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

Submitted to: South Atlantic Fisheries Management Council (SAFMC)

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Date Submitted: December 2, 2010

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° 30'N) to 29° 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° 4.5'N to the north boundary of the current OHAPC (28° 30'N). The east boundary would coincide with the current western boundary of the OHAPC (80° W). The west boundary could either use the 60 m contour line (CRM_10m_nad83; NOAA bathymetric contours) or the 80° 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° 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^o30'N latitude); the western boundary follows the 80° 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° 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° 30'N) northward to 29° 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).

<u>Oculina HAPC West Proposal</u>

In 2000, the OHAPC was expanded to the north up to Cape Canaveral (28° 30'N latitude); the western boundary follows the 80° 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° 4.5'N to the north boundary of the current OHAPC (28° 30'N). The east boundary would coincide with the current western boundary of the OHAPC (80° W). The west boundary could either use the 60 m contour line (CRM_10m_nad83; NOAA bathymetric contours) or the 80° 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° 4.5'N latitude.

<u>Bibliography with Annotations (*= PDFs attached):</u>

Avent, R.M., M.E. King, and R.H. Gore. 1977. Topographic and faunal studies of shelf-edge prominences off the central eastern Florida coast, Int. Revue ges. Hydrobiol. 62: 185-208. (first detailed description of deep-water *Oculina* reefs, geology, biology and habitat, with echosounder transects across shelf edge)

Gilmore, R. G. and R. S. Jones. 1992. Color variation and associated behavior in the epinepheline groupers, *Mycteroperca microlepis* (Goode and Bean) and *M. phenax* Jordan and Swain, Bulletin of Marine Science 51, 83-103. (detailed studies on mating behavior of gag and scamp grouper with beautiful color plates of fish color patterns)

Harter, S., M. Ribera, A. Shepard, J. Reed. 2009. Assessment of fish populations and habitat on *Oculina* Bank: examination of a deep-sea coral marine protected area off eastern Florida. Fishery

Bulletin 107(2):195-206. (ROV surveys inside and outside OHAPC including area of proposed OHAPC West)

Hoskin, C.M., J.K. Reed, and D.H. Mook. 1987. Sediments from a living shelf-edge reef and adjacent area off central eastern Florida. Pp. 42-57, In F. JMR. Maurrasse (ed.), Symposium on south Florida geology, Miami Geological Society Memoirs 3. (first detailed analyses of sediment on *Oculina* banks compared to non-reef shelf areas)

Koenig, C.C., A.N. Shepard, J.K. Reed, F.C. Coleman, S.D. Brooke, J. Brusher, and K.M. Scanlon. 2005. Habitat and fish populations in the deep-sea *Oculina* coral Ecosystem of the western Atlantic. American Fisheries Society Symposium 41: 795-805. (fish populations related to coral habitat- living vs dead)

Moe, Martin A., Jr. 1963. A survey of offshore fishing in Florida. Professional Papers Series, No.4, Florida State Bd. of Conservation Marine Laboratory, St. Petersburg, Florida. (survey of commercial fisheries from Florida shelf waters- including habitat maps showing high-relief coral areas off eastern Florida = *Oculina* reefs)

*Reed, J.K. 1980. Distribution and structure of deep-water *Oculina varicosa* coral reefs off central eastern Florida. Bulletin of Marine Science 30(3): 667-677. Part reprinted In W.J. Richards (ed.) Proceedings of Marine Recreational Fisheries Symposium. (detailed description of deep-water *Oculina* habitat and distribution of *Oculina* banks along eastern Florida)

*Reed, J.K. 1981. Nomination of shelf-edge *Oculina* coral banks as a habitat area of particular concern (HAPC) for the Coral and Coral Reef Fishery Management Plan. Submitted to and accepted by Gulf of Mexico and South Atlantic Fishery Management Councils, 24 pp. (deep-water *Oculina* reefs first nominated by J. Reed as a HAPC)

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)

Reed, J.K. 1981. In situ growth rates of the scleractinian coral *Oculina varicosa* occurring with zooxanthellae on 6-m reefs and without on 80-m banks. Pp. 201-206, In Proceedings Fourth International Coral Reef Symposium, Vol. 2, May 1981, Manila, Philippines. (insitu quantitative analyses of growth rate of deep and shallow water *Oculina*, 6-80 m, in relation to physical parameters- temperature, light, sedimentation, currents)

Reed, J.K., R.H. Gore, L.E. Scotto, and K.A. Wilson. 1982. Community composition, structure, aereal and trophic relationships of decapods associated with shallow- and deep-water *Oculina varicosa* coral reefs. Bulletin of Marine Science 32: 761-786. (quantitative analyses of decapod crustaceans living within live and dead colonies of deep and shallow water *Oculina*, 6-80 m)

Reed, J.K. and P.M. Mikkelsen. 1987. The molluscan community associated with the scleractinian coral *Oculina varicosa.* Bulletin of Marine Science 40(1): 99-131. (quantitative analyses of molluscs living within live and dead colonies of deep and shallow water *Oculina*, 6-80 m)

Reed, J.K. and R. Gilmore. 1982. Nomination of a Habitat Area of Particular Concern (HAPC). Pages L-20-42 in J. Brawner, ed. Fishery management plan, final environmental impact statement for coral and coral reefs, Gulf of Mexico and South Atlantic Fishery Management Councils, 337 p. (SAFMC Fishery Management plan listing the deep-water *Oculina* reefs as a HAPC)

Reed, J. K. 2002. Deep-water *Oculina* coral reefs of Florida: biology, impacts, and management. Hydrobiologia 471: 43-55. (review of research, trawling impacts, and history of management of *Oculina* reefs)

Reed, J.K., A. Shepard, C. Koenig, K. Scanlon, and G. Gilmore. 2005. Mapping, habitat characterization, and fish surveys of the deep-water *Oculina* coral reef Marine Protected Area: a review of historical and current research. Pp. 443-465, In (A. Freiwald, J. Roberts, Ed.), Cold-water Corals and Ecosystems, Proceedings of Second International Symposium on Deep Sea Corals, Sept. 9-12, 2003, Erlanger, Germany, Springer-Verlag, Berlin Heidelberg. (summary of research from 1970 to present on *Oculina* reefs)

*Reed 2006. Deep-water *Oculina* Reefs of Florida: Summary of the State of Knowledge of the Habitat, Fauna, Geology and Physical Processes of the Ecosystem. Report to SAFMC. (This provides a full history and annotations of all known publications on the *Oculina* reefs up to 2006)

Reed, J. K., C. C. Koenig, and A. N. Shepard, 2007. Impacts of bottom trawling on a deep-water Oculina coral ecosystem off Florida. Bulletin of Marine Science 81: 481–496. (quantitative point count analysis of photo transects between 1975 and 2005)

Reed, J.K. and S. Farrington. 2010. Distribution of deep-water commercial fisheries species-golden crab, tilefish, royal red shrimp- in deep-water habitats off eastern Florida from submersible and ROV dives. South Atlantic Fishery Management Council and NOAA National Marine Fisheries Service. 163 pp.

Reed, J.K., C. Messing, B. Walker, S. Brooke, T. Correa, M. Brouwer and T. Udouj. 2011 (in press). Habitat characterization, distribution, and areal extent of deep-sea coral ecosystem habitat off Florida, southeastern United States. Journal of Caribbean Science.

Thompson, M.J. and L.E. Gulliland. 1980. Topographic mapping of shelf edge prominences off southeastern Florida, Southeastern Geology 21, 155-164. (first detailed, high-resolution, side-scan-sonar bathymetric maps of high relief *Oculina* reefs off Sebastian region)

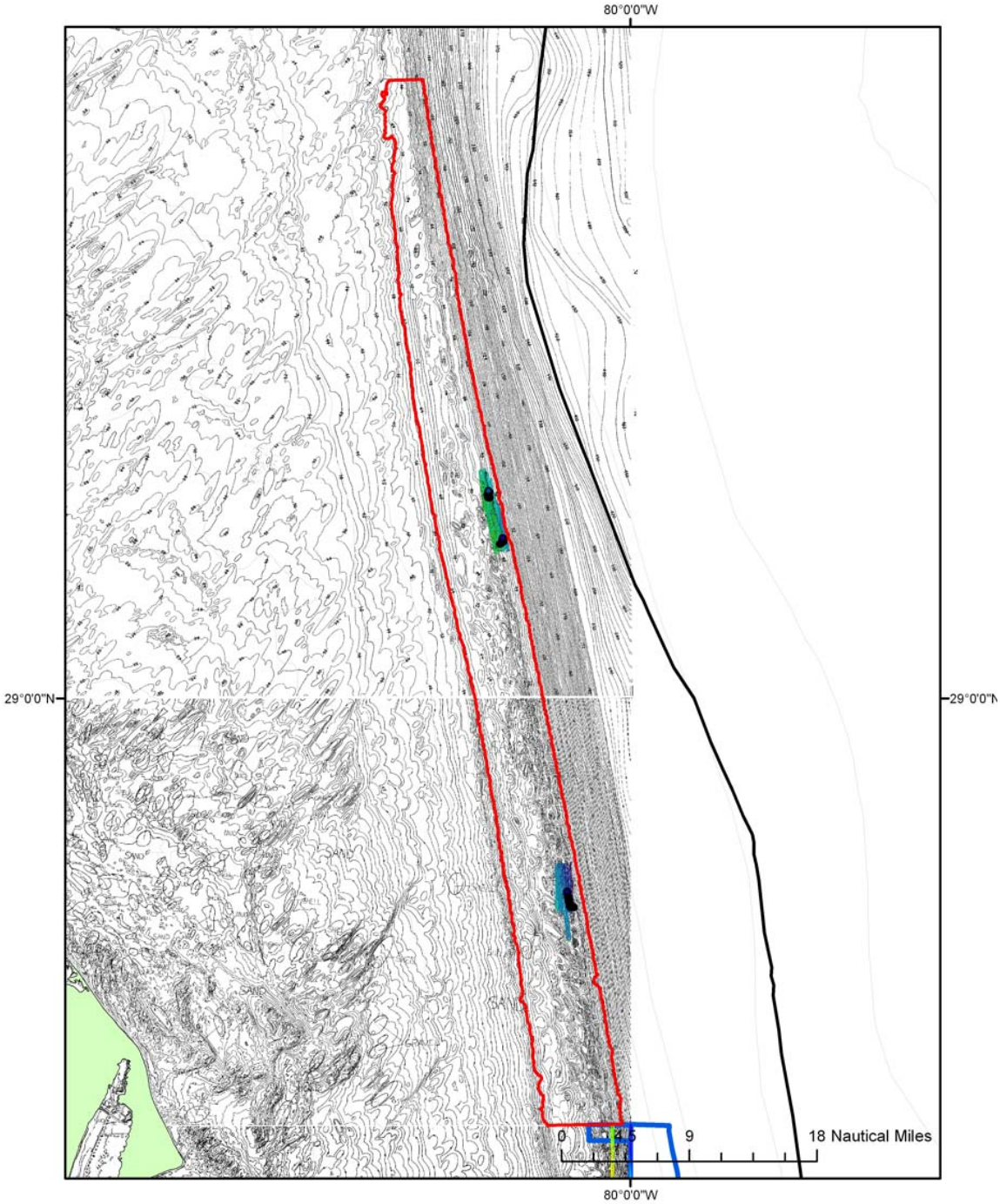


Figure 1. Proposed *Oculina* HAPC North (red polygon). Eastern and western polygon contours follow the 60 m and 100 m bathymetric contour lines, respectively (NOAA- CRM_10m_nad83). Within the polygon are the two multibeam sites off Daytona and Titusville regions and ROV dive tracks (thick black lines) 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)

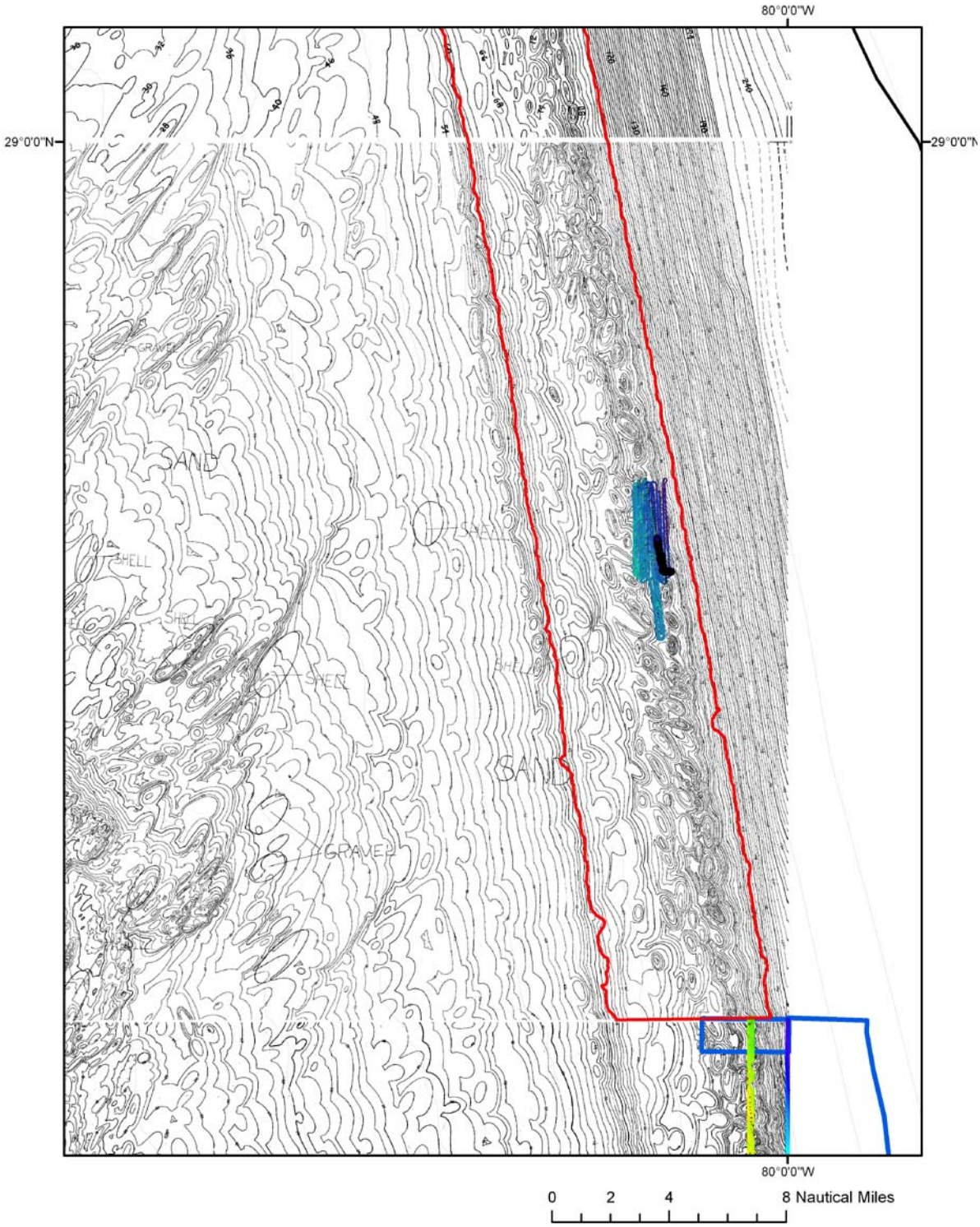


Figure 2. Southern region of proposed *Oculina* HAPC North (see Fig. 1) showing multibeam and ROV dive track (thick black line) off Titusville area from 2011 NOAA *Pisces* cruise. Blue polygons= north end of current OHAPC and OHAPC satellite area with strip of multibeam.

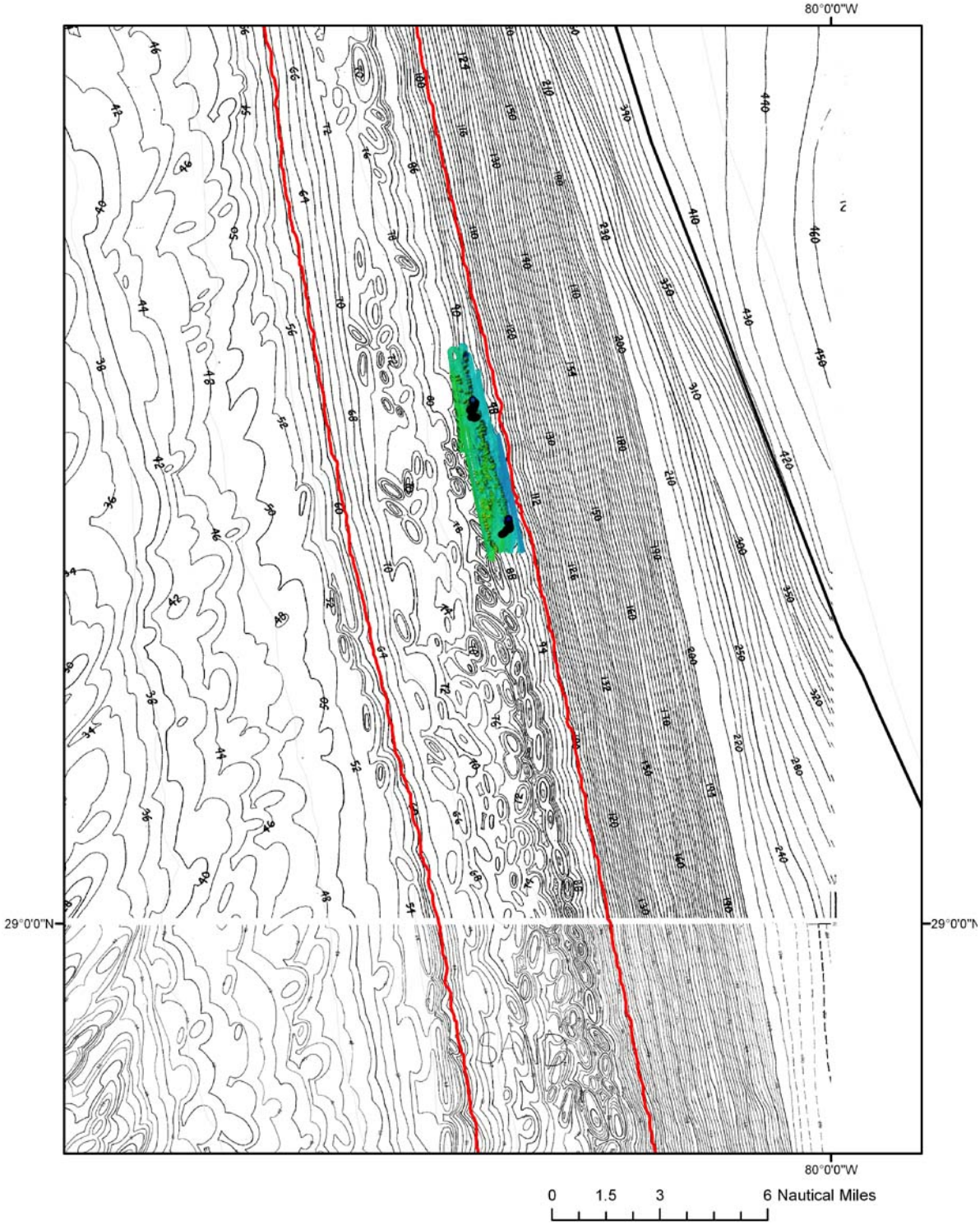


Figure 3. Middle region of proposed *Oculina* HAPC North (see Fig. 1) showing multibeam and ROV dive tracks (thick black lines) off Daytona area from 2011 NOAA *Pisces* cruise.

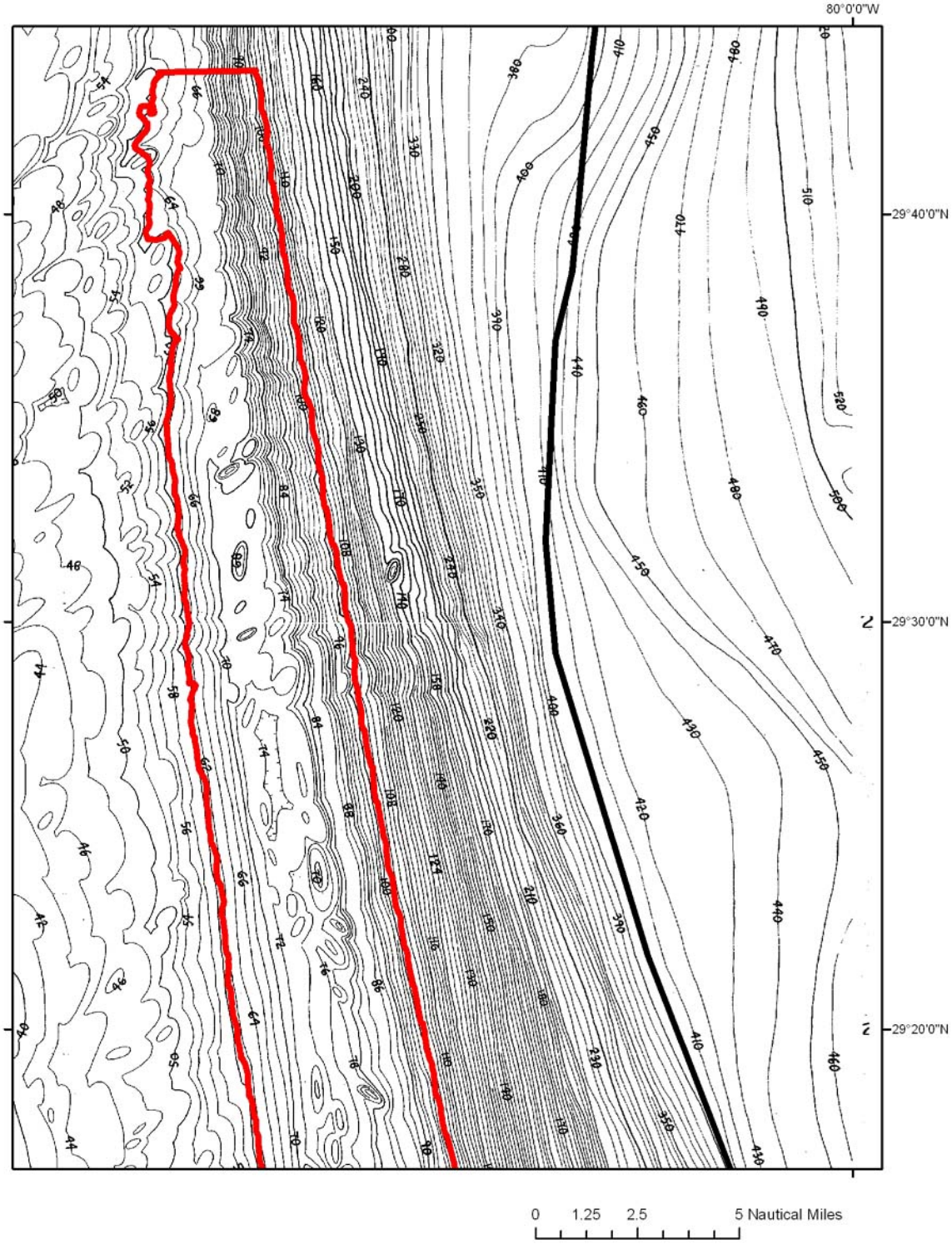
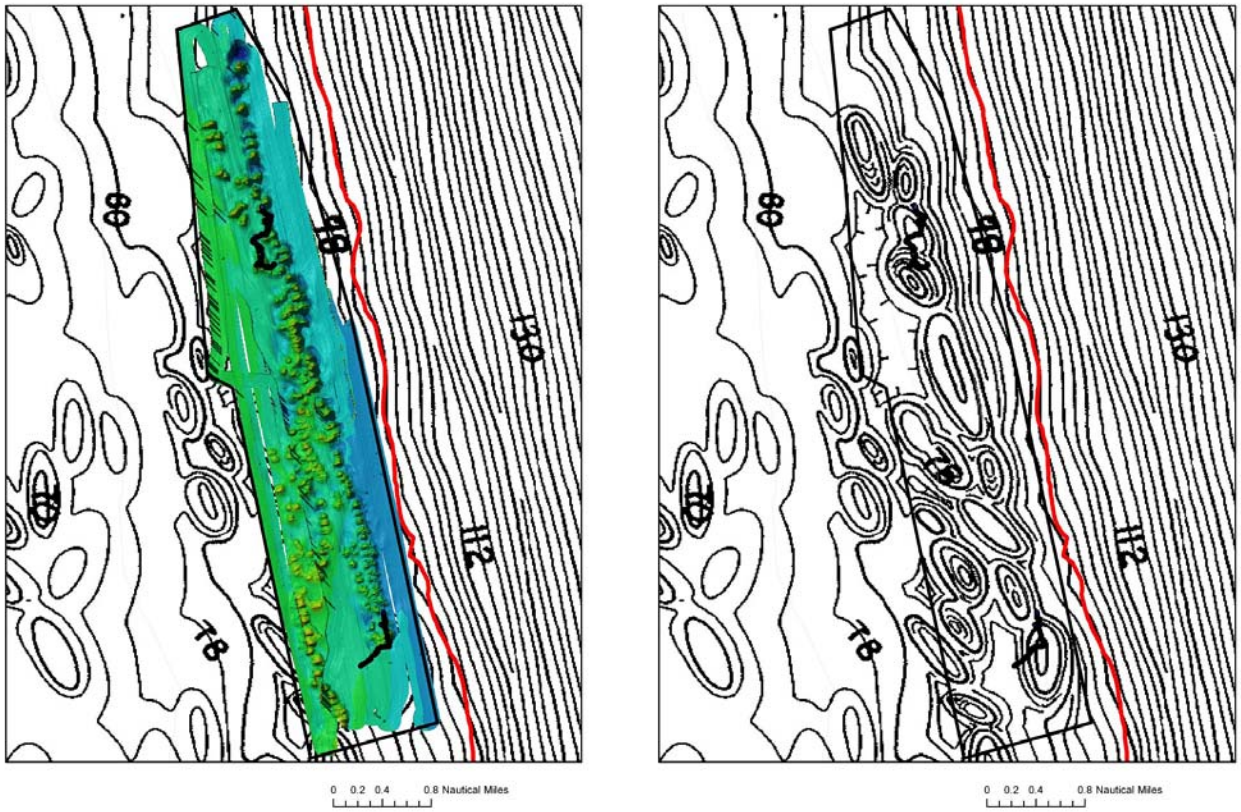
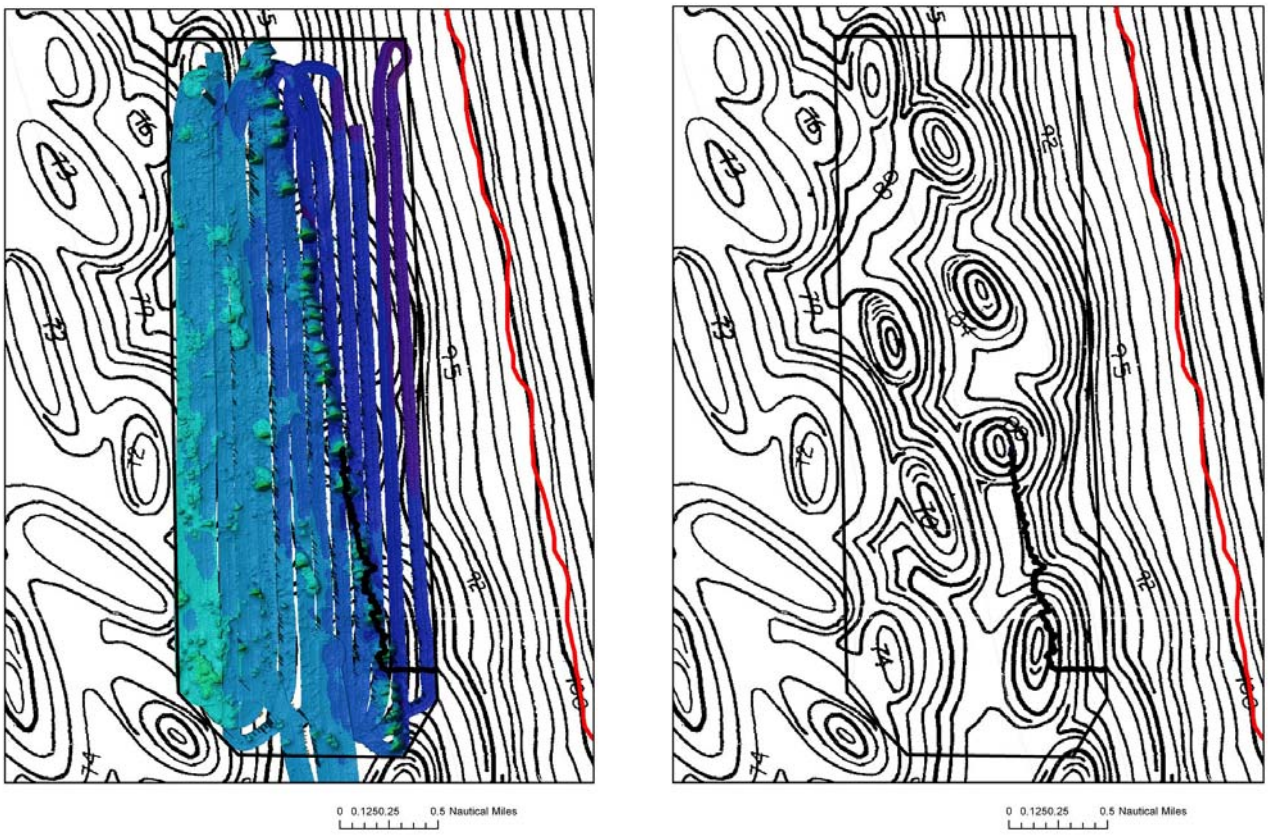


Figure 4. Northern region of proposed *Oculina* HAPC North (see Fig. 1).



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.

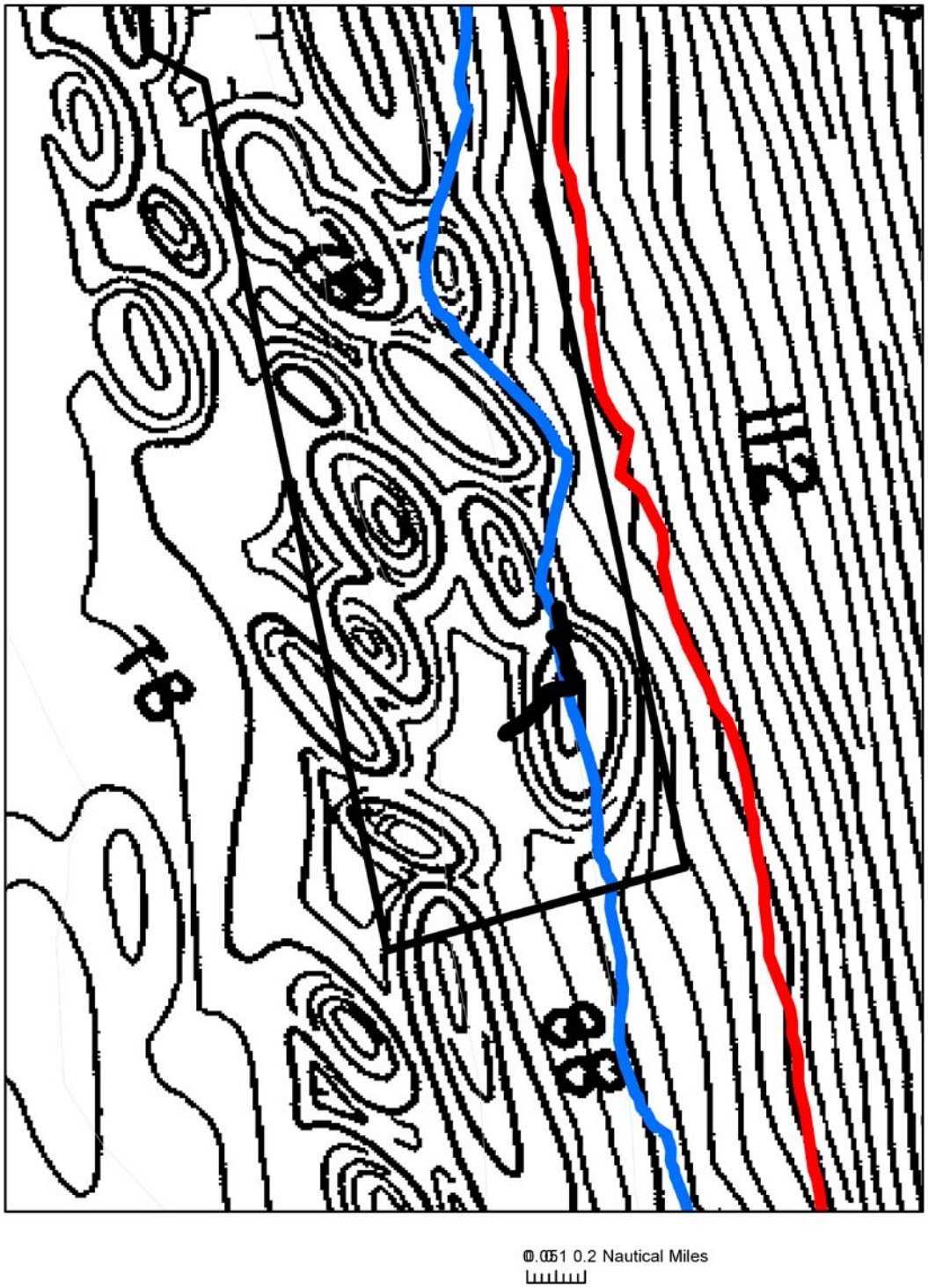


Figure 7. Close-up of NOAA regional bathymetric chart showing the 90 m (blue polyline) bathymetric contour line (NOAA- CRM_10m_nad83) bisecting apparent high-relief coral mounds. The 100 m (red line) contour parallels the eastern base of the coral mounds and avoids coral habitat. ROV track= thick black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

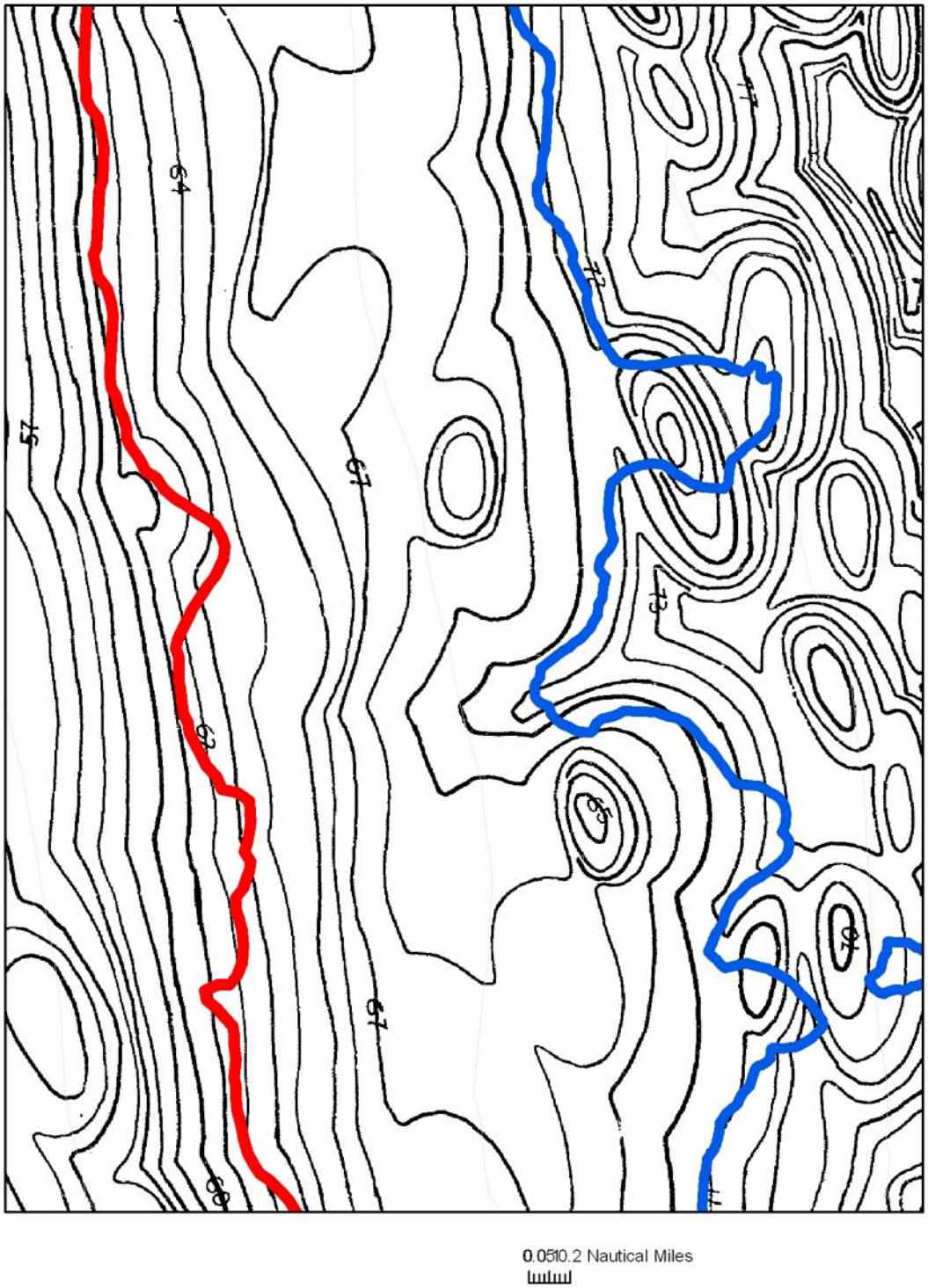


Figure 8. Close-up of NOAA regional bathymetric chart showing the 70 m (blue polyline) bathymetric contour line (NOAA- CRM_10m_nad83) bisecting apparent high-relief coral mounds. The 60 m (red line) contour parallels the western base of the coral mounds and avoids coral habitat.

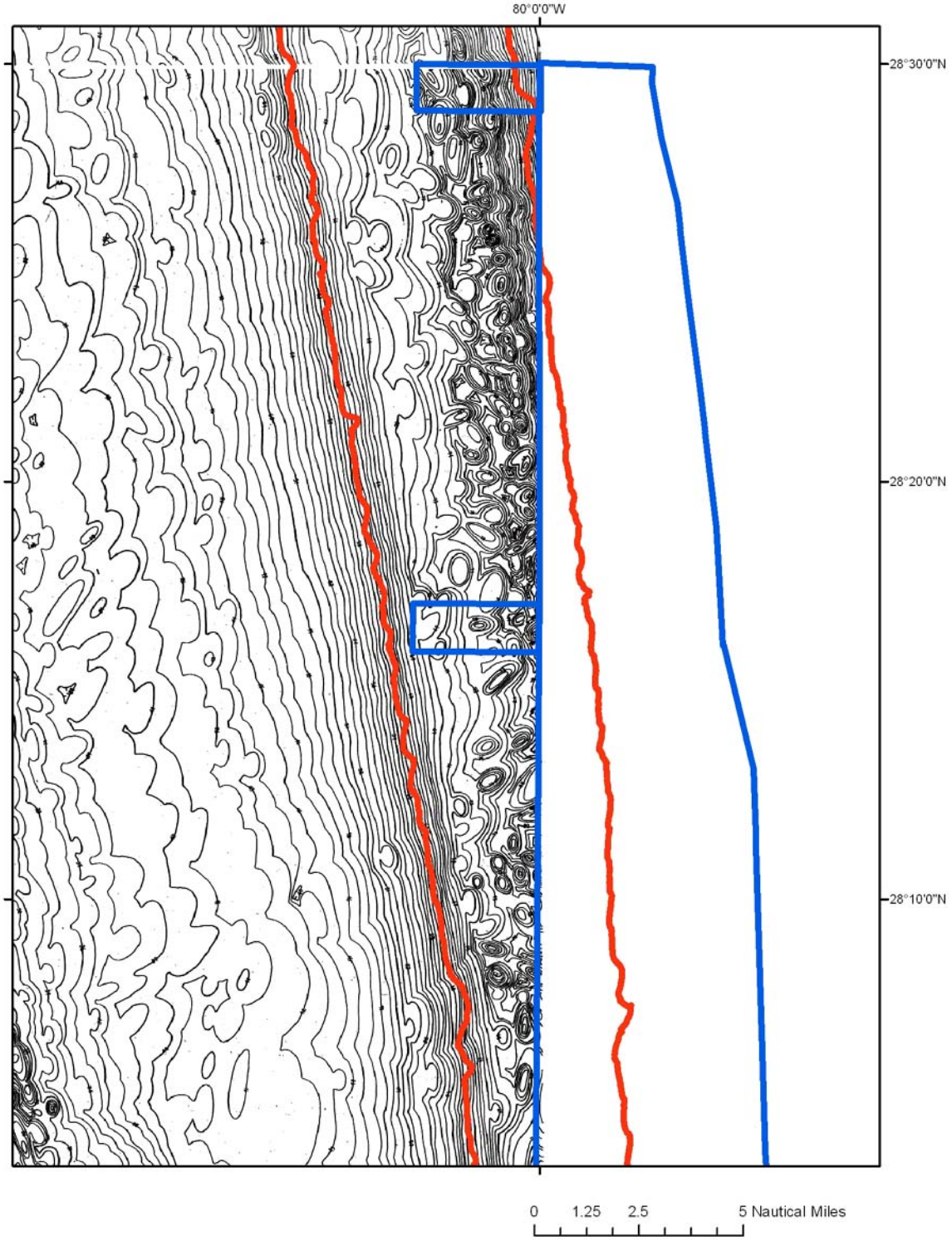
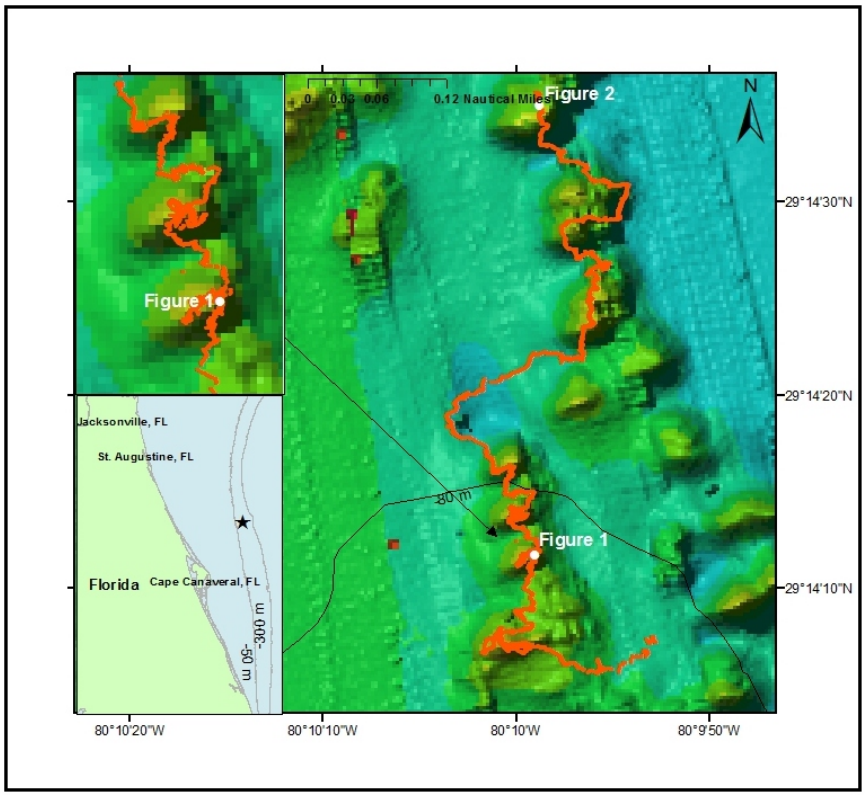


Figure 9. Proposed *Oculina* HAPC West. Blue polygons= current boundary of northern end of the *Oculina* HAPC and two OHAPC satellite areas. Red polylines = 60 m and 100 m contours lines, respectively (NOAA- CRM_10m_nad83). The proposed area could follow the 60 m contour line or use the 80° 03'N longitude which is the western edge of the OHAPC satellite areas. The southern end of the extension would end at 28° 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		
		Scientific Observers:	J. Reed, C. Messing, S. Farrington, J. Thoma, A. David, D.Figueroa
Report Analyst:	John Reed & Stephanie Farrington		
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

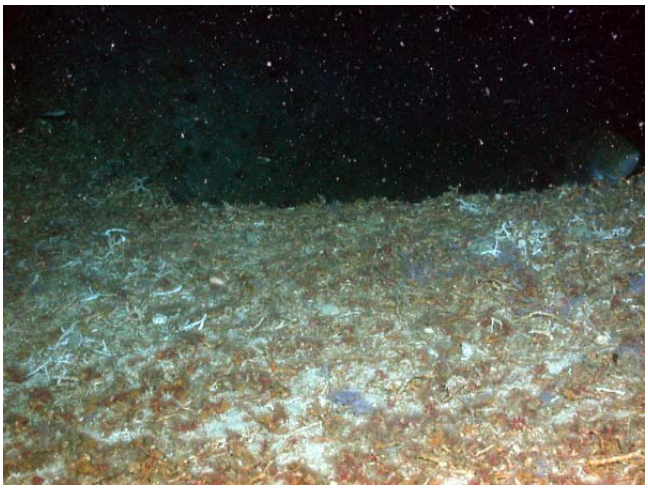


Figure 1: *Oculina* rubble habitat (Image: DSCN7160)

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

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

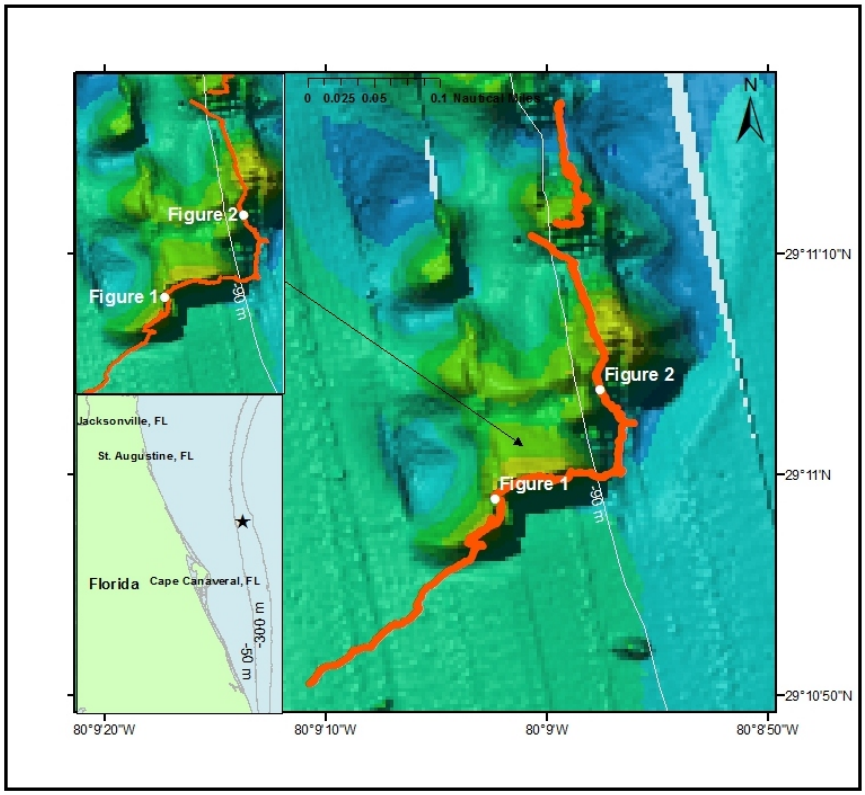
Objective: Survey *Oculina* coral mounds and ground truth sonar survey in area outside *Oculina* HAPC and never surveyed previously. Target site- *Oculina* mound (from *Pisces* multibeam): 29° 14.17'N, 80° 9.802'W; 70-90 m.

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		
		Scientific Observers:	J. Reed, C. Messing, S. Farrington, J. Thoma, A. David, D.Figueroa
Report Analyst:	John Reed & Stephanie Farrington		
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)

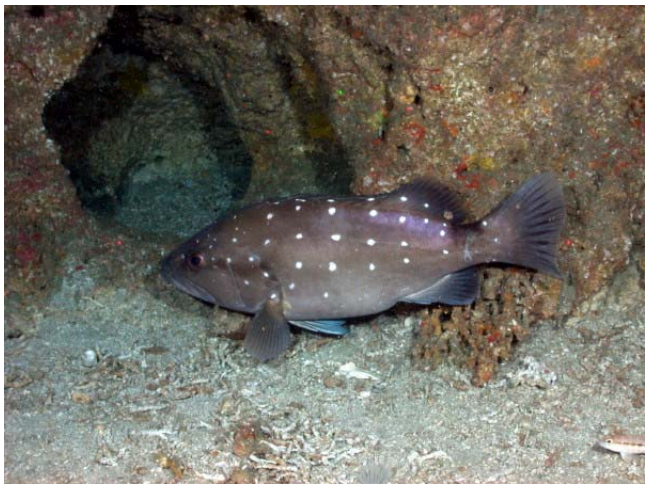


Figure 2: Snowy grouper (*Epinephelus niveatus*) (Image: DSCN7826)

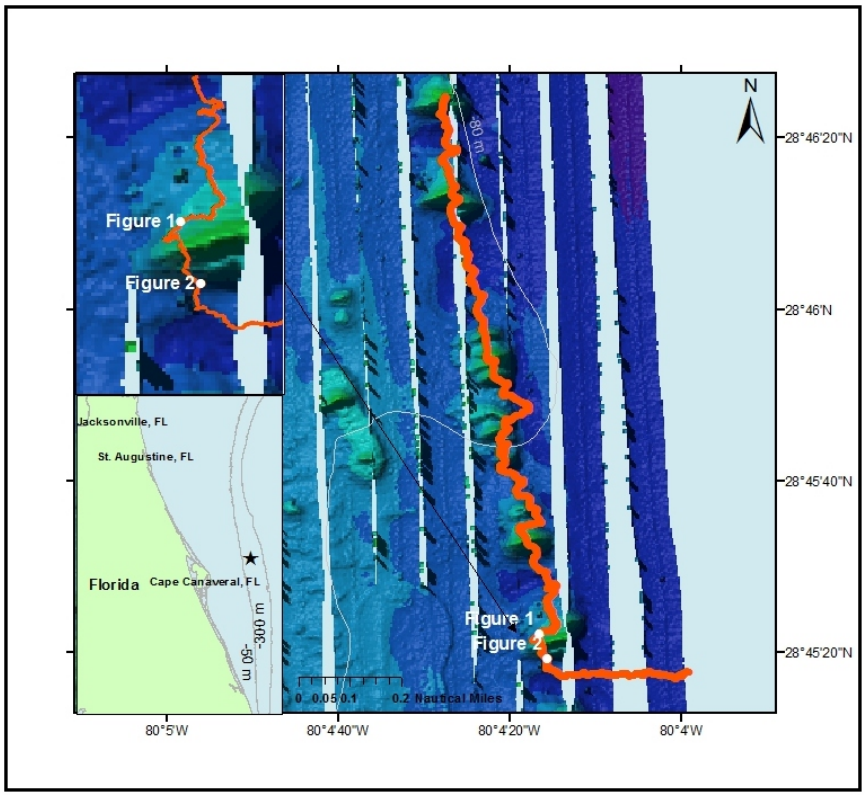
Notes (Objectives, Site Description, Habitat, Fauna):

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 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

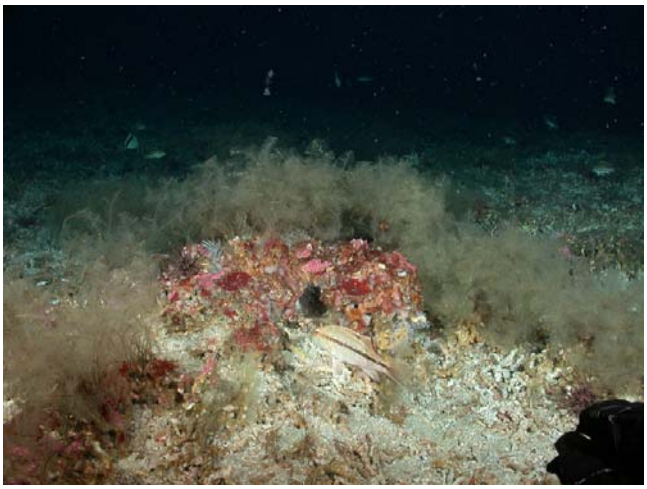


Figure 1: *Oculina* rubble habitat (Image: DSCN8040)

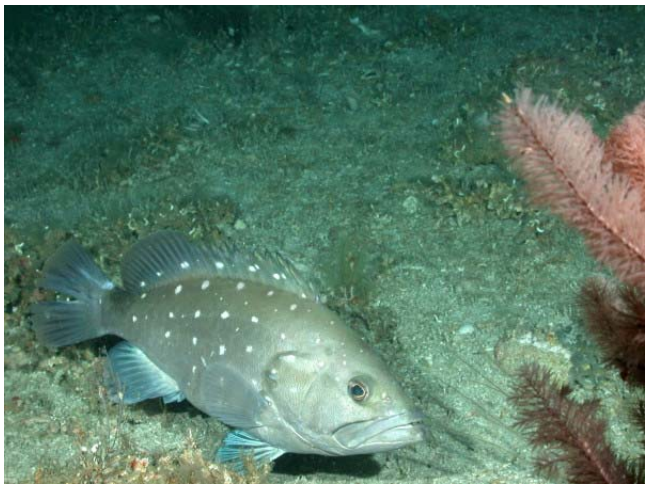


Figure 2: Snowy grouper (*Epinephelus niveatus*) and *Tanacetipathes* (Image: DSCN8268)

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.