

SB830 Alternative Substrate Evaluations and Symposium Update

**Matt Gray, Elizabeth North
Stephanie Alexander, Olivia Caretti, Conor Keitzer,
Dave Nemazie, Vyacheslav Lyubchich, Jason Spires,
Lisa Wainger**

May 29, 2024
Eastern Bay OSW



We define **alternative substrate** as **anything except fresh shell of the eastern oyster, *Crassostrea virginica*,**

so alternative substrate includes dredged and fossil of the eastern oyster, *C. gigas* shell as well as stones (granite, limestone), crushed concrete, synthetic shell, synthetic reefs, etc.



SENATE BILL 830

M1

2lr2868
CF HB 1228

By: **Senators Elfreth, Bailey, Eckardt, Guzzone, and Hershey**

Introduced and read first time: February 7, 2022

Assigned to: Education, Health, and Environmental Affairs and Budget and Taxation

Committee Report: Favorable with amendments

Senate action: Adopted

Read second time: March 10, 2022

(a) The University of Maryland Center for Environmental Science shall collaborate with the Smithsonian Environmental Research Center, the Virginia Institute of Marine Science, appropriate State and federal agencies, and industry and other stakeholders to ~~research~~ evaluate:

(1) the types of substrate, including fresh shell, fossilized shell, combinations of shell, and alternative substrates, that are most appropriate for use in oyster harvest areas;

(2) the benefits, including habitat-related benefits, of using ~~larger stones~~ versus smaller stones of various sizes in oyster restoration areas;

(3) alternative substrates used for oyster restoration or repletion in other regions, including the success of efforts to use alternative substrates; ~~and~~

(4) the potential for retrofitting existing structures, such as riprap revetments, that are unrelated to oyster restoration but that use materials similar to artificial reefs, to include oyster plantings; and

(5) the effect of spat size upon deployment on oyster abundance.

Topics:

1. The types of substrate, including fresh shell, fossilized shell, combinations of shell, and alternative substrates, that are most appropriate for use in oyster harvest areas;
2. The benefits, including habitat-related benefits, of using stones of various sizes in oyster restoration areas;
3. Alternative substrates used for oyster restoration or repletion in other regions, including the success of efforts to use alternative substrates;
4. The potential for retrofitting existing structures, such as riprap revetments, that are unrelated to oyster restoration but that use materials similar to artificial reefs, to include oyster plantings,
5. The effect of spat size upon deployment on oyster abundance.

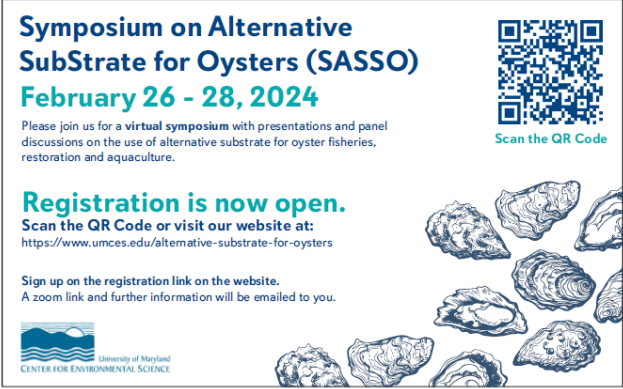


Alternative substrates in other regions

Gray, Fabra, Keitzer, Nair, Nemazi, North

Goal: Gather information about the use of alternative substrates in other regions before we do in lab or in water evaluations

- Held *Symposium on Alternative Substrate for Oysters* on Feb 26-28, 2024
- Produce symposium report (**June 2024**)
- Conduct literature review (**fall 2024**)




Symposium on Alternative Substrate for Oysters (SASSO)
February 26 - 28, 2024

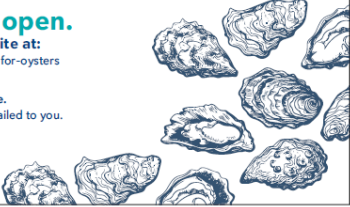
Please join us for a virtual symposium with presentations and panel discussions on the use of alternative substrate for oyster fisheries, restoration and aquaculture.

Registration is now open.
Scan the QR Code or visit our website at:
<https://www.umces.edu/alternative-substrate-for-oysters>

Sign up on the registration link on the website.
A zoom link and further information will be emailed to you.

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Scan the QR Code



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Substrates for use in oyster harvest areas

- Alexander, Gray, Fabra, Caretti, Lyubchich, and North)



OYSTER RECOVERY®
PARTNERSHIP | ORP

Goal: Evaluate alternative substrates for oyster production and compatibility with fishing gear

- Conduct settlement experiments in the lab (June 2024)
- Deploy alternative substrates in cages in July 2024 and 2025, then monitor abundance
- Evaluate interference with fishing gear (2025)



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MD DNR & Private Oyster Planting Projects with Substrate Materials as Approved By Permitting Agencies. 3/11/2024.

P = permitted but not used. U = permitted and used. R = requested in permit application; under review.

Substrate Type	Recent USACE/MDE Permits									
	Baywide Seed and Shell	Aquaculture Leases	St Mary's Sanctuary	Manokin Sanctuary	Harris Creek Sanctuary	Little Choptank Sanctuary	Tred Avon Sanctuary	Flat Rock (Pocomoke Sound fishery area)	Great Marsh (Lower Choptank fishery area)	Baywide Alternative Substrate <i>PENDING</i>
Dredged and fresh										
Oyster shell - <i>C. virginica</i>	U	U	U	U	U	U	U			
Oyster seed/spat - <i>C. virginica</i>	U	U	U	U	U	U	U			
Oyster shell - <i>C. gigas</i>	P	U	P	P	P	P	P			
Non-oyster shell (clam, whelk, conch, and/or scallop)		U	P		U	U	U			R
Florida Fossilized Shell			P		U	U	P			
Granite			U	U	U	U	U	P	P	R
Limestone			P		P	P	P	P	P	R
River Rock		U	P		P	P	P	P	P	R
Other Amphibolite Stone			P	P	P	P	P	P	P	R
Crushed Recycled Concrete (free of debris)		U	P		P	P	P	P	P	R
Green Concrete			P		P	P	P	P	P	R
Recycle Materials (cinder block or brick)					P	P	P			R
Reef Balls			P		P	P	P			
Marl					P	P	P			



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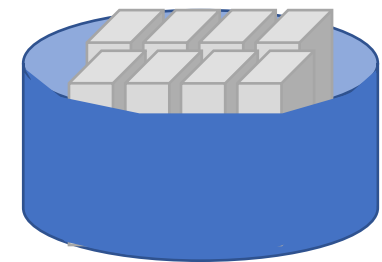
Effect of spat size on oyster abundance

Alexander, Caretti, Gray, Fabra, Lyubchich, Spires, Wainger, North

Goal: determine how long to hold spat in tanks to maximize oyster survival and overall hatchery production



- Conduct evaluations on the HPL Setting Pier in **June – August, 2024**



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Stones of various sizes in sanctuaries

Stones Team (still forming, currently Gray, Fabra, Ogburn, Sowers, Tracy, North)

Goal: Quantify the benefits of restored reefs with stones of different sizes

- Build on analysis of data on oyster abundance and size on stones of various sizes in sanctuaries (fall 2024)
- Evaluate the critters (meiofauna) that live on reefs with stones of various sizes in 2025
- Evaluate compatibility with crabbing gear in 2025



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Retrofitting existing structures for oyster habitat

Gray, Fabra, Nardin, Nemazi, North

- Hold *Symposium on Alternative Substrate for Oysters in the Nearshore* in **February 2025**
- Evaluate selected retrofits (**summer 2025**)



Symposium on Alternative Substrate for Oysters

Day 1: Fisheries

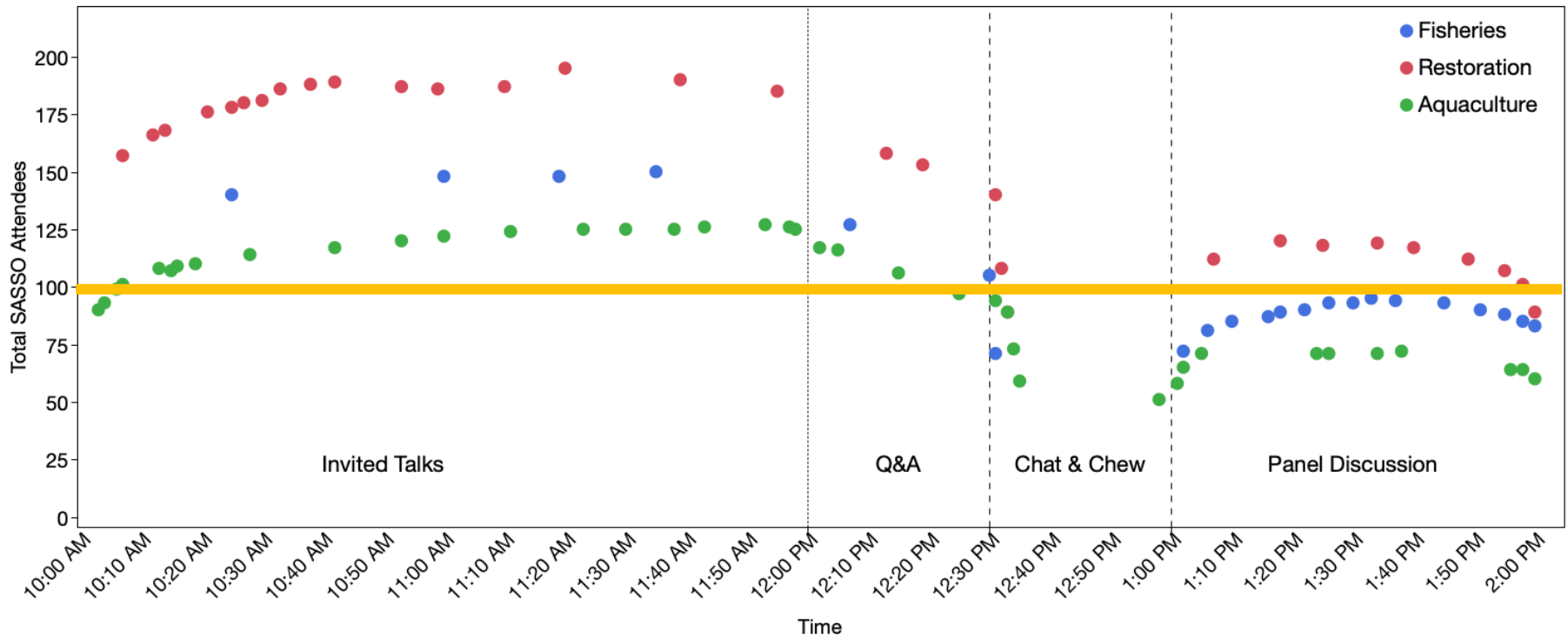
Day 2: Restoration

Day 3: Aquaculture

Common theme: type of alternative substrate and how it is used depends on application

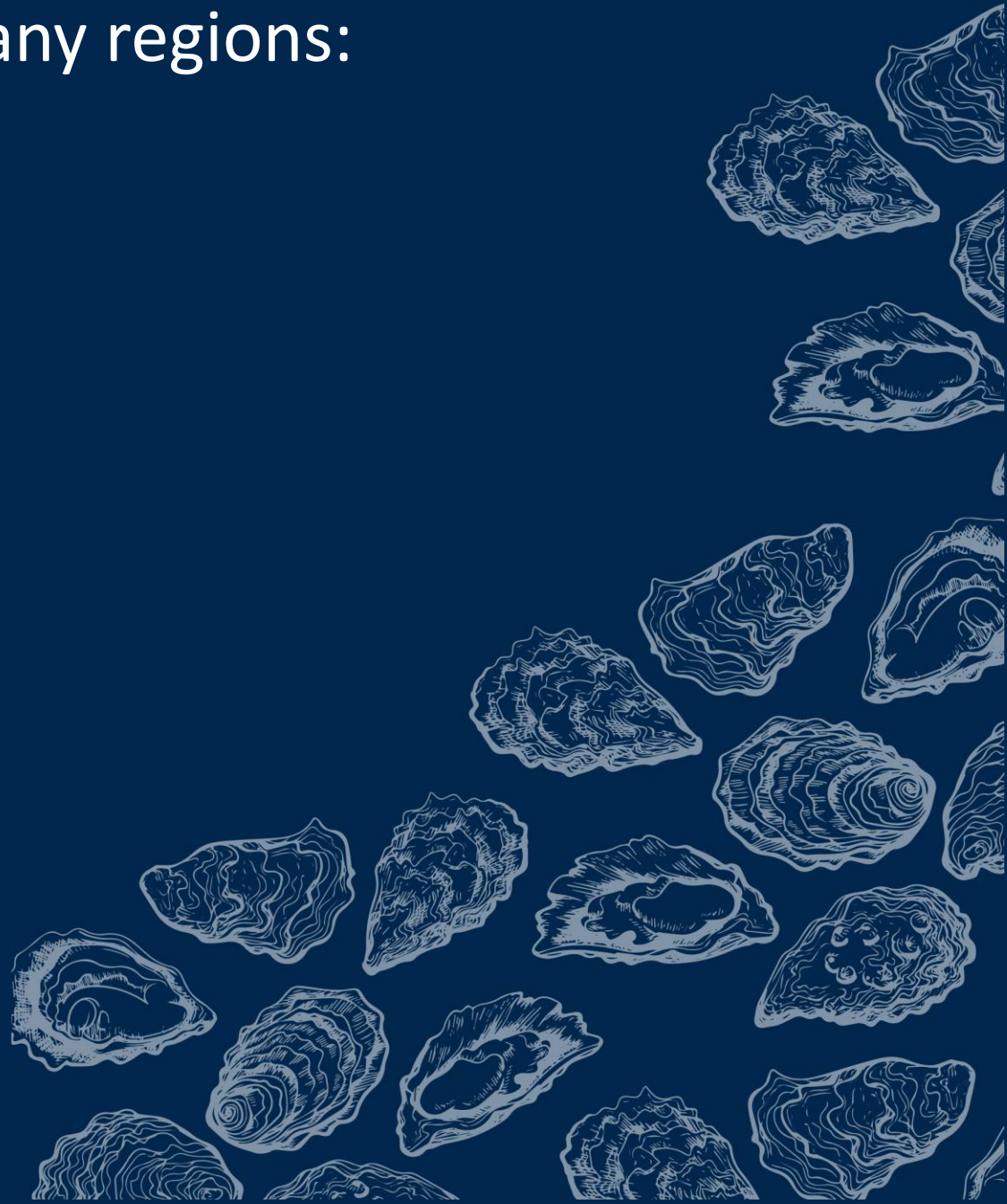


Over 100 people attended each day



Insights from many regions:

- Connecticut
- Delaware
- Florida
- Maryland
- New Jersey
- New York
- North Carolina
- Virginia
- Texas



Alternative Substrates

- Virginia (Andrew Button, VMRC)

Substrate	Used since	Metrics, Results, Feedback	Summary
Dredged and fossil shells	1935	Good spat recruitment and positive shell budget ;	Successful
Granite (large: 2-4 inch; small: < 1 inch)	2014	Good spat recruitment	Successful, depending on stone size

- Shell volume monitored and maintained
- Smaller stones recommended for harvest areas

Many thanks to Dr. Monica Fabra

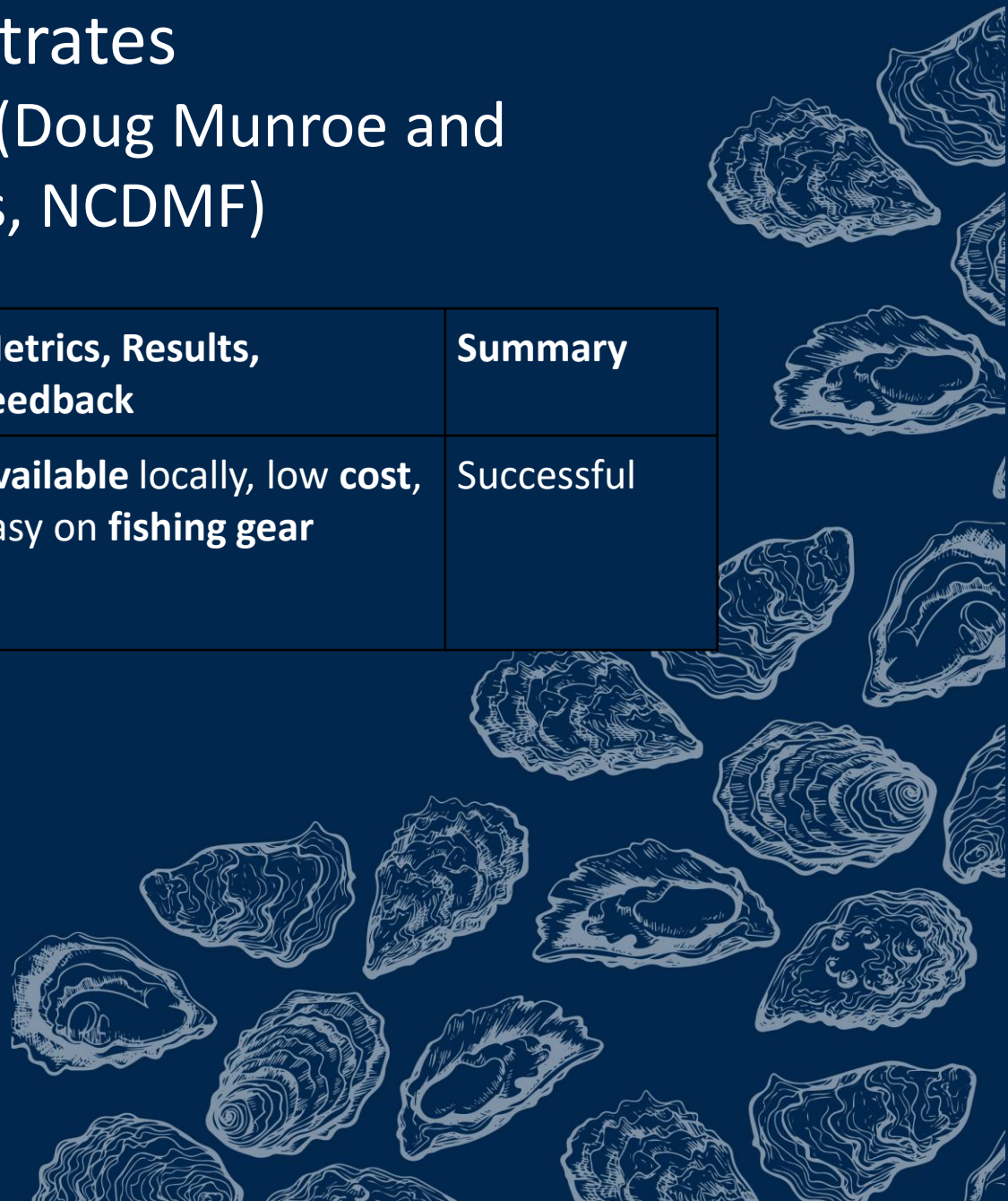


Alternative Substrates

- North Carolina (Doug Munroe and Bennett Paradis, NCDMF)

Substrate	Used since	Metrics, Results, Feedback	Summary
Limestone marl	1980	Available locally, low cost, easy on fishing gear	Successful

- Sanctuaries located to take advantage of larval spillover to harvest areas (also in VA)

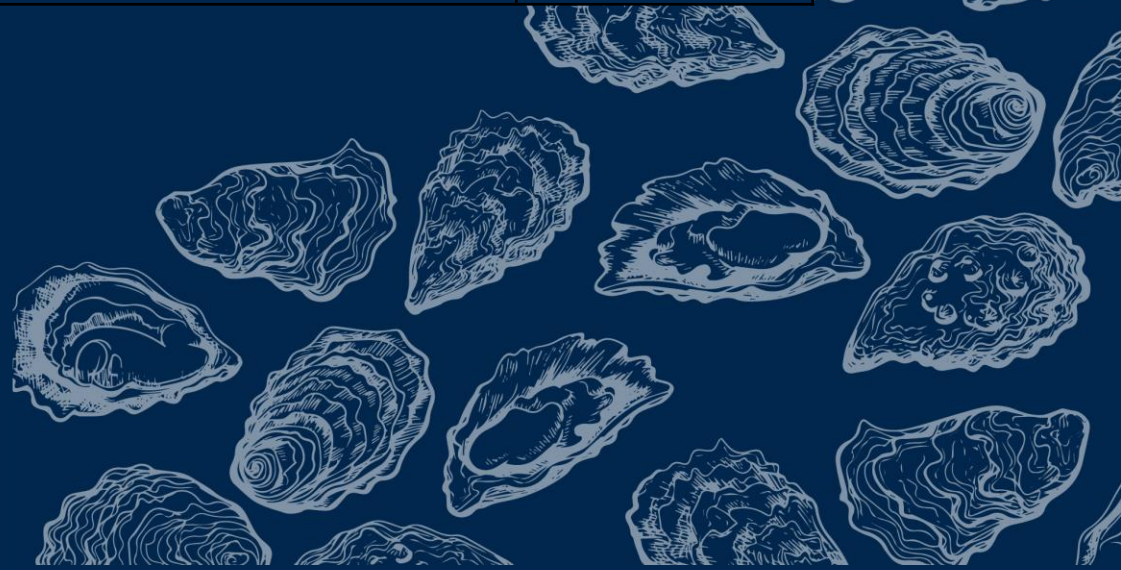
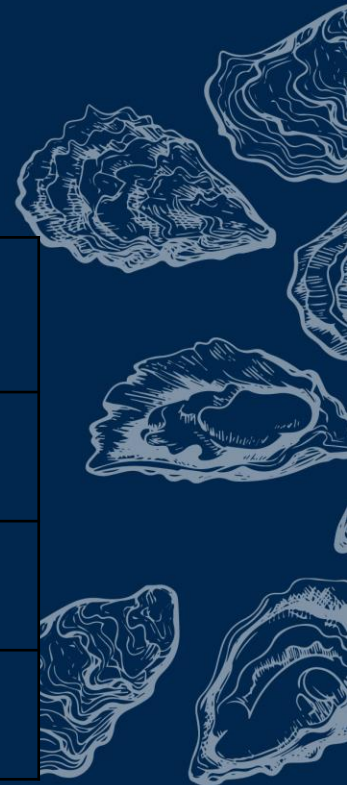


Alternative Substrates

- Texas (Bill Rodney, TP&W)

Substrate	Used since	Metrics, Results, Feedback	Summary
Concrete (1-6 inch)	2009	Good spat recruitment	Successful
River rock ($\frac{3}{4}$ - 6 inch)	2009	Good spat recruitment	Successful
Limestone ($\frac{1}{2}$ - 4 inch)	2020	Good spat recruitment	Successful

- Large stones suitable for sanctuaries, small stones for harvesting

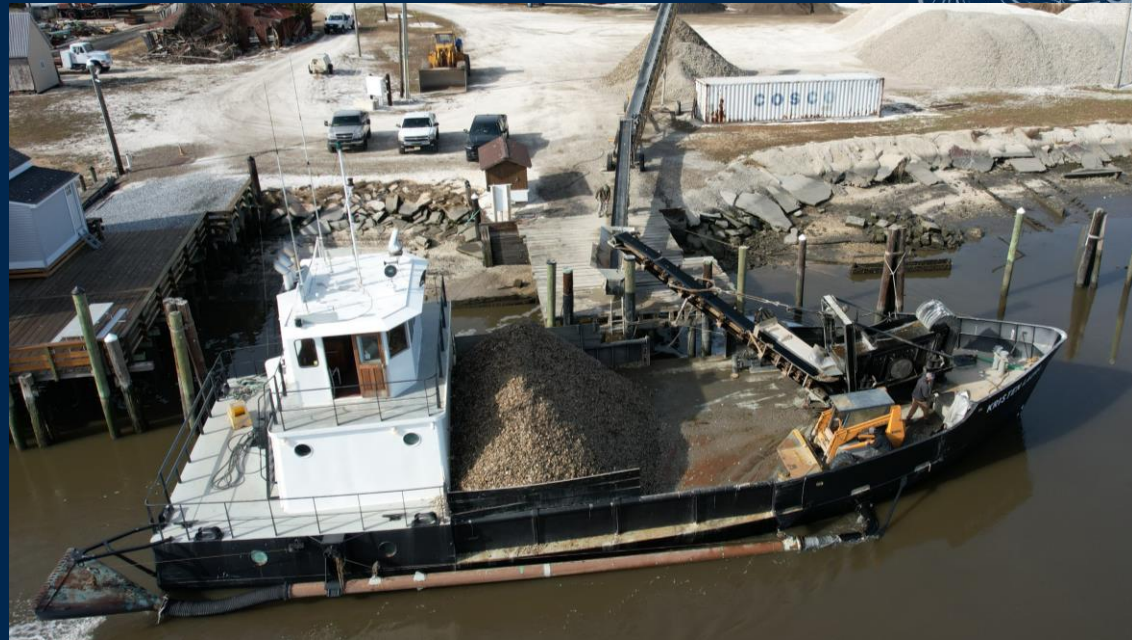


Alternative Idea

From Steve Fleetwood, Bivalve Packing Company

Suction Dredge for Buried Shell

- Recycle shell on aquaculture leases
- Suction in winter, let dry, plant when time for spat set in early summer
- Does not need to purchase shell



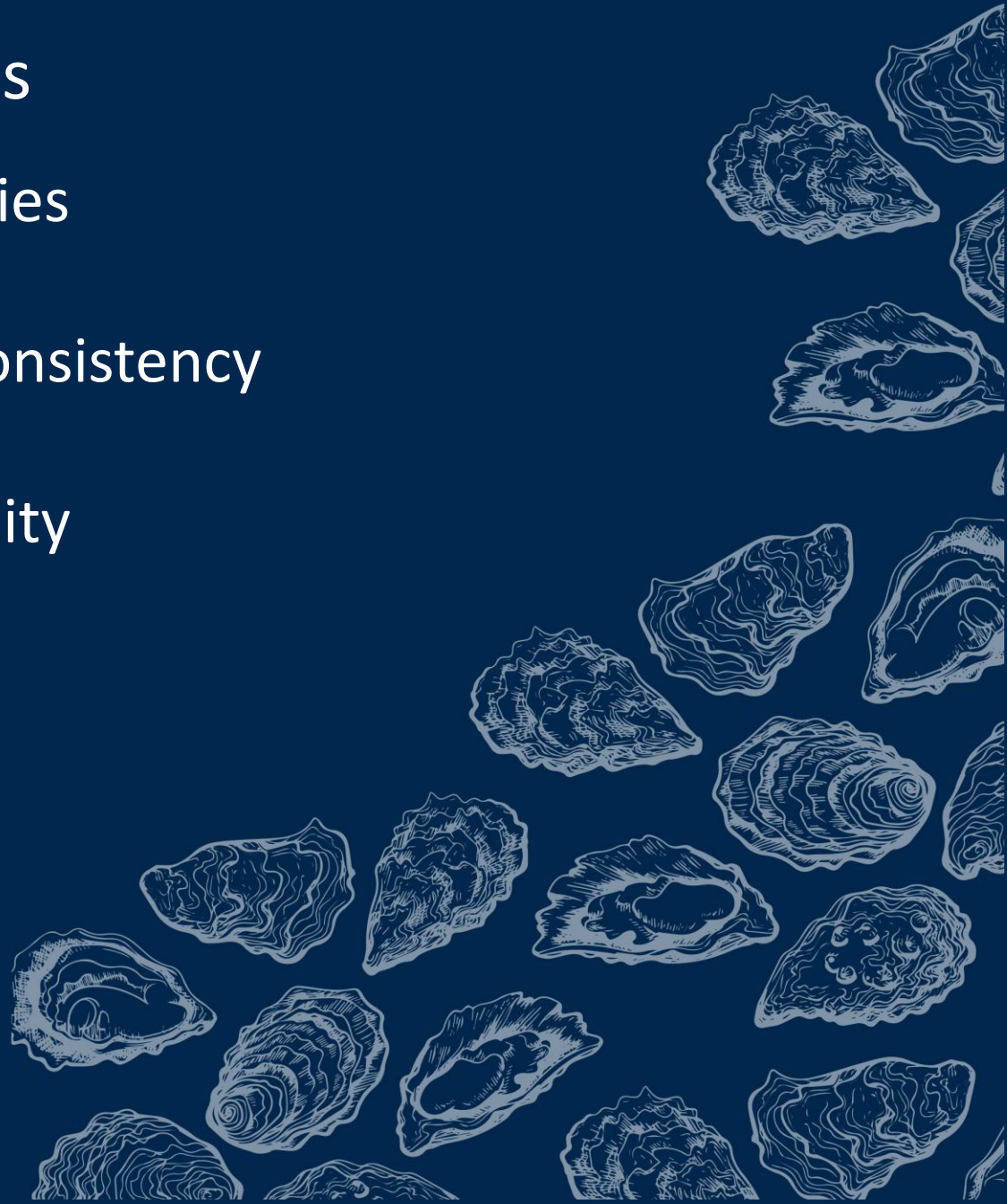
Key points for large-scale applications

- Use of shell - dredged and fresh - clearly the preferred substrate but not accessible to many states
- Concrete (crushed/recycled) and limestone marl used most frequently, followed by river rocks and granite
- Use of smaller stones in harvesting areas, larger stones in sanctuary areas was a common theme
- Benefit of having large-scale programs for both oyster restoration in sanctuaries *and* replenishment in harvest areas



Information needs

- Material properties
- Scalability and consistency
- Chemical suitability
- Biosecurity



Symposium on Alternative Substrate for Oysters

Draft Report

Virtual Symposium
Feb 26-28th, 2024

Draft Report complete in **June**

Will include:

- Highlight of talks and discussions
- Summary table of information about alternative substrates
- Survey of participants

Will send it to speakers for their review

Thank you!



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