

Development of a habitat suitability model for the eastern oyster (*Crassostrea virginica*) in Florida estuaries

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Florida Fish and Wildlife Conservation Commission

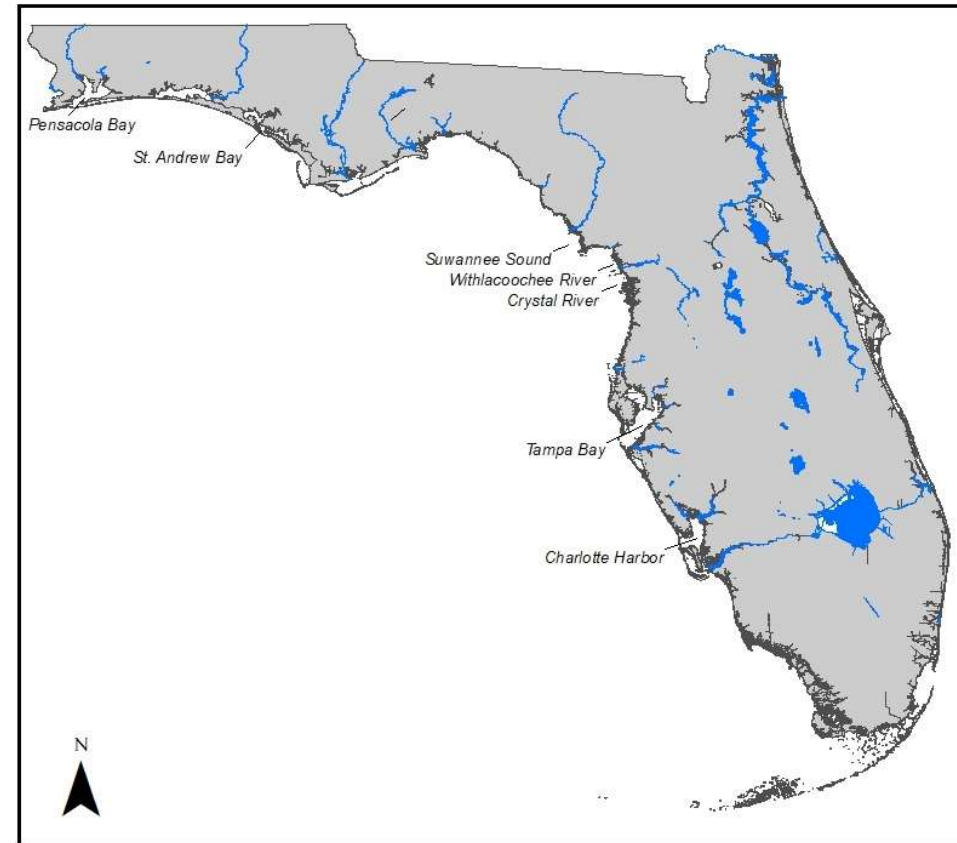
OIMMP Workshop – April 2026

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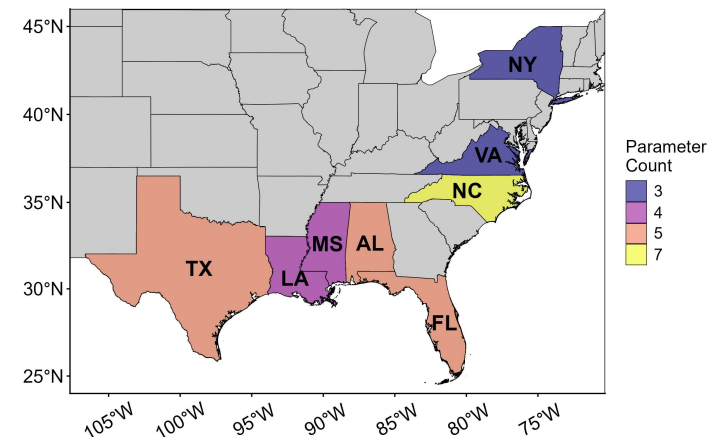
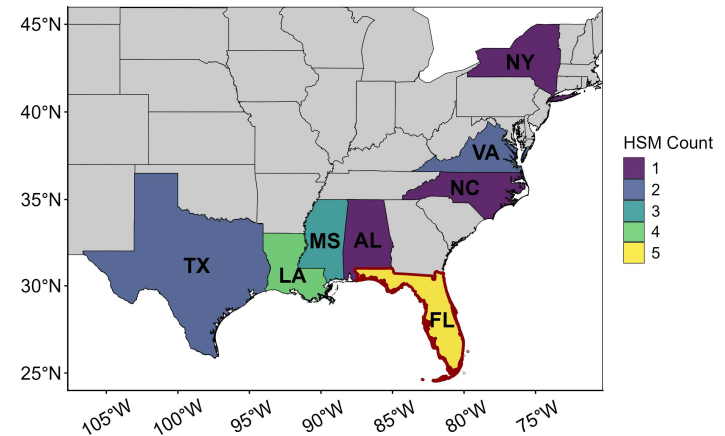
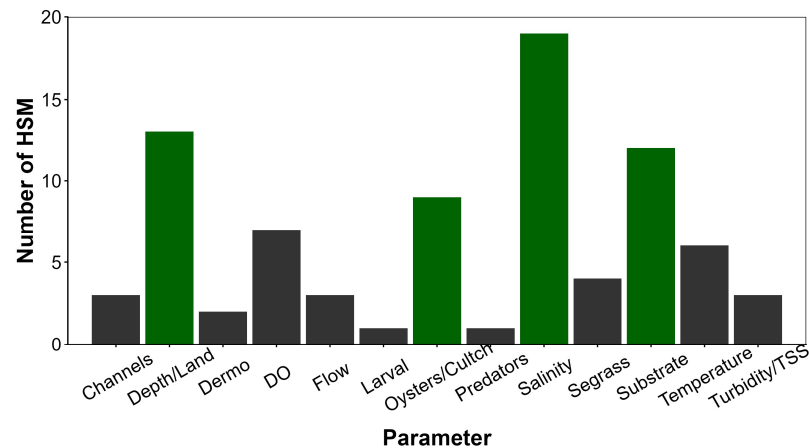
Florida Trustee Implementation Group

- “Identify and address critical data gaps to assist future oyster restoration efforts”
- Tasks
 - *Data compilation*
 - *Benthic mapping*
 - *Field assessment/monitoring*
 - Develop habitat suitability models (HSM)



Habitat suitability models (HSM)

- Geographic Information System-based
- Relate habitat variables to area suitability
- Models along Gulf and East coasts
- Variety of parameters
 - Salinity
 - Substrate
 - Depth/Land
 - Oysters/Cultch



(Barnes et al., 2007; Beseres Pollack et al., 2012; Boswell et al., 2012; Cake, 1983; Christensen et al., 1997; Geselbracht et al., 2024; Hijuelos et al., 2017; Kaufman, 2017; La Peyre et al., 2013; Linhoss et al., 2016; Linhoss & Mickle, 2022; Puckett et al., 2018; Soniat, 2017; Starke et al., 2011; Swannack et al., 2014; Theuerkauf & Lipcius, 2016; Wang et al., 2020)

FL-TIG Habitat Suitability Model

- Develop a standardized HSM method
- Commonly available data
- Comparative over time, conditions
- Comparative among areas and projects

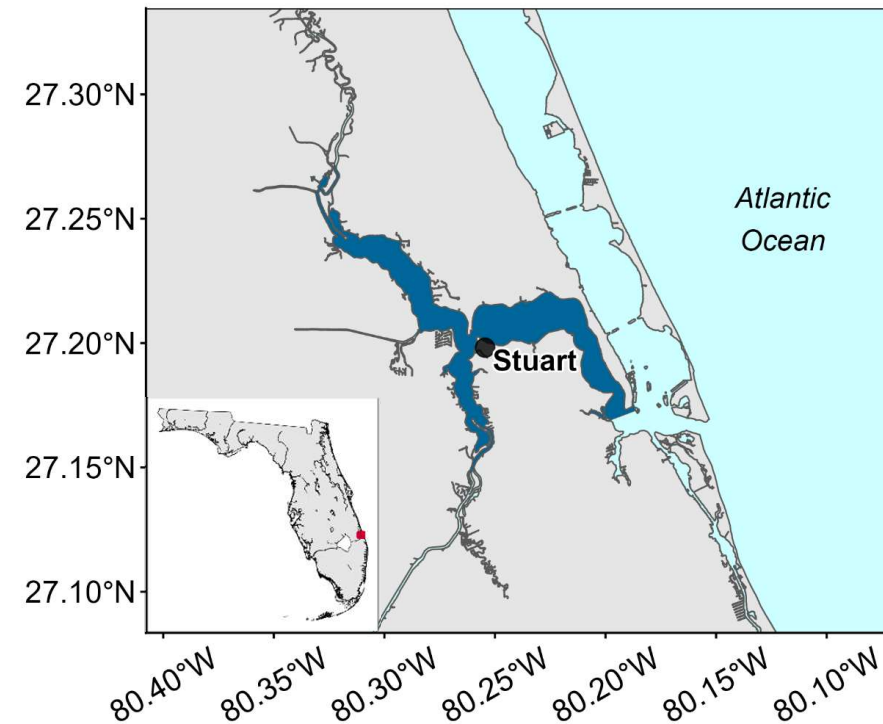


Background – Model – SL model – Model grid – Parameters – SS model – Next steps

Example model area

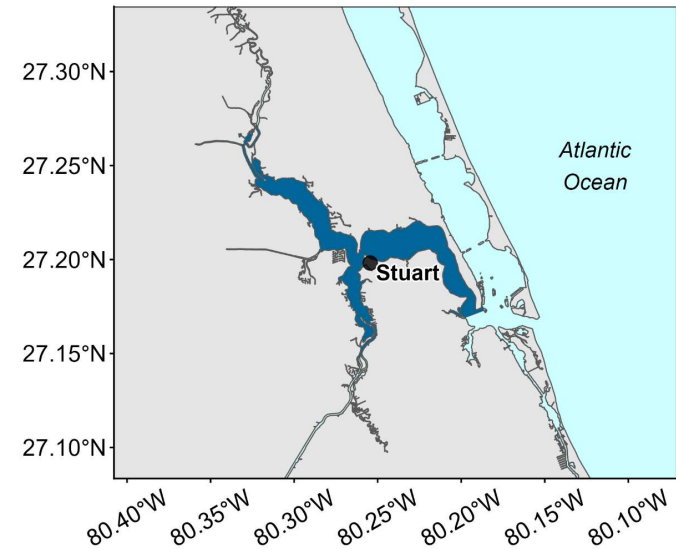
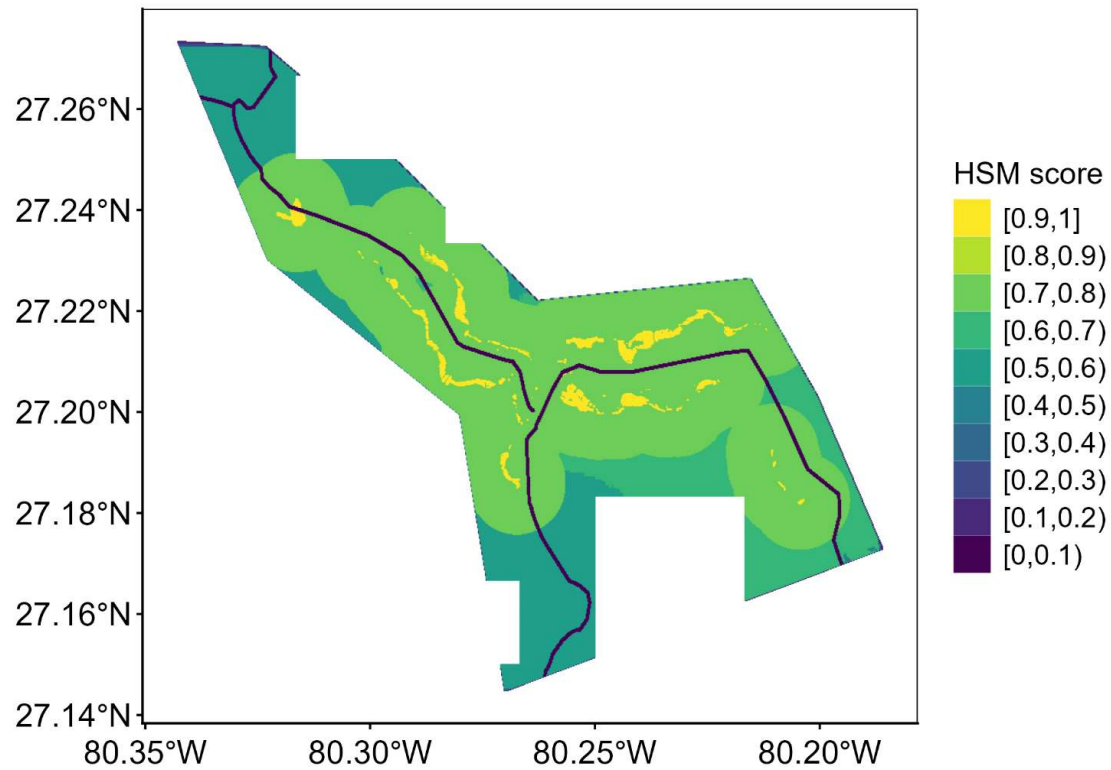
- St. Lucie Estuary
 - Contained, flow-managed
 - ~ 83 km²
 - Closed to harvest
 - Monitored under CERP/RECOVER
- HSM
 - Scored 0-1 scale
 - 2025 model: Data 2020-2024
 - Final model score:

$$\text{Channel} * \frac{(Oyst + Oyst_{buff} + Sgrs + Sal + Temp + Fresh)}{6}$$



Final model

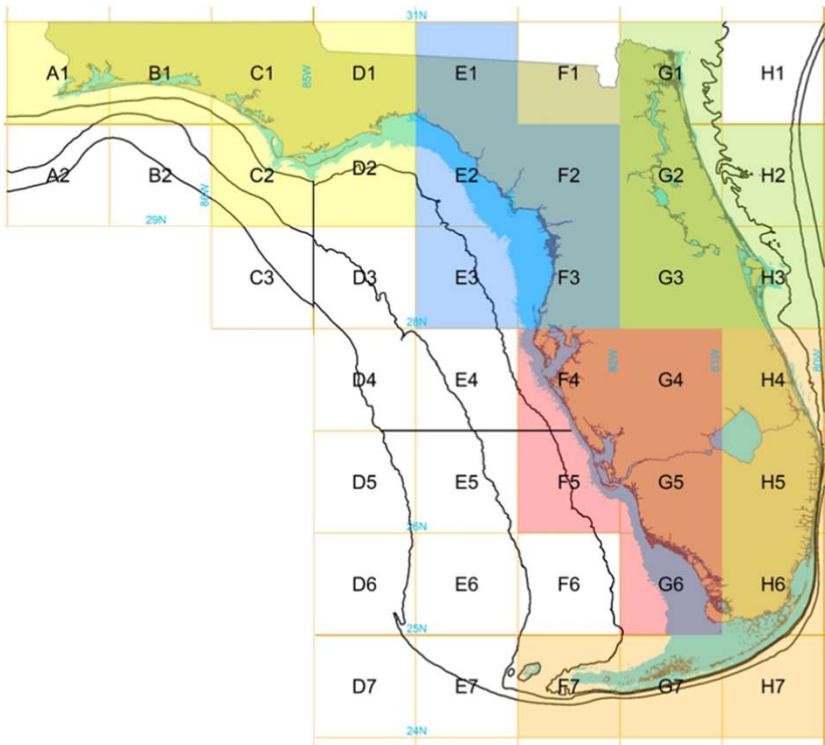
$$HSM = Channel * \frac{(Oyst + Oyst_{buff} + Sgrs + Sal + Temp + Fresh)}{6}$$



Score range	Percent
[0.7 – 1.0]	66
[0.4 – 0.7)	30
[0.0 – 0.4)	4

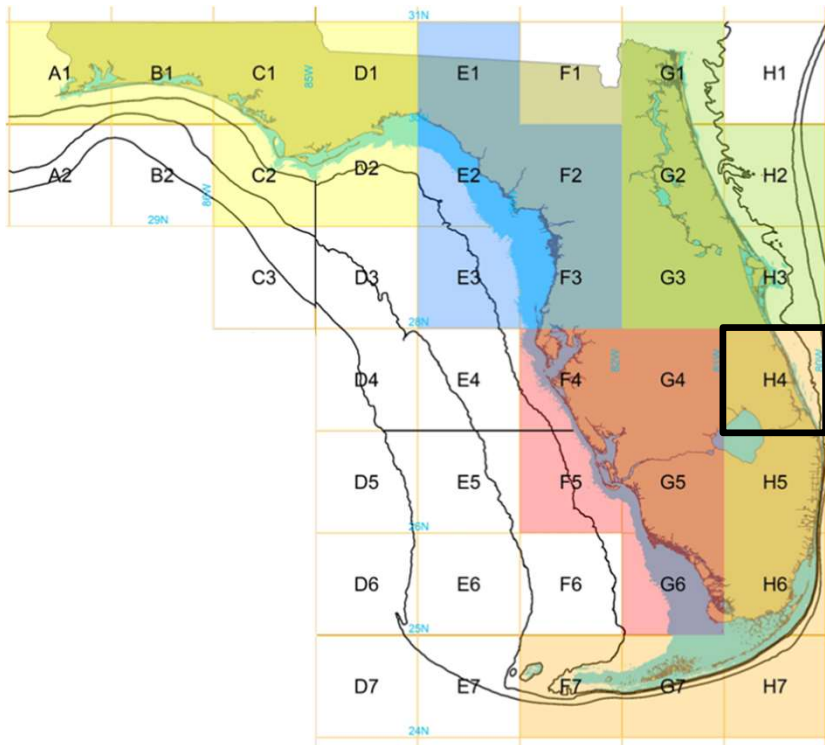
Model grid

- “StateGrid” system

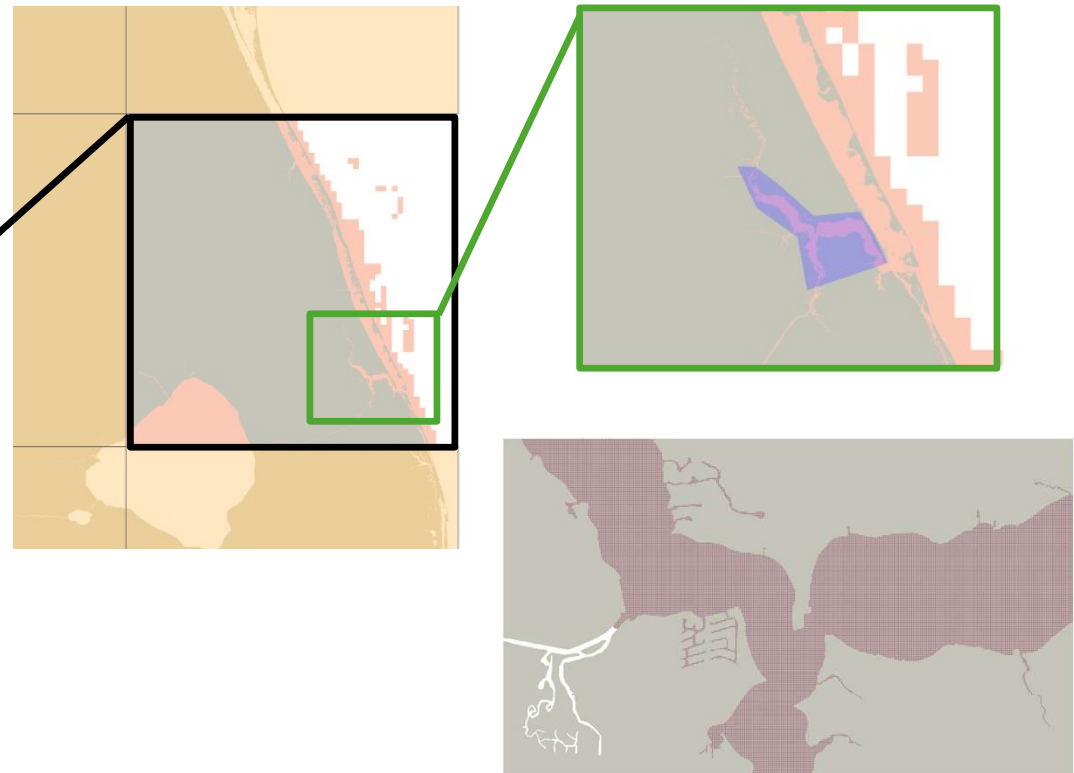


Model grid

- “StateGrid” system

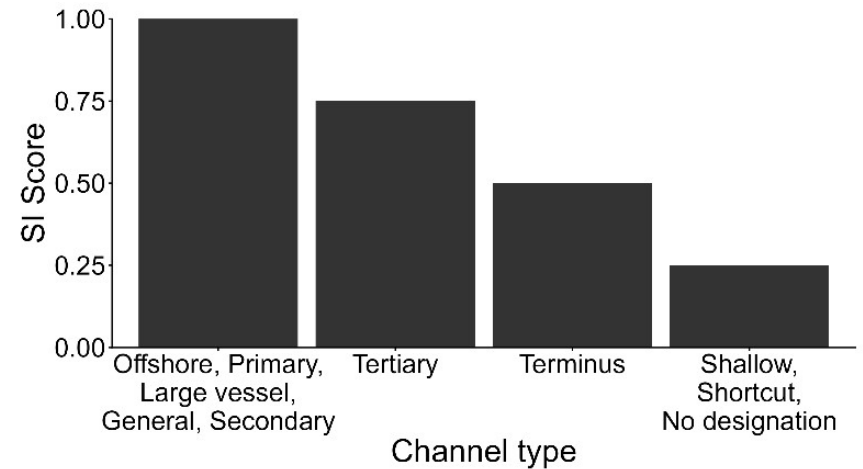
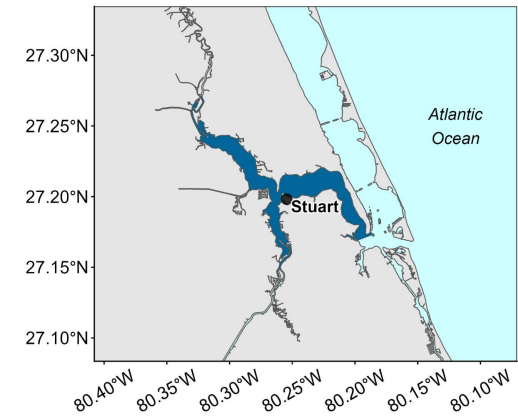
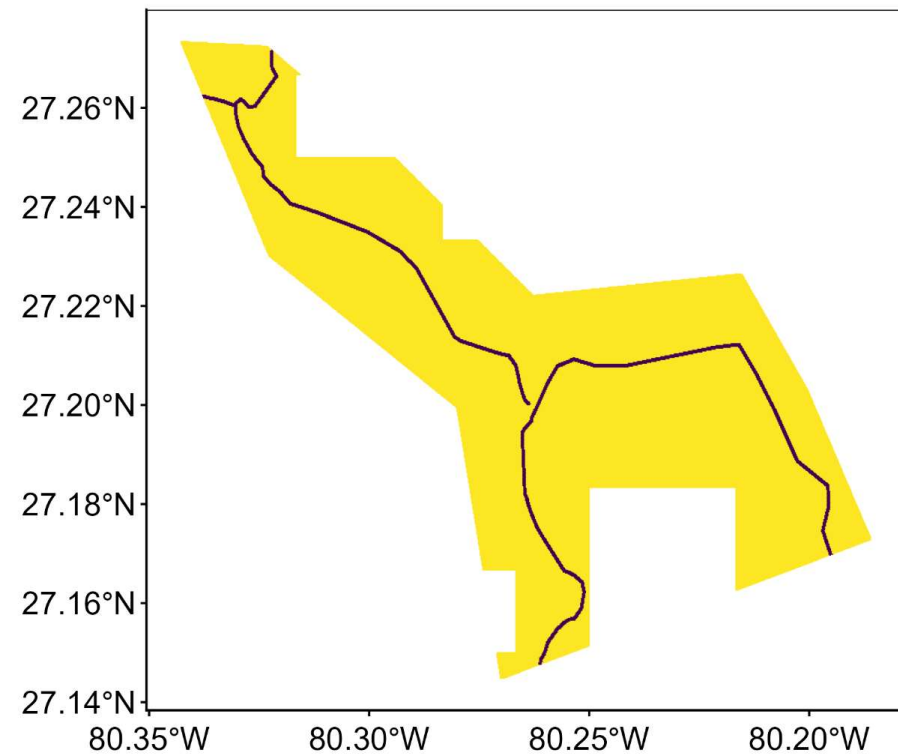


- “PicoGrid” system



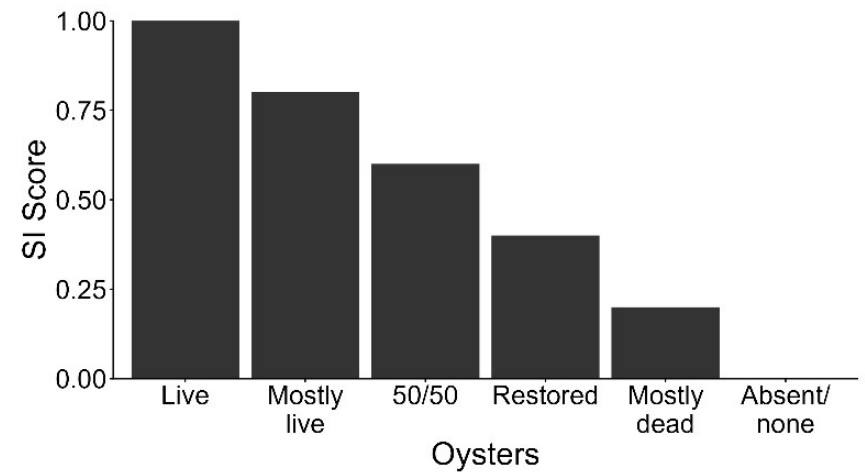
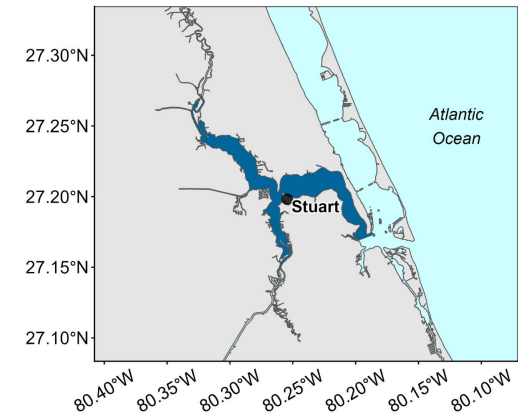
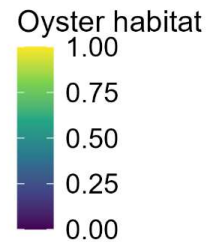
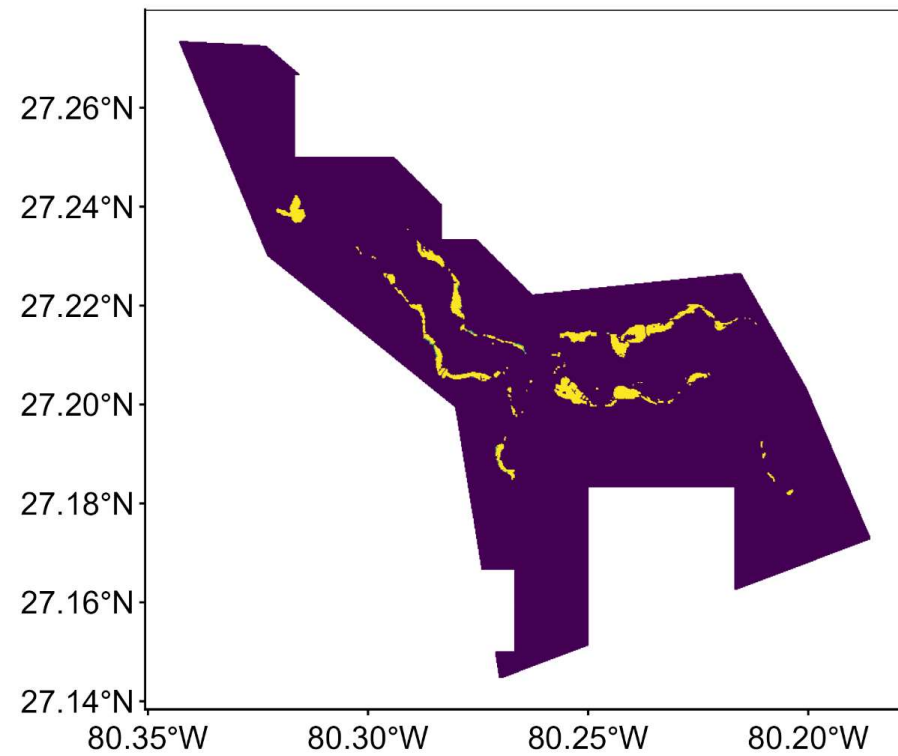
Channels

$$HSM = \text{Channel} \times \frac{(Oyst + Oyst_{buff} + Sgrs + Sal + Temp + Fresh)}{6}$$



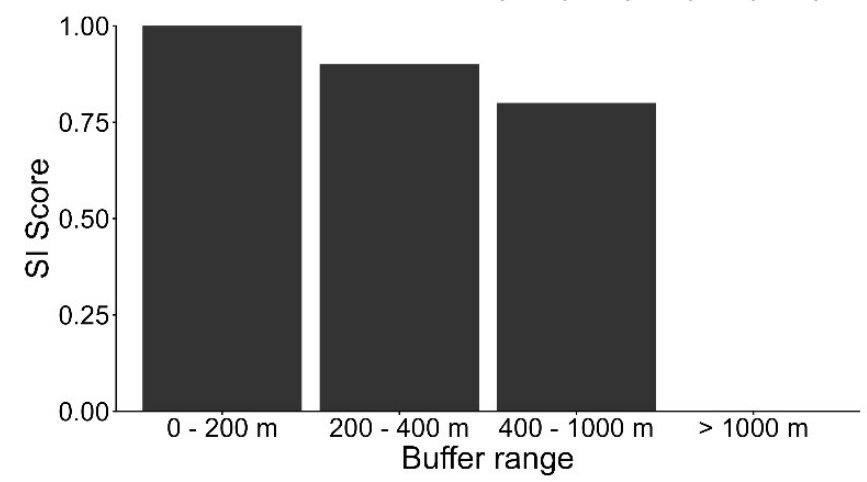
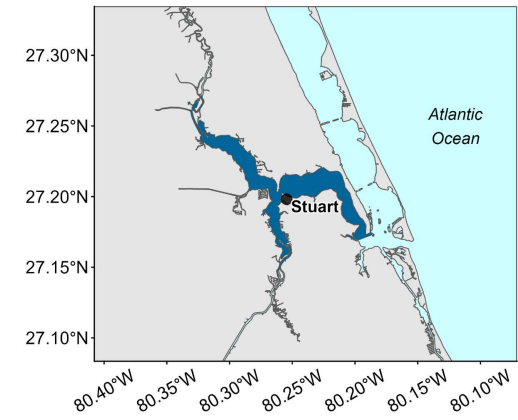
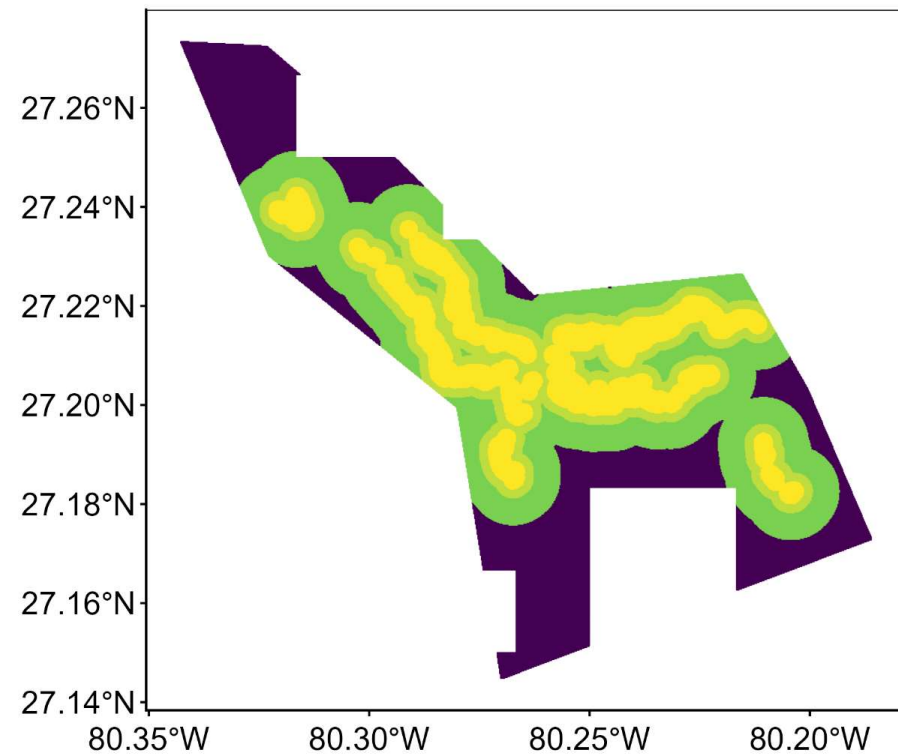
“Historic” oyster

$$HSM = Channel * \frac{Oyst + Oyst_{buff} + Sgrs + Sal + Temp + Fresh}{6}$$



Current oyster

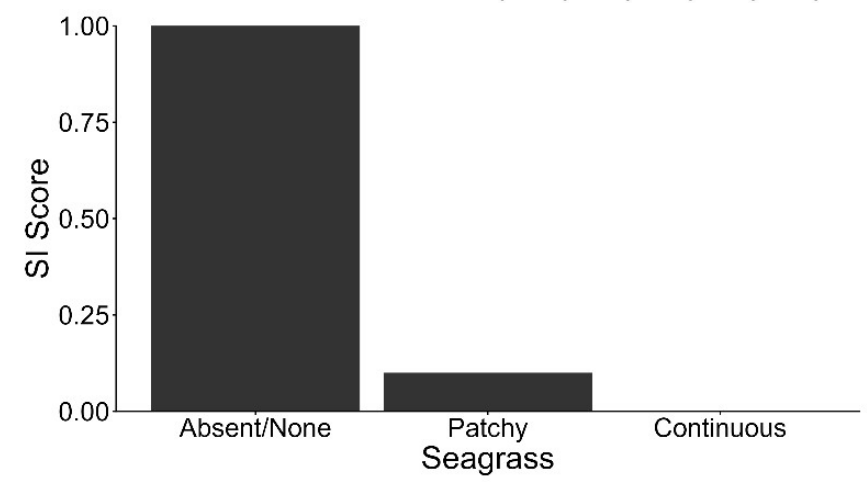
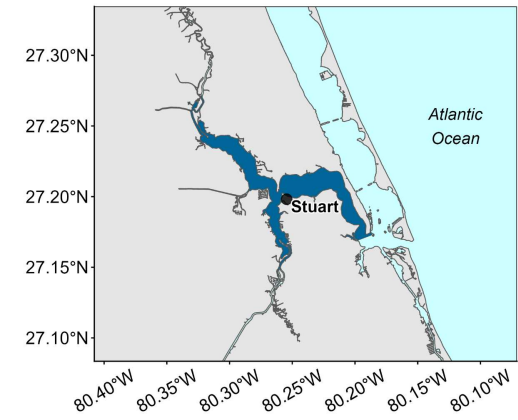
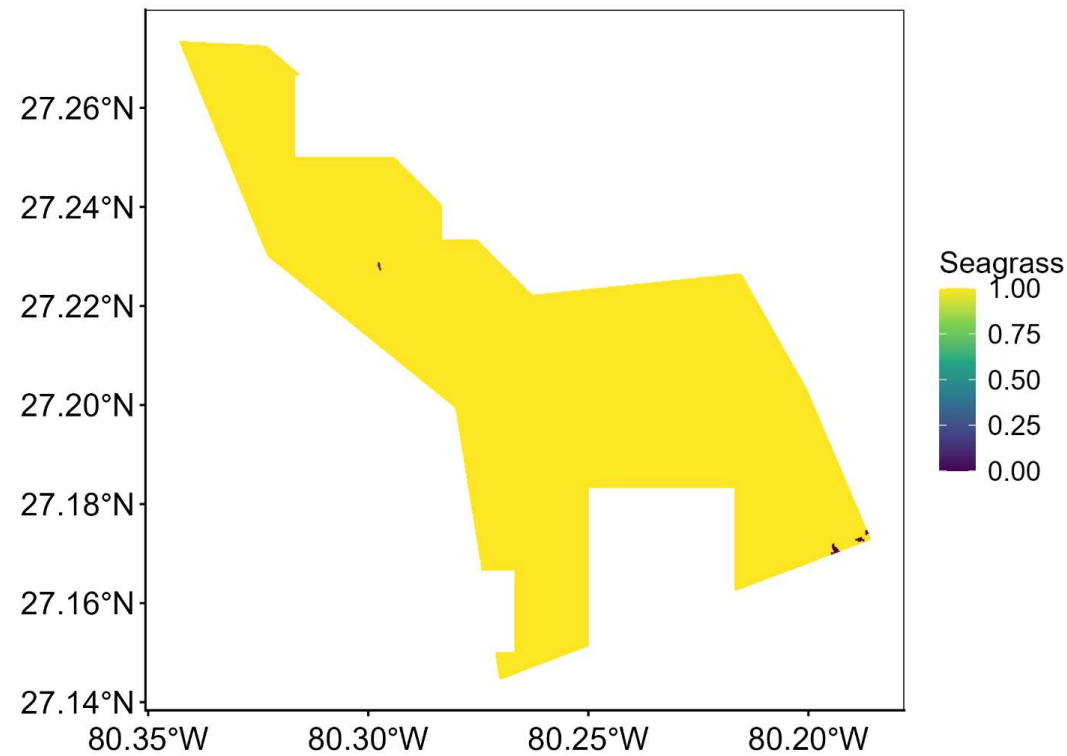
$$HSM = Channel * \frac{(Oyst + Oyst_{buff} + Sgrs + Sal + Temp + Fresh)}{6}$$



Background - Model - SL model - Model grid - Parameters - SS model - Next steps

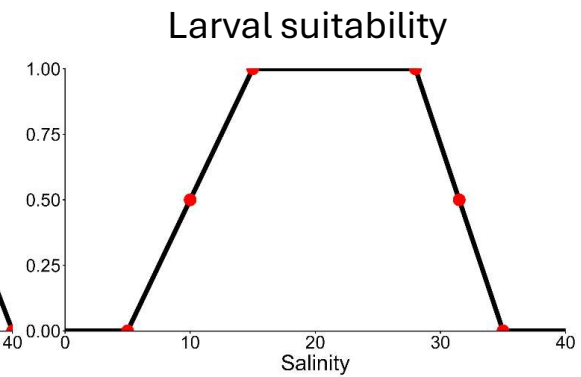
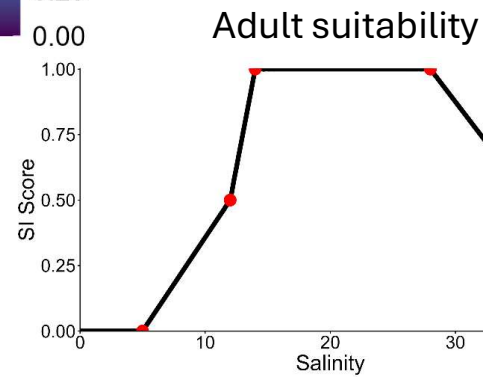
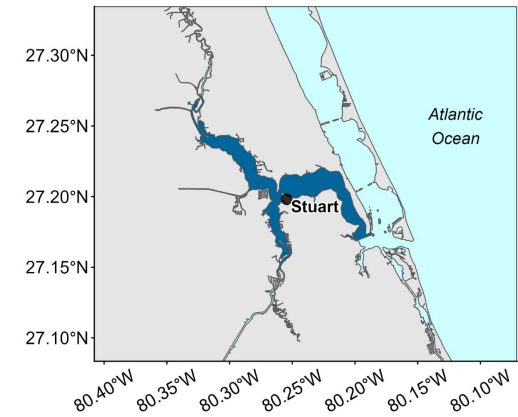
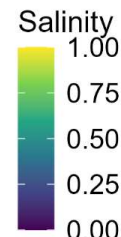
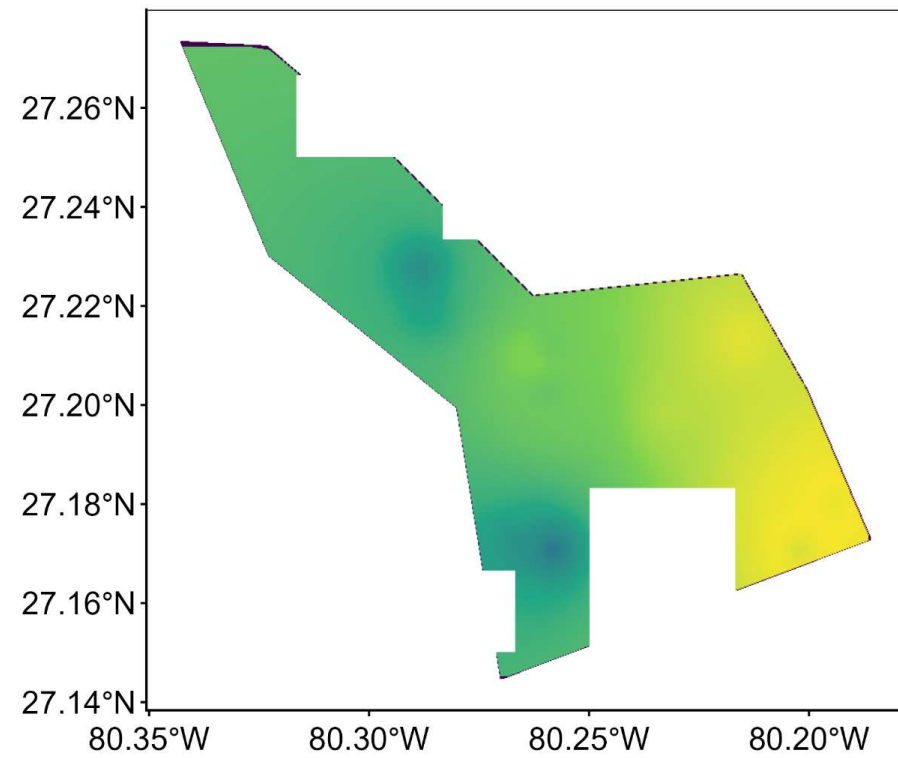
Seagrass habitat

$$HSM = Channel * \frac{(Oyst + Oyst_{buff} + Sgrs + Sal + Temp + Fresh)}{6}$$



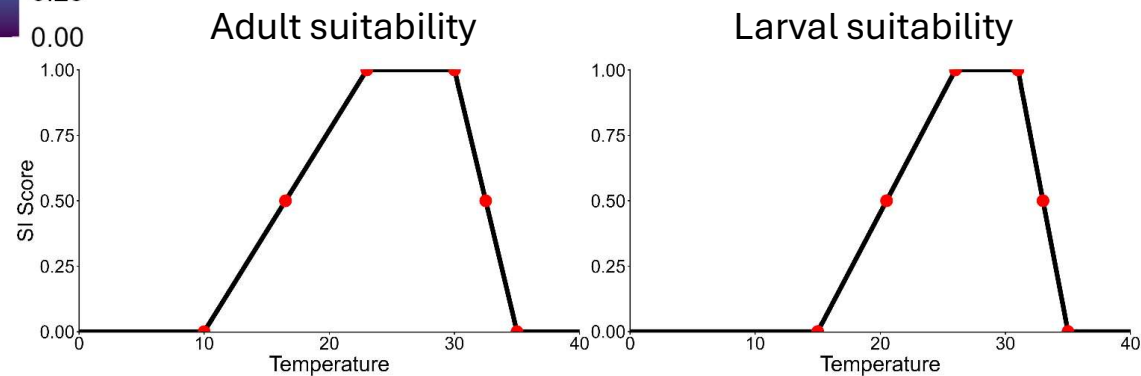
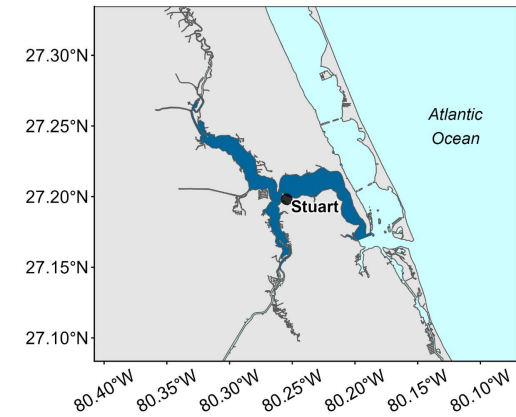
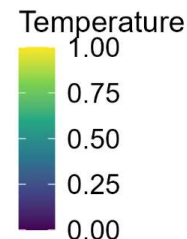
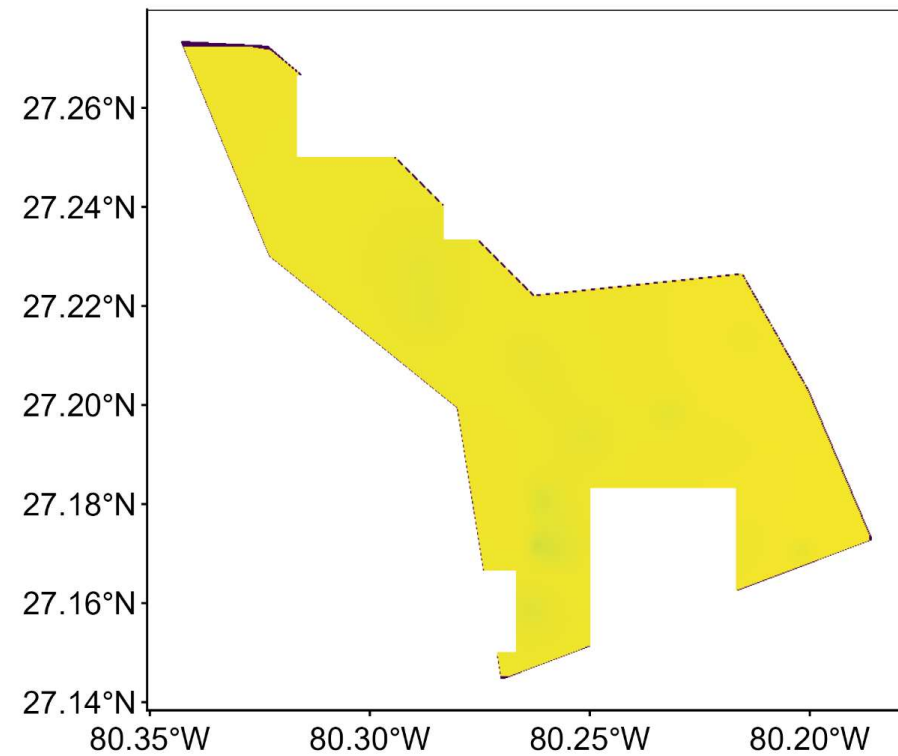
Salinity

$$HSM = Channel * \frac{(Oyst + Oyst_{buff} + Sgrs + Sal + Temp + Fresh)}{6}$$



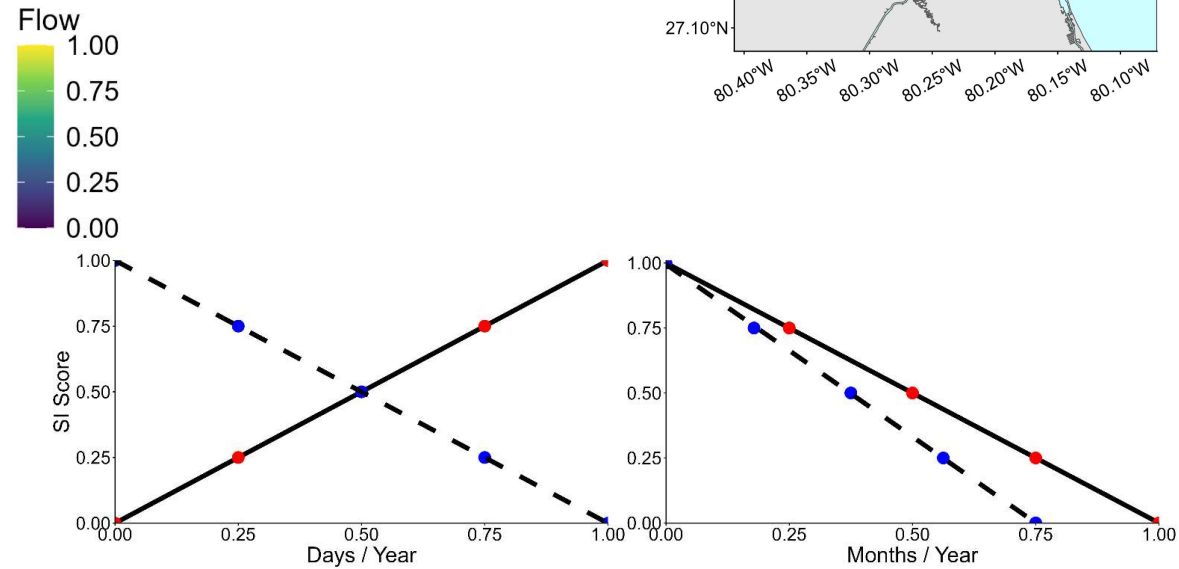
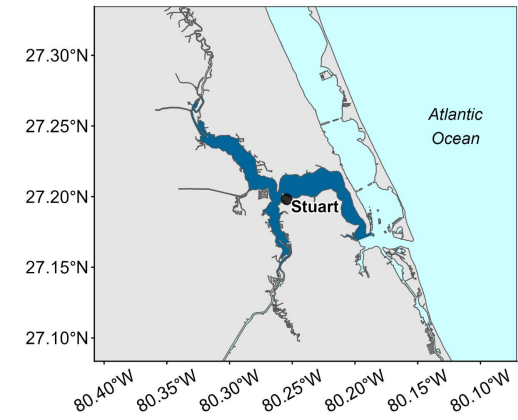
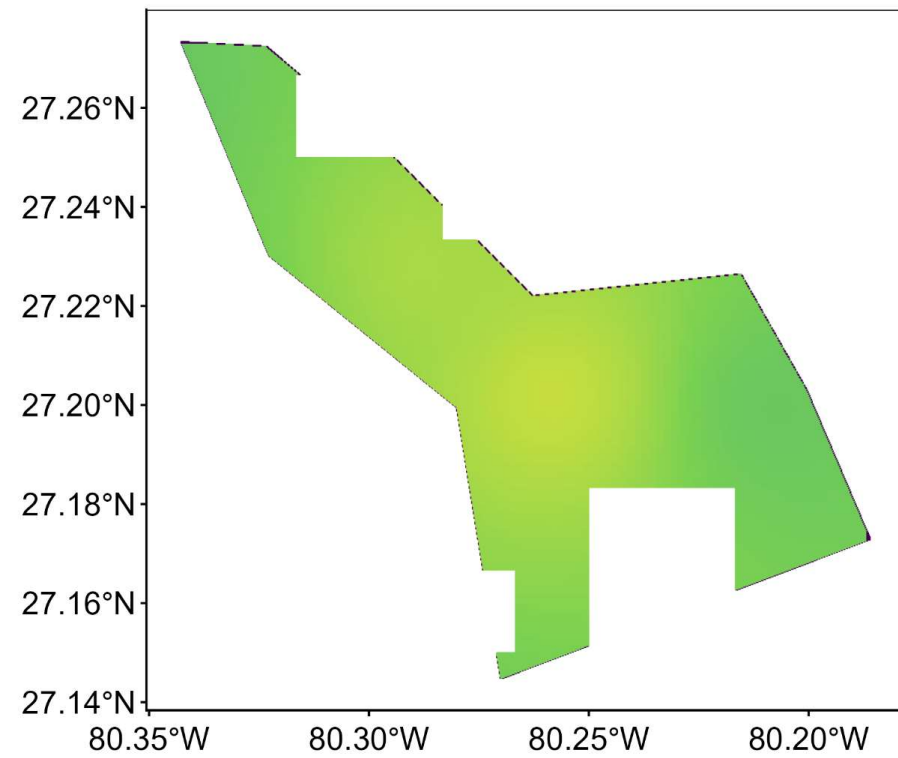
Temperature

$$HSM = Channel * \frac{(Oyst + Oyst_{buff} + Sgrs + Sal + Temp + Fresh)}{6}$$



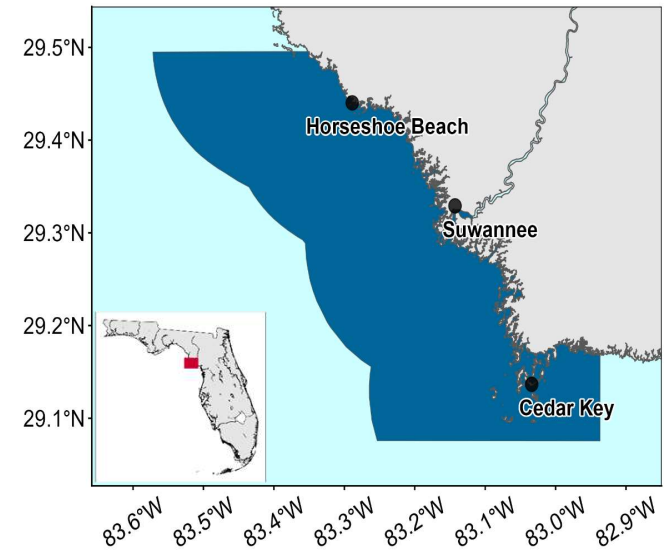
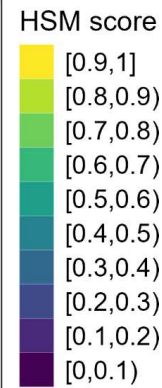
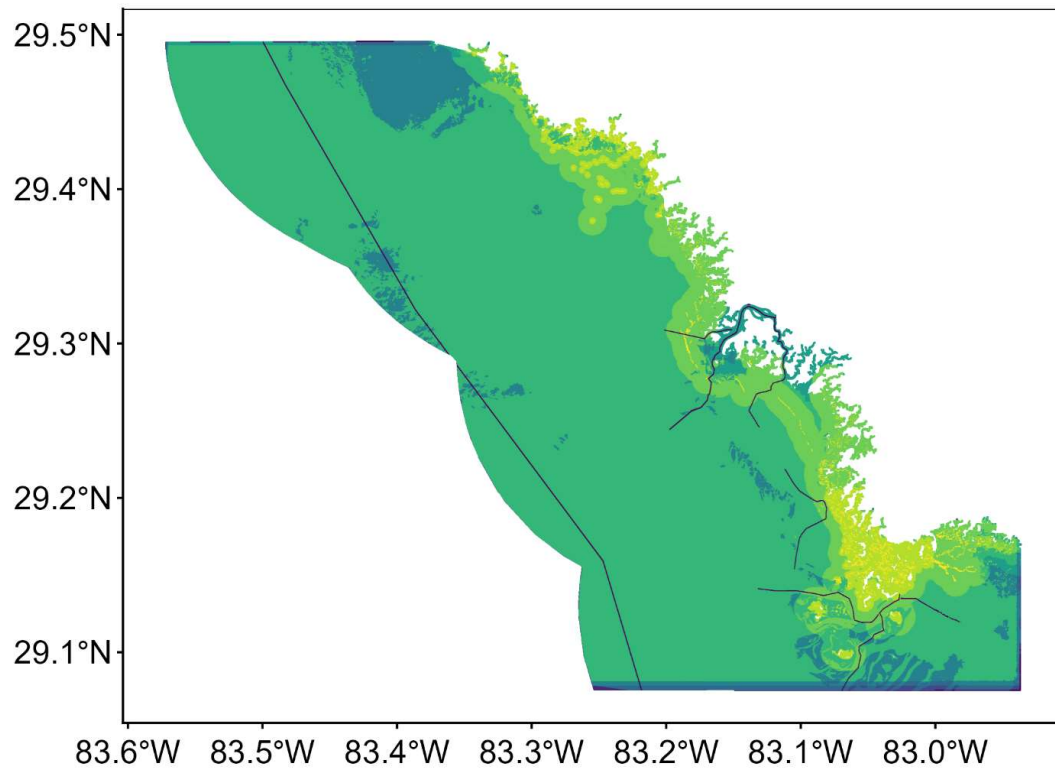
Flow

$$HSM = Channel * \frac{(Oyst + Oyst_{buff} + Sgrs + Sal + Temp + \text{Fresh})}{6}$$



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Also works for large areas!

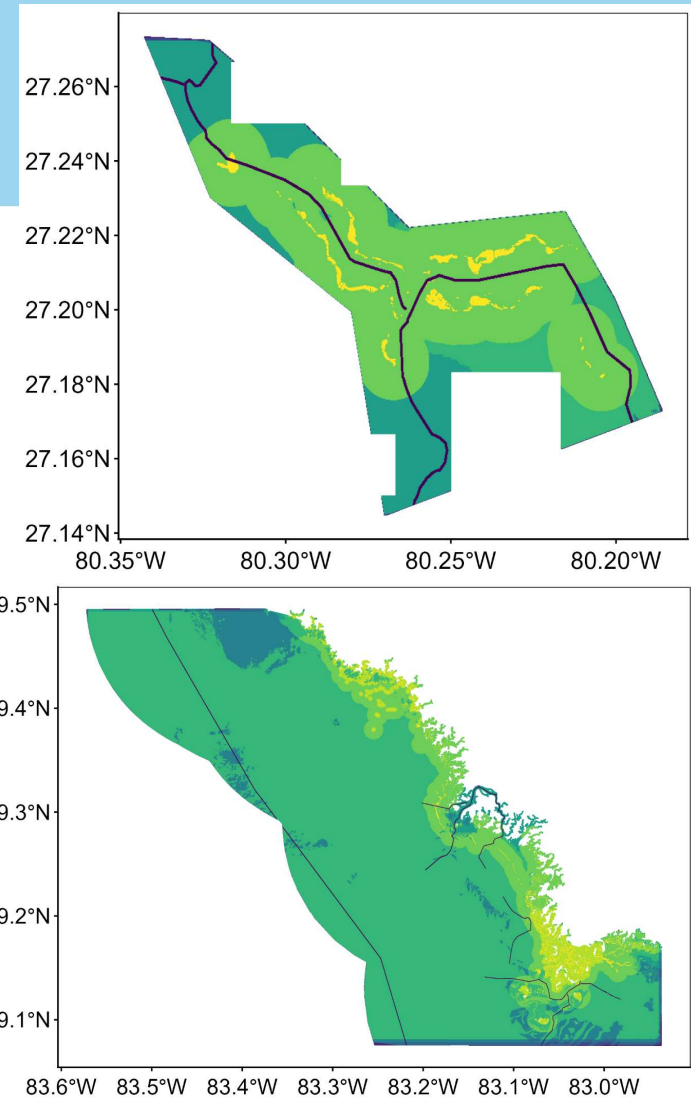
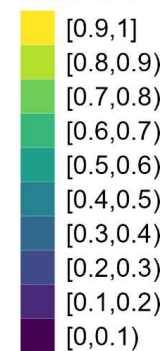


Score range	Percent
[0.7 – 1.0]	15
[0.4 – 0.7)	83
[0.0 – 0.4)	2

Next steps

- Ground truthing
 - Presence/absence
 - Density
- Model refinement
- Application to other estuaries
 - Data disparities, project usefulness
- Communication
 - Restoration guidance
 - Impact assessment

HSM score



Thank you!

Claire McIntyre, Steve Geiger, Tomena Scholze,
and Nicole Holmes

Funded in part by Resolution # FL-2021-016

