# Appendix A. Considered But Eliminated Alternatives

This section describes actions and alternatives that the South Atlantic Fishery Management Council (South Atlantic Council) considered in developing Amendment 8 to the Fishery Management Plan for Coral, Coral Reefs, and Live/Hard bottom Habitats of the South Atlantic Region (Coral Amendment 8), but decided not to pursue. The description of each alternative is followed by a summary statement of why it was eliminated from more detailed analysis in Coral Amendment 8.

**Action 1. Expand Boundaries of the Oculina Bank HAPC**

**Sub-Alternative 2a.** Modify the northern boundary of the Oculina Bank HAPC from the current northern boundary of the Oculina HAPC (28° 30' N) to 29° 43.5' W. The west and east boundaries would follow the 60 meter and 100 meter depth contour lines, respectively, as represented in the simplified polygon (**Figure 1**). Sub-Alternative 2a = 430 square miles.

**Sub-Alternative 2b.** Modify the northern boundary of the Oculina Bank HAPC from the current northern boundary of the Oculina HAPC (28° 30' N) to 29° 43.5' W. The west and east boundaries would follow the 70 meter and 90 meter depth contour lines, respectively, as represented in the simplified polygon (**Figure 2**). Sub-alternative 2b = 228 square miles.

**Sub-Alternative 2c.** Modify the northern boundary of the Oculina Bank HAPC from the current northern boundary of the Oculina HAPC (28° 30' N) to 29° 43.5' W. The west and east boundaries would follow the 70 meter and 100 meter depth contour lines, respectively, as represented in the simplified polygon (**Figure 3**). Sub-alternative 2c = 278 square miles.

**Sub-Alternative 2d**. Modify the northern boundary of the Oculina Bank HAPC from the current northern boundary of the Oculina HAPC (28° 30' N) to 29° 43.5' W. The west and east boundaries would follow the 60 meter and 90 meter depth contour lines, respectively, as represented in the simplified polygon (**Figure 4**). Sub-alternative 2d = 380 square miles.

**Discussion**

During the December 2012 meeting, the South Atlantic Council reviewed the actions and alternatives in the Coral Amendment 8 Options Paper. Prior to the December 2012 meeting, the South Atlantic Council had not thoroughly discussed the specific alternatives and had only discussed the recommendations from the Coral, Habitat, and Deepwater Shrimp Advisory Panels (APs) regarding modifications to Coral Habitat Areas of Particular Concern (HAPC). After review of Action 1, the South Atlantic Council discussed that the APs have based recommendations around alternatives that modify a northern expansion of Oculina Bank along the 100 meter eastern contour. The other alternatives were not discussed in detail by the APs

because trawling has not taken place in the hardbottom habitat between 90 and 100 meters. Therefore, the South Atlantic Council removed from consideration the alternatives (i.e. Sub-Alternatives 2b and 2d) under Action 1 that do not consider modifications to the northern boundary around the 100 meter eastern boundary.

Further, at the June 2013 South Atlantic Council meeting, Sub-alternative 2a under Action 1 was removed to the considered but rejected appendix. The South Atlantic Council discussed at length the Coral, Habitat, and Deepwater Shrimp APs recommendations for preferred alternatives that resulted from discussions during their May 2013 AP meetings. The APs did not recommend the South Atlantic Council consider Sub-alternatives 2a and 2c under Action 1 as a preferred alternative because other sub-alternatives were more favorable for protection of habitat while conserving important rock shrimp fishing grounds. As a result of the APs discussion, the South Atlantic Council removed Sub-alternatives 2a and 2c from further consideration in Coral Amendment 8.

**Action 3. Expand Boundaries of the Stetson-Miami Terrace CHAPC**

**Alternative 2.** Expand Stetson-Miami Terrace Coral HAPC in the area west of the existing boundary approximately by the 200 meter depth contour between latitude 30°45.0' to the north and latitude 29°52.0' to the south (**Figure 5**).

**Discussion**

During the December 2012 meeting, the South Atlantic Council reviewed the actions and alternatives in the Coral Amendment 8 Options Paper. Prior to the December 2012 meeting, the South Atlantic Council had not thoroughly discussed the specific alternatives and had only discussed the recommendations from the Coral, Habitat, and Deepwater Shrimp APs regarding modifications to Coral HAPCs. The modification of Stetson-Miami Terrace Coral HAPC as recommended by the Coral AP during their meeting in October 2011, and depicted in **Figure 5**, was revised during the May 2012 Coral AP, and again during the joint Deepwater Shrimp and Coral AP meeting in October 2012. The recommendation for modification of this area that surfaced during the joint AP meeting was to incorporate areas of newly discovered *Lophelia* habitat west of the existing HAPC while making the flatbottom region in the southern southeast portion available to fishing, to the greatest extent possible. As a result of the revised recommendation from the APs, the South Atlantic Council updated Alternative 2 under Action 3 and removed the former language for this alternative to the Considered but Rejected Appendix.

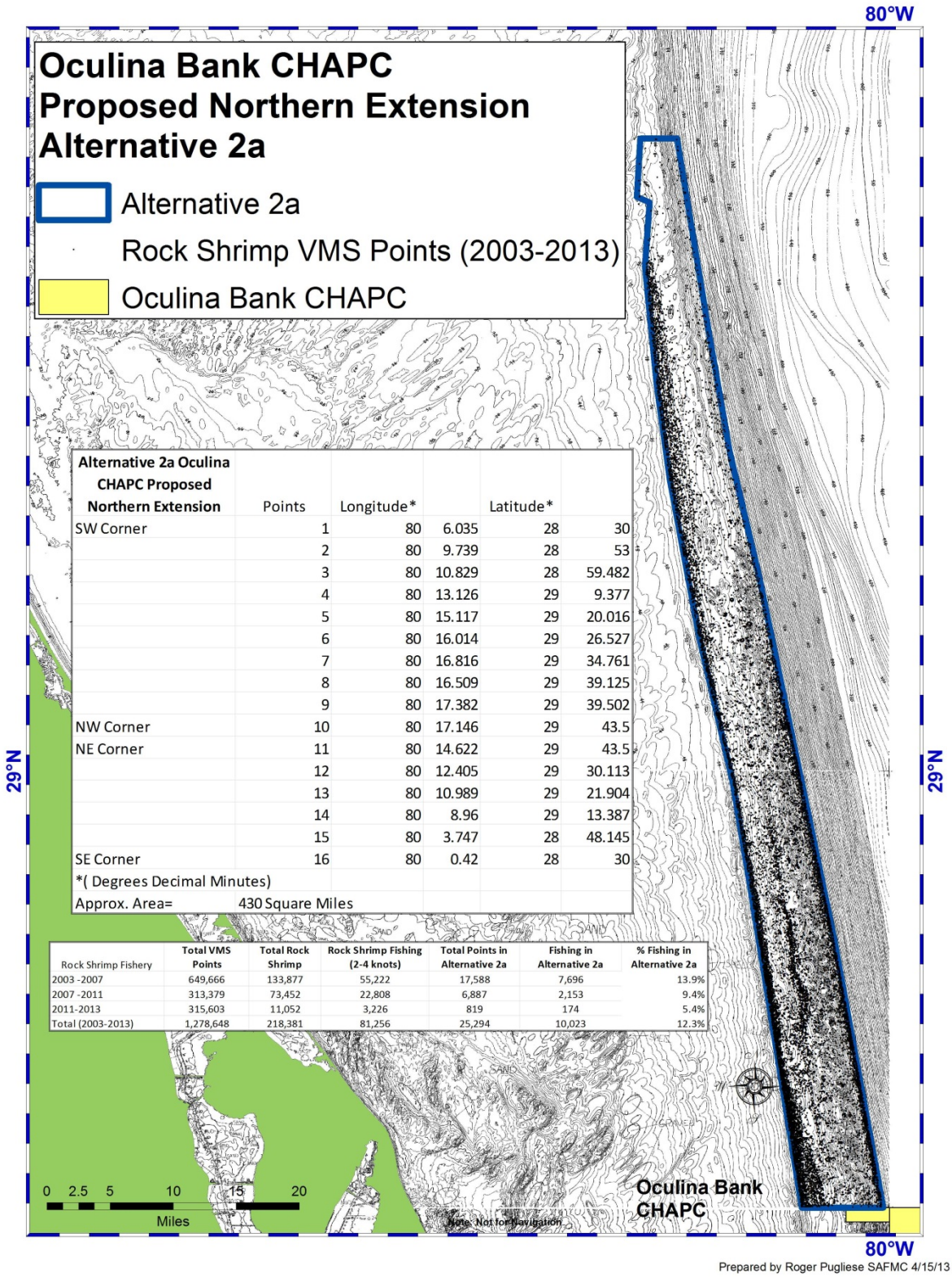
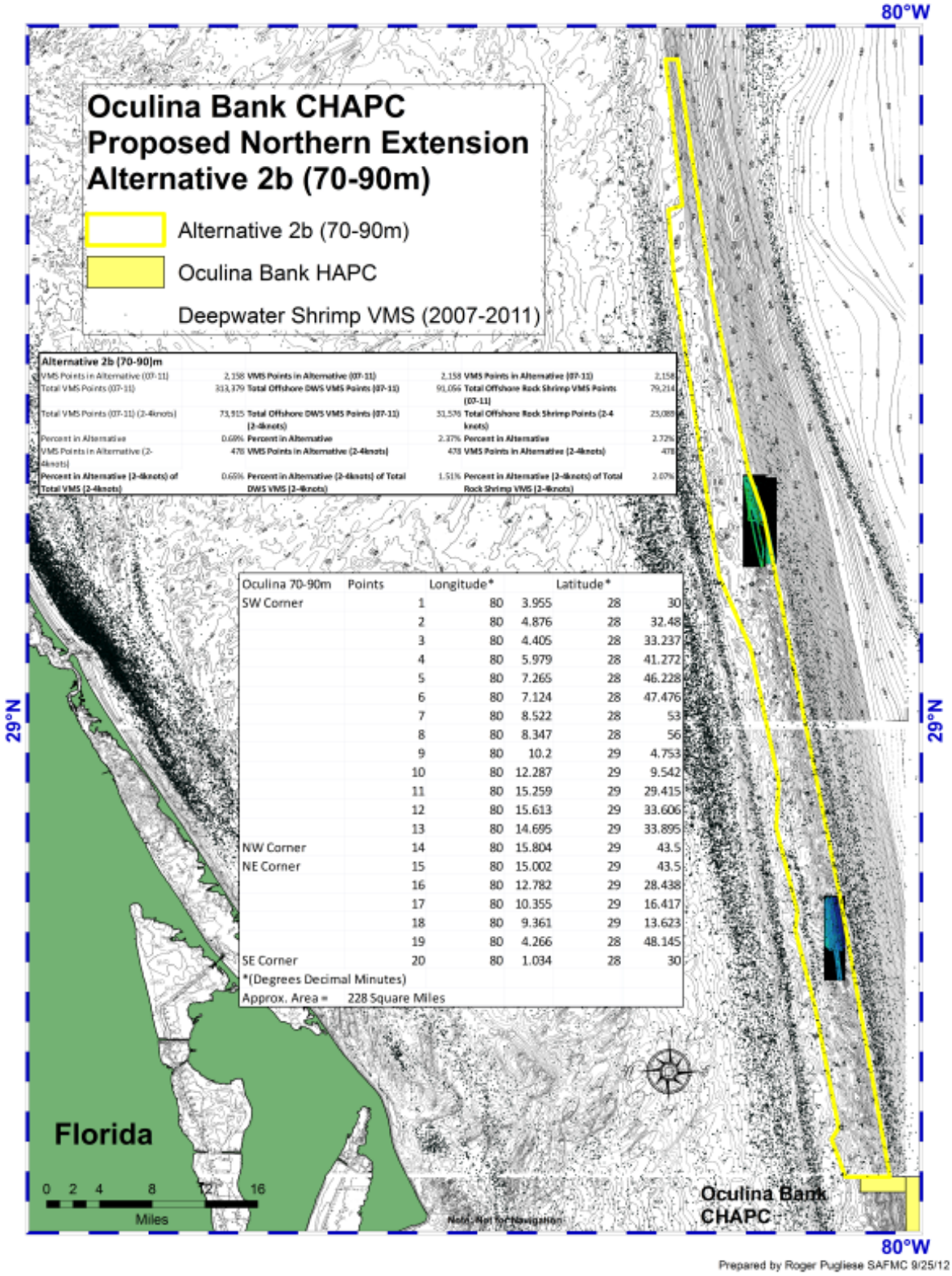


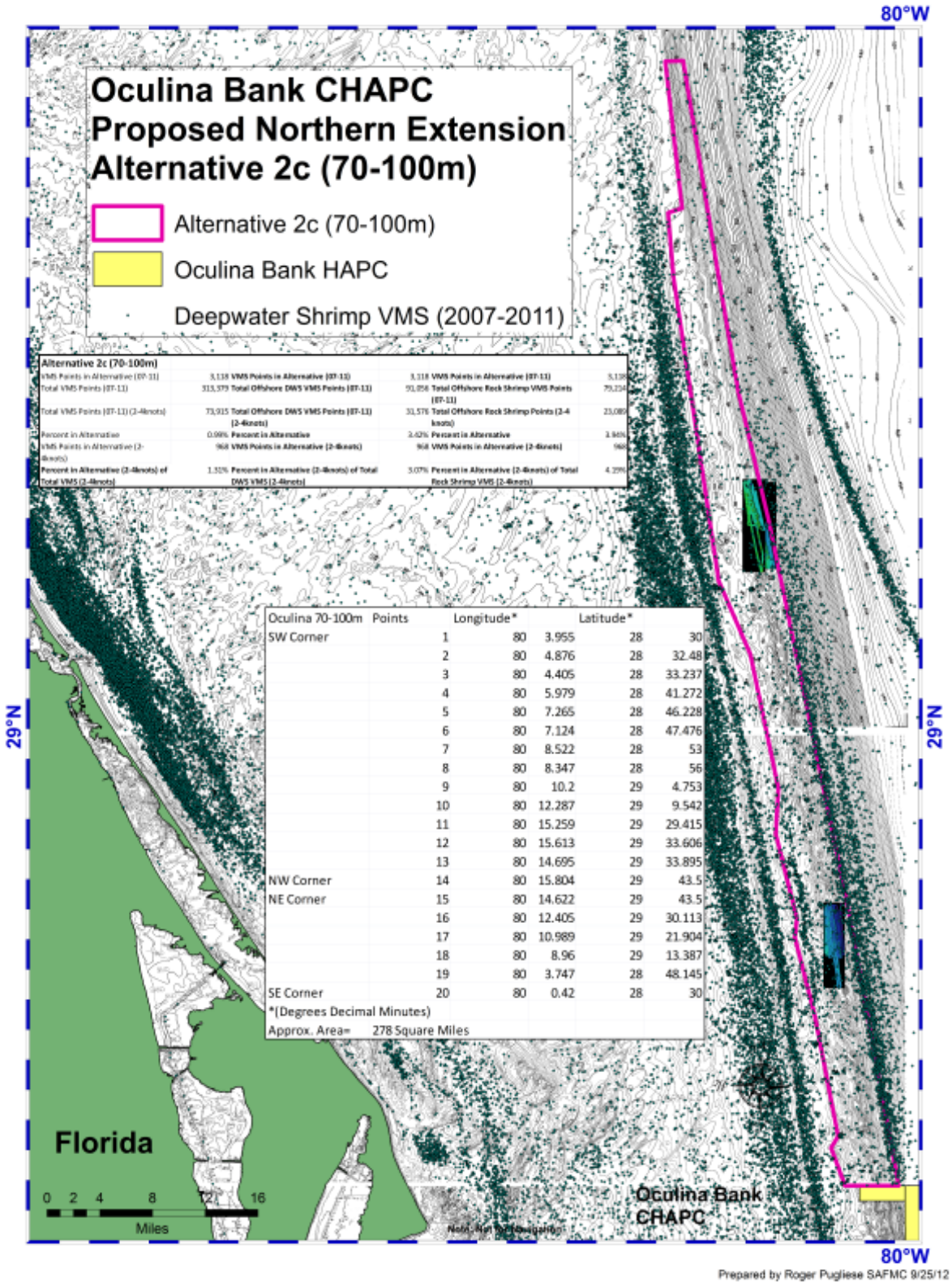

**Figure 1.** Action 1, Sub-Alternative 2a. Oculina Bank HAPC Proposed Northern Extension and Rock Shrimp VMS (2003-2013).




| Alternative 2b (70-90)m | | | | | |
|---|---|---|---|---|---|
| VMS Points in Alternative (07-11) | 2,158 | VMS Points in Alternative (07-11) | 2,158 | VMS Points in Alternative (07-11) | 2,158 |
| Total VMS Points (07-11) | 313,379 | Total Offshore DWS VMS Points (07-11) | 91,056 | Total Offshore Rock Shrimp VMS Points (07-11) | 79,214 |
| Total VMS Points (07-11) (2-4knots) | 73,915 | Total Offshore DWS VMS Points (07-11) (2-4knots) | 31,576 | Total Offshore Rock Shrimp Points (2-4 knots) | 25,089 |
| Percent in Alternative | 0.68% | Percent in Alternative | 2.37% | Percent in Alternative | 2.72% |
| VMS Points in Alternative (2-4knots) | 478 | VMS Points in Alternative (2-4knots) | 478 | VMS Points in Alternative (2-4knots) | 478 |
| Percent in Alternative (2-4knots) of Total VMS (2-4knots) | 0.65% | Percent in Alternative (2-4knots) of Total DWS VMS (2-4knots) | 1.51% | Percent in Alternative (2-4knots) of Total Rock Shrimp VMS (2-4knots) | 2.07% |

| Oculina 70-90m | Points | Longitude* | | Latitude* | |
|---|---|---|---|---|---|
| SW Corner | 1 | 80 | 3.955 | 28 | 30 |
| | 2 | 80 | 4.876 | 28 | 32.48 |
| | 3 | 80 | 4.405 | 28 | 33.237 |
| | 4 | 80 | 5.979 | 28 | 41.272 |
| | 5 | 80 | 7.265 | 28 | 46.228 |
| | 6 | 80 | 7.124 | 28 | 47.476 |
| | 7 | 80 | 8.522 | 28 | 53 |
| | 8 | 80 | 8.347 | 28 | 56 |
| | 9 | 80 | 10.2 | 29 | 4.753 |
| | 10 | 80 | 12.287 | 29 | 9.542 |
| | 11 | 80 | 15.259 | 29 | 29.415 |
| | 12 | 80 | 15.613 | 29 | 33.606 |
| | 13 | 80 | 14.695 | 29 | 33.895 |
| NW Corner | 14 | 80 | 15.804 | 29 | 43.5 |
| NE Corner | 15 | 80 | 15.002 | 29 | 43.5 |
| | 16 | 80 | 12.782 | 29 | 28.438 |
| | 17 | 80 | 10.355 | 29 | 16.417 |
| | 18 | 80 | 9.361 | 29 | 13.623 |
| | 19 | 80 | 4.266 | 28 | 48.145 |
| SE Corner | 20 | 80 | 1.034 | 28 | 30 |
| *(Degrees Decimal Minutes) | | | | | |
| Approx. Area = | 228 Square Miles | | | | |

**Figure 2.** Action 1, Sub-Alternative 2b. Modification to the northern boundary of the Oculina Bank HAPC. In this northern zone, the west and east boundaries would follow the 70 meter and 90 meter depth contour lines, as represented in the simplified polygon.

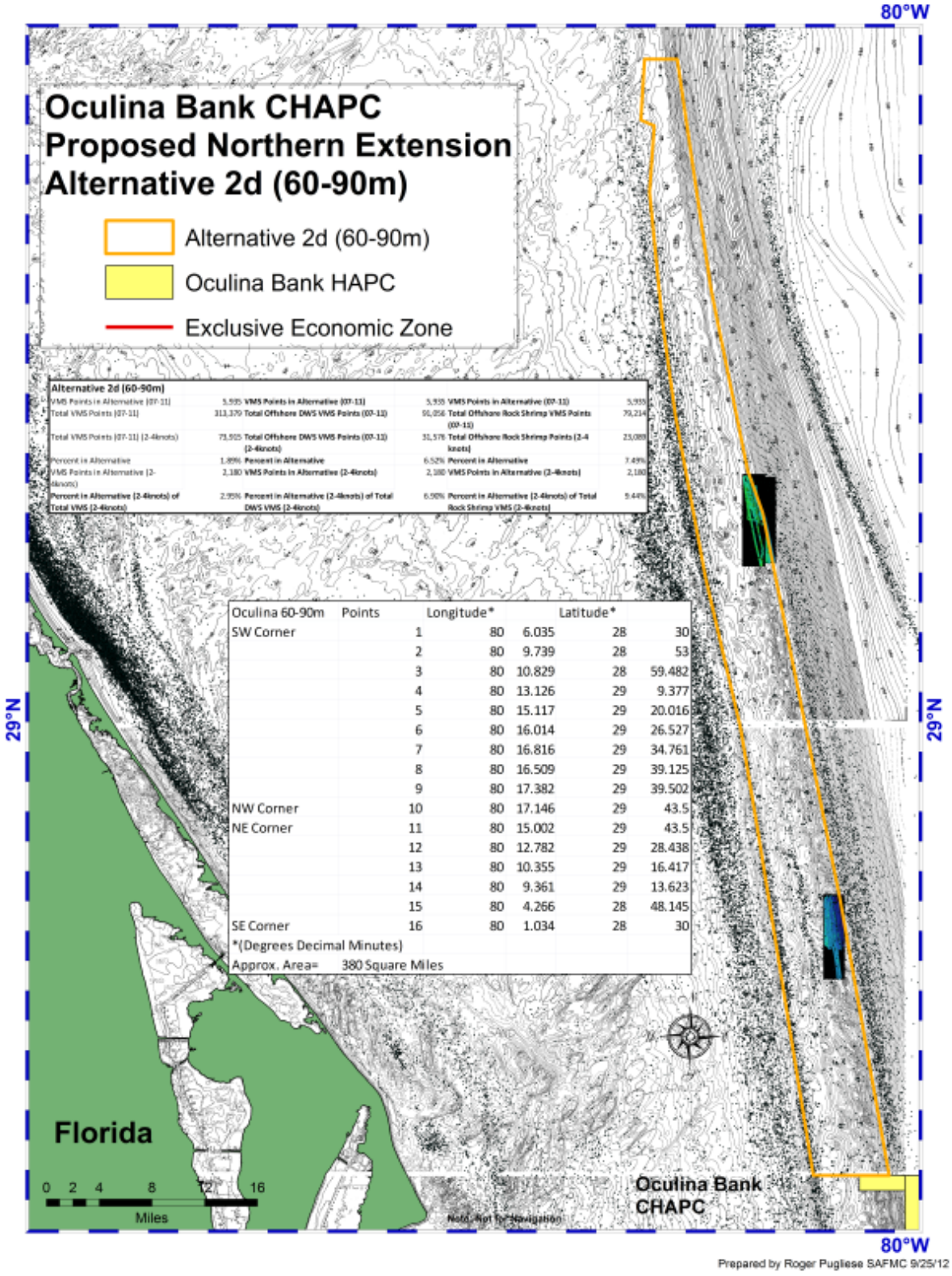



| Oculina 70-100m | Points | Longitude* | | Latitude* | |
|---|---|---|---|---|---|
| SW Corner | 1 | 80 | 3.955 | 28 | 30 |
| | 2 | 80 | 4.876 | 28 | 32.48 |
| | 3 | 80 | 4.405 | 28 | 33.237 |
| | 4 | 80 | 5.979 | 28 | 41.272 |
| | 5 | 80 | 7.265 | 28 | 46.228 |
| | 6 | 80 | 7.124 | 28 | 47.476 |
| | 7 | 80 | 8.522 | 28 | 53 |
| | 8 | 80 | 8.347 | 28 | 56 |
| | 9 | 80 | 10.2 | 29 | 4.753 |
| | 10 | 80 | 12.287 | 29 | 9.542 |
| | 11 | 80 | 15.259 | 29 | 29.415 |
| | 12 | 80 | 15.613 | 29 | 33.606 |
| | 13 | 80 | 14.695 | 29 | 33.895 |
| NW Corner | 14 | 80 | 15.804 | 29 | 43.5 |
| NE Corner | 15 | 80 | 14.622 | 29 | 43.5 |
| | 16 | 80 | 12.405 | 29 | 30.113 |
| | 17 | 80 | 10.989 | 29 | 21.904 |
| | 18 | 80 | 8.96 | 29 | 13.387 |
| | 19 | 80 | 3.747 | 28 | 48.145 |
| SE Corner | 20 | 80 | 0.42 | 28 | 30 |

*(Degrees Decimal Minutes)

Approx. Area= 278 Square Miles

**Figure 3.** Action 1, Sub-Alternative 2c. Modification to the northern boundary of the Oculina Bank HAPC. In this northern zone, the west and east boundaries would follow the 70 meter and 100 meter depth contour lines, as represented in the simplified polygon.




| Oculina 60-90m | Points | Longitude* | | Latitude* | |
|---|---|---|---|---|---|
| SW Corner | 1 | 80 | 6.035 | 28 | 30 |
| | 2 | 80 | 9.739 | 28 | 53 |
| | 3 | 80 | 10.829 | 28 | 59.482 |
| | 4 | 80 | 13.126 | 29 | 9.377 |
| | 5 | 80 | 15.117 | 29 | 20.016 |
| | 6 | 80 | 16.014 | 29 | 26.527 |
| | 7 | 80 | 16.816 | 29 | 34.761 |
| | 8 | 80 | 16.509 | 29 | 39.125 |
| | 9 | 80 | 17.382 | 29 | 39.502 |
| NW Corner | 10 | 80 | 17.146 | 29 | 43.5 |
| NE Corner | 11 | 80 | 15.002 | 29 | 43.5 |
| | 12 | 80 | 12.782 | 29 | 28.438 |
| | 13 | 80 | 10.355 | 29 | 16.417 |
| | 14 | 80 | 9.361 | 29 | 13.623 |
| | 15 | 80 | 4.266 | 28 | 48.145 |
| SE Corner | 16 | 80 | 1.034 | 28 | 30 |

*(Degrees Decimal Minutes)
Approx. Area= 380 Square Miles

**Figure 4.** Action 1, Sub-Alternative 2d. Modification to the northern boundary of the Oculina Bank HAPC. In this northern zone, the west and east boundaries would follow the 60 meter and 90 meter depth contour lines, as represented in the simplified polygon.

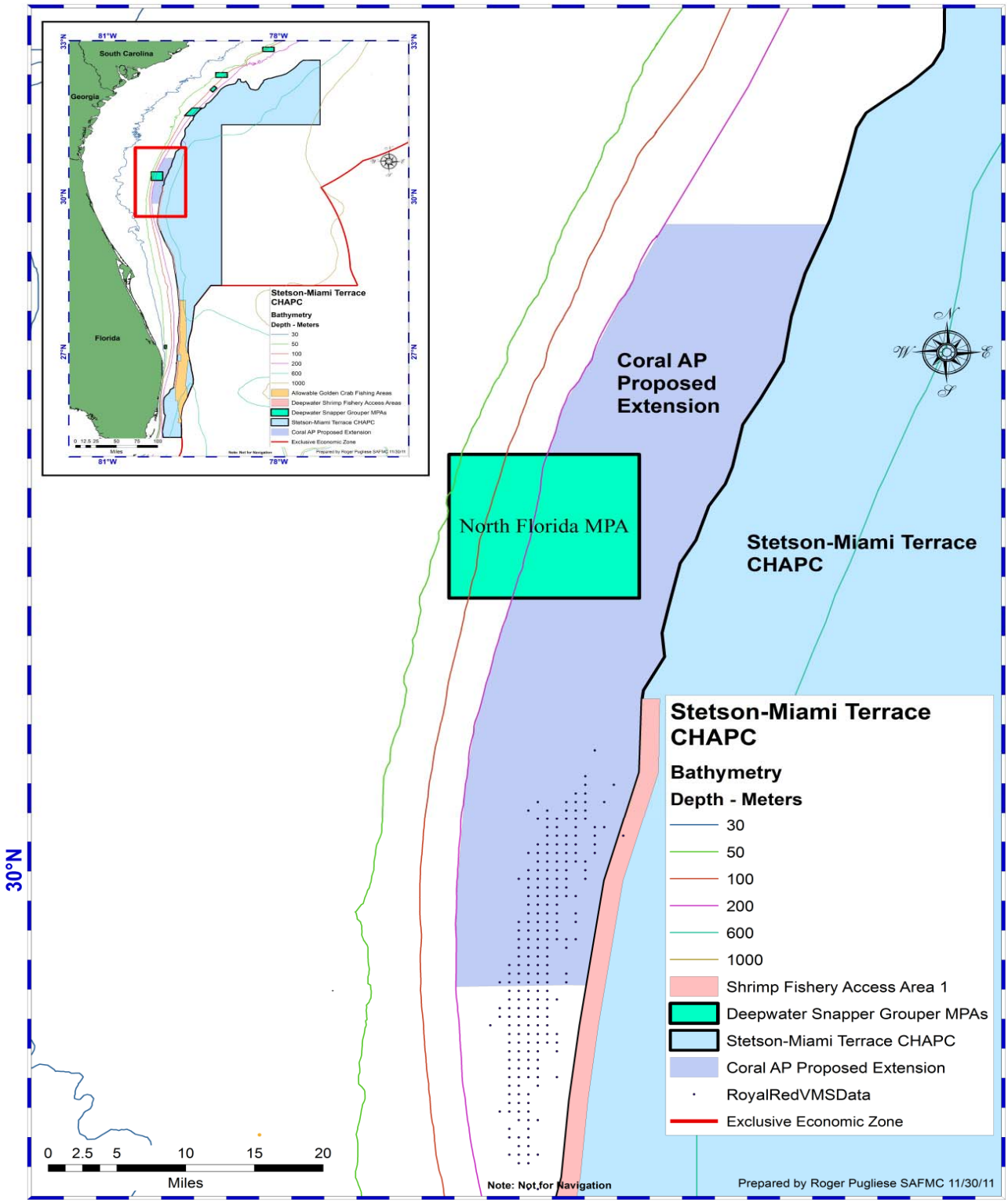



**Figure 5**. Action 3, Alternative 2, the Coral Advisory Panel's original proposed expansion of the Stetson-Miami Terrace HAPC western boundary.

# Appendix B. Regulatory Impact Review

The National Marine Fisheries Service (NMFS) requires a Regulatory Impact Review (RIR) for all regulatory actions that are of public interest. The RIR does three things: (1) it provides a comprehensive review of the level and incidence of impacts associated with a regulatory action; (2) it provides a review of the problems and policy objectives prompting the regulatory proposals and an evaluation of the major alternatives which could be used to solve the problem; and (3) it 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 any proposed regulations are a "significant regulatory action" under certain criteria provided in Executive Order 12866 (E.O. 12866) and whether the approved regulations will have a "significant economic impact on a substantial number of small business entities" in compliance with the Regulatory Flexibility Act of 1980 (RFA).

## 1.1 Problems and Objectives

The purpose and need, issues, problems, and objectives of this action are presented in **Chapter 1** of Amendment 8 to the Fishery Management Plan for Coral, Coral Reefs, and Live/Hardbottom Habitats of the South Atlantic Region, and are incorporated herein by reference.

## 1.2 Methodology and Framework for Analysis

This RIR assesses management measures from the standpoint of determining the resulting changes in costs and benefits to society. To the extent practicable, the net effects of the proposed measures for an existing fishery should be stated in terms of producer and consumer surplus, changes in profits, and employment in the direct and support industries. Where figures are available, they are incorporated into the analysis of the economic impacts of the different actions and alternatives.

## 1.3 Description of the Fishery

A description of the South Atlantic coral, coral reefs, and live/hardbottom habitats is contained in **Chapter 3** of this amendment and is incorporated herein by reference.

## 1.4 Effects of the Management Measures

For the rock shrimp fishery, **Action 1, Sub-Alternative 2a** would be expected to result in the greatest short-term reduction in ex-vessel revenue, $208,410 (2012 dollars), followed by **Preferred Sub-Alternative 2b** ($159,149), and **Preferred Alternative 3** ($30,315) (**Table 4-3**). **Sub-Alternative 2a** would have a greater direct negative economic effect than would **Preferred Sub-Alternative 2b** or **Preferred Alternative 3**. The combined direct short-term negative

economic effect of **Preferred Sub-Alternative 2b** and **Preferred Alternative 3** would be an expected reduction in revenue of $189,464 (2012 dollars). In the short-term, these negative economic effects could be considered moderate. As previously discussed, however, over time, the habitat protected because of **Sub-Alternative 2a**, **Preferred Sub-Alternative 2b**, and **Preferred Alternative 3** would be expected to yield higher biomass of rock shrimp and other species. As a result, these alternatives would be expected to result in a net long-term increase in economic benefits compared to **Alternative 1 (No Action)**. The specific amount of these benefits, however, cannot be determined at this time, but could be reasonably be expected to offset the short-term economic losses resulting in at least a moderate, overall long-term economic benefit.

For the snapper grouper fishery, **Sub-Alternative 2a** would be expected to result in the greatest short-term reduction in ex-vessel revenue, $72,809 (2012 dollars), followed by **Preferred Sub-Alternative 2b** ($42,941), and **Preferred Alternative 3** ($12,672) (**Table 4-7**). **Sub-Alternative 2a** would have a greater direct negative economic effect than would **Preferred Sub-Alternative 2b** or **Preferred Alternative 3**. The combined direct short-term negative economic effect of **Preferred Sub-Alternative 2b** and **Preferred Alternative 3** would be an expected reduction in revenue of $55,613 (2012 dollars). As previously discussed, however, over time, the habitat protected because of **Sub-Alternative 2a**, **Preferred Sub-Alternative 2b**, and **Preferred Alternative 3** would be expected to yield higher biomass of snapper grouper and other species. As a result, these alternatives would be expected to result in a net long-term increase in economic benefits compared to **Alternative 1 (No Action)**. The specific amount of these benefits, however, cannot be determined at this time. Overall, the economic effects of this action on the impacted commercial fisheries are expected to be minor.

**Action 2, Alternative 2** and **Preferred Alternative 3** would allow fishermen to transit the Oculina Bank HAPC, thereby reducing the costs that would occur under **Alternative 1 (No Action)**. Therefore, both **Alternative 2** and **Preferred Alternative 3** would provide moderate positive, direct economic benefits to fishermen because fishermen would be able to use less fuel and take less time to get to their fishing grounds, assuming that stowing their gear is feasible and complying with vessel monitoring system (VMS) regulations are not prohibitive. However, **Preferred Alternative 3** would also require a higher VMS ping rate, which may result in increased costs to purchase a new VMS unit for vessels whose current VMS unit cannot ping at the higher rate. The remaining 57 vessels in the fleet have units that do not need to be replaced, but would incur charges of approximately $150 to $250 per VMS unit to reconfigure or upgrade hardware/software to implement the higher ping rate through the closed area. The total cost of hardware and software upgrades required to allow transit under **Preferred Alternative 3** for all vessels in the fleet is estimated to be $72,890.

The proposed expansions of the Stetson-Miami Terrace Coral Habitat Areas of Particular Concern (CHAPC) under **Action 3** would be expected to result in a minor loss of ex-vessel revenue to the royal red shrimp fleet under **Alternatives 2** and **3**. However, expansion of the Stetson-Miami Terrace CHAPC would be expected to provide additional habitat protection and an associated net increase in economic benefits. **Preferred Alternative 4**, which would allow

for a gear haul back and back drift zone, would not be expected to have any direct short-term economic effects, yet still afford enhanced protection for the Stetson-Miami Terrace CHAPC.

Because the proposed extension of the Cape Lookout CHAPC under **Action 4**, **Preferred Alternative 2** is a relatively small area, the proposed expansion would be expected to have minimal direct negative economic effects particularly on the snapper grouper or other fleets. No information is available on fishing activity specifically in this area. Species from the deepwater complex that tend to prefer this habitat and nearby environments include wreckfish. However, because the affected area is so small and there are other areas nearby where similar fishing activity is allowed, the direct negative economic effects of **Preferred Alternative 2** are expected to be minimal.

## 1.5 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 action include, but are not limited to South Atlantic Council costs of document preparation, meeting, and other costs; NMFS administration costs of document preparation, meetings and review; and annual law enforcement costs. A preliminary estimate is up to $150,000 not including annual law enforcement costs.

## 1.6 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 C. Regulatory Flexibility Act

## 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 fishery management plan (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, objective of, and legal basis for the rule

The need and objective of this proposed action are provided in **Chapter 1**. In summary, the objective of this proposed action is to address recent discoveries of deepwater coral resources and protect deepwater coral ecosystems in the South Atlantic Fishery Management Council's (SAFMC) jurisdiction from activities that could compromise their condition. The Magnuson-Stevens Fishery Conservation and Management Act provides the statutory basis for this proposed action.

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

This proposed action, if implemented, would be expected to directly affect up to 700 vessels that commercially harvest snapper and grouper species and up to 104 vessels that commercially harvest rock shrimp in the affected areas of exclusive economic zone (EEZ) in the South Atlantic. Among the vessels that harvest rock shrimp, an estimated 9 vessels also harvest royal red shrimp. The average vessel involved in commercial snapper-grouper fishing is estimated to earn approximately $28,700 (2012 dollars) in annual gross revenue, and the average vessel involved in rock shrimp fishing is estimated to earn approximately $20,500 (2012 dollars) in annual gross revenue. The average annual gross revenue for vessels that harvest both rock shrimp and royal red shrimp is estimated to be approximately $113,000 (2012 dollars).

No other small entities that would be expected to be directly affected by this proposed action have been identified.

The Small Business Administration (SBA) has established size criteria for all major industry sectors in the U.S. including seafood dealers and harvesters. A business involved in commercial finfish fishing 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 $19.0 million (NAICS code 114111, Finfish Fishing). The receipts threshold for a business involved in shrimp fishing is $5.0 million (NAICS code 114112, Shellfish Fishing). These receipts thresholds are the result of a final rule issued by the SBA on June 20, 2013, and went into effect on July 22, 2013, that increased the size standard for Finfish Fishing from $4.0 million to $19.0 million and the size standard for Shellfish Fishing from $4.0 million to $5.0 million (78 FR 37398). Because the average annual gross revenues for the commercial fishing operations expected to be directly affected by this proposed action are significantly less than the SBA revenue threshold, all these businesses 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 action would not explicitly require any new reporting, record-keeping, or other compliance requirements. However, one component of this proposed action would allow vessel transit through the Oculina Bank Habitat Area of Particular Concern (HAPC) by a vessel with rock shrimp on board if the vessel maintains a minimum speed of not less than five knots, as determined by the ping (signal) rate of the vessel monitoring system (VMS) unit used by the vessel. Older VMS units are not capable of producing the required ping rate and an estimated 22 vessels would be required to purchase a newer unit in order to be able to transit through the Oculina Bank HAPC. Vessels with newer VMS units would also be required to reconfigure or upgrade their VMS hardware/software to generate the higher ping rate. For all vessels, the

communication cost would also increase by an unknown amount depending on the frequency of transit. The purchase and installation of these new units and upgrades, and the decision to transit and incur increased communication costs would be voluntary. The use of VMS units on rock shrimp vessels has been required since 2003. As a result, all affected vessels are expected to have extensive experience using VMS units and are expected to already have captains or crew with the appropriate skills and training to use VMS equipment.

# 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 a substantial number of small entities

**Substantial number criterion**

This proposed action, if implemented, would be expected to directly affect 104 vessels that are permitted to commercially harvest rock shrimp in the South Atlantic EEZ off Florida or Georgia. An additional 113 vessels are permitted to commercially harvest rock shrimp in the South Atlantic EEZ off South Carolina and North Carolina, however, these vessels would not be expected to be directly affected by the proposed action. The 104 commercial rock shrimp vessels that would be expected to directly affected by this proposed action represent approximately 48% of the rock shrimp commercial fleet.

This proposed action would also be expected to potentially affect up to 700 vessels that commercially harvest snapper-grouper species in the South Atlantic EEZ. These 700 vessels represent the entire fleet permitted to commercially harvest snapper-grouper in the South Atlantic EEZ. However, this proposed action would only be expected to reduce the average annual snapper-grouper gross revenue by approximately 0.2%, as discussed below. This minimal effect suggests that this proposed action would affect relatively few vessels and not a significant portion of the snapper-grouper fleet. Nevertheless, it cannot be determined with available data if this proposed action would directly affect a substantial number of the small entities in the commercial snapper-grouper fishing industry.

**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 action are determined for the purpose of this analysis to be small business entities, so the issue of disproportionality does not arise.

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

This proposed action contains four separate actions. The first action would expand the boundaries of the Oculina Bank HAPC. Expansion of the Oculina Bank HAPC would be expected to affect vessels that harvest snapper grouper, rock shrimp, and royal red shrimp. The expected maximum potential reduction in total gross revenue from snapper-grouper species as a result of the proposed expansion of the Oculina Bank HAPC would be approximately $56,000 (2012 dollars), or less than 0.3% of the total average annual revenue from snapper-grouper species. The actual reduction in revenue from snapper-grouper species would be expected to be reduced as fishermen adapt their fishing practices to the expansion of the HAPC and benefit from the enhanced productivity of the protected area.

All vessels that harvest royal red shrimp are expected to also harvest rock shrimp. Royal red shrimp are not managed by the SAFMC although they are subject to regulations on bottom-tending gear. Because royal red shrimp are not managed by the SAFMC, neither logbooks nor VMS units are required to harvest royal red shrimp. As a result, it cannot be determined with available data what portion of the average annual royal red harvest may be affected by the proposed expansion of the Oculina Bank HAPC. However, the primary effect of the proposed expansion of the Oculina Bank HAPC, as identified through public comment during the development of this proposed action and the use of VMS data, would be expected to be on the harvest of rock shrimp and not the harvest of royal red shrimp. This proposed action would be expected to reduce the total revenue from rock shrimp for all potentially affected rock shrimp fishermen (104 vessels) by a maximum of approximately $189,500 (2012 dollars), or approximately 8.5% of the total average annual gross revenue from rock shrimp. Although the revenue from royal red shrimp may also be affected, as discussed above, the average annual gross revenue for vessels harvesting both rock shrimp and royal red shrimp is substantially higher than the average annual gross revenue for vessels that do not harvest royal red shrimp. As a result, the expected economic effects of the proposed expansion of the Oculina Bank HAPC on vessels that harvest royal red shrimp are expected to be minor.

The second action would establish a transit provision through the Oculina Bank HAPC for a vessel with rock shrimp on board. Transit through the Oculina Bank HAPC would require the use of a VMS unit capable of producing a ping (signal) rate sufficient to demonstrate a vessel cruising speed of not less than 5 knots. Vessels that currently use a VMS unit capable of producing this ping rate would be required to spend approximately $200 for hardware or software upgrades to produce this ping rate. Vessels that do not currently use a VMS unit capable of producing this ping rate would be expected to have to incur new expenses of approximately $2,800 to $3,600 for purchase and installation of a new VMS unit and appropriated software. Any vessel transiting the Oculina Bank HAPC would be expected to incur increased communication costs because of the increased communication (ping) rate. The amount of the increased communication cost would depend on how frequently a vessel transits the area. Although these expenses would be required to allow transit through the Oculina Bank HAPC, all of these expenses would be voluntarily incurred because the proposed action would not require that vessels transit the area. Further, the net effect per entity of this proposed action

would be expected to be positive. Transit through the Oculina Bank HAPC would be expected to reduce operating expenses by allowing a vessel to avoid time consuming and costly travel around the area. Revenue may also be increased if a reduction in travel time allows longer fishing. Overall, a fisherman would only decide to incur the increased VMS costs associated with transit if they concluded a net increase in economic benefits, regardless of the source of these benefits. As a result, this proposed action would be expected to have a direct positive economic effect on all affected small entities.

Combined, the expected effects of the proposed expansion of the Oculina Bank HAPC and proposed transit provisions for vessels with rock shrimp on board would be expected to range from a minor short term reduction in the average annual gross revenue from rock shrimp to a net positive economic effect on the average rock shrimp vessel. Although the proposed expansion of the Oculina Bank HAPC would be expected to reduce rock shrimp revenue from this area, the proposed transit provisions would be expected to reduce operating costs and potentially increase rock shrimp revenue by allowing more time to harvest rock shrimp from other areas where permitted. As a result, these two proposed actions would collectively not be expected to have a significant adverse economic effect on a substantial number of small entities.

The third action would expand the boundaries of the Stetson-Miami Terrace Coral Habitat Area of Particular Concern (CHAPC). Fishing for snapper grouper species does not normally occur in this area and fishing for other finfish or golden crab would not be expected to be affected by the proposed expansion of the CHAPC. This action would also allow a gear haul back/drift zone to accommodate the royal red shrimp fishery that occurs in this area. As a result, this proposed action would not be expected to reduce the revenue of any small entities.

The fourth action would expand the boundaries of the Cape Lookout CHAPC. Similar to the proposed expansion of the Stetson-Miami Terrace CHAPC, fishing for snapper-grouper species does not normally occur in this area and fishing for other finfish or golden crab, that occur in this area, would not be expected to be affected. Further, unlike the Stetson-Miami Terrace CHAPC, fishing for royal red shrimp does not occur in the area of proposed expansion of the Cape Lookout CHAPC. As a result, this proposed action would not be expected to reduce the revenue of any small entities.

Based on the discussion above, it is determined that, this proposed action, if implemented, would not be expected to have a significant economic effect on a substantial number of small entities.

## 7 Description of the 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 economic effect on a substantial number of small entities. As a result, the issue of significant alternatives is not relevant.

# Appendix D. Fishery Impact Statement – Social Impact Assessment

The Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) requires a Fishery Impact Statement (FIS) be prepared for all amendments to Fishery Management Plans (FMPs). The FIS contains an assessment of the expected and potential biological, economic, and social 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.

**Actions in Coral Amendment 8**

Amendment 8 to the FMP for Coral, Coral Reefs, and Live/Hard bottom Habitats of the South Atlantic Region (Coral Amendment 8) consists of regulatory actions that focus on deepwater coral ecosystem conservation. Management actions proposed in Coral Amendment 8 include the expansion of several Coral Habitat Areas of Particular Concern (CHAPCs) to increase protections for deepwater coral based on new information of deepwater coral resources in the South Atlantic. An action in the amendment would allow for transit through the Oculina Bank HAPC to provide fishermen access to historical grounds off the eastern boundary of the expanded Oculina Bank HAPC.

**Assessment of Biological Effects**

The proposed management measures are summarized in **Section 2.0**. The South Atlantic Fishery Management Council (South Atlantic Council) has chosen **Sub-Alternative 2b** and **Alternative 3** as preferred alternatives under **Action 1**. Expansion of the northern and western boundary of the Oculina Bank HAPC is expected to have positive biological impacts on the deepwater coral (including *Oculina varicosa*) in these areas as well as the species that utilize these habitats, including rock shrimp. Biological benefits are also expected for snapper grouper species since fishing for snapper grouper species while at anchor or with bottom longline would be prohibited. Expansion of the Oculina Bank HAPC in these areas would protect an additional 343 square miles of deepwater coral habitat from bottom-tending fishing gear.

The South Atlantic Council has selected **Alternative 3** as a preferred under **Action 2**, which would allow for transit through the Oculina Bank HAPC with possession of rock shrimp on board a vessel. Establishing a transit provision through the Oculina Bank HAPC may have negative biological impacts for rock shrimp stocks that are on the eastern side of the HAPC as fishing vessels would be able to access them more easily than they have in the past. Without a transit provision, the trip to those fishing grounds would be long and cost prohibitive to fishermen, providing an indirect protection to those shrimp stocks.

**Alternative 4** is the South Atlantic Council's preferred under **Action 3**. Current gear restrictions within the Stetson-Miami Terrace CHAPC would be extended to incorporate the expansion area identified under **Alternative 4**, which is approximately 490 square miles. The larger the expansion of the Stetson-Miami Terrace CHAPC, the greater the biological benefits to species that occur in this area. The extension of Shrimp Fishery Access Area 1, as identified in the preferred alternative, may encourage fishermen to fish in the area giving a slight negative impact

on the royal red shrimp populations. However, shrimp fisheries would be limited to this historical fishing area and allowed to operate in an area that does not contain deepwater coral habitat.

The South Atlantic Council has selected **Alternative 2** under **Action 4** as preferred, which adds 10 square miles to the existing Cape Lookout CHAPC. The expansion of the CHAPC would benefit deepwater coral ecosystems and has been proposed based on new information of occurrence of deepwater *Lophelia pertusa* corals in the region.

**Assessment of Economic Effects**

Under **Action 1**, various commercial fisheries could experience long-term direct negative effects from potential loss of habitat. The tradeoff for protecting additional habitat under the various alternatives is that the expansion of the Oculina Bank HAPC may result in short-term direct negative economic effects on the rock shrimp and snapper grouper fisheries. For the rock shrimp fishery, **Preferred Sub-Alternative 2b** would be expected to result in a short-term reduction in ex-vessel revenue of $159,149, and **Preferred Alternative 3** would be an expected reduction in revenue of $30,315. Over time, the habitat protected under the preferred alternatives would be expected to yield a higher biomass of rock shrimp and other species. Any inconvenience recreational fishermen may experience from a northern and western proposed expansion of the Oculina Bank HAPC could likely be mitigated by fishing in other areas.

The South Atlantic Council has selected **Alternative 3** as preferred under **Action 2**. **Alternative 2** and **Preferred Alternative 3** would allow fishermen to transit through the Oculina Bank HAPC with possession of rock shrimp on board their vessel, thereby reducing costs they would incur under **Alternative 1 (No Action)**. **Alternative 2** and **Preferred Alternative 3** provide moderate positive, direct economic benefits to fishermen because they would be able to use less fuel and take less time to get to their fishing grounds. Of the 79 vessels that currently have a vessel monitoring system (VMS) unit in the rock shrimp fleet, 22 of those vessels have older units that would need to be upgraded under **Preferred Alternative 3**. Those vessels would have to pay for the installation, maintenance, and increased communications charges associated with having an upgraded VMS. The total cost of hardware and software upgrades required to allow transit under **Preferred Alternative 3** for all vessels in the fleet is estimated to be $72,890.

**Alternative 4** is the South Atlantic Council's preferred under **Action 3**. Under some of the action alternatives, the proposed western extensions of the Stetson-Miami Terrace CHAPC would be expected to result in a minor loss of ex-vessel revenue to the royal red shrimp fleet. **Alternative 2** is expected to result in average annual losses of $1,752. **Alternative 3** would result in expected average annual losses of $557. Like **Alternative 1 (No Action)**, **Preferred Alternative 4** would not be expected to have any direct short-term economic effects.

Under **Action 4**, **Alternative 1** would likely have minimal short-term economic effects because the alternative would maintain access to all current harvest levels. The proposed northern extension of the Cape Lookout CHAPC **(Preferred Alternative 2)** is a relatively small area, and as such, the expansion would be expected to have minimal direct negative economic effects particularly on the snapper grouper or other fleets.

**Assessment of the Social Effects**

For the proposed expansion of closed areas under **Action 1**, the primary communities with the highest regional landings of deepwater shrimp are all in Florida and include Titusville, Mayport, Jacksonville, Cocoa Beach, and Atlantic Beach **(Section 3.4.3)**. Impacts on fishermen and individual businesses due to expansion of closed areas would be expected to occur primarily in these five areas, and community-level impacts would be expected in Titusville, Mayport, and Atlantic Beach, Florida primarily because these communities are more engaged and reliant on commercial fishing, including participation in the royal red and rock shrimp fisheries. **Sub-Alternative 2a**, **Preferred Sub-Alternative 2b**, and **Preferred Alternative 3** would impact the rock shrimp fleet, royal red shrimp fleet, and possibly other commercial fisheries by closing some historic, present, and potential future fishing grounds.

Negative impacts on the fishing vessels and crew may be reduced with a transit provision, as specified under **Action 2**. **Alternative 2** and **Preferred Alternative 3** would be beneficial to shrimp vessels by reducing the risk of negative impacts due to increased travel time and costs when traveling around a closed area to access outer fishing grounds.

The proposed extension of the Stetson-Miami Terrace CHAPC **(Action 3)** without a specified fishing area for the deepwater shrimp fleet **(Alternatives 2** and **3)** could have negative social effects on the royal red and rock shrimp fleet in the future if potential fishing grounds are no longer available. Because **Preferred Alternative 4** would also establish the Shrimp Fishery Access Area based on information of fishing grounds of the royal red shrimp vessels, negative impacts on the deepwater shrimp fleets and associated businesses and communities could be reduced or removed.

**Alternative 1** under **Action 4** would likely have minimal negative social effects because no current or potential fishing grounds would be closed. Because the expansion area as identified under **Preferred Alternative 2** is so small and there are other areas nearby where similar fishing activity will be allowed, the direct negative social effects are expected to be minimal.

**Assessment of the Administrative Effects**

Administrative impacts under each action would be incurred through the rule making process, outreach, and enforcement. It is expected the larger the expansion of the HAPC and CHAPCs as identified under **Actions 1**, **3** and **4,** the more enforcement would be needed. Most of the administrative impacts associated with these action alternatives would relate to at-sea enforcement. Under **Action 2**, if modifications are made to the transit regulations, administrative impacts on the agency would increase. Under **Preferred Alternative 3 (Action 2)**, depending upon vessels' frequency of transit, this might lead to an increase in impacts associated with monitoring by law enforcement.

# Appendix E. Other Applicable Law

## 1.1 Administrative Procedure 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, the National Marine Fisheries Service (NMFS) 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, with some exceptions. Amendment 8 to the Fishery Management Plan for Coral, Coral Reefs, and Live/Hard bottom Habitats of the South Atlantic Region (Coral Amendment 8) complies with the provisions of the APA through the South Atlantic Fishery Management Council's (South Atlantic Council) extensive use of public meetings, requests for comments, and consideration of comments. The proposed rule associated with this amendment will have a request for public comments which complies with the APA, and upon publication of the final rule, there will be a 30-day wait period before the regulations are effective.

## 1.2 Information Quality Act (IQA)

The IQA (Section 515 of the Treasury and General Government Appropriations Act for Fiscal Year 2001 (Public Law 106-443)) which took effect October 1, 2002, directed the Office of Management and Budget (OMB) to issue government-wide guidelines that "provide policy and procedural guidelines to federal agencies for ensuring and maximizing the quality, objectivity, utility, and integrity of information disseminated by federal agencies." OMB directed each federal agency to issue its own guidelines, establish administrative mechanisms allowing affected persons to seek and obtain correction of information that does not comply with OMB guidelines, and report periodically to OMB on the number and nature of complaints. The NOAA Section 515 Information Quality Guidelines require a series of actions for each new information product subject to the IQA. Coral Amendment 8 has used the best available information and made a broad presentation thereof. The information contained in this document was developed using best available scientific information. Therefore, this document is in compliance with the IQA.

## 1.3 Coastal Zone Management Act (CZMA)

Section 307(c)(1) of the federal CZMA of 1972 requires that all federal activities that directly affect the coastal zone be consistent with approved state coastal zone management programs to the maximum extent practicable. The South Atlantic Council, in cooperation with the Mid-Atlantic Fishery Management Council and the New England Fishery Management Council, is responsible for conservation and management of dolphin and wahoo in federal waters off the Atlantic states. While it is the goal of the South Atlantic Council to have management measures that complement those of the states, federal and state administrative procedures vary and regulatory changes are unlikely to be fully instituted at the same time. Based on the analysis of the environmental consequences of the proposed actions in **Section 4**, the South Atlantic Council believes this document is consistent to the maximum extent practicable with the Coastal Zone Management Plans of North Carolina, South Carolina,

Georgia, and east Florida to Key West. This determination will be submitted to the responsible state agencies under Section 307 of the CZMA administering approved Coastal Zone Management Programs in the states mentioned above.

### 1.4 Endangered Species Act (ESA)

The ESA of 1973 (16 U.S.C. Section 1531 et seq.) requires that federal agencies must 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 NMFS 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. They conclude informally when proposed actions may affect but are "not likely to adversely affect" threatened or endangered 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" threatened or endangered species or adversely modify designated critical habitat.

Coral Amendment 8 proposes provide protection to deepwater coral species by expanding the size of existing coral habitat areas of particular concern where the use of all bottom tending gear would be prohibited. Therefore, actions proposed in this amendment are not expected to have impacts on threatened or endangered species or their habitat designated as critical to their survival and recovery.

### 1.5 Executive Order 12612: Federalism

E.O. 12612 requires agencies to be guided by the fundamental federalism principles when formulating and implementing policies that have federalism implications. The purpose of the Order is to guarantee the division of governmental responsibilities between the federal government and the states, as intended by the framers of the Constitution. No federalism issues have been identified relative to the actions proposed in this document and associated regulations. Therefore, preparation of a Federalism assessment under E.O. 13132 is not necessary.

### 1.6 Executive Order 12866: Regulatory Planning and Review

E.O. 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, NMFS prepares a Regulatory Impact Review (RIR) for all fishery regulatory actions that implement a new fishery management plan (FMP) or that significantly amend an existing plan. RIRs 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 Regulatory Flexibility Act (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 if it has other major economic effects.

In accordance with E.O. 12866, the following is set forth by the South Atlantic Council: (1) this rule is not likely to have an annual effect on the economy of more than $100 million or to adversely affect in a material way the economy, a sector of the economy, productivity, jobs, the environment, public health or safety, or state, local, or tribal governments or communities; (2) this rule is not likely to create any serious inconsistencies or otherwise interfere with any action taken or planned by another agency; (3) this rule is not likely to materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights or obligations of recipients thereof; (4) this rule is not likely to raise novel or policy issues arising out of legal mandates, or the principles set forth in the Executive Order; and (5) this rule is not controversial.

This amendment includes the RIR as **Appendix B**.

### 1.7 Executive Order 12898: Environmental Justice

E.O. 12898 requires that "to the greatest extent practicable and permitted by law…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…"

While some communities expected to be affected by this proposed amendment may have minority or economic profiles that exceed the Environmental Justive (EJ) thresholds and, therefore, may constitute areas of concern, significant EJ issues are not expected to arise as a result of this proposed amendment. No adverse human health or environmental effects are expected to accrue to this proposed amendment, nor are these measures expected to result in increased risk of exposure of affected individuals to adverse health hazards. The proposed management measures would apply to all participants in the affected area, regardless of minority status or income level, and information is not available to suggest that minorities or lower income persons are, on average, more dependent on the affected species than non-minority or higher income persons. A detailed description of the communities impacted by the actions contained in this document and potential socioeconomic impacts of those actions are contained in **Sections 3.0** and **4.0** of this document.

### 1.8 Executive Order 12962: Recreational Fisheries

E.O. 12962 requires federal agencies, in cooperation with states and tribes, to improve the quantity, function, sustainable productivity, and distribution of U.S. aquatic resources for increased recreational fishing opportunities through a variety of methods including but not limited to developing joint partnerships; pr0omoting the restoration of recreational fishing areas that are limited by water quality and habitat degradation; fostering sound aquatic conservation and restoration endeavors; and evaluating the effects of federally-funded, permitte, or authorized actions on aquatic systems and recreational fisheries, and documenting those effects. Additionally, the Order establishes a seven-member National Recreational Fisheries Coordination Council responsible for, among other things,

ensuring that social and economic values of healthy aquatic systems that support recreational fisheries are considered by federal agencies in the course of their actions, sharing the latest resource information and management technologies, and reducing duplicative and cost-inefficient programs among federal agencies involved in conserving or managing recreational fisheries. The National Recreational Fisheries Coordination Council also is responsible for developing, in cooperation with federal agencies, states and tribes, a Recreational Fishery Resource Conservation Plan - to include a five-year agenda. Finally, the Order requires NMFS and the U.S. Fish and Wildlife Service to develop a joint agency policy for administering the ESA.

The alternatives considered in this amendment are consistent with the directives of E.O. 12962.

### 1.9 Executive Order 13089: Coral Reef Protection

E.O. 13089, signed by President William Clinton on June 11, 1998, recognizes the ecological, social, and economic values provided by the Nation's coral reefs and ensures that federal agencies are protecting these ecosystems. More specifically, the Order requires federal agencies to identify actions that may harm U.S. coral reef ecosystems, to utilize their program and authorities to protect and enhance the conditions of such ecosystems, and to ensure that their actions do not degrade the condition of the coral reef ecosystem.

The alternatives considered in this amendment are consistent with the directives of E.O. 13089.

### 1.10 Executive Order 13158: Marine Protected Areas (MPAs)

E.O. 13158 was signed on May 26, 2000, to strengthen the protection of U.S. ocean and coastal resources through the use of MPAs. The E.O. defined MPAs as "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 and cultural resources therein". It directs federal agencies to work closely with state, local, and non-governmental partners to create a comprehensive network of MPAs "representing diverse U.S. marine ecosystems, and the Nation's natural and cultural resources".

The alternatives considered in this amendment are consistent with the directives of E.O. 13158.

### 1.11 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 NMFS) 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. Part of the responsibility that NMFS has under the MMPA involves monitoring populations of marine mammals to make sure that they stay at optimum levels. If a population falls below its optimum level, it is designated as "depleted". A conservation plan is then developed to guide research and management actions to restore the population to healthy levels.

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.

Under the MMPA, to legally fish in a Category I and/or II fishery, a fisherman must take certain steps. For example, owners of vessels or gear engaging in a Category I or II fishery, are automatically registered for the Marine Mammal Authorization Program and are required by law to carry a current Authorization Certificate on board their vessel or person when participating in the listed fishery. Fishermen are also required to accommodate an observer if requested (50 CFR 229.7(c)) and must comply with any applicable take reduction plans. Furthermore, all fishermen (regardless of fishery category) must report any incidental mortality or injury to a marine mammal during commercial fishing activities within 48 hours of the fishing trip.

The actions in this EA are related to the coral, coral reef, and live/hard bottom fishery of the South Atlantic, and are not expected to negatively impact the provisions of the MMPA.

### 1.12 Migratory Bird Treaty Act (MBTA) and Executive Order 13186

The MBTA implemented several bilateral treaties for bird conservation between the United States and Great Britain, the United States and Mexico, the United States and Japan, and the United States and the former Union of Soviet Socialists Republics. Under the MBTA, it is unlawful to pursue, hunt, take, capture, kill, possess, trade, or transport any migratory bird, or any part, nest, or egg of a migratory bird, included in bilateral treaties, except as permitted by regulations issued by the Department of the Interior (16 U.S.C. 703-712). Violations of the MBTA carry criminal penalties. Any equipment and means of transportation used in activities in violation of the MBTA may be seized by the United States government and, upon conviction, must be forfeited to it.

Executive Order 13186 directs each federal agency taking actions that have, or are likely to have, a measurable negative effect on migratory bird populations to develop and implement a memorandum of understanding (MOU) with the U.S. Fish and Wildlife Service (USFWS) to conserve those bird populations. In the instance of unintentional take of migratory birds, NMFS would develop and use principles, standards, and practices that will lessen the amount of unintentional take in cooperation with the USFWS. Additionally, the MOU would ensure that NEPA analyses evaluate the effects of actions and agency plans on migratory birds, with emphasis on species of concern.

An MOU was signed on August 15, 2012, which addresses the incidental take of migratory birds in commercial fisheries under the jurisdiction of NMFS. NMFS must monitor, report, and take steps to reduce the incidental take of seabirds that occurs in fishing operations. The United States has already

developed the U.S. National Plan of Action for Reducing Incidental Catch of Seabirds in Longline Fisheries. Under that plan many potential MOU components are already being implemented.

The alternatives considered in this amendment are consistent with the directives of E.O. 13186.

### 1.13 National Environmental Policy Act (NEPA)

This document has been written and organized in a manner that meets NEPA requirements, and thus is a consolidated NEPA document, including an EA, as described in NOAA Administrative Order (NAO) 216- 6, Section 6.03.a.2.

Purpose and Need for Action

The purpose and need for this action are described in **Section 1.4.**

Alternatives

The alternatives for this action are described in **Chapter 2.**

Affected Environment

The affected environment is described in **Chapter 3**.

Impacts of the Alternatives

The impacts of the alternatives on the environment are described in **Chapter 4.**

### 1.14 National Marine Sanctuaries Act (NMSA)

Under the NMSA (also known as Title III of the Marine Protection, Research and Sanctuaries Act of 1972), as amended, the U.S. 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. The National Marine Sanctuary Program is administered by the Sanctuaries and Reserves Division of NOAA. The NMSA provides authority for comprehensive and coordinated conservation and management of these marine areas. The National Marine Sanctuary Program 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. The three sanctuaries in the South Atlantic exclusive economic zone are the USS Monitor, Gray's Reef, and Florida Keys National Marine Sanctuaries.

The alternatives considered in this amendment are not expected to have any adverse impacts on the resources managed by the National Marine Sanctuaries.

### 1.15 Paperwork Reduction Act (PRA)

The purpose of the PRA is to minimize the burden on the public. The PRA is intended to ensure that the information collected under the proposed action is needed and is collected in an efficient manner (44 U.S.C. 3501 (1)). The authority to manage information collection and record keeping requirements is vested with the Director of the Office of Management and Budget (OMB). This authority encompasses establishment of guidelines and policies, approval of information collection requests, and reduction of paperwork burdens and duplications. The PRA requires NMFS to obtain approval from the OMB before requesting most types of fishery information from the public.

Actions in this amendment are not expected to affect PRA since no data collection programs are included.

### 1.16 Regulatory Flexibility Act (RFA)

The RFA of 1980 (5 U.S.C. 601 et seq.) requires federal agencies to assess the impacts of regulatory actions implemented through notice and comment rulemaking procedures on small businesses, small organizations, and small governmental entities, with the goal of minimizing adverse impacts of burdensome regulations and record-keeping requirements on those entities. Under the RFA, NMFS must determine whether a proposed fishery regulation would have a significant economic impact on a substantial number of small entities. If not, a certification to this effect must be prepared and submitted to the Chief Counsel for Advocacy of the Small Business Administration. Alternatively, if a regulation is determined to significantly impact a substantial number of small entities, the RFA requires the agency to prepare an initial and final Regulatory Flexibility Analysis to accompany the proposed and final rule, respectively. These analyses, which describe the type and number of small businesses affected, the nature and size of the impacts, and alternatives that minimize these impacts while accomplishing stated objectives, must be published in the *Federal Register* in full or in summary for public comment and submitted to the chief counsel for advocacy of the Small Business Administration. Changes to the RFA in June 1996 enable small entities to seek court review of an agency's compliance with the RFA's provisions.

As NMFS has determined whether a proposed fishery regulation would have a significant economic impact on a substantial number of small entities, a certification to this effect will be prepared and submitted to the Chief Counsel for Advocacy of the Small Business Administration.

This amendment includes the RFA as **Appendix C**.

### 1.17 Small Business Act (SBA)

Enacted in 1953, the SBA requires that agencies assist and protect small-business interests to the extent possible to preserve free competitive enterprise. The objectives of the SBA 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 firms achieve competitive viability. Because most businesses associated with fishing are considered small businesses, NMFS, in implementing regulations, must make an assessment of how those regulations will affect small businesses.

### 1.18 Public Law 99-659: Vessel Safety

Public Law 99-659 amended the MSFCMA to require that a FMP or FMP amendment must consider, and may provide for, temporary adjustments (after consultation with the U.S. Coast Guard and persons utilizing the fishery) regarding access to a fishery for vessels that would be otherwise prevented from participating in the fishery because of safety concerns related to weather or to other ocean conditions.

No vessel would be forced to participate in South Atlantic fisheries under adverse weather or ocean conditions as a result of the imposition of management regulations proposed in this amendment. No concerns have been raised by fishermen or by the U.S. Coast Guard that the proposed management measures directly or indirectly pose a hazard to crew or vessel safety under adverse weather or ocean conditions.

# Appendix F. Other Things to Consider

**Unavoidable Adverse Effects**
The regulatory actions proposed in Amendment 8 to the Fishery Management Plan for Coral, Coral Reefs, and Live/Hard bottom Habitats of the South Atlantic Region would apply primarily to the rock shrimp and deepwater shrimp fisheries of the South Atlantic. There are no unavoidable adverse effects expected through the implementation of these actions.

**Effects of the Fishery on the Environment**
The biological impacts of the proposed actions are described in Section 4.0, including impacts on habitat. No actions proposed by this amendment are expected to have any adverse impacts on Essential Fish Habitat (EFH) or EFH-Habitat Areas of Particular Concern (HAPC) for managed species. This amendment would modify the size of HAPCs to protect deepwater coral ecosystems, and allow deepwater shrimp vessels to transit the Oculina Bank HAPC.

**Effects on Ocean and Coastal Habitats**
The alternatives proposed by this amendment are not expected to have any adverse effect on the ocean and coastal habitat.

**Public Health and Safety**
The proposed actions are not expected to have any substantial adverse impact on public health or safety.

**Endangered Species and Marine Mammals**
The proposed actions are not expected to change the level of marine mammal or endangered species impacts from the status quo.

**Relationship of Short-Term Uses and Long-Term Productivity**
The actions in this amendment would not have an impact on the short term relationship between short-term uses and long-term productivity. The proposed management measures would protect areas known or presumed to contain deepwater corals. The actions may impact the rock shrimp fishery, the royal red fishery, and the snapper-grouper fishery; however the impacts on fishing effort is minimal.

**Irreversible and Irretrievable Commitments of Resources**
Irreversible commitments are defined as commitments which cannot be reversed, except perhaps in the extreme long-term, whereas irretrievable commitments are lost for a period of time. None of the actions proposed by this amendment would result in irreversible or irretrievable commitments of resources.

**Monitoring and Mitigation Measures**
Expanding the size of habitat areas of particular concern may require more enforcement and monitoring. However, the action that would allow for transit through the Oculina Bank HAPC

will require an increase in ping rate from the required vessel monitoring system on rock shrimp vessels.

**Unavailable or Incomplete Information**

The Council on Environmental Quality, in implementing regulations for the National Environmental Policy Act, the Council on Environmental Quality addressed incomplete or unavailable information at 40 CFR 1502.22 (a) and (b). That direction has been considered. There are two tests to be applied: (1) does the incomplete or unavailable information involve "reasonable foreseeable adverse effects…;" and (2) is the information about these effects "essential to a reasoned choice among alternatives…".

The actions and alternatives considered in this amendment are based on studies of deepwater corals in the South Atlantic and are included in the Appendices.

# Appendix G. Bycatch Practicability Analysis

## Population Effects for the Bycatch Species

### Background

Actions in Amendment 8 to the Fishery Management Plan for Coral, Coral Reefs, and Live/Hardbottom Habitats of the South Atlantic Region (Coral FMP) address modifications to three Habitat Areas of Particular Concern (HAPC) in the South Atlantic, and transit through the Oculina Bank HAPC. Within the HAPCs, prohibited gear includes bottom longline, trawl, dredge, pot or trap as well as the use of an anchor, anchor and chain, or grapple and chain. Actions 1, 3, and 4 would extend these gear prohibitions to expansions of the Oculina Bank HAPC, Stetson-Miami Terrace Coral HAPC (CHAPC), and the Cape Lookout CHAPC. Therefore, as the size of these HAPCs is increased, the biological benefits would increase for coral, species that use the bottom substrate as habitat, and shrimp. Increasing the size of the HAPC may provide a refuge for other important species in the area, such as snapper grouper species by prohibiting bottom longline activity as well as anchoring. The actions would have a positive impact on reducing the potential for bycatch interactions to the degree it reduces interaction of gear, habitat, and deepwater species that may be directly or indirectly affected by habitat damage or unintended capture. Transit through the Oculina Bank HAPC (Action 2) is expected to provide socio-economic benefits, and enhance safety at sea for fishermen targeting rock shrimp on the eastern side of the Oculina Bank HAPC.

Detailed descriptions of the proposed HAPC expansions are provided in reports developed by Reed (2011) and Brooke and Ross (2012) (**Appendices J-L**). Some commercially valuable deepwater species congregate around deepwater coral habitat**.** Various crabs, especially galatheoids, are abundant on the deep reefs. Other invertebrates, particularly ophiuroids, populate the coral matrix in high numbers. Although the measures in the amendment would only modify the Coral FMP, it sets in place provisions that would have slight impacts on the shrimp and snapper grouper fisheries. The golden crab fishery operates within allowable gear areas, which are not located in the proposed HAPC expansions in Actions 1, 3, and 4. These activities would not have a direct biological impact on dolphin, wahoo, or coastal migratory pelagic species as fishing for these species does not impact bottom habitat, and would still be allowed in the expanded area.

The rock shrimp fishery is known to operate in the proposed Oculina Bank HAPC expansion area (Action 1), and royal red shrimp are targeted in the vicinity of Stetson-Miami Terrace CHAPC. Fishing for deepwater shrimp species does not occur within the proposed HAPC expansion area for Action 3. The prohibition of bottom tending gear in the proposed HAPC expansion areas is expected to provide biological benefits to coral and shrimp species, as well as reduce bycatch.

The royal red fleet utilizes the same vessels and gear as that used to target rock shrimp. In addition, many rock shrimp fishermen also participate part-time to target royal red shrimp. South Atlantic royal red shrimp are caught in the U.S. exclusive economic zone in depths from 1,080 to 1,260 feet (330 - 380 meters) (W. Moore, personal communication) to just over 1,320

feet (400 meters) (M. Solorzano, personal communication). Elsewhere, reported depth for targeted royal red shrimp ranges from 800 feet to more than 1,800 feet (250-550 meters) (Perry and Larson 2004, Rezak et al. 1985, Alabama Sea Grant 1987). Because of the depths in which royal red shrimp are caught, no Turtle Excluder Devices (TEDs) or Bycatch Reduction Devices (BRDs) are required off the east coast of Florida.

No observer trips or bycatch study exists pertaining to bycatch in the royal red shrimp sector; however, there are some bycatch data for the rock shrimp sector from a report of the National Marine Fisheries Service (NMFS) observer study conducted during September 2001 through September 2006 (NMFS 2007). The main findings in this report are:

1. Rock shrimp comprised 19% of the catch by weight and 28% by number.
2. Penaeid shrimp comprised 4% of the catch by weight and 3% by number.
3. Finfish comprised 49% of the catch by weight and 30% of the catch by number.

Little is known about the status of finfish (e.g., dusky flounder, inshore lizardfish, spot, and red goatfish) and invertebrate (e.g., iridescent swimming crab, longspine swimming crab, and blotched swimming crab) species present in rock shrimp trawl bycatch in the greatest numbers. None of these species have undergone (or are likely to undergo) formal stock assessments because most, with the exception of spot, are not targeted in commercial or recreational fisheries. Data are inadequate to conduct a formal, coast-wide assessment of spot. However, fishery managers believe a combination of BRD and minimum size limit requirements is sufficient to protect this stock until such an assessment can be completed (SAFMC 2010).

Although some variability in fish fauna has been observed in the region, most of the deepwater coral habitat is dominated by relatively few fish species**.** Some recreational and commercial fishing for snapper grouper species is taking place in the proposed HAPC expansion areas; however, the level of harvest is minimal (See **Section 4.0** of Coral Amendment 8). Bottom longline is one of the gear types used to target snapper grouper species but it generally occurs in shallower water than proposed HAPC expansions. The prohibition on the use of bottom longline gear within the proposed HAPCs would be expected to provide biological benefits to bottom dwelling species.

Regulations require participants in the South Atlantic snapper grouper commercial sector, who are selected by the Science and Research Director (SRD), to maintain and submit a fishing record on forms provided by the SRD. The same logbook is required for fishermen in the coastal migratory pelagics, and dolphin and wahoo fisheries. These fishermen are also required to submit logbooks with trip and effort information. Currently, discard data are collected using a supplemental form that is sent to a 20% stratified random sample of the active permit holders in these fisheries. The South Atlantic Fishery Management Council (South Atlantic Council) is developing an amendment that would consider a requirement for electronic logbooks to improve the accuracy of these data.

### Practicability of Management Measures in Directed Fisheries Relative to their Impact on Bycatch and Bycatch Mortality

Management measures proposed in Amendment 8 to the Coral FMP (Coral Amendment 8) would expand the existing HAPCs to provide additional protection for deepwater corals.

Currently, there is likely very little bycatch within the proposed areas since there is only a small amount of fishing currently taking place. The proposed actions in the amendment would minimize any future bycatch in the proposed CHAPCs by: prohibiting use of bottom longline, trawls (mid-water and bottom), dredge, pot or trap; use of anchor and chain, or use a grapple and chain; and prohibiting possession of any species regulated by the Coral FMP.

### Ecological Effects Due to Changes in Bycatch

The ecological effects of bycatch mortality are the same as fishing mortality from directed fishing efforts. If not properly managed and accounted for, either form of mortality could potentially reduce stock biomass to an unsustainable level. Currently, there is probably very little bycatch within the proposed HAPC expansion areas since there is not much fishing taking place there. The proposed actions in Coral Amendment 8 would minimize any future bycatch in the proposed in the HAPC expansion areas by: Prohibiting use of bottom longline, trawls (mid-water and bottom), dredge, pot or trap; prohibit use of anchor and chain, or use a grapple and chain; and prohibiting possession of any species regulated by the Coral FMP. Therefore, expansion of the HAPCs would likely result in positive ecological benefits in the community structure and species diversity of deepwater ecosystems occupied by these species.

The South Atlantic Council and NMFS are in the process of developing actions that would improve bycatch monitoring in all fisheries. For example, the Joint South Atlantic/Gulf of Mexico Generic Charter/Headboat Reporting in the South Atlantic Amendment (Charter/Headboat Amendment), which has been approved by the South Atlantic Council, includes an action that would require weekly electronic reporting of landings and bycatch data for headboats in the South Atlantic. The Gulf of Mexico Fishery Management Council and the South Atlantic Council are developing an amendment that would require electronic reporting of logbook data, which would include landed and discarded fish. Better bycatch and discard data would provide a better understanding of the composition and magnitude of catch and bycatch, enhance the quality of data provided for stock assessments, increase the quality of assessment output, provide better estimates of interactions with protected species, and lead to better decisions regarding additional measures to reduce bycatch. Management measures that affect gear and effort for a target species can influence fishing mortality in other species. Therefore, enhanced catch and bycatch monitoring would provide better data that could be used in multi-species assessments.

### Changes in Bycatch of Other Fish Species and Resulting Population and Ecosystem Effects

The expansion of existing HAPCs along with actions to: Prohibit use of bottom longline, trawls (mid-water and bottom), dredge, pot or trap; use of anchor and chain, or use a grapple and chain; and prohibit possession of any species regulated by the Coral FMP are intended to preserve pristine areas from habitat damage. These proposed actions would prevent fisheries from expanding into the proposed areas along with associated bycatch. Therefore, the actions in Coral Amendment 8 would likely result in long-term, positive ecological benefits and prevent disruptive changes that could occur in the community structure of coral reef ecosystems.

**Effects on Marine Mammals and Birds**

Under Section 118 of the Marine Mammal Protection Act (MMPA), NMFS must publish, at least annually, a List of Fisheries (LOF) that places all U.S. commercial fisheries into one of three categories based on the level of incidental serious injury and mortality of marine mammals that occurs in each fishery. Of the gear utilized within the snapper grouper fishery, only the black sea bass pot, which is used far inshore of the proposed HAPC expansion areas, is considered to pose an entanglement risk to marine mammals. The southeast U.S. Atlantic black sea bass pot sector is included in the grouping of the Atlantic mixed species trap/pot fisheries, which the 2013 LOF classifies as a Category II (78 FR 53336, August 29, 2013). Gear types used in these sectors are determined to have occasional incidental mortality and serious injury of marine mammals. For the South Atlantic snapper grouper fishery, the best available data on protected species interactions are from the Southeast Fisheries Science Center (SEFSC) Supplementary Discard Data Program (SDDP) initiated in July 2001. The SDDP sub-samples 20% of the vessels with an active permit. Since August 2001, only three interactions with marine mammals have been documented; each was taken by handline gear and each released alive (McCarthy SEFSC database).

Although the black sea bass pot sector can pose an entanglement risk to large whales due to their distribution and occurrence, sperm, fin, sei, and blue whales are unlikely to overlap with the black sea bass pot sector operated within the snapper grouper fishery since it is executed primarily off North Carolina and South Carolina in waters ranging from 70-120 feet deep (21.3-36.6 meters). However, the risk to protected species has likely been reduced with the implementation of Amendment 18A to the FMP for the Snapper Grouper Fishery of the South Atlantic Region, which established 32 black sea bass pot endorsements, limited the number of pots that can be fished to 35, and required that pots be returned to shore at the conclusion of a trip. There are no known interactions between the black sea bass pot sector and large whales. NMFS' biological opinion on the continued operation of the South Atlantic snapper grouper fishery determined the possible adverse effects resulting from the fishery are extremely unlikely. The longline and hook-and-line gear components of the snapper grouper fishery in the South Atlantic are classified in the 2013 LOF (78 FR 53336, August 29, 2013) as Category III fisheries. Category III designates fisheries with a remote likelihood or no known serious injuries or mortalities.

Under the LOF the Southeastern U.S. Atlantic and Gulf of Mexico shrimp trawl fishery is listed as a Category II fishery (78 FR 53336, August 29, 2013). It is categorized as such, based on observer reports, stranding data, and fisheries research data indicating that interactions are occurring, with multiple strategic and non-strategic marine mammal stocks. In lieu of more complete data on the potential impacts to marine mammals, NMFS classified the fishery as a Category II fishery based on a qualitative analysis. Even with low observer coverage, NMFS observed 12 dolphin takes (of which 11 were serious injuries or mortalities) since 1993; 11 of which were taken since 2002. Further, Marine Mammal Authorization Program records list 1 dolphin take in shrimp trawl gear in South Carolina in 2002.

The Bermuda petrel and roseate tern occur within the action area. Bermuda petrels are occasionally seen in the waters of the Gulf Stream off the coasts of North and South Carolina during the summer. Sightings are considered rare and only occurring in low numbers (Alsop

2001). Roseate terns occur widely along the Atlantic coast during the summer but in the southeast region they are found mainly off the Florida Keys (unpublished USFWS data). Interaction with South Atlantic fisheries has not been reported as a concern for either of these species.

### Changes in Fishing, Processing, Disposal, and Marketing Costs

Detailed descriptions of any expected changes associated with fishing, processing, disposal, and marketing costs are contained in **Section 4.0**. The actions contained within this amendment are expected to serve as greater protections of fragile deepwater coral species through expansions of existing HAPCs. The expansions could have small negative economic impacts on fishermen who utilize these areas. Action 2 of Coral Amendment 8 would allow transit of the Oculina HACP, which would be expected to provide socio-economic benefits, and enhance safety at sea for fishermen targeting rock shrimp on the eastern side of the Oculina HAPC.

### Changes in Fishing Practices and Behavior of Fishermen

The proposed expansions of the HAPCs would be expected to have a small effect on the rock shrimp fleet, royal red shrimp fleet, and possibly other commercial fisheries by closing some historic, present, and potential future fishing grounds. Establishment of a transit provision through the Oculina HAPC is expected have a positive effect on shrimp operations as fishermen would not need to travel around the larger Oculina HAPC when fishing on the eastern side of this feature. Furthermore, fishermen would be able to more easily return to port when poor weather conditions effect vessel safety.

### Changes in Research, Administration, and Enforcement Costs and Management Effectiveness

The actions in Coral Amendment 8 would affect some measure of change in research, administration, and enforcement costs and management effectiveness. See **Chapter 4** of each amendment for more details. Research is ongoing to discover additional areas of deepwater coral (**Appendices J-L**), and the South Atlantic Council has been very active in providing protection for these areas. Furthermore, in July 2013, the Chairmen of the South Atlantic Council, Mid-Atlantic Fishery Management Council, and New England Fishery Management Council signed a Memorandum of Understanding (MOU) to help coordinate the protection of deepsea corals off the east coast of the United States from Maine to eastern Florida. The MOU identifies areas of consensus and strategies to promote more effective coordination of deepsea coral conservation efforts among the Councils.

Research and monitoring is ongoing to understand the effectiveness of proposed management measures and their effect on bycatch of various fisheries. In 1990, the SEFSC initiated a logbook program for vessels with federal permits in the snapper grouper fishery from the Gulf of Mexico and South Atlantic, and the same logbook program is required for use by commercial fishermen targeting coastal migratory peglagic species as well as dolphin and wahoo. Approximately 20% of commercial fishermen from snapper grouper, dolphin wahoo, and coastal migratory pelagic fisheries are asked to fill out discard information in logbooks; however, a greater percentage of fishermen could be selected with emphasis on individuals that dominate landings. Recreational discards are obtained from the Marine Recreational Information Program and logbooks from the NMFS headboat program.

The preferred alternative in Charter/Headboat Amendment, which has been approved by the South Atlantic Council, would require electronic reporting for headboats and increase the frequency of reporting to seven days for the snapper grouper, dolphin wahoo, and coastal migratory pelagic fisheries in the Atlantic. Some observer information for the snapper grouper fishery has been provided by the SEFSC, Marine Fisheries Initiative, and Cooperative Research Programs (CRP), but more is desired for the snapper grouper, dolphin wahoo, reef fish, and coastal migratory pelagics fisheries. An observer program is in place for headboats in the southeast for the snapper grouper, reef fish, dolphin wahoo, and coastal migratory pelagics fisheries. Observers in the NMFS Headboat survey collect information about numbers and total weight of individual species caught, total number of passengers, total number of anglers, location fished (identified to a 10 mile by 10 mile grid), trip duration (half, ¾, full or multiday trip), species caught, and numbers of released fish with their disposition (dead or alive). The headboat survey does not collect information on encounters with protected species. At the September 2012 South Atlantic Council meeting, the SEFSC indicates that observers are place on about 2% of the headboat trips out of South Carolina to Florida, and about 9% of the headboat trips out of North Carolina (http://www.safmc.net/LinkClick.aspx?fileticket=XGaVZzxLePY%3d&tabid=745).

Cooperative research projects between science and industry are being used to a limited extent to collect bycatch information from fisheries in the Gulf and South Atlantic. Research funds for observer programs, as well as gear testing and testing of electronic devices are also available each year in the form of grants from the Marine Fisheries Initiative, Saltonstall-Kennedy program, and the CRP. Efforts are made to emphasize the need for observer and logbook data in requests for proposals issued by granting agencies. A condition of funding for these projects is that data are made available to the Councils and NMFS upon completion of a study.

Stranding networks have been established in the Southeast Region. The NMFS SEFSC is the base for the Southeast United States Marine Mammal Stranding Program (http://sero.nmfs.noaa.gov/pr/strandings.htm). NMFS authorizes organizations and volunteers under the MMPA to respond to marine mammal strandings throughout the United States. These organizations form the stranding network whose participants are trained to respond to, and collect samples from live and dead marine mammals that strand along southeastern United State beaches. The SEFSC is responsible for: coordinating stranding events; monitoring stranding rates; monitoring human caused mortalities; maintaining a stranding database for the southeast region; and conducting investigations to determine the cause of unusual stranding events including mass strandings and mass mortalities (http://www.sefsc.noaa.gov/species/mammals/strandings.htm).

The Southeast Regional Office and the SEFSC participate in a wide range of training and outreach activities to communicate bycatch related issues. The NMFS Southeast Regional Office issues public announcements, Southeast Fishery Bulletins, or News Releases on different topics, including use of turtle exclusion devices, bycatch reduction devices, use of methods and devices to minimize harm to turtles and sawfish, information intended to reduce harm and interactions with marine mammals, and other methods to reduce bycatch for the convenience of constituents in the southern United States. These are mailed out to various organizations, government entities, commercial interests and recreational groups. This information is also

included in newsletters and publications that are produced by NMFS and the various regional fishery management councils. Announcements and news released are also available on the internet and broadcasted over NOAA weather radio.

Additional administrative and enforcement efforts would help to implement and enforce fishery regulations. NMFS established the South East Fishery-Independent Survey in 2010 to strengthen fishery-independent sampling efforts in southeast U.S. waters, addressing both immediate and long-term fishery-independent data needs, with an overarching goal of improving fishery-independent data utility for stock assessments. Meeting these data needs is critical to improving scientific advice to the management process, ensuring overfishing does not occur, and successfully rebuilding overfished stocks on schedule.

### Changes in the Economic, Social, or Cultural Value of Fishing Activities and Non-Consumptive Uses of Fishery Resources

The preferred management measures, and any changes in economic, social, or cultural values are discussed in **Section 4.0** of Coral Amendment 8.

### Changes in the Distribution of Benefits and Costs

The actions contained within this amendment are expected to serve as greater protections of fragile deepwater coral species; however, very little fishing is currently taking place in the proposed HAPC expansion areas. Coral Amendment 8 also includes an action to allow for transit of the Oculina HAPC, which would be expected to provide socio-economic benefits for rock shrimp fishermen and address safety at sea concerns. Therefore, little change is expected in the distribution of costs associated with the proposed action in Coral Amendment 8. Discussion associated displacement effects, costs, and benefits associated with various alternatives for vessels that would normally fish in the proposed expansion areas are described in **Section 4.0**.

### Social Effects

The Social Effects of all the proposed management measures are described in **Section 4.0**.

### Conclusion

This section evaluates the practicability of taking additional action to minimize bycatch and bycatch mortality using the ten factors provided at 50 CFR 600.350(d)(3)(i). Actions in this bycatch practicability analysis are intended to prohibit damaging gear from operating in deepwater coral habitat, and allowing for transit through the Oculina HAPC. The proposed actions would have a positive impact on reducing the potential for bycatch interactions to the degree it reduces interaction of gear, habitat and deepwater species that may be directly or indirectly affected by habitat damage or unintended capture. Currently, there is probably very little bycatch within the proposed areas since there is not much fishing taking place there. The proposed actions in the amendment would minimize any future bycatch in the proposed HAPC expansion areas by: prohibiting use of bottom longline, trawls (mid-water and bottom), dredge, pot or trap; prohibit use of anchor and chain, or use a grapple and chain; and prohibiting possession of any species regulated by the coral FMP. Therefore, expansion of the HAPCs would likely result in positive ecological benefits in the community structure and species diversity of deepwater ecosystems occupied by these species. Transit through the Oculina

HAPC (Action 2) is expected to provide socio-economic benefits, and enhance safety at sea for fishermen targeting rock shrimp on the eastern side of the Oculina HAPC.

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# Appendix H. History of Management.

The following is a summary of management actions for plans amended through the Fishery Management Plan (FMP) for Coral, Coral Reefs and Live/Hard bottom Habitats of the South Atlantic Region (Coral FMP)). Other summaries of South Atlantic Fishery Management Council (South Atlantic Council) actions and history of management for other Fishery Management Plans are available online at www.safmc.net.

**The Fishery Management Plan for Coral, Coral Reefs, and Live/Hardbottom Habitat of the South Atlantic Region**

Management of coral resources was originally established with the joint Gulf of Mexico Fishery Management Council (Gulf Council) and South Atlantic Council Coral FMP (GMFMC & SAFMC 1982). The Coral FMP's intent was to optimize the benefits generated from the coral resource while conserving the coral and coral reefs. Specific management objectives addressed through the FMP were to: (1) develop scientific information necessary to determine feasibility and advisability of harvest of coral; (2) minimize, as appropriate, adverse human impacts on coral and coral reefs; (3) provide, where appropriate, special management for Coral Habitat Areas of Particular Concern (CHAPCs); (4) increase public awareness of the importance and sensitivity of coral and coral reefs; and (5) provide a coordinated management regime for the conservation of coral and coral reefs.

The Coral FMP implemented the following management measures for coral and coral reefs: (1) disallowed any level of foreign fishing and established the domestic annual harvest to equal the optimum yield (OY); (2) prohibited the taking of stony corals and sea fans or the destruction of these corals and coral reefs anywhere in the exclusive economic zone (EEZ) of the Gulf and South Atlantic Councils' area of jurisdiction; (3) established that stony corals and sea fans taken incidentally in other fisheries must be returned to the water in the general area of capture as soon as possible (with the exception of the groundfish, scallop, or other similar fisheries where the entire unsorted catch is landed, in which case stony corals and sea fans may be landed but not sold); (4) established that the Councils may notify the Secretary of Commerce of the threat of widespread or localized depletion from overharvest of one or more species of octocorals and recommend specific actions; (5) established a permit system for the use of chemicals for the taking of fish or other organisms that inhabit coral reefs; (6) established a permit system for taking prohibited corals for scientific and educational purposes; and (7) identified Habitat Areas of Particular Concern (HAPC) and established time and area restrictions in HAPCs.

**Amendment 1** (GMFMC & SAFMC 1990) implemented the following regulations: (1) included octocorals in the management unit as a controlled species; (2) implemented a combined octocoral quota for the Gulf of Mexico and South Atlantic EEZ of 50,000 individual colonies; (3) stated the OY for coral reefs, stony corals, and sea fans to be zero; (4) included a definition of overfishing; (5) established a permit system to take octocorals; (6) provided reporting requirements for those taking corals under federal permit; (7) included a section on vessel safety considerations; and (8) revised the section on habitat.

**Amendment 2** (GMFMC & SAFMC 1994) included the following regulations: (1) defined live rock and added it to the Coral FMP management unit (live rock is defined as living marine organisms or an assemblage thereof attached to a hard substrate including dead coral or rock); (2) redefined allowable octocorals to mean erect, non-encrusting species of the subclass Octocorallia, except the prohibited sea fans, including only the substrate covered by and within one inch of the holdfast; (3) revised management measures to address bycatch of octocorals; (4) provided for different management in the jurisdictional areas of the two Councils by promulgating a separate set of management measures and regulations for the South Atlantic; (5) prohibited all wild live rock harvest north of Dade County, Florida, and prohibited chipping throughout the jurisdiction of the South Atlantic Council; (6) capped harvest of wild live rock to 485,000 pounds annually until January 1, 1996, when all wild live rock harvest was prohibited; (7) allowed and facilitated aquaculture of live rock in the EEZ and required live rock harvest federal permits; and (8) required a federal permit for harvest and possession of prohibited corals and prohibited live rock from the EEZ for scientific, educational, and restoration purposes.

**Amendment 3** (SAFMC 1995) implemented the following: (1) established a live rock aquaculture permit system for the South Atlantic EEZ; (2) prohibited octocoral harvest north of Cape Canaveral to prevent expansion of the fishery to areas where octocorals constitute a more significant portion of the live/hardbottom habitat; and (3) prohibited anchoring of all fishing vessels in the Oculina Bank HAPC.

**Amendment 4/EIS** to the South Atlantic Coral FMP, included in the Comprehensive Essential Fish Habitat (EFH) Amendment (SAFMC 1998), expanded the Oculina Bank HAPC to an area bounded to the west by 80°W., to the north by 28°30' N., to the south by 27°30' N., and to the east by the 100 fathom (600 feet) depth contour. Amendment 4 expanded the Oculina Bank HAPC to include the area closed to rock shrimp harvest. The expanded Oculina Bank HAPC is 60 nautical miles long by about 5 nautical miles wide although the width tracks the 100 fathom (600 foot) depth contour rather than a longitude line. Within the expanded Oculina Bank HAPC area, no person may:

1. Use a bottom longline, bottom trawl, dredge, pot, or trap.
2. If aboard a fishing vessel, anchor, use an anchor and chain, or use a grapple and chain.
3. Fish for rock shrimp or possess rock shrimp in or from the area on board a fishing vessel.

**Amendment 5** to the Coral FMP, included in the Comprehensive Sustainable Fisheries Act Amendment (SAFMC 1998c), extended the OY definition to include harvest allowances under live rock aquaculture permits.

**Amendment 6** to the Coral FMP, included in the Comprehensive Ecosystem-Based Amendment 1 (CE-BA 1; SAFMC 2009), established deepwater Coral HAPCs (CHAPCs) and prohibited the use of bottom tending gear in these areas, created a "Shrimp Fishery Access Area" within the Stetson-Miami Terrace CHAPC and created "Allowable Golden Crab Fishing Areas" within the Stetson-Miami Terrace and Pourtalés Terrace CHAPCs. The CE-BA 1 also provided spatial information on designated EFH in the South Atlantic Council's Habitat Plan (SAFMC 1998).

**Amendment 7** to the Coral FMP, included in the CE-BA 2 (SAFMC 2011), implemented the following management measures: redefined the management unit for octocorals in the South Atlantic to include the EEZ waters off North Carolina, South Carolina and Georgia; specified an

annual catch limit of 0 for octocorals under management in the South Atlantic; limited the harvest and possession of snapper grouper and coastal migratory pelagic species in Special Management Zones off South Carolina to the recreational bag limit; revised sea turtle release gear requirements for the snapper grouper fishery; and amended the Snapper Grouper, Coral and *Sargassum* FMPs to designate EFH and EFH-HAPCs.

# Appendix I. Essential Fish Habitat and Move to Ecosystem Based Management

## South Atlantic Fishery Management Council Habitat Conservation, Ecosystem Coordination and Collaboration

The Council, using the Essential Fish Habitat Plan as the cornerstone, adopted a strategy to facilitate the move to an ecosystem-based approach to fisheries management in the region. This approach required a greater understanding of the South Atlantic ecosystem and the complex relationships among humans, marine life, and the environment including essential fish habitat. To accomplish this, a process was undertaken to facilitate the evolution of the Habitat Plan into a Fishery Ecosystem Plan (FEP), thereby providing a more comprehensive understanding of the biological, social, and economic impacts of management necessary to initiate the transition from single species management to ecosystem-based management in the region.

### Moving to Ecosystem-Based Management

The Council adopted broad goals for Ecosystem-Based Management to include maintaining or improving ecosystem structure and function; maintaining or improving economic, social, and cultural benefits from resources; and maintaining or improving biological, economic, and cultural diversity. Development of a regional FEP (SAFMC 2009a) provided an opportunity to expand the scope of the original Council Habitat Plan and compile and review available habitat, biological, social, and economic fishery and resource information for fisheries in the South Atlantic ecosystem. The South Atlantic Council views habitat conservation as the core of the move to EBM in the region. Therefore, development of the FEP was a natural next step in the evolution and expands and significantly updates the SAFMC Habitat Plan (SAFMC 1998a) incorporating comprehensive details of all managed species (SAFMC, South Atlantic States, ASMFC, and NOAA Fisheries Highly Migratory Species and Protected Species) including their biology, food web dynamics, and economic and social characteristics of the fisheries and habitats essential to their survival. The FEP therefore serves as a source document and presents more complete and detailed information describing the South Atlantic ecosystem and the impact of fisheries on the environment. This FEP updated information on designated Essential Fish Habitat (EFH) and EFH-Habitat Areas of Particular Concern; expanded descriptions of biology and status of managed species; presented information that will support ecosystem considerations for managed species; and described the social and economic characteristics of the fisheries in the region. In addition, it expanded the discussion and description of existing research programs and needs to identify biological, social, and economic research needed to fully address ecosystem-based management in the region. In is anticipated that the FEP will provide a greater degree of guidance by fishery, habitat, or major ecosystem consideration of bycatch reduction, prey-predator interactions, maintaining biodiversity, and spatial management needs. This FEP serves as a living source document of biological, economic, and social information for all Fishery Management Plans (FMP). Future Environmental Assessments and Environmental Impact Statements associated with subsequent amendments to Council FMPs will draw from or cite by reference the FEP.

The Fishery Ecosystem Plan for the South Atlantic Region encompasses the following volume structure:

FEP Volume I - Introduction and Overview of FEP for the South Atlantic Region
FEP Volume II - South Atlantic Habitats and Species
FEP Volume III - South Atlantic Human and Institutional Environment
FEP Volume IV - Threats to South Atlantic Ecosystem and Recommendations
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Comprehensive Ecosystem-Based Amendment (CE-BA) 1 (SAFMC 2009b) is supported by this FEP and updated EFH and EFH-HAPC information and addressed the Final EFH Rule (e.g., GIS presented for all EFH and EFH-HAPCs). Management actions implemented in CE-BA 1 established deepwater Coral HAPCs to protect what is thought to be the largest continuous distribution (>23,000 square miles) of pristine, deepwater coral ecosystems in the world.

The Fishery Ecosystem Plan, slated to be revised every 5 years, will again be the vehicle to update and refine information supporting designation and future review of EFH and EFH-HAPCs for managed species. Planning for the update is being conducted in cooperation with the Habitat Advisory Panel during the fall and winter of 2013 with initiation during 2014.

## Ecosystem Approach to Deepwater Ecosystem Management

The South Atlantic Council manages coral, coral reefs and live/hard bottom habitat, including deepwater corals, through the Fishery Management Plan for Coral, Coral Reefs and Live/Hard Bottom Habitat of the South Atlantic Region (Coral FMP). Mechanisms exist in the FMP, as amended, to further protect deepwater coral and live/hard bottom habitats. The SAFMC's Habitat and Environmental Protection Advisory Panel and Coral Advisory Panel have supported proactive efforts to identify and protect deepwater coral ecosystems in the South Atlantic region. Management actions in Comprehensive Ecosystem-Based Amendment (CE-BA 1) (SAFMC 2009b) established deepwater coral HAPCs (C- HAPCs) to protect what is thought to be the largest continuous distribution (>23,000 square miles) of pristine deepwater coral ecosystems in the world. In addition, CE-BA 1 established areas within the CHAPC, which provide for traditional fishing in limited areas, which do not impact deepwater coral habitat. CE-BA 1, supported by the FEP, also addressed non-regulatory updates for existing EFH and EFH- HAPC information and addressed the spatial requirements of the Final EFH Rule (i.e., GIS presented for all EFH and EFH-HAPCs). Actions in this amendment included modifications in the management of the following: octocorals; special management zones (SMZs) off the coast of South Carolina; and sea turtle release gear requirements for snapper grouper fishermen. The amendment also designated essential fish habitat (EFH) and EFH-Habitat Areas of Particular Concern (EFH-HAPCs).

CE-BA 2 established annual catch limits (ACL) for octocorals in the South Atlantic as well as modifying the Fishery Management Unit (FMU) for octocorals to remove octocorals off the coast

of Florida from the FMU (SAFMC 2011). The amendment also limited the possession of managed species in the SMZs off South Carolina to the recreational bag limit for snapper grouper and coastal migratory pelagic species; modified sea turtle release gear requirements for the snapper grouper fishery based upon freeboard height of vessels; amends Council fishery management plans (FMPs) to designate or modify EFH and EFH-HAPCs, including the FMP for Pelagic Sargassum Habitat; amended the Coral FMP to designate EFH for deepwater Coral HAPCs designated under CE-BA 1; and amended the Snapper Grouper FMP to designate EFH-HAPCs for golden and blueline tilefish and the deepwater Marine Protected Areas. The final rule was published in the federal register on December 30, 2011, and regulations became effective on January 30, 2012.

## Building from a Habitat to an Ecosystem Network to Support the Evolution

Starting with our Habitat and Environmental Protection Advisory Panel, the Council expanded and
fostered a comprehensive Habitat network in our region to develop the Habitat Plan of the South Atlantic Region completed in 1998 to support the EFH rule. Building on the core regional collaborations, the Council facilitated an expansion to a Habitat and Ecosystem network to support development of the FEP and CE-BA as well as coordinate with partners on other regional efforts.

### *Integrated Ocean Observing System (IOOS) and Southeast Coastal and Ocean Observing Regional Association (SECOORA)*

The Integrated Ocean Observing System (IOOS®) is a partnership among federal, regional, academic, and private sector parties that works to provide new tools and forecasts to improve safety, enhance the economy, and protect our environment. IOOS supplies critical information about our Nation's oceans, coasts, and Great Lakes. Scientists working to understand climate change, governments adapting to changes in the Arctic, municipalities monitoring local water quality, and industries affected by coastal and marine spatial planning all have the same need: reliable, timely, and sustained access to data and information that inform decision making. Improving access to key marine data and information supports several purposes. IOOS data sustain national defense, marine commerce, and navigation safety. Scientists use these data to issue weather, climate, and marine forecasts. IOOS data are also used to make decisions for energy siting and production, economic development, and ecosystem-based resource management. Emergency managers and health officials need IOOS information to make decisions about public safety. Teachers and government officials rely on IOOS data for public outreach, training, and education.

SECOORA is one of 11 Regional Associations established nationwide through the US Integrated Ocean Observing System (IOOS) whose primary source of funding is via US IOOS through a 5-year cooperative agreement titled Coordinated Monitoring, Prediction, and Assessment to Support Decision-Makers Needs for Coastal and Ocean Data and Tools, but was recently awarded funding via a NOAA Regional Ocean Partnership grant through the Governors' South Atlantic Alliance. SECOORA is the regional solution to integrating

coastal and ocean observing data in the Southeast United States to inform decision makers and the general public. The SECOORA region encompasses 4 states, over 42 million people, and spans the coastal ocean from North Carolina to the west Coast of Florida and is creating customized products to address these thematic areas: Marine Operations; Coastal Hazards; Ecosystems, Water Quality, and Living Marine Resources; and Climate Change. The Council is a voting member and Council staff was recently re-elected to serve on the Board of Directors for the Southeast Coastal Regional Ocean Observing Association (SECOORA) to guide and direct priority needs for observation and modeling to support fisheries oceanography and integration into stock assessments through SEDAR. Cooperation through SECOORA is envisioned to facilitate the following:

- Refining current or water column designations of EFH and EFH-HAPCs (e.g., Gulf Stream and Florida Current).
- Providing oceanographic models linking benthic, pelagic habitats, and food webs.
- Providing oceanographic input parameters for ecosystem models.
- Integration of OOS information into Fish Stock Assessment process in the SA region.
- Facilitating OOS system collection of fish and fishery data and other research necessary to support the Council's use of area-based management tools in the SA Region including but not limited to EFH, EFH-HAPCs, Marine Protected Areas, Deepwater Coral Habitat Areas of Particular Concern, Special Management Zones, and Allowable Gear Areas.
- Integration of OOS program capabilities and research Needs into the South Atlantic Fishery Ecosystem Plan.
- Collaboration with SECOORA to integrate OOS products with information included in the Council's Habitat and Ecosystem Web Services and Atlas to facilitate model and tool development.
- Expanding Map Services and the Regional Habitat and Ecosystem Atlas in cooperation with SECOORAs Web Services that will provide researchers access to data or products including those collected/developed by SA OOS partners.

SECOORA researchers are developing a comprehensive data portal to provide discovery of, access to, and metadata about coastal ocean observations in the southeast US. Below are various ways to access the currently available data.

One project recently funded by SECOORA initiated development of species specific habitat models that integrate remotely sensed and in situ data to enhance stock assessments for species managed by the Council. The project during 2013/2014 was initiated to address red porgy, gray triggerfish, black seabass, and vermilion snapper. Gray triggerfish and red porgy are slated for assessment through SEDAR in 2014/15 and 2015/16 respectively.

*National Fish Habitat Plan and Southeast Aquatic Resource Partnership (SARP)*

In addition, the Council serves on the National Habitat Board and, as a member of the Southeast Aquatic Resource Partnership (SARP), has highlighted this collaboration by including the Southeast Aquatic Habitat Plan (SAHP) and associated watershed conservation restoration

targets into the FEP. Many of the habitat, water quality, and water quantity conservation needs identified in the threats and recommendations Volume of the FEP are directly addressed by on-the-ground projects supported by SARP. This cooperation results in funding fish habitat restoration and conservation intended to increase the viability of fish populations and fishing opportunity, which also meets the needs to conserve and manage
Essential Fish Habitat for Council managed species or habitat important to their prey. To date, SARP has funded 53 projects in the region through this program. This work supports conservation objectives identified in the SAHP to improve, establish, or maintain riparian zones, water quality, watershed connectivity, sediment flows, bottoms and shorelines, and fish passage, and addresses other key factors associated with the loss and degradation of fish habitats. SARP also developed the Southern Instream Flow Network (SIFN) to address the impacts of flow alterations in the Southeastern US aquatic ecosystems which leverages policy, technical experience, and scientific resources among partners based in 15 states. Maintaining appropriate flow into South Atlantic estuarine systems to support healthy inshore habitats essential to Council managed species is a major regional concern and efforts of SARP through SIFN are envisioned to enhance state and local partners ability to maintain appropriate flow rates.

*Governor's South Atlantic Alliance (GSAA)*

Initially discussed as a South Atlantic Eco-regional Compact, the Council has also cooperated with South Atlantic States in the formation of a Governor's South Atlantic Alliance (GSAA). This will also provide regional guidance and resources that will address State and Council broader habitat and ecosystem conservation goals. The GSAA was initiated in 2006. An Executive Planning Team (EPT), by the end of 2007, had created a framework for the Governors South Atlantic Alliance. The formal agreement between the four states (NC, SC, GA, and FL) was executed in May 2009. The Agreement specifies that the Alliance will prepare a "Governors South Atlantic Alliance Action Plan" which will be reviewed annually for progress and updated every five years for relevance of content. The Alliance's mission and purpose is to promote collaboration among the four states, and with the support and interaction of federal agencies, academe, regional organizations, non-governmental organizations, and the private sector, to sustain and enhance the region's coastal and marine resources. The Alliance proposes to regionally implement science-based actions and policies that balance coastal and marine ecosystems capacities to support both human and natural systems. The GSAA Action Plan was released in December 2010 and describes the four Priority Issue Areas that were identified by the Governors to be of mutual importance to the sustainability of the region's resources: Healthy Ecosystems; Working Waterfronts; Clean Coastal and Ocean Waters; and Disaster-Resilient Communities. The goals, objectives, actions, and implementation steps for each of these priorities were further described in the GSAA Implementation Plan released in July 2011. The final Action Plan was released on December 1, 2010 and marked the beginning of intensive work by the Alliance Issue Area Technical Teams (IATTs) to develop implementation steps for the actions and objectives. The GSAA Implementation Plan was published July 6, 2011, and the Alliance has been working to implement the Plan through the IATTs and two NOAA-funded Projects. The Alliance also partners with other federal agencies, academia, non-profits, private industry, regional organizations, and others. The Alliance supports both national and state-level ocean and coastal policy by coordinating federal, state,

and local entities to ensure the sustainability of the region's economic, cultural, and natural resources. The Alliance has organized itself around the founding principles outlined in the GSAA Terms of Reference and detailed in the GSAA Business Plan. A team of natural resource managers, scientists, and information management system experts have partnered to develop a Regional Information Management System (RIMS) and recommend decision support tools that will support regional collaboration and decision-making. In addition to regional-level stakeholders, state and local coastal managers and decision makers will also be served by this project, which will enable ready access to new and existing data and information. The collection and synthesis of spatial data into a suite of visualization tools is a critical step for long-term collaborative planning in the South Atlantic region for a wide range of coastal uses. The Council's Atlas presents the spatial representations of Essential Fish Habitat, managed areas, regional fish and fish habitat distribution, and fishery operation information and it can be linked to or drawn on as a critical part of the collaboration with the RIMS.

*South Atlantic Landscape Conservation Cooperative*

One of the more recent collaborations is the Council's participation as Steering Committee member for the newly establish South Atlantic Landscape Conservation Cooperative (SALCC). Landscape Conservation Cooperatives (LCCs) are applied conservation science partnerships focused on a defined geographic area that informs on-the-ground strategic conservation efforts at landscape scales. LCC partners include DOI agencies, other federal agencies, states, tribes, non-governmental organizations, universities, and others. The newly formed Department of Interior Southeast Climate Services Center (CSC) has the LCCs in the region as their primary clients. One of the initial charges of the CSCs is to downscale climate models for use at finer scales.

The SALCC developed a Strategic Plan through an iterative process that began in December 2011. The plan provides a simple strategy for moving forward over the next few years. An operations plan was developed under direction from the SALCC Steering Committee to redouble efforts to develop version 1.0 of a shared conservation blueprint by spring-summer of 2014. The SALCC is developing the regional blueprint to address the rapid changes in the South Atlantic including but not limited to climate change, urban growth, and increasing human demands on resources which are reshaping the landscape. While these forces cut across political and jurisdictional boundaries, the conservation community does not have a consistent cross-boundary, cross-organization plan for how to respond. The South Atlantic Conservation Blueprint will be that plan. The blueprint is envisioned to be a spatially-explicit map depicting the places and actions need to sustain South Atlantic LCC objectives in the face of future change. The steps to creating the blueprint include development of: indicators and targets (shared metrics of success); the State of the South Atlantic (past, present, and future condition of indicators); and a Conservation Blueprint. Potential ways the blueprint could be used include: finding the best places for people and organizations to work together; raising new money to implement conservation actions; guiding infrastructure development (highways, wind, urban growth, etc.); creating incentives as an alternative to regulation; bringing a landscape perspective to local adaptation efforts; and locating places and actions to build resilience after major disasters (hurricanes, oil spills, etc.). Integration of connectivity,

function, and threats to river, estuarine and marine systems supporting Council managed species is supported by the SALCC and enhanced by the Council being a voting member of its Steering Committee.
In addition, the Council's Regional Atlas presents spatial representations of Essential Fish Habitat, managed areas, regional fish and fish habitat distribution, and fishery operation information and it be linked to or drawn on as a critical part of the collaboration with the recently developed SALCC Conservation Planning Atlas.

### Building Tools to support EBM in the South Atlantic Region

The Council has developed a Habitat and Ecosystem Section of the website http://www.safmc.net/ecosystem/Home/EcosystemHome/tabid/435/Default.aspx and, in cooperation with the Florida Wildlife Research Institute (FWRI), developed a Habitat and Ecosystem Internet Map Server (IMS). The IMS was developed to support Council and regional partners' efforts in the transition to EBM. Other regional partners include NMFS Habitat Conservation, South Atlantic States, local management authorities, other Federal partners, universities, conservation organizations, and recreational and commercial fishermen. As technology and spatial information needs evolved, the distribution and use of GIS demands greater capabilities. The Council has continued its collaboration with FWRI in the now evolution to Web Services provided through the regional SAFMC Habitat and Ecosystem Atlas (http://ocean.floridamarine.org/safmc_atlas/) and the SAFMC Digital Dashboard (http://ocean.floridamarine.org/safmc_dashboard/). The Atlas integrates services for the following:

Species distribution and spatial presentation of regional fishery independent data from the SEAMAP-SA, MARMAP, and NOAA SEFIS systems; SAFMC Fisheries: (http://ocean.floridamarine.org/SA_Fisheries/)

Essential Fish Habitat and Essential Fish Habitat Areas of Particular Concern; SAFMC EFH: (http://ocean.floridamarine.org/sa_efh/)

Spatial presentation of managed areas in the region; SAFMC Managed Areas: (http://ocean.floridamarine.org/safmc_managedareas/)

An online life history and habitat information system supporting Council managed, State managed, and other regional species was developed in cooperation with FWRI. The Ecospecies system is considered dynamic and presents, as developed, detailed individual species life history reports and provides an interactive online query capability for all species included in the system: http://atoll.floridamarine.org/EcoSpecies

Web Services System Updates:

- Essential Fish Habitat (EFH) – displays EFH and EFH-HAPCS for SAFMC managed species and NOAA Fisheries Highly Migratory Species.
- Fisheries - displays Marine Resources Monitoring, Assessment, and Prediction (MARMAP) and Southeast Area Monitoring and Assessment Program South Atlantic (SEAMAP-SA) data.
- Managed Areas - displays a variety of regulatory boundaries (SAFMC and Federal) or management boundaries within the SAFMC's jurisdiction.
- Habitat – displays habitat data collected by SEADESC, Harbor Branch Oceanographic Institute (HBOI), and Ocean Exploration dives, as well as the SEAMAP shallow and ESDIM deepwater bottom mapping projects, multibeam imagery, and scientific cruise data.
- Multibeam Bathymetry - displays a variety of multibeam data sources and scanned bathymetry charts.
- Nautical Charts – displays coastal, general, and overview nautical charts for the SAFMC's jurisdictional area.

## Ecosystem Based Action, Future Challenges and Needs

The Council has implemented ecosystem-based principles through several existing fishery management
actions including establishment of deepwater Marine Protected Areas for the Snapper Grouper fishery, proactive harvest control rules on species (e.g., dolphin and wahoo) which are not overfished, implementing extensive gear area closures which in most cases eliminate the impact of fishing gear on Essential Fish Habitat, and use of other spatial management tools including Special Management Zones. Pursuant to development of the Comprehensive Ecosystem-Based Amendment, the Council has taken an ecosystem approach to protect deepwater ecosystems while providing for traditional fisheries for the Golden Crab and Royal Red shrimp in areas where they do not impact deepwater coral habitat. The stakeholder based process taps in on an extensive regional Habitat and Ecosystem network. Support
tools facilitate Council deliberations and with the help of regional partners, are being refined to address long-term ecosystem management needs.

One of the greatest challenges to the long-term move to EBM in the region is funding high priority research, including but not limited to, comprehensive benthic mapping and ecosystem model and management tool development. In addition, collecting detailed information on fishing fleet dynamics including defining fishing operation areas by species, species complex, and season, as well as catch relative to habitat is critical for assessment of fishery, community, and habitat impacts and for Council use in place based management measures. Additional resources need to be dedicated to expand regional coordination of modeling, mapping, characterization of species use of habitats, and full funding of regional fishery independent surveys (e.g., MARMAP, SEAMAP, and SEFIS) which are linking directly to addressing high priority management needs. Development of ecosystem information systems to support Council management should build on existing tools (e.g., Regional Habitat and Ecosystem GIS and Arc Services) and provide resources to regional cooperating partners for expansion to address long-

term Council needs.

The FEP and CE-BA 1 complement, but do not replace, existing FMPs. In addition, the FEP serves as a source document to the CE-BAs. NOAA should support and build on the regional coordination efforts of the Council as it transitions to a broader management approach. Resources need to be provided to collect information necessary to update and refine our FEP and support future fishery actions including but not limited to completing one of the highest priority needs to support EBM, the completion of mapping of near-shore, mid-shelf, shelf edge, and deepwater habitats in the South Atlantic region. In developing future FEPs, the Council will draw on SAFEs (Stock Assessment and Fishery Evaluation reports) which NMFS is required to provide the Council for all FMPs implemented under the Magnuson-Stevens Act. The FEP, which has served as the source document for CE-BAs, could also meet some of the NMFS SAFE requirements if information is provided to the Council to update necessary sections.

## EFH and EFH-HAPC Designations Translated to Cooperative Habitat Policy Development and Protection

The Council actively comments on non-fishing projects or policies that may impact fish habitat. **Appendix A** of the Comprehensive Amendment Addressing Essential Fish Habitat in Fishery Management Plans of the South Atlantic Region (SAFMC 1998b) outlines the Council's comment and policy development process and the establishment of a four-state Habitat Advisory Panel. Members of the Habitat Advisory Panel serve as the Council's habitat contacts and professionals in the field. AP members bring projects to the Council's attention, draft comment letters, and attend public meetings. With guidance from the Advisory Panel, the Council has developed and approved policies on:

1. Energy exploration, development, transportation, and hydropower re-licensing;
2. Beach dredging and filling and large-scale coastal engineering;
3. Protection and enhancement of submerged aquatic vegetation;
4. Alterations to riverine, estuarine, and nearshore flows;
5. Marine aquaculture;
6. Marine Ecosystems and Non-Native and Invasive Species: and
7. Estuarine Ecosystems and Non-Native and Invasive Species.

NOAA Fisheries, State and other Federal agencies apply EFH and EFH-HAPC designations and protection policies in the day-to-day permit review process. The revision and updating of existing habitat policies and the development of new policies is being coordinated with core agency representatives on the Habitat and Coral Advisory Panels. Existing policies are included at the end of this Appendix.

The Habitat and Environmental Protection Advisory Panel, as part of their role in providing continued policy guidance to the Council, is during 2013/14, reviewing and proposing revisions and updates to the existing policy statements and developing new ones for Council consideration. The effort is intended to enhance the value of the statements and support cooperation and collaboration with NOAA Fisheries Habitat Conservation Division and State

and Federal partners in better addressing the Congressional mandates to the Council associated with designation and conservation of EFH in the region.

### South Atlantic Bight Ecopath Model

The Council worked cooperatively with the University of British Columbia and the Sea Around Us project to develop a straw-man and preliminary food web models (Ecopath with Ecosim) to characterize the ecological relationships of South Atlantic species, including those managed by the Council. This effort was envisioned to help the Council and cooperators in identifying available information and data gaps while providing insight into ecosystem function. More importantly, the model development process provides a vehicle to identify research necessary to better define populations, fisheries, and their interrelationships. While individual efforts are still underway in the South Atlantic, only with significant investment of new resources through other programs will a comprehensive regional model be further developed.

The latest collaboration builds on the previous Ecopath model developed through the Sea Around Us project for the South Atlantic Bight with a focus on beginning a dialogue on the implications of potential changes in forage fish populations in the region that could be associated with environmental or climate change or changes in direct exploitation of those populations.

### Essential Fish Habitat and Essential Fish Habitat Areas of Particular Concern

Following is a summary of the current South Atlantic Council's EFH and EFH-HAPCs. Information supporting their designation was updated (pursuant to the EFH Final Rule) in the Council's Fishery Ecosystem Plan and Comprehensive Ecosystem Amendment:

### Snapper Grouper FMP

Essential fish habitat for snapper grouper species includes coral reefs, live/hard bottom, submerged aquatic vegetation, artificial reefs, and medium to high profile outcroppings on and around the shelf break zone from shore to at least 600 feet (but to at least 2,000 feet for wreckfish) where the annual water temperature range is sufficiently warm to maintain adult populations of members of this largely tropical complex. EFH includes the spawning area in the water column above the adult habitat and the additional pelagic environment, including *Sargassum*, required for larval survival and growth up to and including settlement. In addition the Gulf Stream is an essential fish habitat because it provides a mechanism to disperse snapper grouper larvae.

For specific life stages of estuarine dependent and nearshore snapper grouper species, essential fish habitat includes areas inshore of the 100-foot contour, such as attached macroalgae; submerged rooted vascular plants (seagrasses); estuarine emergent vegetated wetlands (saltmarshes, brackish marsh); tidal creeks; estuarine scrub/shrub (mangrove fringe); oyster reefs and shell banks; unconsolidated bottom (soft sediments); artificial reefs; and coral reefs and live/hard bottom.

Areas which meet the criteria for EFH-HAPCs for species in the snapper-grouper management

unit include medium to high profile offshore hard bottoms where spawning normally occurs; localities of known or likely periodic spawning aggregations; nearshore hard bottom areas; The Point, The Ten Fathom Ledge, and Big Rock (North Carolina); The Charleston Bump (South Carolina); mangrove habitat; seagrass habitat; oyster/shell habitat; all coastal inlets; all state-designated nursery habitats of particular importance to snapper grouper (e.g., Primary and Secondary Nursery Areas designated in North Carolina); pelagic and benthic *Sargassum*; Hoyt Hills for wreckfish; the *Oculina* Bank Habitat Area of Particular Concern; all hermatypic coral habitats and reefs; manganese outcroppings on the Blake Plateau; and Council-designated Artificial Reef Special Management Zones (SMZs). In addition, the Council through CEBA 2 (SAFMC 2011) designated the deepwater snapper grouper MPAs and golden tilefish and blueline tilefish habitat as EFH-HAPCs under the Snapper Grouper FMP as follows:

> EFH-HAPCs for golden tilefish to include irregular bottom comprised of troughs and terraces inter-mingled with sand, mud, or shell hash bottom. Mud-clay bottoms in depths of 150-300 meters are HAPC. Golden tilefish are generally found in 80-540 meters, but most commonly found in 200-meter depths.
>
> EFH-HAPC for blueline tilefish to include irregular bottom habitats along the shelf edge in 45-65 meters depth; shelf break or upper slope along the 100-fathom contour (150-225 meters); hardbottom habitats characterized as rock overhangs, rock outcrops, manganese-phosphorite rock slab formations, or rocky reefs in the South Atlantic Bight; and the Georgetown Hole (Charleston Lumps) off Georgetown, SC.
>
> EFH-HAPCs for the snapper grouper complex to include the following deepwater Marine Protected Areas (MPAs) as designated in Snapper Grouper Amendment 14: Snowy Grouper Wreck MPA, Northern South Carolina MPA, Edisto MPA, Charleston Deep Artificial Reef MPA, Georgia MPA, North Florida MPA, St. Lucie Hump MPA, and East Hump MPA.
>
> Deepwater Coral HAPCs designated in Comprehensive Ecosystem-Based Amendment 1 are designated as Snapper Grouper EFH-HAPCs: Cape Lookout Coral HAPC, Cape Fear Coral HAPC, Blake Ridge Diapir Coral HAPC, Stetson-Miami Terrace Coral HAPC, and Pourtalés Terrace Coral HAPC.

### Shrimp FMP

For penaeid shrimp, Essential Fish Habitat includes inshore estuarine nursery areas, offshore marine habitats used for spawning and growth to maturity, and all interconnecting water bodies as described in the Habitat Plan. Inshore nursery areas include tidal freshwater (palustrine), estuarine, and marine emergent wetlands (e.g., intertidal marshes); tidal palustrine forested areas; mangroves; tidal freshwater, estuarine, and marine submerged aquatic vegetation (e.g., seagrass); and subtidal and intertidal non- vegetated flats. This applies from North Carolina through the Florida Keys.

For rock shrimp, essential fish habitat consists of offshore terrigenous and biogenic sand bottom habitats from 18 to 182 meters in depth with highest concentrations occurring between 34 and

55 meters. This applies for all areas from North Carolina through the Florida Keys. Essential fish habitat includes the shelf current systems near Cape Canaveral, Florida, which provide major transport mechanisms affecting planktonic larval rock shrimp. These currents keep larvae on the Florida Shelf and may transport them inshore in spring. In addition, the Gulf Stream is an essential fish habitat because it provides a mechanism to disperse rock shrimp larvae.

Essential fish habitat for royal red shrimp include the upper regions of the continental slope from 180 meters (590 feet) to about 730 meters (2,395 feet), with concentrations found at depths of between 250 meters (820 feet) and 475 meters (1,558 feet) over blue/black mud, sand, muddy sand, or white calcareous mud. In addition, the Gulf Stream is an essential fish habitat because it provides a mechanism to disperse royal red shrimp larvae.

Areas which meet the criteria for EFH-HAPCs for penaeid shrimp include all coastal inlets, all state-designated nursery habitats of particular importance to shrimp (for example, in North Carolina this would include all Primary Nursery Areas and all Secondary Nursery Areas), and state-identified overwintering areas.

### Coastal Migratory Pelagics FMP

Essential fish habitat for coastal migratory pelagic species includes sandy shoals of capes and offshore bars, high profile rocky bottom, and barrier island ocean-side waters, from the surf to the shelf break zone, but from the Gulf Stream shoreward, including *Sargassum*. In addition, all coastal inlets and all state-designated nursery habitats of particular importance to coastal migratory pelagics (for example, in North Carolina this would include all Primary Nursery Areas and all Secondary Nursery Areas).

For Cobia essential fish habitat also includes high salinity bays, estuaries, and seagrass habitat. In addition, the Gulf Stream is an essential fish habitat because it provides a mechanism to disperse coastal migratory pelagic larvae.

For king and Spanish mackerel and cobia essential fish habitat occurs in the South Atlantic and Mid-Atlantic Bights.

Areas which meet the criteria for EFH-HAPCs include sandy shoals of Capes Lookout, Cape Fear, and Cape Hatteras from shore to the ends of the respective shoals, but shoreward of the Gulf stream; The Point, The Ten-Fathom Ledge, and Big Rock (North Carolina); The Charleston Bump and Hurl Rocks (South Carolina); The Point off Jupiter Inlet (Florida); *Phragmatopoma* (worm reefs) reefs off the central east coast of Florida; nearshore hard bottom south of Cape Canaveral; The Hump off Islamorada, Florida; The Marathon Hump off Marathon, Florida; The "Wall" off of the Florida Keys; Pelagic *Sargassum*; and Atlantic coast estuaries with high numbers of Spanish mackerel and cobia based on abundance data from the ELMR Program. Estuaries meeting this criteria for Spanish mackerel include Bogue Sound and New River, North Carolina; Bogue Sound, North Carolina (Adults May-September salinity >30 ppt); and New River, North Carolina (Adults May-October salinity >30 ppt). For

Cobia they include Broad River, South Carolina; and Broad River, South Carolina (Adults & juveniles May-July salinity >25ppt).

### Golden Crab FMP

Essential fish habitat for golden crab includes the U.S. Continental Shelf from Chesapeake Bay south through the Florida Straits (and into the Gulf of Mexico). In addition, the Gulf Stream is an essential fish habitat because it provides a mechanism to disperse golden crab larvae. The detailed description of seven essential fish habitat types (a flat foraminferan ooze habitat; distinct mounds, primarily of dead coral; ripple habitat; dunes; black pebble habitat; low outcrop; and soft-bioturbated habitat) for golden crab is provided in Wenner et al. (1987). There is insufficient knowledge of the biology of golden crabs to identify spawning and nursery areas and to identify HAPCs at this time. As information becomes available, the Council will evaluate such data and identify HAPCs as appropriate through the framework.

### Spiny Lobster FMP

Essential fish habitat for spiny lobster includes nearshore shelf/oceanic waters; shallow subtidal bottom; seagrass habitat; unconsolidated bottom (soft sediments); coral and live/hard bottom habitat; sponges; algal communities (*Laurencia*); and mangrove habitat (prop roots). In addition the Gulf Stream is an essential fish habitat because it provides a mechanism to disperse spiny lobster larvae.

Areas which meet the criteria for EFH-HAPCs for spiny lobster include Florida Bay, Biscayne Bay, Card Sound, and coral/hard bottom habitat from Jupiter Inlet, Florida through the Dry Tortugas, Florida.

### Coral, Coral Reefs, and Live/Hard Bottom Habitats FMP

Essential fish habitat for corals (stony corals, octocorals, and black corals) incorporate habitat for over 200 species. EFH for corals include the following:

A. Essential fish habitat for hermatypic stony corals includes rough, hard, exposed, stable substrate from Palm Beach County south through the Florida reef tract in subtidal waters to 30 m depth; subtropical (15°-35° C), oligotrophic waters with high (30-35$^{o}/_{oo}$) salinity and turbidity levels sufficiently low enough to provide algal symbionts adequate sunlight penetration for photosynthesis. Ahermatypic stony corals are not light restricted and their essential fish habitat includes defined hard substrate in subtidal to outer shelf depths throughout the management area.

B. Essential fish habitat for *Antipatharia* (black corals) includes rough, hard, exposed, stable substrate, offshore in high (30-35$^{o}/_{oo}$) salinity waters in depths exceeding 18 meters (54 feet), not restricted by light penetration on the outer shelf throughout the management area.

C. Essential fish habitat for octocorals excepting the order Pennatulacea (sea pens

and sea pansies) includes rough, hard, exposed, stable substrate in subtidal to outer shelf depths within a wide range of salinity and light penetration throughout the management area.

D. Essential fish habitat for Pennatulacea (sea pens and sea pansies) includes muddy, silty bottoms in subtidal to outer shelf depths within a wide range of salinity and light penetration.

Areas which meet the criteria for EFH-HAPCs for coral, coral reefs, and live/hard bottom include: The 10-Fathom Ledge, Big Rock, and The Point (North Carolina); Hurl Rocks and The Charleston Bump (South Carolina); Gray's Reef National Marine Sanctuary (Georgia); The *Phragmatopoma* (worm reefs) reefs off the central east coast of Florida; Oculina Banks off the east coast of Florida from Ft. Pierce to Cape Canaveral; nearshore (0-4 meters; 0-12 feet) hard bottom off the east coast of Florida from Cape Canaveral to Broward County); offshore (5-30 meter; 15-90 feet) hard bottom off the east coast of Florida from Palm Beach County to Fowey Rocks; Biscayne Bay, Florida; Biscayne National Park, Florida; and the Florida Keys National Marine Sanctuary. In addition, the Council through CEBA 2 (SAFMC 2011) designated the Deepwater Coral HAPCs as EFH-HAPCs under the Coral FMP as follows:

> Deepwater Coral HAPCs designated in Comprehensive Ecosystem-Based Amendment 1 as Snapper Grouper EFH-HAPCs: Cape Lookout Coral HAPC, Cape Fear Coral HAPC, Blake Ridge Diapir Coral HAPC, Stetson-Miami Terrace Coral HAPC, and Pourtalés Terrace Coral HAPC.

### Dolphin and Wahoo FMP

EFH for dolphin and wahoo is the Gulf Stream, Charleston Gyre, Florida Current, and pelagic *Sargassum*. This EFH definition for dolphin was approved by the Secretary of Commerce on June 3, 1999 as a part of the South Atlantic Council's Comprehensive Habitat Amendment (SAFMC 1998b) (dolphin was included within the Coastal Migratory Pelagics FMP at that time).

Areas which meet the criteria for EFH-HAPCs for dolphin and wahoo in the Atlantic include The Point, The Ten-Fathom Ledge, and Big Rock (North Carolina); The Charleston Bump and The Georgetown Hole (South Carolina); The Point off Jupiter Inlet (Florida); The Hump off Islamorada, Florida; The Marathon Hump off Marathon, Florida; The "Wall" off of the Florida Keys; and Pelagic *Sargassum*. This EFH-HAPC definition for dolphin was approved by the Secretary of Commerce on June 3, 1999 as a part of the South Atlantic Council's Comprehensive Habitat Amendment (dolphin was included within the Coastal Migratory Pelagics FMP at that time).

### Pelagic *Sargassum* Habitat FMP

The Council through CEBA 2 (SAFMC 2011) designated the top 10 meters of the water

column in the South Atlantic EEZ bounded by the Gulfstream, as EFH for pelagic Sargassum.

## Actions Implemented That Protect EFH and EFH-HAPCs

### Snapper Grouper FMP

- Prohibited the use of the following gears to protect habitat: bottom longlines in the EEZ inside of 50 fathoms or anywhere south of St. Lucie Inlet, Florida; bottom longlines in the wreckfish fishery; fish traps; bottom tending (roller- rig) trawls on live bottom habitat; and entanglement gear.
- Established the *Oculina* Experimental Closed Area where the harvest or possession of all species in the snapper grouper complex is prohibited.
- Established deepwater Marine Protected Areas (MPAs) as designated in Snapper Grouper Amendment 14: Snowy Grouper Wreck MPA, Northern South Carolina MPA, Edisto MPA, Charleston Deep Artificial Reef MPA, Georgia MPA, North Florida MPA, St. Lucie Hump MPA, and East Hump MPA.

### Shrimp FMP

- Prohibition of rock shrimp trawling in a designated area around the *Oculina* Bank,
- Mandatory use of bycatch reduction devices in the penaeid shrimp fishery,
- Mandatory Vessel Monitoring System (VMS) in the Rock Shrimp Fishery.
- A mechanism that provides for the concurrent closure of the EEZ to penaeid shrimping if environmental conditions in state waters are such that the overwintering spawning stock is severely depleted.

### *Pelagic Sargassum* Habitat FMP

- Prohibited all harvest and possession of *Sargassum* from the South Atlantic EEZ south of the latitude line representing the North Carolina/South Carolina border (34° North Latitude).
- Prohibited all harvest of *Sargassum* from the South Atlantic EEZ within 100 miles of shore between the 34° North Latitude line and the Latitude line representing the North Carolina/Virginia border.
- Harvest of *Sargassum* from the South Atlantic EEZ is limited to the months of November through June.
- Established an annual Total Allowable Catch (TAC) of 5,000 pounds landed wet weight.
- Required that an official observer be present on each *Sargassum* harvesting trip. Require that nets used to harvest *Sargassum* be constructed of four inch stretch mesh or larger fitted to a frame no larger than 4 feet by 6 feet.

### Coastal Migratory Pelagics FMP

- Prohibited of the use of drift gillnets in the coastal migratory pelagic fishery.

### Golden Crab FMP

- In the northern zone, golden crab traps can only be deployed in waters deeper than 900 feet; in the middle and southern zones traps can only be deployed in waters deeper than 700 feet.

  Northern zone - north of the 28°N. latitude to the North Carolina/Virginia border;
  Middle zone - 28°N. latitude to 25° N. latitude; and
  Southern zone - south of 25°N. latitude to the border between the South Atlantic and Gulf of Mexico Fishery Management Councils.

### Coral, Coral Reefs and Live/Hard Bottom FMP

- Established an optimum yield of zero and prohibiting all harvest or possession of these resources which serve as essential fish habitat to many managed species.
- Designated the *Oculina* Bank Habitat Area of Particular Concern.
- Expanded the *Oculina* Bank Habitat Area of Particular Concern (HAPC) to an area bounded to the west by 80°W. longitude, to the north by 28°30' N. latitude, to the south by 27°30' N. latitude, and to the east by the 100 fathom (600 feet) depth contour.
- Established the following two Satellite *Oculina* HAPCs: (1) Satellite *Oculina* HAPC #1 is bounded on the north by 28°30'N. latitude, on the south by 28°29'N. latitude, on the east by 80°W. longitude, and on the west by 80°3'W. longitude; and (2) Satellite *Oculina* HAPC #2 is bounded on the north by 28°17'N. latitude, on the south by 28°16'N. latitude, on the east by 80°W. longitude, and on the west by 80°3'W. longitude.
- Prohibited the use of all bottom tending fishing gear and fishing vessels from anchoring or using grapples in the *Oculina* Bank HAPC.
- Established a framework procedure to modify or establish Coral HAPCs.
- Established the following five deepwater CHAPCs:
  - Cape Lookout Lophelia Banks CHAPC;
  - Cape Fear Lophelia Banks CHAPC;
  - Stetson Reefs, Savannah and East Florida Lithoherms, and Miami Terrace (Stetson- Miami Terrace) CHAPC;
  - Pourtales Terrace CHAPC; and
  - Blake Ridge Diapir Methane Seep CHAPC.
- Within the deepwater CHAPCs, the possession of coral species and the use of all bottom damaging gear are prohibited including bottom longline, trawl (bottom and mid-water), dredge, pot or trap, or the use of an anchor, anchor and chain, or grapple and chain by all fishing vessels.

## South Atlantic Council Policies for Protection and Restoration of Essential Fish Habitat

### SAFMC Habitat and Environmental Protection Policy

In recognizing that species are dependent on the quantity and quality of their essential habitats, it is the policy of the SAFMC to protect, restore, and develop habitats upon which fisheries species depend; to increase the extent of their distribution and abundance; and to improve their productive capacity for the benefit of present and future generations. For purposes of this policy, "habitat" is defined as the physical, chemical, and biological parameters that are necessary for continued productivity of the species that is being managed. The objectives of the SAFMC policy will be accomplished through the
recommendation of no net loss or significant environmental degradation of existing habitat. A long-term objective is to support and promote a net-gain of fisheries habitat through the restoration and rehabilitation of the productive capacity of habitats that have been degraded, and the creation and development of productive habitats where increased fishery production is probable. The SAFMC will pursue these goals at state, Federal, and local levels. The Council shall assume an aggressive role in the protection and enhancement of habitats important to fishery species, and shall actively enter Federal, decision making processes where proposed actions may otherwise compromise the productivity of fishery resources of concern to the Council.

### SAFMC EFH Policy Statements

In addition to implementing regulations to protect habitat from fishing related degradation, the Council in cooperation with NOAA Fisheries, actively comments on non-fishing projects or policies that may impact fish habitat. The Council adopted a habitat policy and procedure document that established a four-state Habitat Advisory Panel and adopted a comment and policy development process. Members of the Habitat Advisory Panel serve as the Council's habitat contacts and professionals in the field. With guidance from the Advisory Panel, the Council has developed and approved a number of habitat policy statements which are available on the Habitat and Ecosystem section of the Council website (http://www.safmc.net/ecosystem/Home/EcosystemHome/tabid/435/Default.aspx ).

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# A Proposal for Extension of the Boundaries of the *Oculina* Coral Habitat Area of Particular Concern (OHAPC)

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## Proposal Summary

Recently two areas of high-relief *Oculina* coral mounds and hard bottom have been discovered outside, but adjacent to, the current boundaries of the *Oculina* Habitat Area of Particular Concern (OHAPC). These were suspected from NOAA regional bathymetric charts and later verified with multibeam sonar and ground-truthed with Remotely Operated Vehicles (ROV) and submersible video/photo surveys. One region extends from the northern boundary of the OHAPC up to the St. Augustine area; the second region is to the west of the current boundary primarily between the OHAPC satellite areas. The following are the proposed boundaries for the two additional regions of the OHAPC:

1) *Oculina* HAPC North: From the current northern boundary of the OHAPC ($28^o$ 30'N) to $29^o$ 43.5'W. The west and east boundaries would follow the 60 m and 100 m depth contour lines, respectively (CRM_10m_nad83; NOAA bathymetric contours). Total area = 393 $nmi^2$. (Figure 1).

2) *Oculina* HAPC West: From $28^o$ 4.5'N to the north boundary of the current OHAPC ($28^o$ 30'N). The east boundary would coincide with the current western boundary of the OHAPC ($80^o$ W). The west boundary could either use the 60 m contour line (CRM_10m_nad83; NOAA bathymetric contours) or the $80^o$ 03'W longitude (which is the west border of the OHAPC satellite regions). Total area = 75 $nmi^2$ (~25 x 3 nmi). (Figure 9).

## Appended Documentation

The following documents and datasets are presented to the SAFMC along with this report:

1) NOAA Regional Bathymetric Charts- georeferenced shape files: (Cape Canaveral 85, Titusville 84, New Smyrna 83, and Daytona 82).
2) NOAA bathymetry contours in 10 m isobaths- shape file (CRM_10m_nad83).
3) *Oculina* literature (see attached PDFs listed below).

## Background

In 1981, the shelf-edge, deep-water *Oculina* coral reefs off eastern Florida were proposed to the SAFMC for nomination as an Habitat Area of Particular Concern (HAPC) within the Corals and Coral Reef Fishery Management Plan (see attached pdf- Reed 1981). In that proposal various options for the boundaries were suggested: Option 1- the entire area of deep-water *Oculina* off eastern Florida from Jupiter to Cape Canaveral as it was known at that time; Option 2- from Ft. Pierce to Cape Canaveral, and Option 3- a 92 $nmi^2$ area from Ft. Pierce to Sebastian. Option 3 was accepted and finally approved by NOAA in 1984. We knew at that time that these deep-water coral mounds existed between 60 and 100 m depths and tended to parallel the Florida coastline. So in effect, from Jupiter to Cape Canaveral, the reef track tends to follow a NNW-SSE orientation at these depths. The original proposal suggested using $80^o$ 02'W longitude for the western boundary which would encompass all the known coral mounds in that region. Another option suggested was to make the boundaries follow the depth contours of 60 and 100 m thus encompassing the true reef tract. In 2000, the OHAPC was expanded to the north up to Cape Canaveral ($28^o$30'N latitude); the western boundary follows the $80^o$ W longitude. Recent discoveries now show that numerous *Oculina* coral mounds and hard-bottom habitat exist to the west and north of the current OHAPC boundaries. These are described in detail below.

**Oculina HAPC North Proposal**

The region to the north of Cape Canaveral and the current OHAPC is a continuation of the reef track that is apparent in NOAA regional bathymetric charts (Cape Canaveral 85, Titusville 84, New Smyrna 83, and Daytona 82). These regional contour charts were made by NOAA in 1983 at a scale of 1:100,000. They were obtained by the PI from NOAA (Scanned NOS Bathymetric Maps, Vol. 2, U.S. East and Gulf Coast) and were imported into ArcGIS 9.3 as georeferenced TIFF images (see attached shape files). Reed and Farrington 2010 and Reed et al. in press show that these NOAA regional charts are quite accurate in depicting high-relief features off eastern and southern Florida. We have used these charts to select areas to be further mapped with higher resolution multibeam sonar and then ground-truthed with video/photo surveys with manned submersibles or ROV.

In June, 2011, Andrew David (NOAA Fisheries) and John Reed conducted a research cruise (funded by NOAA's Deep Sea Coral Program and HBOI's Cooperative Institute for Ocean Exploration, Research, and Technology) to survey various deep-water and shelf-edge reef sites along eastern Florida. Using the NOAA Ship *Pisces* multibeam sonar, two sites were selected and mapped within this zone of high-relief features that are apparent on the NOAA regional charts north of Cape Canaveral that the PI suspected to be *Oculina* coral habitat. Three ROV dives followed up which verified that these high-relief features were in fact *Oculina* coral bioherms. The two multibeam areas were randomly selected off Daytona and Titusville areas; the multibeam survey was conducted overnight and followed up the next day with ROV dives using a ROV from NOAA's Southwest Fisheries Science Center (La Jolla, CA) which was outfitted with video and digital still cameras. Quantitative video and photographic transects were conducted during 4-hour dives to document the habitat and fauna. The sonar maps and ROV dives confirmed that the high-relief features of the NOAA regional charts were in fact high-relief *Oculina* coral mounds.

These ROV dives are described in SEADESC reports at the end of this paper which provides habitat description and lists the dominant benthic and fish fauna (Appendix 1). In general, these coral mounds are of the same type of habitat as the *Oculina* reefs within the OHAPC. The individual mounds are conical shaped or elongated with E-W oriented ridges. The individual mounds are 15-20 m in height; maximum depth is 92 m and minimum depth is 64 m at the peaks. The slopes are gentle 10-45$^{o}$ and covered with coral rubble, standing dead coral and sparse live *Oculina varicosa* coral colonies. The dead coral rubble and standing coral (both live and dead) provide habitat to a dense variety of benthic invertebrates and fish, most likely similar to that reported from the *Oculina* HAPC (see Reed 2006 for complete bibliography of deep-water *Oculina* references). At the base of some mounds is exposed limestone rock and 1-2 m relief ledges which also provide essential fish habitat to numerous commercially and recreationally important fish species including scamp, gag, snowy, and red groupers. Between the mounds and west of the main reef track is mostly soft sediment but also coral rubble and patchy rock pavement habitat. East of the main reef track the base of the mounds flatten out between 90 and 100 m into the muddy Florida-Hatteras slope. Coral rubble may extend 10s of meter east of the mounds. Dominant fish observed during the ROV video transects included scamp (common), gag grouper, snowy grouper, red porgy (common), amberjack (abundant), black seabass (abundant), tilefish, red hogfish, tattler, cubbyu, blue angelfish, bank butterfly, morays, roughtongue bass, bigeye, scorpionfish, batfish, wrasses. Dominant invertebrates include *Oculina varicosa* coral (10-40 cm colonies), gorgonian corals, black coral (abundant), sponges, starfish, sea urchins, and mollusks.

Unfortunately, the mounds appear to have been impacted by years of bottom shrimp trawling as documented within the *Oculina* HAPC (Reed et al. 2007, Koenig et al. 2005).

By extrapolating the multibeam to all the high-relief, shelf-edge topography that is clearly apparent in the NOAA regional charts (Cape Canaveral 85, Titusville 84, New Smyrna 83, and Daytona 82), we propose extending the current northern OHAPC boundary (28$^o$ 30'N) northward to 29$^o$ 43.5'W. The west and east boundaries would follow the 60 m and 100 m contour lines, respectively, based on the NOAA bathymetric contour shape file (CRM_10m_nad83). The total area is approximately = 392.88 nmi$^2$ (Figure 1; see attached shape file). Figures 2-4 show close-ups of this region. The 60 and 100 m contours were selected to encompass all possible mounds. Figures 5 and 6 compare the multibeam maps with the older NOAA Regional Bathymetric Charts. The multibeam clearly verifies high-relief features of the bathy charts although the individual mounds are not exact. We also plotted 70 and 90 m contour lines but these excluded some apparent high-relief coral mounds so we opted for the 60-100 m lines for the boundaries (Figs. 7 and 8).

**Oculina HAPC West Proposal**

In 2000, the OHAPC was expanded to the north up to Cape Canaveral (28$^o$ 30'N latitude); the western boundary follows the 80$^o$ W longitude. Recent discoveries now show that *Oculina* coral mounds and hard-bottom habitat exist to the west of the current OHAPC boundary. Multibeam sonar maps made later in 2002 and 2005 discovered numerous (dozens) high-relief coral mounds and hard-bottom habitat that are west of the western OHAPC boundary, primarily between the two satellite areas (Reed et al. 2005, see above). The habitat and fauna for these region are described in part in Harter et al. 2009. These remain outside the boundaries of the OHAPC and therefore are still are open to bottom trawling.

The proposed boundaries for the *Oculina* HAPC West are from 28$^o$ 4.5'N to the north boundary of the current OHAPC (28$^o$ 30'N). The east boundary would coincide with the current western boundary of the OHAPC (80$^o$ W). The west boundary could either use the 60 m contour line (CRM_10m_nad83; NOAA bathymetric contours) or the 80$^o$ 03'W longitude (which is the west border of the OHAPC satellite regions). The total area is approximately 75 nmi$^2$ (25 x 3 nmi) (Fig. 9). The NOAA regional contour charts show the NNW-SSW orientation of the reef track which currently goes west and outside of the current OHAPC boundary at 28$^o$ 4.5'N latitude.

**Bibliography with Annotations (*= PDFs attached):**

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Reed, J.K. 1981. Nomination of shelf-edge *Oculina* coral banks as a National Marine Sanctuary. Submitted to National Oceanographic and Atmospheric Administration (NOAA), and accepted for Final Site Evaluation List, 31 pp. (deep-water *Oculina* reefs first nominated by J. Reed as a National Marine Sanctuary)

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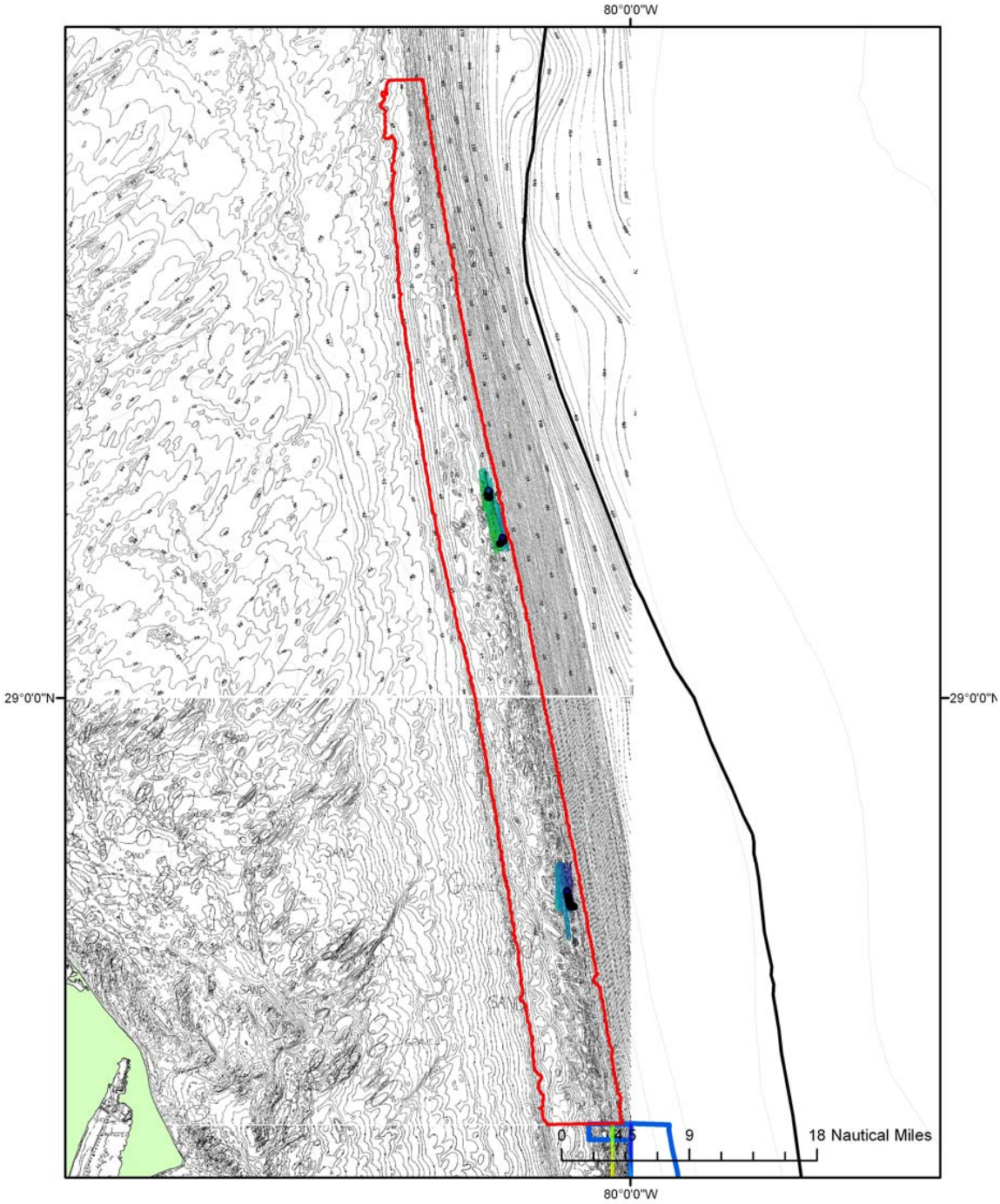



Figure 1. Proposed *Oculina* HAPC North (red polygon). Eastern and western polygon contours follow the 60 m and 100 m bathymetric contour lines, respectively (NOAA- CRM_10m_nad83). Within the polygon are the two multibeam sites off Daytona and Titusville regions and ROV dive tracks (thick black lines) from the 2011 NOAA *Pisces* cruise. Black polyline = west boundary of the Deep Coral HAPC. Blue polygons= the north end of the current *Oculina* HAPC. (NOAA regional charts: Cape Canaveral 85, Titusville 84, New Smyrna 83, and Daytona 82)

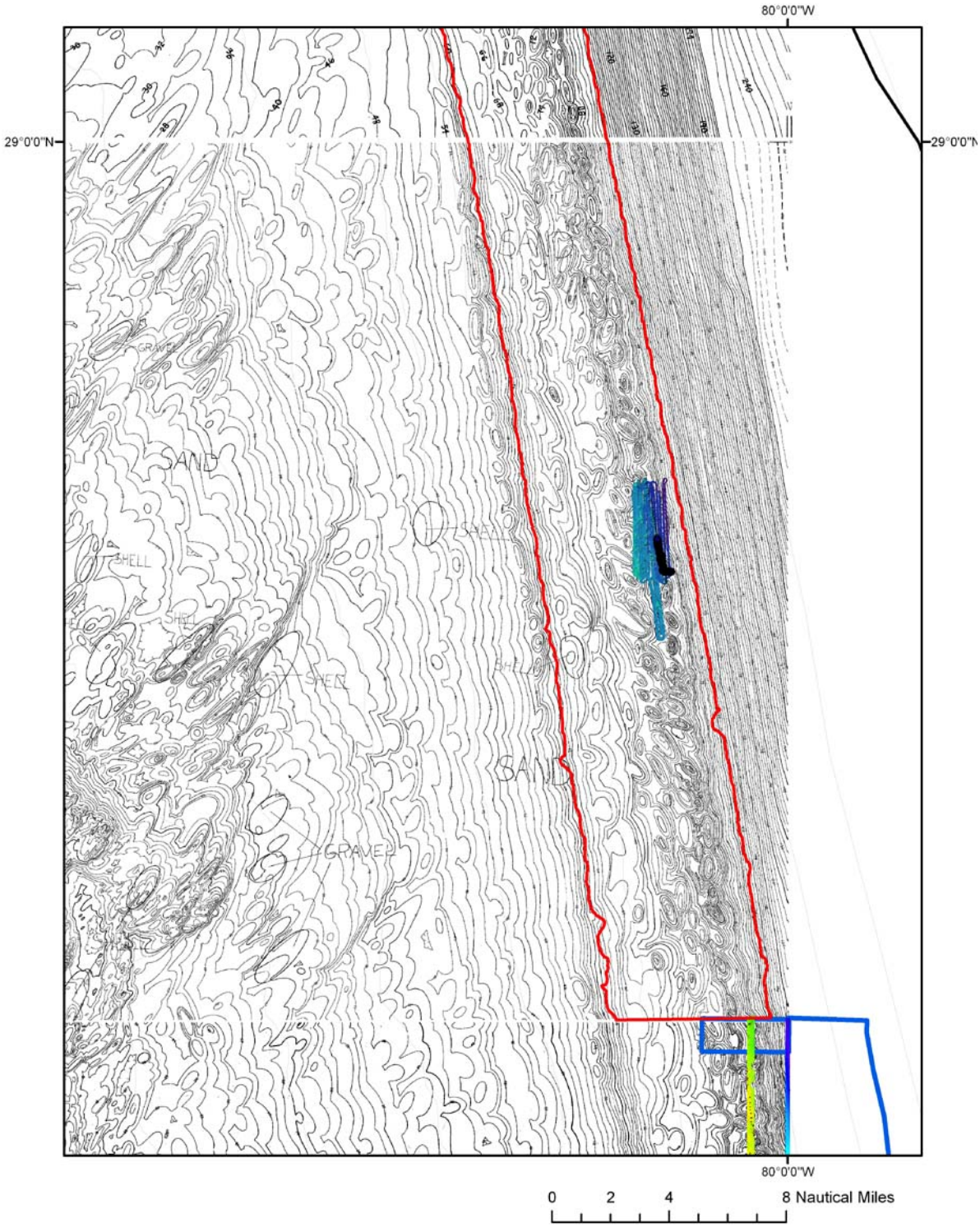



Figure 2. Southern region of proposed *Oculina* HAPC North (see Fig. 1) showing multibeam and ROV dive track (thick black line) off Titusville area from 2011 NOAA *Pisces* cruise. Blue polygons= north end of current OHAPC and OHAPC satellite area with strip of multibeam.

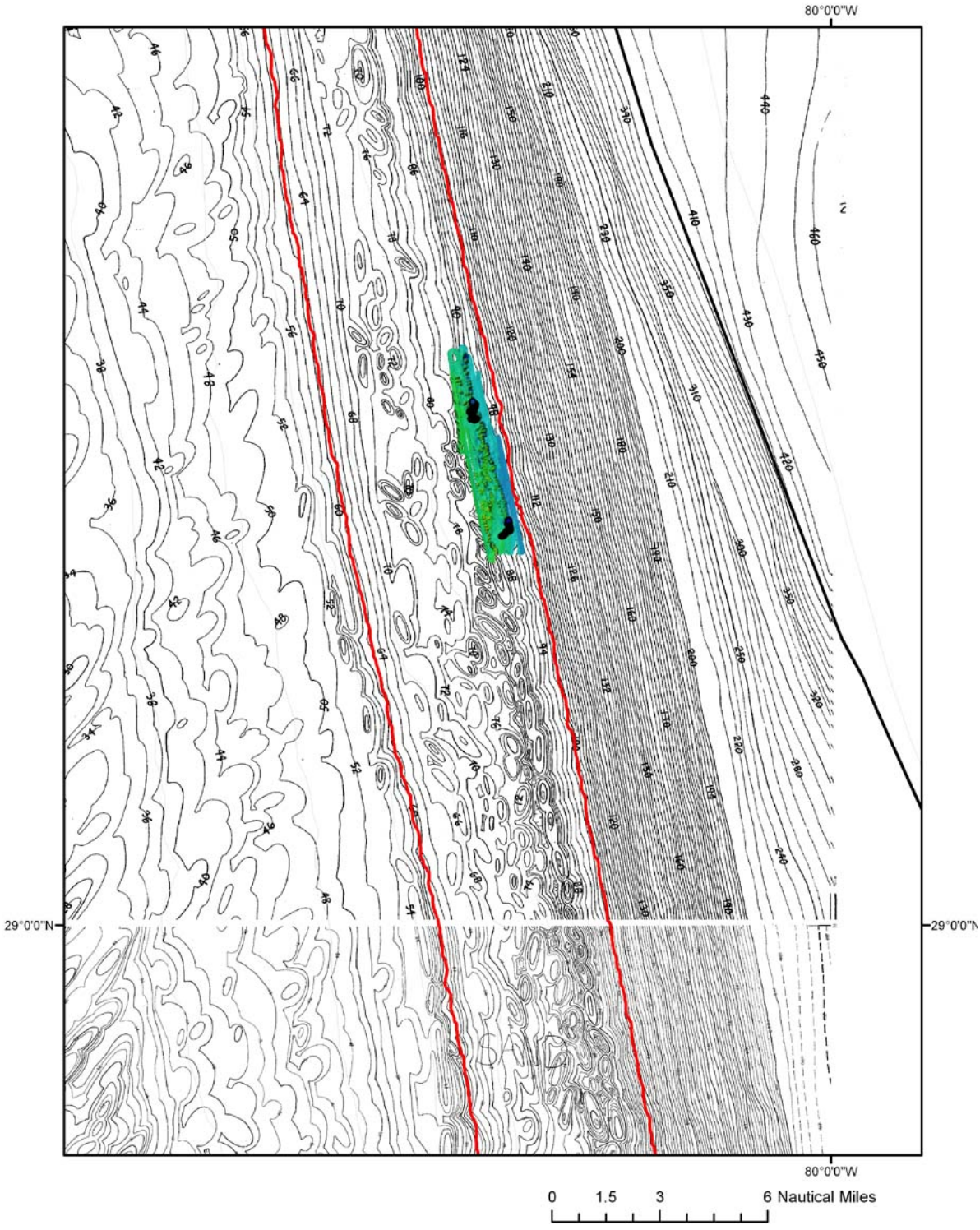



Figure 3. Middle region of proposed *Oculina* HAPC North (see Fig. 1) showing multibeam and ROV dive tracks (thick black lines) off Daytona area from 2011 NOAA *Pisces* cruise.

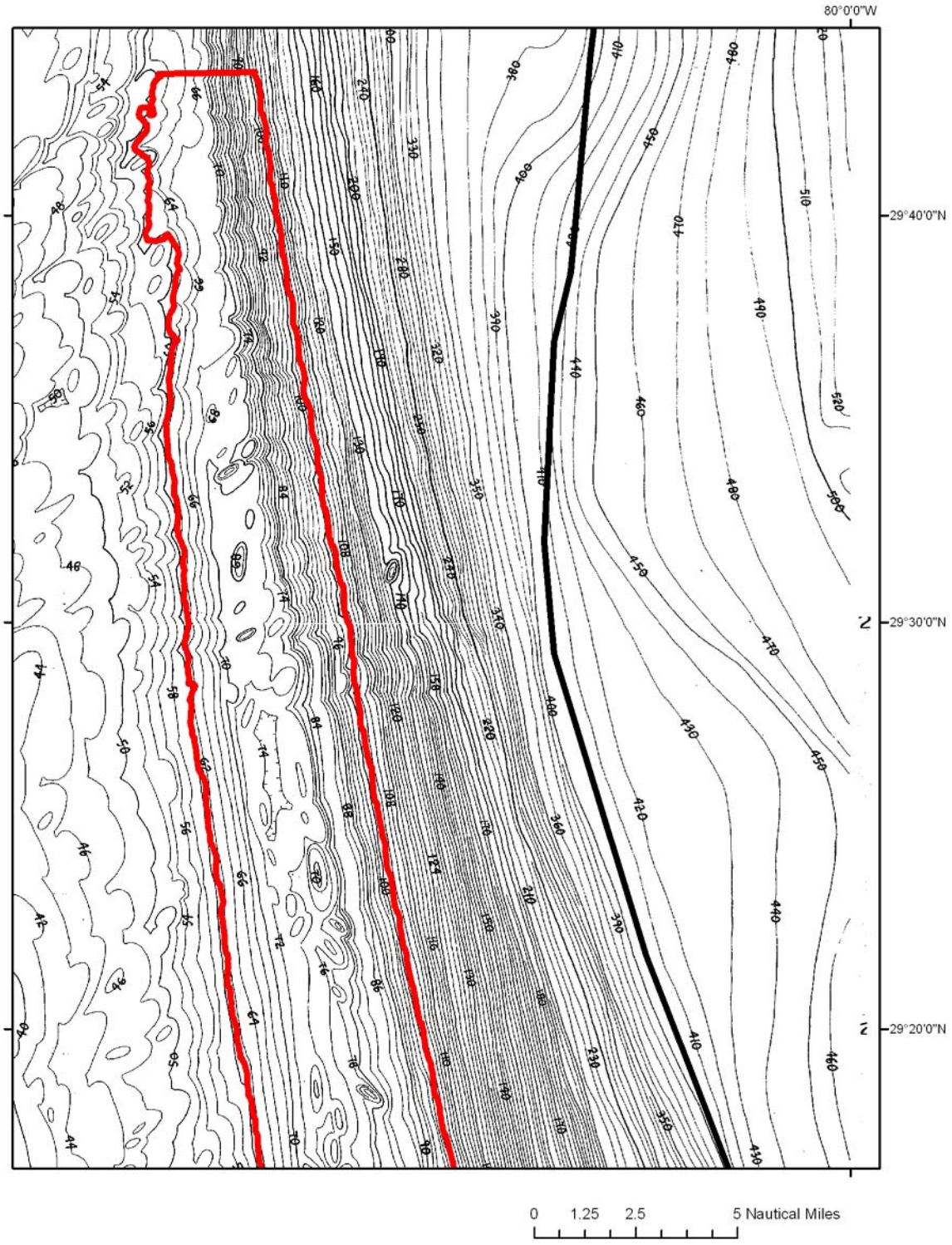
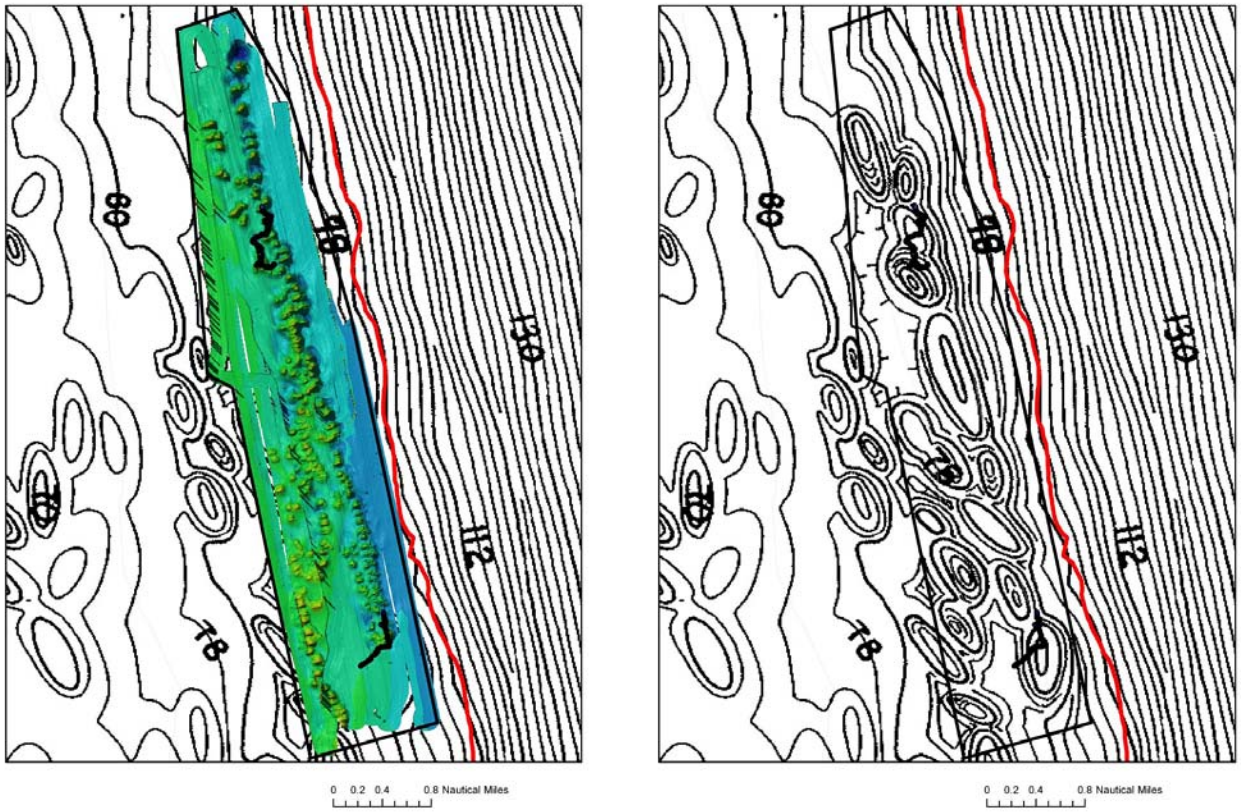
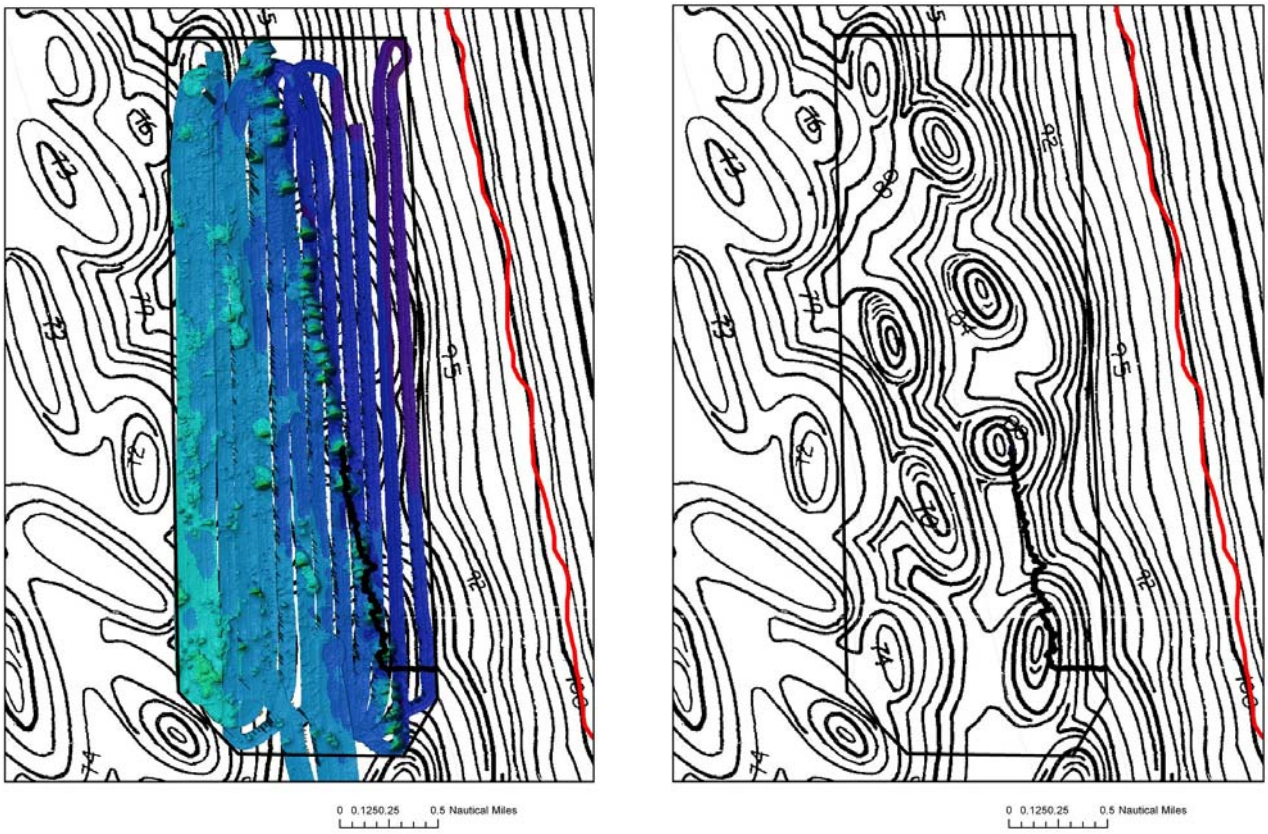



Figure 4. Northern region of proposed *Oculina* HAPC North (see Fig. 1).




A. B.

Figure 5 A (left). 2011 NOAA Ship *Pisces* multibeam sonar off Daytona area with overlay of two ROV dive tracks (Dives 11-156A, 11-156 B; see Appendix 1 SEADESC dive reports). B (right). NOAA regional bathymetric contour chart of same site; black polygon is area of the multibeam in Figure A. Red line= 100 m contour line (NOAA- CRM_10m_nad83). The multibeam map shows over 100 individual, high-relief mounds (base depth from 80-90+ m; peaks 60-70 m). Two ROV dives (thick black lines) verified that these are *Oculina* coral mounds.




A. B.

Figure 6 A (left). 2011 NOAA Ship *Pisces* multibeam sonar off Titusville area with overlay of one ROV dive track (Dive 11-157A; see Appendix 1 SEADESC dive reports). B (right). NOAA regional bathymetric contour chart of same site; black polygon is area of the multibeam in Figure A. Red line= 100 m contour line (NOAA- CRM_10m_nad83). The multibeam map shows dozens of individual, high-relief mounds (base depth from 80-90+ m; peaks 60-70 m). The ROV dive (black line) verified that these are *Oculina* coral mounds.

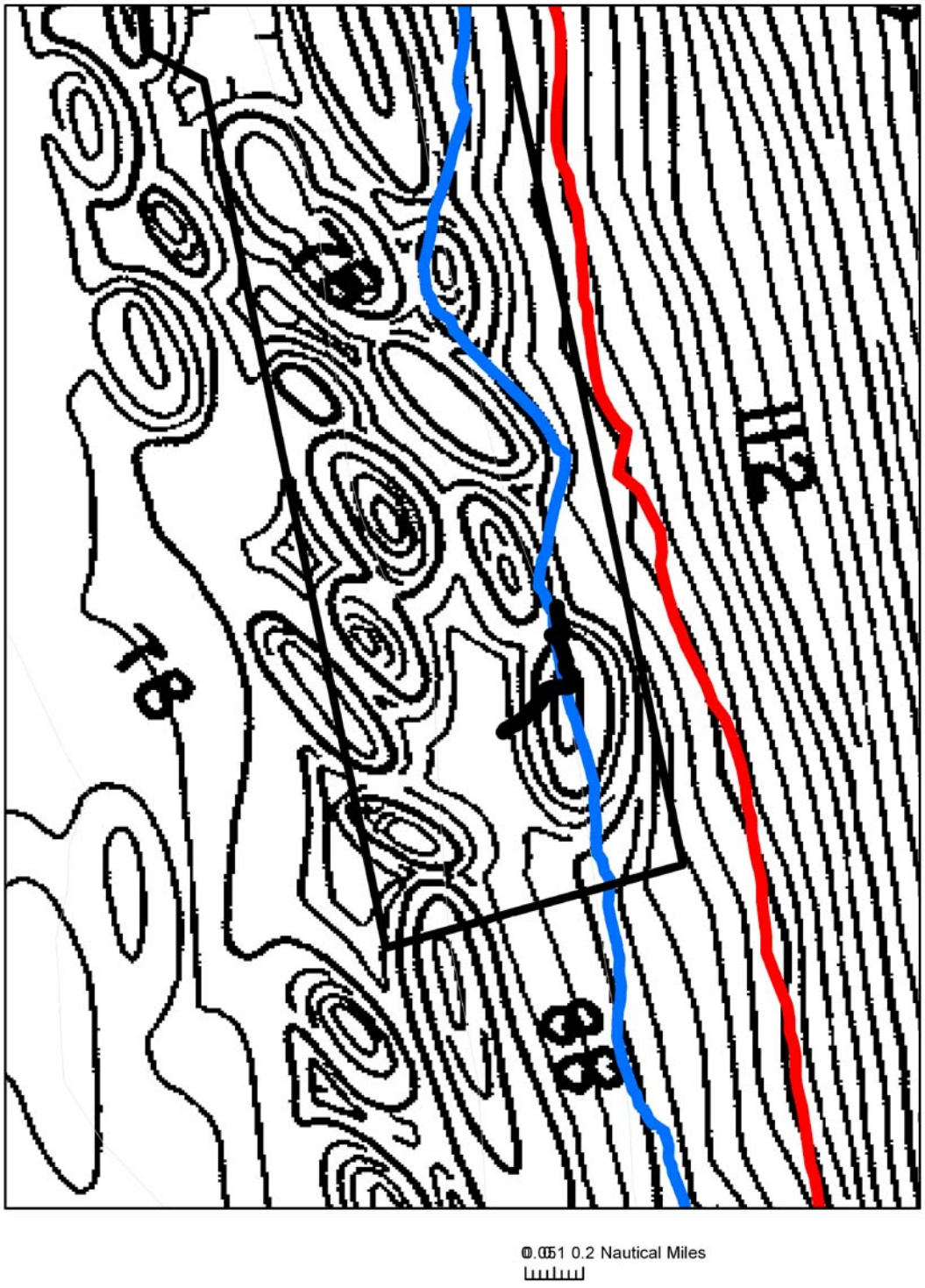



Figure 7. Close-up of NOAA regional bathymetric chart showing the 90 m (blue polyline) bathymetric contour line (NOAA- CRM_10m_nad83) bisecting apparent high-relief coral mounds. The 100 m (red line) contour parallels the eastern base of the coral mounds and avoids coral habitat. ROV track= thick black line. East of the coral mounds is the muddy Florida-Hatteras slope.

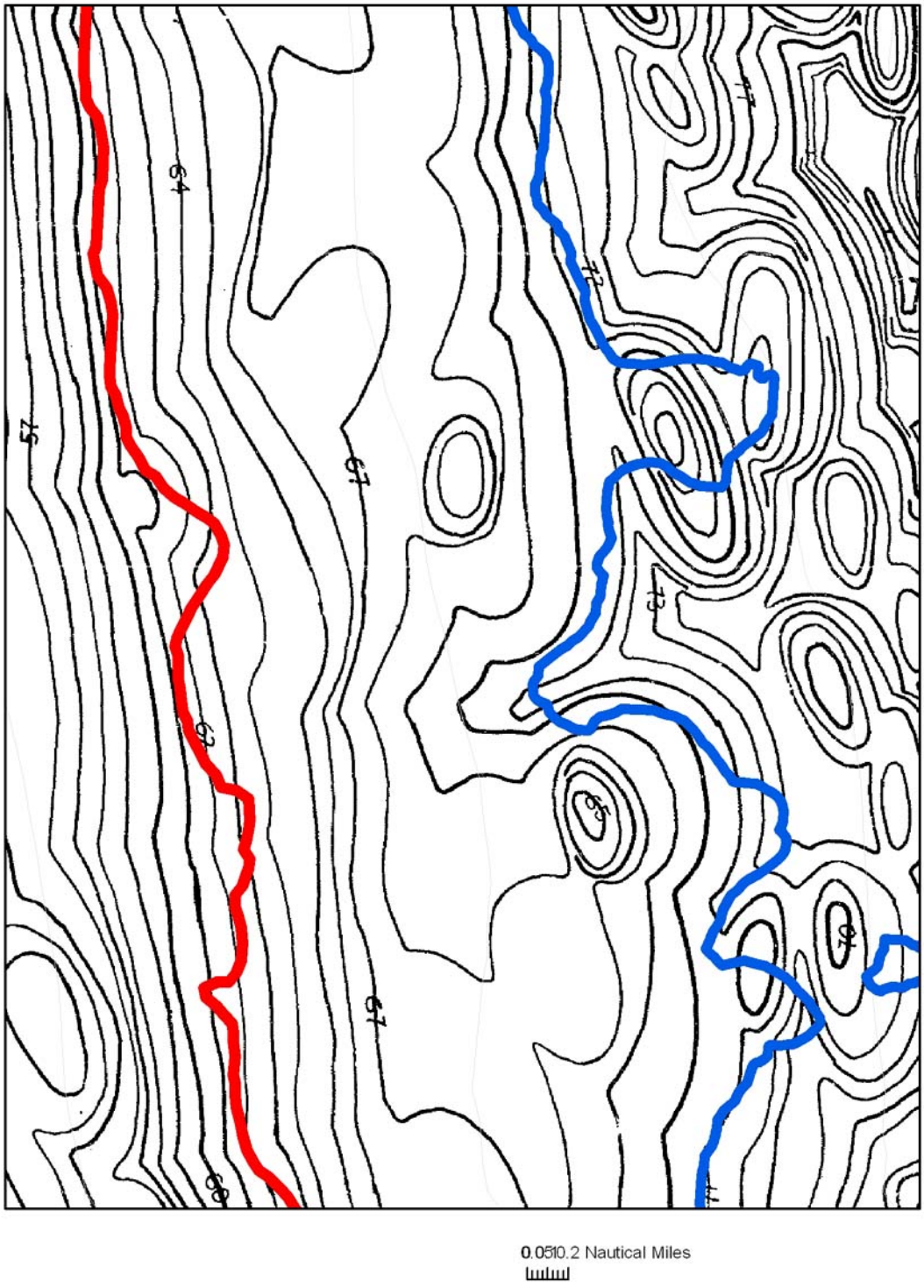



Figure 8. Close-up of NOAA regional bathymetric chart showing the 70 m (blue polyline) bathymetric contour line (NOAA- CRM_10m_nad83) bisecting apparent high-relief coral mounds. The 60 m (red line) contour parallels the western base of the coral mounds and avoids coral habitat.

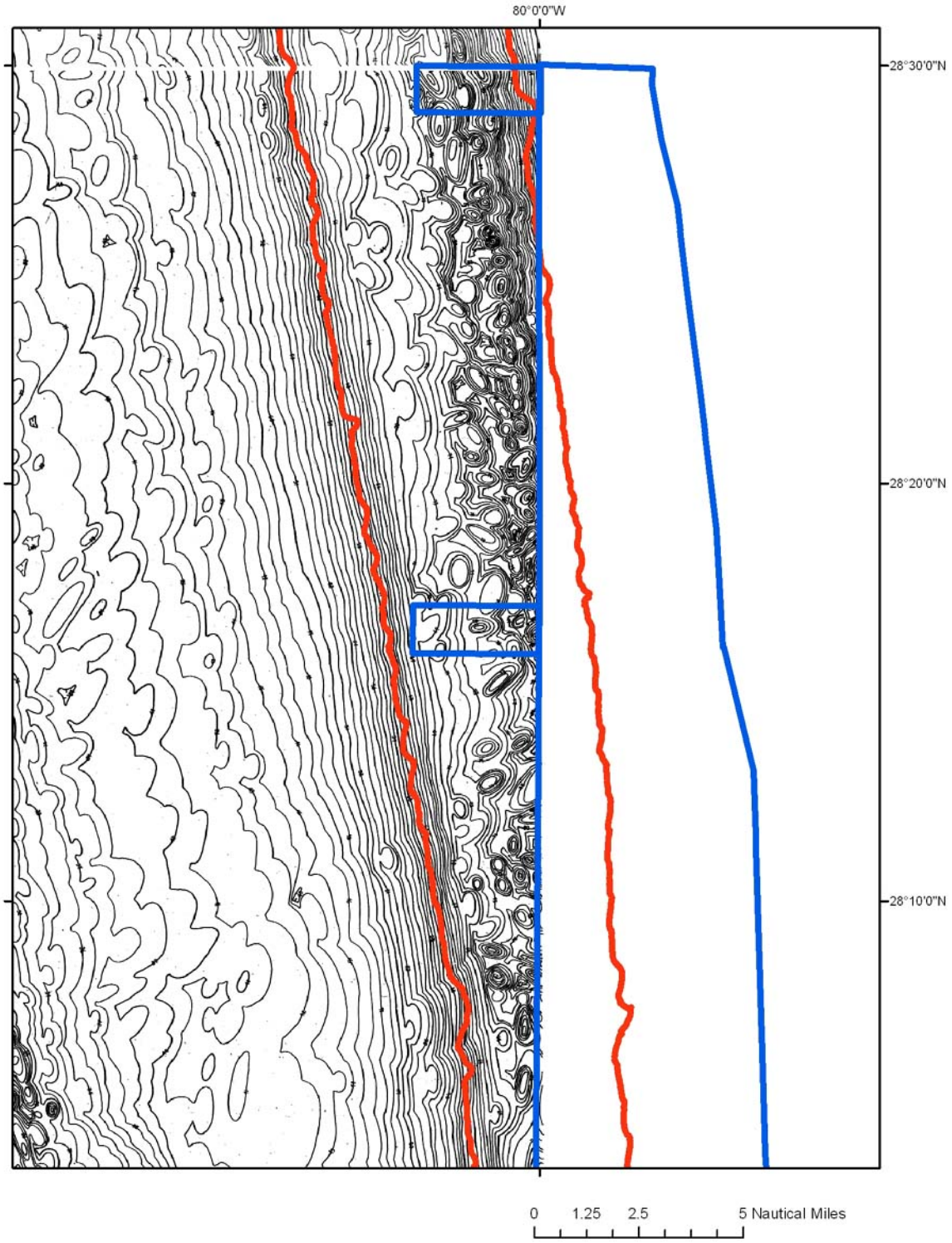
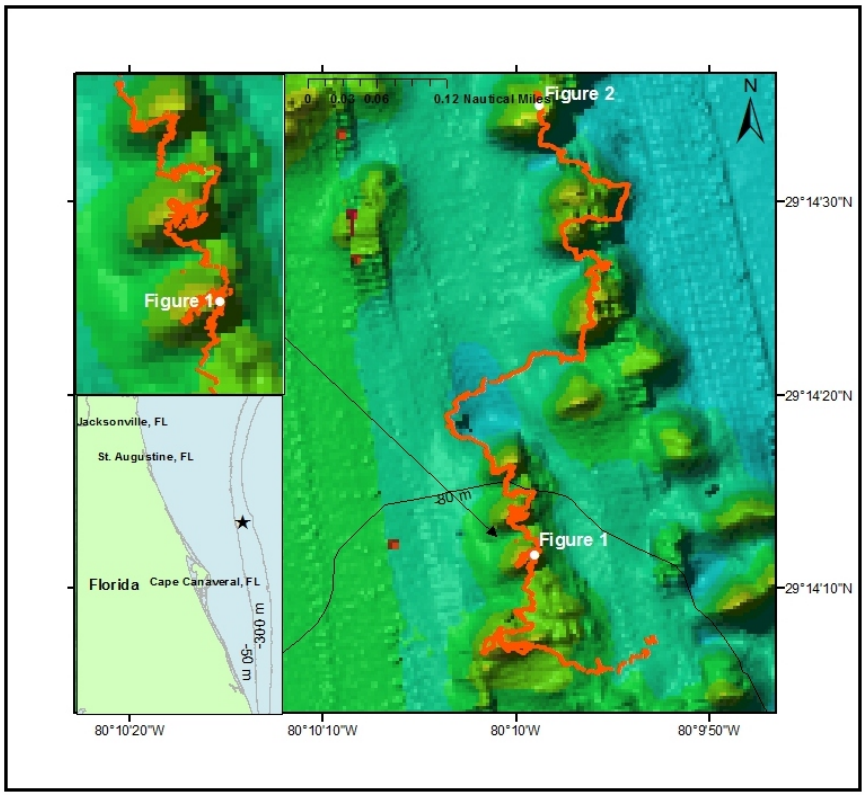



Figure 9. Proposed *Oculina* HAPC West. Blue polygons= current boundary of northern end of the *Oculina* HAPC and two OHAPC satellite areas. Red polylines = 60 m and 100 m contours lines, respectively (NOAA- CRM_10m_nad83). The proposed area could follow the 60 m contour line or use the 80$^{o}$ 03'N longitude which is the western edge of the OHAPC satellite areas. The southern end of the extension would end at 28$^{o}$ 4.5'N where the *Oculina* reef track enters into the current OHAPC.

**Dive Number:** NOAA SW Fisheries Phantom ROV 11-156A **Location:** Daytona Oculina Pinnacles, site 1

## Dive Track:




## Dive Overview:

| | | | |
|---|---|---|---|
| **Project:** | 2011 Extreme Corals, NOAA DSCP | **Sensors:** | Salinity, Temperature, Dissolved Oxygen, |
| **Principal Investator:** | Andrew W. David | **ROV Digital Photos:** | 560 |
| **PI Contact Info:** | NOAA Fisheries; Panama City Laboratory | **ROV Videos:** | 2 - Sony HDV tapes PDV-276HD, Std. Def |
| **Purpose:** | Map and characterize DSCE off SE USA | **DVDs:** | 5 |
| | | **ROV Navigation Data:** | Yes- Winfrog |
| **Expedition Websites:** | http://cioert.org/xcorals2011 http://coralreef.noaa.gov/deepseacorals | **Ship Position System:** | GPS (not DGPS) |
| | | **Sonar Data:** | Yes- Multibeam - Simrad ME-70 |
| **ROV Dive #:** | NOAA SW Fisheries Phantom ROV 11-156A | **Specimens:** | 3 |
| **Vessel:** | NOAA R/V *Pisces* | **Data Management:** | Access database, Excel log, Winfrog |
| **Location:** | Daytona Oculina Pinnacles, site 1 | | |
| **Report Analyst:** | John Reed & Stephanie Farrington | **Scientific Observers:** | J. Reed, C. Messing, S. Farrington, J. Thoma, A. David, D.Figueroa |
| **Date of Dive:** | 6/5/2011 | **Date Compiled:** | 8/23/2011 |

**Dive Number:** NOAA SW Fisheries Phantom ROV 11-156A **Location:** Daytona Oculina Pinnacles, site 1

## Dive Data:

| | | | |
|---|---|---|---|
| **Minimum Bottom Depth (m):** | 70 | **Total Transect Length (m):** | 2524 |
| **Maximum Bottom Depth (m):** | 90 | **Surface Current (kn):** | .25 |
| **On Bottom (Time- GMT):** | 13:34 | **On Bottom (Lat/Long):** | 29°14.1116'N, 80°09.8650'W |
| **Off Bottom (Time- GMT):** | 17:53 | **Off Bottom (Lat/Long):** | 29°14.5875'N, 80°09.9818'W |

**Physical (bottom); Temp (°C):** 14.1 **Salinity:** 35.8 **Visibility (m):** 18 **Current (kn):** 0

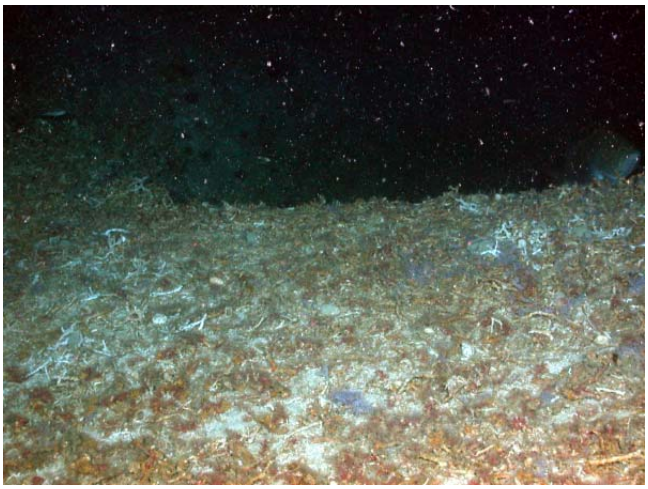


Figure 1: *Oculina* rubble habitat (Image: DSCN7160)

Figure 2: *Oculina varicosa* (Image: DSCN7584)

**Notes (Objectives, Site Description, Habitat, Fauna):**

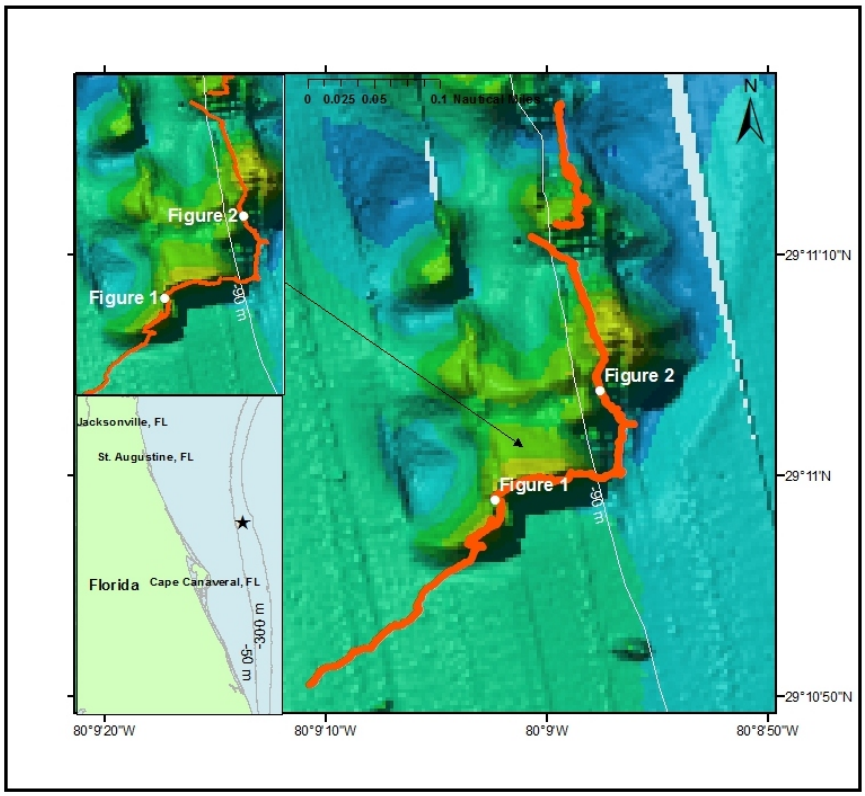
Objective: Survey *Oculina* coral mounds and ground truth sonar survey in area outside *Oculina* HAPC and never surveyed previously. Target site- *Oculina* mound (from *Pisces* multibeam): 29° 14.17'N, 80° 9.802'W; 70-90 m.

Dive Events: Surveyed seven *Oculina* mounds at the northern end of the *Pisces* Daytona sonar survey area. Prior to dive had to switch to different ROV and umbilical with standard definition camera. The *Phantom* ROV's top parallel lasers are calibrated at 20 cm, bottom lasers 61cm.

Site Description/Habitat/Fauna: *Pisces* shipboard multibeam surveyed for first time an area of deep-sea *Oculina* coral mounds along the shelf edge break, ~40 nmi north of the *Oculina* HAPC. The sonar survey off Daytona covered 5.7 x 0.8 nmi, discovering >100 mounds, 15-20 m relief, forming a very dense linear pattern oriented NNW-SSE. Individual mounds are conical to E-W oriented ridges, 150-450 m wide at the base, and with base depths of 85-90 m, and peaks 70-75 m. Mounds are *Oculina* bioherms; 70-100% coral rubble and mud on slopes (10-45°) and peaks, with scattered live and dead standing colonies of *Oculina varicosa* (white, azooxanthellate); most colonies ~10-30 cm diameter. The peaks are generally E-W ridges covered with coral rubble and patches of abundant standing dead coral. Near the base of some mounds is exposed rock pavement and 1-2 m ledges. Valleys between the mounds is mostly soft sediment, sandy mud, and shell hash. Dominant fauna: Fish- scamp (common), few gag and snowy grouper, red porgy, amberjack, tilefish burrow, black seabass, bank butterfly, blue angel, moray, roughtongue bass, bigeye, scorpionfish, batfish, wrasses, Ogcocephalidae; Sponges- Demospongiae, barrel sponge; Cnidaria- *Oculina varicosa* (Ivory tree coral), *Telesto*, Plexauridae, *Titanideum*, *Condylactis gigantea*, Cerianthidae, Antipatharia; Polychaeta- Sabellidae; Echinoderms- *Eucidaris tribuloides*, *Centrostephanus*, *Narcissia trigonaria*, *Astroporpa annulata*.

**Dive Number:** NOAA SW Fisheries Phantom ROV 11-156B **Location:** Daytona Oculina Pinnacles, site 2, southern end

## Dive Track:




## Dive Overview:

| | | | |
|---|---|---|---|
| **Project:** | 2011 Extreme Corals, NOAA DSCP | **Sensors:** | Salinity, Temperature, Dissolved Oxygen, |
| **Principal Investator:** | Andrew W. David | **ROV Digital Photos:** | 270 |
| **PI Contact Info:** | NOAA Fisheries; Panama City Laboratory | **ROV Videos:** | 1 - Sony HDV tapes PDV-276HD, Std. Def |
| **Purpose:** | Map and characterize DSCE off SE USA | **DVDs:** | 3 |
| | | **ROV Navigation Data:** | Yes- Winfrog |
| **Expedition Websites:** | http://cioert.org/xcorals2011 http://coralreef.noaa.gov/deepseacorals | **Ship Position System:** | GPS (not DGPS) |
| | | **Sonar Data:** | Yes- Multibeam - Simrad ME-70 |
| **ROV Dive #:** | NOAA SW Fisheries Phantom ROV 11-156B | **Specimens:** | 0 |
| **Vessel:** | NOAA R/V *Pisces* | **Data Management:** | Access database, Excel log, Winfrog |
| **Location:** | Daytona Oculina Pinnacles, site 2, southern end | | |
| **Report Analyst:** | John Reed & Stephanie Farrington | **Scientific Observers:** | J. Reed, C. Messing, S. Farrington, J. Thoma, A. David, D.Figueroa |
| **Date of Dive:** | 6/5/2011 | **Date Compiled:** | 8/23/2011 |

**Dive Number:** NOAA SW Fisheries Phantom ROV 11-156B **Location:** Daytona Oculina Pinnacles, site 2, southern end

## Dive Data:

| | | | |
|---|---|---|---|
| **Minimum Bottom Depth (m):** | 70 | **Total Transect Length (m):** | 1338 |
| **Maximum Bottom Depth (m):** | 92 | **Surface Current (kn):** | .75 |
| **On Bottom (Time- GMT):** | 19:45 | **On Bottom (Lat/Long):** | 29°10.8294'N, 80°09.1835'W |
| **Off Bottom (Time- GMT):** | 21:47 | **Off Bottom (Lat/Long):** | 29°11.2590'N, 80°08.9894'W |

**Physical (bottom); Temp (°C):** 14.1 **Salinity:** 35.81 **Visibility (m):** 12 **Current (kn):** 0

Figure 1: *Oculina* rubble habitat with demosponge and Cidaroida urchins (Image: DSCN7708)

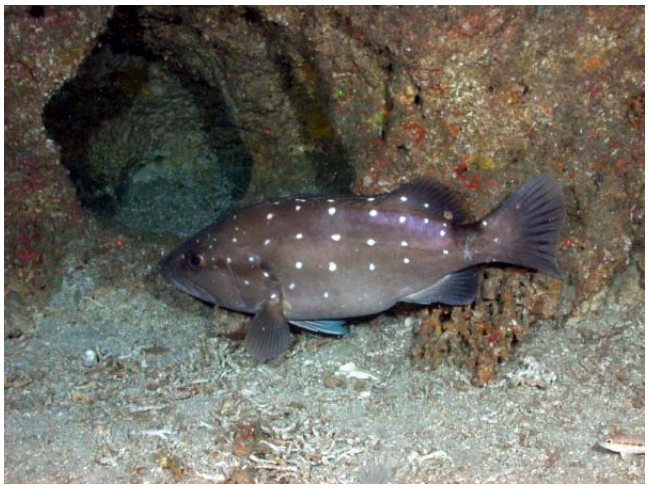


Figure 2: Snowy grouper (*Epinephelus niveatus*) (Image: DSCN7826)

**Notes (Objectives, Site Description, Habitat, Fauna):**

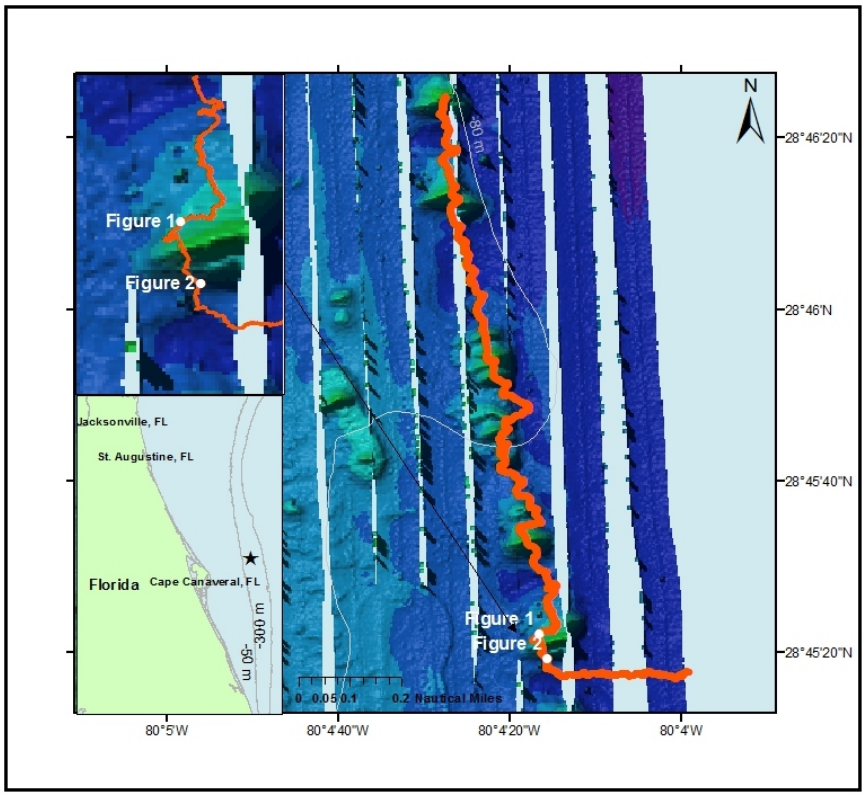
Objective: Survey *Oculina* coral mounds and ground truth sonar survey in area outside *Oculina* HAPC and never surveyed previously. Target site- *Oculina* mound (from *Pisces* multibeam): 29° 10.948'N, 80° 9.0585'W; 70-90 m.

Dive Events: ROV transect surveyed four *Oculina* mounds at the southern end of the *Pisces* Daytona sonar survey area. One colony (15 cm) of *Oculina varicosa* was collected with a by-catch of two crabs.

Site Description/Habitat/Fauna: ROV ground truthed that the mounds are *Oculina* bioherms; ~70-100% coral rubble and mud on slopes (10-45o) and peaks, with scattered live and dead standing colonies of *Oculina varicosa* (white, azooxanthellate); most colonies ~10-30 cm diameter. Individual mounds are E-W oriented ridges with base depths of 85-90 m, and peaks 70-75 m. The peaks are covered with coral rubble and patches of abundant standing dead coral. Near the base of some mounds is exposed rock pavement and 1-2 m ledges. Valleys between the mounds is mostly soft sediment, sandy mud, and shell hash. Dominant fauna: Fish- snowy grouper, dozens of greater amberjack, black seabass, bank butterfly, bigeye, roughtongue bass; Cnidaria- *Oculina varicosa* (Ivory tree coral), dense burrowing anemones Cerianthidae, *Virgularia*, *Stichopathes*, hydroids; Echinoderms- *Ophioderma devaneyi*, dense congregations of black long-spined urchins *Centrostephanus*, *Arbacia punctulata*, *Eucidaris tribuloides.*

**Dive Number:** NOAA SW Fisheries Phantom ROV 11-157A **Location:** North Canaveral Oculina Mounds - Site 1; Reed Site DR 14

## Dive Track:




## Dive Overview:

| | | | |
|---|---|---|---|
| **Project:** | 2011 Extreme Corals, NOAA DSCP | **Sensors:** | Salinity, Temperature, Dissolved Oxygen, |
| **Principal Investator:** | Andrew W. David | **ROV Digital Photos:** | 1072 |
| **PI Contact Info:** | NOAA Fisheries; Panama City Laboratory | **ROV Videos:** | 2 - Sony HDV tapes PDV-276HD, Std. Def |
| **Purpose:** | Map and characterize DSCE off SE USA | **DVDs:** | 6 |
| | | **ROV Navigation Data:** | Yes- Winfrog |
| **Expedition Websites:** | http://cioert.org/xcorals2011 http://coralreef.noaa.gov/deepseacorals | **Ship Position System:** | GPS (not DGPS) |
| | | **Sonar Data:** | Yes- Multibeam - Simrad ME-70 |
| **ROV Dive #:** | NOAA SW Fisheries Phantom ROV 11-157A | **Specimens:** | 7 |
| **Vessel:** | NOAA R/V *Pisces* | **Data Management:** | Access database, Excel log, Winfrog |
| **Location:** | North Canaveral Oculina Mounds - Site 1; Reed Site DR 14 | | |
| **Report Analyst:** | John Reed & Stephanie Farrington | **Scientific Observers:** | J. Reed, C. Messing, S. Farrington, J. Thoma, A. David, D.Figueroa |
| **Date of Dive:** | 6/6/2011 | **Date Compiled:** | 8/23/2011 |

**Dive Number:** NOAA SW Fisheries Phantom ROV 11-157A **Location:** North Canaveral Oculina Mounds - Site 1; Reed Site DR 14

## Dive Data:

| | | | |
|---|---|---|---|
| **Minimum Bottom Depth (m):** | 64 | **Total Transect Length (m):** | 3747 |
| **Maximum Bottom Depth (m):** | 88 | **Surface Current (kn):** | 0.8-1.5 |
| **On Bottom (Time- GMT):** | 16:11 | **On Bottom (Lat/Long):** | 28°45.2923'N, 80°03.9855'W |
| **Off Bottom (Time- GMT):** | 21:41 | **Off Bottom (Lat/Long):** | 28°46.4133'N, 80°04.4582'W |

**Physical (bottom); Temp (°C):** 13.3 **Salinity:** 35.7 **Visibility (m):** 15 **Current (kn):** .3-.6

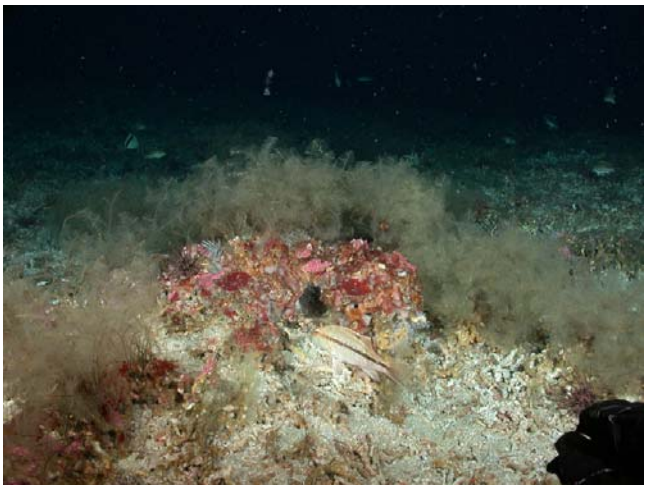


Figure 1: *Oculina* rubble habitat (Image: DSCN8040)

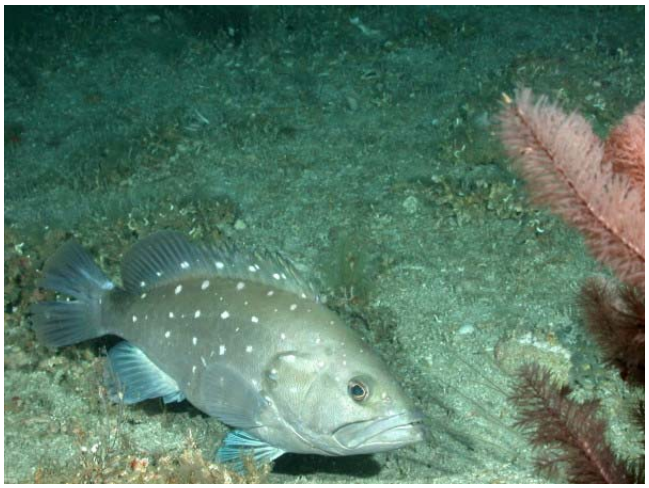


Figure 2: Snowy grouper (*Epinephelus niveatus*) and *Tanacetipathes* (Image: DSCN8268)

**Notes (Objectives, Site Description, Habitat, Fauna):**

Objective: Survey *Oculina* coral mounds and ground truth sonar survey in area outside *Oculina* HAPC. Target site- *Oculina* mound (from *Pisces* multibeam): 28° 45.497'N, 80° 04.283'W, 64-88 m. Only one submersible dive has been made in this area in 1982 on Reed Peak DR-14 (JSL I-1209).

Dive Events: ROV transect crossed ten *Oculina* coral mounds on a northerly heading. One colony of black coral (15 cm) was collected: *Tanacetipathes* sp. with six associated animals.

Site Description/Habitat/Fauna: *Pisces* shipboard multibeam surveyed for first time an area of deep-sea *Oculina* coral mounds along the shelf edge break, ~15 nmi north of the *Oculina* HAPC. The sonar survey off Titusville covered ~3.2 x 1.0 nmi, discovering ~35 10-20 m-tall mounds oriented in a linear pattern parallel to the shoreline NNW-SSE. Individual mounds are oval with an E-W oriented ridge at the peak; the peaks range from 64-75 m depth and the bases 80-88 m. Individual mound slopes and peaks are nearly 100% coral rubble with sparse small (10-40 cm) live *Oculina varicosa* coral colonies; the peaks appear hummocky with 20-cm tall patches of standing dead coral. The northern bases of the mounds have exposed rock boulders and 1 m ledges. Some of the dead coral appears to be coated with black fuzz, possibly cyanobacteria(?). Dominant fauna: Fish- snowy grouper, scamp, gag grouper, red porgy (common), black seabass (abundant), bigeye, bank butterfly, scorpaenids, roughtongue bass, cubbyu, red hogfish, tattler, leopard toadfish, toadfish, greater amberjack; Cnidaria- *Oculina varicosa (*Ivory tree coral)*, Stichopathes*, Plexauridae, *Nidalia*, hydroids, Cerianthidae, Antipatharia; Echinoderms- *Centrostephanus*, *Eucidaris tribuloides*, *Ophioderma devanyi*, *Astroporpa annulata*. Video of trawl door.

# EXTREME CORALS 2010

## Cruise Report for NOAA ship *Ronald H. Brown*, 9-23 November 2010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**20 January 2011**

## BACKGROUND

To our knowledge the southeastern US (SEUS) and Gulf of Mexico (GOM) have the most extensive areas of *Lophelia pertusa* dominated habitats in US waters; however, until recently these regions were poorly explored. Deep coral habitats are difficult to study because of their great depths, rugged bottom topography, and extreme currents (i.e., Gulf Stream, Loop Current). In general, to study deep-sea coral banks requires expensive sampling techniques (e.g., manned submersibles, ROVs), which hampers the scope of research projects. In addition, the lack of substantial commercial fisheries in these depths made them low priority for research funding. Over the past decade, however, there has been considerable investment by federal agencies in deep coral research in the US. Although this has considerably expanded our knowledge of these complex ecosystems, research cruises continue to yield new data, and much of these regions still remains to be explored.

Research cruises off the SEUS and in the GOM have focused on the scleractinian coral *Lophelia pertusa* because it is abundant, widely distributed, and creates complex structure that provides habitat for diverse communities of invertebrates and fishes. The research objectives and methods applied to *Lophelia* habitats are also applicable to other hard substrata ecosystems, including mixed corals and sponges, as well as artificial substrata such as shipwrecks and oil platforms. The research conducted during the 2010 cruise builds upon previous work by the cruise participants, who plan to expand ongoing research topics to increase understanding of these ecosystems and address major research gaps. As an integrated regional exploration of deep-reef physical structure and ecology, this interconnected, multidisciplinary approach will advance our understanding of important deep-sea habitats. Using standardized methods in all study regions facilitates comparisons among complex habitats over great depth and latitudinal ranges, and increases our understanding of how these ecosystems function and the degree to which they are interconnected.

NOAA's Coral Reef Conservation Program, through its Deep Sea Coral Research and Technology Program (DSCRTP) sponsored this research expedition, which is year two of a three-year research effort in the SEUS region. This expedition maintains continuity with the DSCRTP 2009 cruise (see http://fl.biology.usgs.gov/DISCOVRE/cruise_plan_2009.html). Like the 2009 expedition, the 2010 cruise was a partnership between NOAA, the University of NC at Wilmington, USGS, and a variety of collaborators. The multi-disciplinary team of investigators (see below) addressed: 1) program needs of the NOAA DSCRTP, 2) management needs of the South Atlantic Fishery Management Council (SAFMC), and 3) ongoing participant research priorities. Scientists from NOAA's Cooperative Institute for Ocean Exploration Research and Technology (CIOERT) participated in the mission and collaborated with multiple science objectives. The research cruise utilized the NOAA ship *Ronald H. Brown* and the *Jason II* ROV (Woods Hole Oceanographic Institute). The research objectives emphasized the use of the ROV, but allowed for other sampling activities to generate data for complementary objectives. This expedition occurred immediately after a similar deep coral cruise (Lophelia II project funded by BOEMRE) in the GOM using the same ship and ROV. While impacts from the recent Deepwater Horizon oil spill seemed unlikely in this part of the Atlantic, cruise participants were aware of potential impacts and recorded any apparent oil related phenomena.

The cruise mobilized in Pensacola, FL (08-09 Nov 2010) and demobilized in Cape Canaveral, FL (23 Nov). The ROV *Jason II* was used to conduct video transects and other photographic documentation, deploy equipment and make collections to meet the cruise objectives. When weather permitted, a single ROV dive was completed per day, and generally one to two days were spent at each site. In addition to ROV operations, several multibeam sonar surveys, CTD/Niskin

rosette casts, and otter trawls were conducted. Several small colonies of *Lophelia* were collected and maintained alive in a chilled re-circulating system on the ship, and we conducted some experiments on board ship with these samples. Although weather was marginal for much of the cruise, the cruise was generally considered successful. The expedition covered a large area and completed nine (of 12 scheduled) ROV dives, with additional sampling gear deployed whenever logistics and conditions allowed.

This cruise title was 'Extreme Corals 2010' and two internet sites (http://deepcoral.wordpress.com and http://cioert.org/xcorals) documented cruise progress and facilitated public awareness of deep coral ecosystems and cruise objectives. These sites were linked to and supplemented by other sites which also had information about past missions (http://naturalsciences.org/microsites/education/deepsea/index.html) or about deep-sea corals in general (www.lophelia.org). This report describes the field work accomplished during this cruise. Data analyses will follow and be detailed in future reports.

## CRUISE OBJECTIVES

The Extreme Corals cruise directly followed a research cruise on deep corals in the GOM (funded by BOEMRE), which had similar objectives. Where possible, we collected samples for the BOEMRE-funded scientists, as they had done for scientists on the Extreme Corals cruise. The Extreme Corals cruise had several target deep coral sites in the eastern GOM and off the East coast of Florida (see Figs. 1-3). Considering the recent Deepwater Horizon oil spill (MC 252 Macondo well), special attention was paid to the status of habitats and communities encountered. If oil contamination was observed, it was entered onto station data sheets as appropriate. Cruise objectives were: 1) Document coral and sponge habitats, 2) Describe habitat associations, community structure, and map distributions of coral habitats, 3) Examine growth, reproduction, feeding and energetics of major structure forming corals, 4) Determine trophodynamics of communities associated with reef and off-reef habitats, 5) Collect samples for paleoecology (coral age, growth and historical temperature and productivity), 6) Describe reef physical environment 7) Collect water samples for aragonite saturation analysis from near corals and water column, 8) Collect live corals for multiple analyses and experiments, 9) Collect sponge samples for taxonomy, genetics and habitat characterization, 10) Collect samples for population genetics to assess connectivity between deep coral ecosystems, 11) Conduct education/outreach activities (teacher at sea, web sites, daily updates, blogs, etc.). Each PI provided data that allowed prioritization of dive locations, numbers of samples and target species. Each ROV dive always had multiple objectives, with tasks given priority for specific dives.

## METHODS

### Study Areas

All target study sites for this project were on the continental slope ($\geq$ 200 m) off the East coast of Florida, except for one station on the West Florida slope that was visited during transit to the Atlantic (Figs. 1-3). Multibeam sonar data from past surveys (as well as new data collected during the cruise) were used to help identify dive and sampling sites as well as to improve ROV navigation. Target sites were prioritized according to several criteria: 1) areas that were poorly explored and had a high probability of having well developed coral ecosystems, 2) areas that were high priority for the South Atlantic Fishery Management Council, 3) areas that represented data gaps in long term studies, 4) new areas that had not been explored previously. Similar methodologies were applied at all sites to facilitate large area comparisons.

**Science Personnel**

The science crew came from Wilmington, NC, Bellevue, WA, College Station, TX, St. Petersburg, FL, Leetown, WV, Ft. Pierce, FL, Raleigh, NC, Lafayette, LA and Washington, DC. The science crew arrived at the ship on 7-8 November in Pensacola. The ROV crew was already on the ship, having participated in the previous GOM cruise. We conducted 24 hour operations with the scientific crew divided into two watches: 12 hrs on-12 hrs off. The night watch was on duty from 2000 to 0800 hr, while the day watch operated from 0800 to 2000 hr. The main night responsibilities were multi-beam sonar survey, bottom sampling with otter trawls, CTD casts, water sampling and specimen or data processing. Day watch responsibilities centered around ROV operations, but also included CTD casts and water sampling, multibeam sonar surveys, specimen processing and maintaining live coral tanks.

**Personnel (assignments, * = watch chief)**

Steve W. Ross* (UNCW, Chief Scientist, co-Lead PI) - Overall organization and cruise logistics, ROV ops, fish communities
Sandra Brooke (MCBI, co-Chief Scientist, co-Lead PI) – Assist with cruise logistics, coral biology, live corals, aragonite samples, ROV ops
Martha S. Nizinski (NMFS Systematics Lab, day) - ROV ops, wet lab organization, invertebrate data (all collections)
Andy David (NOAA Fisheries, day) – assist all day ops., ROV ops
John Tomczuk (NOAA, day) - Data Manager for NOAA
Brendan Roark (TAMU, day) – coral samples for paleoecology, ROV ops
John Reed (HBOI, FAU, day) – sponge data, help with site selection, ROV ops
Mike Dunn (NCMNS, day) – Educator & outreach activities, web maintenance
Art Howard (ArtWork, Inc., day) – Videographer, support education & outreach
Beverly Owens (NCMNS, day) – teacher at sea provided by NCMNS
Peyton Hale (NCMNS, day) – Photographer, assist education & outreach
Katherine Coykendall (USGS, day) – Scleractinian genetics samples, coral samples, ROV ops
Jana Thoma (Univ. of Louisiana, day) – Octocoral genetics samples, coral samples, ROV ops
Mike Rhode* (UNCW, night watch chief) – CTD casts, bottom nets, gear management, GIS support, multibeam sonar
Tara Casazza (UNCW, night) – CTD casts, bottom nets, gear management
Jenny McClain (UNCW, night) - Data management, CTD casts, isotope sample processing, video copying
Steve Matthews (NOAA Fisheries, night) – CTD, assist all night ops

Ten ROV crew were provided by WHOI to operate the *Jason II* ROV.

**Field Methods**

The *Ronald H. Brown* departed Pensacola, FL on 9 Nov 2010 (about 0900 hr) and steamed for coral banks located on the west Florida slope (about 270 nmi distance), arriving on station in the morning of 10 November. Because the *Jason II*'s new navigation system required calibration, the first activity in this study area was to deploy an elevator at ~600 m depth and conduct calibration transects. This required six to seven hours; however, the elevator acoustic release failed and *Jason II* was launched to recover it. This delayed operations considerably and the dive in this area was shortened (just over five hr bottom time) and occurred at night. All other dives were mostly during daylight. After recovery of the vehicle, the vessel steamed to the Miami Terrace (about 360 nmi

distance), arriving on 12 November. Sea conditions were too rough to dive in this area, so we steamed south to the Pourtales Terrace, where we conducted a short ROV dive followed by multibeam sonar surveys. We continued to work in this area through 13 November, waiting for weather to improve further north. Adverse weather caused the ROV dive to be cancelled on 14 November; therefore, we conducted multibeam sonar surveys and then steamed north to the Jacksonville lithoherm study area where we conducted ROV and surface operations from 15-18 November. Since adverse weather prevented the ROV dive on 16 November, multibeam sonar surveys, CTD casts and transects were conducted in this region. After the dive on 18 November, the ship moved south to the study areas off Cape Canaveral. We again lost the ROV dive on 19 November due to inclement weather. We worked in the Cape Canaveral region from 19-22 November, conducting ROV dives, CTD casts, bottom trawls and multibeam sonar surveys. After the last ROV dive the *Ronald H Brown* moved inshore and waited all night until coming into Port Canaveral fueling dock on 23 November (about 0930). Science crews unloaded the vessel and departed that day.

***Jason II* ROV** (Figs. 4, 5)

Each ROV dive was scheduled for about 12 hours, 0800-2000 hr (deck to deck). While flexibility was allowed to respond to unforeseen events, most ROV dives followed a similar pattern, emphasizing bottom transecting, sample collecting and photographing specimens and habitats on or near the bottom. In general, a lead scientist managed the ROV dive assisted by two other people (an event logger and a video data manager) from the science crew. There were also three to four ROV crew in the control van. The lead scientist (this position rotated through the senior science personnel) controlled the dive activities and guided the ROV operators. Guidelines for dive objectives and video operations were provided in the cruise plan, and were re-iterated during the cruise as needed. Scientists in the control van used the WHOI computerized system to create event logs of launch and recovery, transect start and finish, collections, habitat observations, equipment deployments, etc., and also generated hard copy back-up datasheets to record the same information.

The ROV was usually launched south of the target site to compensate for the northerly Gulf Stream current. The descent through the water column to the seafloor took longer than expected on every dive, either due to strong currents or navigational problems. During descent, observations were made on distributions/behaviors of fauna or any indications of oil/dispersant contamination. Position fixes (GPS coordinates and depth) were taken when the ROV landed on bottom, at the start and end of each transect, at each collection, at noteworthy observations, and when the ROV left bottom. Specimen collecting began soon after landing on the bottom, unless target animal abundance was low. The relative proportion of time spent collecting samples, taking video transects or completing other objectives varied by dive and current conditions. For video transects, the high definition (HD) video camera (NDSF HDTV Hybrid Motion and Still Imaging System) was positioned to record directly in front of the ROV, set on wide angle (or near wide angle), and the ROV ran video transects at slow speeds with the ROV as near to bottom as possible as per past mission methods (see Ross and Quattrini 2007). This was modified as needed in areas of rugged topography or in heavy currents. Multiple transects were conducted on every dive and across all habitat types (including coral and non-coral areas). Two parallel red lasers mounted 10 cm apart were used for scale reference at all times, unless footage was being taken for outreach or website purposes. The HD video camera recorded continuously throughout the dive, and digital still images (digital camera, Insite Pacific Scorpio and HD video frame grabs) were taken frequently to augment the video footage. Sample collections were documented with video and digital photography. Specimens were collected during each dive as target fauna were encountered to meet multiple research objectives (trophodynamics, genetics, taxonomy, reproductive biology, and other

objectives). Large samples and those that were subsequently maintained alive were placed in the port and starboard insulated, polypropylene bioboxes. Other samples were placed in various other containers on the ROV tray or were suctioned into one of six acrylic sample buckets (Figs. 4, 5). Small samples were placed into PVC quivers that could accommodate up to three samples each, using rubber stoppers as dividers (Fig. 4); this greatly expanded sampling capacity. Additional sampling spaces were available on the bow extendable tray. Sampling of most mobile organisms (e.g., fishes and invertebrates) was limited since they move to quickly for the ROV manipulators. Bottom water samples were collected near coral colonies using two 5 L Niskin bottles, one attached to the top starboard frame and one to the bottom rear of the ROV (Fig. 5).

**Bottom Trawl**

Bottom trawling, using the 16' (3.5 m) otter trawl for 30 min tows, was accomplished at several locations off the Cape Canaveral area (Fig. 3). A 3:1 wire to depth scope was used for these tows. Once the appropriate amount of wire was determined, this gear was used with consistent success.

**CTD and Water Samples**

Because of limitations with the ROV's data logger the UNCW SeaBird CTD (SBE 19+) was attached to the ROV (Fig. 6) and recorded data throughout each ROV dive, providing environmental information in the water column as well as near bottom. Sensors on the instrument measured turbidity (Seapoint), fluorescence (Chelsea Instruments), dissolved oxygen, depth, conductivity, temperature, salinity, and pH at a frequency of once per second. At selected sites during the cruise, the ship's CTD array with water sampling rosette was used to record water column environmental data (see Fig. 7 for example profiles). The ship's CTD unit had limited sensor capabilities; therefore, the UNCW SeaBird SBE 911+ was attached to the CTD frame and used for these profiles. Water samples were collected during the upcast by triggering 5L Niskin bottles at selected stations from specific depths in the water column. Water samples collected during CTD casts and during ROV dives were processed according to standard protocols for later analysis of aragonite saturation and nutrients.

**General Specimen and Data Treatment**

Samples from all collections were processed at sea according to various scientific objectives. Taxonomy and genetic samples were preserved in 70% and 95% ethanol, respectively, and samples for reproductive analysis were fixed in 10% formalin-seawater solution. After arriving on deck, sub-samples were quickly taken from most specimens for stable isotope analyses (trophodynamic studies); tissue samples for isotope analyses were removed, dried, and saved separately from the rest of the specimens. Samples of *Lophelia pertusa* that were collected in the insulated bioboxes were sub-sampled for genetics, reproduction, and isotopic analysis, then transferred to the chilled tanks. These samples were ultimately shipped to tank systems at the Oregon Institute of Marine Biology and UNCW for future biological experiments. Selected species were set aside for on-board photography and were photographed on a light table under daylight balanced strobes or daylight balanced fluorescent lights. After being photographed, specimens were preserved for scientific objectives.

**Ship and ROV Operations**

In general, the *Jason* ROV and its equipment performed very well and were reliable. The exception was that the HD video imagery was not of acceptable quality. The lighting was poor and the camera was difficult to focus. For this reason most of our frame grabs from this camera were out of focus. Color balance for this camera was also out of balance for the first dive, but the science

team's videographer corrected this. The digital still camera was out of date and generally performed poorly. Collection capability was sufficient for our needs and the ROV team was flexible in accommodating different configurations. Overall the ROV crew exhibited a great deal of skill and dedication in trying to meet the needs of this mission; however, a greater degree of experience and confidence with Gulf Stream conditions would probably improved operational efficiency.

Inclement weather was a significant factor affecting ROV operations, as were the high currents of the Gulf Stream. The ship worked well with the ROV team to maintain stations and facilitate the ROV dives under challenging conditions. Several areas ship operations need improvement, and these were detailed in the post-cruise evaluation. These issues impacted amount of work accomplished. Some of these issues included slow responses to requests by science crew, rigid chain of command, very poor email/internet access, lack of knowledge about some operations, lack of 24 hr ops for survey crew, poor attitudes of some crew, and inadequate CTD instrument.

## FIELD RESULTS

### Sample summary

Overall, the cruise was a success, and we accomplished most of our objectives. Twenty-nine non-ROV stations were sampled or surveyed during this cruise, and nine ROV dives were successfully accomplished (Table 1, Figs. 1-3). Most of the scheduled ROV dives were accomplished, although many were of shorter duration than planned due to weather or equipment issues. While ROV dives were assigned one station number, all dives accomplished multiple objectives, which in many cases could be considered additional stations. The non-ROV stations included 22 CTD casts and 7 otter trawl tows (Table 1, Figs. 1-3). Examples of bottom habitats and fauna in each study area are provided in Figures 9-11.

A variety of samples were collected for many research topics (Table 2). For stable isotope analyses, 98 individual samples were collected from 10 taxa (Table 2). Most of these samples were dried on the ship and will later be processed for analysis of $\delta^{13}C$ and $\delta^{15}N$ as part of a larger study on the trophodynamics of deep reef ecosystems. A large number (unknown at present) of taxa were photographed at sea and were representative of the samples collected for research objectives. Many of the specimens that were photographed have not been identified, and some are likely to be new species or range extensions.

At least 38 taxa were subsampled for genetic studies, producing 245 tissue samples. These represent a valuable addition to our studies of connectivity among deep reef ecosystems. We added samples from several sites for which previous sample sizes were small. C.L. Morrison, A. Quattrini, J. Thoma, K. Coykendall will be analyzing these samples for various taxa over the next few years.

Eight coral taxa (67 samples) and two other invertebrate taxa (6 samples) were subsampled for analysis of reproductive condition. Most of these coral samples were *L. pertusa*, but also included other structure forming species such as *Enallopsammia profunda, Madrepora oculata, Keratoisis* sp. and *Leiopathes* sp. These samples were preserved at sea in 10% fully buffered formalin solution and will be transferred to OIMB for future analysis by S. Brooke. Thirteen small colonies of *L. pertusa* were retained alive from several different sites (SEUS and West Florida slope site) and were held in an insulated tank cooled to 7-8° C using a portable chiller (Fig. 8). These colonies were successfully transferred to the UNCW and OIMB after the cruise where they are being held in laboratory chiller systems for future research. Coral spawning was not observed in the field.

Fourteen water samples were taken from either surface, mid-water and or near bottom, with the majority of the samples taken close to coral communities. These samples will be analyzed for aragonite saturation state (Pacific Marine Environmental Laboratory, WA) and nutrient levels

(University of Washington) in 2011.

When inclement weather prevented other sampling, we mapped selected study sites using the ship's multibeam sonar system (Kongsburg EM 122). The survey areas were selected to support ROV dives during the cruise, and to expand existing multibeam data for the region. About 69 $km^2$ was mapped at the Pourtales terrace site, 412 $km^2$ off Cape Canaveral, and 834 $km^2$ off the Jacksonville area for an overall total of 1,315 $km^2$ mapped.

All general station data sheets were electronically entered into the Access database, checked, and archived on board ship and at the UNCW lab and are being edited as needed. All fish samples have been sorted and transferred to alcohol storage. Most macro-invertebrate samples were transported to the Smithsonian Institution for indentification and archiving by M. Nizinski.

**Observations related to the DWH oil spill**

We were particularly vigilant for signs of oil spill related damage. We were pleased to see the surface, water column, and benthic communities appeared to be healthy. At the general overview, macroscopic level, these communities and their habitats appeared to be in similar conditions as observed in pre-oil spill cruises. There were no overt signs of hydrocarbon of any kind observed at any stations during this cruise.

**Education, Outreach and Media**

The North Carolina Museum of Natural Sciences (NCMNS) provided outreach and education before, during and after the 14 day Extreme Corals Expedition. Museum educator Mike Dunn (Senior Manager of Outreach) and living collections specialist Peyton Hale were joined by Cleveland County 8th grade science teacher Beverly Owens and Emmy-award winning photographer Art Howard to share the mission with students, teachers and the general public. They did so through a variety of venues.

During the mission the NCMNS set up a website which included a daily blog, biographies of the research team, and links to partners and related sites. It also included links to the websites for previous missions. The blog provided information about the daily activities on the ship and interviews with the science team and ship and ROV crew. Over the course of the cruise there were 41 posts and 62 comments. The blog page has received 4,160 views to date. See http://deepcoral.wordpress.com. In addition to the Museum's site, the Cleveland County School System posted daily pictures from Ms. Owens, keeping the entire county linked to the mission.

The Cooperative Institute for Ocean Extension, Research and Technology also hosted a site which covered press releases, an expedition overview, and an explanation of NOAA's DSCRTP program objectives. This website was linked directly to the Museum site so that visitors to either location could read the daily updates and see the images. See also http://cioert.org/xcorals.

Twenty-five still images were provided for the press kit, and a DVD with 5 minutes of edited underwater footage was prepared for press distribution. On 26 Nov 2010 NOAA and partners distributed a press release to the media describing this cruise (see Appendix I). Articles appeared in several publications, including: The Daytona Beach news journal (http://www.news-journalonline.com/ news/local/east-volusia/2010/11/27/aquatic-showcase-nearby.html), TCPalm (http://www.tcpalm.com/news/2010/nov/24/noaa-news-expedition-explores-previously-uncharted/), The Shelby Star, Cleveland County Schools site (http://www.clevelandcountyschools.org/index.php/news/41-district-news/396-follow-cms-science-teacher-on-15-day-deep-sea-coral-expedition). Also, the local Cleveland County cable TV station interviewed Beverly Owens about the cruise.

## FUTURE WORK

Identification of specimens and analysis of data from this and the 2009 cruise are high priorities. However, these tasks are time consuming and require additional funding to move forward. The first task for all samples is to identify the animals collected. The first priority is to identify samples used for isotope analysis, followed by photo specimens, and then the remainder of the collections. In general, ROV samples have the highest priority for sample treatment. Analysis of samples for stable isotopes of carbon and nitrogen will proceed along with the identification process, and these samples will be sent to a contract lab for standard treatment. Analysis of fish diets will proceed after identifications and isotope analyses are complete, depending on funding. Other data treatments will proceed in various stages in the labs of the scientists who participated in these cruises. We expect data from the cruises to result in several peer reviewed publications in the future.

Future education/outreach activities include expected articles in the Wake Weekly and the Museum's Naturalist magazine. Beverly Owens has been contacted by a reporter from the Charlotte Observer for an interview in February. Art Howard is providing an additional 50-70 images to NOAA for use on their website and elsewhere. Peyton Hale's personal image gallery is linked to the CIOERT site and has had 875 views. Peyton is also providing a DVD of images to the participating scientists and will be giving a presentation to Carolinas Nature Photography Association Triangle chapter this summer detailing the trip and focusing on the photography that was done for the expedition. Liz Baird plans a presentation on the cruise and deep-sea corals at NC Science Teachers Association later this year. The NCMNS is continuing to incorporate deep-sea coral research into its displays and is designing a large gallery in the new building related to this, all of which relies heavily on these cruises.

## ACKNOWLEDGMENTS

The majority of the support for this cruise was provided by the NOAA Deep Sea Coral Science and Technology Program. Various levels of support were also provided by U.S. Geological Survey, Marine Conservation Biology Institute, NC Museum of Natural Sciences (NCMNS), and ArtWork, Inc. We thank Andy David, Andy Shepard, and John Tomczuk for help with a variety of issues before, during and after this cruise. We thank Liz Baird for assisting with organizing the education and outreach efforts. Dave Naar assisted with multibeam sonar data. Aaron Alexander (UNCW) and Karen Swain (NCMNS) managed the onshore web sites. We thank all cruise personnel (listed above) for their hard work and dedication while at sea and in dealing with logistics and data before and after the cruise. We thank the ship and shore based personnel who operated the *Ronald H. Brown*, especially the Operations Officer James Brinkley and the Bosun Bruce Cowden, for their assistance during the cruise. Finally, we thank the *Jason II* ROV personnel for their service and dedication during the mission.

Table 1. Stations sampled in the eastern Gulf of Mexico and western Atlantic off Florida (9-22 November 2010) using NOAA ship *Ronald H. Brown* (RB). D=Day (0800 to 2000 hr EST), N=Night (2000 to 0800 hr EST), S=surface. CTD=Seabird SBE 19+, OT=3.5 m otter trawl, ROV=*Jason II*. ROV total time and depth range data are only for the period when the ROV was on the bottom.

| Station # | Gear | Date | Time | Total Time (min) | Start Latitude (°N) | Start Longitude (°W) | End Latitude (°N) | End Longitude (°W) | Depth Range (m) |
|---|---|---|---|---|---|---|---|---|---|
| ROV-2010-RB-542 | ROV | 10-Nov-10 | N | 323 | 26° 12.228 | 84° 45.295 | 26° 12.312 | 84° 43.712 | 495-734 |
| ROV-2010-RB-543 | ROV | 12-Nov-10 | D | 103 | 24° 45.028 | 80° 27.196 | 24° 44.948 | 80° 27.298 | 169-212 |
| ROV-2010-RB-544 | ROV | 13-Nov-10 | D | 311 | 24° 25.989 | 80° 45.281 | 24° 25.697 | 80° 45.044 | 162-367 |
| ROV-2010-RB-545 | ROV | 15-Nov-10 | D | 598 | 30° 41.850 | 79° 40.677 | 30° 43.826 | 79° 39.679 | 471-633 |
| ROV-2010-RB-546 | ROV | 17-Nov-10 | D | 610 | 30° 07.009 | 79° 56.260 | 30° 05.029 | 79° 57.404 | 455-518 |
| ROV-2010-RB-547 | ROV | 18-Nov-10 | D | 477 | 30° 02.173 | 80° 11.780 | 30° 01.508 | 80° 11.788 | 210-249 |
| ROV-2010-RB-548 | ROV | 20-Nov-10 | D | 155 | 27° 53.245 | 79° 36.933 | 27° 53.935 | 79° 36.982 | 634-731 |
| ROV-2010-RB-549 | ROV | 21-Nov-10 | D | 410 | 27° 53.735 | 79° 37.050 | 27° 54.097 | 79° 36.899 | 633-687 |
| ROV-2010-RB-550 | ROV | 22-Nov-10 | D | 613 | 28° 19.177 | 79° 44.988 | 28° 19.232 | 79° 45.562 | 399-480 |
| RB-2010-001 | CTD | 16-Nov-10 | N | 15 | 30° 08.031 | 79° 50.056 | 30° 08.338 | 79° 49.976 | S-608 |
| RB-2010-002 | CTD | 16-Nov-10 | N | 9 | 30° 02.023 | 80° 11.467 | 30° 02.298 | 80° 11.243 | S-201 |
| RB-2010-003 | CTD | 16-Nov-10 | N | 11 | 30° 01.766 | 80° 08.615 | 30° 02.147 | 80° 08.310 | S-300 |
| RB-2010-004 | CTD | 16-Nov-10 | N | 9 | 30° 02.197 | 80° 04.532 | 30° 02.567 | 80° 04.319 | S-374 |
| RB-2010-005 | CTD | 17-Nov-10 | N | 10 | 30° 02.731 | 80° 00.050 | 30° 02.993 | 79° 59.890 | S-465 |
| RB-2010-006 | CTD | 17-Nov-10 | N | 11 | 30° 01.820 | 79° 56.934 | 30° 02.272 | 79° 56.650 | S-546 |
| RB-2010-007 | CTD | 17-Nov-10 | N | 11 | 30° 01.883 | 79° 53.165 | 30° 02.224 | 79° 52.938 | S-556 |
| RB-2010-008 | CTD | 17-Nov-10 | N | 14 | 30° 01.895 | 79° 49.534 | 30° 02.316 | 79° 49.217 | S-652 |
| RB-2010-009 | CTD | 17-Nov-10 | N | 15 | 30° 03.221 | 79° 46.645 | 30° 03.445 | 79° 46.560 | S-765 |
| RB-2010-010 | CTD | 17-Nov-10 | N | 12 | 30° 03.197 | 79° 50.964 | 30° 03.502 | 79° 50.892 | S-610 |
| RB-2010-011 | CTD | 17-Nov-10 | N | 11 | 30° 03.124 | 79° 55.368 | 30° 03.388 | 79° 55.300 | S-565 |
| RB-2010-012 | CTD | 18-Nov-10 | N | 11 | 30° 03.130 | 79° 59.697 | 30° 03.616 | 79° 59.622 | S-453 |
| RB-2010-013 | CTD | 18-Nov-10 | N | 9 | 30° 03.173 | 80° 04.012 | 30° 03.635 | 80° 03.996 | S-370 |
| RB-2010-014 | CTD | 18-Nov-10 | N | 7 | 30° 03.074 | 80° 08.555 | 30° 03.438 | 80° 08.550 | S-299 |
| RB-2010-015 | CTD | 18-Nov-10 | N | 5 | 30° 03.178 | 80° 12.030 | 30° 03.356 | 80° 12.037 | S-209 |
| RB-2010-016 | CTD | 18-Nov-10 | N | 3 | 30° 02.981 | 80° 15.755 | 30° 03.054 | 80° 15.754 | S-608 |
| RB-2010-017 | CTD | 18-Nov-10 | N | 3 | 30° 03.050 | 80° 19.954 | 30° 03.072 | 80° 19.958 | S-31 |
| RB-2010-018 | OT | 19-Nov-10 | N | 30 | 28° 25.918 | 79° 45.021 | 28° 24.923 | 79° 45.022 | 469-474 |
| RB-2010-019 | OT | 20-Nov-10 | N | 30 | 28° 20.662 | 79° 44.885 | 28° 19.739 | 79° 44.459 | 455-462 |
| RB-2010-020 | OT | 20-Nov-10 | N | 15 | 28° 14.824 | 79° 43.950 | 28° 14.367 | 79° 43.962 | 456-462 |

| Station # | Gear | Date | Time | Total Time (min) | Start Latitude (°N) | Start Longitude (°W) | End Latitude (°N) | End Longitude (°W) | Depth Range (m) |
|---|---|---|---|---|---|---|---|---|---|
| RB-2010-021 | OT | 20-Nov-10 | N | 30 | 28° 12.251 | 79° 44.474 | 28° 11.230 | 79° 44.473 | 437-439 |
| RB-2010-022 | OT | 21-Nov-10 | N | 30 | 28° 07.395 | 79° 44.472 | 28° 06.190 | 79° 44.473 | 428-430 |
| RB-2010-023 | OT | 21-Nov-10 | N | 30 | 28° 01.827 | 79° 44.472 | 28° 00.738 | 79° 44.473 | 421-422 |
| RB-2010-024 | OT | 21-Nov-10 | N | 30 | 27° 56.786 | 79° 44.474 | 27° 55.785 | 79° 44.475 | 416-417 |
| RB-2010-025 | CTD | 22-Nov-10 | N | 21 | 28° 20.266 | 79° 37.003 | 28° 21.233 | 79° 37.324 | S-750 |
| RB-2010-026 | CTD | 22-Nov-10 | N | 12 | 28° 20.065 | 79° 41.072 | 28° 20.730 | 79° 41.252 | S-541 |
| RB-2010-027 | CTD | 22-Nov-10 | N | 9 | 28° 19.856 | 79° 45.198 | 28° 20.316 | 79° 45.358 | S-431 |
| RB-2010-028 | CTD | 22-Nov-10 | N | 11 | 28° 20.243 | 79° 49.511 | 28° 20.875 | 79° 49.698 | S-322 |
| RB-2010-029 | CTD | 22-Nov-10 | N | 5 | 28° 20.264 | 79° 53.908 | 28° 20.472 | 79° 53.928 | S-215 |

Table 2. Summary of the types of subsamples collected for various study topics on the eastern and western Florida slopes during 9-22 November 2010 *Ronald H. Brown* cruise. The number of taxa is based on tentative identifications conducted in the field and is subject to change as data are analyzed. A more detailed and complete break down of this summary table has been provided to NOAA.

| **Sample Type** | **Custodian[#]** | **No. Taxa** | **No. Samples** |
|---|---|---|---|
| Isotope (Trophic study) | SWR | 10 | 98 |
| Genetic | JNT/AMQ/ABT | 38 | 245 |
| Photo | AH/SWR | n/a | n/a |
| Water Samples | SWR/SDB | | 14 |
| ROV macrofauna collection* | MSN | 62 | 248 |
| Paleoecology - Corals | EBR | 5 | 14 |
| Reproduction & Biology – Corals | SDB | 8 | 67 |
| Reproduction - Other Invertebrates^ | SDB | 2 | 6 |
| Taxonomy – Crinoids & Forams | CGM | 2 | 7 |
| Biomedical & Taxonomy - Sponges | JKR | 14 | 25 |

*Collections made with suction, or in quivers, milkcrate or bioboxes
^Other invertebrates=*Echinus* spp. and glass sponge
[#]EBR=Brendan Roark, SDB=Sandra Brooke, JKR=John Reed, JNT=Jana Thoma, DKC=Katherine Coykendall, MSN=Martha Nizinski, SWR=Steve Ross, CGM=Chuck Messing, ABT=Amy Baco-Taylor, AMQ=Andrea Quattrini, AH=Art Howard

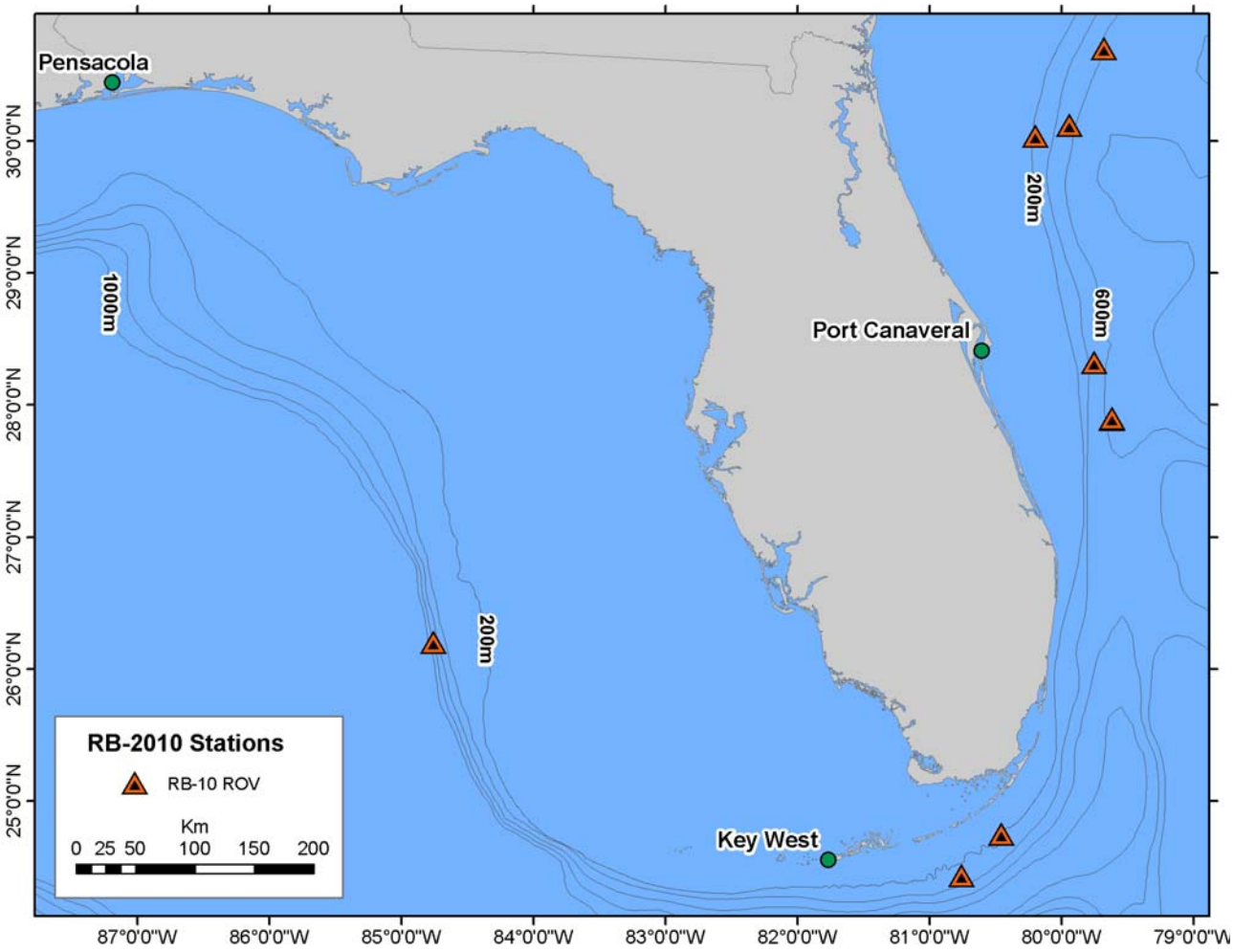



Figure 1. Overall area sampled during 9-22 November 2010 cruise of NOAA ship *Ronald H. Brown* (RB). Cruise originated in Pensacola, FL and ended in Cape Canaveral, FL. See Figs. 2 and 3 for details of selected areas.

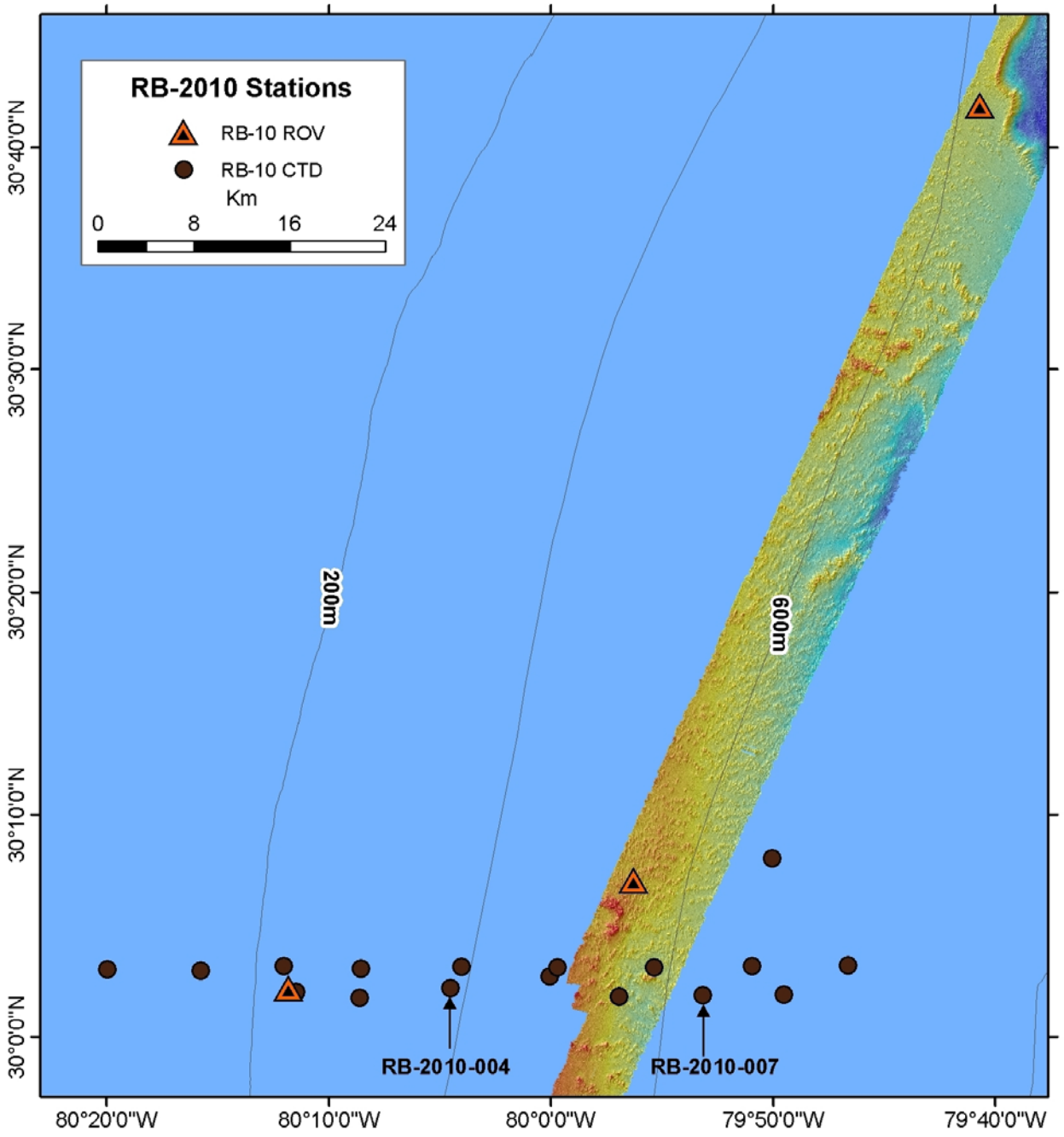



Figure 2. R/V *Ronald H. Brown* (RB) and *Jason II* ROV stations in the Jacksonville lithoherm area, sampled 15-18 November 2010. Black circles = CTD stations (Seabird SBE 911+); red triangles=ROV dives (only bottom start locations plotted). Underlying color-shaded multibeam data courtesy of D. Naar. Two stations labeled are CTD casts that generated data in Fig. 7.

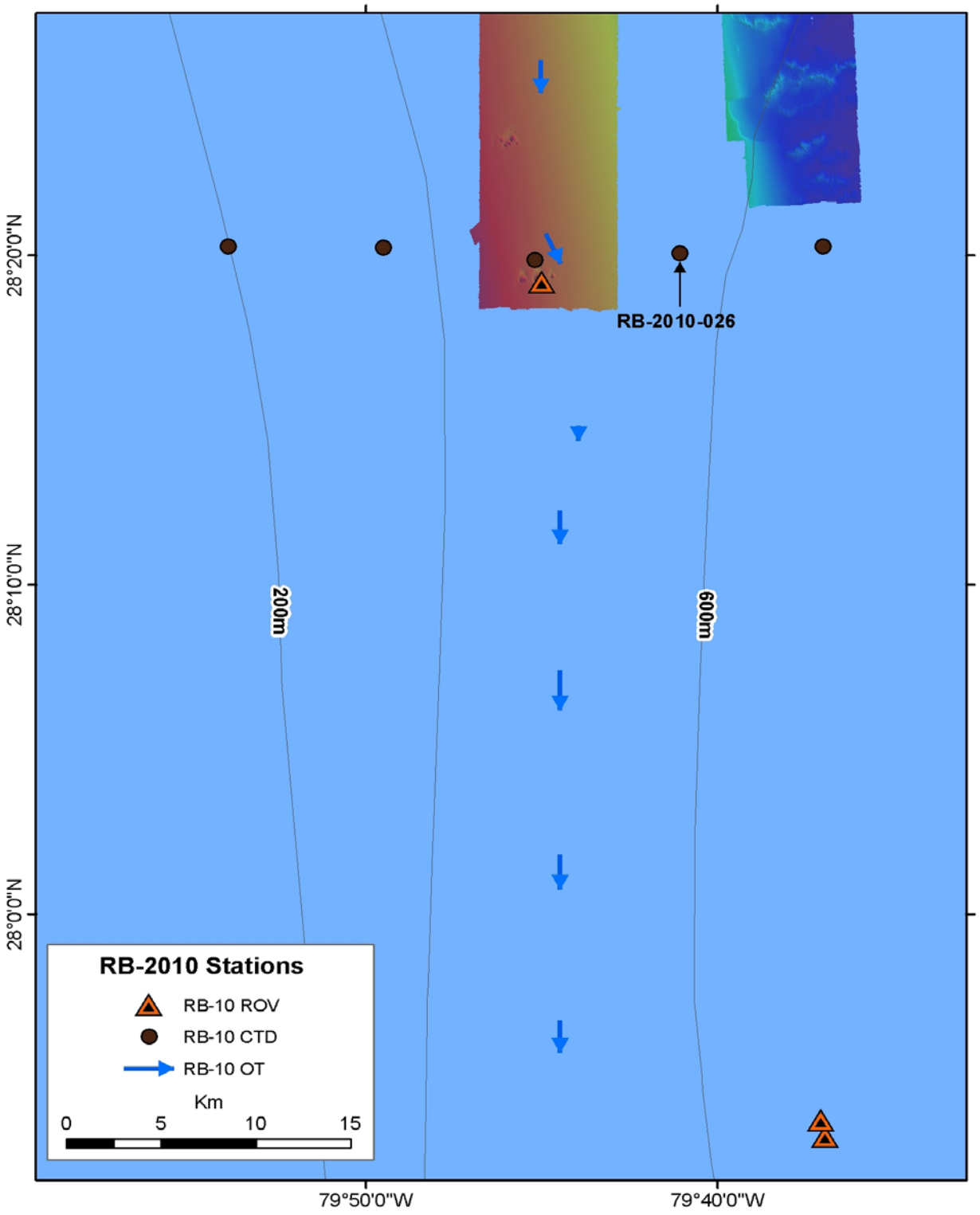



Figure 3. R/V *Ronald H. Brown* (RB) and *Jason II* ROV stations sampled off the Cape Canaveral area, 19-22 November 2010. Black circles = CTD stations (Seabird SBE 911+); red triangles=ROV dives (only bottom start locations plotted); blue arrows are bottom otter trawl stations. Underlying color-shaded multibeam data are from previous NOAA ship *Nancy Foster* cruises. The station labeled is CTD cast that generated data in Fig. 7.

Figure 4. Front views of *Jason II* ROV illustrating extended front work tray with 12 PVC quivers used for most dives. After this rack was lost, it was replaced by the quiver arrangement in right panel. Round biobox with T-handle can be seen in both photos as can other milk crates and a rectangular sample box (right). HD video science camera with adjacent mounted still camera is visible to port side of vehicle, uncovered (left) and covered (right).

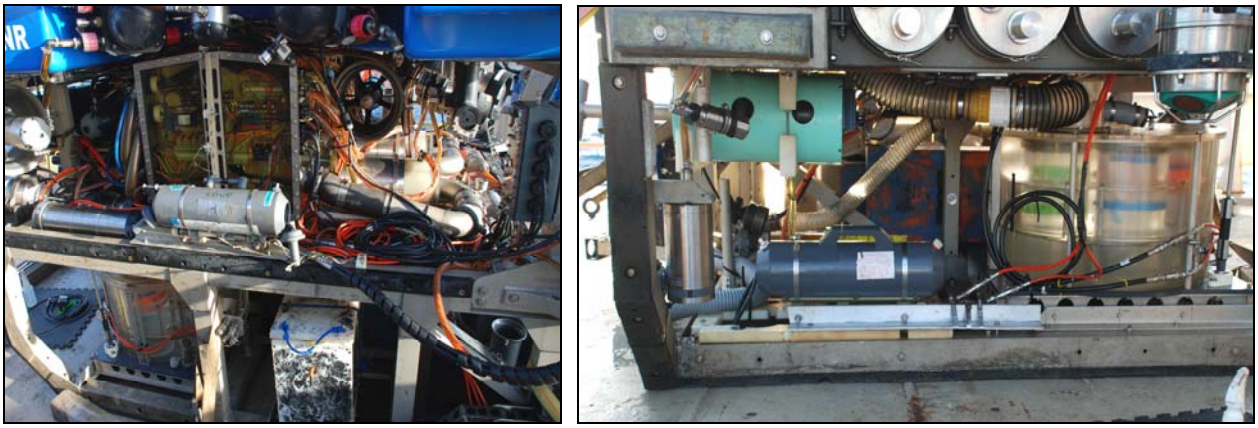


Figure 5. The two gray Niskin bottles used for water samples are shown open, one mounted to the middle frame on the starboard side (left) and the other mounted to the port side of the bottom skid. Starboard biobox can be seen underneath front end of Niskin bottle in left photo. Carousel containing the rotating suction sampler buckets is shown on right side of right photo.

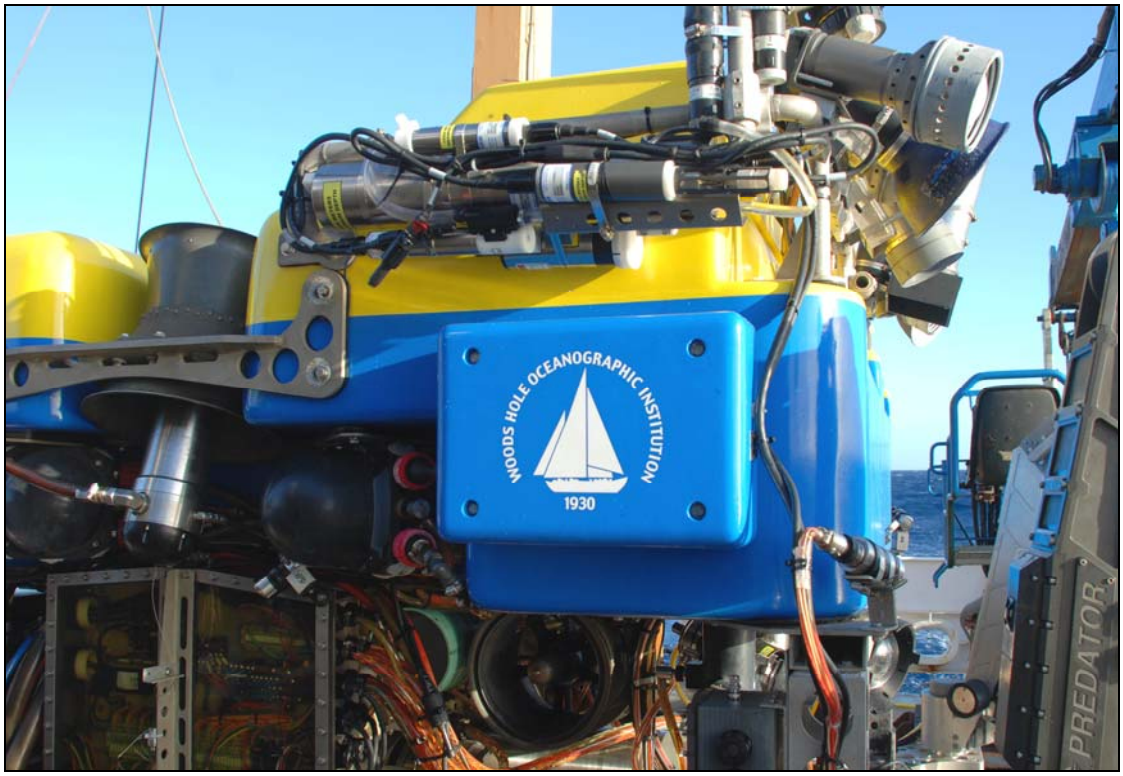



Figure 6. UNCW Seabird SBE 19+ mounted on starboard top frame of *Jason II* ROV.

Figure 8. Insulated holding tank used to keep coral colonies alive at 7-8° C. Portable chiller not shown. Two YSI data loggers used for coral respiration experiments appear at top and bottom of photo. Tank is normally covered.

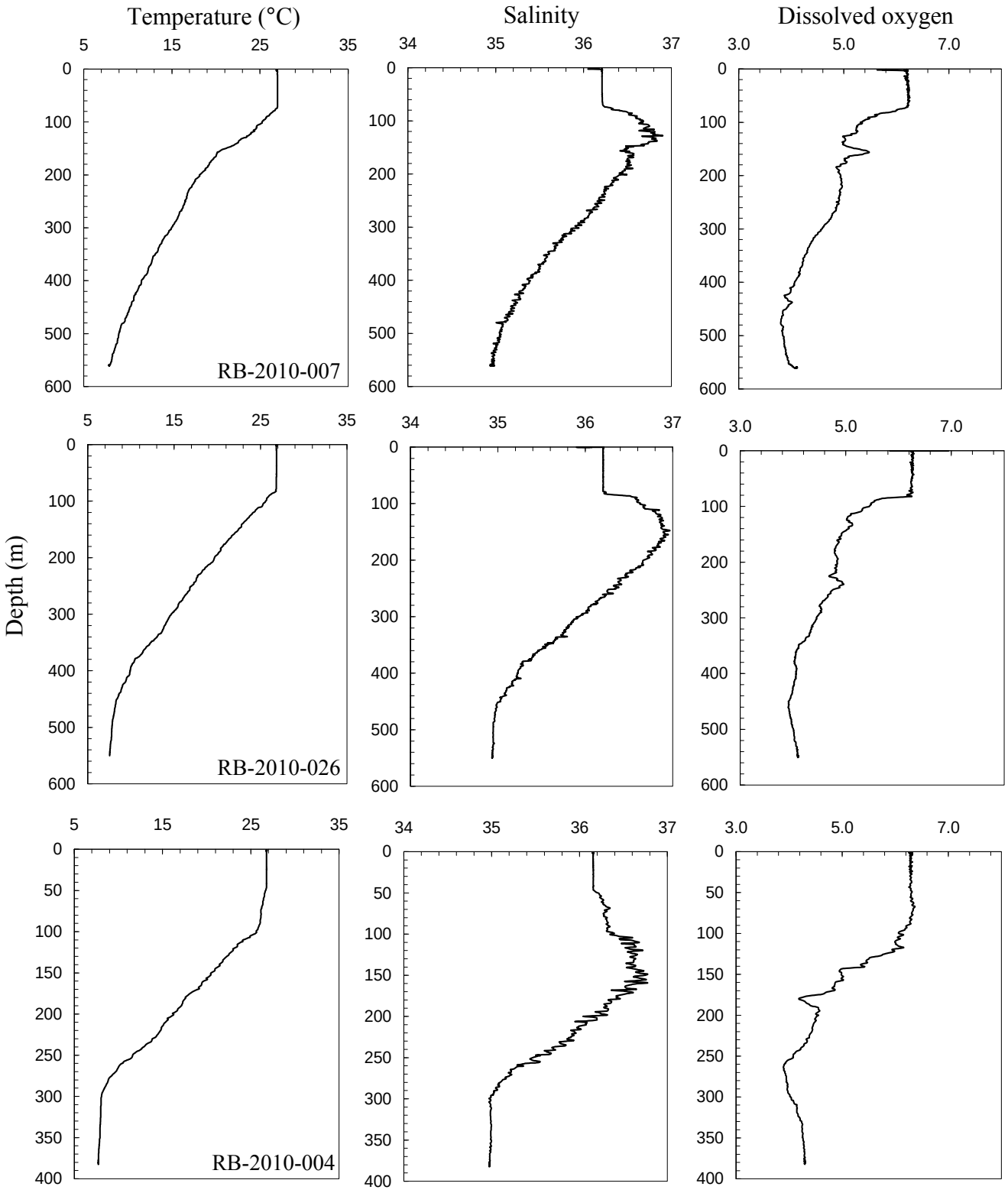



Figure 7. CTD (SeaBird SBE19 +) casts at three stations (RB-2010-007, RB-2010-026, RB-2010-004) off the Florida east coast, illustrating water temperature, salinity and dissolved oxygen profiles. See Figs. 2 and 3 for locations of these stations.

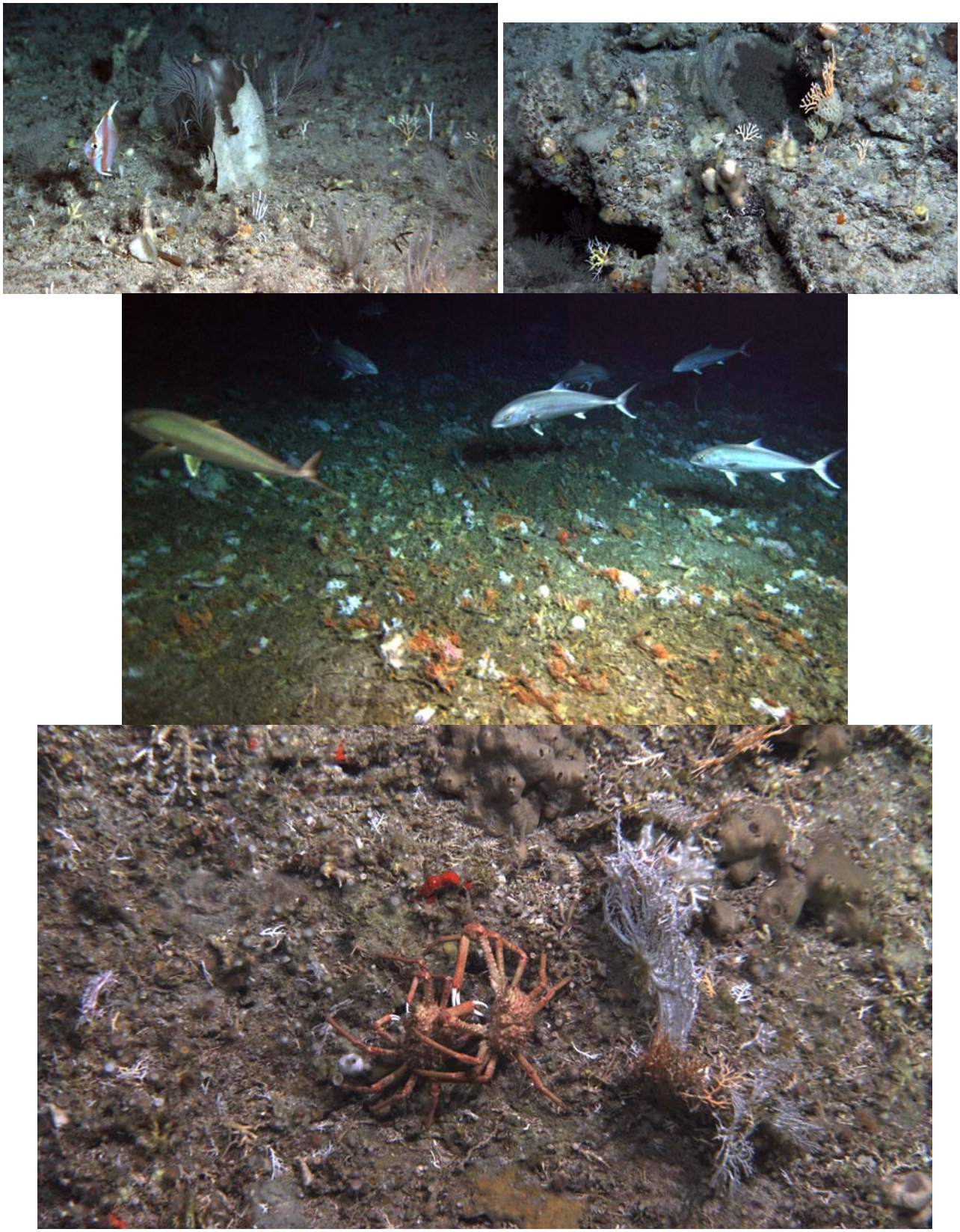


Figure 9. Selected photographs of habitat and fauna from ROV dives on deep-sea coral study sites on the Pourtales Terrace, 12-13 November 2010.

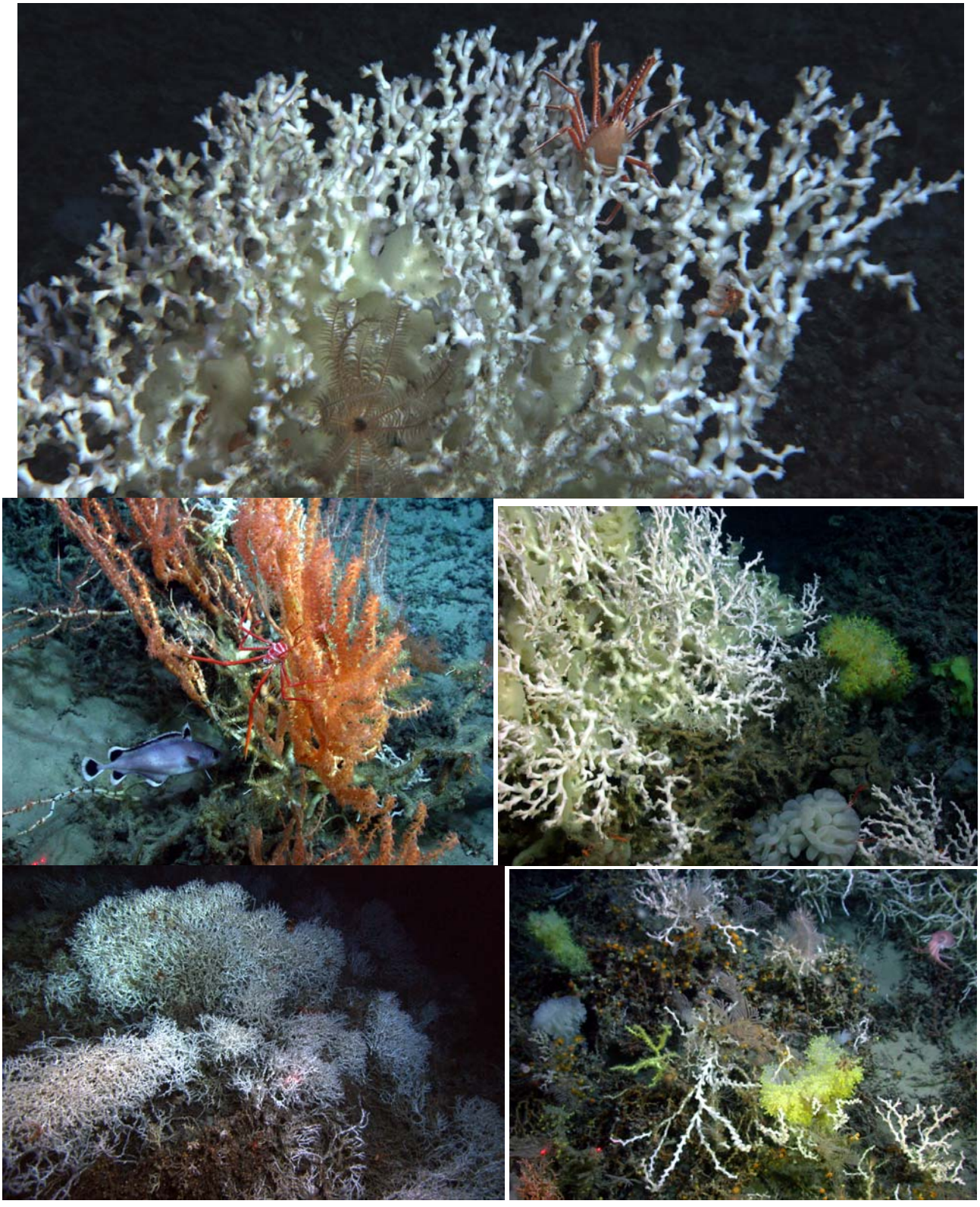


Figure 10. Selected photographs of habitat and fauna from ROV dives on deep-sea coral study sites off the Cape Canaveral area, 20-22 November 2010.

Figure 11. Selected photographs of habitat and fauna from ROV dives on deep-sea coral study sites off Jacksonville, FL, 15-18 November 2010.

APPENDIX I


**CONTACT:** **Karrie Carnes** FOR IMMEDIATE RELEASE

**305-304-0179** **November 24, 2010**

NOAA Expedition Explores Previously Uncharted Deep-sea Coral Reefs off Florida
***Sonar Mapping Reveals Extensive Reef Habitat in Protected Area***

**Scientists from NOAA, University of North Carolina Wilmington, Marine Conservation Biology Institute, and partner organizations returned yesterday from a 15-day expedition aboard the NOAA Ship *Ronald H. Brown* exploring previously uncharted deep-sea coral sites off the east coast of Florida. Marine life samples collected and new maps created from the mission will guide management of important deepwater coral habitats and provide insight into environmental changes.**

**During the NOAA mission "Extreme Corals 2010," scientists used the *Jason II* remotely operated vehicle from Woods Hole Oceanographic Institution to survey deep-sea coral sites from the Florida Keys to Jacksonville, Fla., and collect invertebrate and fish samples from depths over two thousand feet beneath the Gulf Stream.**

**"Deep-sea coral reefs are some of the oldest and most fragile, yet least studied habitats on the planet," said Andrew David, NOAA research fishery biologist. "Attaining a balance between protection and use of these areas is critical, and this expedition will advance our knowledge of and promote effective management strategies for these important ecosystems."**

**Earlier this year, based on recommendations from the South Atlantic Fishery Management Council, NOAA designated the largest marine managed area on the U.S. east coast to protect deep coral ecosystems from Florida to North Carolina. This year's mission is the first time many of these reefs had been seen by scientists. The protected area prohibits bottom fishing, which could impact fragile deep-sea coral reefs and the marine communities they support.**

**"Because these deeper regions are at increased risk of exploitation, their ecological role and value need to be better understood," said expedition chief scientist Dr. Steve Ross of the University of North Carolina. "These ecosystems represent thousands to millions of years of development and once damaged, they may never recover," said Ross.**

**During the Extreme Corals 2010 mission, research teams used multibeam sonar to map more than 800 square miles of deep-sea coral habitat inside and outside the protected area.**

**"High resolution maps greatly increase our ability to locate deep-sea coral reefs and are an invaluable tool for scientists and the management agencies tasked with protecting**

**these ecosystems," said expedition co-chief scientist Dr. Sandra Brooke of the Marine Conservation Biology Institute.**

**Deep-sea coral reefs can reach several hundred feet above the seafloor, and are constructed by delicate branching deep-sea corals that provide habitat for an abundant and diverse community of marine life. Some deep-sea corals grow only millimeters per year, and deep-sea coral reefs can take thousands of years to form. The skeletons of deep-sea corals can be analyzed like tree rings on land to look at past environmental conditions, providing a record of thousands of years of ecological changes.**

**NOAA's Coral Reef Conservation Program, through its Deep Sea Coral Research and Technology Program, sponsored the expedition, now in year two of a three-year project in the southeast U.S.**

**Expedition partners include: NOAA, University of North Carolina Wilmington, Marine Conservation Biology Institute, North Carolina Museum of Natural Sciences, Harbor Branch Oceanographic Institution/Florida Atlantic University, University of Louisiana-Lafayette, Texas A&M University, and U.S. Geological Survey.**

**NOAA's mission is to understand and predict changes in the Earth's environment, from the depths of the ocean to the edge of space, and to conserve and manage our coastal and marine resources.**

###

On the Web

- **NOAA Deep-sea Corals: http://coralreef.noaa.gov/deepseacorals/**
- **NOAA Ship *Ronald H. Brown*: http://www.moc.noaa.gov/rb/**
- **Extreme Corals 2010 Mission Blog: http://cioert.org/xcorals/**

# An Unusually Shallow and Productive Deep-Water Coral Community Discovered Off the Southeastern United States

Steve W. Ross (Univ. of NC at Wilmington), Sandra D. Brooke (Marine Conservation Institute), Andrea M. Quattrini (Temple Univ.)


## ABSTRACT

During ROV surveys off northeastern Florida, we discovered live colonies of the scleractinian coral *Lophelia pertusa* and other typically deep-water organisms in unusually shallow depths of 180-250 m. Bottom temperatures (7-10° C) were colder than expected at these depths, and were similar to those normally encountered at 400-600 m. Small coral bioherms and abundant dead coral rubble indicate long-term presence of *L. pertusa* in this area. Other typically deep-water fauna not only occurred here, but were much more abundant and larger than observed elsewhere. Common hard-substrate macro-invertebrates included octocorals, stony corals, antipatharians, *Eumunida picta*, *Echinus* spp., and *Chaceon fenneri*. The most common fishes recorded on hard substrate were *Helicolenus dactylopterus*, *Dysommina rugosa*, *Laemonema barbatulum*, and *Anthias* spp. The well developed cold-water sessile community and the abundance of associated fauna suggest this site is a long-term feature, rather than short-term opportunistic colonization. The Gulf Stream pulls away from the coast in this area, creating a upwelling of deep water and consequently a long-term primary productivity envelope. These oceanographic features explain the presence of a deep slope community at this site. Considering the unusual depth, long-term colonization by the corals, and the apparent productivity of benthic fauna, this site warrants further research and has been proposed as a Coral Habitat Area of Particular Concern (C-HAPC).


## INTRODUCTION

- The shelf to upper slope off the southeastern US (SEUS) is a transition zone between a temperate/sub-tropical fauna and typical deep-sea slope fauna.
- Depth boundaries of this transition vary and are defined by oceanographic conditions resulting from Gulf Stream movement.
- Deep-sea corals are abundant off the SEUS, usually at 370-800 m and are likely controlled (in part) by their upper temperature limits.
- *Lophelia pertusa* is the dominant structure forming species.
- Small colonies of *L. pertusa* have been seen at ~ 300 m off the SEUS, but no substantial amounts had been reported in < 370 m depth.
- Recent multibeam mapping and ROV surveys off north-eastern Florida revealed *L. pertusa* bioherms and extensive hardgrounds in unusually shallow depths (~200 m) supporting well-developed deep-sea communities.

## METHODS

**CRUISES:**

**April 2010:** M/V *White Holly* and ROV *Mohican.* Multibeam mapping and ROV video

**November 2010:** M/V *Lost Coast Explorer.* Multibeam mapping

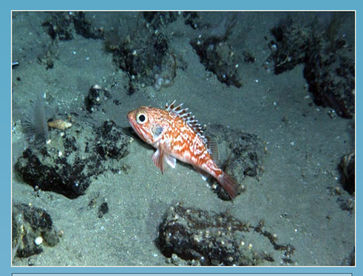
**November 2010:** NOAA ship *Ronald H. Brown* and ROV *Jason II.* Multibeam mapping, ROV video, CTD, sample collections

**CTD:** SeaBird SBE 911+ measured conductivity (µS/cm), temperature (°C), salinity, density ($\sigma_0$, kg m-3), dissolved oxygen (ml/l), and depth once per second. CTD casts to about 10 m off bottom; only bottom CTD data from *Jason* ROV were used.

**BOTTOM OBSERVATIONS:** ROVs conducted video transects across all habitats, with still photography and sample collections. Erroneous tracking data were removed from dive tracks. Locations along the track were assigned habitat codes (below), and all location points were plotted (ArcGIS 9.31, ESRI). Dive tracks were smoothed (ADELIE 1.8, IFREMER) and buffered by 10 m each side. Dive videos were reviewed multiple times to classify habitats and to document benthic macrofauna.

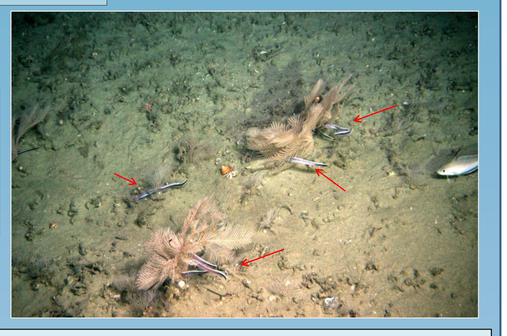
**HABITAT CODES**

1) Sand and/or silt soft substrata, little or no hard structure apparent
2) Soft substrata < 50% coral rubble and/or small rocks, profile < 1 m, variable attached fauna
3) Rubble bottom > 50% covered with coral rubble and/or small rocks, profile < 1 m, variable attached fauna
4) Low profile rock, > 50% bottom cover with scattered rocks and boulders, < 1 m profile
5) Rocky ledges and/or boulders, profile > 1 m, varying amounts of attached fauna
6) Hard corals, 90-100% bottom cover, > 50% dead, profile > 1 m, variable attached fauna
7) Hard corals, 90-100% bottom cover, > 50% live coral, usually high % of attached fauna



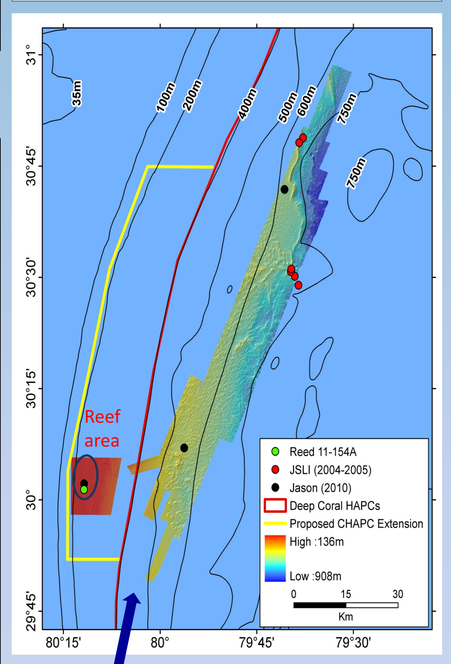
*Helicolenus dactylopterus* adults large and abundant in close association with structure

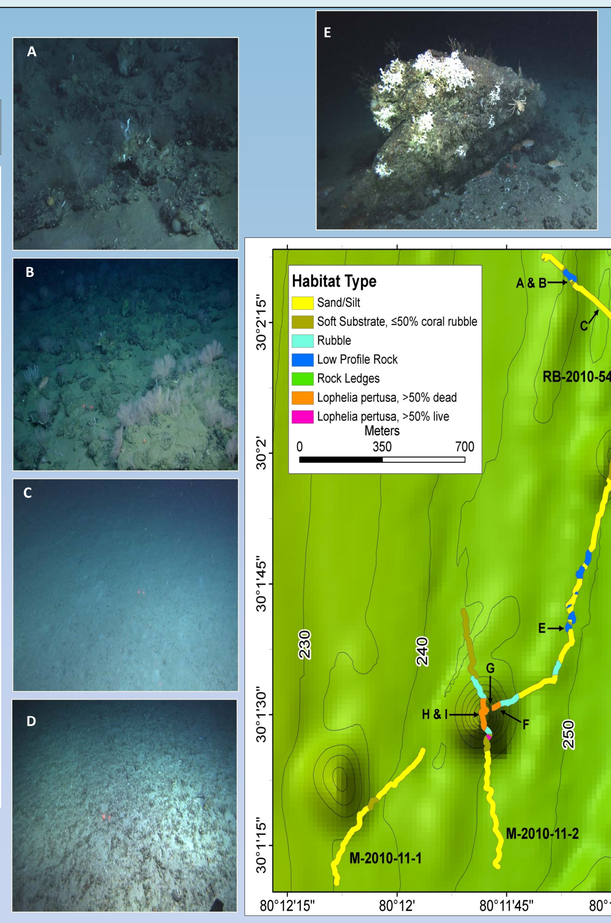
*Laemonema barbatulum* often occur as large adults in aggregations



*Dysommina rugosa* (arrows) were very common with heads buried under rocks or in sediment. *L. barbatulum* at right

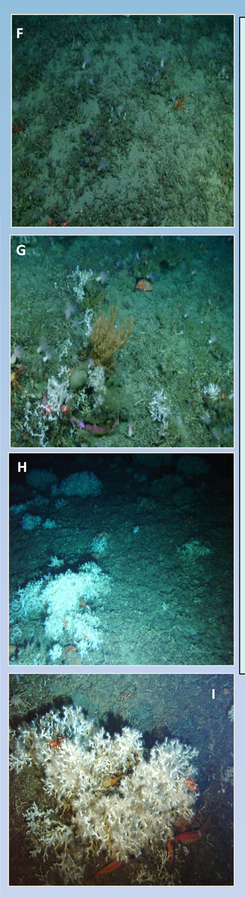
Boundary of the SEUS deep Coral HAPCs with proposed boundary extension







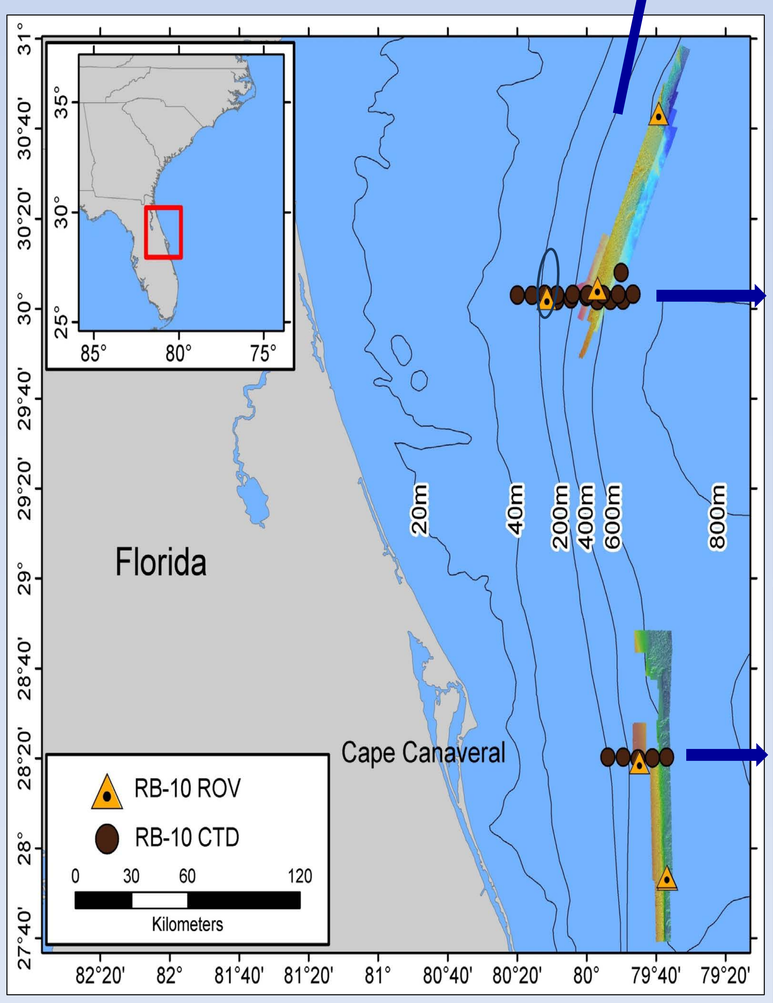



Rocky habitat (A, B, E) is common as are patches of rock-coral rubble (D, F). Multibeam data indicate large areas of hard substrata at 180-300 m. Extensive *Lophelia pertusa* rubble (F) lead up to a bioherm (G, H, I) at least 20 m tall composed of a sediment-coral matrix topped with living and dead *L. pertusa* colonies. Coarse sandy substrate (C) surrounds the hard bottom areas.

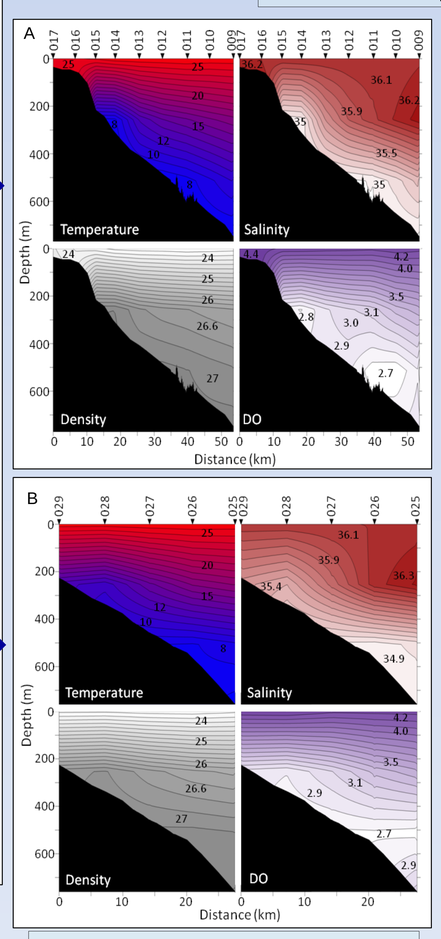
**FISH TAXA OBSERVED AND/OR COLLECTED ON OR AROUND SHALLOW REEFS OFF JACKSONVILLE, FL.**

| Species | Reef | Soft Bottom | Water Column |
|---|---|---|---|
| **Scyliorhinidae** | | | |
| *Scyliorhinus retifer* | | X | |
| **Synaphobranchidae** | | | |
| *Dysommina rugosa* | X | X | |
| **Chlorophthalmiidae** | | | |
| *Chlorophthalmus agassizi* | | X | |
| **Phycidae** | | | |
| *Merluccius albidus* | | X | |
| *Urophycis regia* | X | X | |
| **Moridae** | | | |
| *Laemonema barbatulum* | X | X | |
| **Scorpaenidae** | | | |
| *Helicolenus dactylopterus* | X | X | |
| **Acropomatidae** | | | |
| *Synagrops* sp. A | | X | |
| **Serranidae** | | | |
| *Anthias nicholsi* | X | | |
| *A. woodsi* | X | | |
| **Cynoglossidae** | | | |
| *Symphurus* sp. | | X | |
| **Molidae** | | | |
| *Mola mola* | | | X |

Fishes observed at this site are typical of deeper waters and are apparently following cold water. The most unusual aspect of the fish fauna compared with other deep reef sites off the southeastern US and in the Gulf of Mexico is that the dominant species (*D. rugosa, L. barbatulum, H. dactylopterus*) exhibited larger body sizes and greater abundances. This suggests an area rich in food and appropriate habitat. Some discarded fishing gear was observed, indicating the area is a known fishing ground to some extent.




Southeastern US coast off north-central Florida, illustrating 2010 ROV dive sites, CTD transects, and multibeam sonar data (color shaded areas). Red circle is area of shallow *Lophelia pertusa* bioherms and rocky reefs.




CTD casts reveal upwelling in the 200 m depth range (A) off Jacksonville compared with the area off (B) Cape Canaveral, FL.

## ENVIRONMENTAL DATA

- Upper CTD transect across the shallow Jacksonville bioherm illustrates unusually cold bottom water temperatures around 200 m, more typical of 400-600 m depths (lower panel of CTD data).
- ROV recorded CTD data indicated lower than usual temperature throughout the area surveyed (Table below).
- Low dissolved oxygen (DO) and salinity around 35 are similar between these transects and are typical of deep-coral habitats in the region.
- The Gulf Stream is over or near the deep coral sites in the lower panel but is considerably offshore of the upper panel shallow (Jacksonville) site.
- The Gulf Stream swing offshore causes upwelling as evidenced by low bottom temperatures moving onto the shelf edge.

Benthic data off NE FL recorded by Jason ROV (dive 547), 18 Nov 2010, (0943-1740 hrs, depth 210-249 m).

| | Mean | Range | SD |
|---|---|---|---|
| Temp (°C) | 7.43 | 7.42-7.71 | 0.013 |
| Salinity | 34.95 | 34.93-34.99 | 0.002 |
| DO (ml/l) | 2.95 | 2.91-2.97 | 0.005 |

## CONCLUSIONS

- Bottom temperatures at this shallow site (7-10° C) are colder than other known locations at similar depths in the SEUS. Such low temperatures are usually seen at depths > 300 m in the region.
- Rocky habitats were common and colonized by various sessile cold-water fauna, including substantial colonies of *L. pertusa*
- *Lophelia pertusa* appeared to form bioherms (coral mounds) in part of the study area at ~200 m depth.
- All fishes and invertebrates observed were typical of deeper waters, but their most unusual attributes were very high abundance and large sizes than seen on deeper reefs.
- This community appears to be thriving and has probably been established for a long time as evidenced by accumulated coral rubble and abundant cold-water fauna.
- The Gulf Stream pulls away from the coast in this region, creating nutrient rich upwelling. This feature is persistent and probably largely responsible for this unusually shallow and productive cold-water community, together with abundant rocky substrata.
- This ecosystem requires further investigation and is being considered for protection under a proposed boundary expansion of the Coral Habitat Areas of Particular Concern in the SEUS region.

**Acknowledgements:** Support for the *Ron Brown* cruise was provided by the NOAA Deep Sea Coral Research and Technology Program. Support was also provided by U.S. Geological Survey, Marine Conservation Institute, NC Museum of Natural Sciences, and ArtWork, Inc. We appreciate the contributions of data from the US Navy. Liz Baird assisted with organizing education and outreach efforts. Dave Naar assisted with multibeam sonar data. We thank all cruise participants for their hard work and dedication before and after cruises. Thanks to the *Ronald H. Brown* crew for their assistance during the cruise. Finally, we thank the *Jason II* ROV personnel for their service during the mission.

# APPENDIX M. Coordinates for the CHAPC areas proposed for modification through Coral Amendment 8

**(Source: Roger Pugliese, SAFMC)**

**NOTE: The list of coordinates for the No Action alternatives in Coral Amendment 8 is represented in the Federal Register for Comprehensive Ecosystem-Based Amendment 1, which follows the tables below.**

**Table 1.** List of Coordinates for Action 1, Sub-Alternative 2a Proposed Northern Extension of the Oculina Bank HAPC.

| **Sub-Alternative 2a Oculina CHAPC Proposed Northern Extension** | Points | Longitude* | | Latitude* | |
|---|---|---|---|---|---|
| SW Corner | 1 | 80 | 3.955 | 28 | 30 |
| | 2 | 80 | 5.248 | 28 | 32.492 |
| | 3 | 80 | 5.498 | 28 | 33.238 |
| | 4 | 80 | 5.238 | 28 | 35.096 |
| | 5 | 80 | 5.979 | 28 | 41.272 |
| | 6 | 80 | 7.265 | 28 | 46.228 |
| | 7 | 80 | 7.124 | 28 | 47.476 |
| | 8 | 80 | 8.884 | 28 | 52.74 |
| | 9 | 80 | 8.894 | 28 | 56.031 |
| | 10 | 80 | 10.2 | 29 | 4.753 |
| | 11 | 80 | 12.287 | 29 | 9.542 |
| | 12 | 80 | 15.263 | 29 | 29.415 |
| | 13 | 80 | 15.861 | 29 | 34.123 |
| | 14 | 80 | 15.013 | 29 | 34.861 |
| NW Corner | 15 | 80 | 15.804 | 29 | 43.5 |
| NE Corner | 16 | 80 | 14.622 | 29 | 43.5 |
| | 17 | 80 | 12.405 | 29 | 30.113 |
| | 18 | 80 | 10.989 | 29 | 21.904 |
| | 19 | 80 | 8.96 | 29 | 13.387 |
| | 20 | 80 | 3.747 | 28 | 48.145 |
| SE Corner | 21 | 80 | 0.42 | 28 | 30 |
| *(Degrees Decimal Minutes) | | | | | |
| Approx. Area= 329 Square Miles | | | | | |

**Table 2.** List of Coordinates for Action 1, Preferred Sub-Alternative 2b Proposed Northern Extension of the Oculina Bank HAPC.

| **Sub-Alternative 2b Oculina CHAPC Proposed Northern Extension** | Points | Longitude* | | Latitude* | |
|---|---|---|---|---|---|
| SW Corner | 1 | 80 | 3.955 | 28 | 30 |
| | 2 | 80 | 4.399 | 28 | 30.856 |
| | 3 | 80 | 5.41 | 28 | 33.849 |
| | 4 | 80 | 5.238 | 28 | 35.096 |
| | 5 | 80 | 5.979 | 28 | 41.272 |
| | 6 | 80 | 7.265 | 28 | 46.228 |
| | 7 | 80 | 7.124 | 28 | 47.476 |
| | 8 | 80 | 8.884 | 28 | 52.74 |
| | 9 | 80 | 8.894 | 28 | 56.031 |
| | 10 | 80 | 10.2 | 29 | 4.753 |
| | 11 | 80 | 12.287 | 29 | 9.542 |
| | 12 | 80 | 15.263 | 29 | 29.415 |
| | 13 | 80 | 15.861 | 29 | 34.123 |
| | 14 | 80 | 15.013 | 29 | 34.861 |
| NW Corner | 15 | 80 | 15.804 | 29 | 43.5 |
| NE Corner | 16 | 80 | 14.801 | 29 | 43.497 |
| | 17 | 80 | 13.684 | 29 | 35.931 |
| | 18 | 80 | 12.648 | 29 | 30.262 |
| | 19 | 80 | 11.501 | 29 | 23.589 |
| | 20 | 80 | 10.115 | 29 | 17.566 |
| | 21 | 80 | 8.615 | 29 | 11.327 |
| | 22 | 80 | 4.814 | 28 | 53.306 |
| | 23 | 80 | 3.946 | 28 | 48.619 |
| | 24 | 80 | 3.475 | 28 | 46.014 |
| SE Corner | 25 | 80 | 0.767 | 28 | 30.006 |
| *(Degrees Decimal Minutes) | | | | | |
| Approx. Area= 267 Square Miles | | | | | |

**Table 3.** List of Coordinates for Action 1, Preferred Alternative 3 Proposed Northern Extension of the Oculina Bank HAPC.

| **Oculina CHAPC Proposed Western Extension Alternative 3** | Points | Longitude* | | Latitude* | |
|---|---|---|---|---|---|
| SW Corner | 1 | 80 | 1.168 | 28 | 4.5 |
| | 2 | 80 | 3 | 28 | 16 |
| NW Corner | 3 | 80 | 3 | 28 | 30 |
| NE Corner | 4 | 80 | 0 | 28 | 30 |
| SE Corner | 5 | 80 | 0 | 28 | 4.5 |
| *(Degrees Decimal Minutes) | | | | | |
| Approx. Area= 76.42 Square Miles | | | | | |

**Table 4.** List of Coordinates for Action 3, Alternative 2 Proposed Extension of the Stetson-Miami Terrace CHAPC.

| **Stetson-Miami CHAPC Proposed Extension Alternative 2** | Points | Longitude* | | Latitude* | |
|---|---|---|---|---|---|
| SE Corner | 1 | 80 | 2.76 | 30 | 4 |
| | 2 | 80 | 6 | 30 | 3 |
| | 3 | 80 | 9.5 | 30 | 3 |
| | 4 | 80 | 9.5 | 30 | 0 |
| SW Corner | 5 | 80 | 13 | 30 | 0 |
| | 6 | 80 | 12.327 | 30 | 7.928 |
| | 7 | 80 | 11.254 | 30 | 13.293 |
| | 8 | 80 | 9.376 | 30 | 19.381 |
| | 9 | 80 | 8.143 | 30 | 23.888 |
| | 10 | 80 | 7.687 | 30 | 26.999 |
| | 11 | 80 | 5.916 | 30 | 34.107 |
| NW Corner | 12 | 80 | 5 | 30 | 37 |
| NE Corner | 13 | 79 | 52.62 | 30 | 37 |
| Point 13 to point 1 follow western boundary of Stetson Miami CHAPC | | | | | |
| *(Degrees Decimal Minutes) | | | | | |
| Approx. Area= 490 Square Miles | | | | | |

**Table 5.** List of Coordinates for Action 3, Alternative 3 Proposed Extension of the Stetson-Miami Terrace CHAPC.

| **Stetson-Miami CHAPC Proposed Extension Alternative 3** | Points | Longitude* | | Latitude* | |
|---|---|---|---|---|---|
| SE Corner | 1 | 80 | 1.839 | 30 | 11.952 |
| | 2 | 80 | 9.779 | 30 | 5.649 |
| | 3 | 80 | 11.281 | 29 | 52 |
| SW Corner | 4 | 80 | 13.105 | 29 | 52 |
| | 5 | 80 | 13.158 | 29 | 57.119 |
| | 6 | 80 | 12.327 | 30 | 7.928 |
| | 7 | 80 | 11.254 | 30 | 13.293 |
| | 8 | 80 | 9.376 | 30 | 19.381 |
| | 9 | 80 | 8.143 | 30 | 23.888 |
| | 10 | 80 | 7.687 | 30 | 26.999 |
| | 11 | 80 | 5.916 | 30 | 34.107 |
| | 12 | 80 | 2.429 | 30 | 40.034 |
| NW Corner | 13 | 80 | 0.901 | 30 | 44.996 |
| NE Corner | 14 | 79 | 50.11 | 30 | 44.996 |
| Point 14 to point 1 follow western boundary of Stetson Miami CHAPC | | | | | |
| *(Degrees Decimal Minutes) | | | | | |
| Approx. Area= 653 Square Miles | | | | | |

**Table 6.** List of Coordinates for Action 3, Preferred Alternative 4 Proposed Extension of the Stetson-Miami Terrace CHAPC.

| **Stetson-Miami Terrace CHAPC Proposed Extension Alternative 4** | Points | Longitude* | | Latitude* | |
|---|---|---|---|---|---|
| SE Corner | 1 | 80 | 2.76 | 30 | 4 |
| | 2 | 80 | 6 | 30 | 3 |
| | 3 | 80 | 9.5 | 30 | 3 |
| | 4 | 80 | 9.5 | 30 | 0 |
| SW Corner | 5 | 80 | 13 | 30 | 0 |
| | 6 | 80 | 12.327 | 30 | 7.928 |
| | 7 | 80 | 11.254 | 30 | 13.293 |
| | 8 | 80 | 9.376 | 30 | 19.381 |
| | 9 | 80 | 8.143 | 30 | 23.888 |
| | 10 | 80 | 7.687 | 30 | 26.999 |
| | 11 | 80 | 5.916 | 30 | 34.107 |
| NW Corner | 12 | 80 | 5 | 30 | 37 |
| NE Corner | 13 | 79 | 52.62 | 30 | 37 |
| Point 13 to point 1 follow western boundary of Stetson Miami CHAPC | | | | | |
| *(Degrees Decimal Minutes) | | | | | |
| Approx. Area= 490 Square Miles | | | | | |

**Table 7.** List of Coordinates for Proposed Shrimp Fishery Access Area (Haul Back Zone) included in Action 3, Preferred Alternative 4 Extension of the Stetson-Miami Terrace CHAPC.

| **Stetson-Miami Terrace CHAPC Proposed Shrimp Fishery Access Area (Haul Back Zone)** | Points | Longitude* | | Latitude* | |
|---|---|---|---|---|---|
| | 1 | 80 | 2.76 | 30 | 4 |
| | 2 | 80 | 6 | 30 | 3 |
| | 3 | 80 | 9.5 | 30 | 3 |
| | 4 | 80 | 5.66 | 30 | 6.5 |
| | 5 | 80 | 1.527 | 30 | 9.694 |

**Table 8.** List of Coordinates for Action 4, Preferred Alternative 2 Proposed Extension of the Cape Lookout CHAPC.

| **Cape Lookout CHAPC Proposed Extension Alternative 2** | Points | Longitude* | | Latitude* | |
|---|---|---|---|---|---|
| SE Corner | 1 | 75 | 45.183 | 34 | 24.6166 |
| SW Corner | 2 | 75 | 43.967 | 34 | 23.4833 |
| NW Corner | 3 | 75 | 42.75 | 34 | 27.9 |
| NE Corner | 4 | 75 | 41.75 | 34 | 27 |
| *(Degrees Decimal Minutes) | | | | | |
| Approx. Area= 10 Square Miles | | | | | |