W00224

NOAA FORM 76-35A

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL OCEAN SURVEY

DESCRIPTIVE REPORT

Type of Survey **Outside Source Data**
Project No. **M-E918-OSD-12**
Registry No. **W00224**

LOCALITY

State **Maryland**

General Locality **Central Chesapeake Bay**

Sub-locality **Approaches to Choptank River**

2011

CHIEF OF PARTY
David G. Bruce, NCBO
HYDROGRAPHER
Jay Lazar, NCBO

LIBRARY & ARCHIVES

DATE

NOAA FORM 77-28 (11-72)

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

REGISTRY NUMBER: W00224

HYDROGRAPHIC TITLE SHEET

State: Maryland

General Locality: Central Chesapeake Bay

Locality: Approaches to Choptank River

Scale: 1:40,000 Date of Survey: 28 Mar 2011 - 26 May 2011

Instructions Dated: N/A Project Number: M-E918-OSD-12

Vessels: R/V Lookdown

Chief of Party: David G. Bruce (Habitat Ecologist, NCBO, NOAA)

Surveyed by: Jay Lazar (Lead Hydrographer, NCBO, NOAA)

Soundings by: Reson 8125 multibeam echosounder

Graphic record scaled by: N/A

Graphic record checked by: N/A

Protracted by: N/A Automated plot by: N/A

Verification by: ***Atlantic Hydrographic Branch***

Soundings in: Feet: _____ Fathoms: _____ Meters: X at MLW: _____ MLLW: X

The purpose of this survey is to provide contemporary surveys to update National Ocean Service (NOS) nautical charts. All separates are filed with the hydrographic data. Revisions and Red notes were generated during office processing. The processing branch concurs with all information and recommendations in the DR unless otherwise noted. Page numbering may be interrupted or non-sequential. All pertinent records for this survey, including the Descriptive Report, are archived at the National Geophysical Data Center (NGDC) and can be retrieved via http://www.ngdc.noaa.gov/.

Remarks: All times are in UTC
UTM Zone 18

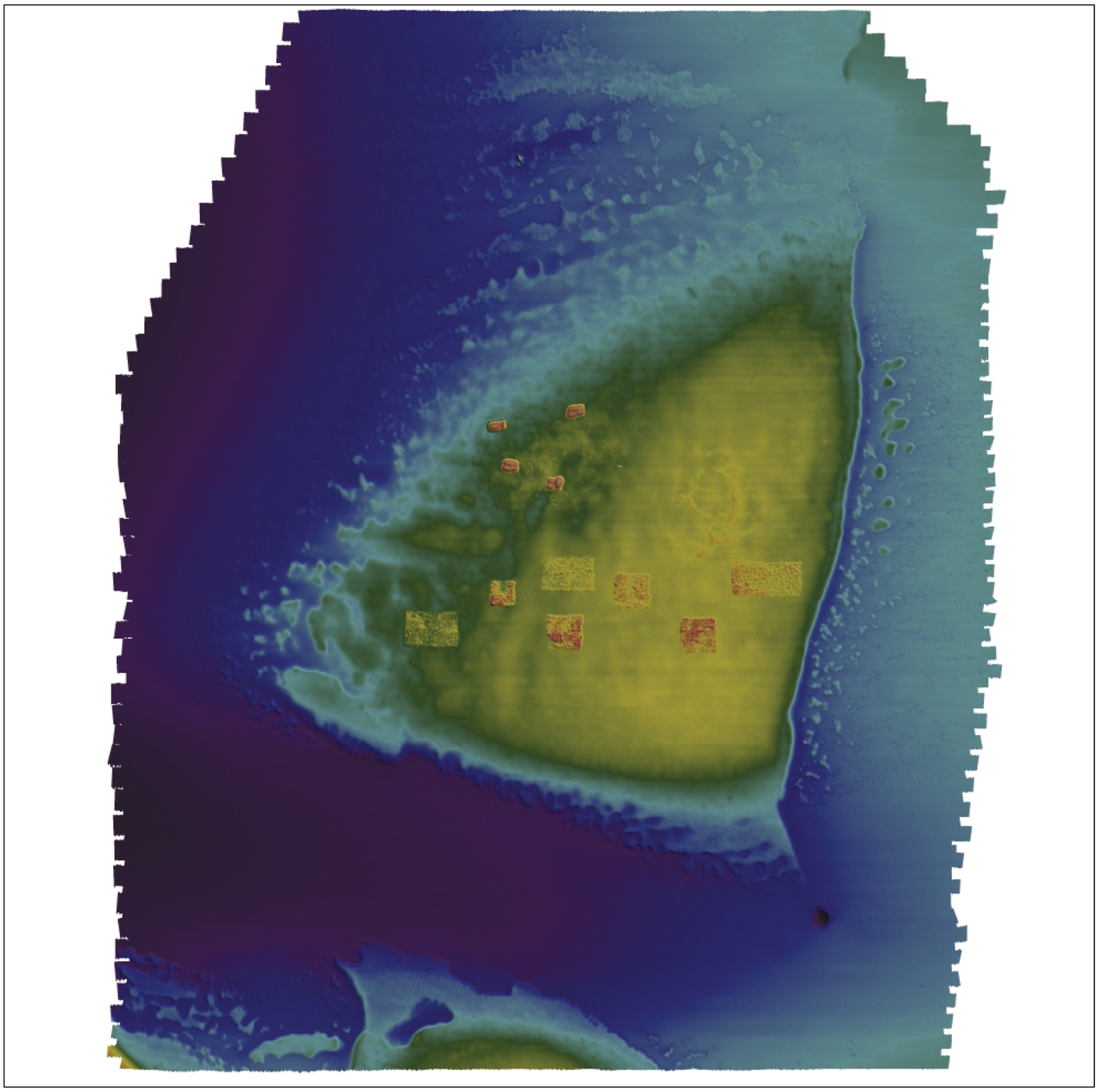
NOAA FORM 77-28 SUPERSEDES FORM C & GS - 537

Survey Report:

Cook Point Oyster Sanctuary

Multibeam Sonar Survey

February 2011



NOAA Chesapeake Bay Office

October 17 2011

Index

Summary

We conducted a multibeam sonar survey at Cook Point Oyster Sanctuary in March 2011 to provide as-built bathymetry data and imagery for seven alternative substrate reefs recently constructed by the US Army Corps of Engineers (USACE) Baltimore District. The entire survey extent was 2.9 km^2 (716.6 ac). Additional features mapped were shell mounds and flat plantings created by the MD Department of Natural Resources (MD DNR), reef balls placed by the Chesapeake Bay Foundation, a wrecked WWII era seaplane, and extensive natural oyster shell bottom. Minimum depth of Corps reefs was 3.8 m (12.5 ft; MLLW), and estimated maximum relief was 3.2 m (10.5 ft). The approximate area of alternative substrate reefs ranged from 1,986 to 8,113 m^2 (0.5-2.0 ac). Minimum depth of DNR shell mounds was 4.2 m (13.8 ft). Total area of alternative substrate reefs and shell plantings is 34,722 m^2 (8.6 ac) and 107,695 m^2 (26.6 ac) respectively. A total of 454,929 m^2 (112.4 ac) of un-restored sandy bottom remains on top of the main shoal of the oyster bar, and this is surrounded by 825,384 m^2 (203.9 ac) of natural oyster shell bottom, most of which appears to be highly sedimented.

A compressed (*.rar) version of the GIS data in an ESRI geodatabase can be downloaded from: **ftp://ftp.chesapeakebay.net/NOAA/Ecosystem_Science/Habitat_Assessment/Public/Cook_Point_Multibeam_and_Habitat_Characterization_2011/**

Objectives

In January and February of 2011 the USACE constructed seven alternative substrate reefs on Cook Point Oyster Sanctuary in the Choptank River. In March 2011 the NOAA Chesapeake Bay Office (NCBO) Habitat Assessment Team conducted a multibeam sonar survey of the site to provide as-built bathymetry data and imagery of the constructed reefs. The survey extent was expanded to cover an area that contained reefballs placed by the Chesapeake Bay Foundation, and shell mound reefs created by MD DNR. Because of the complex morphology of natural seabed features in the area, in addition to the amount of apparent natural oyster reef, the survey ultimately was extended to cover the entire central shoal of the Sanctuary.

The survey provides fine scale bathymetric and expanded benthic habitat characterization data that can be used to identify additional sites for restoration and to assess the morphological and surface complexity of differing restoration sites and natural features.

Sanctuary Site Description

Cook Point Sanctuary encompasses a large portion of Cook Point Oyster Bar (Figure 1). The bar includes a geologically isolated shoal between Cook Point (Dorchester County) to the south, and Nelson Point (Talbot County) to the north. The bar also includes shoal areas associated with the Dorchester County shoreline. The centroid coordinates of the sanctuary are 76 ^{o} 16.89' Lon. and 38^{o} 38.96' Lat. Prior to the 2011 multibeam survey, parts of the sanctuary were surveyed with sidescan sonar by NOAA Office of Coastal Survey (1999) and the Maryland Geological Survey (MGS; 2007-2010; Figure 2).

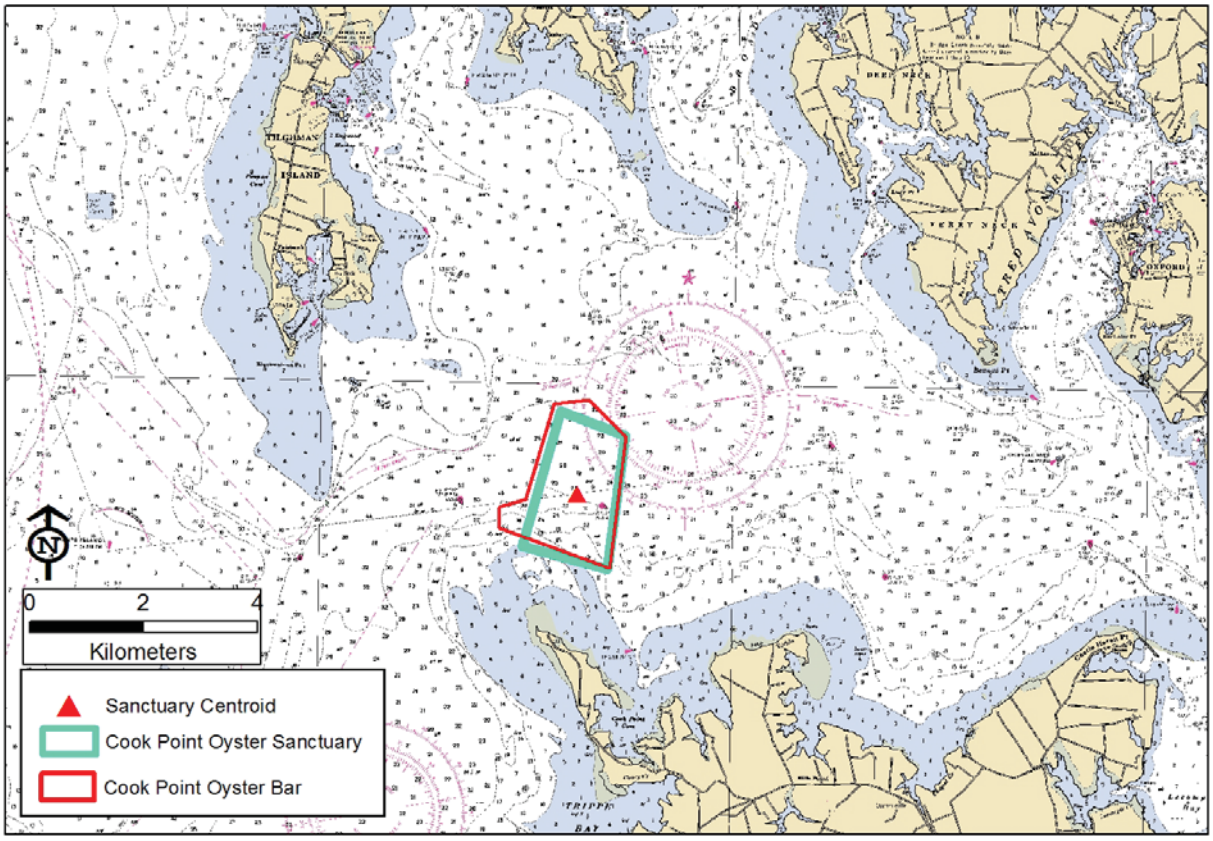


Figure 1. Location of Cook Point Sanctuary and Oyster Bar in the Choptank River.

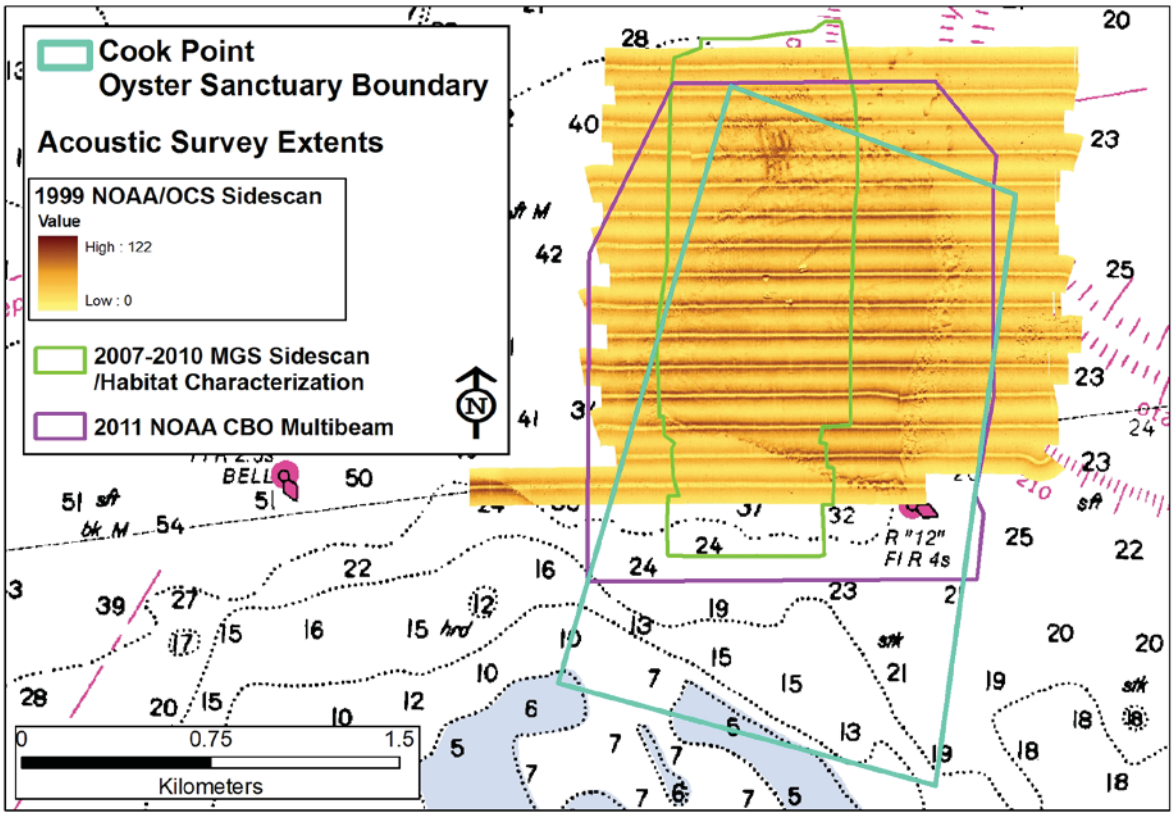


Figure 2. Extents of acoustic surveys conducted at the site. The 2001 multibeam survey expands coverage of the 2007-2010 MGS survey extent and provides an updated and more comprehensive benthic habitat characterization than the 1999 survey.

Methodology

Data Acquisition **-**The NCBO survey vessel, RV Lookdown, is integrated with a complete sensor package to conduct multibeam bathymetric and backscatter surveys. The sonar is a Reson Seabat 8125 multibeam designed to map seabeds less than 100 meters deep. The Seabat 8125 is a 455-kHz system with a 120° swath consisting of 240 individually formed, electronically roll-stabilized 0.5° beams pinging with a maximum rate of 20Hz, depending on water depth. Vessel position and orientation is determined with an Applanix POS/MV Wavemaster V4 (POS). The GPS aided Inertial Motion Unit (IMU) provides measurements of roll, pitch and heading that are all accurate to $\pm$ 0.03°. Heave measurements supplied by POS maintain an accuracy of 5% of the measured vertical displacement or $\pm$ 5cm for swell periods of 20 seconds or less. The accuracy and stability of measurements delivered by the system remain unaffected by vessel turns, changes of speed, wave-induced motion (sea state dependent), or other dynamic maneuvers. These corrections are provided real-time to the acquisition software and the raw measurements are recorded via Ethernet logging on the acquisition PC. The IMU is located near the vessel's center of motion. An auxiliary Trimble DSM 232 differentially corrected global positioning system (DGPS) provides a ground beacon corrected (RTCM) data stream to the POS. The Seabat 8125 is equipped with a real time sound velocity probe (Teledyne Odom Digibar Pro) at the sonar head that is interfaced with the topside unit to correct for sound velocity variability in the water mass and assist accurate beam-forming. The primary sensor for determining sound velocity throughout the water column is a Seabird Electronics SBE-19 Plus V2 CTD. Sound velocity casts are obtained approximately every four hours during survey operations. Hypack Hysweep 2010 provided the acquisition platform for integrating the sensor data in addition to survey setup and navigation.

Survey Area- 2.9 km^2 of the Cook Point Sanctuary was mapped with multibeam sonar over six days in March 2011. Survey transect spacing was 20 m and there were 103 transects in the survey line plan.

Bathymetry Processing – Bathymetric data were edited with CARIS HIPS processing software. The vessel configuration used for the data conversion was the Lookdown_8125.hvf file. This file includes the preliminary patch test results, the final patch test results, waterline and the Total Propagated Error (TPE) values. All the acquired data was converted and processed in the field. Preliminary data processing consisted of: application of sound velocity, zero tides, and CARIS Combined Uncertainty Bathymetric Editor (CUBE) Bathymetry Associated with Statistical Error (BASE) surface creation. The Hips Subset Editor was the second phase of editing. With the CUBE BASE surfaces of *depth, standard deviation and hypothesis count* identifying areas of outliers, Subset editing was used to remove gross outlier soundings while identifying potential tidal and motion artifacts. The verification and alignment of features from adjacent lines also confirmed preliminary sensor offsets. CUBE BASE surfaces were created to illustrate adequate sonar coverage and to also identify systematic errors or artifacts within the data set. The BASE surfaces created from the merged and TPE calculated soundings are geo-referenced images of a weighted mean surface. The BASE surface uses a combination of range, uncertainty and swath angle weights to assign nodes depth values to create an image of the seabed surface. The BASE surface images were reviewed with multiple resolutions, sun angles, sun azimuths and vertical exaggerations. The BASE surface routine produced images representing *depth, shoal-biased depth, deep-biased depth, mean depth, standard deviation, sounding density, and depth uncertainty*. During acquisition field editing steps were expedited to create BASE surfaces to confirm adequate multibeam coverage for each survey area. Final subset editing of the entire dataset included the re-application of sound velocity profiles, and post patch test refinement from the application of post-processed kinematic data from the POS system. Zone verified tide data were applied to correct for variability in vessel elevation during the survey and to standardize bathymetry data to the Mean Lower Low Water (MLLW) datum.

Backscatter Processing- Hypack Hysweep MBMax software integrated the raw bathymetry (*.hsx) with the raw backscatter (*81x) files and saved the combined data in the general survey format (*gsf). The gsf data files were then loaded into Hypack's implementation of Geocoder, a program that normalizes backscatter data by removing artifacts

inherent in sonar operation. Slope artifacts are removed by loading an edited bathymetric surface from CARIS HIPS into Geocoder prior to processing. The resulting mosaic is saved as a geotiff and in an ASCII XYB text file where the B references the average amplitude intensity at the size of the grid cell.

Ground Truthing and Habitat Characterization- On 10 June 2011 the site was ground truthed with video and Ponar grabs to assist the creation of benthic habitat characterization of the seabed within the sonar survey extent. Georeferenced seabed material descriptions were recorded in real-time as Hypack target files from 13 PONAR grabs and 83 video drops at sixteen generalized sites. Acoustic backscatter mosaics and the ground truthing data were used to identify the geometry and composition of benthic habitat features. Habitat boundary polygons were created and classified with the ArcGIS Habitat Digitizer Extension, using a variant of the Coastal and Marine Ecological Classification Standard-Surface Geology Component (CMECS-SGC) developed for the Chesapeake Bay by NCBO and MGS.

Spatial Data Products - The HIPS export wizard produced a 24-bit sun-illuminated geotiff image of the BASE *depth* surfaces (Title page), and ASCII XYZ text exports at resolutions in accordance with the depth thresholds for the survey. XYZ files were converted to a bathymetric grid standardized to MLLW. The Geocoder export tool produced an acoustic backscatter geotiff image and an ASCII XYB text file. The hillshade, bathymetry, and backscatter grids have a 0.5m grid cell resolution. Video and PONAR point data and habitat characterization polygons are represented as ArcGIS feature class layers. All spatial data were projected to the North American Datum of 1983, Universal Transverse Mercator Zone 18, Northern Hemisphere (NAD83 UTM18N). Bathymetry data use the MLLW vertical datum. Bathymetric data discussed in this document were extracted from the 0.5m grid; reef relief was calculated from range of depth values extracted to create 3D digital elevation models.

GIS-ready data are contained in an ESRI Personal Geodatabase named “Cook Point Oyster Sanctuary Seabed Mapping 2011”. A compressed (*.rar) version of the geodatabase can be downloaded from: **ftp://ftp.chesapeakebay.net/NOAA/Ecosystem_Science/Habitat_Assessment/Public/Cook_Point_Multibeam_and_Habitat_Characterization_2011/**

Results

Bathymetry – Several bathymetric features related to native oyster restoration projects exist on the top of the main shoal. The most significant features are the seven alternative substrate reefs constructed by USACE (Figure 3, A-G). These reefs (Figures 4-10) were built of 0.08-0.15 m granite pieces (USACE Balt. Dist. 2011). The greatest relief of an individual reef is 3.2 m and was observed on reef A (Figure 4). The most shoal reef sounding is 3.8 m MLLW, located on the southwest corner of reef A. There are also four large (30 x 20 m) mounds of oyster shell (Figure 3, H-K) constructed by MD DNR in 1998. The most shoal sounding is 4.15 m MLLW observed on the southernmost mound (Figure 3, J); the average relief of the four mounds is 2.7 m. Observed circular features are “flat” oyster shell plantings that were placed by MD DNR in 2006 (Figure 3, L) and 1990 (Figure 3, N & O). Both planting sites exhibit detectable bathymetric relief. In the vicinity of L and M (Figure 3) are concrete reefballs placed by the Chesapeake Bay Foundation between 2008 and 2010 (Figure 11). Natural oyster patch reefs are located on the east and west sides of the bar (Figure 3; P, Q, & R); the shoalest (Figure 3, R) is 6.9 m MLLW with a relief of 1.4 m. An additional man-made feature is the charted wreckage of a WWII era seaplane lying among natural oyster patch reefs, on the northern edge of the bar in approximately 9.0 m of water (Figures 12 & 13). This wreck is a popular recreational fishing site.

Charted depths in the final bathymetry grid ranged from 2.8 to 12.1 m MLLW (Figure 14). The shoalest value is the raised left wing of the airplane wreck (Figure 13) and the deepest value is located at the southeastern tip of the main shoal in a depression created by the anchor and chain of the Red #12 navigation buoy.

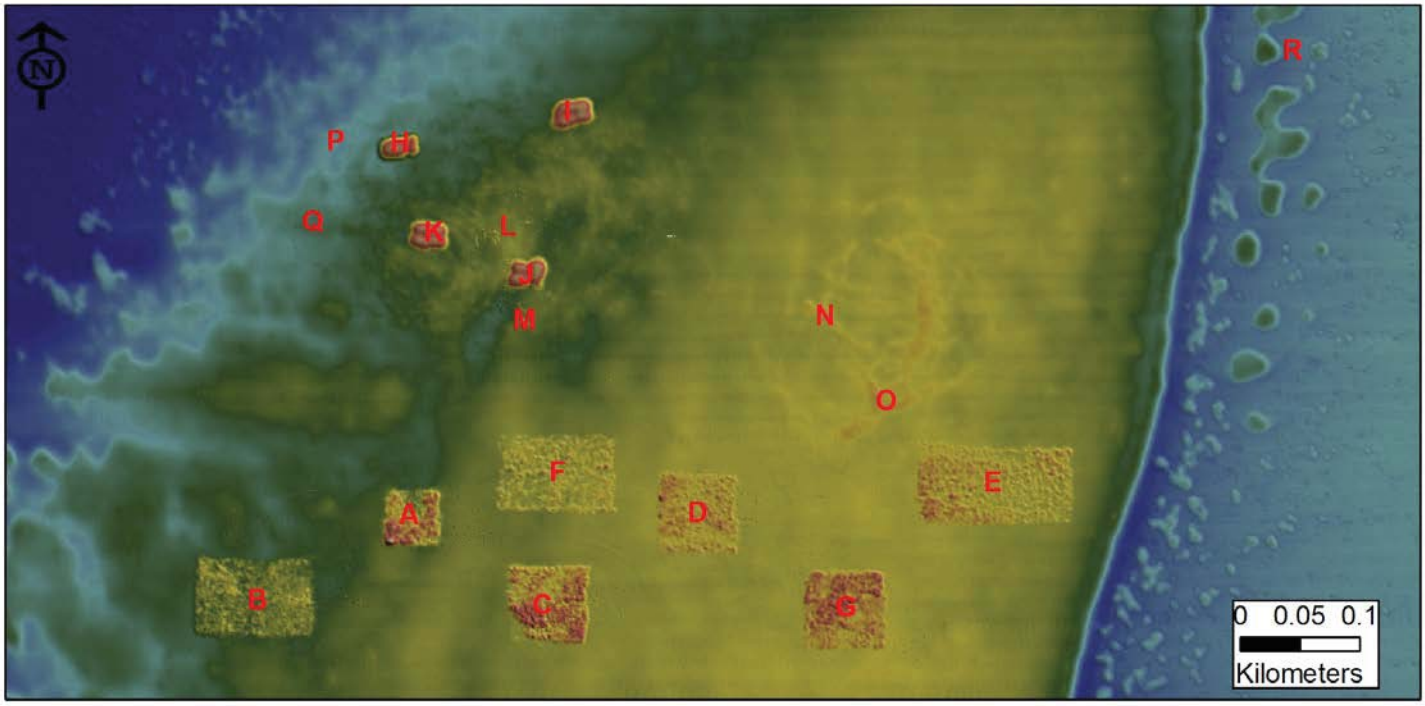


Figure 3. Hill-shaded bathymetry with 3X vertical exaggeration identifying a variety of oyster restoration projects and natural features. Red and blue colors represent the greatest and least depths respectively.

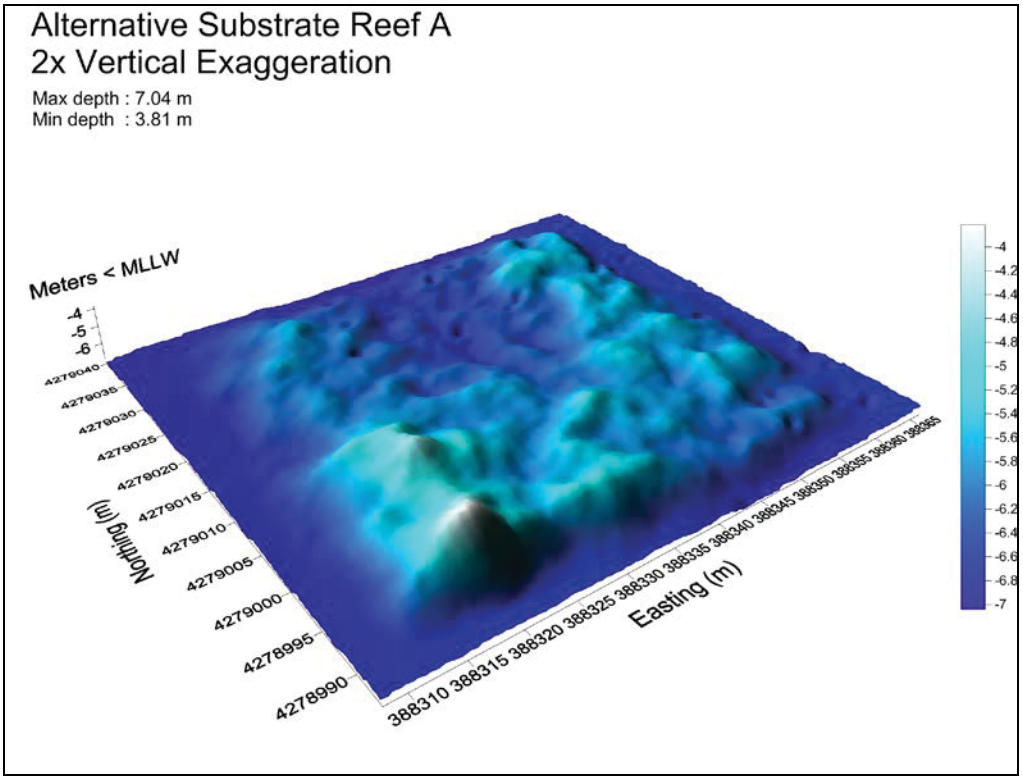


Figure 4. Terrain model of reef A. Circular depressions were created by placement barge spuds.

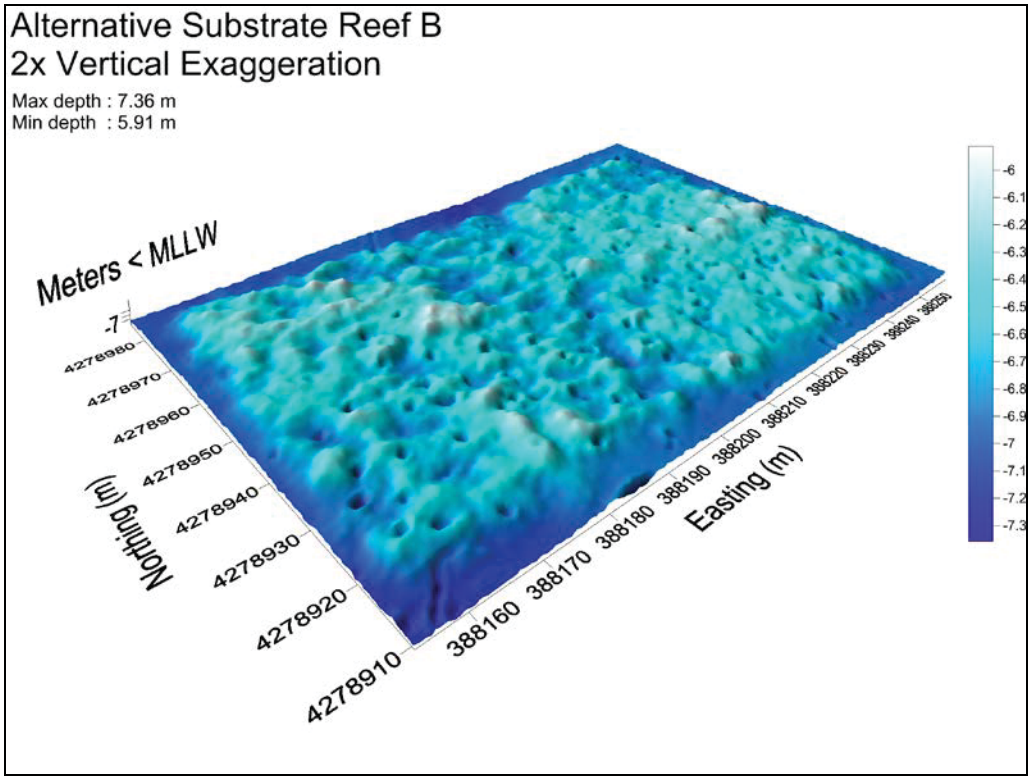


Figure 5. Terrain model of reef B.

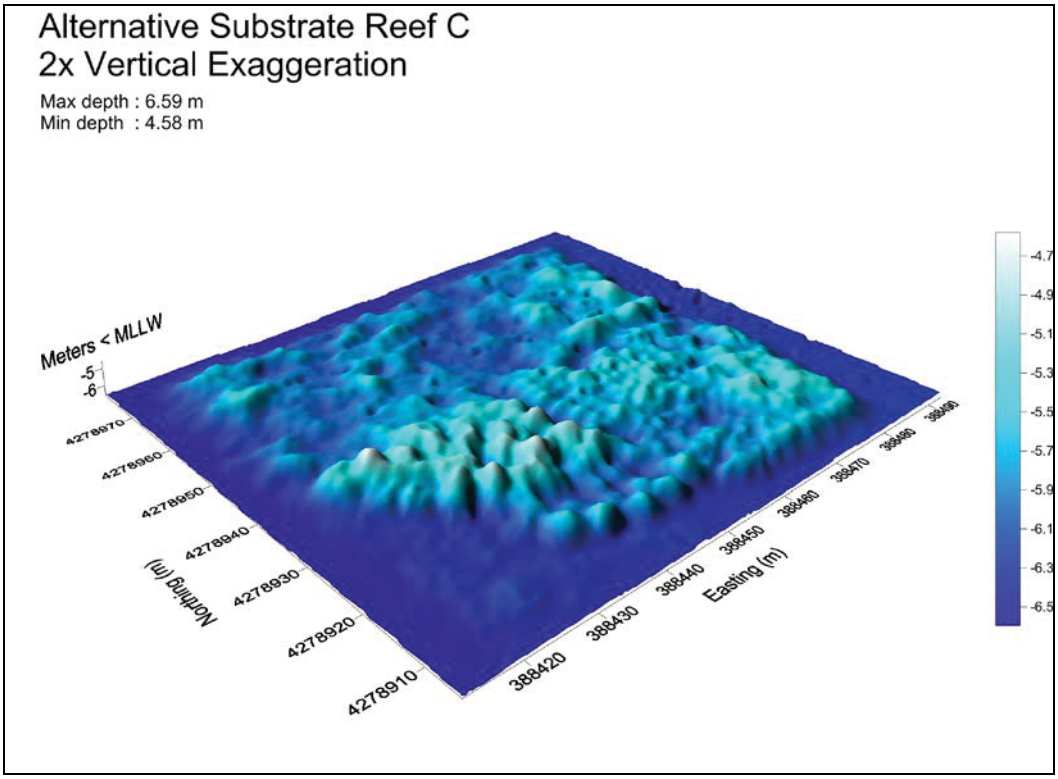


Figure 6. Terrain model of reef C.

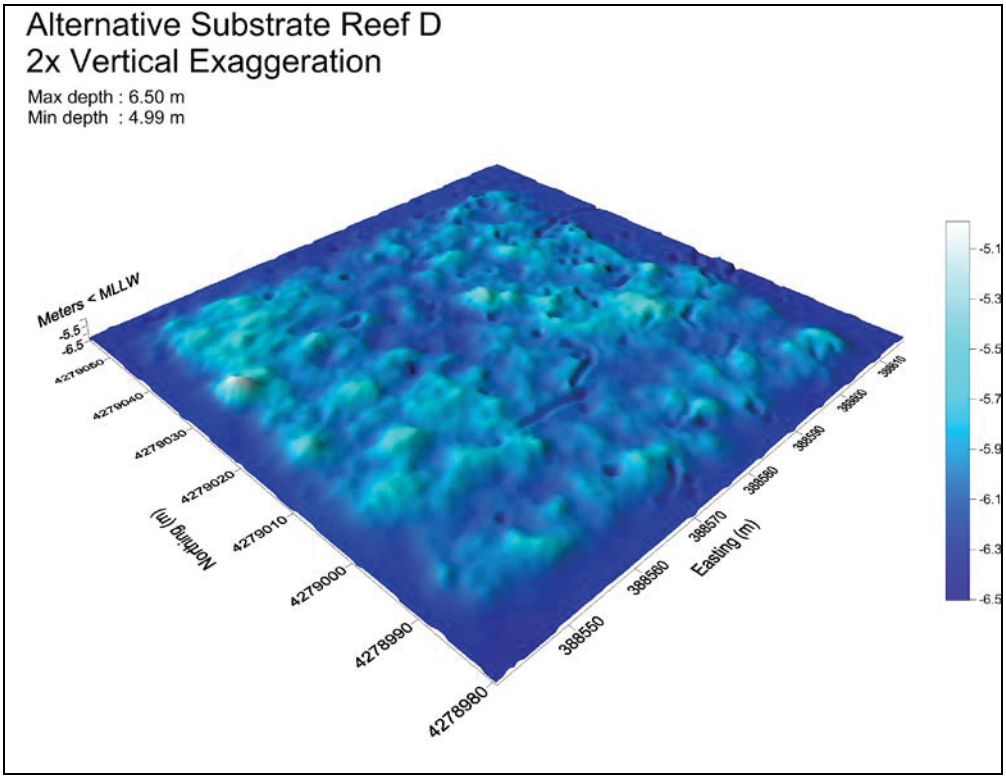


Figure 7. Terrain model of reef D.

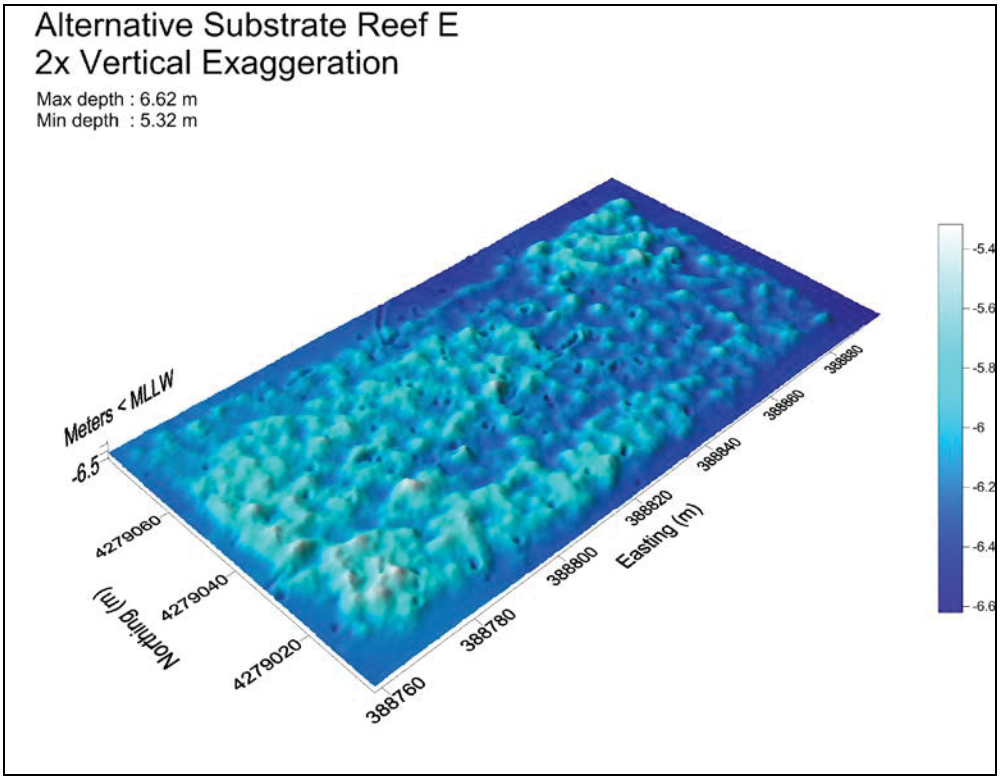


Figure 8. Terrain model of reef E.

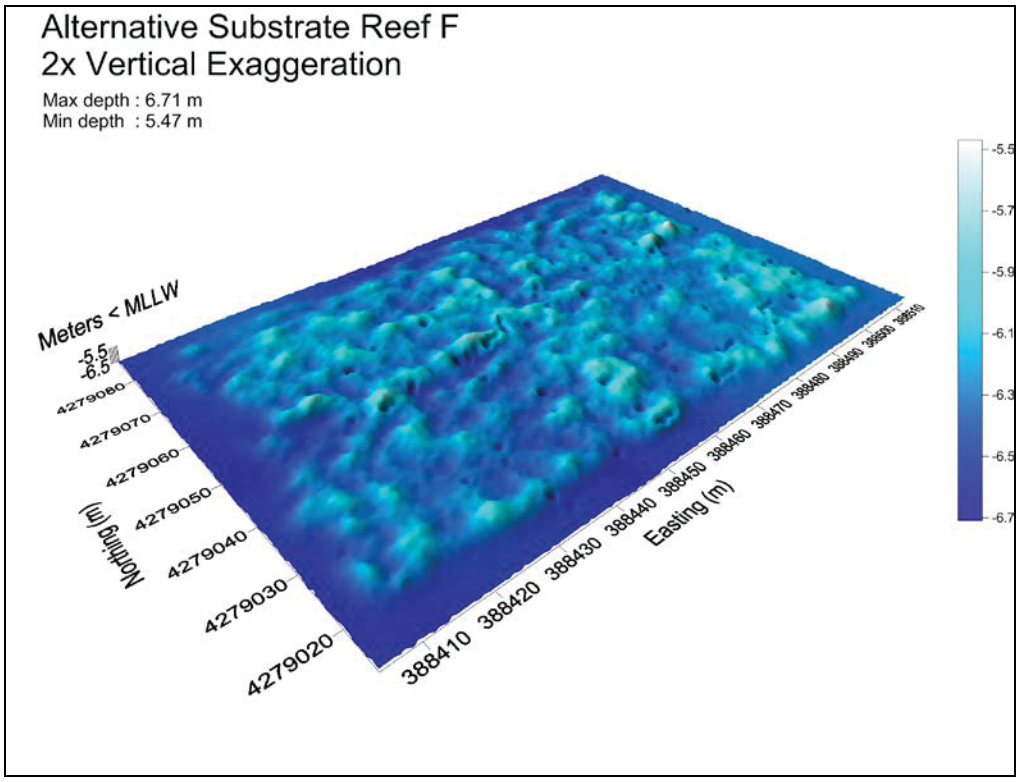


Figure 9. Terrain model of reef F.

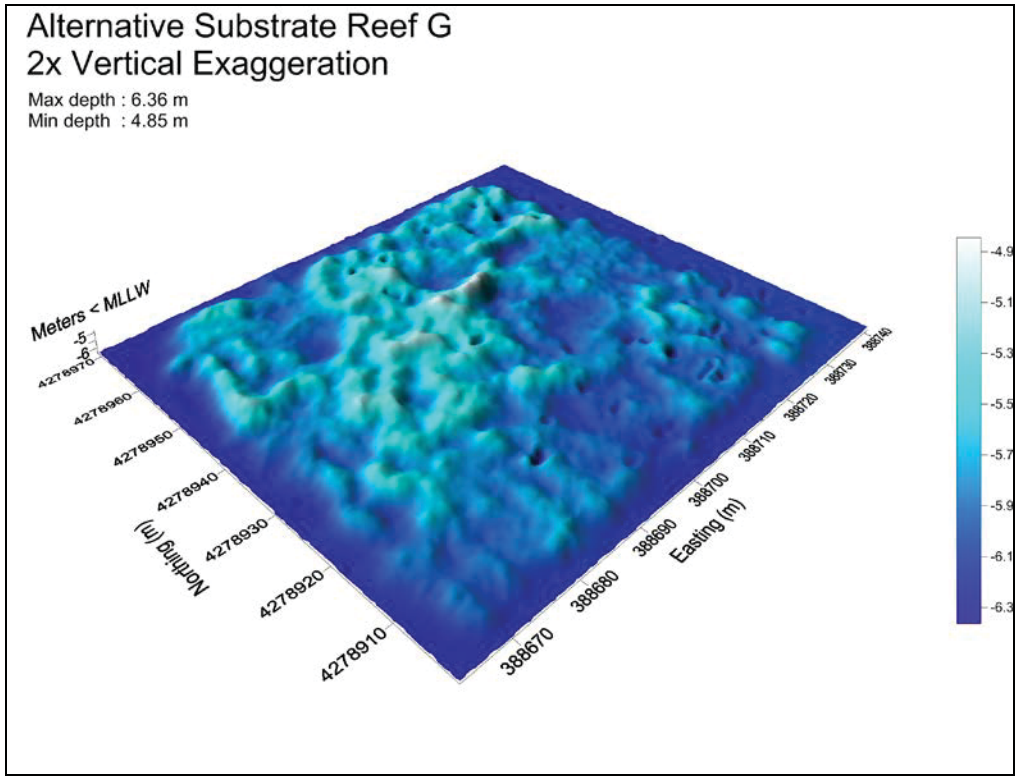


Figure 10. Terrain model of reef G.

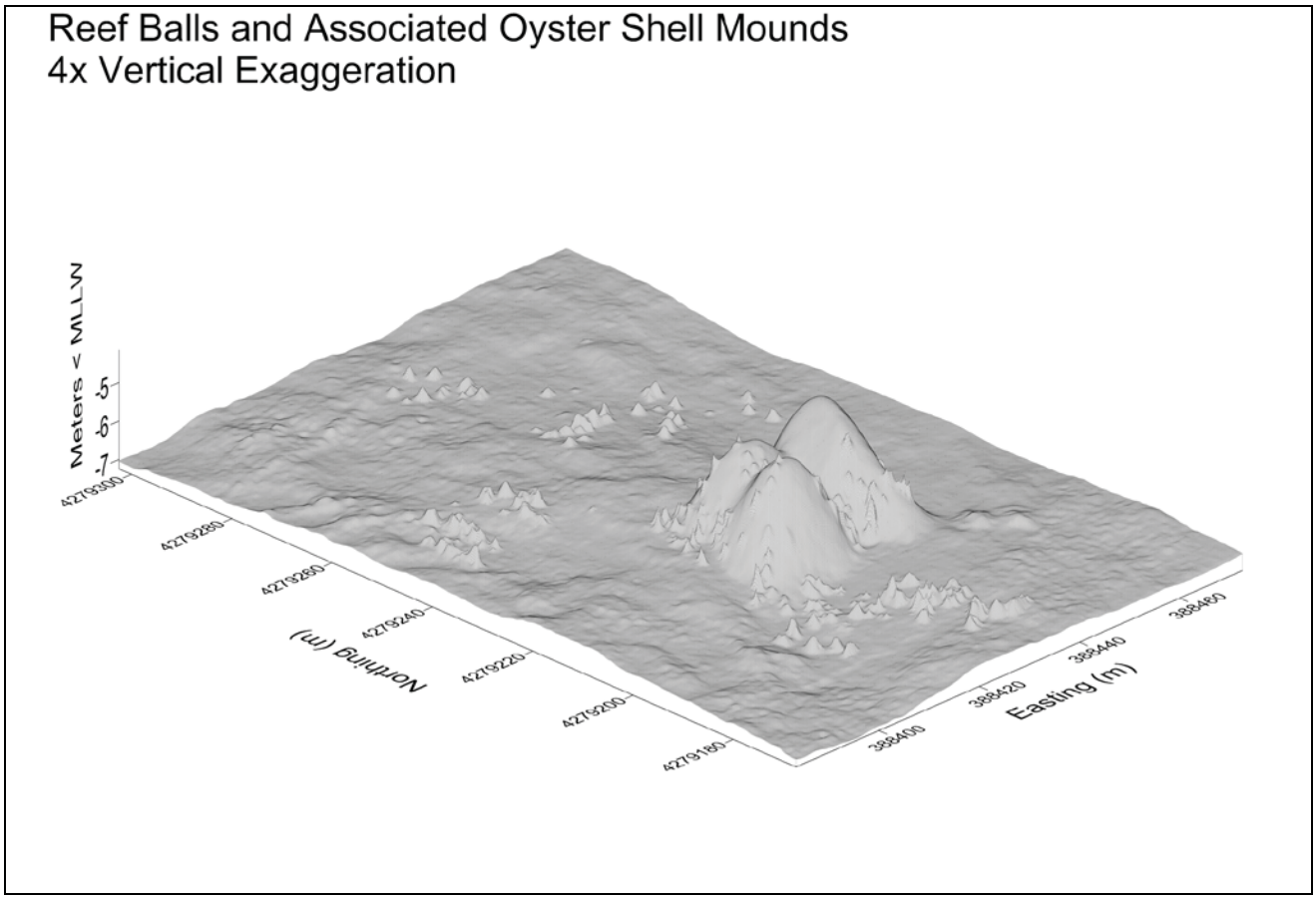


Figure 11. Digital terrain model of reefballs and oyster shell mounds (feature J in Figure 3). Reefballs, the small bathymetric features, were placed on and around the mounds by the Chesapeake Bay Foundation 2008-2010. Shell mounds were constructed by MD DNR in 1998.

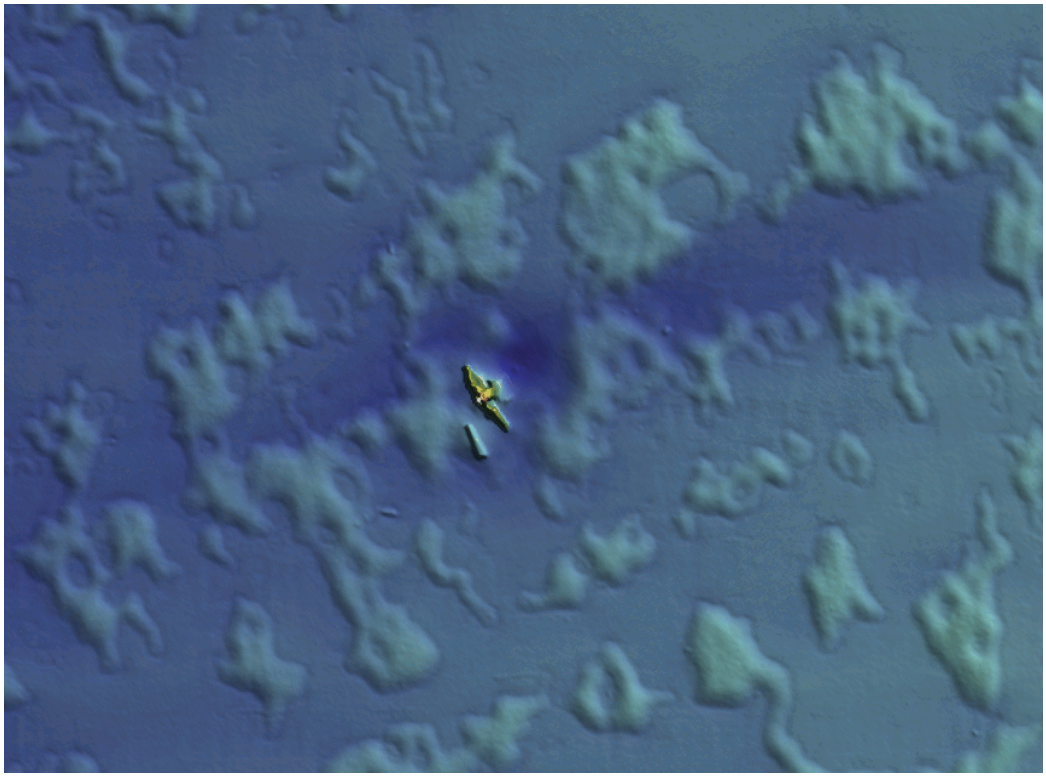


Figure 12. Wreckage of a 1944 seaplane among patch oyster reefs north of the main shoal.

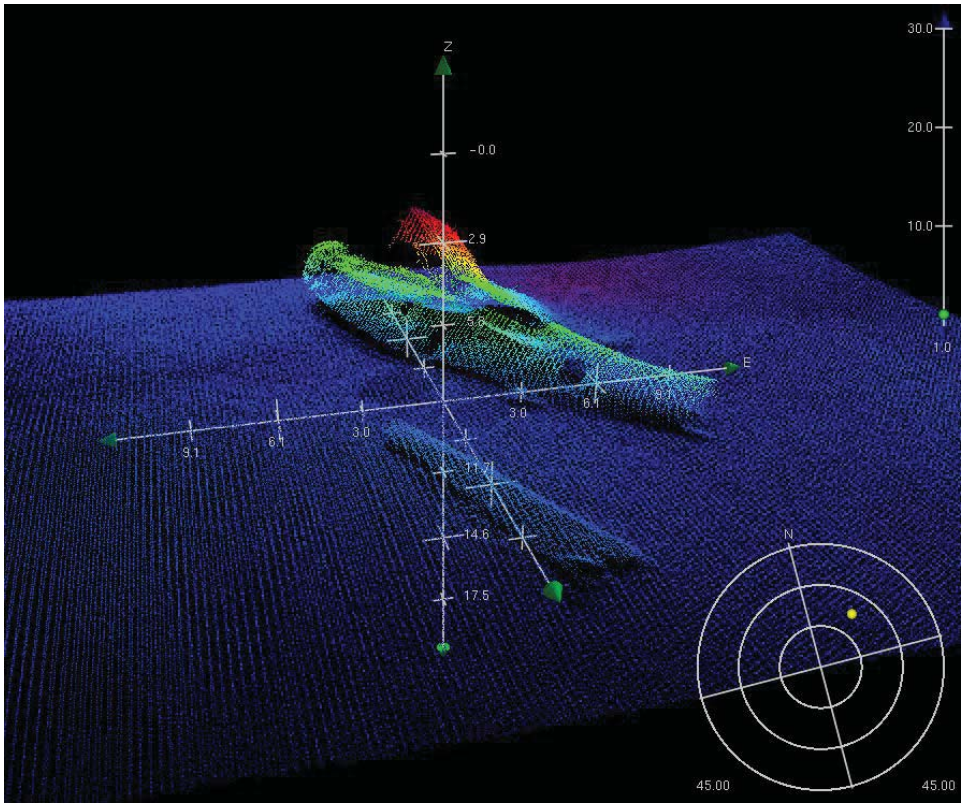


Figure 13. A 3-dimensional point cloud image derived from multibeam sonar echoes provides detail of the wreck. The view is of the left side of the fuselage with the missing tail section on the right. A wing lies in the foreground. The red feature is the remaining stub of the left wing and is the shallowest part of the wreck.

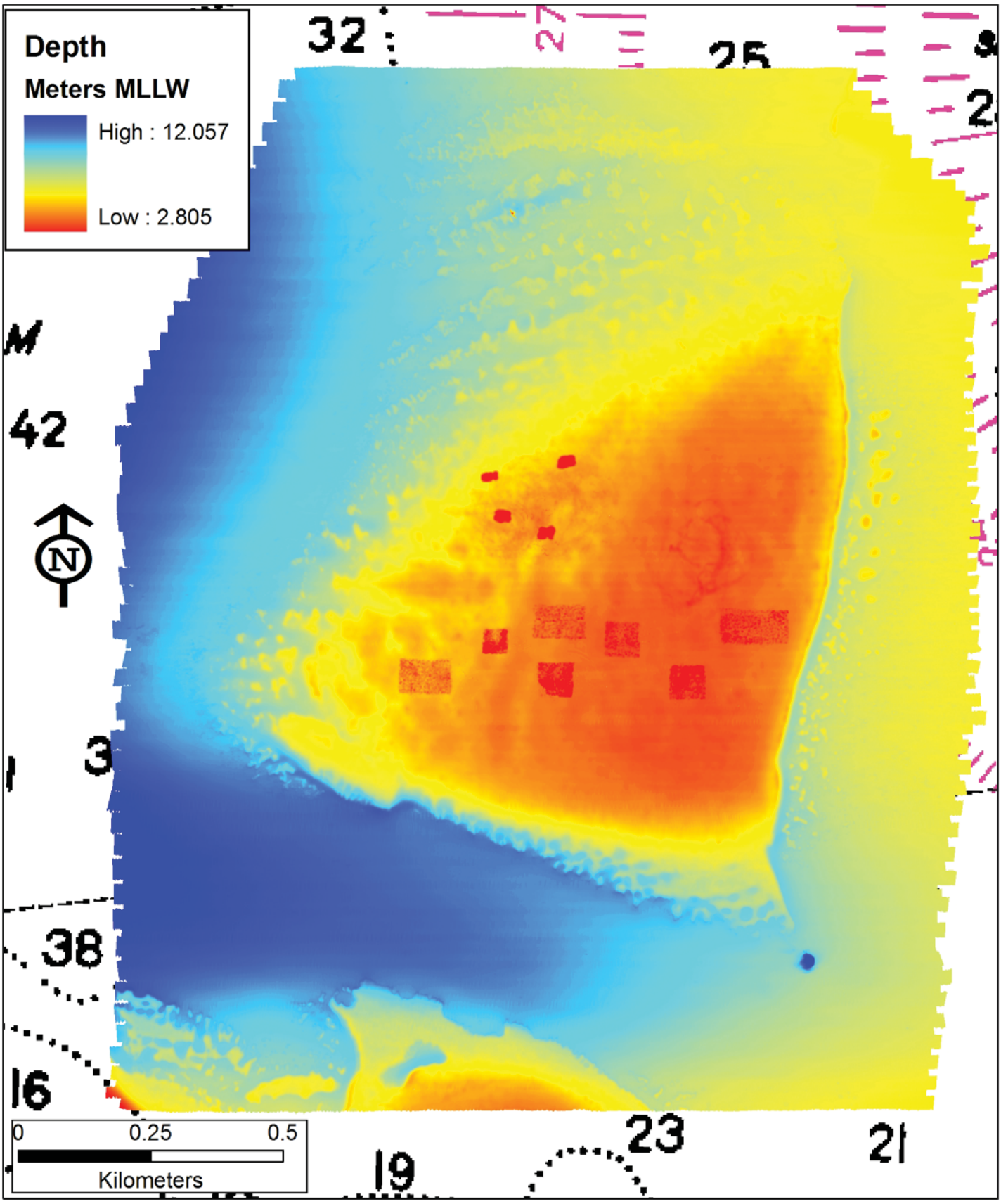


Figure 14. Bathymetry grid of Cook Point oyster bar.

Topographic Complexity- High spatial complexity and surface area can support greater fish species richness (Pittman et al. 2007) and higher numbers of sessile invertebrates per unit of planar area. Using this logic, topographic complexity, as determined from fine scale bathymetry, could be considered a proxy metric for ecological value.

We used bathymetry data to calculate surface area of natural oyster reef and artificial reefs. Bathymetry grid cells (0.25 x 0.25m) were selectively extracted with half-acre polygons. Inconsistent placement of the polygon on the raster image resulted in varying pixel counts so the analysis was normalized for 32490 grid cells. Surface area values were calculated for each cell with a triangulation method (Jenness 2004). Mean surface area was then calculated and compared among the sites.

This cursory comparison of surface area (Figure 15) indicates that the alternative substrate reefs have the highest surface areas followed by the shell piles and the reefball sites. Once planted with a veneer of shell and hatchery spat-on-shell the alternative substrate reefs should enhance the ecological value of the shoal for oysters, other sessile organisms, and resident and transient fish species.

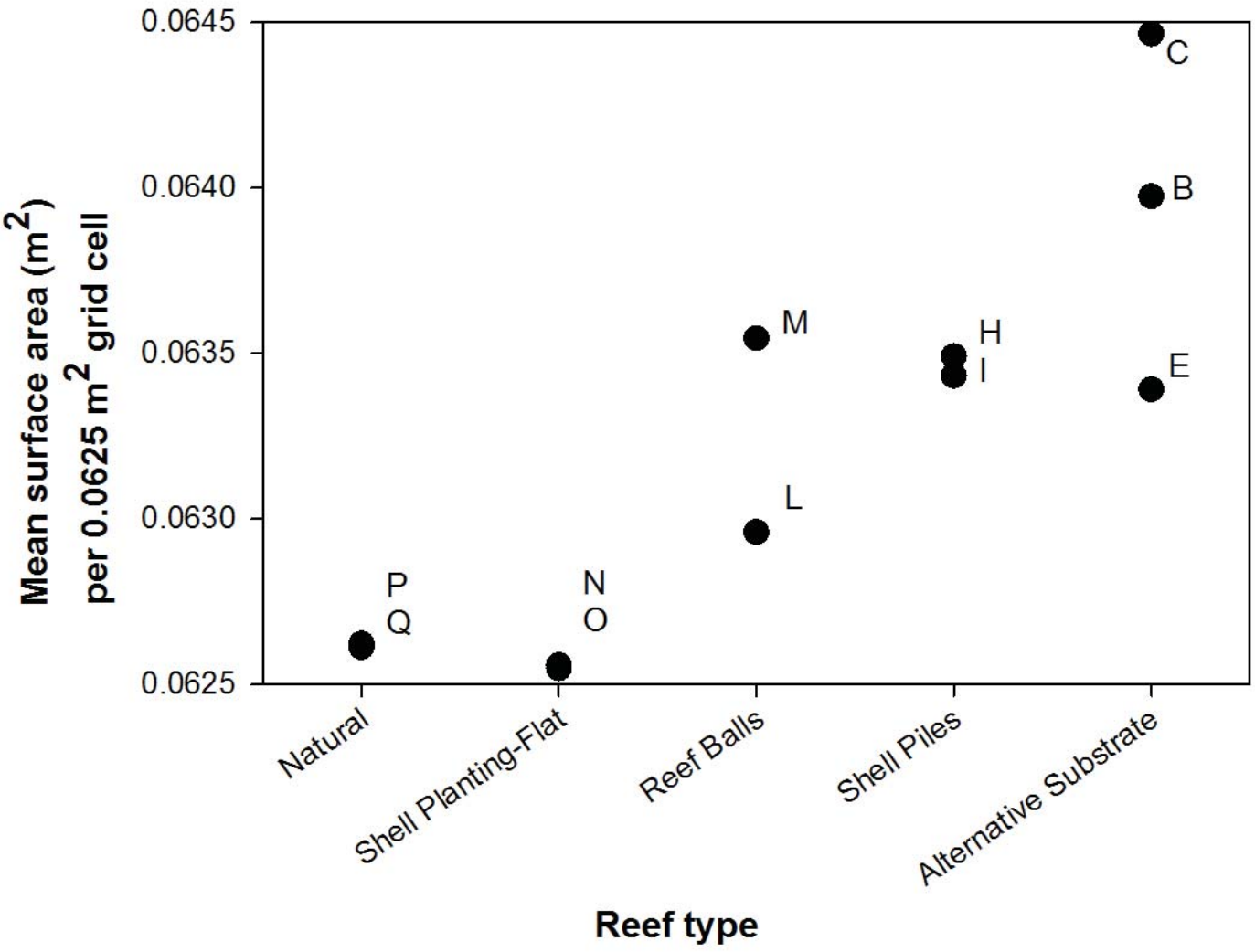


Figure 15. Surface area, calculated from 0.5 acre bathymetry grids, is compared among different oyster reef types; letters identify the sites in Figure 3. A surface area value of 0.0625 m^2 is that of a flat surface.

Benthic Habitat- Acoustic backscatter was extracted from the sonar record to identify the distribution of hard and soft sediments (Figure 16). Although the available native pixel resolution is not as high as sidescan sonar, backscatter provides a product free of some sidescan sonar acquisition artifacts. Backscatter complements bathymetry by defining the geometry and relative hardness of features associated with the main shoal. Video camera drops and Ponar grab samples (Figure 16) suggest that the shell piles and flat shell plantings on the main shoal are relatively free of sediment but that the patchy natural oyster habitat surrounding the shoal is heavily sedimented. Presumably, sedimentation of natural patch reef is greatest in areas of lower relief.

Backscatter, ground validation (Figure 16), and data from the earlier MGS survey were used to characterize benthic habitat within the survey extent and create habitat polygons. Figure 17 and Table 1 illustrate and summarize the area currently covered by various forms of reef building activities. GIS polygons, hand digitized from sonar imagery at a scale of 1:3000, indicate that the USACE alternative substrate reefs cover 34722 m^2. There is much natural oyster shell habitat in various stages of sedimentation surrounding the main shoal (Figure 17). The shoal still has a considerable area of hard sandy bottom suitable for additional reef building efforts (Table 1).

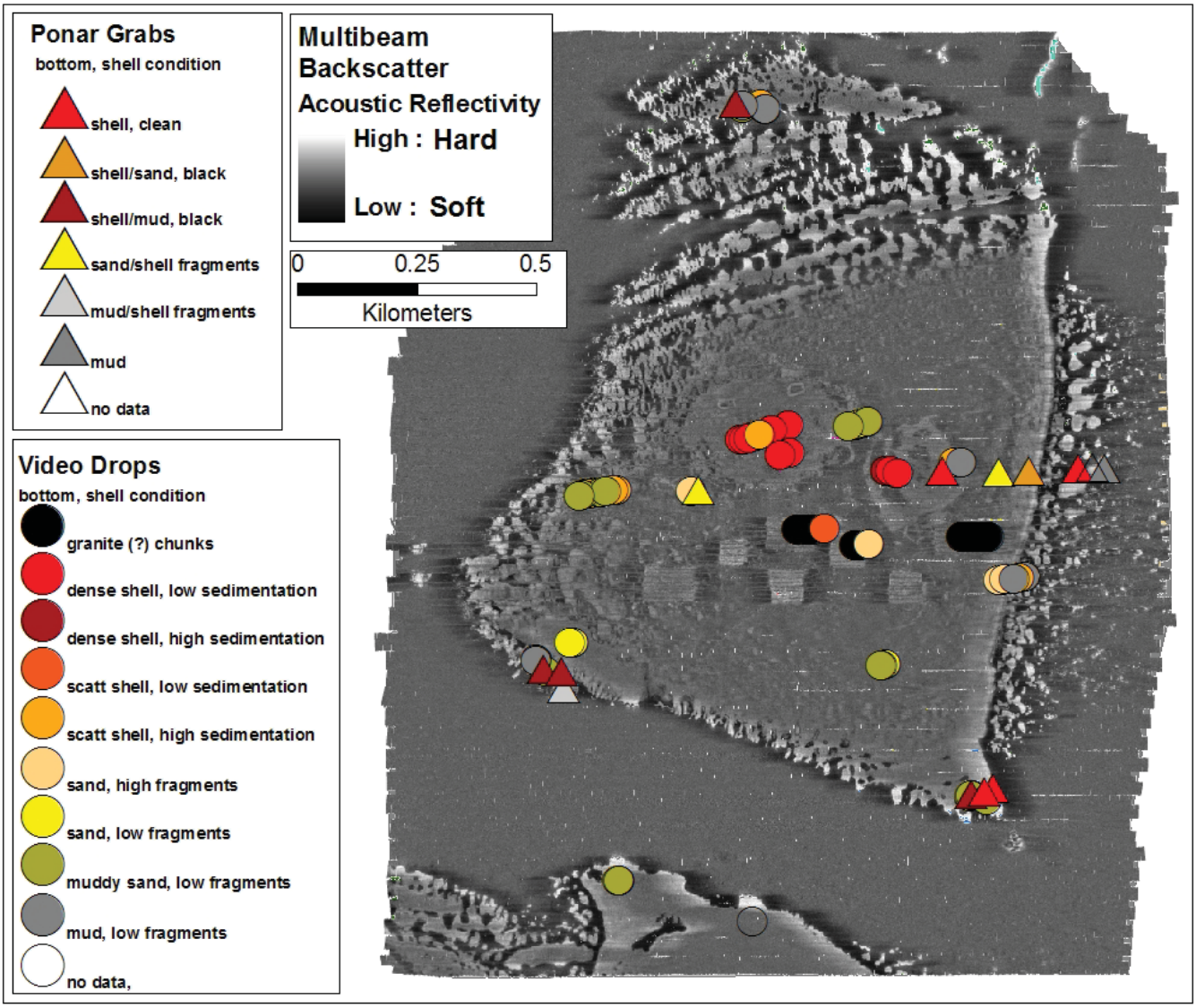


Figure 16. Acoustic backscatter and ground validation data used to create benthic habitat polygons. Shadow effects in the backscatter result from sonar system autogain settings.

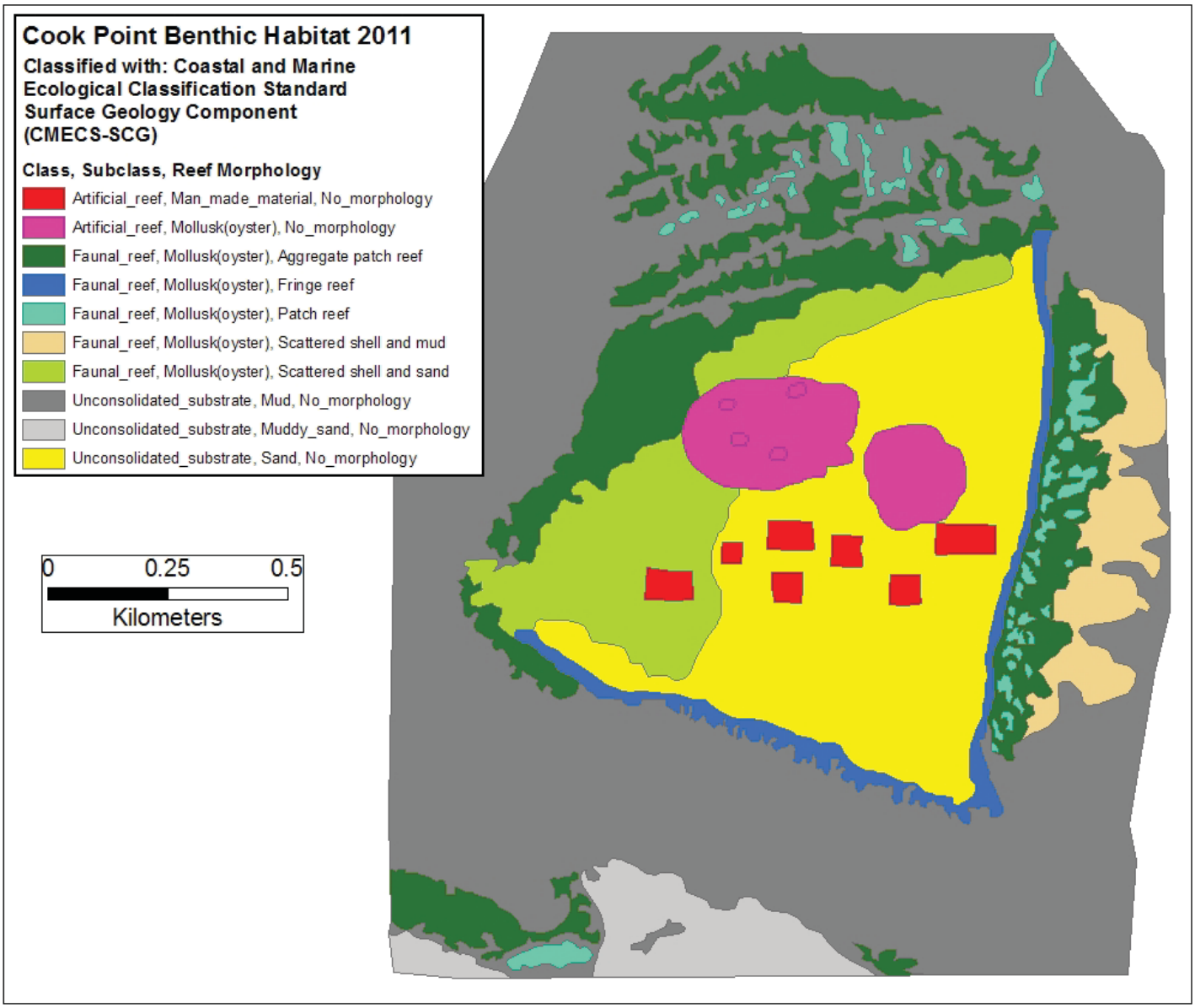


Figure 17. Benthic habitat polygons derived from acoustic backscatter and ground truthing data.

Table 1. Area summary by CMECS-SGC habitat type.

Class	Subclass	Morphology	Area (m^2)	Area (%)
Artificial_reef	Man_made_material	No_morphology	34722.2	1.2
Faunal_reef	Mollusk(oyster)	Patch	48805.2	1.6
Faunal_reef	Mollusk(oyster)	Fringe	59990.2	2.0
Unconsolidated_sediments	Muddy_sand	No_morphology	97756.0	3.3
Faunal_reef	Mollusk(oyster)	Scattered_mud	99423.1	3.3
Artificial_reef	Mollusk(oyster)	No_morphology	107695.9	3.6
Faunal_reef	Mollusk(oyster)	Scattered_sand	202931.8	6.8
Faunal_reef	Mollusk(oyster)	Aggregate_patch	414234.1	13.9
Unconsolidated_sediments	Sand	No_morphology	454929.0	15.2
Unconsolidated_sediments	Mud	No_morphology	1468942.0	49.1
		Total area =	2989429.5	

Citations

Jenness, J.S. 2004. Calculating landscape surface area from digital elevation models. Wildl. Soc. Bull. 32(3):829-839.

Pittman, S.J., et al. 2007. Predictive mapping of fish species richness across shallow water seascapes in the Caribbean. Ecological modeling 207:9-21

USACE Baltimore District. 2011. Choptank River – Cook Point Sanctuary Construction Summary Factsheet.

This document was prepared by:

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Jay Lazar - Hydrographer
443-949-9319, jay.lazar@noaa.gov

APPENDIX □

□□□ □□

No tidal records were submitted with the survey deliverables

APPENDIX II

Hi Seth,

Attached are the coordinates for the other jobs under the Alternate Materials permit: 2007-03659-M24

1. Severn River reefs (between Rt. 50 Bridge and Naval Academy Bridge), built by USACE oyster restoration project

2. Cook's Pt granite reefs, built by USACE oyster restoration project

3. Asquith Reef in Severn River off mouth of Asquith Creek (built by partnership between DNR and CBF, under the Maryland Artificial Reef Initiative-MARI)

Erik

From: Campbell, Eric
Sent: Wednesday, November 09, 2011 9:55 AM
To: Zlokovitz, Erik
Subject: Coordinates for Alternate material plantings

Erik,

Here are the coordinates for the other sites we've done under the current Alternate material permit. Cooks Point and the Severn River projects were done by the Corps of Engineers under our permit and the Asquith creek site was done with CBF.

Eric Campbell

DNR Chesapeake Shellfish Program

580 Taylor Avenue, B-2

Annapolis, MD 21401

Office: 410-260-8261

Fax: 410-260-8279

Ecampbell@dnr.state.md.us

DEPARTMENT OF THE ARMY
BALTIMORE DISTRICT, U.S. ARMY CORPS OF ENGINEERS
P.O. BOX 1715
BALTIMORE, MD 21203-1715

DEPARTMENT OF THE ARMY PERMIT

Application Name and Permit Number: **CENAB-OP-RMN**
(MD DNR/ALTERNATE MATERIAL)2007-03659-M24

Issuing Office:

U.S. Army Engineer District, Baltimore
Corps of Engineers
P.O. Box 1715
Baltimore, MD 21203

NOTE: The term "you" and its derivatives, as used in this permit, means the permittee or any future transferee. The term "this office" refers to the appropriate district or division office of the Corps of Engineers having jurisdiction over the permitted activity or the appropriate official of that office acting under the authority of the commanding officer.

You are authorized to perform work in accordance with the terms and conditions specified below.

Project Description:

To plant up to 1.5 million cubic yards of alternate (non-oyster shell) materials within Maryland charted oyster bars in the Chesapeake Bay for the purpose of rehabilitating oyster bar habitat to work towards the re-establishment of an abundant and self-sustaining oyster population. The types of material to be planted include: clam shell, marl, concrete, stone brick, and cinderblock; all materials will be free of building debris and protruding rebar. The height of the proposed reefs will maintain a minimum depth of 8 feet mean low water. All work is to be completed in accordance with the attached plan(s).

Project Location:

Alternate material plantings will be made in the Maryland Chesapeake Bay and its tributaries upon charted oyster bars as mapped on the legal oyster bar charts. The plantings may also include the Maryland Coastal Bays. A total of 246 oyster bars, identified in the attachment, are excluded from the project area.

At Maryland's Chesapeake Bay and tidal tributaries and Coastal Bays.

Permit Conditions:

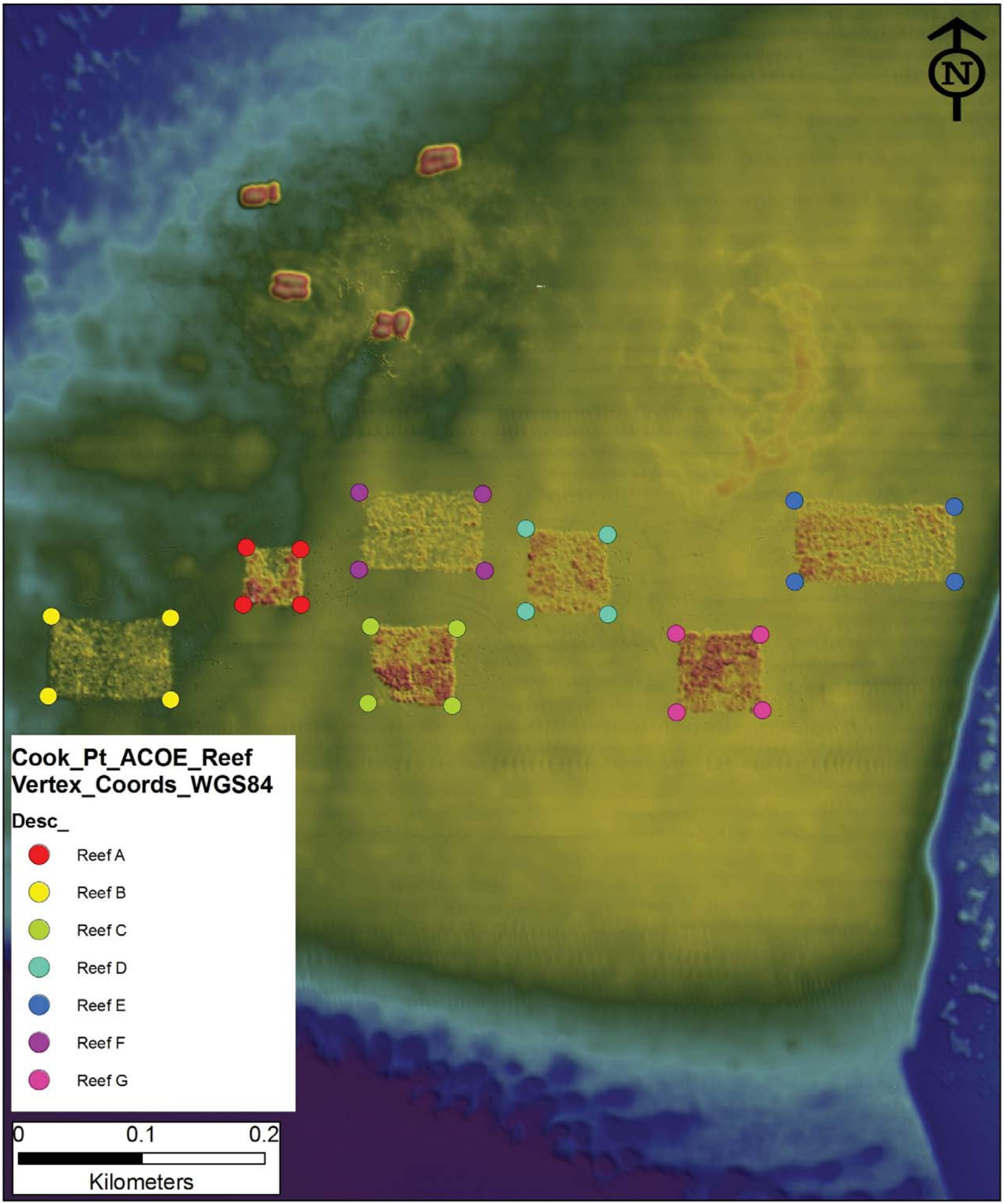
General Conditions:

1. The time limit for completing the work authorized ends on December 31, 2018. If you find that you need more time to complete the authorized activity, submit your request for a time extension to this office for consideration at least one month before the above date is reached.

2. You must maintain the activity authorized by this permit in good condition and in conformance with the terms and conditions of this permit. You are not relieved of this requirement if you abandon the permitted activity, although you may make a good faith transfer to a third party in compliance with General Condition 4 below. Should you wish to cease to maintain the authorized activity or should you desire to abandon it without a good faith transfer, you must obtain a modification of this permit from this office, which may require restoration of the area.

3. If you discover any previously unknown historic or archeological remains while accomplishing the activity authorized by this permit, you must immediately notify this office of what you have found. We will initiate the

lat_dec_deg	long_dec_deg	lat_deg	lat_dec_min	long_deg	long_dec_min	point	Desc_	Acreage	Planting Height(ft)	Cubic Yd to Plant (Granite)	Shell Veneer (cy)
38.652867	-76.283501	38	39.17202	76	17.01006	1	Reef A	0.5	3	2420	
38.652857	-76.282992	38	39.17142	76	16.97952	2	Reef A	0.5	3	2420	
38.652452	-76.282982	38	39.14712	76	16.97892	3	Reef A	0.5	3	2420	
38.652447	-76.283523	38	39.14682	76	17.01138	4	Reef A	0.5	3	2420	
38.65234	-76.285314	38	39.1404	76	17.11884	1	Reef B	1.5	1	2420	
38.65234	-76.2842	38	39.1404	76	17.052	2	Reef B	1.5	1	2420	
38.651744	-76.284186	38	39.10464	76	17.05116	3	Reef B	1.5	1	2420	
38.651757	-76.285329	38	39.10542	76	17.11974	4	Reef B	1.5	1	2420	
38.652299	-76.28233	38	39.13794	76	16.9398	1	Reef C	1	2	3226	807
38.652292	-76.281523	38	39.13752	76	16.89138	2	Reef C	1	2	3226	807
38.651729	-76.281554	38	39.10374	76	16.89324	3	Reef C	1	2	3226	807
38.651736	-76.282345	38	39.10416	76	16.9407	4	Reef C	1	2	3226	807
38.653033	-76.280889	38	39.18198	76	16.85334	1	Reef D	1	1	1613	807
38.652996	-76.280127	38	39.17976	76	16.80762	2	Reef D	1	1	1613	807
38.652414	-76.280112	38	39.14484	76	16.80672	3	Reef D	1	1	1613	807
38.652428	-76.28088	38	39.14568	76	16.8528	4	Reef D	1	1	1613	807
38.653263	-76.278389	38	39.19578	76	16.70334	1	Reef E	2	1	3226	
38.653235	-76.276892	38	39.1941	76	16.61352	2	Reef E	2	1	3226	
38.652688	-76.27688	38	39.16128	76	16.6128	3	Reef E	2	1	3226	
38.652671	-76.278372	38	39.16026	76	16.70232	4	Reef E	2	1	3226	
38.653279	-76.282449	38	39.19674	76	16.94694	1	Reef F	1.5	1	2420	
38.653279	-76.281298	38	39.19674	76	16.87788	2	Reef F	1.5	1	2420	
38.65272	-76.281268	38	39.1632	76	16.87608	3	Reef F	1.5	1	2420	
38.652716	-76.282446	38	39.16296	76	16.94676	4	Reef F	1.5	1	2420	
38.65228	-76.279476	38	39.1368	76	16.76856	1	Reef G	1	2	3226	
38.65228	-76.278686	38	39.1368	76	16.72116	2	Reef G	1	2	3226	
38.651727	-76.278659	38	39.10362	76	16.71954	3	Reef G	1	2	3226	
38.651703	-76.27946	38	39.10218	76	16.7676	4	Reef G	1	2	3226	
TOTALS								**8.5**		**18551**	**1614**


N
Cook_Pt_ACOE_Reef
Vertex_Coords_WGS84
Desc_
Reef A
Reef B
Reef C
Reef D
Reef E
Reef F
Reef G
0
0.1
0.2
Kilometers

APPENDIX III

W00224_AWOIS

Registry Number: W00224
State: Maryland
Locality: Central Chesapeake Bay
Sub-locality: Approaches to Choptank River
Project Number: M-E918-OSD-12
Survey Dates: 20110328 - 20110526

Charts Affected

Number	Edition	Date	Scale (RNC)	RNC Correction(s)*
12266	29th	11/01/2006	1:40,000 (12266_1)	[L]NTM: ?
12263	55th	04/01/2007	1:80,000 (12263_1)	[L]NTM: ?
12280	8th	03/01/2008	1:200,000 (12280_1)	[L]NTM: ?
13003	49th	04/01/2007	1:1,200,000 (13003_1)	[L]NTM: ?

* Correction(s) - *source: last correction applied (last correction reviewed--"cleared date")*

Features

No.	Name	Feature Type	Survey Depth	Survey Latitude	Survey Longitude	AWOIS Item
1.1	AWOIS #1109 - 8ft WRECK	Wreck	2.66 m	38° 39' 35.7" N	076° 16' 58.9" W	1109

□ - S□□DR_AWOIS

□□□□ AWOIS □□□0□ - □ft WR□C□

Primary Feature for AWOIS Item □□□0□

Search Positio□:	38° 39' 34.7" N, 076° 16' 59.3" W
□istorical De□th:	[None]
Search Radius:	0
Search □ech□i□ue:	[None]
□ech□i□ue Notes:	[None]

□istory Notes:

HISTORY

NOT CHARTED AT PRESENT (9/18/87).

LNM9/98--ADD WRECK WITH A LEAST DEPTH OF 7 FEET WITH A LEGEND "PA" IN LAT. 38-39-35N, LONG. 76-16-59.5W.

DESCRIPTION

**** ATLANTIC COASTAL DIVER-ARTICLE DESCRIBES DISCOVERY BY DIVERS IN 1973;

SEAPLANE 6672 CRASHED AND SUNK 1/3/44, RECENT OBSERVATIONS SHOW PLANE

IN 3 SECTIONS W/MIDSECTION 100 FT N OF FRONT SECTION, TAILSECTION 80 FT

N OF MAIN SECTION.

(COPY OF ARTICLE SENT TO BUD HOLMES THRU TOM RICHARDS TO BE SUBMITTED TO

MCD AS USPS REPORT, THEREBY BECOMING A SOURCE FOR CHARTING) .

**** LTR. FROM DAVID HOWE TO JOHN WALTERS 5CGD (oan) DATED 23 MAY, 1996 AND RESENT 23 FEB. 1998;

DESCRIBES WRECK SITE IN THE CHOPTANK RIVER; MR. HOWE DOVE ON THE SITE 4 MAY, 1996 AND FOUND A

SUBSTANTIAL FRAME STRUCTURE WITH THIN, RIVETED SKIN. LIES IN 30 FEET OF WATER AND STICKS UP 20

FEET FOR A LEAST DEPTH OF 10 FEET. HIS LORAN-C NUMBERS WERE 27496.1, 42482.0. HIS GPS READ 38/39.

578N, 76/16.989W. LOCAL FISHERMEN KNOW THE WRECK; IT WAS FESTOONED WITH NETS AND

MONOFILAMENT. THE GENERAL AREA IS LABELED "AIRPLANE WRECK" IN THE CHESAPEAKE BAY CHART

BOOK COMMERCIALY PUBLISHED BY ADC BUT THE SPECIFIC LOCATION S NOT SHOWN. IN FAX TO N/CS31

(STEVE VERRY) FROM CGD5 (DENNIS MAULDING) INFO. HAS BEEN REVISED TO A LD 0F 7 FEET IN LAT.

38/39.578N, LONG. 76/16.989W (LISTED POSITION ABOVE) WITH AN ACCURACY OF 40 FEET, PLUS OR MINUS.

Survey Summary

Survey Positio□: 38° 39' 35.7" N, 076° 16' 58.9" W

Least De□th: 2.66 m (= 8.72 ft = 1.453 fm = 1 fm 2.72 ft)

□P□ □□□□□σ□: □□□ □□**P□h□**[None] ; □□□ □□**P□v□**[None]

□imestam□: 2011-146.00:00:00.000 (05/26/2011)

Dataset: W00224_CS.000

FOID: US 0000050741 00001(02260000C6350001)

Charts Affected: 12266_1, 12263_1, 12280_1, 13003_1

Remar□s:

[None]

Feature Correlatio□

Source	Feature	Range	Azimuth	Status
W00224_CS.000	US 0000050741 00001	0.00	000.0	Primary
AWOIS_EXPORT	AWOIS # 1109	33.95	018.6	Secondary

□ydrogra□her Recomme□datio□s

[None]

Cartogra□hically-Rou□ded De□th □Affected Charts□:

8ft (12266_1, 12263_1, 12280_1)

1 ½fm (13003_1)

S-□□ Data

□eo object □: Wreck (WRECKS)

Attributes: CATWRK - 2:dangerous wreck

NINFOM - chart wreck

QUASOU - 6:least depth known

SORDAT - 20110526

SORIND - US,US,graph,W00224

TECSOU - 3:found by multi-beam

VALSOU - 2.658 m

WATLEV - 3:always under water/submerged

Office Notes

SAR: Charted AWOIS feature located at survey position by ODMB. AWOIS history indicates that this feature is the wreckage of a WWII seaplane that crashed in 1944.

Compile: Delete charted dangerous wreck PA, least depth 7 feet. Chart dangerous wreck, least depth 8 feet at the survey position.

Feature Images

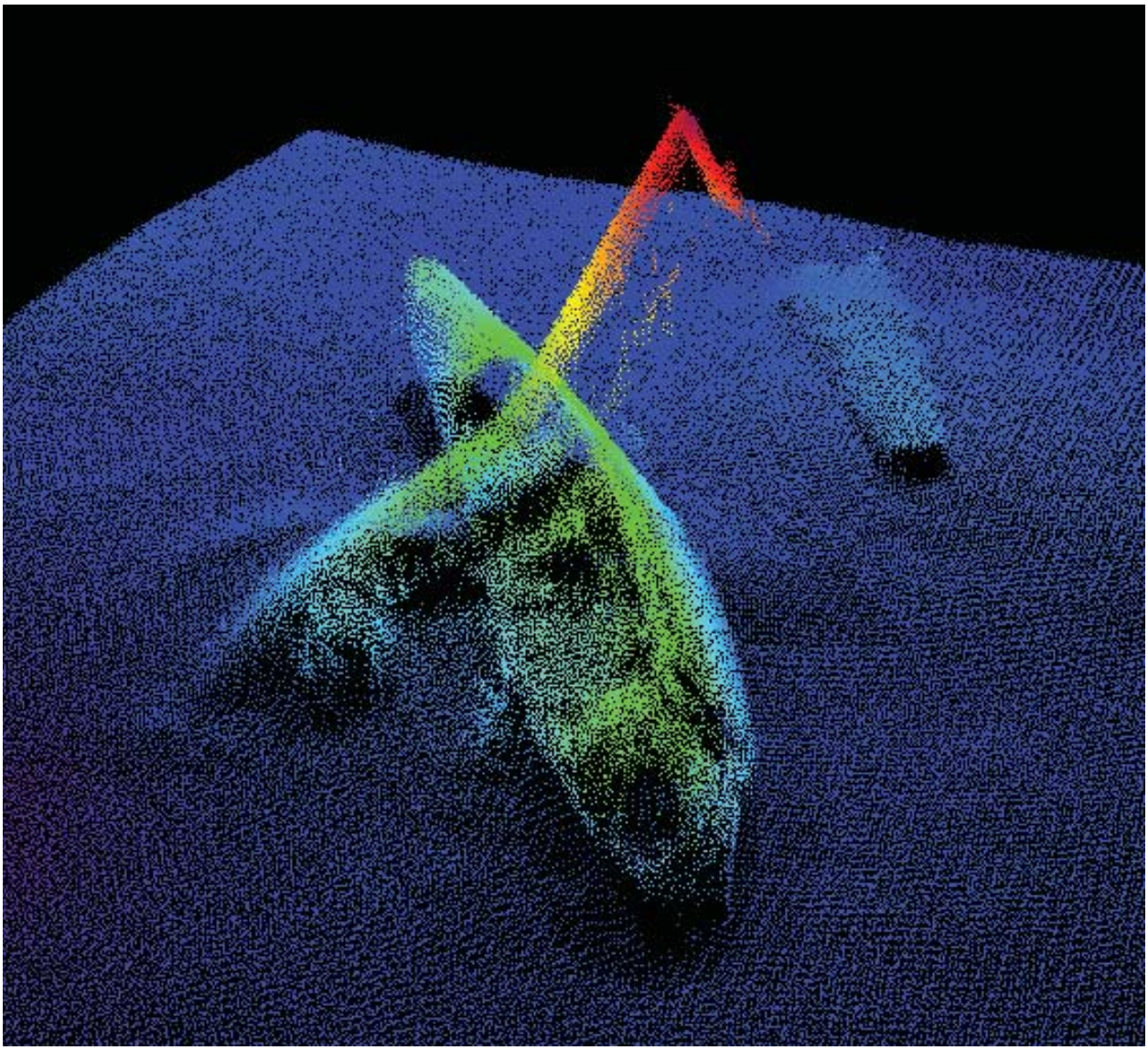
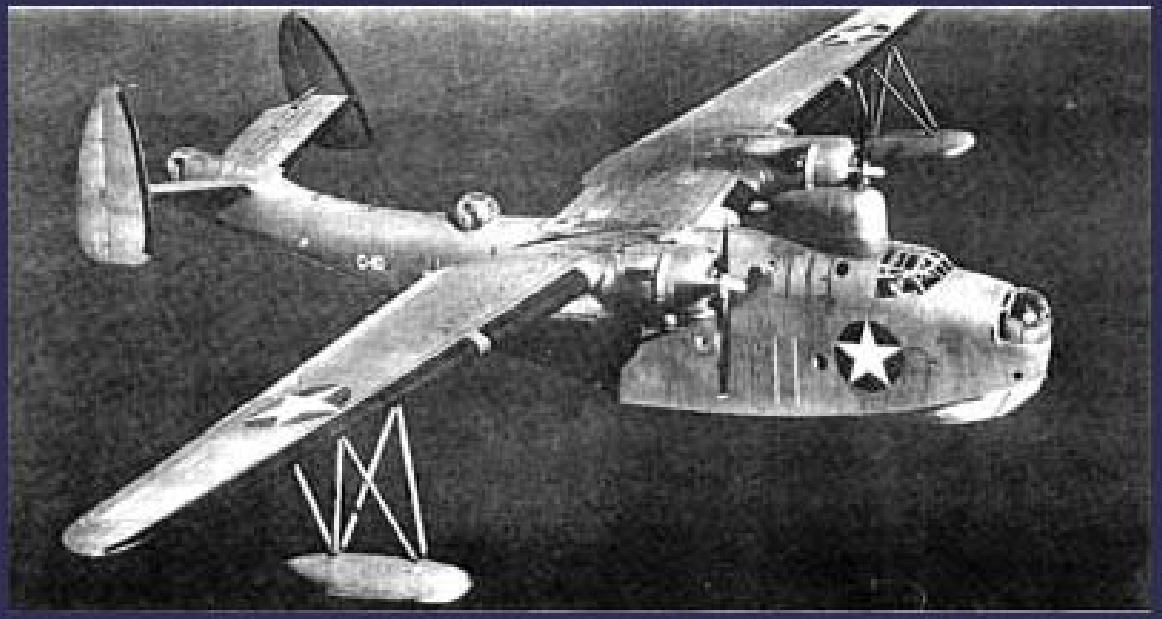


Figure 1

Investigation of a U.S. Navy PBM-3

Over the course of four years, MAHS researchers investigated the wreck of U.S. Navy PBM-3 (BuNo 6672) located in the Choptank River, on the Eastern Shore of Maryland. The work was conducted on behalf of the Underwater Archeology Branch of the Naval Historical Center and the Maryland Historical Trust (MHT).

The Martin Patrol Bomber ("PBM" or "Mariner") was a twin-engine seaplane that was developed and built in the 1930s and 40s for the U.S. Navy by the Glenn L. Martin Aircraft Company of Baltimore, Maryland.



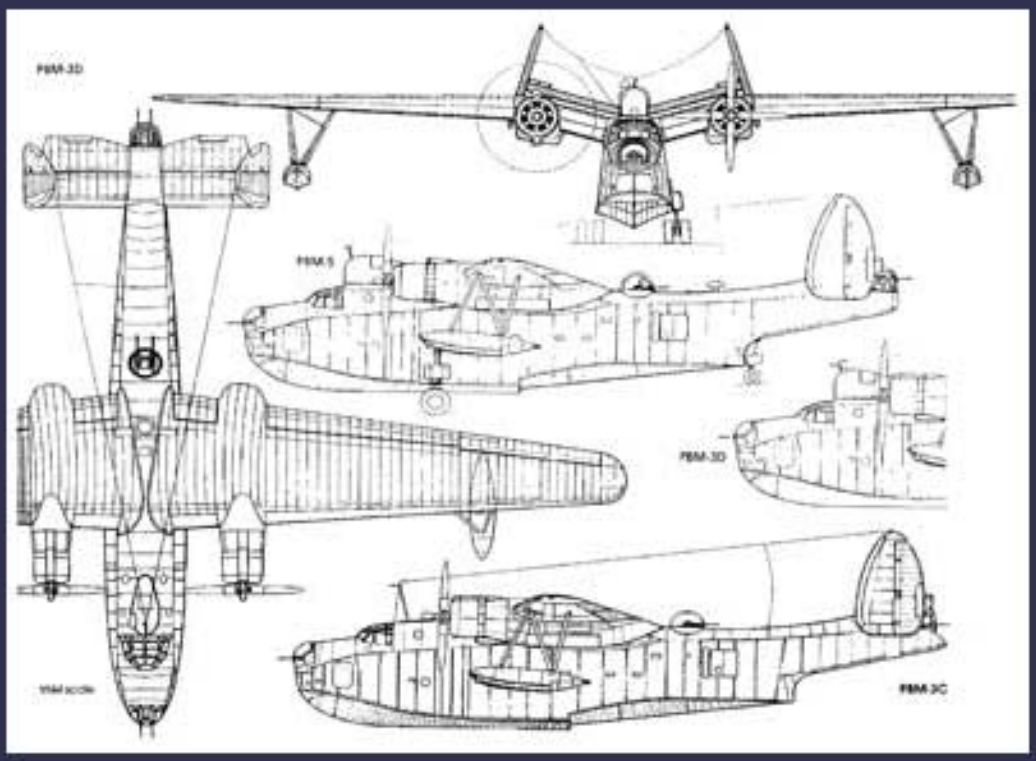
Almost as big as a Boeing 737, the plane's fuselage was 80 feet long. It had a wingspan of 118 feet and a maximum gross weight of 58,000 pounds.

Next | MAHS Project List

Investigation of a U.S. Navy PBM-3

Two types of PBM were built, the PBM-3 and PBM-5. The types differed in their engines and a slight variation in the tail configuration. All were true seaplanes that could not operate from land -- they did not have landing gear.

Of a total of 1,367 PBMs built by Martin, only three are known to survive. One is a PBM-3D lying in Lake Washington, near Seattle -- the Navy tried to recover the wreck in 1990 and 1996. The second is an intact, original PBM-5A in the Smithsonian Institution's collection in Arizona. The third is BuNo 6672, which lies in the Choptank River. The Navy retains legal title to the two sunken PBMs, as it does to all sunken Navy ships and aircraft unless sold or transferred.



On April 26, 1943, a new PBM-3 was delivered to the U.S. Navy and was assigned Bureau of Aeronautics number (BuNo) 6672. The plane was transferred to Transport Squadron Eight (VR-8) at Naval Air Station, Patuxent River, Maryland, on December 31, 1943. During a training flight two days later, it crashed in the Choptank River four miles southeast of Tilghman Island, Maryland. All six crew members survived.

Next | Previous MAHS Project List

ASN Wikibase Occurrence # 77389

This information is added by users of ASN. ASN nor the Flight Safety Foundation are responsible for the completeness or correctness of this information. If you feel this information is incomplete or incorrect, you can submit corrected information.

Date: 02-JAN-1944
Time:
Type: Martin PBM-3C Mariner
Operator: US Navy
Registration: 6672
C/n / msn:
Fatalities: Fatalities: / Occupants:
Airplane damage: Written off (damaged beyond repair)
Location: Choptank River, MD - United States of America
Phase:
Nature: Military
Departure airport:
Destination airport:
Narrative:
Water-looped on takeoff and sank.

Sources:
http://joebaugher.com/navy_serials/secondseries2.html

Revision history:

Date/time	Contributor	Updates
31-Dec-1969 17:00	ASN Archive	

Number of views: 656

Corrections or additions? ... Edit this accident description

APPROVAL PAGE

W00224

Data meet or exceed current specifications as certified by the OCS survey acceptance review process. Descriptive Report and survey data except where noted are adequate to supersede prior surveys and nautical charts in the common area.

The following products will be sent to NGDC for archive

- W00224_DR.pdf
- Collection of depth varied resolution BAGS
- Processed survey data and records
- W00224_GeoImage.pdf

The survey evaluation and verification has been conducted according to current OCS Specifications, and the survey has been approved for dissemination and usage of updating NOAA's suite of nautical charts.

Digitally signed by Edward Owens
DN: cn=Edward Owens, o=NOAA, ou=AHB, email=Edward.Owens@noaa.gov, c=US
Date: 2012.07.31 10:53:20 -04'00'

Approved for: _____

LT Abigail Higgins
Chief, Atlantic Hydrographic Branch