



New River “Oyster Highway” Initiative



New River "Oyster Highway"- Phase I&II



New River "Oyster Highway"- Phase I&II



Expansion of Oyster Habitat
and their Ecosystem Services
in the New River Estuary
with the Creation of Stepping
Stone Reefs in Farnell Bay





New River, Onslow County

Our Natural Resource

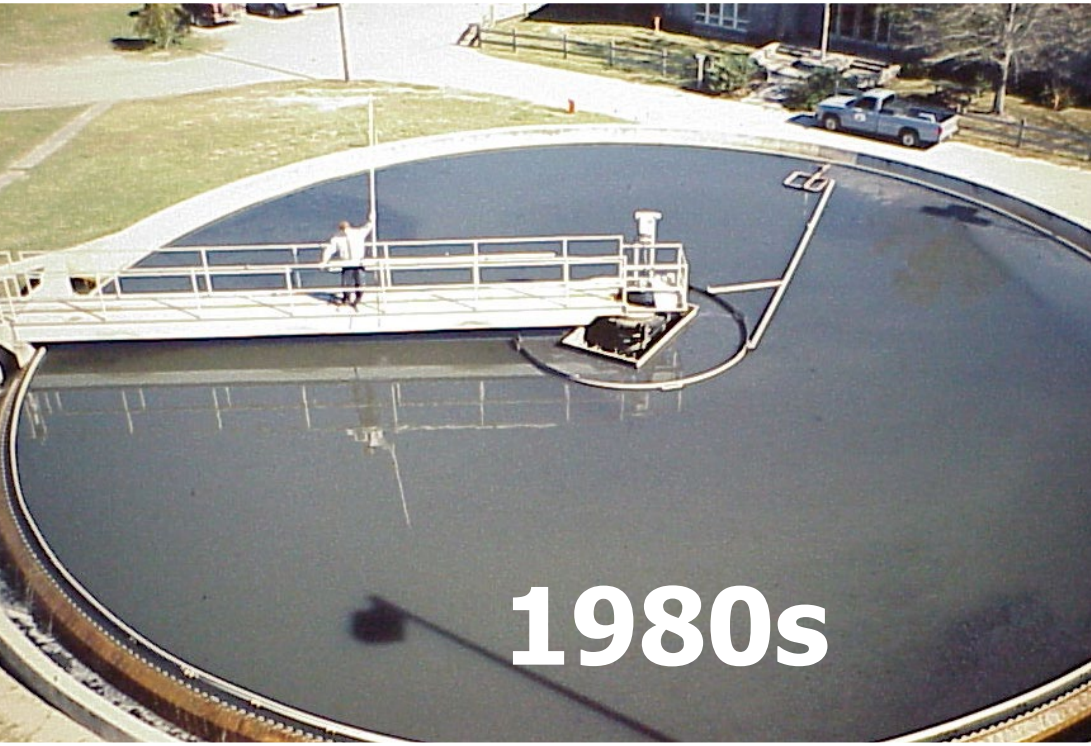
Old City Wastewater Treatment Plant at Wilson Bay

Wilson Bay & the New River

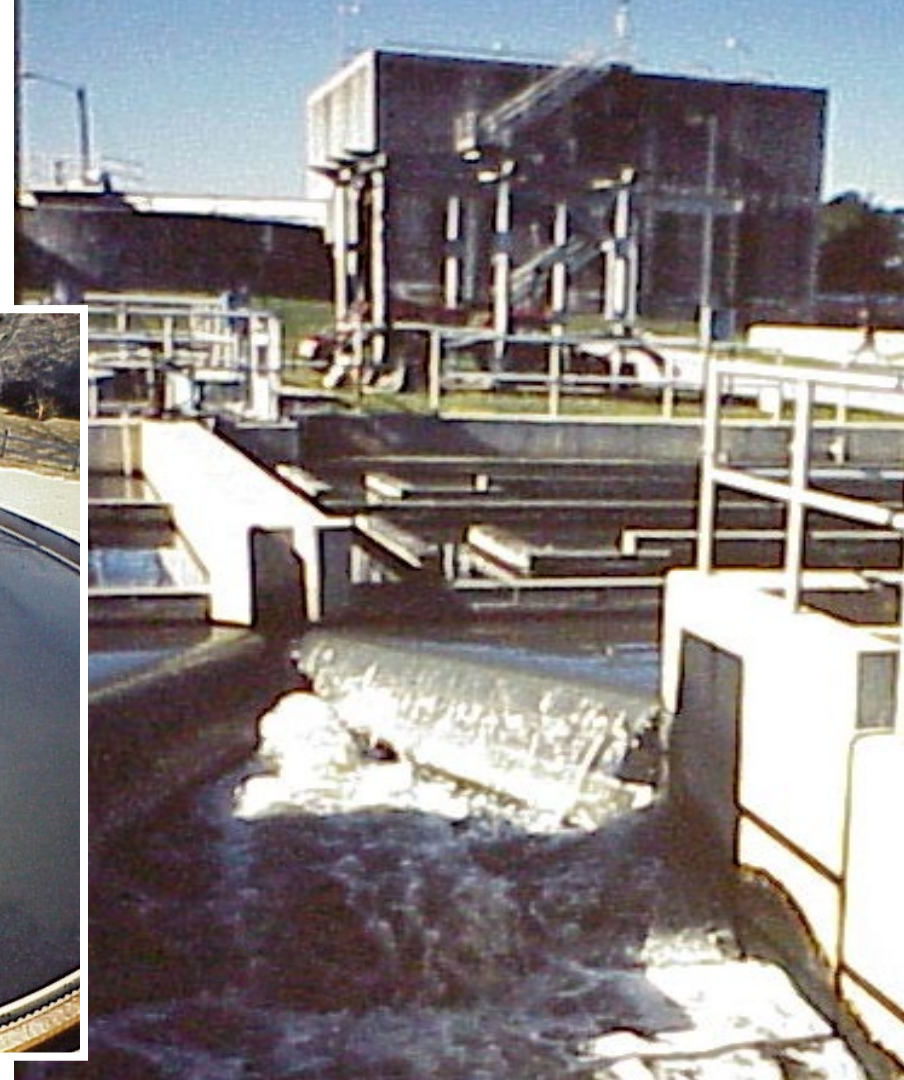


Wilson Bay Wastewater Treatment Plant

Images: In operation, 1980s



1980s



Wastewater Treatment at Land App Site

Images: Currently In operation



A Little Help From Paddlewheels



Wetlands Restoration

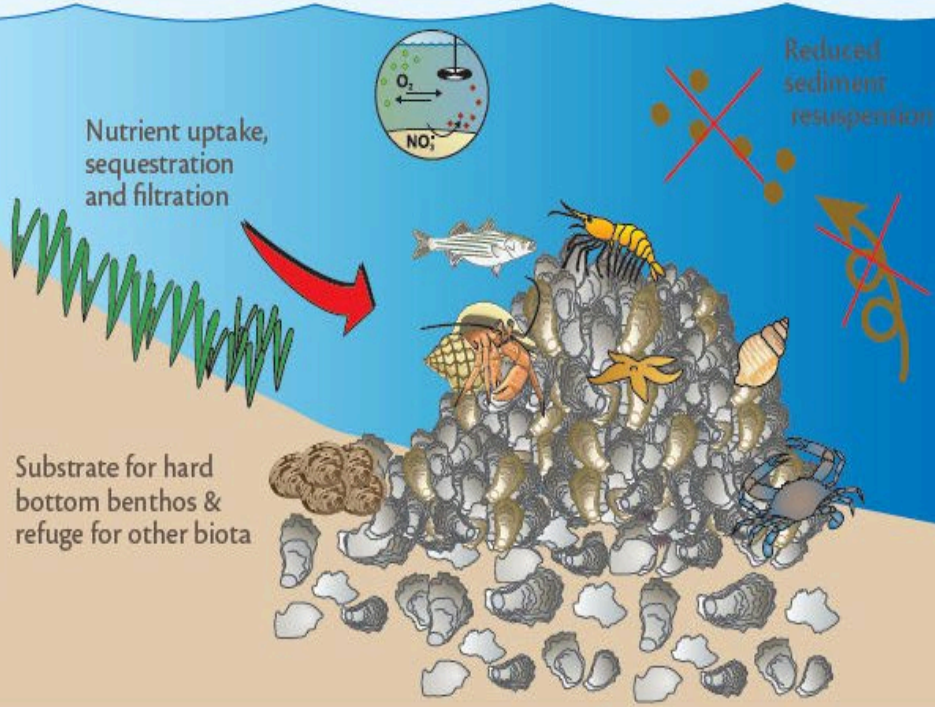


**CHUB links deployed last
15 years into Wilson Bay**



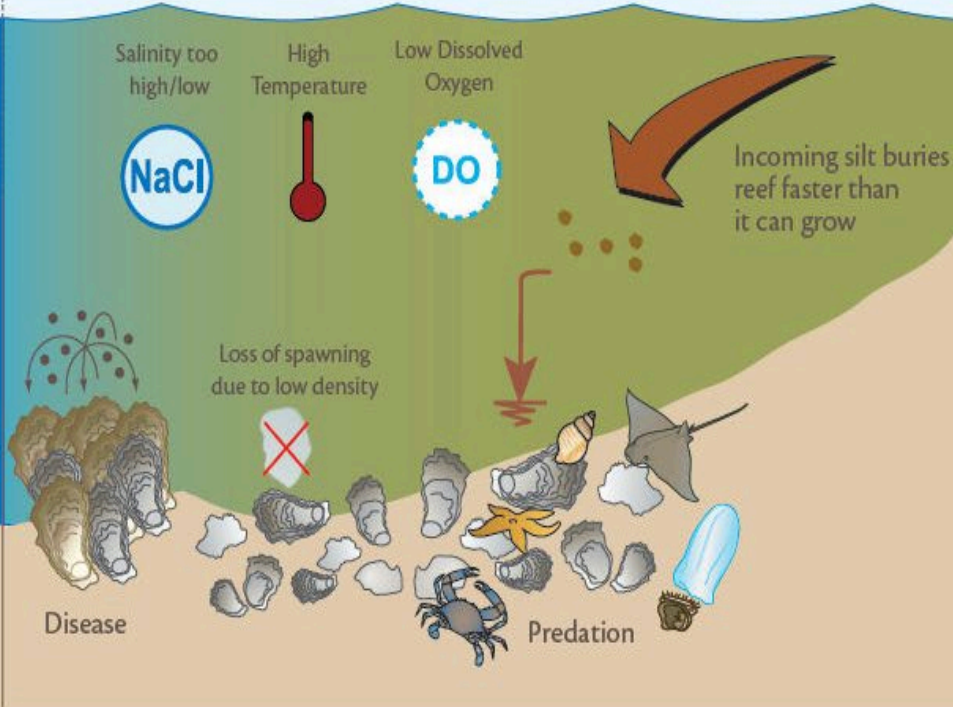
Ecosystem benefits provided by Oysters

Improved Water Quality



Ecosystem stressors to Oysters

Water Quality Stressors

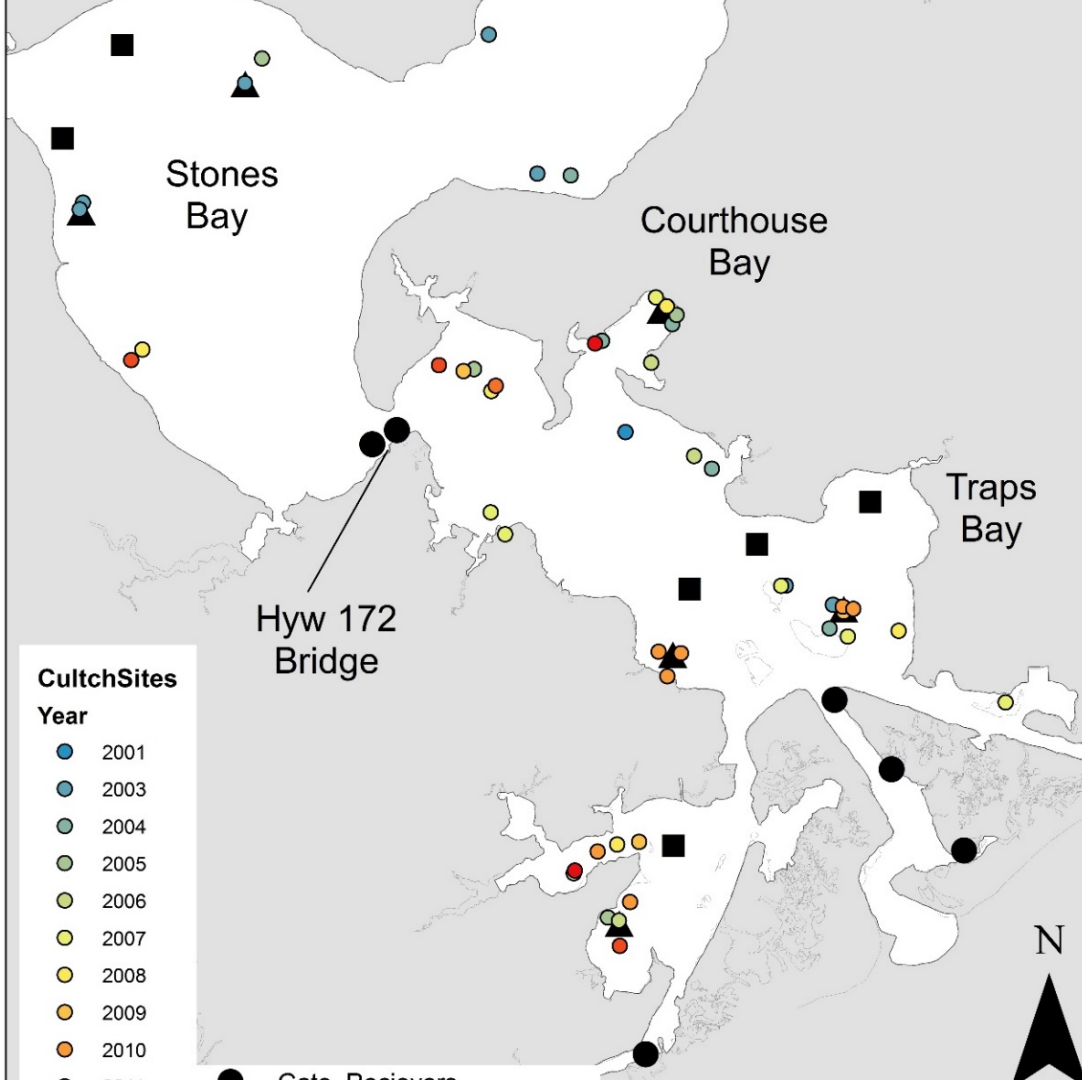




The Decline in Oyster Reefs

New River Cultch Reef Sites

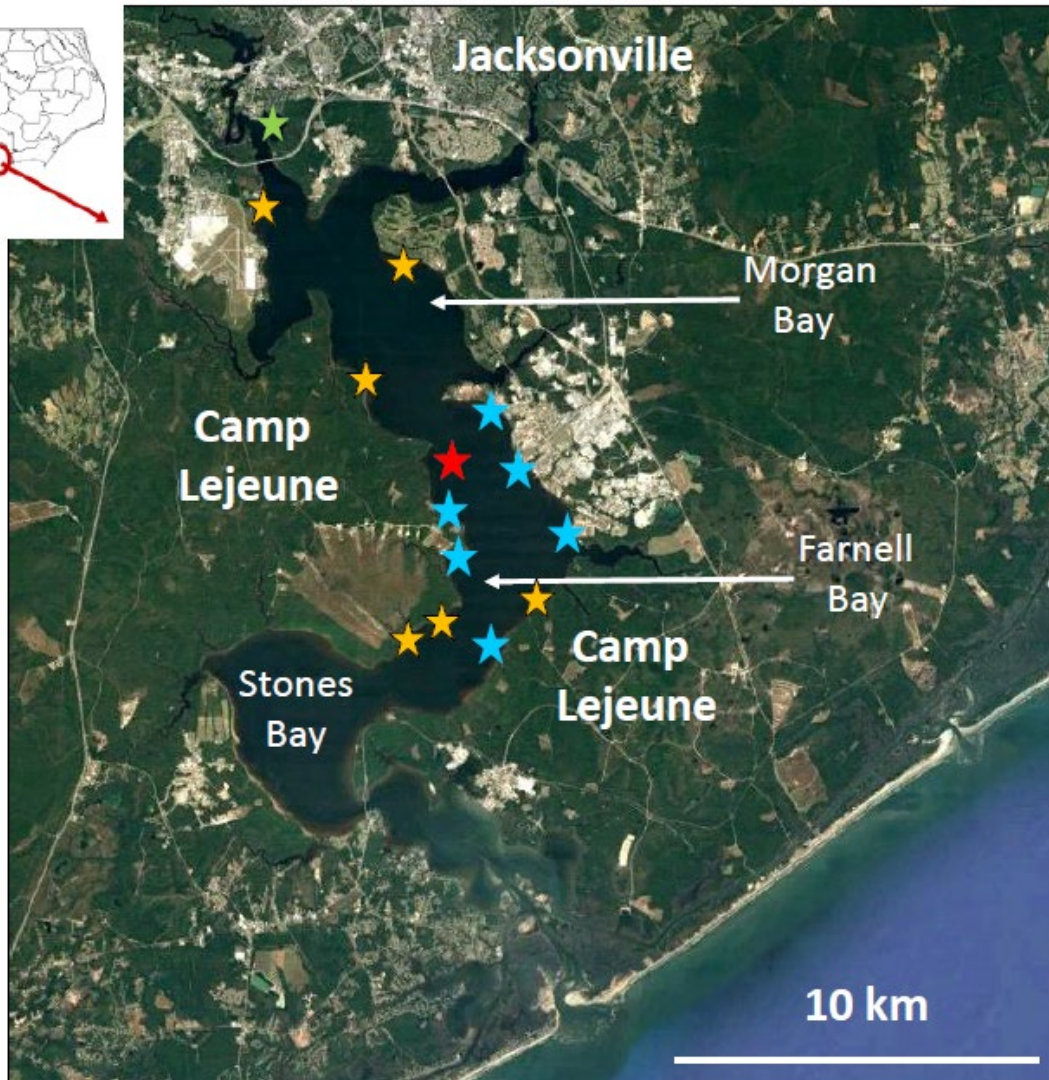
Cultch Sites by Year



New River Estuary Oyster Highway Sites



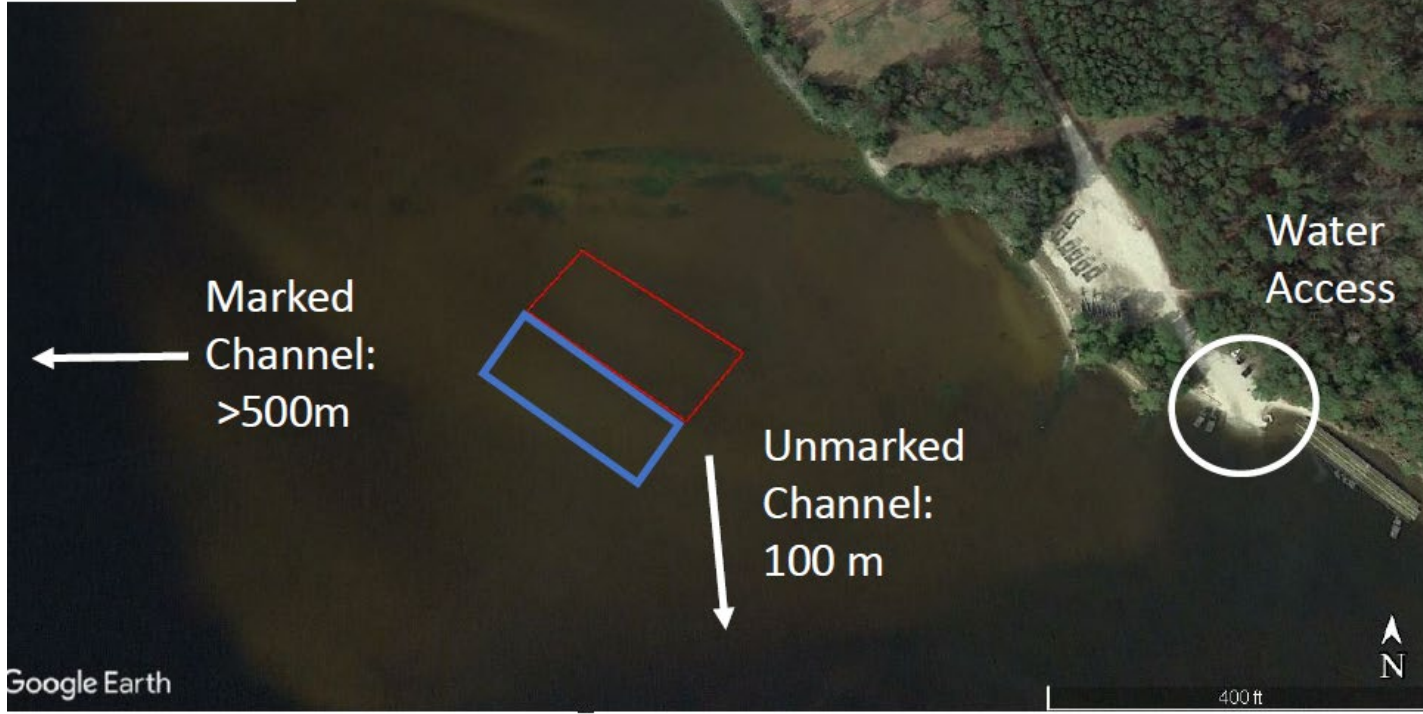
-  Existing AR-398
-  Existing Wilson Bay Reef
-  2019-Constructed Oyster Highway Reefs (Phase I; Reefs 1-6)
-  2020-Constructed Oyster Highway Reefs (Phase II; Reefs 7-12)



Reef Locations

Google Earth
View of Site 3

Legend
NRECH 3



Latitude: N34.64064°
Longitude: W77.33974°
Depth at MLW: 1.00 m
Distance from Shore: 60 m

Bottom Type: Unvegetated mud/sand
Potential User Conflicts: None anticipated, water access 100 m SE

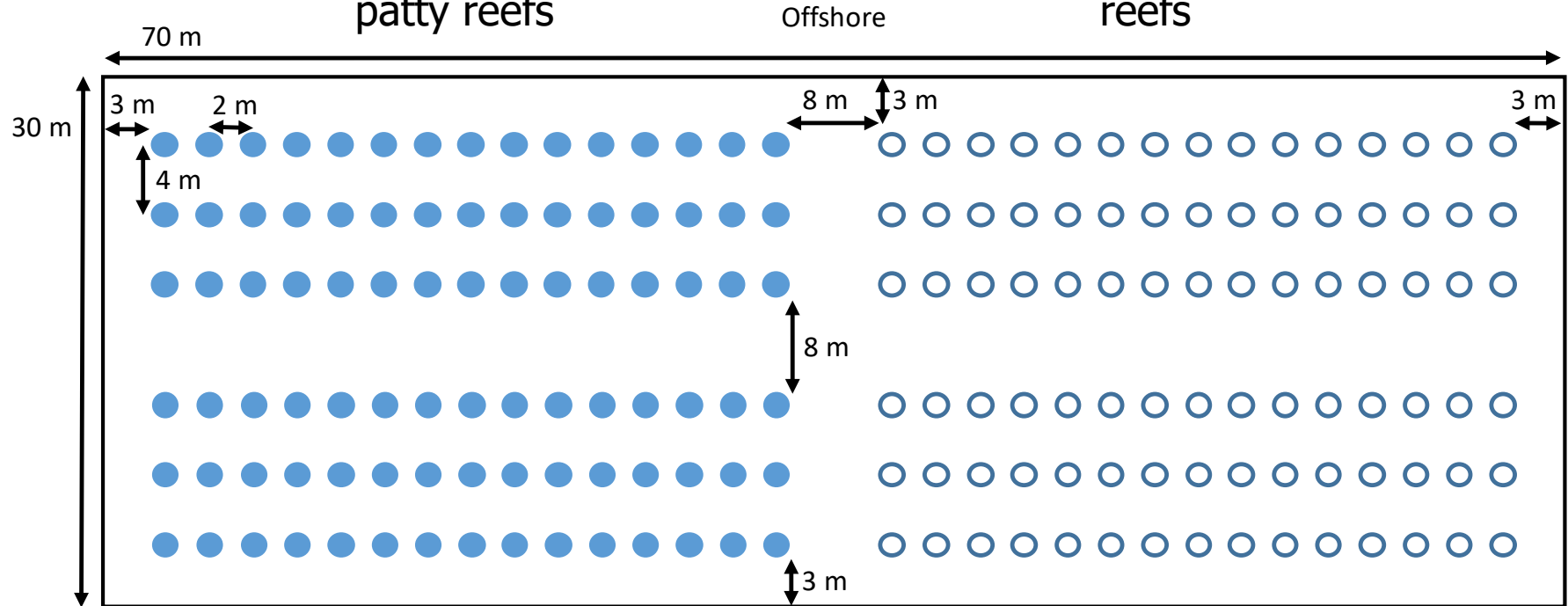
- Extended Site Boundary (70 m * 30 m)
- Existing Site Boundary (70 m * 30 m)



Proposed Oyster Highway Reef Complexes Phase I and II

● Oyster
Catcher™
patty reefs

○ Oyster
Castle®
reefs

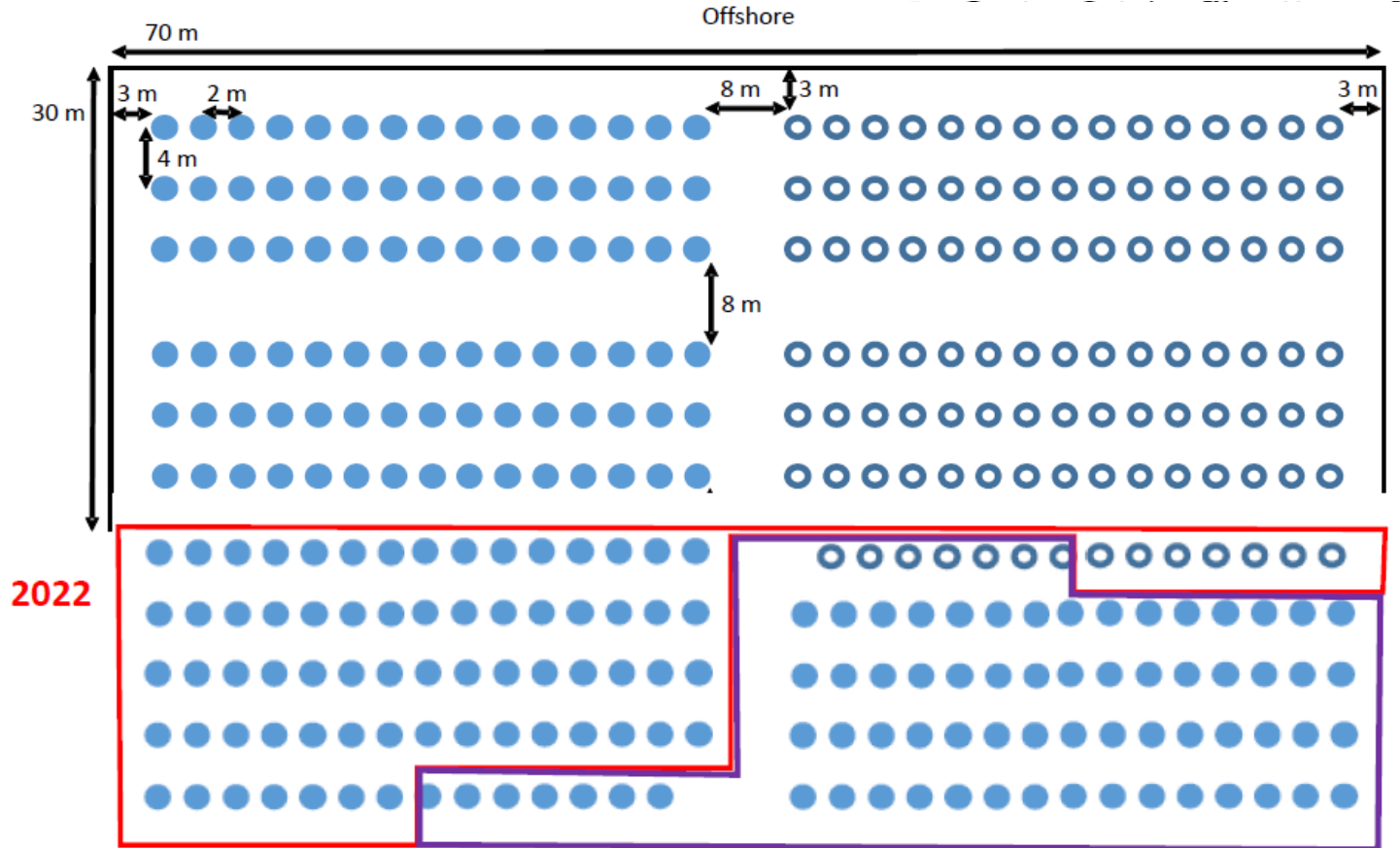


Proposed Oyster Highway Reef Complexes Phase I and II

- Six ~0.5 acre reef development sites in Farnell Bay
- 720 Oyster Castle® units per site; 90 oyster castle reefs per site
- 900 Seeded Oyster Catcher Patties per site; 90 oyster catcher reefs per site
- Reefs proposed to be located in near-shore shallow water to:
 - Allow shore access to the reefs for recreational fishing; and
 - Avoid periodic hypoxia/anoxia events that occur in deeper waters.

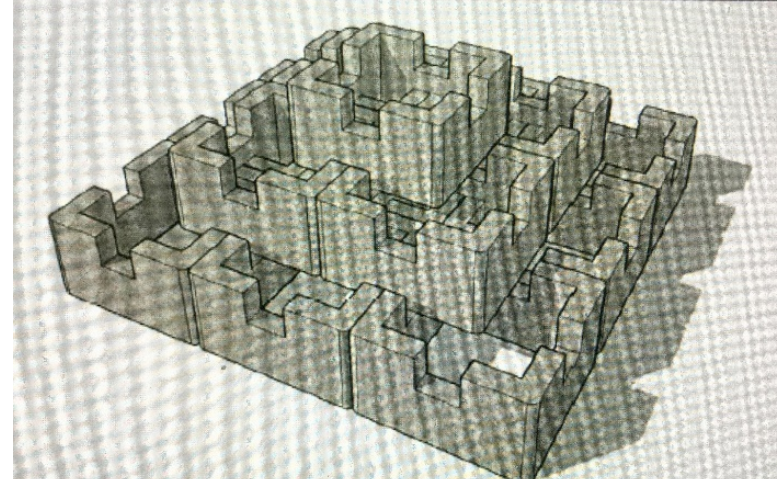
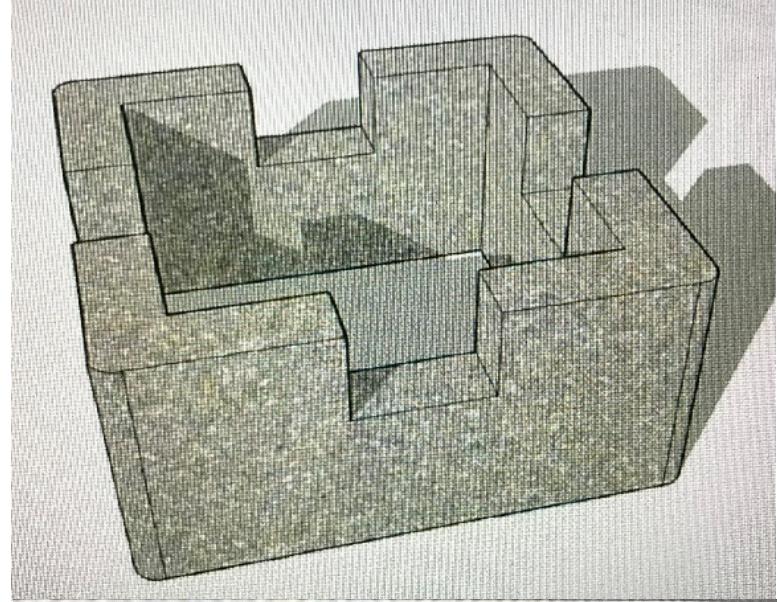
Plan View: Extended NREOH Reef Complexes (Year 2, 2023)

All Oyster Castle Patch Reefs will be top-dressed with 16 Oyster Catcher Tuffs



Oyster Highway Project Oyster Castle® Allied Concrete, Charlottesville, VA

- Manufactured concrete units (12" * 12" * 8" [L * W * H])
- Stackable and interlocking, designed to create complex, stable habitat
- Suitable for oyster settlement
- In use in restoration projects in AL, DE, NJ, NY, SC, and VA



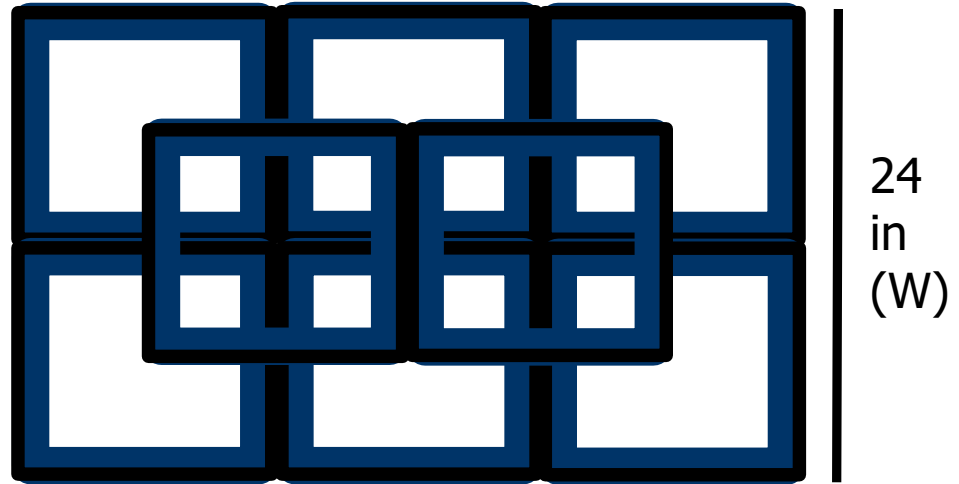
images courtesy of AlliedConcrete.com



Oyster Highway Oyster Castle® Individual Reef Configuration

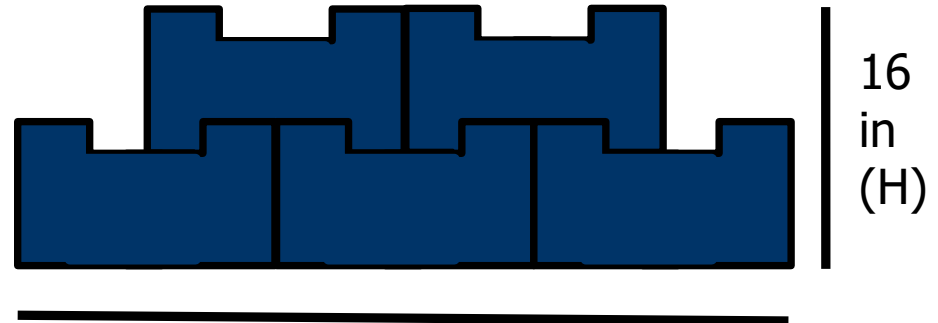
Plan View:

- 90 reefs per site
- 8 units per individual reef
- Note: these gaps are 1-2 in in width



Cross Section View:

MLW depth: 50 in [1.25m]





*photos courtesy of
AlliedConcrete.com*

Oyster Highway Project Oyster Catcher™

Sandbar Oyster Company, Morehead City, NC - SandbarOysterCompany.com

- Biodegradable jute plant fiber and cement plaster units (12" * 12" * 4" [L * W *H])
- Stackable and interlocking, designed to create complex, stable habitat
- Suitable for oyster settlement
- In use in restoration projects in NC



*Photo of individual patty
from Niels Lindquist*







New River Estuary Oyster Highway

Reef #2 **Notice:**
Shellfish
Harvest
Prohibited



Reef Visitor Survey
JacksonvilleNC.gov/FishSurvey

Contact:
City of Jacksonville • 910 938-6446



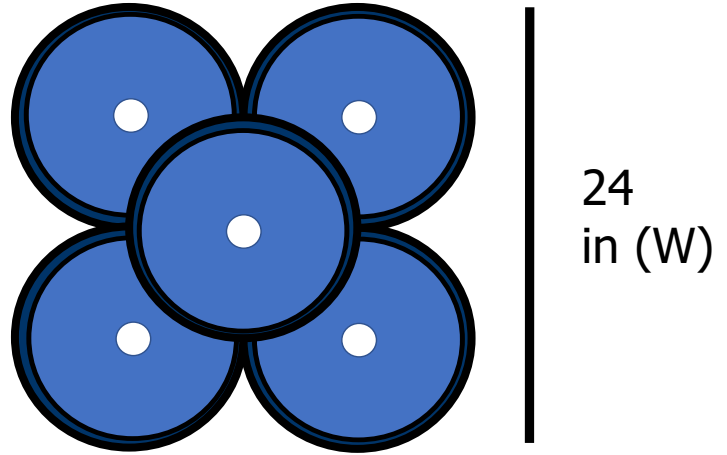
Oyster Paddys



Oyster Highway Oyster Castle® Individual Reef Configuration

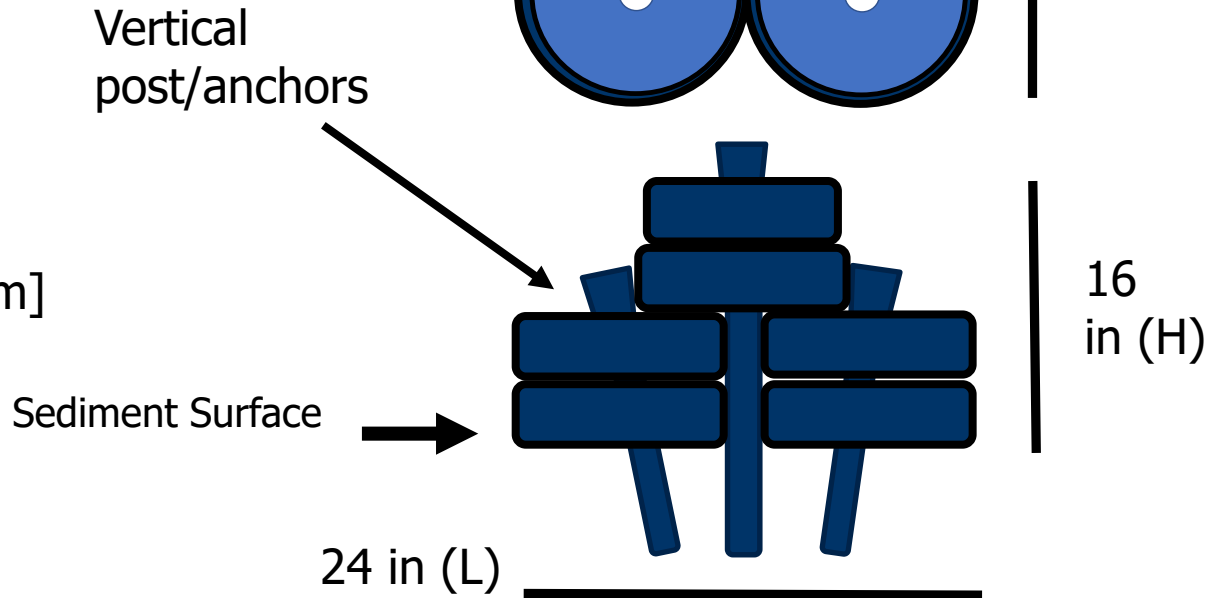
Plan View:

- 90 reefs per site
- 10 patties per individual reef



Cross Section View:

MLW depth: 50 in [1.25m]

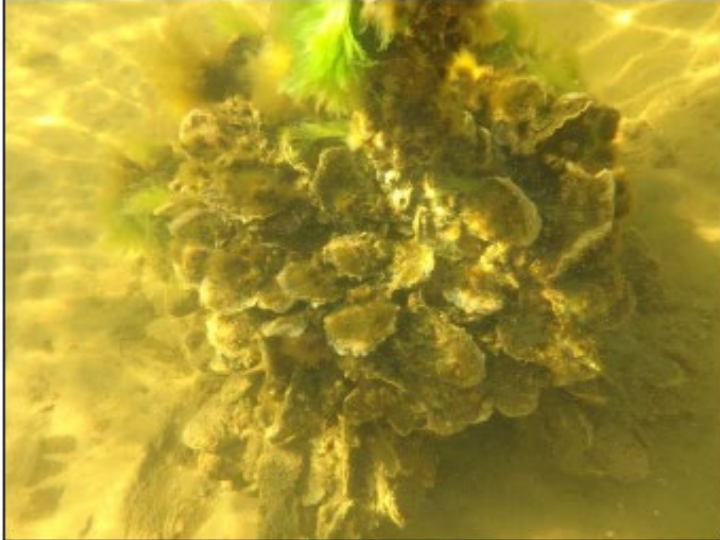


Phase 1 Images

January 26, 2020

New River Oyster
Highway patties
transferred to site
In April of 2019

Estimated density:
>100 oysters m⁻²





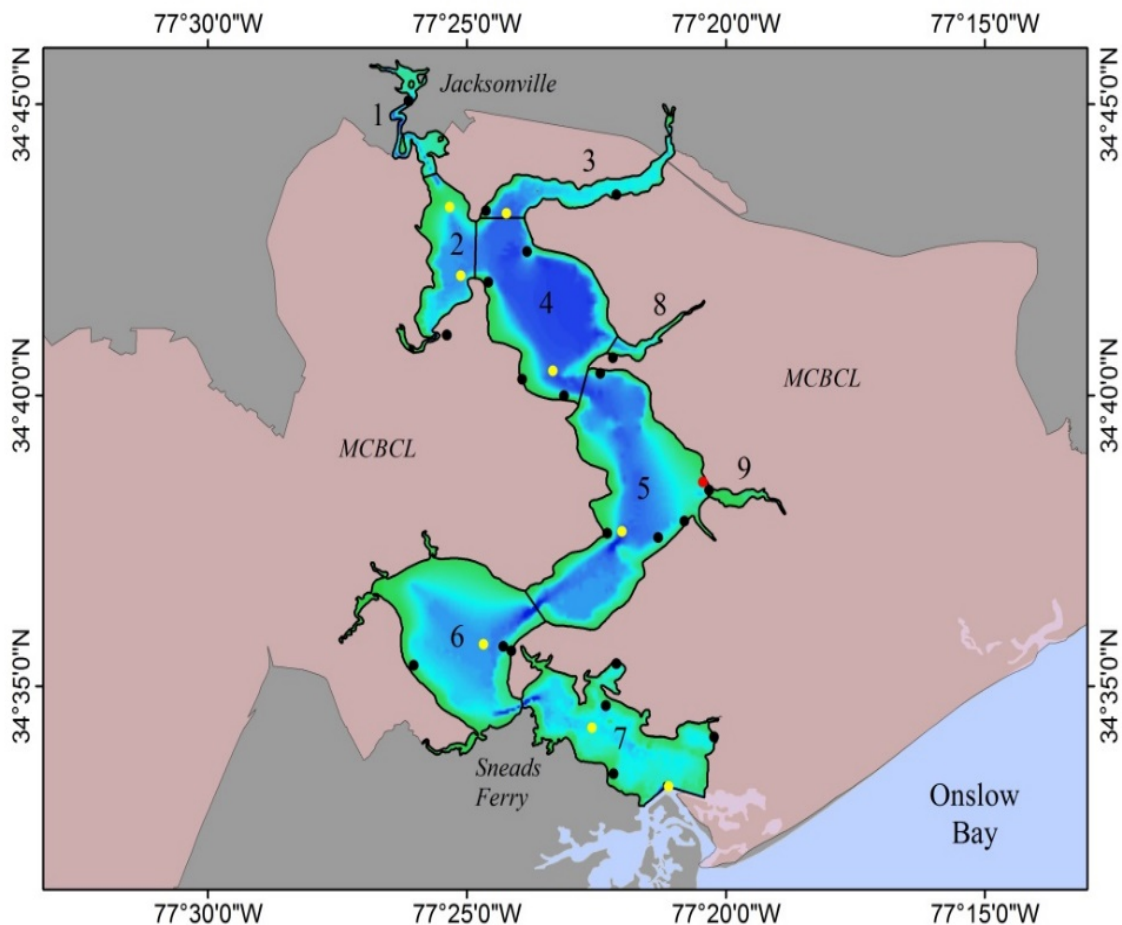


From Niels' spreadsheet - Farnell Bay

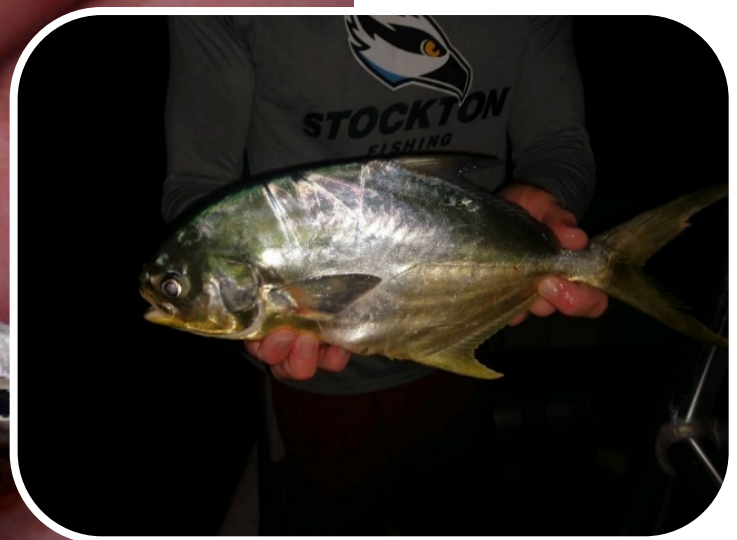
	at initial deployment	1-yr post deployment	2-yr post deployment
	juvenile	young adult	adult
# of oysters across 6 reef sites	2,700,000	540,000	270,000
Assuming 50% mortality @ shallow sites over 2 yr			1,350,000

Specify the # of oysters:

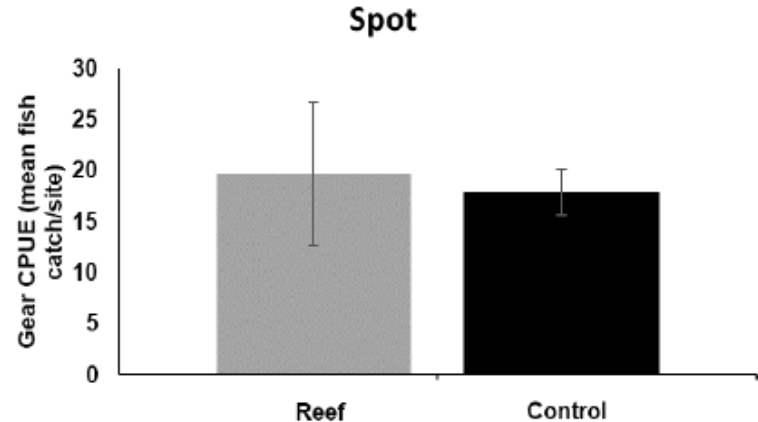
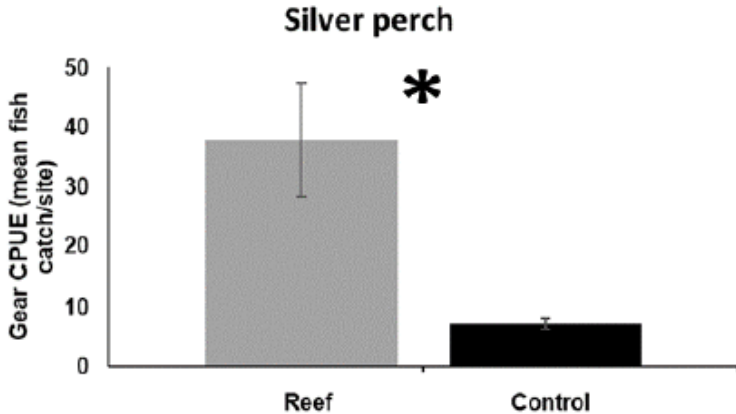
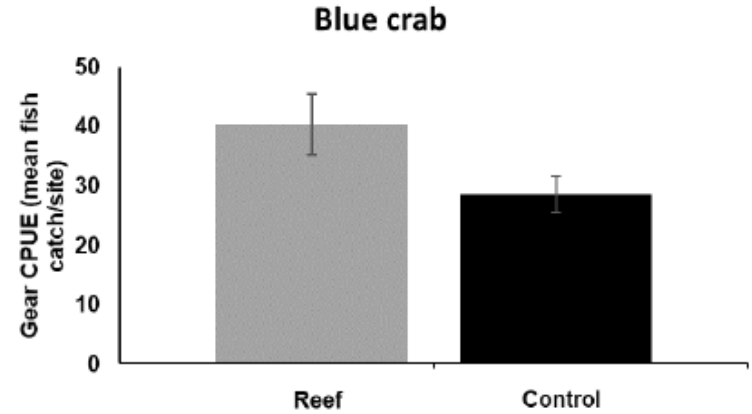
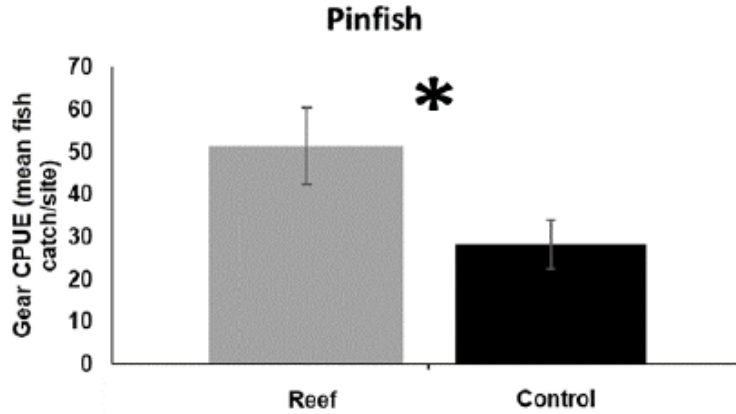
		Box-specific removals kg/y			
	#	TSS	N	P	
Box 1	0	0	0	0	
Box 2	0	0	0	0	
Box 3	0	0	0	0	
Box 4	0	0	0	0	
	1,350,00	Box 5	1,150,905	14,282	1,976
Box 5	0	Box 6	0	0	0
Box 6	0	Box 7	0	0	0
Box 7	0				
		Estuary-wide totals (kg/y):	1,150,905	14,282	1,976



Fish Monitoring

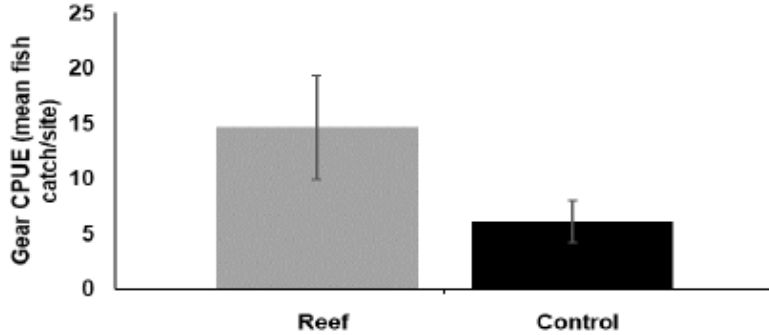


Finfish Assessments- Reefs verses Control Sites

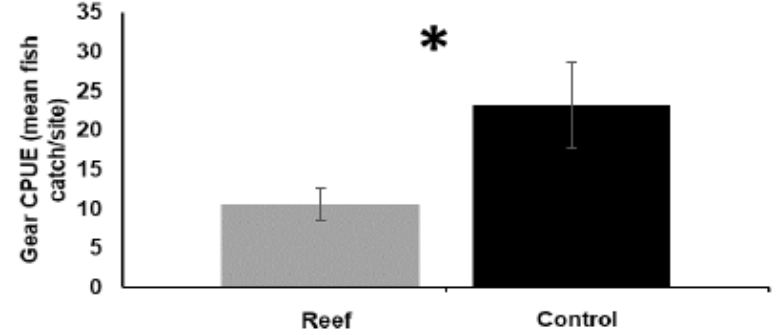


Finfish Assessments- Reefs verses Control Sites

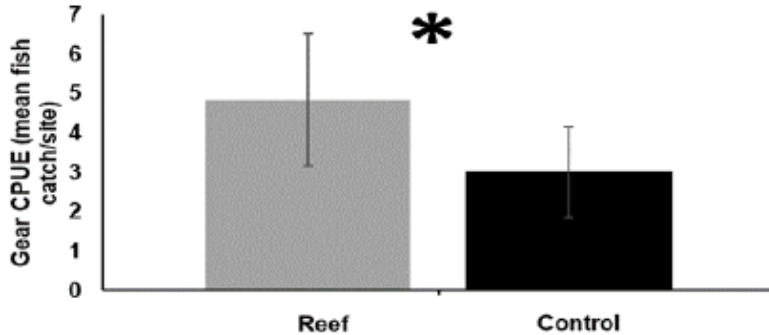
Mullet (striped and white)



Penaeid shrimp



Pigfish



Atlantic croaker

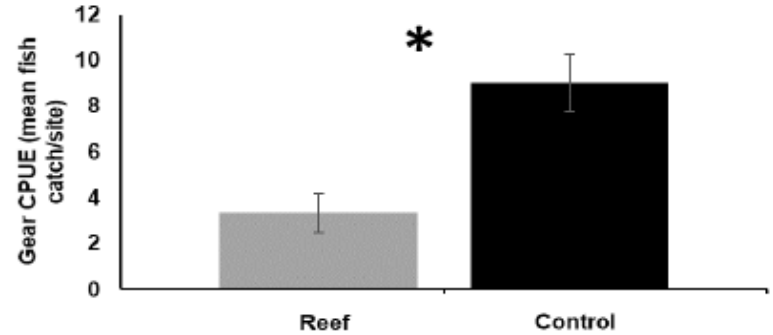
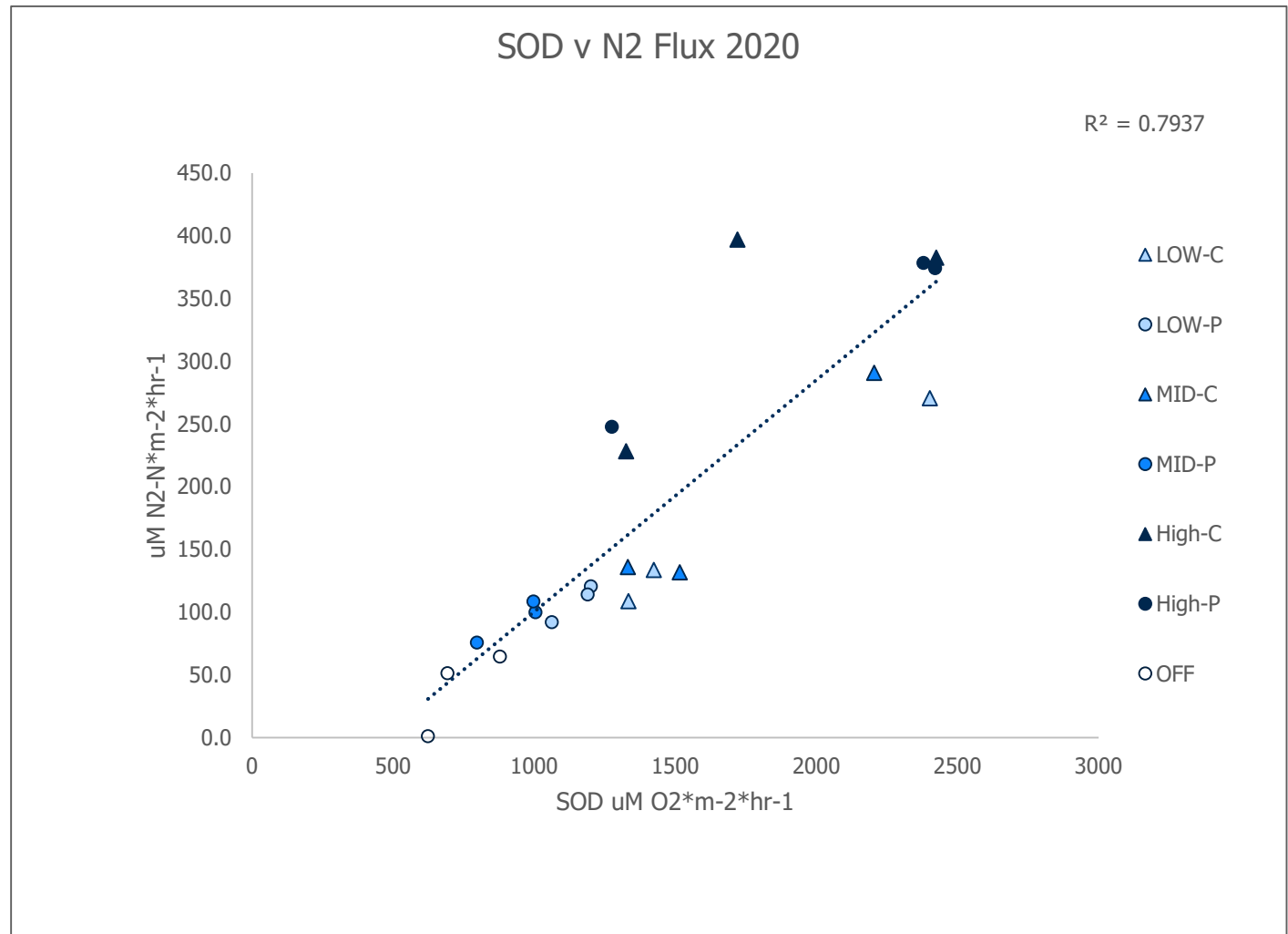
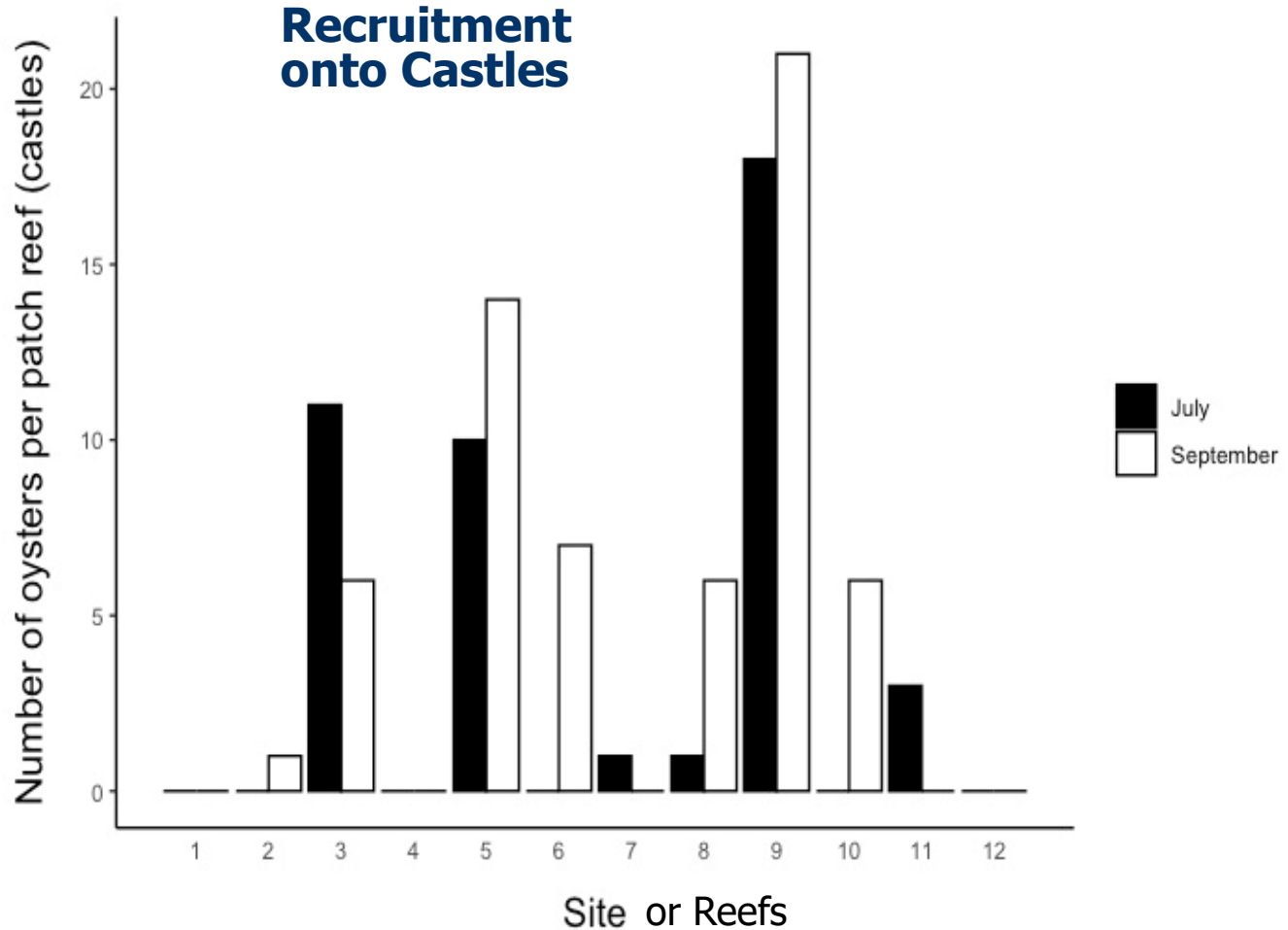


Figure 5. SOD vs. N_2 flux for patty (P) and castle (C) reefs with low, mid and high density of oysters/reef structure.



Reefs 1,2,4,7 & 12
are upstream and
low salinities

**Reefs 3,5,6,8,9,10 &
11** are downstream and
higher salinities.
Castles were NOT
pre-seeded.



Recruitment within first two months





Hooked Mussel

Ischadium recurvum

We estimate 300,000
mussels recruited to NREOH
oyster catcher patties during
the summer of 2019-Phase I

