



**Wilmington Harbor, North Carolina
Navigation Improvement Project**

**Integrated
Section 203 Study
&
Environmental Report**

**APPENDIX H
HARDBOTTOM RESOURCES**

June 2019

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1. INTRODUCTION

The North Carolina State Ports Authority (NCSPA) is performing a feasibility and environmental study to assess improvements to the federal navigation project at Wilmington Harbor. Potential improvements include deepening and widening of the federal navigational channel, extending the ocean entrance channel farther offshore, expansion of the Turning Basin, and expanded widenings at turns along the channel. The purpose of these potential improvements is to efficiently accommodate larger cargo vessels which are already using or are projected to use the Port of Wilmington (POW) in the near future. Dial Cordy and Associates Inc. (DCA) was tasked with conducting marine biological and cultural resources surveys of the proposed federal project. This report includes a review and assessment of side-scan records for hardbottom habitat occurrences and towed video surveys of potential hardbottom targets in the study area.

Hardbottom resources along the North Carolina coast provide important foraging habitat and protective cover for tropical, subtropical, and warm-temperate reef fishes. Inner-shelf hardbottoms support a higher proportion of temperate species such as black sea bass (*Centropristis striata*), spottail pinfish (*Diplodus holbrookii*), and estuarine-dependent migratory species (Huntsman and Manooch 1978, Grimes et al. 1982). Lindquist et al. (1989) reported 30 species representing 14 families at a nearshore hardbottom site in Onslow Bay. Common species included juvenile grunts (*Haemulon* spp.), round scad (*Decapterus punctatus*), tomtate (*Haemulon aurolineatum*), spottail pinfish, black sea bass, scup (*Stenotomus chrysops*), pigfish (*Orthopristis chrysoptera*), cubbyu (*Pareques umbrosus*), belted sandfish (*Serranus subligarius*), and sand perch (*Diplectrum formosum*). Nearshore hardbottom sites support spawning of smaller and more temperate reef species, such as black sea bass and sand perch; and also provide larval settlement sites and juvenile nursery habitats for reef-associated fishes, including taxa that are thought to spawn in deeper offshore waters. The northern section of Long Bay between Cape Fear and Shallotte Inlet contains one of the highest concentrations of known hardbottom sites along the North Carolina coast (Deaton et al. 2010). Hardbottoms consisting of Cretaceous and Paleocene Age limestones and sandstones are frequently exposed on the Oak Island shoreface and adjoining inner shelf (Marden et al. 1999).

2. TECHNICAL APPROACH

2.1 Side-scan Sonar Survey

As part of the remote sensing survey of the study area by Panamerican Consultants, Inc. and DC&A (Main Report Appendix G: Cultural Resources) performed from 5-15 April 2017, a side-scan sonar survey was conducted. A Marine Sonics dual frequency 900-1800 kilohertz side-scan system was used for the survey. Survey lines were spaced at 100-foot intervals as per state requirements for the offshore study area. A total of 170 survey miles covering over ten transect lines were completed. Crew members monitored a real-time video linked to the Differential Global Positioning System and navigational computer. Survey lines were preprogrammed, then tracked to ensure coverage of the entire survey area (Main Report Appendix G: Cultural Resources Figures 3-12 through 3-18). Speed of the vessel was maintained at three to four knots to ensure uniform data collection. Positioning is crucial with any project; however, especially

important where locating objects under water by remote sensing for later physical investigation. Accurate positioning was accomplished by using a Trimble DMS12/212 Global Positioning System and Hypack navigational software.

Post processing of the side-scan sonar records for hardbottom occurrences was accomplished using SonarWiz.MAP. This product enables the user to view the side-scan data in a digitizer waterfall format, pick targets, and enter target parameters that can include length, width, height, material, and other characterizations into a database of contacts.

2.2 Towed Video Survey

To verify potential hardbottom targets identified through interpretation of side-scan records, an integrated towed video system was used (Photograph 1). The towed video camera system is integrated with a Trimble DMS12/212 Global Positioning System and Hypack navigational software to provide real time overlays of the coordinate positions during the survey on the video record. The video feed is stored onboard and viewed on a monitor during the survey. The towed video transect lines surveyed are shown in Figure 1.



Photograph 1. Towed video sled used for groundtruthing potential hardbottom.

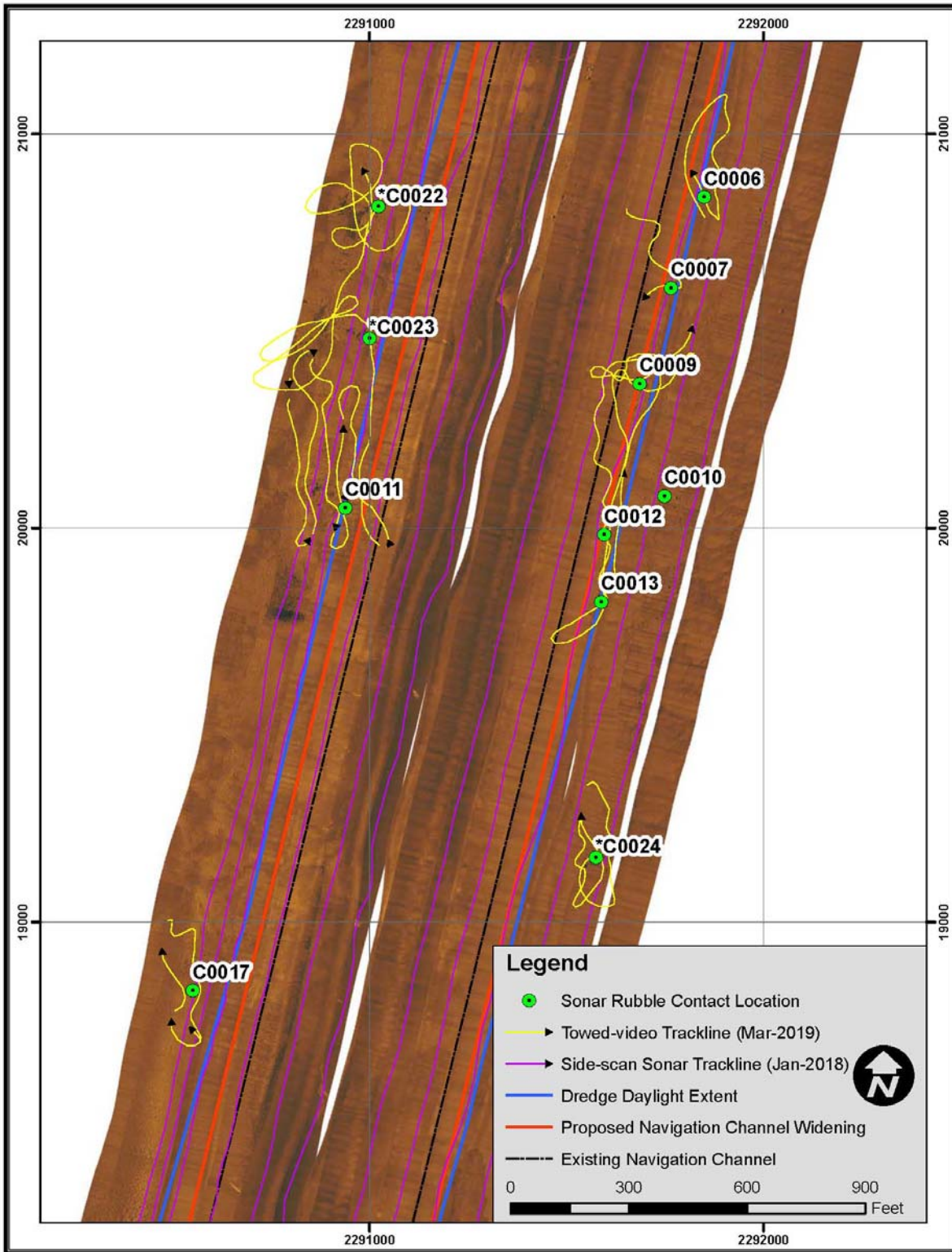


Figure 1. Track Lines of Towed Video Performed on 24 March 2019

3. SURVEY RESULTS

3.1 Side-scan Sonar Hardbottom Targets

Analysis of the survey data identified several targets along the existing channel and close to the proposed channel widening limits that appeared to be rubble/rock piles (Figures 2 and 3) or possibly debris (wire rope) from industrial shipping activities. Most of the targets were identified within the old Ocean Dredged Material Disposal Site (ODMDS) adjacent to the existing channel and proposed channel extension. Table 1 provides a summary of interpreted results of the side-scan records reviewed for subject targets.

3.2 Towed Video Survey

A towed video survey was performed on 24 March 2019 to verify potential side-scan sonar signatures that showed scattered rubble and rock along the section of the proposed outer channel, which passes through the old ODMDS. Based on the mapped targets identified from the side-scan sonar survey and subsequent towed video survey, the resources present in the ODMDS represent rubble, rock and other finer material disposed of during past dredging projects, which used this disposal location. The towed video survey lines overlaying the sonar records are shown in Figures 2 and 3. Representative images from target locations C0023, C0011, and C0022 pulled from the video surveys are shown in Photographs 2 through 5. Due to very limited visibility during the survey, the video record provides a clearer view of the marine biological community present on the rubble piles present (available upon request). A summary of the results of the video survey are provided in Table 2. Rubble and rock has been colonized with marine algae, tunicates (*Tunicata* spp.), echinoderms (*Arbacia punctulata*, *Luidia clathrate*) octocorals (*Leptogorgia virgulata*, *L. hebes*, *Phyllangia americana*, *Astrangia* sp.) and other typical sessile and motile invertebrates common to hardbottom reefs. Fish observed on the video records included black sea bass, sheepshead (*Archosargus probatocephalus*), belted sandfish, and pinfish (*Lagodon rhomboides*).

During the towed video survey, most rocks identified were surrounded by sand with very few consolidated into piles. These rocks appeared to be consistent with the expected dredged material from previous dredging activities in the federal channel. The colonization of these rocks by hardbottom associated species is providing a functional habitat similar to any artificial reef in the adjacent project area. Two of the targets, C0022 and C0023 had an estimated relief of 1 to 1.5 meters and as such, provide the best hardbottom habitat in the surveyed area. (Figure 3). These two areas of higher relief would be mostly outside or on the edge of the proposed daylight (refers to top of slope) limits of the new channel width. Based on the surveys performed, any small realignment of the proposed channel to the east might help avoid impacts to the marine resources that have colonized past disposed dredged material. In the event this is not possible, it should be noted that the removal of the material and associated hardbottom community occur in the old designated Wilmington ODMDS. Further coordination on effects of the proposed project on these resources should be minimal since they occur within the old ODMDS.

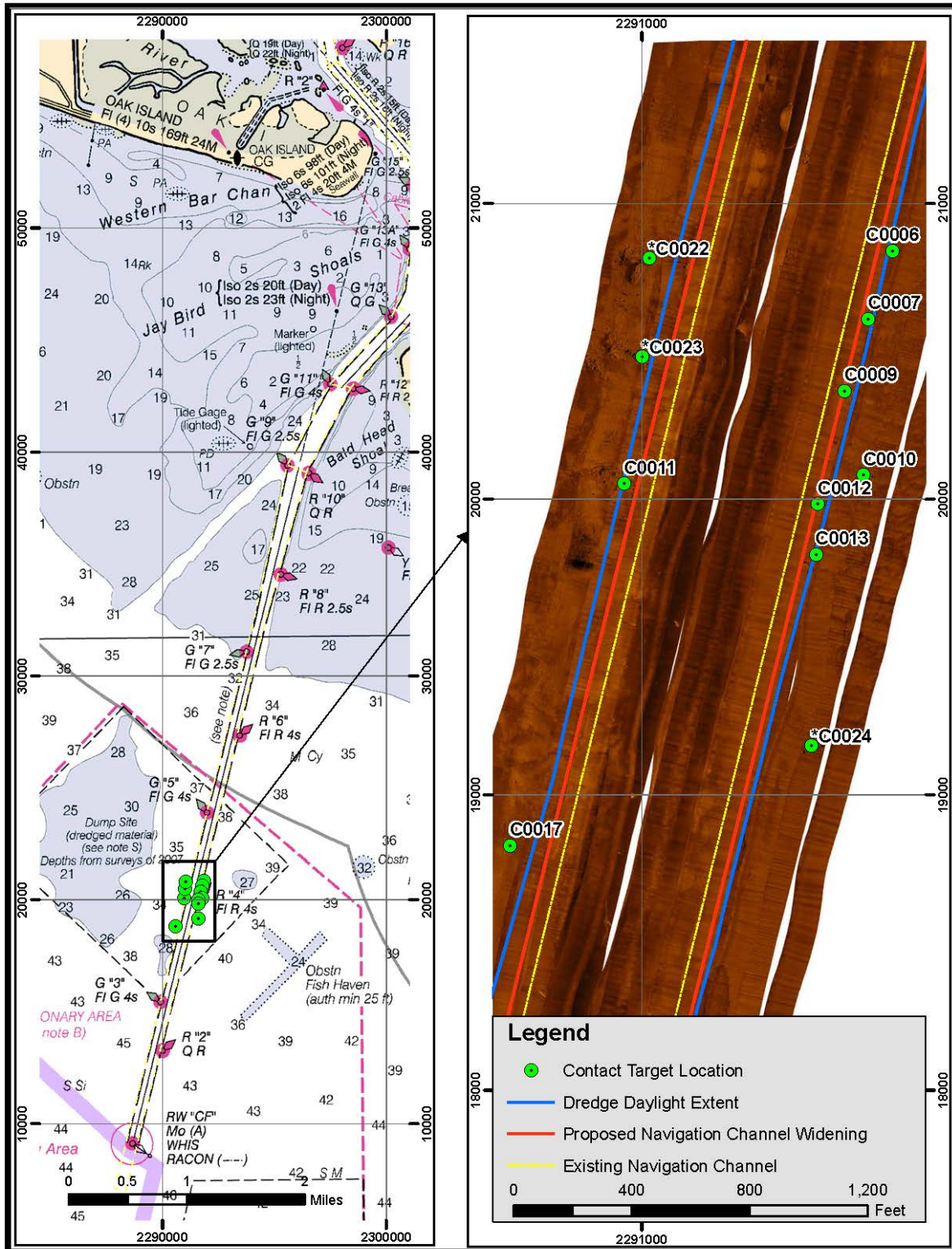


Figure 2. Side-scan Sonar Targets Identified in the Old ODMDS, Existing Channel, and Proposed Channel Widening Locations

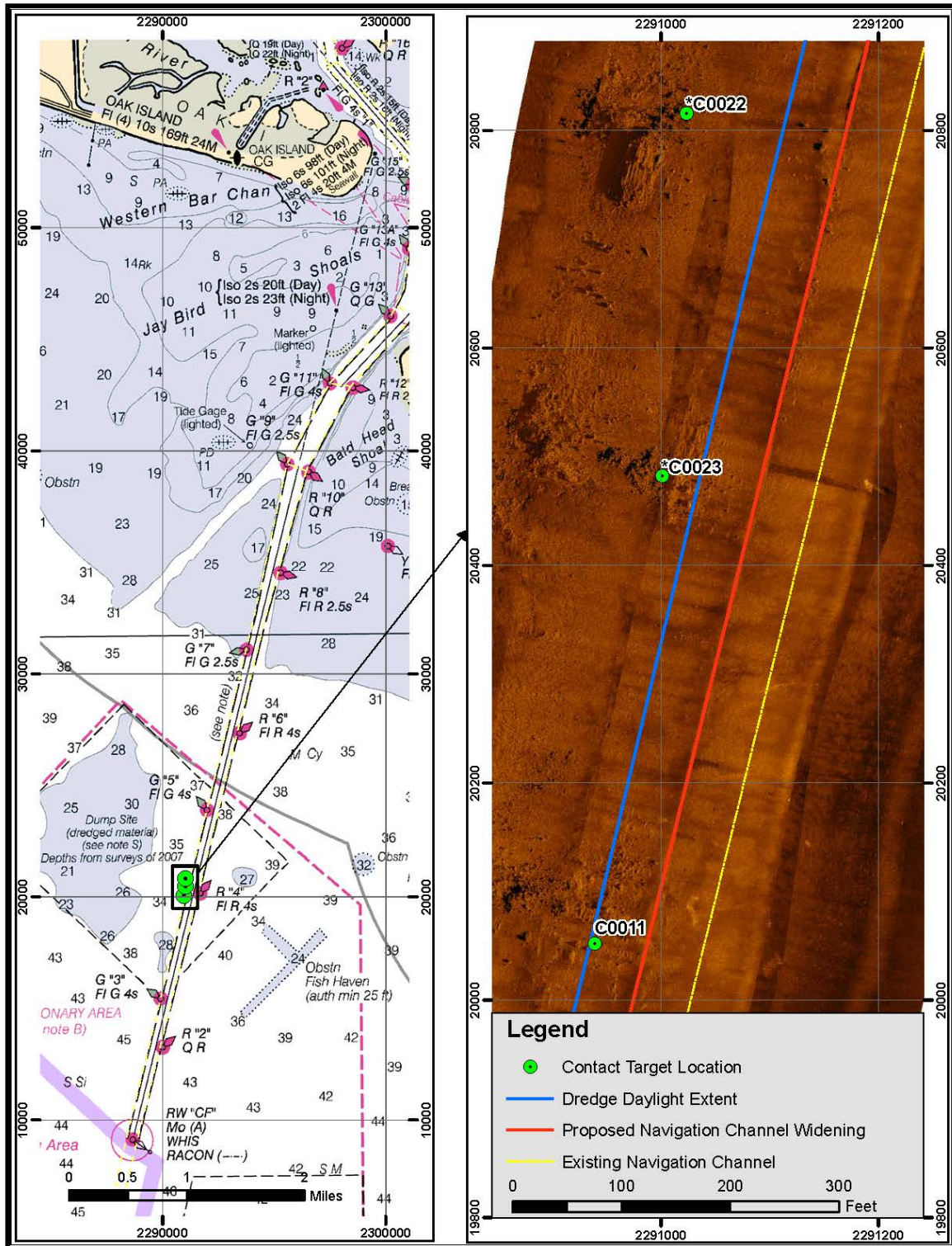


Figure 3. Close-up of Side-scan Records and Targets with Hardbottom Signatures in the ODMDS Adjacent to the Existing Channel, and Proposed Widening Location

Table 1. Potential hardbottom targets from interpretation of side-scan records.

Target Identification	DESCRIPTION	DIVE_ID	VERTICAL RELIEF (Meters)
C0006	Debris scatter or geological feature	C0006	<1
C0007	Debris scatter or geological feature	C0007	1
C0009	Debris or geological feature	C0009	<1
C0010	Debris or geological feature	C0010	<1
C0011	Wire rope and surrounding outcrop	C0011	1-1.5
C0012	Debris or geological feature	C0012	<2
C0013	Debris or geological feature	C0013	<2
C0017	Debris or geological feature	C0017	<1
C0022	Debris or geological feature	*C0022	1-1.5
C0023	Debris or geological feature	*C0023	1-1.5
C0024	Debris or geological feature	*C0024	1



Photograph 2. Octocorals on scattered rubble.



Photograph 3. Sea whip (*Leptogorgia virgulata*) attached to rubble.



Photograph 4. Gorgonians attached to scattered rubble.



Photograph 5. Black sea bass (*Centropristis striata*) over observed rubble.

Table 2. Summary of findings from video survey.

Target Identification	Description of Target	Estimated Height (meters)
C0006	Sparsely scattered rock colonized with hardbottom organisms	<1
C0007	Scattered rock and piles of unconsolidated rock	<1
C0009	Rock piles and isolated rocks with hardbottom organisms	<1
C0011	Scattered rock and piles of unconsolidated rock	<1
C0012	Sparsely scattered rock colonized with hardbottom organisms	<1
C0013	Sparsely scattered rock colonized with hardbottom organisms	<1
C0017	Sparsely scattered rock colonized with hardbottom organisms	<0.5
C0022	Largest rock piles observed, colonized with hardbottom organisms	<2
C0023	Large rock piles observed, colonized with hardbottom organisms	<2
C0024	Scattered rock and manmade debris	<0.5

4. SUMMARY AND RECOMMENDATIONS

The targets identified during the remote sensing and subsequent ground-truthing through towed video showed that a hardbottom community has colonized on the disposed rock/rubble in the old Wilmington ODMDS. Most of the targets consisted of scattered rock with relatively low relief and some gorgonians protruding through a thin veneer of sandy material; however, targets C0022 and C0023 consisted of large deposits of rubble/rock with relief of 1 to 1.5 meters. These higher relief habitats on the northwest side of the channel are in close proximity to the proposed channel widening limits. These two targets represent the largest deposits surveyed and effects should be minimized, if possible. If the channel realignment could be shifted by a degree or two, it is possible that these targets would receive little to no disturbance. Further regulatory compliance regarding these features should be minimal given that they are located in the old Wilmington ODMDS.

5. LITERATURE CITED

- Deaton, A.S., W.S. Chappell, K. Hart, J. O'Neal, and B. Boutin. 2010. North Carolina Coastal Habitat Protection Plan. North Carolina Department of Environment and Natural Resources. Division of Marine Fisheries, NC. 639 pp.
- Grimes, C.B., C.S. Manooch, and G.R. Huntsman. 1982. Reef and rock outcropping fishes of the outer continental shelf of North Carolina and South Carolina, and ecological notes on the red porgy and vermilion snapper. *Bulletin of Marine Science* 32(1): 277-289.
- Huntsman, G.R., and C.S. Manooch, III. 1978. Coastal pelagic and reef fishes in the South Atlantic Bight. Pp. 97-106 *In* H. Clepper, Ed., *Marine Recreational Fisheries III. Proceedings of the Second Annual Marine Recreational Fisheries Symposium*. Norfolk, VA. March 29-30. Sport Fisheries Institute, Washington, D.C.
- Lindquist, D.G., E. I. Clavijo, L. B. Cahoon, S. K. Bolden, and S. W. Burk. 1989. Quantitative diver visual survey of innershelf natural and artificial reefs in Onslow Bay, NC: Preliminary Results for 1988 and 1989. Department of Biological Sciences and Center for Marine Science Research, University of NC. Wilmington, NC 28403-3297. USA.
- Marden, T. P., W. J. Cleary, N. R. Grindlay, and W. B. Harris. 1999. Sea floor mapping using digital sidescan sonar reflects Cretaceous-aged prograding clinofolds, Long Bay, NC, *Geologic Society of America, Abstracts with Programs*, V. 31 No. 2.