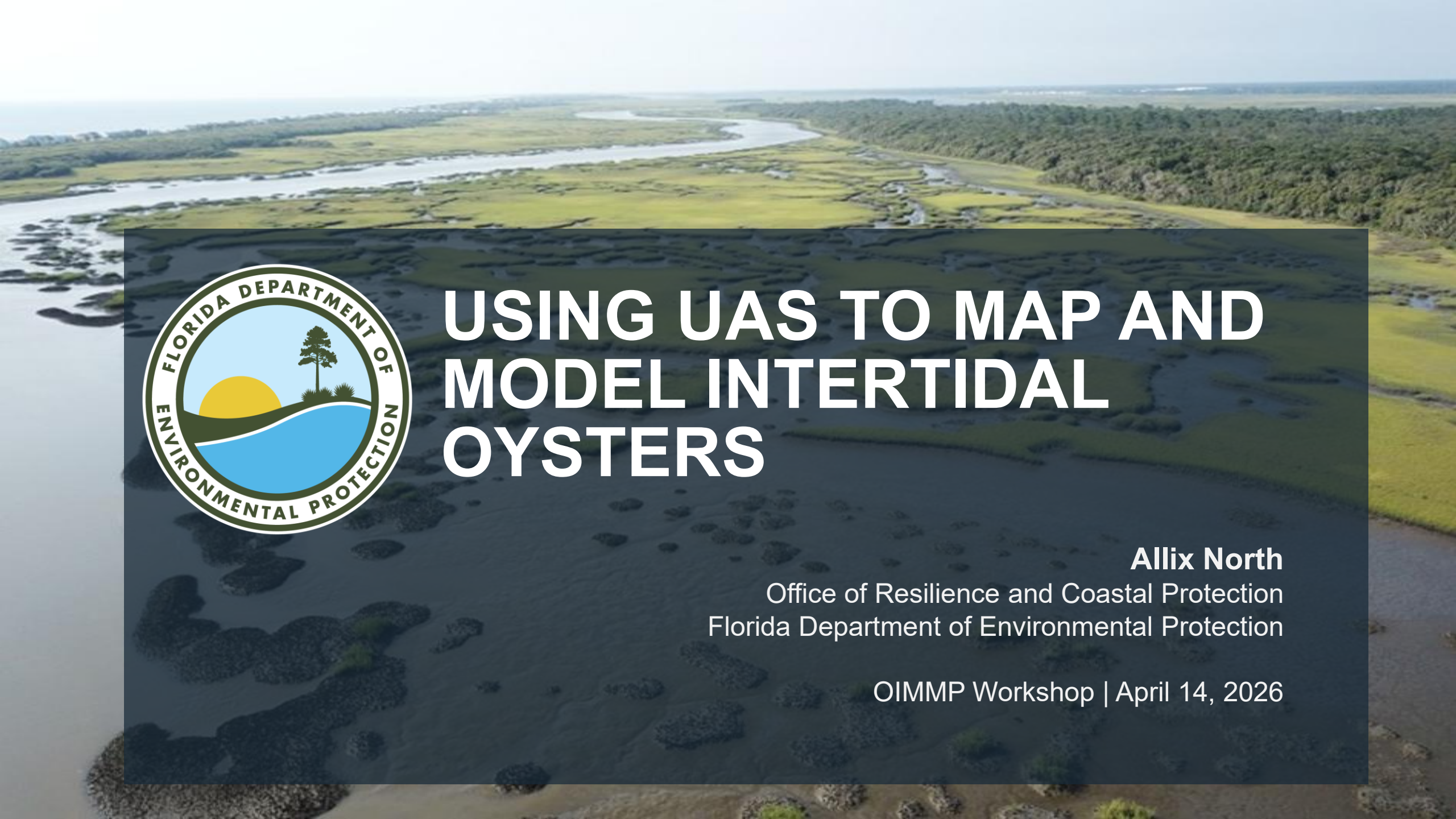
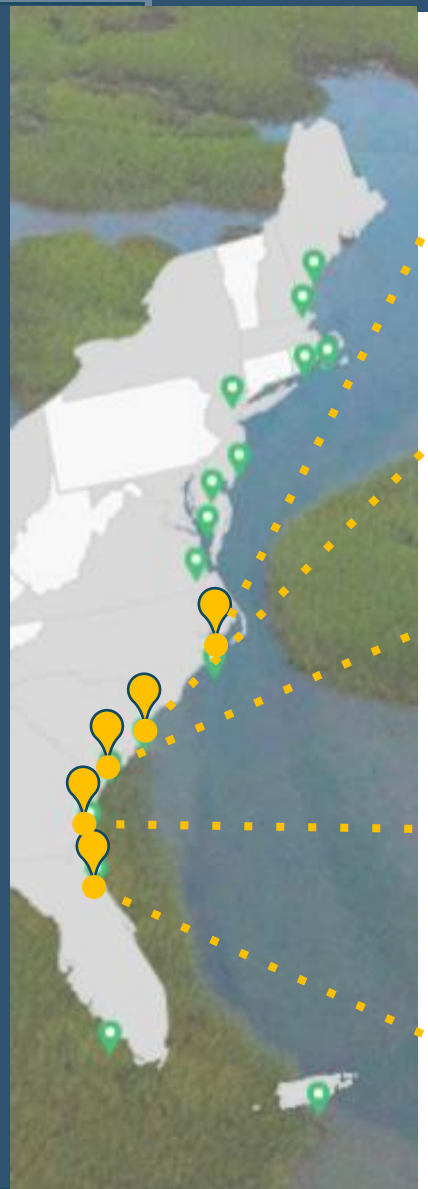


USING UAS TO MAP AND MODEL INTERTIDAL OYSTERS

Allix North
Office of Resilience and Coastal Protection
Florida Department of Environmental Protection

OIMMP Workshop | April 14, 2026

PROJECT TEAM



Justin Ridge, **Kerryanne Newman**, Whitney Jenkins (NCNERR)

Brandon Puckett, Camille Steenrod, Ryan Giannelli (NOAA)

Erik Smith & Robert Dunn (NI-WBNERR)

Peter Kingsley-Smith, **Gary Sundin, Laura Sanchez**, Lexi Mitchell (SCDNR)

Josh Matheson, Dave Johnston (Duke)

Rachel Guy & Colby Peffer (SINERR)

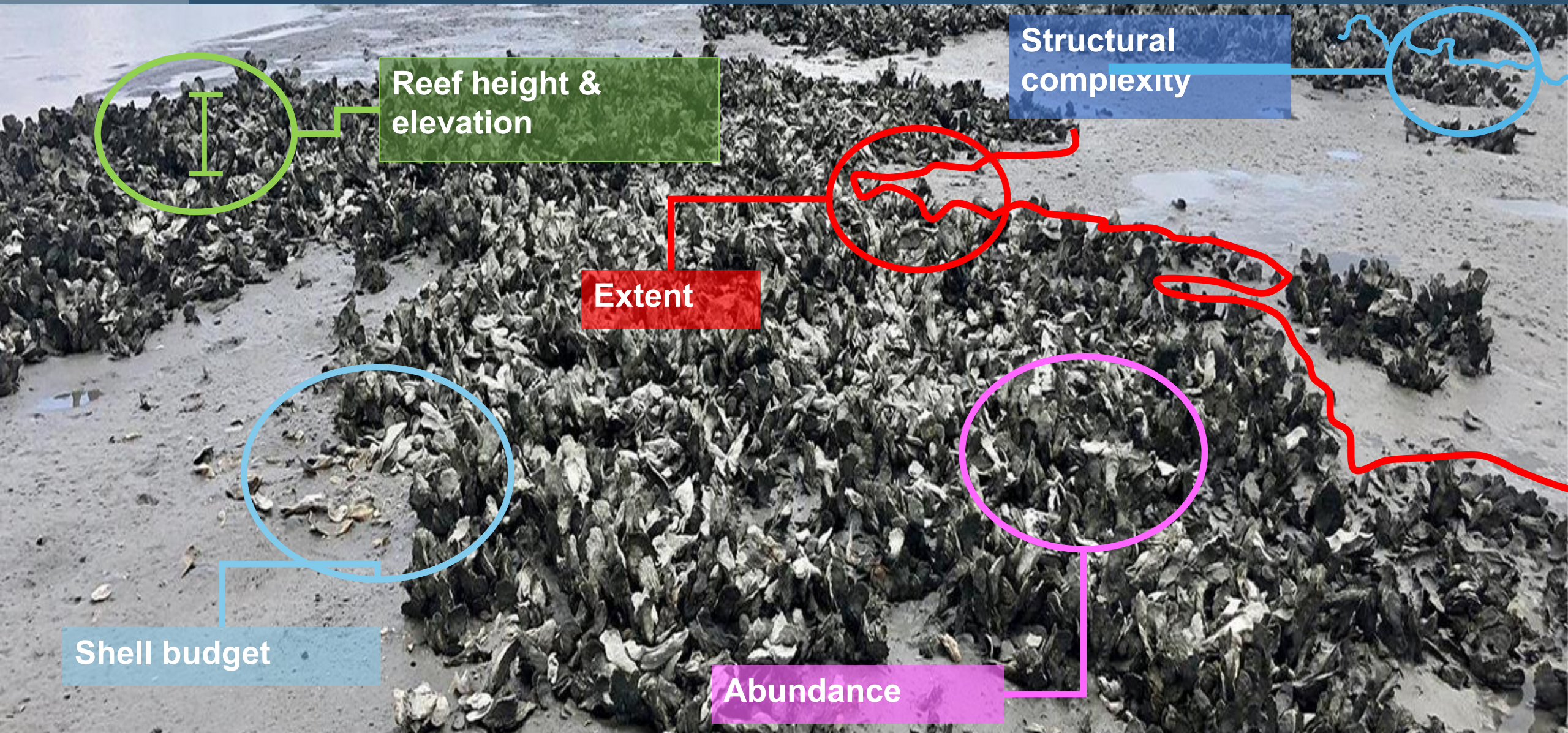
Nikki Dix, Alyah Bennett (GTMNERR)

Dan Bowling NC State (NERRS Davidson Fellow)

End Users Involved

National Estuarine Research Reserve System Science Collaborative

REEF RESILIENCE, PERSISTENCE AND FUNCTION



MANAGEMENT NEED

- Need for rapid, standardized and quantitative measures to assess oyster reef structural and demographic characteristics for management and restoration purposes.

- Structural and demographic characteristics = integration of 2D (e.g., extent) and 3D (e.g., rugosity) metrics with demographic metrics (e.g., oyster density) to infer reef resilience, sustainability and habitat function.

GOAL AND OBJECTIVES

Goal: Evaluate UAS as a tool for providing quantitative measures of intertidal Eastern oyster (*Crassostrea virginica*) reef structural and demographic characteristics and changes to those characteristics.

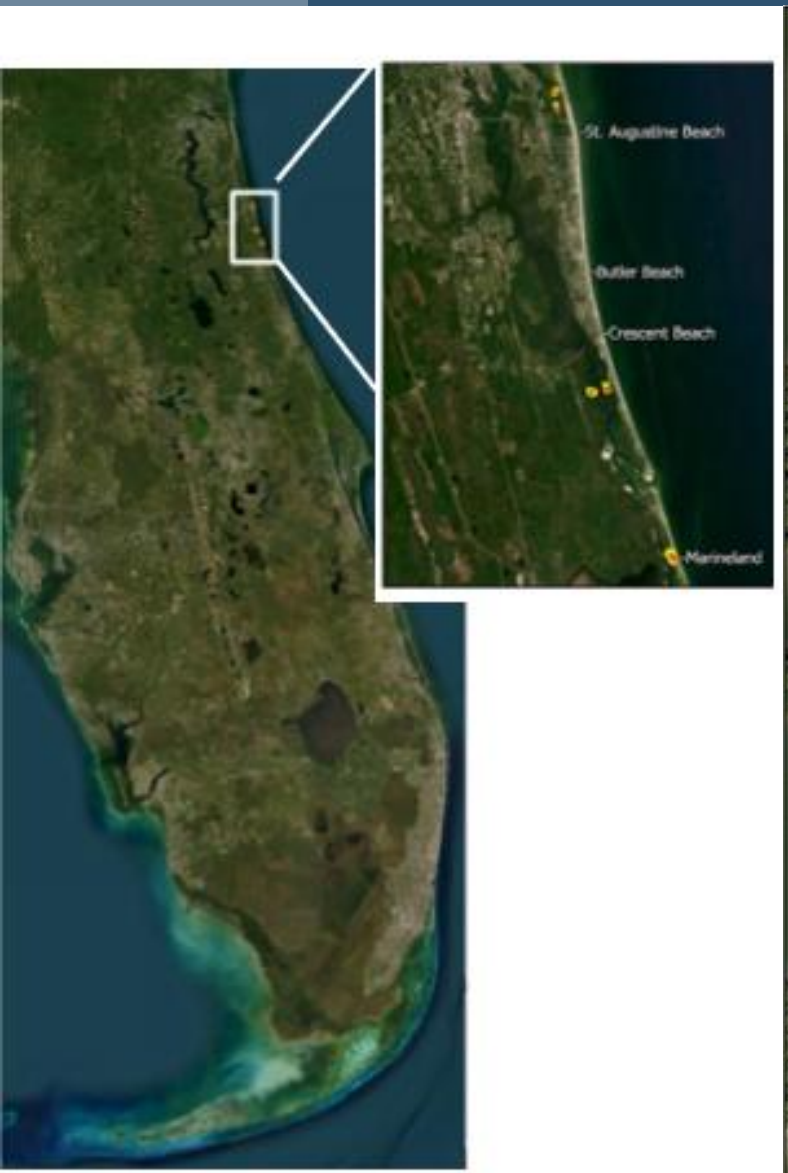
Objective 1: Use UAS-derived geospatial, spectral and three-dimensional products to measure and model priority structural and demographic metrics (e.g., reef extent, vertical relief, rugosity, shell volume, oyster density and size structure).

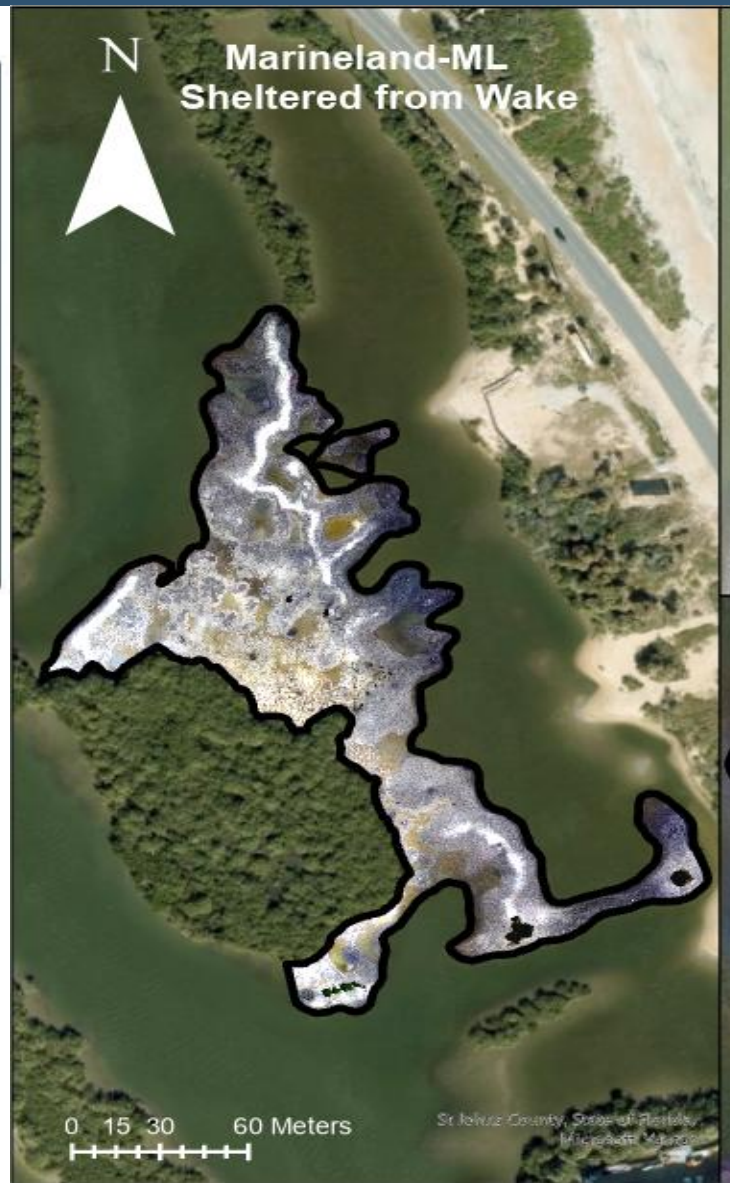
Objective 2: Conduct *in situ* measurements of reef metrics identified in objective 1 to assess the accuracy of UAS-based estimates.

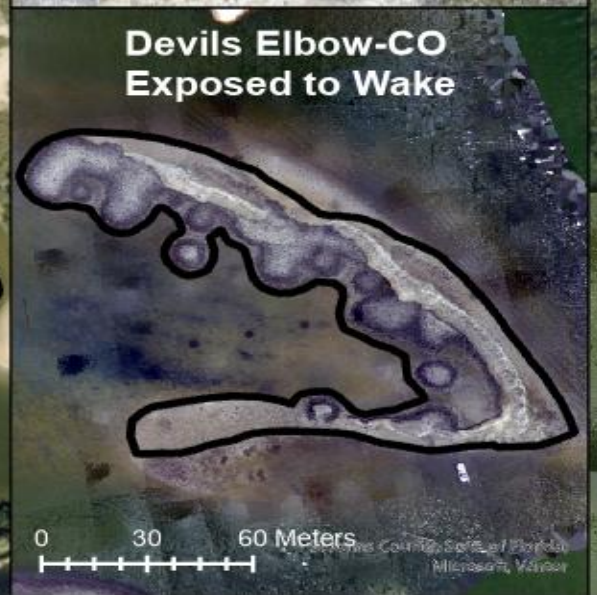
Objective 3: Assess the ability of UAS-derived products to detect and quantify change in reef metrics.

Objective 4: Compare *in situ* and UAS methods in terms of effort, costs and benefits.

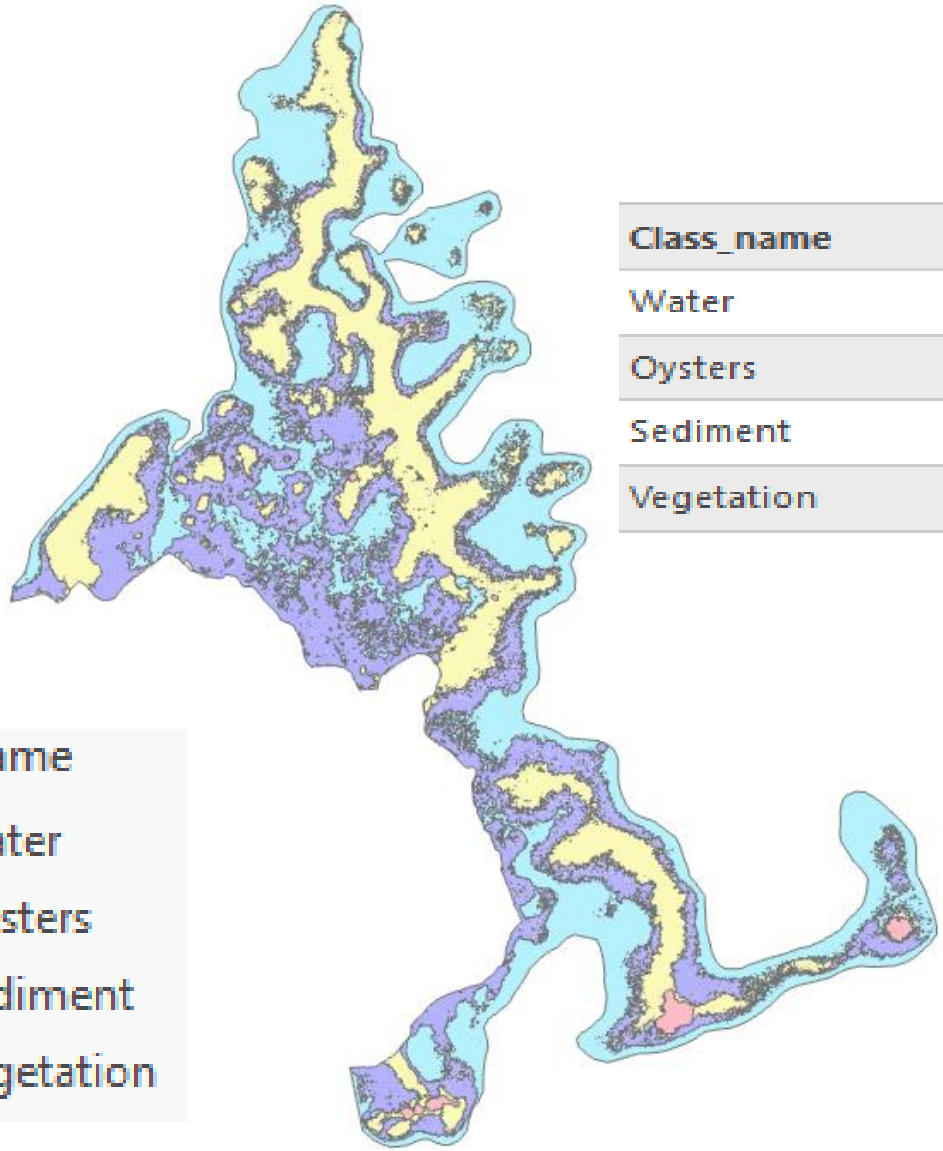
REEF LOCATION AT GTM





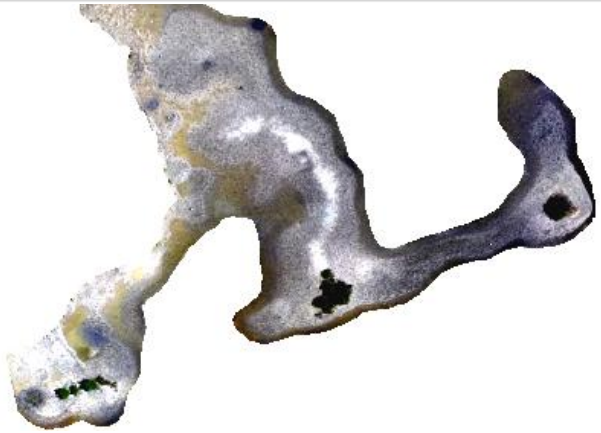


REEF FOOTPRINT

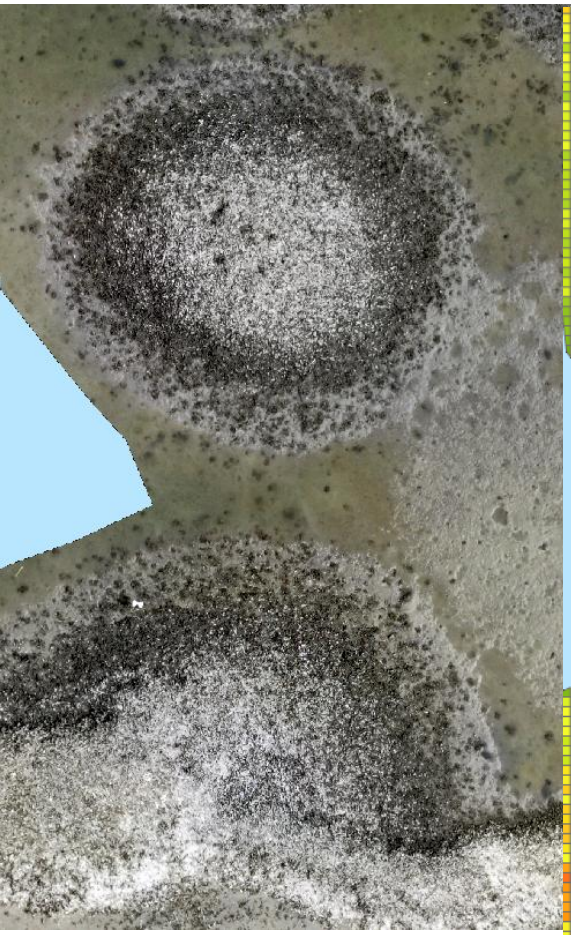


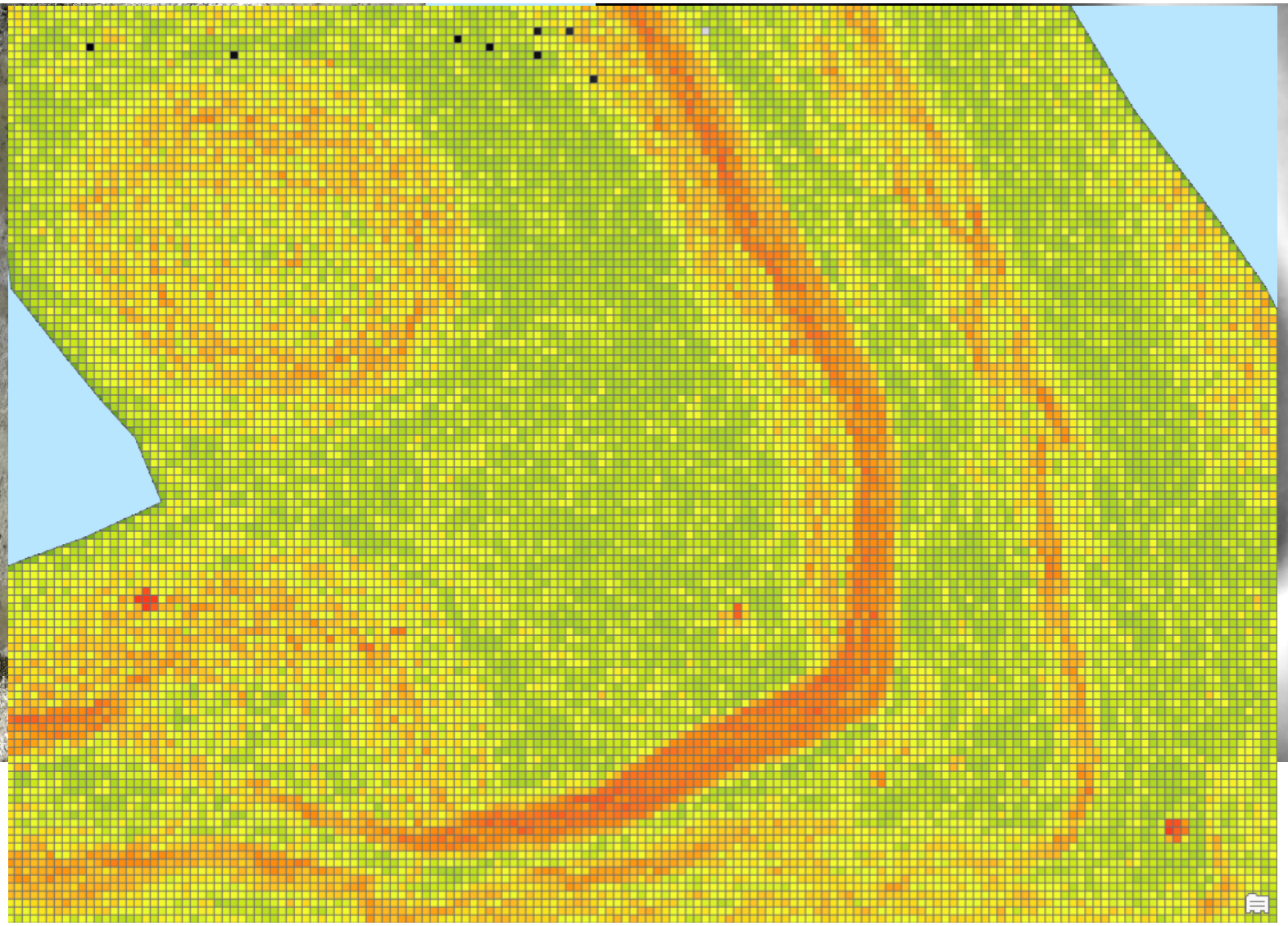
Class_name
Water
Oysters
Sediment
Vegetation

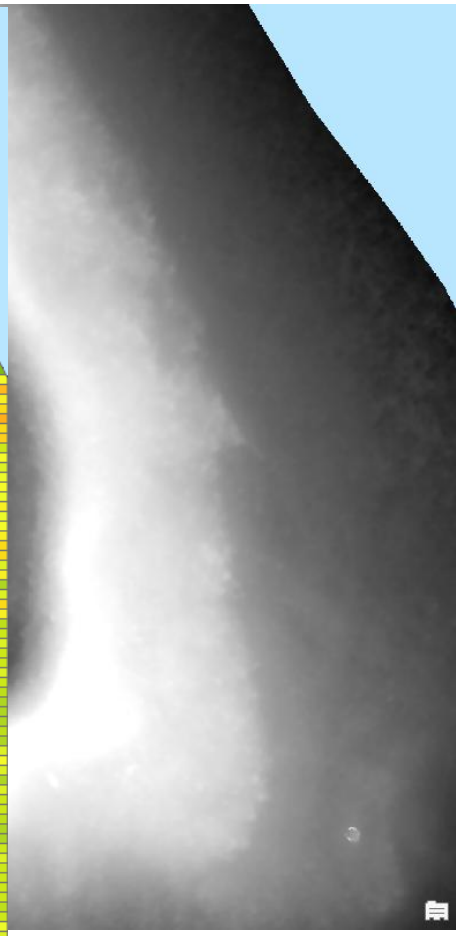
ClassValue	C_0	C_1	C_10	C_20	Total	U_Accuracy	Kappa
C_0	108	11	4	0	123	0.878049	0
C_1	0	74	5	0	79	0.936709	0
C_10	0	17	78	0	95	0.821053	0
C_20	0	0	0	10	10	1	0
Total	108	102	87	10	307	0	0
P_Accuracy	1	0.72549	0.896552	1	0	0.879479	0
Kappa	0	0	0	0	0	0	0.824006



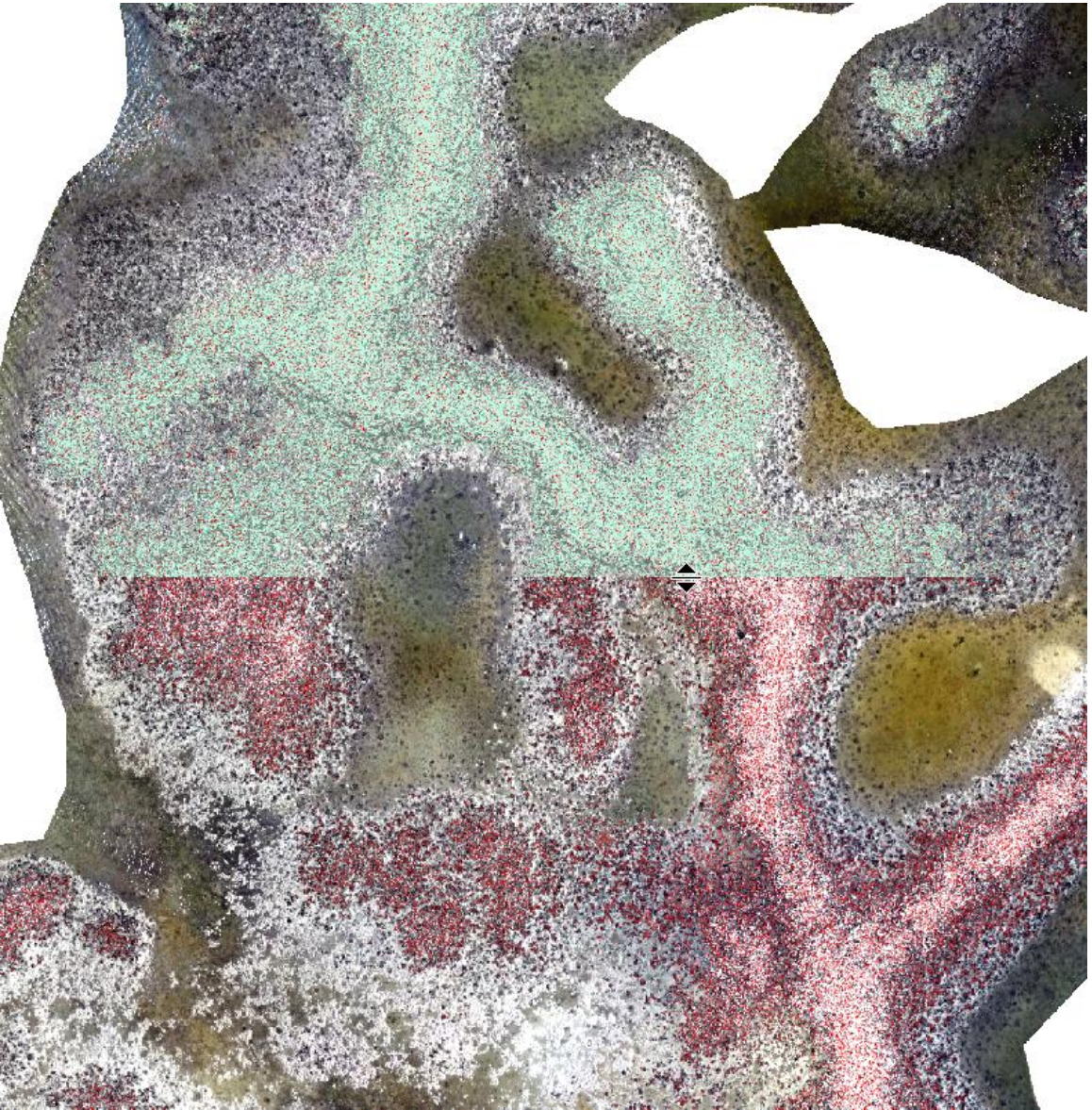
REEF RUGOSITY

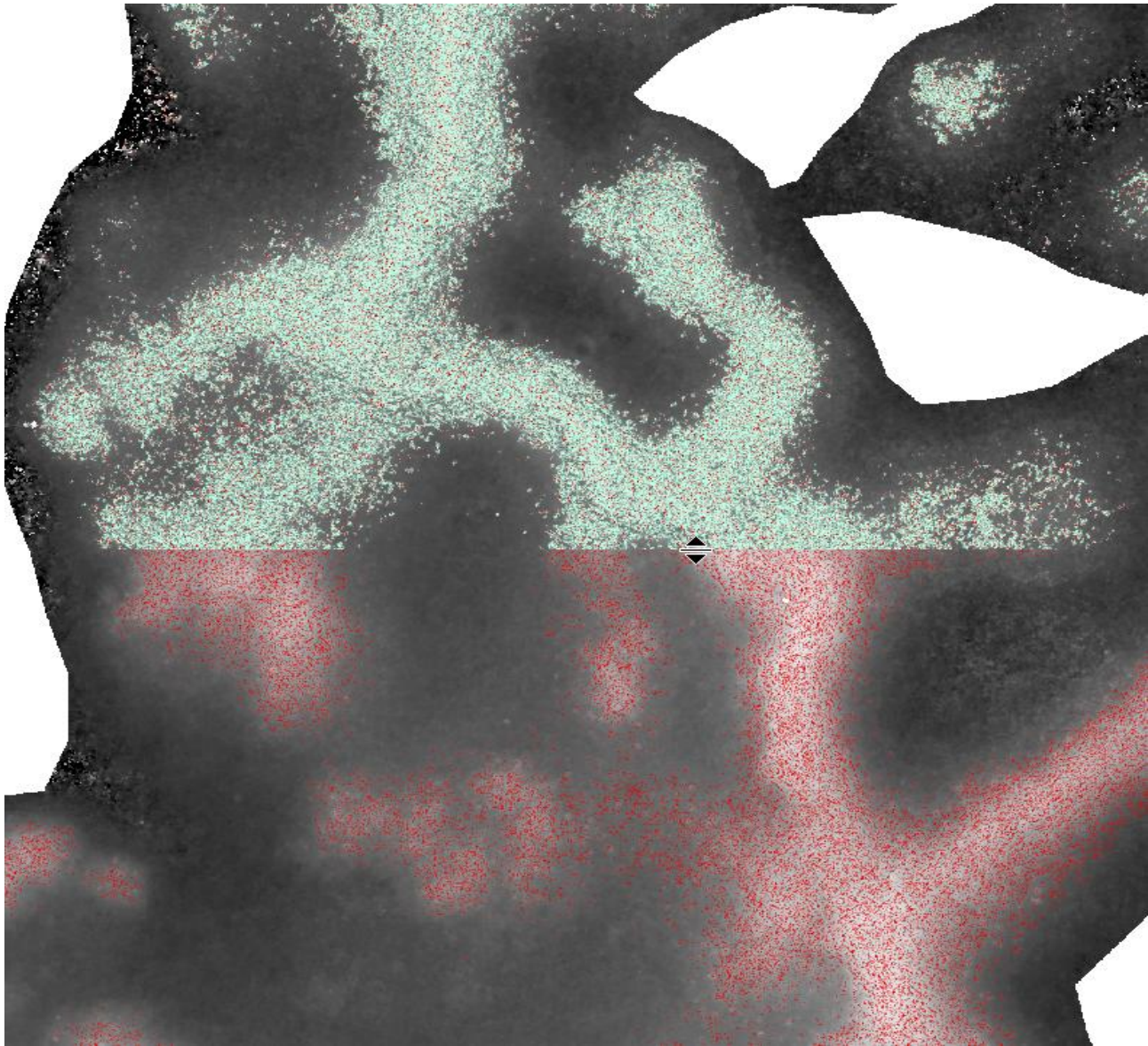




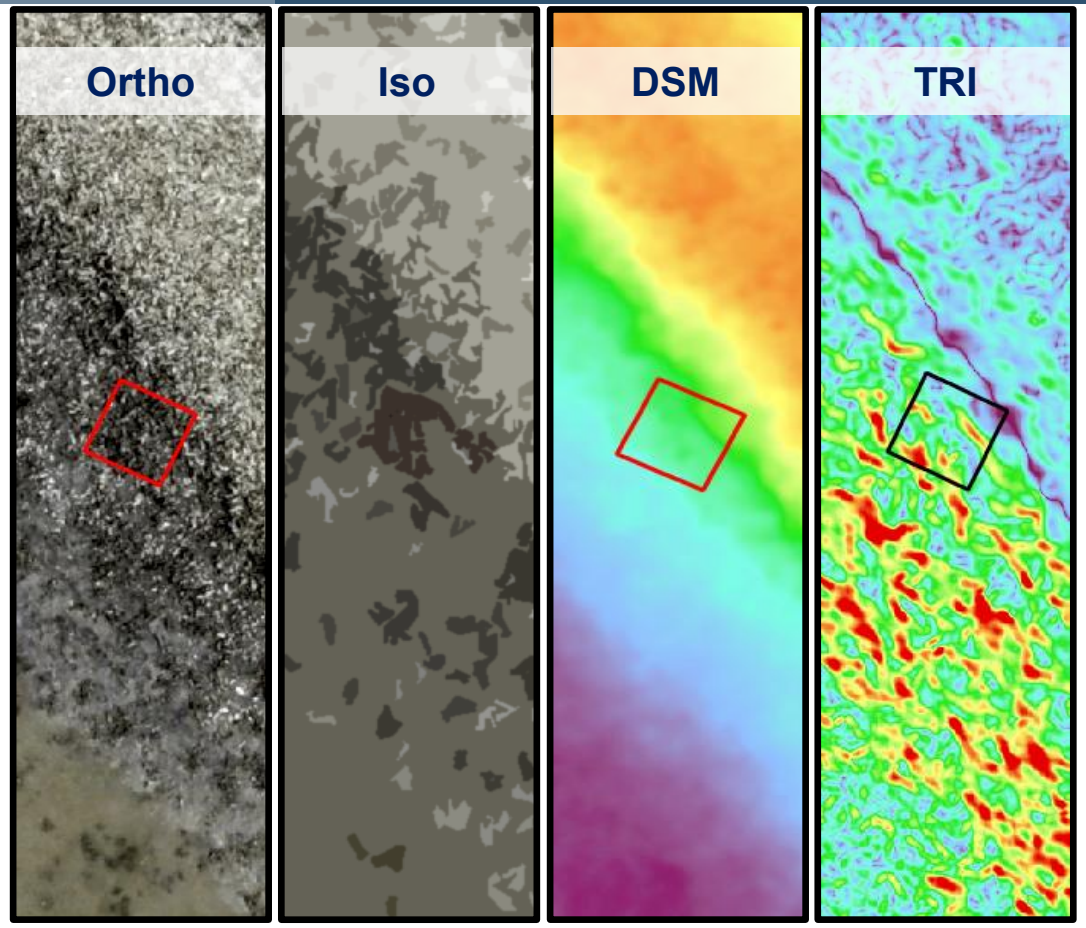


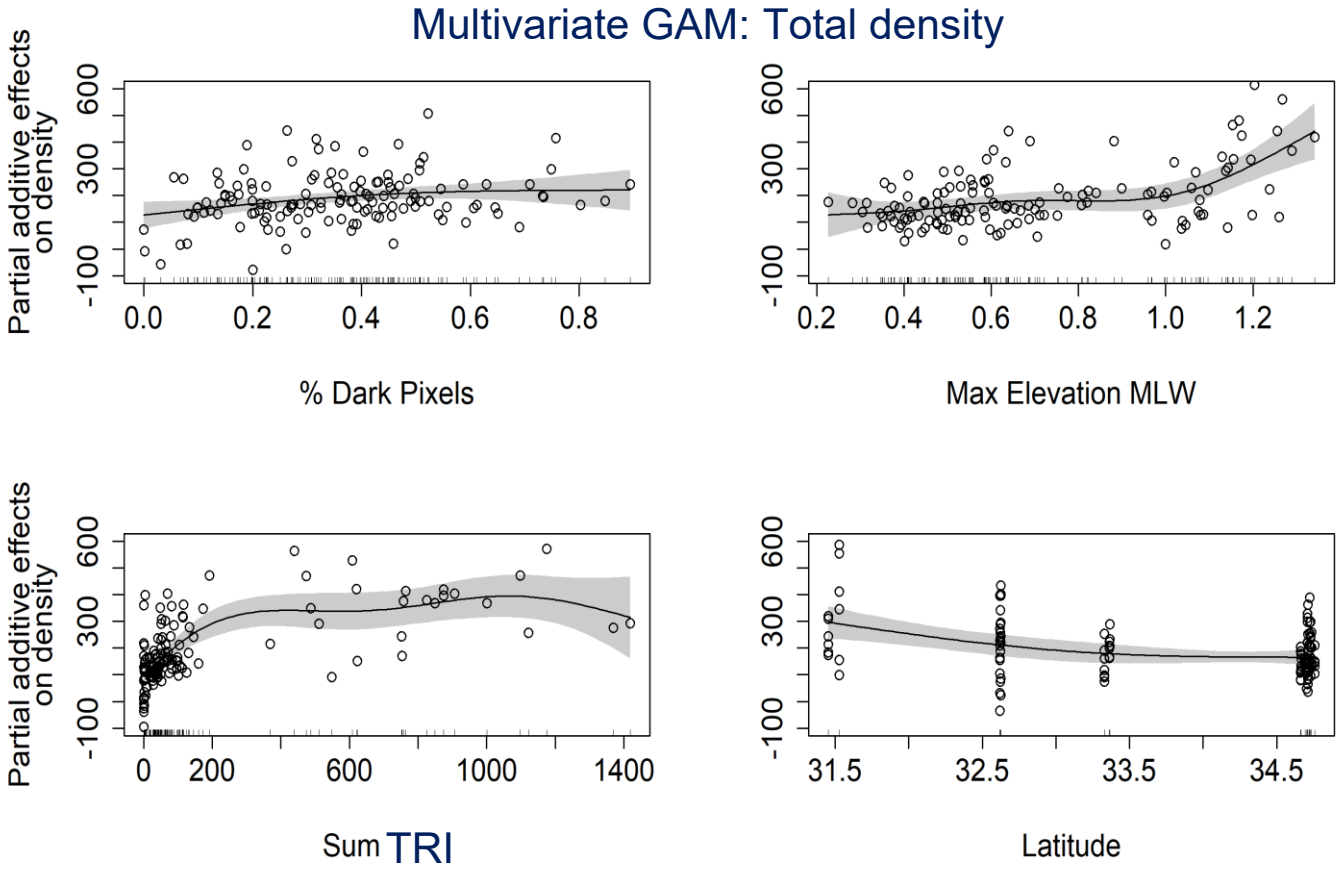
REEF PERCENT COVER





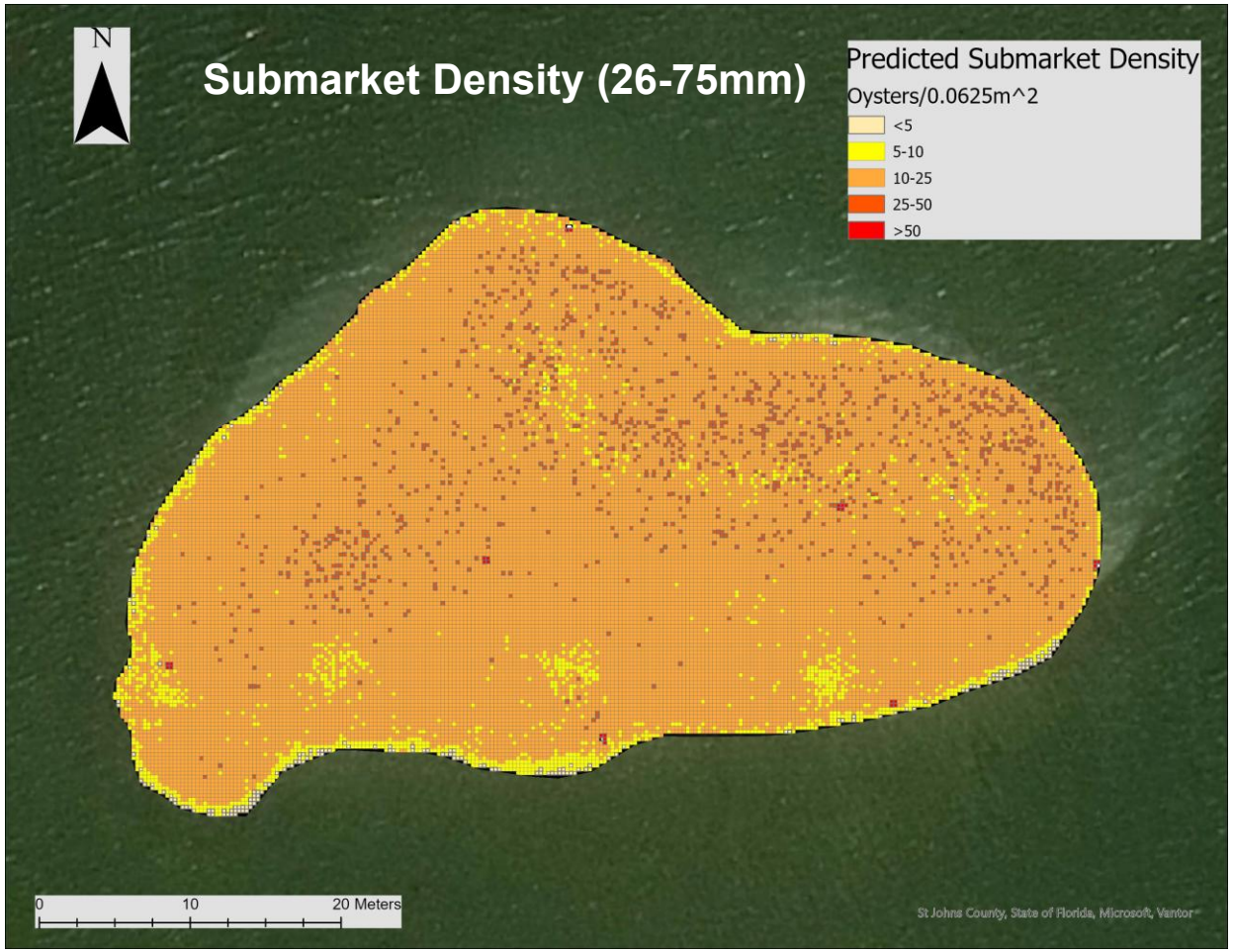
REEF DENSITY

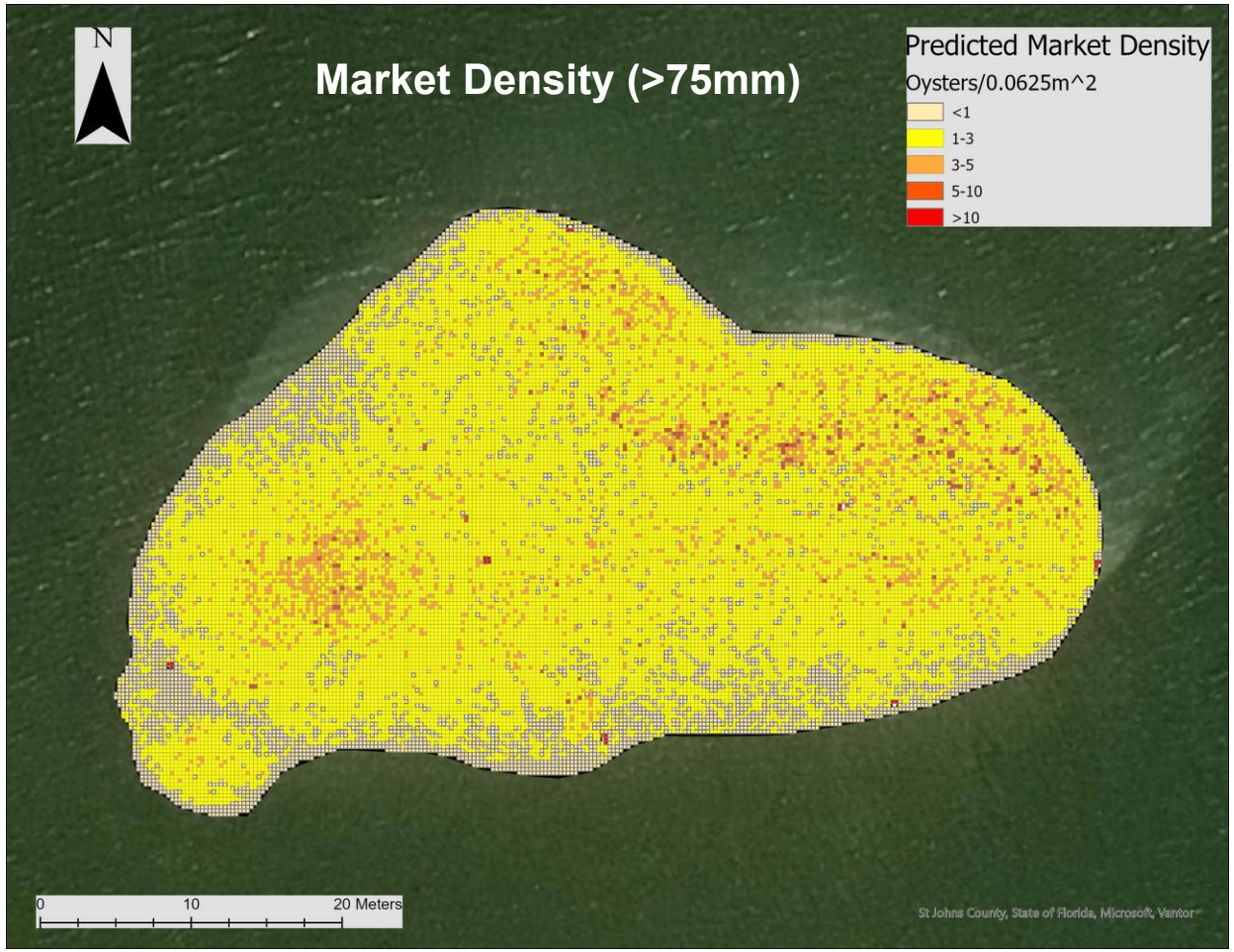




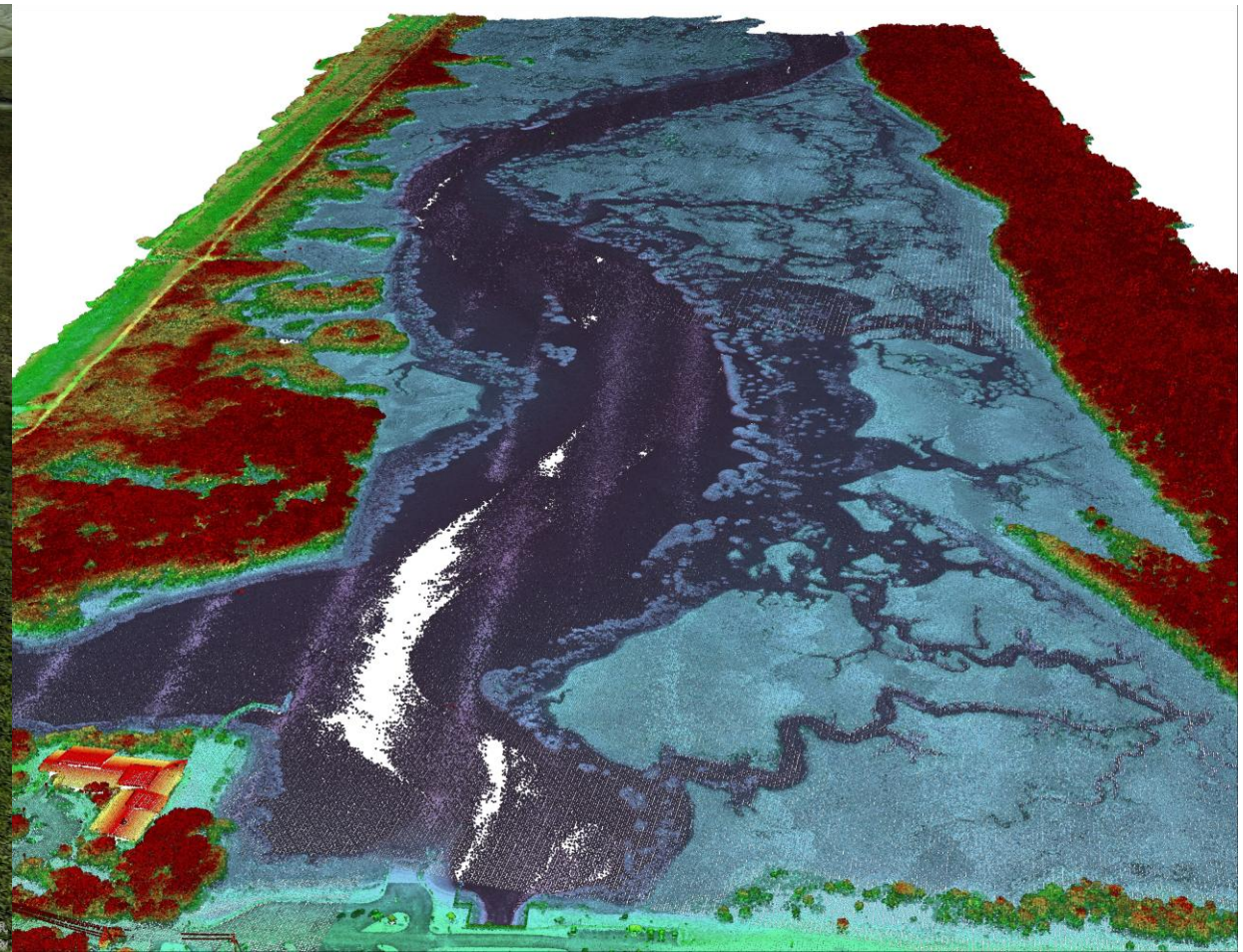
- Ortho, Iso Cluster, DSM, TRI → Zonal statistics → 36 explanatory variables.
- Generalized additive modeling (sensu Windle et al. 2022) in R → univariate relationships → multivariate model.
- Total, recruit, submarket, market density.

REEF DENSITY





THE FUTURE IS UPON US



THANK YOU

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Florida Department of Environmental Protection

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