Florida Department of Environmental Protection

Effects of oyster harvesting on shell availability in the Matanzas River, Northeast Florida

February 3, 2017





Effects of oyster harvesting on shell availability in the Matanzas River, Northeast Florida

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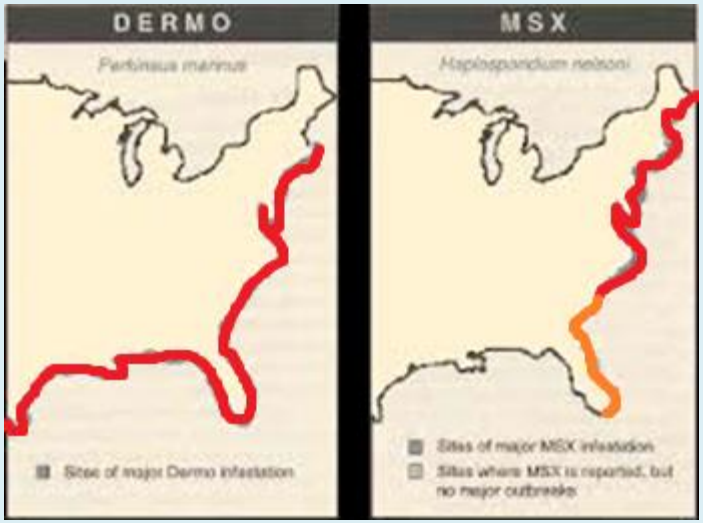
Guana Tolomato Matanzas National Estuarine Research Reserve

Eastern oyster – *Crassostrea virginica*

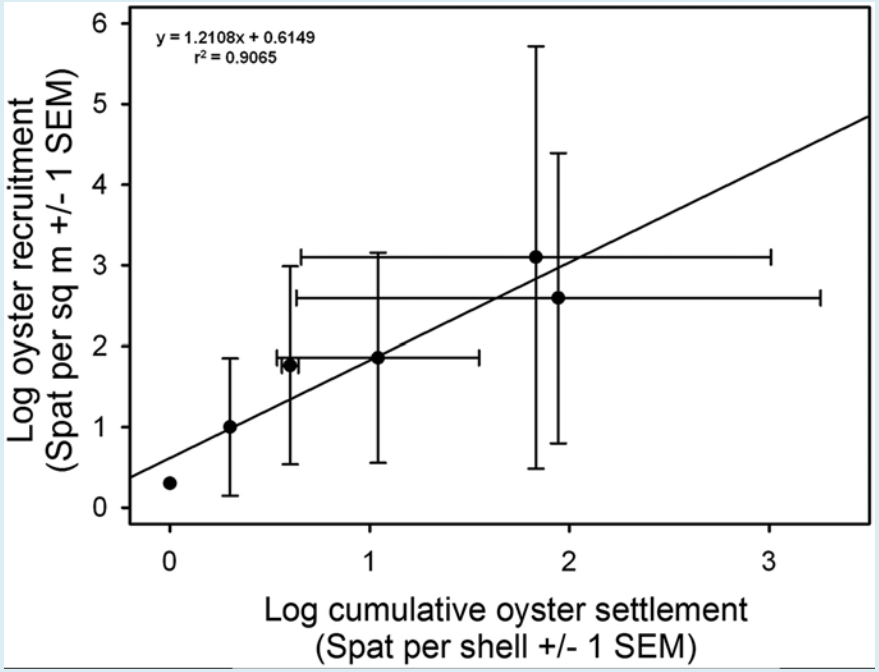
- Socioeconomic & ecological benefits
  - Fisheries, water filtration, habitat & shoreline stability
    (Grabowski & Peterson 2007)
- 85% global decline in oyster reef ecosystems
  - Most ecoregions @ < 10% historic abundance (Beck et. al 2011)
- Accredited to four main factors (Coen et. al 2007)
  - Overharvesting
  - Disease
  - Reduced water quality
  - Altered hydrology



Maryland Sea Grant

Why is cultch important?

- Harvesting removes cultch:
  - ⬇ available substrate
    (Nestlerode et. al 2007)
  - ⬇ recruitment potential
  - ⬇ overall sustainability
    (Schulte and Burke 2014)



12 spat on one shell

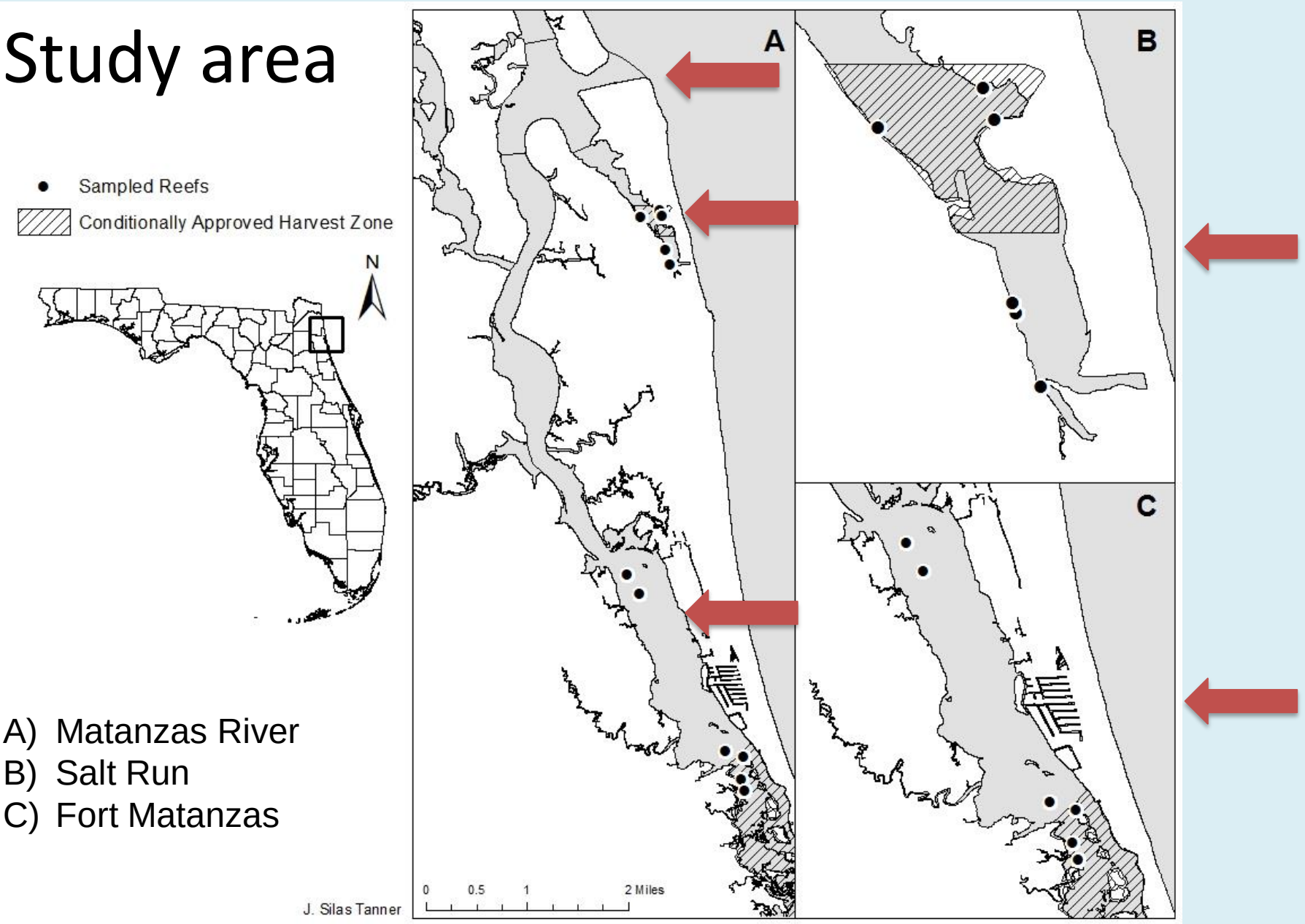
Local Implications

- Extensive populations of intertidal oysters in NE FL
- GTM estuary has harvest & non-harvest zones
  - Ideal to study effects of harvesting on shell availability

First Coast News

Hypothesis:
Cultch (dead shell) density to be greater in non-harvest zones than harvest zones.

Study area



A) Matanzas River
B) Salt Run
C) Fort Matanzas

Conditionally approved harvest zones delineated by Florida Department of Agriculture and Consumer Services (FDACS)

Methods

- Transect walked along densest ridge of reef
- Surficial cultch collected within three ¼-m^2 quadrats
- Rinsed samples with hose to remove any sediment

Methods

$$\text{Dry cultch density } \left(\frac{\text{kg}}{\text{m}^2}\right) = \frac{\text{Wet shell weight} \times \text{Moisture factor}}{\text{Quadrat area}}$$

- Moisture factor
  - subsamples dried at 60°C for 24 hours & weighed to 0.1g
    (Waldebusser et al 2011)

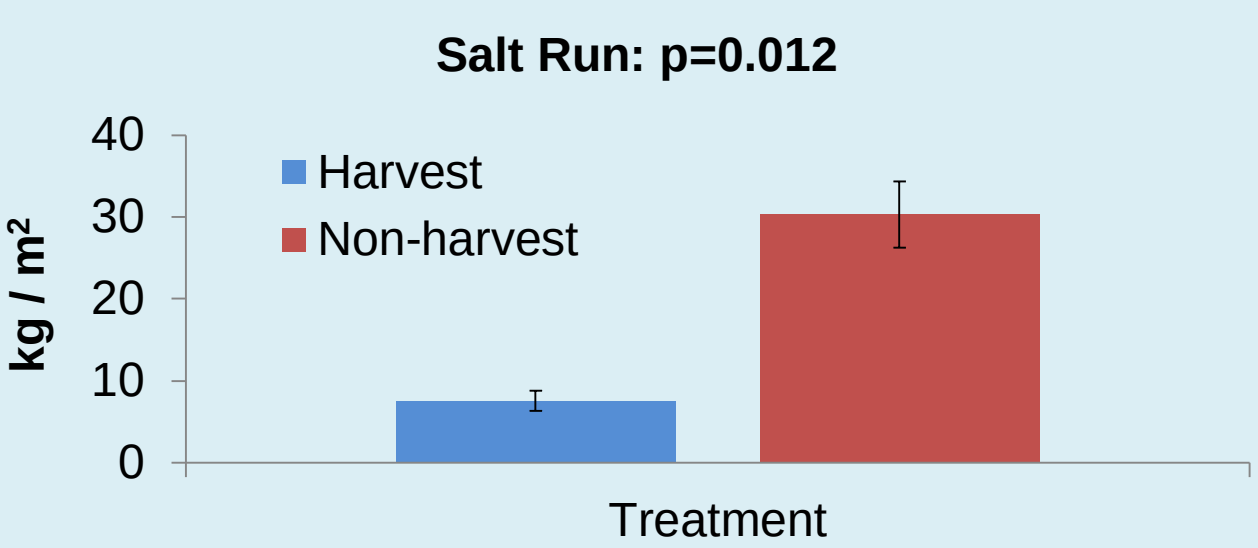
Results

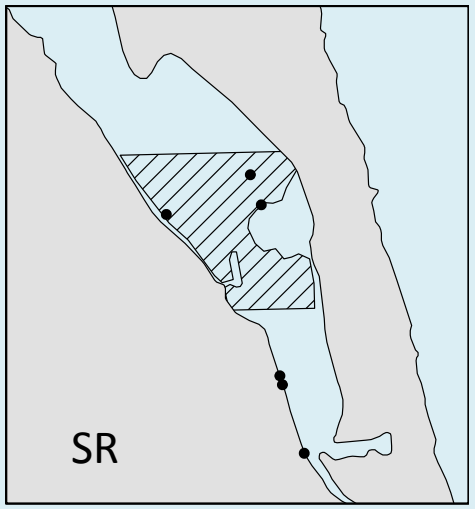
- Two-way ANOVA ($\alpha = 0.05$) was run to determine if treatment or region had significant effect on average cultch density

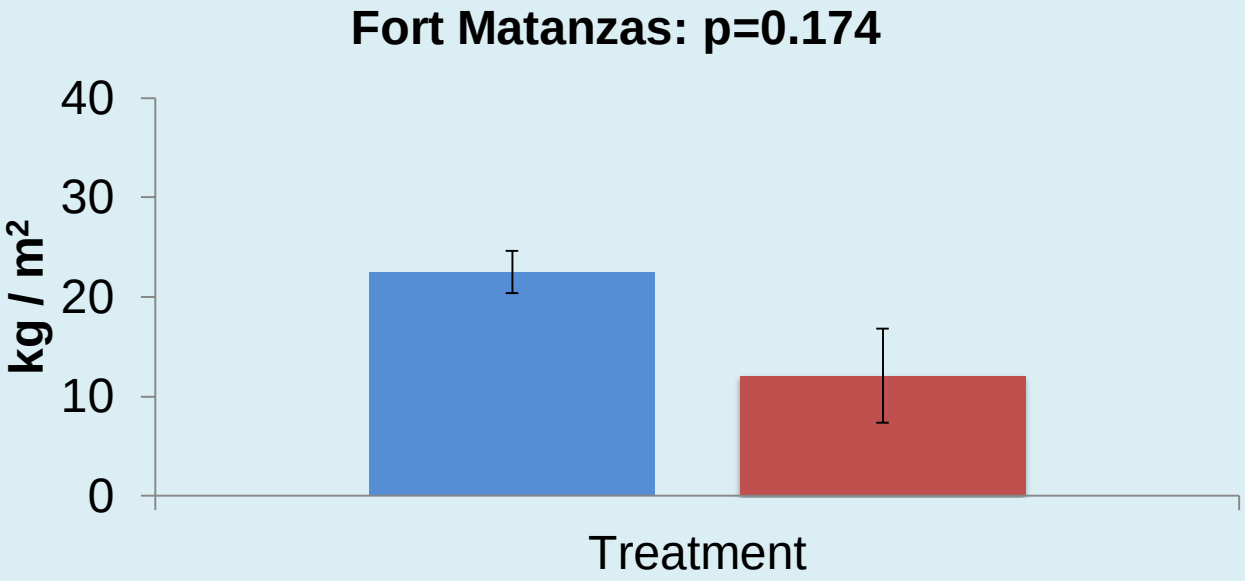
Factor	n	p
Region	6	0.701
Treatment	6	0.169
Region × Treatment	12	0.0036

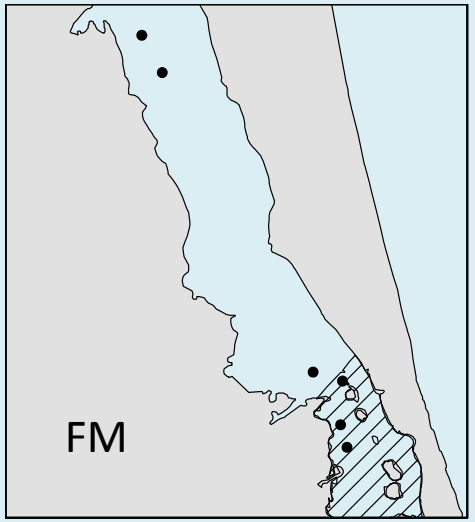
*Significant interaction between region and treatment

Higher cultch densities in non-harvest zones in Salt Run

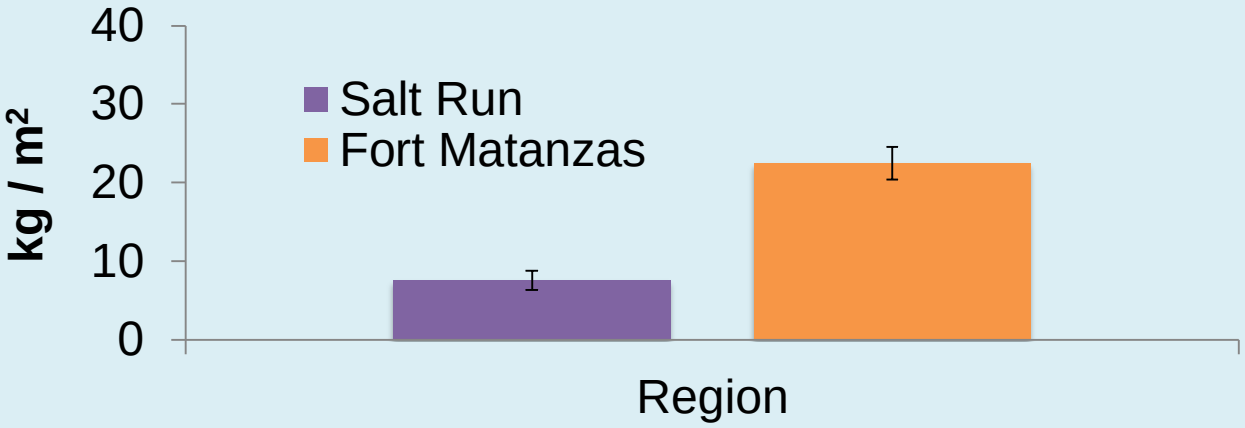


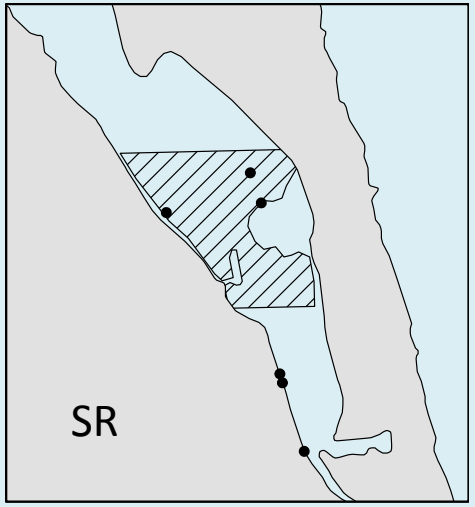


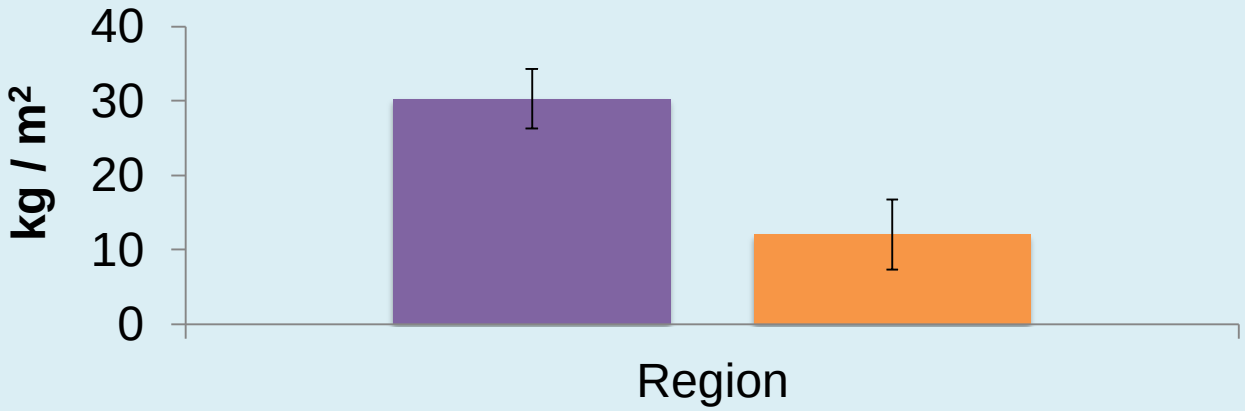


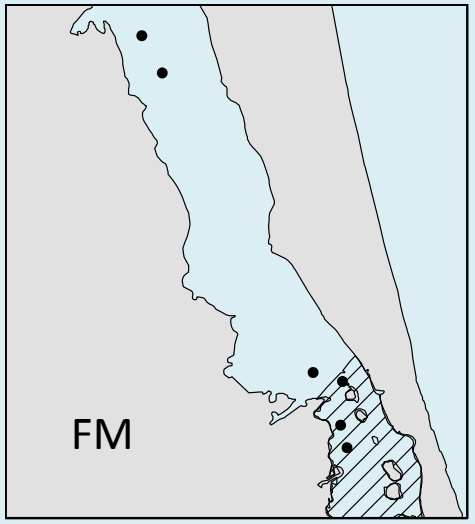


Lower cultch densities in Salt Run harvest zones









Discussion

- Effect of harvest on cultch density was regionally dependent
- Fort Matanzas harvest reefs ↑ cultch densities than Salt Run harvest reefs
  - potentially limited site access & reduced harvest pressure
- Reef accessibility
  - Harvesters, both commercial and recreational, tend to exploit easily accessed reefs.

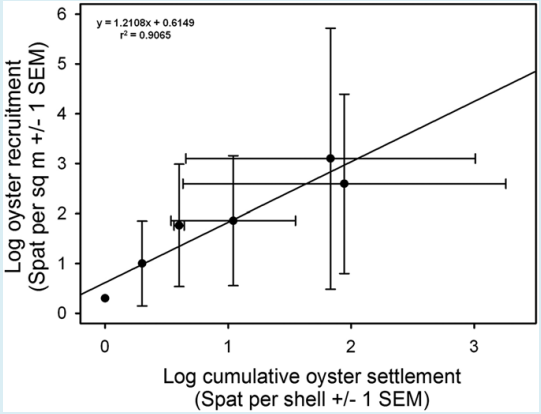
Conclusions

- Public outreach
  - Harvesting alternative areas other than Salt Run
- Data gaps
  - Localized life history parameters
  - CPUE data for both commercial and recreational fisheries
    - » Used to accurately access the effect of fisheries impact, and sustainability of the population

Conclusions

- Fisheries managers may consider implementing guidelines for replacement of shell after harvesting

↑ shell availability = ↑ settlement = ↑ recruitment



Western Mississippi Sound cultch supplementation

www.restore.ms

Recycling my shells

Conclusions

- Salt Run cultch densities likely due to influence of fisheries harvesting
- Sustainability of oyster population in Salt Run may be effected by harvest

Edible Magazine – Sean Kelly Conway

Conclusions

Edible Magazine – Sean Kelly Conway

"*I don't have any idea of how many thousands of bushels come out of that small area every year. I've been very surprised Salt Run has held up with the level of oystering for the past few years.*"

Frank Usina, owner of Aunt Kate's restaurant
Edible Magazine Issue May/June 2016

Works cited

- Beck M, Brumbaugh R, Airoldi L, Carranza A, Coen L, Crawford C, Defeo O, Edgar G, Hancock, Kay M et al. 2011. Oyster Reefs at Risk and Recommendations for Conservation, Restoration, and Management. Bioscience 61(2): 107-116.
- Coen L, Brumbaugh R, Bushek D, Grizzle R, Luckenbach M, Posey M, Powers S, and Tolley G. 2007. Ecosystem services related to oyster restoration. Marine Ecology Progress Series 341: 303-307.
- Grabowski J and Peterson C. 2007. Restoring oyster reefs to recover ecosystem services. Ecosystem Engineers 4: 281-298.
- Nestlerode J, Luckenbach M, and O'Beirn F. 2007. Settlement and Survival of the Oyster *Crassostrea virginica* on Created Oyster Reef Habitats in Chesapeake Bay. Restoration Ecology 15(2): 273-283.
- Schulte D and Burke P. 2014. Recruitment Enhancement as an Indicator of Oyster Restoration Success in Chesapeake Bay. Ecological Restoration 32(4): 434-440.
- Waldbusser G, Steenson R, Green M. 2011. Oyster shell dissolution rates in estuarine waters: effects of pH and shell lagacy. Journal of Shellfish Research 30(3): 659-669.


Questions ?

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