10 min break

Page 1

10 min

Objectives:

- To discuss various modeling uses/needs for oyster restoration
- To discuss barriers for model use & applicability
- To discuss options & feasibility streamlining model use for restoration

Intended outcomes:

- Seek consensus on or identify suite of broader needs on path forward for improving collaboration, minimizing barriers, & streamlining modeling
- Identify next steps, including collaborations & future meetings
- Produce post-workshop report that documents the discussion & any recommendations to pursue next steps & any potential available funding

Please write your name & affiliation

State government

Academic

Federal government

NGO

Local government

Other

State government

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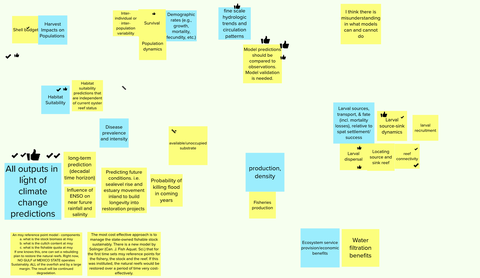
Modeling needs to meet select objectives

30 min

What model outputs are most important for oyster restoration in GoM?



Outputs	What models are out there?				Accessibility
Demographic rates (e.g., growth, mortality, fecundity, etc.)	Dynamic Energy Budget models	metapopulation models	USEPA AQUATOX 3.2	Hemeon et al. 2020 Surface-area Recruitment Model	Readily accessible; Somewhat accessible; Not accessible
Larval sources, transport, & fate (incl. mortality losses), relative to spat settlement/ success	Coupled hydrodynamic-oyster larval model	The Dekshenieks larval model is now a downloadable component in ROMS	MaxEnt models		Readily accessible; Somewhat accessible; Not accessible
Habitat Suitability	Many examples available. Relatively easy to construct.	Geometric mean models	Presence or presence/absence	A new modern forward prediction model is needed. The Dekshenieks/Hofmann/Powell models are out-dated. The new IBM approach is an option the future.	Readily accessible; Somewhat accessible; Not accessible
All outputs in light of climate change predictions	habitat suitability models can incorporate climate change (or uncertainty associated with changing environmental conditions)		DEB/Reef IBM		Readily accessible; Somewhat accessible; Not accessible
Harvest Impacts on Populations	Reef/population model coupling DEB, hydrodynamics and population structure (Yurek et al., 2021)	USEPA AQUATOX 3.2	The Solinger model is comprehensive and can be used to structure rebuilding plans for state-managed oyster stocks.	Shell budget models - Soniat	Solinger et al. 2022 Surface-area Recruitment-based Reference Point Model

KEY THEMES

- Most 'somewhat accessible' with the exception of HSI (most 'readily accessible')
- Variable 'ease of use' - potential barrier
- Some 'not accessible' but ranked high on important output - key barrier

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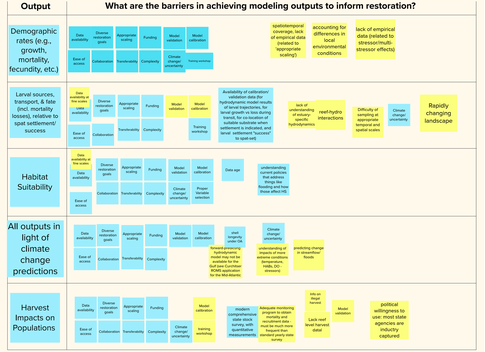
Modeling applicability for enhancing oyster habitat

30 min

Data availability: : lack of access to available data hinders model(s) use (e.g., types of data, data spatial resolution)
Calibration: : spatial & temporal resolution of data hinders model application
Model validation: : confirming model is depicting natural conditions relatively accurately
Ease of access: : appropriate/needed data is not readily accessible or useable
Appropriate scaling: : data doesn't provide adequate resolution for modeling outputs
Collaboration: : limited ability to work with others in accessing data, developing models, getting stakeholder buy-in
Transferability: : site-specific data & resulting models are applicable to other areas
Complexity: : model resolution (data granularity/scale) tradeoffs result in simple instead of complex model approaches
Funding: : funding limitations limit types of modeling used when more robust modeling is desired

What are the barriers in achieving modeling outputs to inform restoration?



Barrier	Please provide recommendations on how to address each barrier?				
Data availability	Dramatically update and modernize state surveys; add to them a monthly monitoring program for recruitment/ mortality	Funding	ID most uncertain data types limiting model resolution and focus on improvements: e.g., shell loss (taphonomic) rates, calibration of surface area-recruitment relationships,		
Model calibration and/or validation data	WE must get a forward-predicting hydrodynamic capbility to evaluate future conditions under climate change - see Curchitser for a ROMS application to the Mid-Atlantic	This is certainly related to data availability. Model calibration and validation should be undertaken with every type of model	for metapopulation models: transfer coefficients validated = source-sink relationships	Funding	
Complexity	Good models are complex - life is rough	Training	Good metadata to describe model use	Combining approaches (process-based/HSI/ ...) might help mitigate complexity or barriers related to one approach	development of detailed instructions for use/combined with training, AND open-source software!

KEY THEMES

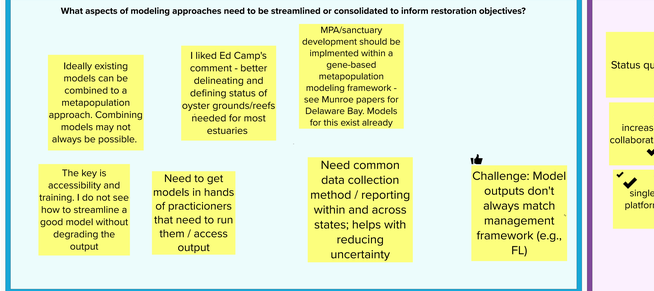
- Data availability doesn't always reflect spatiotemporal variability
- Monitoring is key but requires resources ($$$)
- Ease of use can be challenging
- Need for forwarding thinking / planning espec. wrt climate change

Page 4

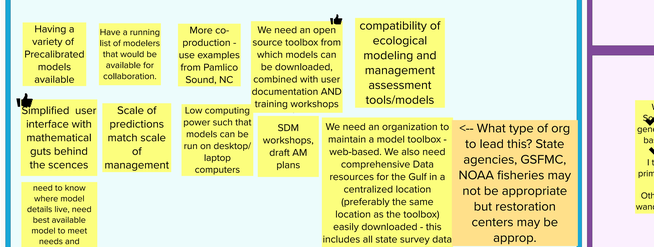
Achieving best modeling approaches for oyster habitat

75 min

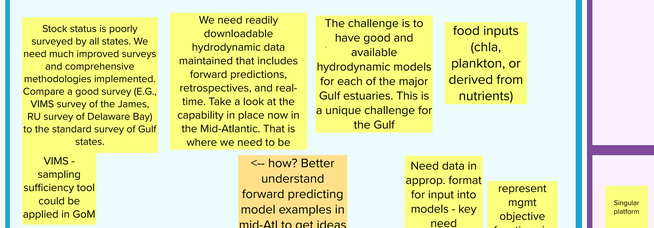
What aspects of modeling approaches need to be streamlined or consolidated to inform restoration objectives?



How can models be more readily accessible to managers?



What critical data are needed to achieve a streamlined approach to apply models to restoration efforts?



KEY THEMES

- In the absence of state mgmt goals or decision framework, hard to evaluate/apply these models; hard to tell decisionmakers how well strategy will do without those explicit goals (espec wrt ecosystem services compared to fisheries production and MSY)
- Takes time to get these objectives set up (e.g., animals as habitat vs production); communication not in modelers wheelhouse to fix
- Coordination across restoration and fisheries is needed at front end during model development; need clear problem statement at front end, define management need at front end, ID modeling needs/ application
- Scale: can we collectively agree on problem/mgmt statement at large spatial scale? Starting point: look at restoration goals but need more info on connecting general mgmt objectives to specifics of model output
- Need group coordinating research across GoM (e.g., restoration, fisheries) but recognize state-specific decisionmaking needs

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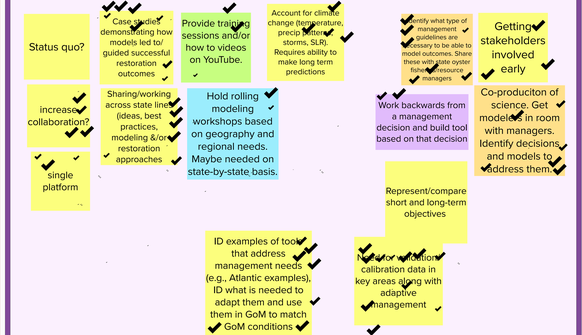
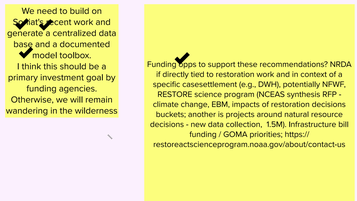
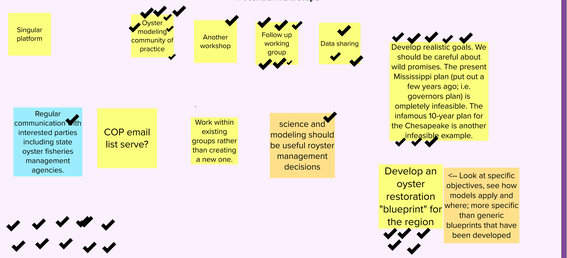
Next Steps

40 min

Please provide recommendations for how to advance modeling to enhance oyster restoration



How do we apply these recommendations?



Potential next steps