



September 1, 2017

Ms. Kathy Herring
North Carolina Department of Transportation
1020 Birch Ridge Drive Raleigh, NC 27610

Re: **Proposed Rodanthe Bridge Alignment on New Location, B-2500 Phase IIb
Submerged Aquatic Vegetation Survey (August 2017 Survey)**

Dear Ms. Herring,

RK&K is pleased to provide you with this Findings Report from the August 2017 submerged aquatic vegetation (SAV) assessment for the proposed (B-2500IIb) bridge project adjacent to Rodanthe, NC.

Project Area Description

The proposed bridge project is located in the Pamlico Sound, west of the Town of Rodanthe in Dare County, and consists of the area anticipated to be directly affected by the proposed bridge (Figure 1). The proposed bridge alignment is approximately 13,000 linear feet in length and 42 feet wide. The total area occupied by the proposed alignment is approximately 12.6 acres total for the entire span. Approximately 10,900 linear feet of the proposed alignment is located over the open waters of Pamlico Sound and approximately 2,100 linear feet of the proposed alignment is located landward of open waters. The project area consists of open-water area anticipated to be shaded by the proposed bridge and totals 10.51 acres. Throughout much of the project area, water depths range from the shoreline to greater than 4 feet near the visible ship remains located near the southern terminus of the project area (Figure 2). The substrate within the project area consists of sand, with no areas of hard bottom noted.

Project Description

Surveys to determine the accurate boundaries of SAV consisted of three general tasks:

- Delineation of SAV boundaries using color aerial photography (2014-2017) along with previous SAV delineations, National Oceanic and Atmospheric Administration (NOAA)¹ and North Carolina Department of Environmental Quality (NCDEQ)² GIS data.
- Field surveys were conducted to verify the accuracy of delineated SAV boundaries
- Refinement of delineated SAV boundaries were conducted onsite utilizing submeter GPS and mobile GIS technology

Initial delineations of SAV boundaries utilized ArcGIS to interpret recent color aerial photography provided by NCDOT. Color photography was manipulated and filtered to enhance visibility of SAV beds. In addition to the color aerial photography, the August 2017 SAV delineation included previous photography from 2014 and 2015 along with data from NOAA, NCDEQ, and previously delineated SAV beds. All areas delineated as potential SAV were loaded onto a Trimble Geo XH handheld Global Positioning System (GPS) receiver for use in identifying the accuracy of delineated SAV based upon aerial photography.

¹National Oceanic and Atmospheric Administration. *Estuarine Benthic Cover GIS Data Layer, NC90*.
Estuarine Aquatic Bed, Submersed Rooted Vasculars (SRV), Beaufort Marine Lab. 1998

²North Carolina Department of Environmental Quality. *Submerged Aquatic Vegetation, GIS Data Layer*.
Albemarle-Pamlico National Estuary Partnership (APNEP), Raleigh, NC. 2008

B2500 Phase IIB –SAV Findings Report 2017

Ms. Kathy Herring

September 1, 2017

Page 3

Field investigations were conducted by accessing the project study area from a shallow draft skiff. SAV beds within the project corridor were verified by wading the proposed bridge footprint and comparing each existing SAV bed with aerial SAV delineation files. RK&K personnel surveyed the entire project study area on foot and made adjustments to the aerial delineations as needed on each SAV polygon.

In deep and turbid water conditions, RK&K staff members utilized mask and snorkel to view bottom conditions and SAV presence. Photographs were taken at random intervals throughout the project area (Photographs 1 through 22). Additionally, aerial photography depicts a myriad of dark, generally circular areas averaging 2 to 3 feet in diameter. These areas were investigated closely, and their composition was recorded as non-SAV detritus.

Project Results

Based upon the field survey, it was found that areas delineated as potential SAV were correctly identified in the shallow areas in the northern and southern portions of the project area. SAV bed boundaries within the project area were adjusted during field verification to reflect existing conditions and deviations from the aerial assessment. Figures 3A through 3C depict final SAV delineation boundaries.

Areas identified as potential SAV on the aerial photography, were more difficult to identify in areas of deeper water in the southern and central portions of the project area. The distinction between areas of sparse SAV coverage and sandy bottom on the aerial photography, decreases quickly with depth.

Multiple small dark areas surveyed were found to be shallow depressions containing various detritus composed predominantly of dead SAV. Several depressions contained small amounts of unrooted green SAV and hard objects such as oyster shells and various debris.

SAV bed boundaries within the project area were adjusted during field verification to reflect existing conditions. Figures 3A through 3C depict final SAV delineation boundaries. A total of 6.21 acres of SAV were delineated from August 22-23, 2017.

B2500 Phase IIB –SAV Findings Report 2017

Ms. Kathy Herring
September 1, 2017
Page 3

Table 1. Submerged Aquatic Vegetation Assessment History

Year	Aerial Photogrammetry Date	SAV Assessment Date	Total Area (acres)
2014	August	October	6.01*
2015	June	August	5.81*
2016	May	July	5.79*
2017	May	June	5.76*
2017	May	August	6.21*

**SAV assessed within the bridge dripline*

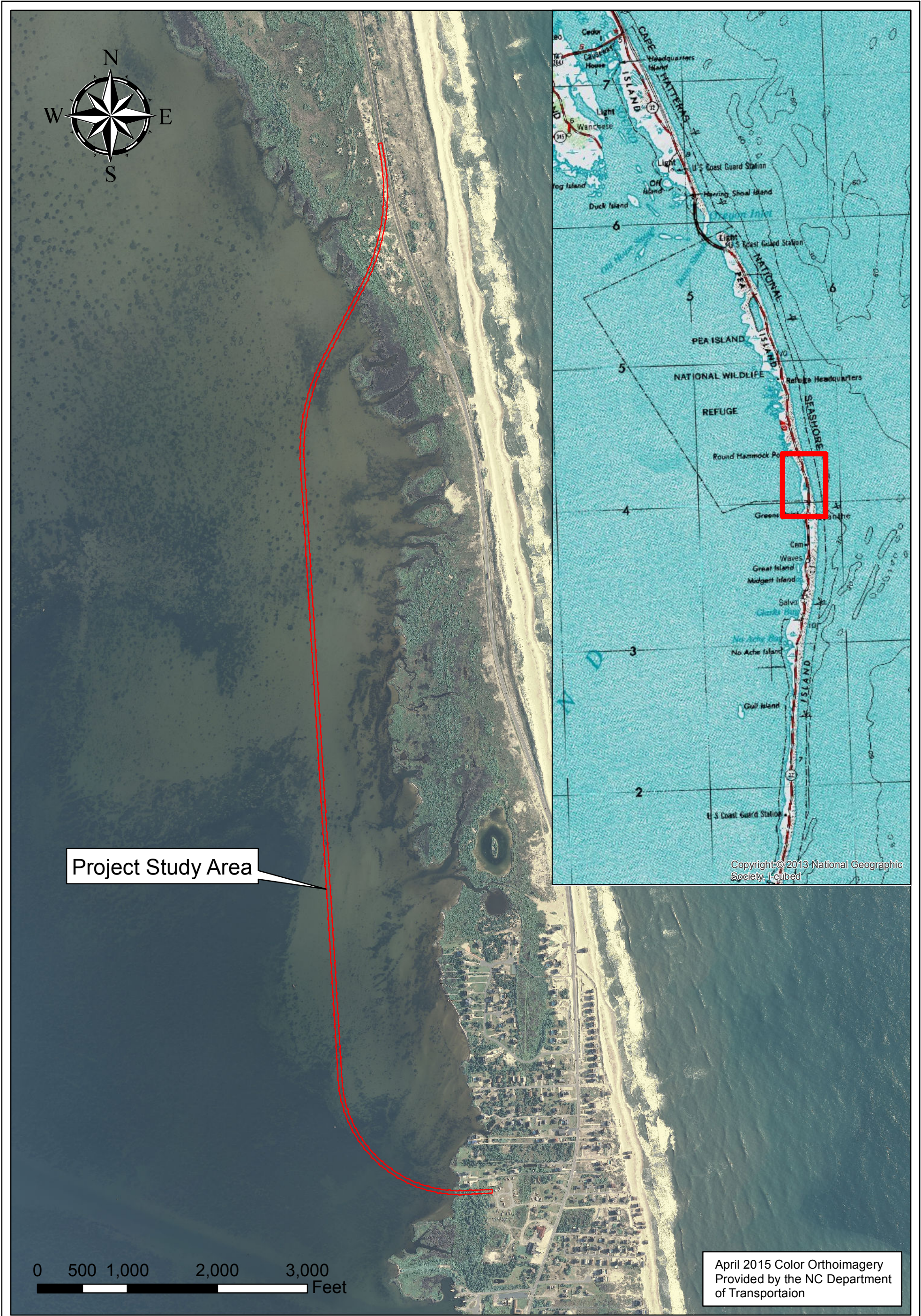
A total of 13.58 acres were delineated within the right-of-way (ROW). For both the entire ROW and the bridge dripline, the species composition was 95% shoal grass (*Halodule wrightii*) and 5% widgeon grass (*Ruppia maritima*).

We appreciate the opportunity to provide you with these services. Please let me know questions or comments you may have.

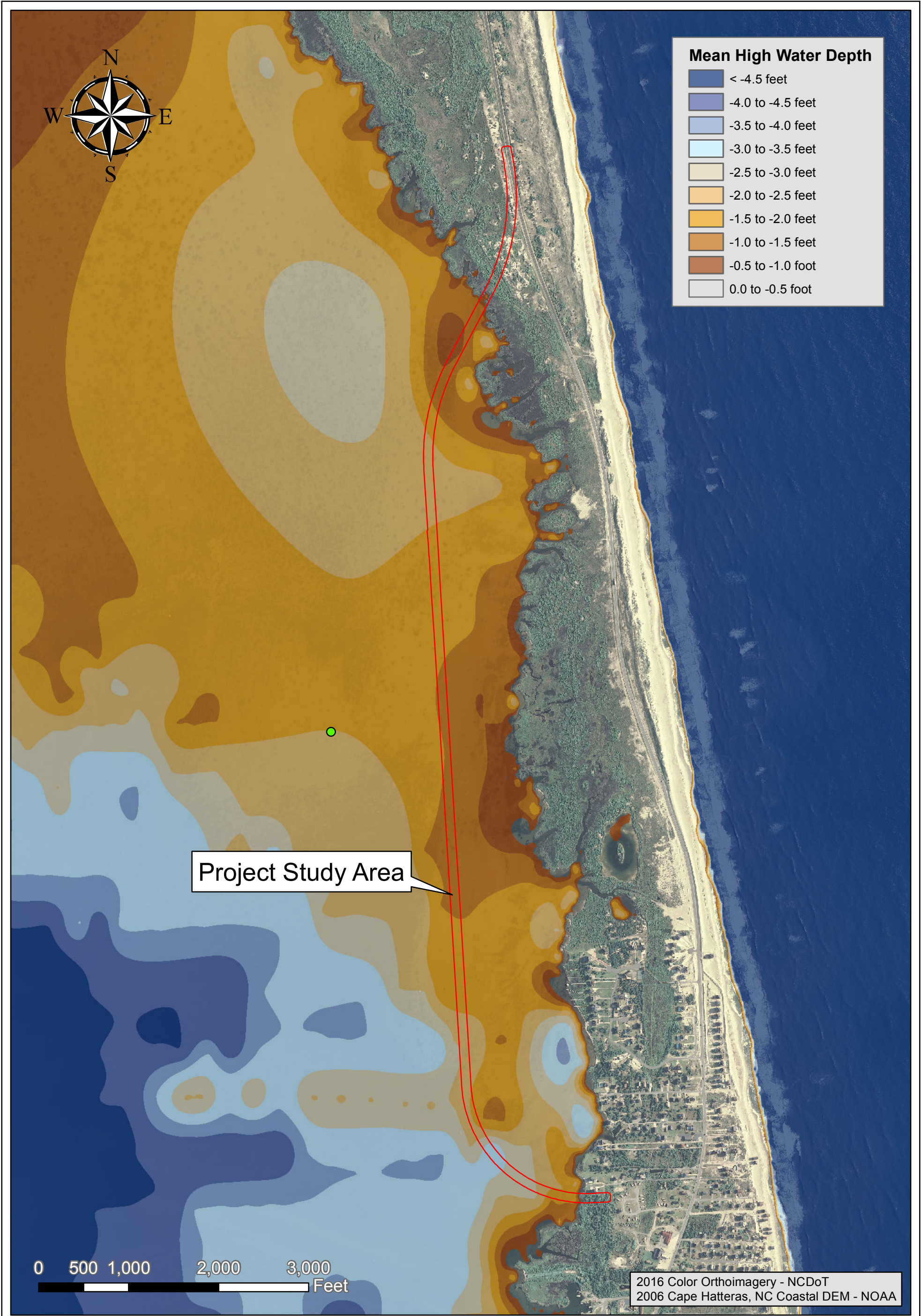
Sincerely,

Pete Stafford

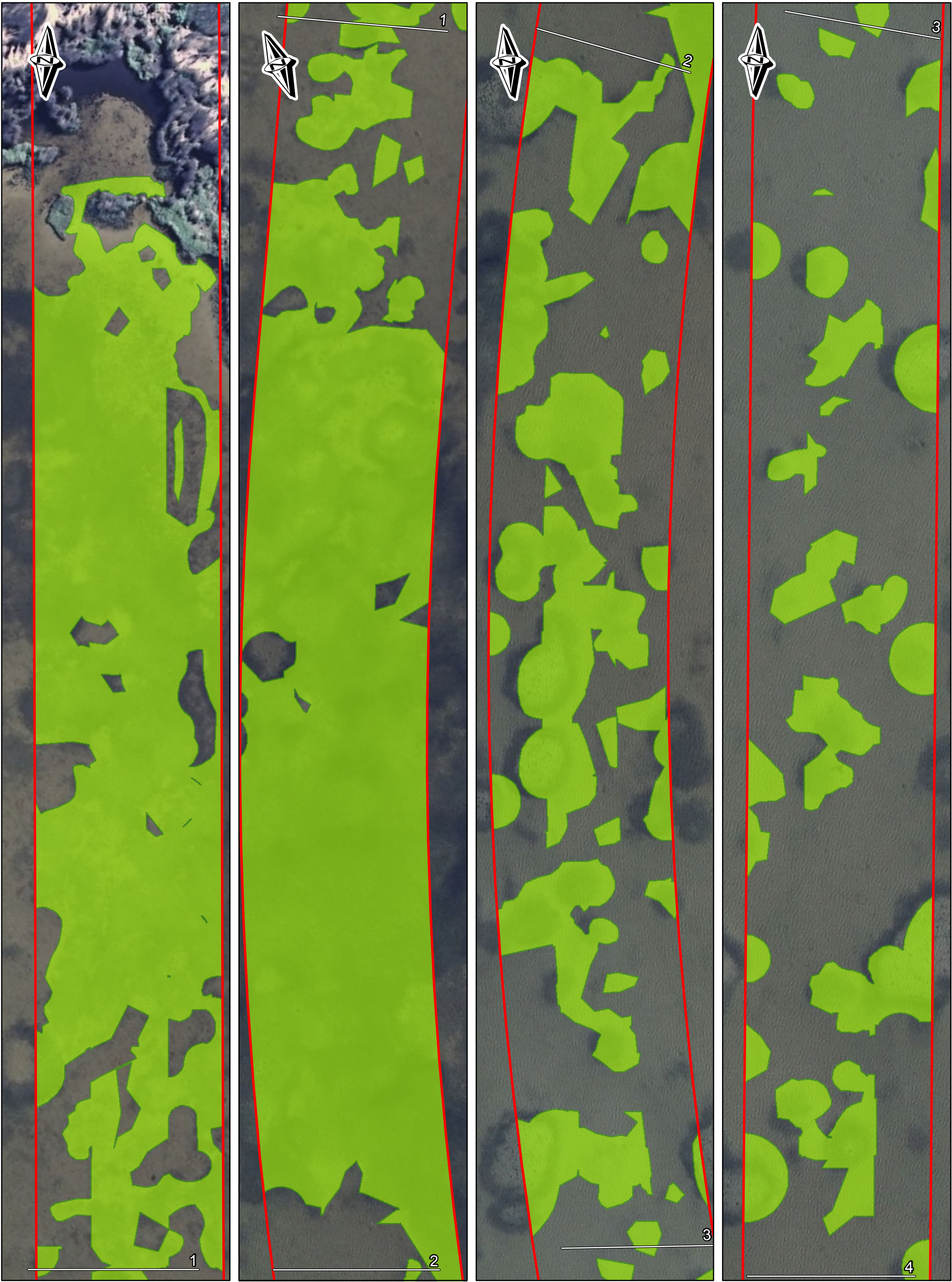
Attachments

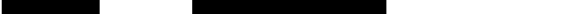


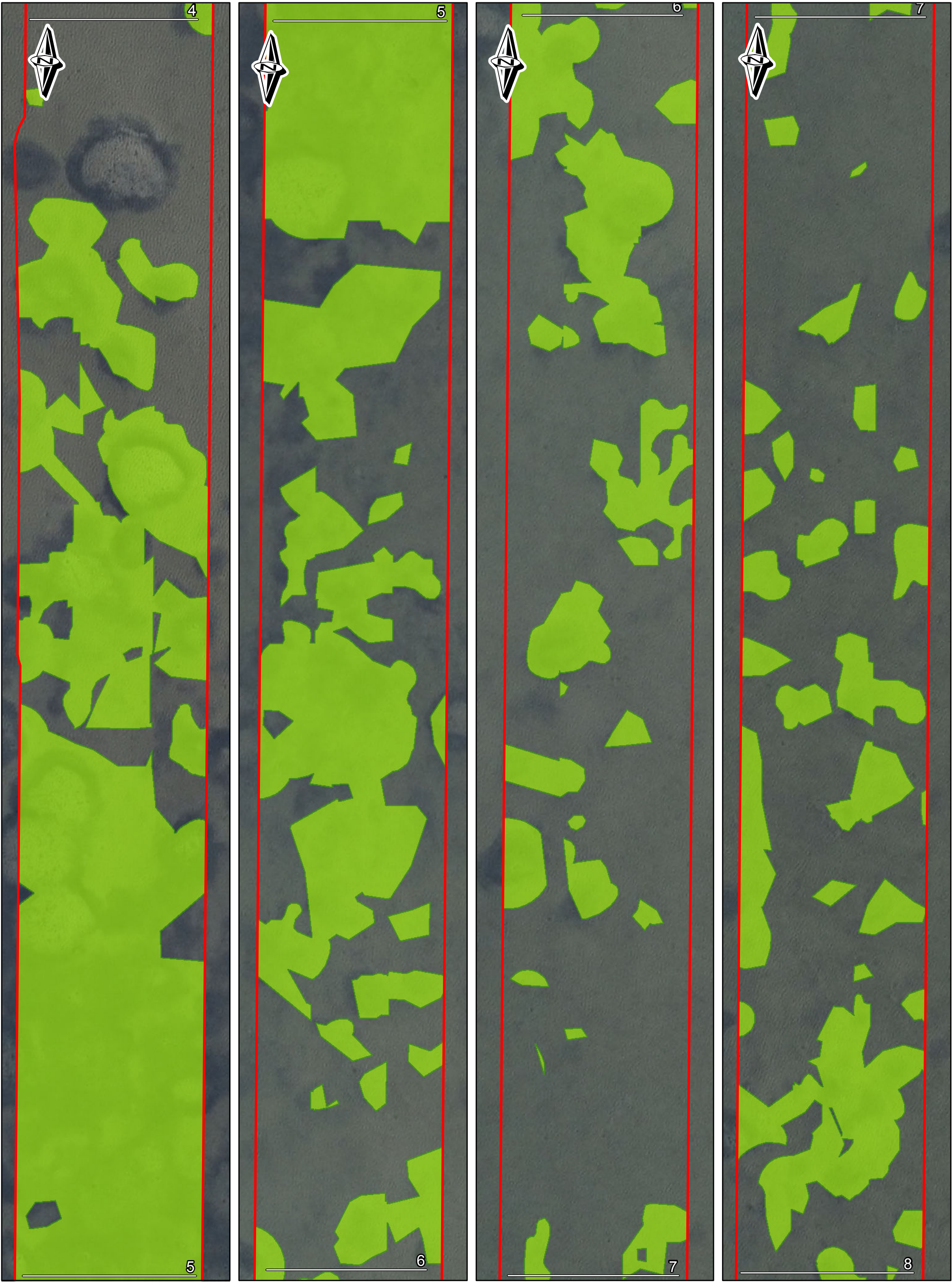
		Project: B-2500 PHASE IIb PROPOSED RODANTHE BRIDGE ON NEW ALIGNMENT Dare County, NC	Title: SUBMERGED AQUATIC VEGETATION SURVEYS PROJECT LOCATION		FIGURE 1
				Date: AUG 2017	
				Project No. B-2500 Phase IIb	
				Scale: 1:1000	



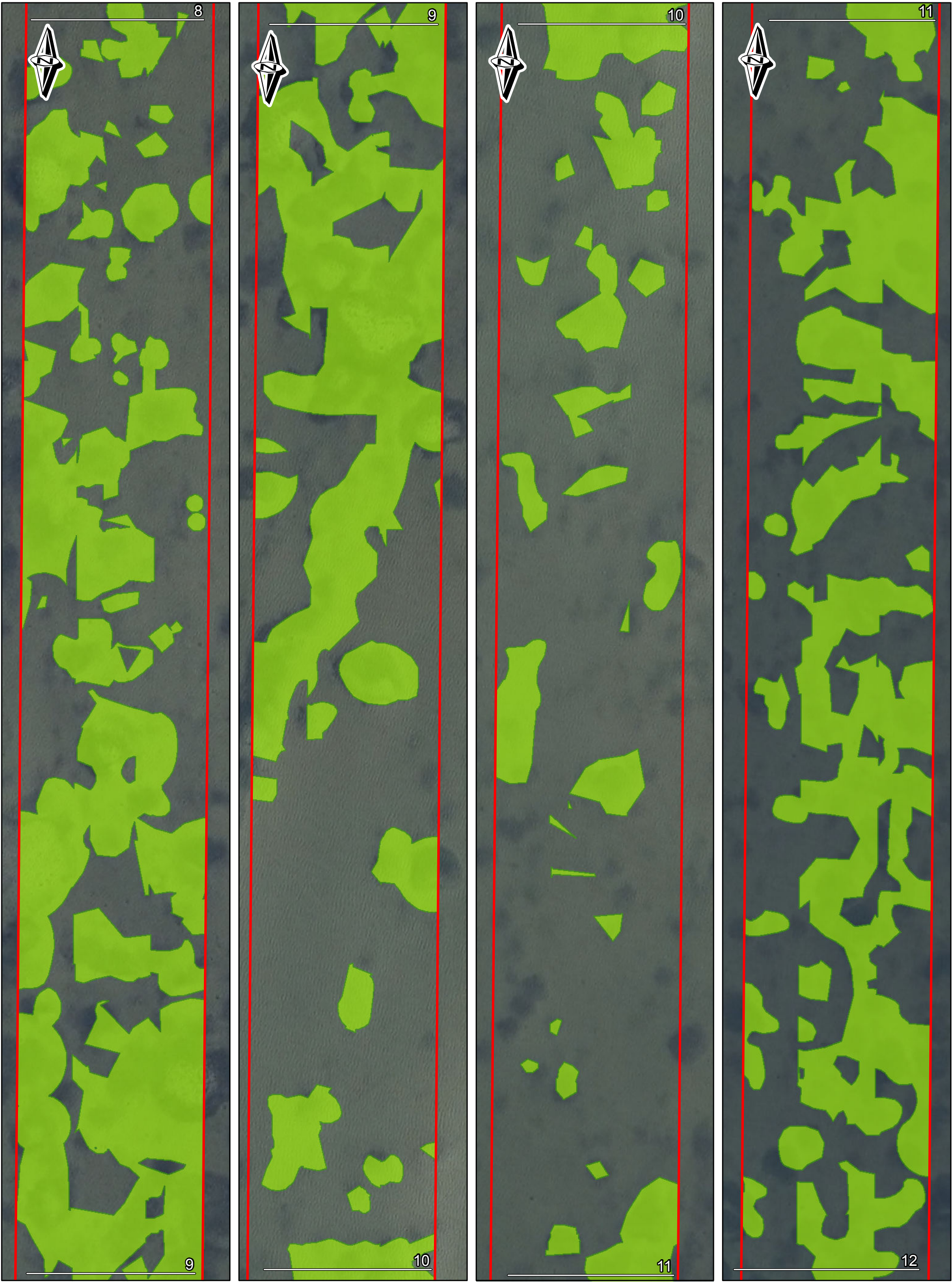
		Project: B-2500 PHASE IIb PROPOSED RODANTHE BRIDGE ON NEW ALIGNMENT Dare County, NC	Title: SUBMERGED AQUATIC VEGETATION SURVEYS APPROXIMATE SITE BATHYMETRY		FIGURE 2
				Date: AUG 2017	
				Project No. B-2500 Phase IIb	
				Scale: 1:1000	



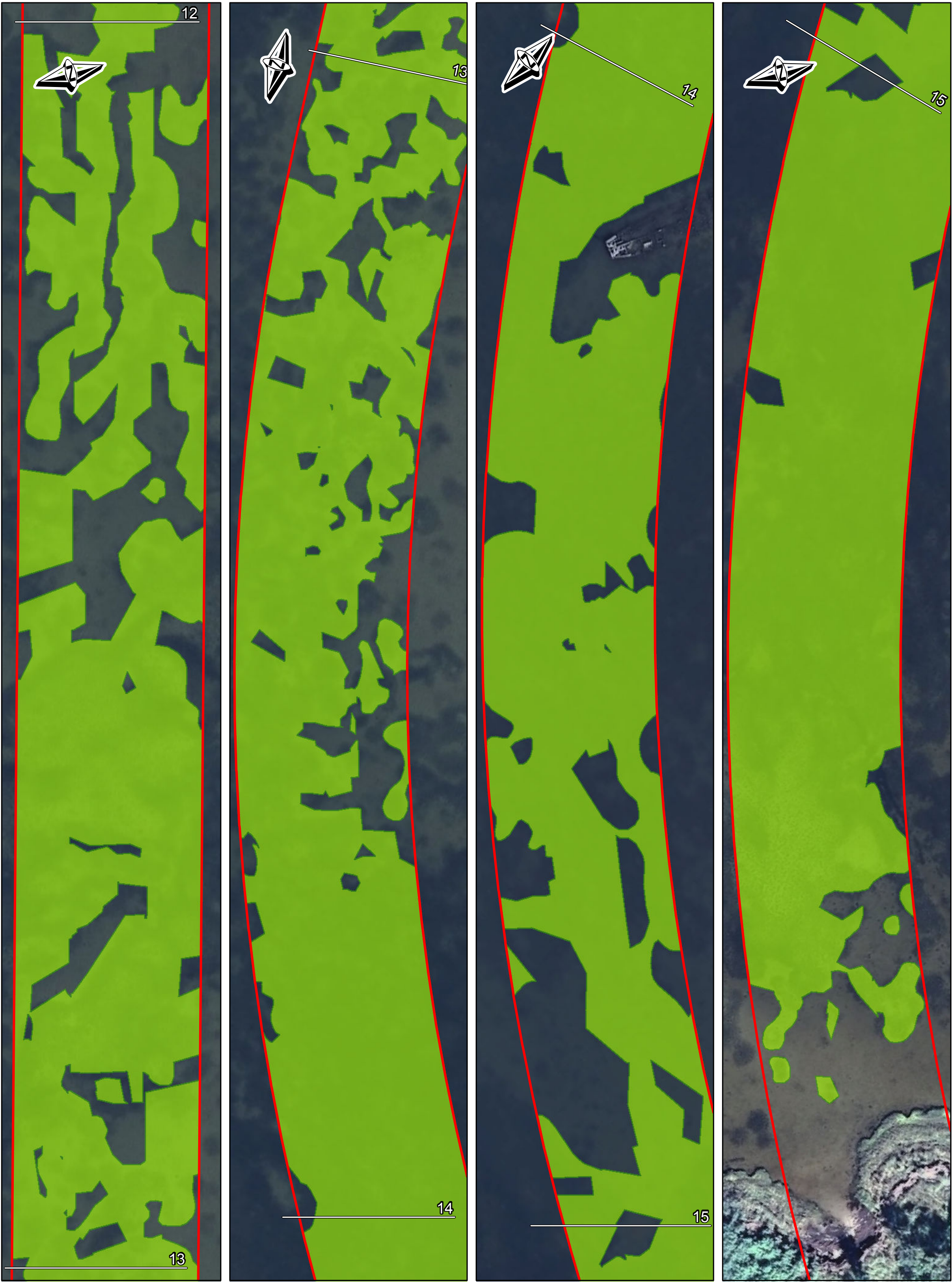
Legend  Matchline  Project Study Area  August 2017 Delineation				02550100150  Feet	
	Prepared for: 	Project: B-2500 PHASE IIb PROPOSED RODANTHE BRIDGE ON NEW ALIGNMENT Dare County, NC	Title: SUBMERGED AQUATIC VEGETATION SURVEYS DELINEATION RESULTS	Drawn By: WES	FIGURE 3A
				Date: Aug 2017	
				Project No. B-2500 Phase IIb	
				Scale: 1:50	



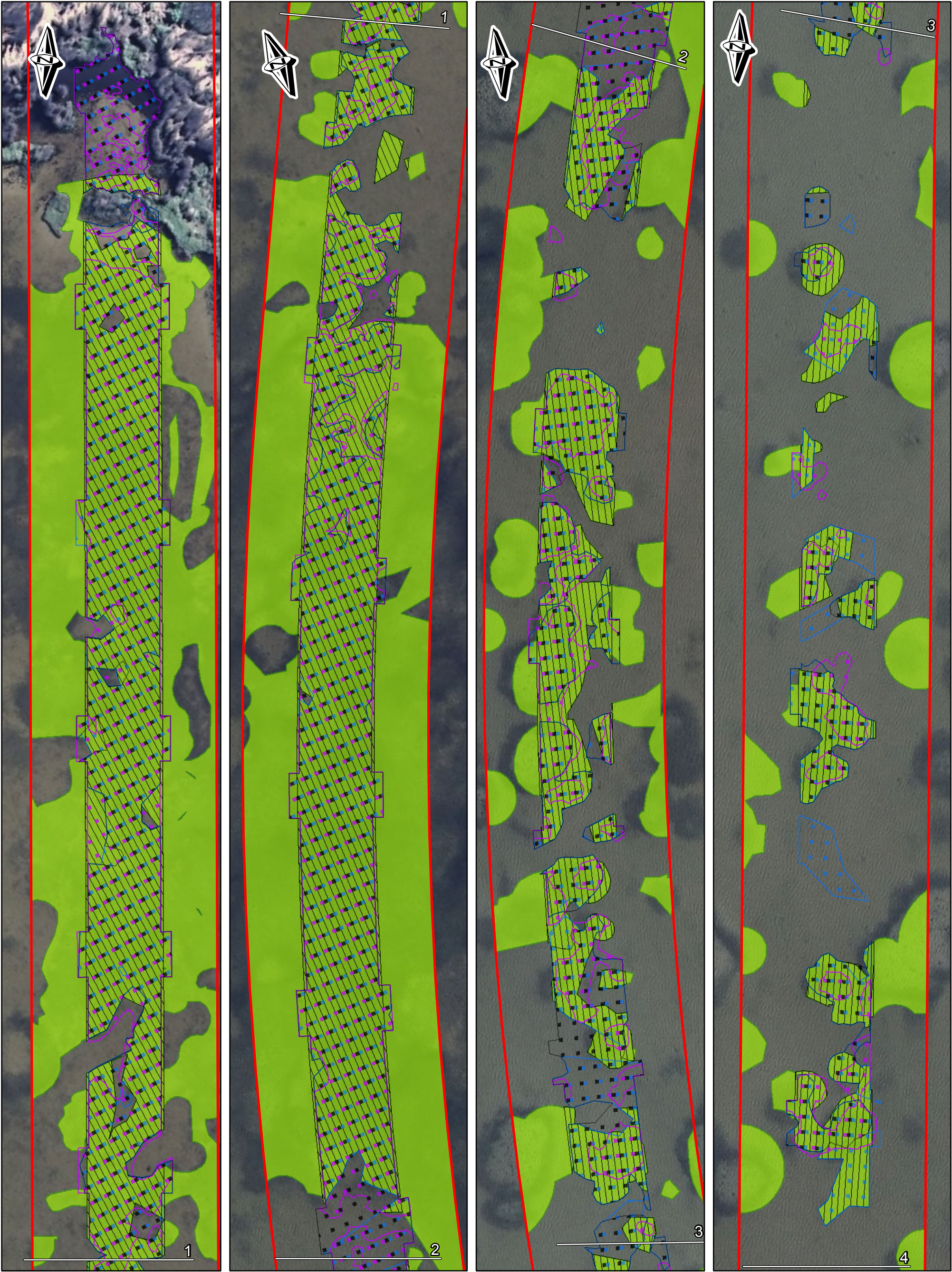
Legend		— Matchline		Project Study Area	August 2017 Delineation	0 25 50 100 150 Feet	
	Prepared for:	Project: B-2500 PHASE IIb PROPOSED RODANTHE BRIDGE ON NEW ALIGNMENT Dare County, NC	Title: SUBMERGED AQUATIC VEGETATION SURVEYS DELINEATION RESULTS	Drawn By: WES	FIGURE 3B		
				Date: Aug 2017			
				Project No. B-2500 Phase IIb			
				Scale: 1:50			



Legend		— Matchline		Project Study Area	August 2017 Delineation	0 25 50 100 150 Feet	
	Prepared for:	Project: B-2500 PHASE IIb PROPOSED RODANTHE BRIDGE ON NEW ALIGNMENT Dare County, NC	Title: SUBMERGED AQUATIC VEGETATION SURVEYS DELINEATION RESULTS	Drawn By: WES	FIGURE 3C		
				Date: Aug 2017			
				Project No. B-2500 Phase IIb			
				Scale: 1:50			



Legend Matchline Project Study Area August 2017 Delineation				02550100150 Feet	
RK&K	Prepared for: STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION	Project: B-2500 PHASE IIb PROPOSED RODANTHE BRIDGE ON NEW ALIGNMENT Dare County, NC	Title: SUBMERGED AQUATIC VEGETATION SURVEYS DELINEATION RESULTS	Drawn By: WES	FIGURE 3D
				Date: Aug 2017	
				Project No. B-2500 Phase IIb	
				Scale: 1:50	



Legend

— Matchline

■ Project Study Area

■ August 2017 Delineation

▨ B-2500 July 2017 Delineation

▤ B-2500 July 2016 Delineation

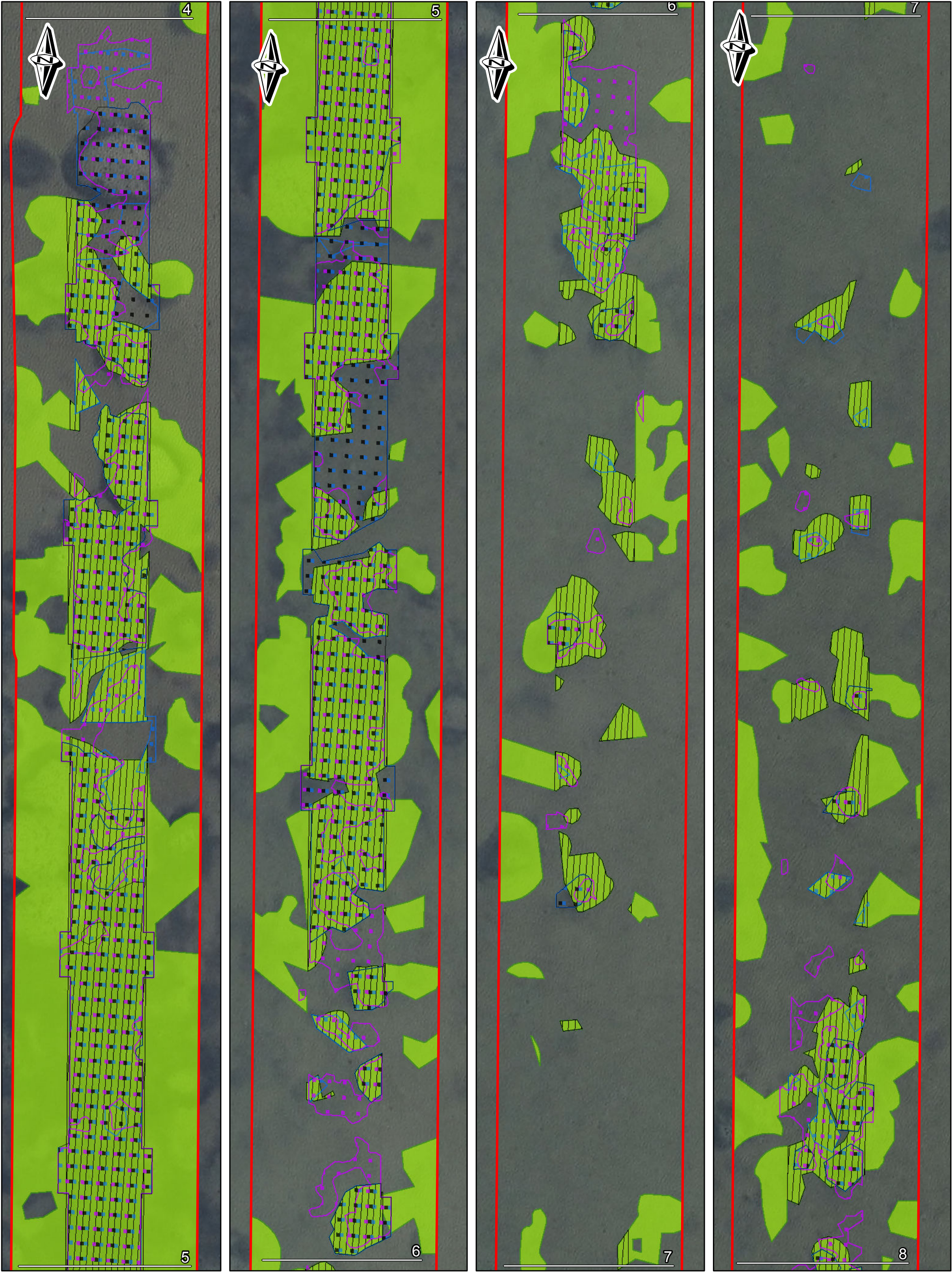
■ B-2500 Final 2015 Delineation

■ B-2500 Final 2014 Delineation

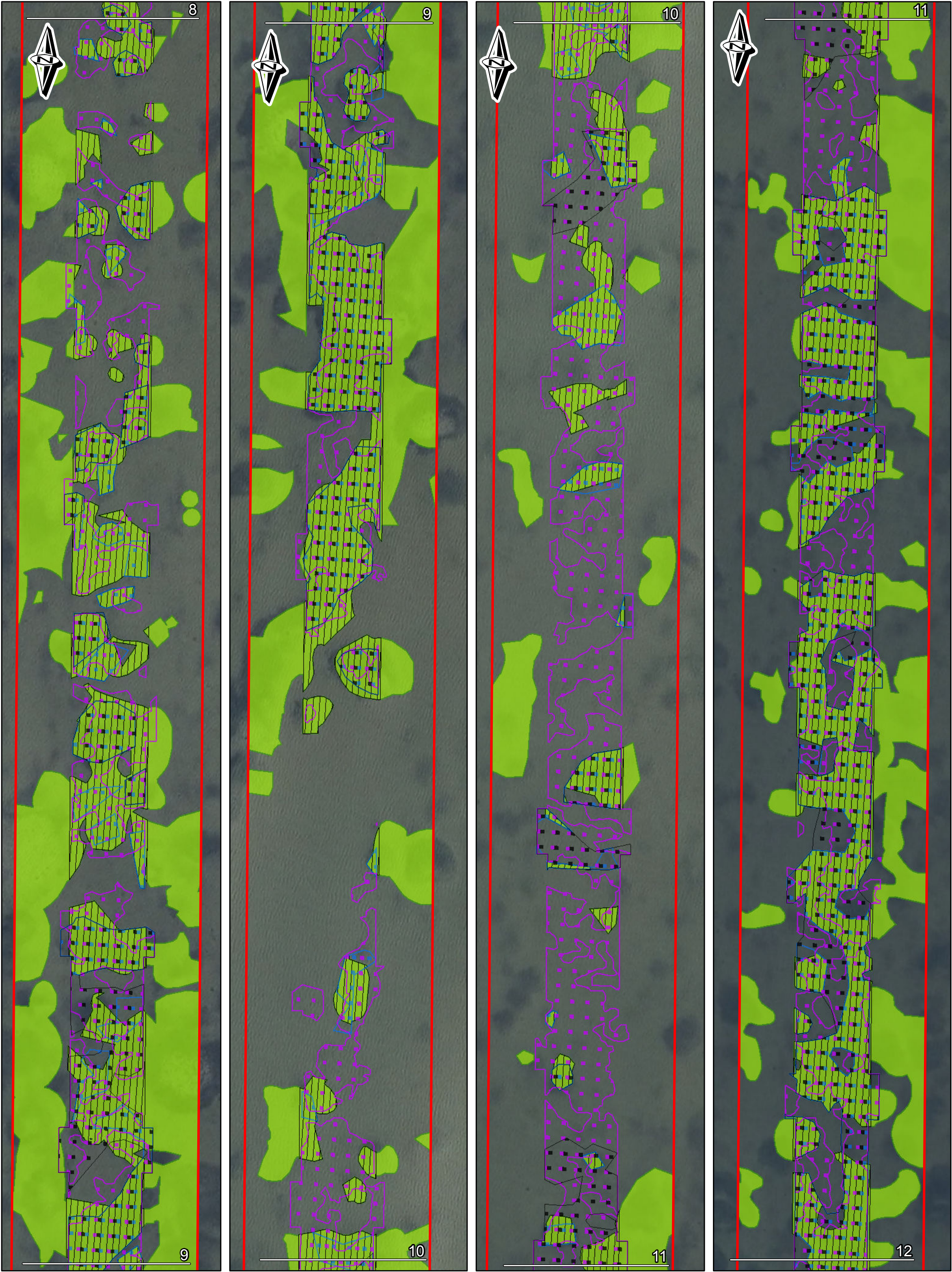
02550100150

Feet

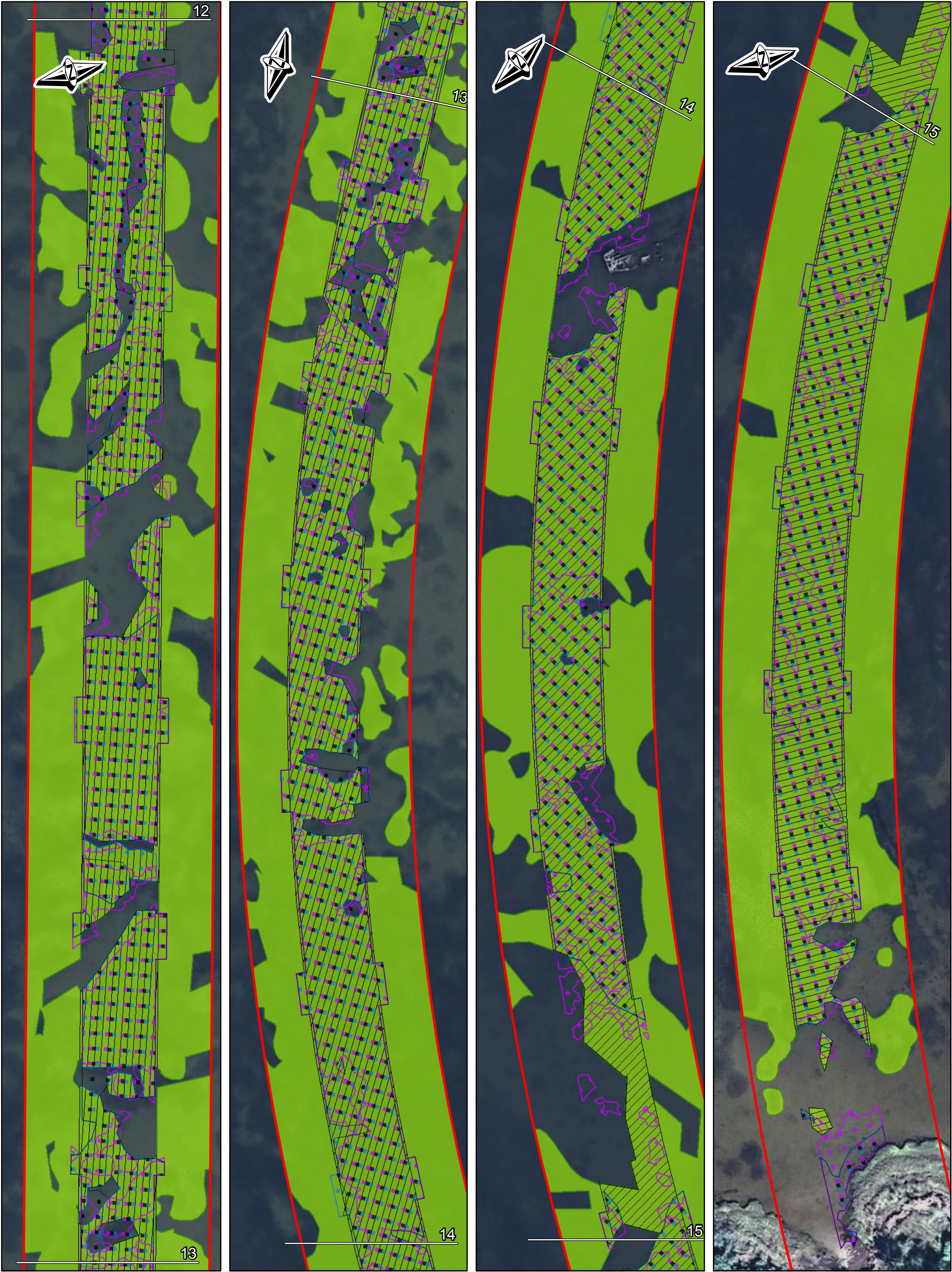
		Project: B-2500 PHASE IIb PROPOSED RODANTHE BRIDGE ON NEW ALIGNMENT Dare County, NC	Title: SUBMERGED AQUATIC VEGETATION SURVEYS COMPARISON OF 2014, 2015, 2016, and 2017 DELINEATION RESULTS	Drawn By: WES	FIGURE 4A
				Date: Aug 2017	
				Project No. B-2500 Phase IIb	
				Scale: 1:50	



Legend — Matchline Project Study Area August 2017 Delineation		B-2500 July 2017 Delineation B-2500 July 2016 Delineation B-2500 Final 2015 Delineation B-2500 Final 2014 Delineation		0 25 50 100 150 Feet	
		Project: B-2500 PHASE IIb PROPOSED RODANTHE BRIDGE ON NEW ALIGNMENT Dare County, NC	Title: SUBMERGED AQUATIC VEGETATION SURVEYS COMPARISON OF 2014, 2015, 2016, and 2017 DELINEATION RESULTS	Drawn By: WES	FIGURE 4B
				Date: Aug 2017	
				Project No. B-2500 Phase IIb	
				Scale: 1:50	



Legend — Matchline Project Study Area August 2017 Delineation B-2500 July 2017 Delineation B-2500 July 2016 Delineation B-2500 Final 2015 Delineation B-2500 Final 2014 Delineation		0 25 50 100 150 Feet			
	Prepared for:	Project:	Title:	Drawn By: WES	FIGURE 4C
		B-2500 PHASE IIb PROPOSED RODANTHE BRIDGE ON NEW ALIGNMENT Dare County, NC	SUBMERGED AQUATIC VEGETATION SURVEYS COMPARISON OF 2014, 2015, 2016, and 2017 DELINEATION RESULTS	Date: Aug 2017	
				Project No. B-2500 Phase IIb	
				Scale: 1:50	



Legend

— Matchline

Project Study Area

August 2017 Delineation

B-2500 July 2017 Delineation

B-2500 July 2016 Delineation

B-2500 Final 2015 Delineation

B-2500 Final 2014 Delineation

0

25

50

100

150

Feet

		Project: B-2500 PHASE IIb PROPOSED RODANTHE BRIDGE ON NEW ALIGNMENT Dare County, NC	Title: SUBMERGED AQUATIC VEGETATION SURVEYS COMPARISON OF 2014, 2015, 2016, and 2017 DELINEATION RESULTS	Drawn By: WES	FIGURE 4D
				Date: Aug 2017	
				Project No. B-2500 Phase IIb	
				Scale: 1:50	