding protected areas in the future in the event of new discoveries of elkhorn and staghorn coral colonies not identified in this EIS.

Response: Discussion of a review of the closed areas and coordination with the Florida Keys Marine National Marine Sanctuary Program can be found on page 8.

Action 2
EPA recommends that NOAA further expand on potential future actions that could be taken to meet the 2009 biological opinion trap line marking requirements. Based on our review, it would appear that additional research related to UV degradation of trap lines and the potential economic impact on the fishing industry may be needed. Please clarify if NOAA plans to study these issues further and if NOAA plans to address this action in a future amendment.

Response: The discussion of the no action alternative (p. 28) and the Council Conclusions section (p. 66) have been updated to indicate the Florida Fish and Wildlife Conservation Commission is conducting a study of trap line marking methods. Although UV degradation is not specifically being studied, NMFS will recommend different color lines be included in the study to test their longevity. The Councils intend to revisit this issue after results of that study are available. No specific timeline has been given, but the study is expected to last approximately one year.

Appendix K. FWC Letter to NOAA Fisheries Service

Florida Fish and Wildlife Conservation Commission

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Vice Chairman
Winter Park

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March 21, 2012

Dr. Roy Crabtree
NOAA Fisheries Service
Southeast Regional Office
263 13th Avenue South
Saint Petersburg, FL 33701

RE: Spiny Lobster Amendment 11 and FWC Trap Marking Study

Dear Dr. Crabtree:

The Gulf of Mexico Fishery Management Council took action at its February meeting and the South Atlantic Fishery Management Council took action at its March meeting to approve Spiny Lobster Amendment 11. This amendment will establish 60 areas closed to spiny lobster trapping in federal waters off the Florida Keys to minimize interaction between the spiny lobster trap fishery and *Acropora* corals. This amendment also contains alternatives that would have required spiny lobster trap lines to be marked so that fishery interactions with Endangered Species Act (ESA) listed species could be monitored, but no action was taken by either Council on this item. However, a 2009 Biological Opinion (Bi Op) on the spiny lobster fishery mandates the establishment of trap line marking requirements for the spiny lobster fishery.

As you know, a large portion of spiny lobster trap harvest occurs in Florida state waters. The Florida Fish and Wildlife Conservation Commission (FWC) is aware of the spiny lobster fishery Bi Op and the August 6, 2017 deadline to implement trap line marking requirements. To that end, the FWC's Fish and Wildlife Research Institute (FWRI) has obtained NOAA Cooperative Research Grant funds to test the suitability of rope marking techniques to assist with the identification of lobster trap lines.

The specific objectives and scope of this project will be outlined in a workshop with NOAA's Protected Resources Division and the Florida Keys Commercial Fishermen's Association (FKCFA) in April 2012. Many of the details of this project will be determined in this workshop, but FWRI will be partnering with spiny lobster fishermen to test a range of line marking options. The time and cost of retrofitting new and old rope with marking options will also be determined. Line marking options will be deployed on active lobster traps in the Florida Keys when the commercial spiny lobster season begins in August 2012. Marked lines will be monitored monthly throughout the open season for durability and qualitatively assessed by fishermen for handling. Marked lines will continue to be monitored during the April through July 2013 closed season to determine the effects of off-season storage on the durability of line marking options. Results of this study should be available during the fall of 2013 and are anticipated to include 1) an assessment of

time and effort required to implement a line marking system and 2) a report on the durability and suitability of tested line marking options.

We look forward to continuing to work with NOAA Fisheries Service and the Councils to manage our shared fisheries resources in the South Atlantic. If you have any questions about this study, please contact me in the Division of Marine Fisheries Management at 850-487-0554.

Sincerely,

Jessica McCawley
Division Director

jm/mb

cc: David Cupka
Bob Gill