Oyster Futures

Stakeholder Workgroup

MEETING IX SUMMARY REPORT

Friday-Saturday, March 23-24, 2018
Horn Point Laboratory, University of Maryland
Cambridge Maryland

Summarized by:

FCRC CONSENSUS CENTER

"Facilitating Consensus Solutions, Supporting Collaborative Action."

THE FLORIDA STATE UNIVERSITY

OysterFutures Stakeholder Workgroup
Meeting IX Summary Report

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OYSTERFUTURES WORKGROUP MEETING IX
EXECUTIVE SUMMARY
MARCH 23-24, 2018

On behalf of the OysterFutures Research Team, Elizabeth North welcomed the Workgroup Members to the ninth and final Phase I meeting of the OysterFutures Workgroup and introduced the facilitation team of Jeff Blair and Bob Jones with the FCRC Consensus Center at Florida State University. The facilitators reviewed the agenda and the Workgroup approved the agenda and accepted the February 2018 Workgroup meeting summary without changes. The facilitator reminded the members of the Workgroup guidelines that were adopted at the organizational meeting in February 2016 which call for the development of a package of Workgroup consensus recommendations to DNR informed by the model which has been collaboratively developed by the Workgroup and the OysterFutures project research team. As in past meetings, members also completed a short Social Science Study survey at the outset and on Saturday afternoon after the review the final vote on the recommendations.

On the first day the Workgroup reviewed model results and began to discuss and rate options and draft recommendations. Dr. Wilberg reviewed the model results of each option highlighting its impact on oyster abundance, habitat and harvest. These included options on enforcement, rotational harvest, habitat modification/restoration, stocking, and combinations of these options.

Following a general overview, review and discussion of the modeling results, the Workgroup then rated each option and associated draft recommendation based on its acceptability and support, discussed concerns and offered refinements to the recommendations. The facilitators reminded the group that they agreed that the exact locations for adding shell, adding spat, and siting reef balls will be done in consultation with the respective shell committees, waterman and other key stakeholders as relevant for each option. The following captures the rating results:

A. THE NEED FOR CHANGE

1. The OysterFutures Workgroup recommends that DNR take swift and positive action to change existing regulations and policies regarding oyster management in the Choptank and Little Choptank Rivers. Maintaining the current Status Quo does not benefit the oyster resource or the ecosystem and human economies that depend on it. Change is needed. *(3/23 Rating: 4s-14, 3s-0, 2s-0, 1s-0; 100%)*

B. ENFORCEMENT RECOMMENDATIONS

The OysterFutures Workgroup reviewed enforcement options that could be modeled to determine their impact on oyster abundance, habitat, and harvest. The Workgroup found that enforcement and compliance play an important role in ensuring the protection of the oyster resource, and has the following recommendations:

1. In consultation with oyster resource stakeholders, DNR should enhance enforcement presence on the water, address and provide funding by increasing the numbers and training of compliance officers to address poaching and support strategies such as focusing on the buyer level. *(3/23 Rating: 4s-14, 3s-0, 2s-0, 1s-0; 100%)*
2. To enhance compliance, DNR should modify regulations so a single oyster bar is not divided between gear types, or where parts are open and other parts closed. *(3/23 Rating: 4s-14, 3s-0, 2s-0, 1s-0; 100%)*
3. To help inform and guide oyster resource participants in the Choptank system, DNR should address, correct and update DNR oyster resource mapping issues such as bottom mapping to better define oyster bars, and provide electronic maps that could be used with GPS chart programs. *(3/23 Rating: 4s-14, 3s-0, 2s-0, 1s-0; 100%)*
4. DNR should provide the necessary resources to make its website more user friendly. *(3/23 Rating: 4s-14, 3s-0, 2s-0, 1s-0; 100%)*
5. To protect the oyster resource, oyster populations, and the oyster industry, DNR should strive for full compliance with the current size laws and sanctuary regulations. *(3/23 Rating: 4s-14, 3s-0, 2s-0, 1s-0; 100%)*

C. LIMITED ENTRY RECOMMENDATION

The OysterFutures Workgroup discussed options for maintaining a level of fishing effort which would improve the long-term viability of the oyster fishery and the health of the oyster resource. The workgroup has the following recommendation:

1. Working together with oyster resource stakeholders, DNR should evaluate a limited entry oyster fishery that can provide access to watermen making the majority of their living from commercial fishing, enables generational succession in the fishery, and should have a way for new participants to gain entry that does not solely rely on having a large amount of capital. *(3/23 Rating: 4s-13, 3s-1, 2s-0, 1s-0; 100%)*

D. ROTATIONAL HARVEST RECOMMENDATION

1. The Workgroup evaluated opening portions of sanctuaries to rotational harvest where no restoration activities have taken place or are planned, and recommends that DNR implement a 2 year hand tong rotation in Middle Choptank sanctuary paired with planting spat on shell in the closed years. *(3/23 Rating: 1s-1, 3s-10, 2s-3, 1s-0; 79%)*

E. HABITAT MODIFICATION AND RESTORATION RECOMMENDATIONS

The OysterFutures Workgroup reviewed options for improving oyster habitat and restoring oyster populations, and conducted model runs to determine the impact of these options on oyster abundance, habitat, and harvest. The Workgroup found that habitat enhancement and restoration would significantly enhance the oyster resource and industry, and has the following recommendations:

1. Working in consultation with the Talbot County Oyster Shell Committee, DNR should increase the annual budget to support adding shell each year in Broad Creek to significantly

enhance the habitat, and increase oyster abundance and harvest. *(3/23 Rating: 4s-11, 3s-3, 2s-1, 1s-0; 93%)*

2. Working in consultation with the Dorchester County Oyster Shell Committee, DNR should open tributaries in the Little Choptank River to hand tonging, and increase the annual budget to support adding spat on shell every three years to significantly enhance the habitat and increase oyster abundance and harvest. *(3/23 Rating: 4s-7, 3s-5, 2s-3, 1s-0; 80%)*
3. DNR should work with federal partners to complete the planned restoration activities in the Little Choptank and Tred Avon Rivers. *(3/23 Rating: 4s-9, 3s-5, 2s-1, 1s-0; 93%)*
4. DNR should help coordinate stakeholder input in the permitting process to enable placement of privately-funded reefballs in the Middle Choptank River in areas that would not be in conflict with fishing activities (e.g., near/around the bridge, channel markers, etc.). *(3/23 Rating: 4s-7, 3s-8, 2s-0, 1s-0; 100% support])*

F. PLANTING HATCHERY- REARED SPAT RECOMMENDATION

The OysterFutures Workgroup reviewed options for planting hatchery-reared oysters, and conducted model runs to determine the impact of these options on oyster abundance, habitat, and harvest. The Workgroup found that planting hatchery-reared spat would enhance the oyster resource and industry, and has the following recommendation:

1. Working in consultation with the Dorchester and Talbot County Oyster Shell Committees, DNR should increase the annual budget to support adding spat on shell each year in the Middle Choptank River to enhance habitat and increase oyster abundance and harvest. *(3/23 Rating: 4s-4, 3s-10, 2s-1, 1s-0; 93%)*

G. SHELL RESOURCE RECOMMENDATIONS

The OysterFutures Workgroup recognizes the fundamental need for clean shell and substrate which will support many of their recommendations for enhancement of the oyster resource, including restoration, habitat improvement, and stocking.

1. The Workgroup recommends that DNR should evaluate and develop cost effective strategies, with engagement with stakeholders, for identifying sources of shells and substrate to supplement the oyster bars and increase the viability of the oyster resource. *(3/23 Rating: 4s-6, 3s-9, 2s-0, 1s-0; 80%)*
2. DNR should review the current state regulations and evaluate potential strategies, including providing economic incentives, to retain shell in the state of Maryland. *(3/23 Rating: 4s-13, 3s-2, 2s-0, 1s-0; 100%)*

H. COMBINED OPTIONS RECOMMENDATION

The OysterFutures Workgroup requested combinations of the options be considered and evaluated for implementation. Model results showed that the oyster resource and fishery would significantly improve when multiple options were combined.

1. The OysterFutures Workgroup recommends that DNR evaluate and consider combining options to take advantage of these improvements. *(3/24 Rating: 4s-12, 3s-3, 2s-0, 1s-0; 100%)*

Among the combined options modeled and considered, the Workgroup rated the three below with consensus support:

Combined Option with Rotational Harvest:

- Option 26a+16a+19: Add spat every year in Middle Choptank $600K; 2-yr rotation in Little Choptank tributaries with spat on shell $600K; Complete Little Choptank and Tred Avon restoration. *(3/24 Rating: 4s-0, 3s-13, 2s-2, 1s-0; 87%)*

Combined Options with Planting Hatchery-Reared Spat (Stocking):

- Option 26a+19+3: Add spat every year in the Middle Choptank investing a range between $600K-$2million; Complete Little Choptank and Tred Avon restoration; full compliance with current size laws and sanctuary regulations. *(3/24 Rating: 4s-2, 3s-13, 2s-0, 1s-0; 100%)*
- Option 26a+17a+19+23+3: Add spat every year in the Middle Choptank $600K; Add shell to each bar every year in Broad Creek $600K; Complete Little Choptank and Tred Avon restoration; Place reefballs in the Middle Choptank region; full compliance with current size laws and sanctuary regulations. *(3/24 Rating: 4s-6, 3s-7, 2s-2, 1s-0; 87%)*

I. CONSENSUS SOLUTIONS PROCESS RECOMMENDATION

1. Based on its experience with the consensus solutions process, the OysterFutures Workgroup recommends that DNR invest in and support this type of process for including stakeholders in decision making. The Workgroup has found that this type of structured engagement with stakeholders and scientists on oyster resource policies and management issues can meet the needs of industry, citizens, and government stakeholders and will result in better decisions that have the support of more groups. *(3/23 Rating: 4s-15, 3s-0, 2s-0, 1s-0; 100%)*

J. BUSINESS PRACTICES & MARKETING RECOMMENDATION

1. In recognition of the important role that the oyster industry plays in the Choptank region, the OysterFutures Workgroup recommends that DNR should work with other related Maryland, Virginia and Federal agencies to coordinate investments in marketing strategies and development of business plans that celebrate cultural heritage and support the oyster resources in the Chesapeake Bay and Choptank River system. Examples include developing a Chesapeake Oyster Trail, implementing a "True Blue" initiative for oysters, creating strategies to build on the growing consumer interest in local products, and partnering with the Working Waterfronts program. *(3/23 Rating: 4s-14, 3s-1, 2s-0, 1s-0; 100%)*

K. FEES & TAXES RECOMMENDATION

1. To assist with funding new efforts to enhance the oyster resource and industry, the OysterFutures Workgroup recommends that, in consultation with oyster resource stakeholders, DNR should evaluate and consider changes and increases of oyster fishery related fees and taxes (e.g., doubling the bushel tax and doubling the oyster surcharge) to support a thriving and healthy oyster resource for current and future generations. *(3/23 Rating: 4s-11, 3s-2, 2s-0, 1s-0, 2 abstentions by agency members; 100%)*

L. EDUCATION & TRAINING RECOMMENDATIONS

The OysterFutures Workgroup recognizes the important need to educate and train citizens about stewardship of the oyster fishery and resource, with the goal of maintaining thriving and healthy oyster resources for current and future generations. The Workgroup recommends that:

1. DNR should work with stakeholders and other agencies to support environmental education opportunities for the public and children on the important role of oyster resources in the region's economic viability, ecosystem, cultural heritage, and tourism. *(3/23 Rating: 4s-15, 3s-0, 2s-0, 1s-0; 100%)*
2. DNR, in consultation with oyster resource stakeholders, community colleges, and universities, should support educational programs which provide training and apprenticeships for the industry, fisheries science and management, and the consensus solutions process. *(3/23 Rating: 4s-14, 3s-1, 2s-0, 1s-0; 100%)*

M. RESEARCH RECOMMENDATIONS

In the process of developing the model, the OysterFutures Workgroup identified several knowledge gaps, which if filled, would enhance management of the oyster resource. The Workgroup supports conducting and funding the following research to:

1. Better understand the efficiency of gear types and their impacts on the oyster resource, habitat quality and shell. *(3/23 Rating: 4s-14, 3s-1, 2s-0, 1s-0; 100%)*
2. Continue to address and find solutions to reduce the effects of oyster diseases. *(3/23 Rating: 4s-15, 3s-0, 2s-0, 1s-0; 100%*
3. Review data from the restoration efforts to estimate the financial and economic benefits of enhanced water quality, including nutrient credit trading programs. *(3/23 Rating: 4s-15, 3s-0, 2s-0, 1s-0; 100%) 3-24- All OK with change.*
4. Support research to evaluate the economic benefits and impacts of the oyster fishery and replenishment activities. *(3/24 Rating: 4s-15, 3s-0, 2s-0, 1s-0; 100%)*
5. Review best management practices and outcomes for oyster resources and study and adapt successful techniques and applications from other places and regions. *(3/23 Rating: 4s-14, 3s-1, 2s-0, 1s-0; 100%)*
6. Conduct research on the performance of shell plantings over time. *(3/23 Rating: 4s-15, 3s-0, 2s-0, 1s-0; 100%)*
7. Conduct research on alternative ways to maximize the use of shell resources in plantings and restoration, e.g. cultchless seed setting. *(3/24 Rating: 4s-15, 3s-0, 2s-0, 1s-0; 100%)*

After completing the discussion and rating of options and draft recommendations on the second day of the workgroup meeting, the Facilitation Team requested a motion to approve the consensus package of recommendations.

The motion included direction to the Research and Facilitation Team to provide introduction language to the recommendation package consistent with the Workgroup's discussion and direction at the March 23-24, 2018 meeting.

Final Vote on the Motion to Approve the Consensus Package of Recommendations

The Workgroup unanimously adopted the Consensus Recommendations: Yes= 15, No= 0

Elizabeth North reviewed a draft executive summary with the Workgroup. Following the discussion, the Workgroup agreed that all of the consensus recommendations should appear in the Executive Summary. Other suggestions included simplifying the cover text, seeking images that represent every user group participating on the Workgroup, describing why the OysterFutures came together to work on charting a course for oysters, using the OysterFutures vision and purpose statements and providing some personal member reflections on the process.

For the full report, the Workgroup directed the Research and Facilitation Team to review the discussion comments at the final meeting regarding explanatory text in the context of the recommendations. The report should feature a description of both the consensus solutions process and the participatory modeling effort. The Workgroup agreed that the report should be delivered to Secretary Belton, DNR in mid-April and could be presented publicly at the Oyster Advisory Committee meeting on May 14, 2018. The Research Team would work with the UMCES Public Relations Office to develop a press/media and roll out strategy and would coordinate with DNR.

The Workgroup discussed Phase 2 of the OysterFutures process. The Workgroup discussed what the Phase 2 might feature and focus on. Elizabeth North noted the plan was to focus on future trends and impacts on the oyster resource such as nutrient trading, sea level rise, and temperature changes.

Rasika Gawde presented the water quality model that focused on nutrient reduction and water clarity results and noted the results provide accurate results in the shallow regions of the Choptank system.

In terms of Phase 2 funding, Elizabeth North noted that in discussions with NSF, they understand and accept the importance of successfully completing Phase 1, but have indicated they are not able to provide supplemental funding for the project's Phase 2. To move into Phase 2 it will be necessary to seek additional funding. Elizabeth mentioned the Research Team had been invited to submit a pre-proposal to The Campbell Foundation (focusing on nutrient trading, sea level rise and temperature changes on the oyster resource) and could seek funds from the Sloan Foundation (especially focusing on fuel/prices and transportation changes impacting the oyster resource).

Elizabeth North noted that 10 years ago The Campbell Foundation helped develop a proof-of-concept model to optimize investments in the oyster resource. Following extensive Workgroup discussions regarding Phase 2 funding, the Workgroup agreed that the Team could pursue the proposal to The Campbell Foundation on the condition that the OysterFutures consensus solutions process be supported with no strings attached or specific outcomes required so that the same people work together, including the Workgroup, Research and Facilitation Team, who worked together to build trust and reach consensus in Phase 1.

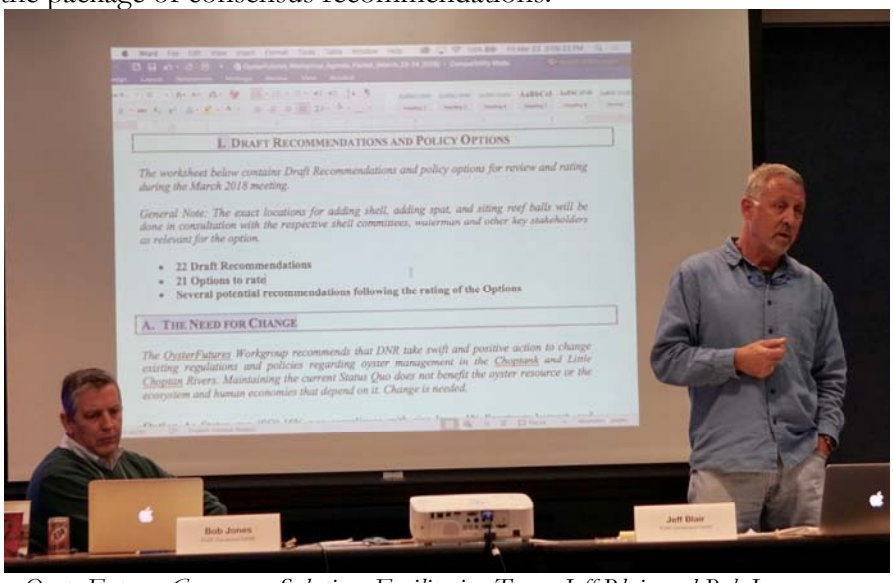
Workgroup members thanked the Team for a job well done and each other for the respectful dialogue and the willingness to engage on these important oyster resource issues over the course of 2 years. Dave Blazer noted, "Once we sit down and talk, we can help build a model that has helped us come up with good recommendations and options." Workgroup members completed meeting evaluations and the Research Team agreed to circulate a contact list of OysterFutures Workgroup Members, Research and Facilitation Team.

The meeting adjourned at 12:00 p.m. on Saturday.

OYSTER FUTURES WORKGROUP
MEETING IX SUMMARY
MARCH 23-24, 2018

I. WELCOME, INTRODUCTIONS AND REVIEW OF AGENDA AND WORKGROUP SUMMARY

On behalf of the Oyster Futures Research Team, Elizabeth North welcomed the Workgroup Members to the ninth meeting of the Oyster Futures Workgroup and introduced the facilitation team of Jeff Blair and Bob Jones with the FCRC Consensus Center at Florida State University. Following a workgroup member roll call *(See, Appendix #2 for the Workgroup members list and meeting participants)*, the facilitators reviewed the agenda *(See, Appendix #1)* and the Workgroup approved the agenda and accepted the February 2018 Work Group meeting summary without changes. The facilitator reminded the members of the workgroup guidelines that were adopted at the organizational meeting in February 2016 which call for the development of consensus on a package of Workgroup recommendations to DNR informed by the model and the options which has been collaboratively identified and developed by the Workgroup and the OysterFutures project research team. As in past meetings, members also completed a short Social Science Study survey at the outset and on Saturday morning following the final vote on the package of consensus recommendations.



OysterFutures Consensus Solutions Facilitation Team: Jeff Blair and Bob Jones

II. OVERVIEW AND DISCUSSION OF MODELED OPTIONS

A. OVERVIEW OF MODEL UPDATES AND OPTIONS

Mike Wilberg noted that, following the February 2018 OysterFutures Workgroup meeting, the Research Team worked with Chris Judy at DNR to conduct a new analysis and produce some new estimates for options that involve shell additions. Previously it was assumed that spat survival on new shell was the same as on existing shell. DNR provided data which compared spat/bushel of cultch in areas with and without shell plantings. On average, spat per bushel of cultch was 3.42 times higher in areas with shell plantings. The amount of shell that was planted on the bars was significantly more than what was simulated in the OysterFutures simulation model in the options for planting shell (i.e. 2-4 inches vs. ½ inch in the OysterFutures model).

The model was run using both assumptions about spat survival (no difference between clean and old shell, and 3.42 times higher survival on clean shell) and results indicate that the model was sensitive to the numbers used to simulate survival during the first year of planting. When survival was 3.42 times higher in areas with shell plantings during the first year, the model predicted large increases in oyster abundance, harvest, and ecosystem services compared to model runs with the assumption that spat survival on new shell was the same as on old shell. The model runs with higher spat survival on freshly planted shell helped bring model predictions more in line with the experience of stakeholders in Broad Creek. Based on the Workgroup guidance in February 2018, Mike Wilberg stated that the model was used to test the following options:

- **Compliance with minimum size limit and sanctuary regulations**
- **Rotational harvest (with spat on shell):** Middle Choptank and Little Choptank
- **Shell additions and spat on shell additions:** Broad Creek (shell) & Little Choptank (shell or spat on shell)
- **Restoration;** Complete Lit. Choptank and Tred Avon restorations; Middle Choptank restoration (with reefballs)
- **Planting hatchery-reared spat on shell** (in the Middle Choptank)
- **Combination options**

B. REVIEW OF MODELING RESULTS

Mike Wilberg reported that in general, all options making it this far in the Workgroup process tended to be positive across performance measures, took 5-10 years to realize strong benefits, and increased in cost-effectiveness over time. He congratulated the Workgroup on selecting options that performed positively on almost every measure.

Workgroup Questions and Comments

- Is there any information on the age of the shell at the 'natural bar' comparison sites? *A: Natural bar comparison sites may have had shell planting but if they did the planting would have been very old (5 yrs or more) at the time of the comparison.*
- Is there any scaling? Would planting ½ vs 2 inches of shell decrease spat set by ¼?: *A: Not sure. The model approach was to use book end scenarios with the answer somewhere in the middle.*
- What did the DNR data suggest? *A: The DNR data showed performance for new shell plantings resulting in the 3.42 enhancement figure and suggested that performance is best the year of planting and that over time the enhancement will become compromised.*
- In terms of the years included in the shell planting analysis, only 1997 was a good year.
- On Option 19, why does it jump up on harvest if not harvestable in the sanctuary? *A: if the Sanctuary area grows in terms of abundance, this creates better spat sets in the nearby areas that are open to fishing.*
- In Option 19, are we assuming that the prongs of Lower Choptank River open? *A: Not in this option.*
- How are we treating the prongs of Lower Choptank River in the combination of 16 and 19? *A: Because no there is no restoration in the prongs, the model is indicating that they will be open to fishing (hand tong).*
- Are the sanctuary areas that are close by the harvested areas contributing oyster larvae? *A: Yes.*
- Stocking: spat on shell in part of Middle Choptank (open). 26a 26b- some of the best options for overall harvest. Relatively good in increasing abundance as well.
- Do Options 18a and 18b- include completing sanctuaries? *A: No.*
- Why does the shell seem to have less effect in the Little Choptank than Broad Creek? *A: The model indicates that more larvae are getting to Broad Creek than in Little Choptank.*
- Does model predict the nature of Little Choptank River as well as Broad Creek? *A: No. The habitat maps from Broad Creek include sonar surveys. However, the prongs were not surveyed. The habitat size, amount and exact location are less well known in the Little Choptank. The hydrodynamics that are part of the larval transport model are well validated in the Choptank River but not in the Little Choptank River.*
- Should we be less confident in the model results in Little Choptank? *A: Yes but the size of the effect should be well represented unless we are underestimating the amount habitat.*
- Local knowledge suggests that recruitment is better in the Little Choptank. *A: True. The model results are driven by larvae supply which results in a bigger return on same amount of shell being put out.*
- What is the value of nitrogen removal vs. costs of restoration efforts. *A: There is a potential for a large benefit for nitrogen removal. Positive enforcement results are tied back in the model to how many oysters on the reef. The combinations of options produce the largest increases in oyster abundance and therefore the largest nitrogen removal numbers.*
- Does the model assume that nitrogen removal is done and cashed out? *A: The model estimates the social benefit of nitrogen, not the value it would have if there was a nutrient trading market. The social benefit values assume that the effect of oysters would were based on comparisons with nutrient reduction projects which were planned in Talbot and Dorchester Counties. We didn't model on credit values since they are not yet set. It was based on value in terms of implementing County TMDLs (Total Maximum Daily Loads).*

- We should do both scenarios to see what is the nitrogen removal contribution with and without harvesting. *A: The performance measures for N removed by reef and catch show this difference.*
- Need good preamble language in the report so this is not misunderstood.
- What is the source of the cost information of completing option 19 which appears to be $14-15 million spread out over time? *A: Cost info is based on NOAA tributary plans and total areas planned for restoration.*
- *Option 16 not a strong performer. Didn't get much change in abundance or harvest.*
- What are the benefits of implementing the options? *A: All performance measures of benefits are limited in their nature (in other words, the model does not predict all of the benefits that oysters provide). For the benefits that are capture in the model, most appear by 10 years out.*
- Why does Option 26 a/b (stocking in the Middle Choptank with spat on shell) not differ by a consistent amount relative to the status quo? *A: We can't provide a certain answer to you without detailed exploration of model results. It could be because of the difference between status quo and harvest changes over time. It goes up quickly at first, (i.e. harvest increasing faster than status quo) and then levels off. There will be less of difference at the end than at the beginning between status quo and options 26 a/b.*
- At its "worst" the option is much better than status quo and each location is a little different.

Mike Wilberg and Elizabeth North reviewing modeling results

III. CONSENSUS RATING OF MODELED OYSTER FUTURES OPTIONS AND RECOMMENDATIONS

The facilitators noted there were 22 Draft Recommendations with 21 modeled options to rate and several potential additional recommendations following the rating of the Options. The facilitators noted that for all options, the exact locations for adding shell, adding spat, and siting reef balls will be done in consultation with the respective shell committees, waterman and other key stakeholders as relevant for the option. Below are the various draft recommendations and options consensus ratings and comments.

A. THE NEED FOR CHANGE

1. The OysterFutures Workgroup recommends that DNR take swift and positive action to change existing regulations and policies regarding oyster management in the Choptank and Little Choptank Rivers. Maintaining the current Status Quo does not benefit the oyster resource or the ecosystem and human economies that depend on it. Change is needed.
   (3/23 Rating: 4s-15, 3s-0, 2s-0, 1s-0; 100%)

March 23-24 OysterFutures Workgroup Meeting, Horn Point Laboratory, UMCES

B. ENFORCEMENT RECOMMENDATIONS

The OysterFutures Workgroup reviewed enforcement options that could be modeled to determine their impact on oyster abundance, habitat, and harvest. The Workgroup found that enforcement and compliance play an important role in ensuring the protection of the oyster resource, and has the following recommendations:

1. In consultation with oyster resource stakeholders, DNR should enhance enforcement presence on the water, address and provide funding by increasing the numbers and training of compliance officers to address poaching and support strategies such as focusing on the buyer level.
   (3/23 Rating: 4s-14, 3s-0, 2s-0, 1s-0; 100%)

2. To enhance compliance, DNR should modify regulations so a single oyster bar is not divided between gear types, or where parts are open and other parts closed.
   (3/23 Rating: 4s-14, 3s-0, 2s-0, 1s-0; 100%)

3. To help inform and guide oyster resource participants in the Choptank system, DNR should address, correct and update DNR oyster resource mapping issues such as bottom mapping to better define oyster bars, and provide electronic maps that could be used with GPS chart programs.
   (3/23 Rating: 4s-14, 3s-0, 2s-0, 1s-0; 100%)

4. DNR should provide the necessary resources to make its website more user friendly.
   (3/23 Rating: 4s-14, 3s-0, 2s-0, 1s-0; 100%)

5. To protect the oyster resource, oyster populations, and the oyster industry, DNR should strive for full compliance with the current size laws and sanctuary regulations.
   (3/23 Rating: 4s-14, 3s-0, 2s-0, 1s-0; 100%)

Comments before Rating #5

- This assumes 5%? *A: Yes*

The Workgroup agreed not to rate Enforcement Options 2 & 3 as they are incorporated in #5 above.

- ~~**Option 2:** Status quo with complete compliance with current minimum size laws, no additional enforcement of sanctuaries (1% Sanctuary harvest).~~
- ~~**Option 3:** Full compliance with the current size laws and sanctuary regulations (i.e., increased enforcement of minimum size regulations and sanctuaries).~~

C. LIMITED ENTRY RECOMMENDATION

The OysterFutures Workgroup discussed options for maintaining a level of fishing effort which would improve the long-term viability of the oyster fishery and the health of the oyster resource. The workgroup has the following recommendation:

1. Working together with oyster resource stakeholders, DNR should evaluate a limited entry oyster fishery ~~in the Choptank River system~~ that can provide access to watermen making the majority of their living from commercial fishing, enables generational succession in the fishery, and should have a way for new participants to gain entry that does not solely rely on having a large amount of capital.
   [3/23 Rating: 4s-13, 3s-1, 2s-0, 1s-0; 100%]
   (February 4, 2018 Unanimous Support; April 2016, Theme A—Rating Average: 3.9 of 4)

Comments before Rating the Recommendation

- Delete "Choptank River system"- as this is not a recommendation for limited entry for the rest of the state.
- Established law and precedent directs that a license allows fishing anywhere in the state.
- "Generational succession" -how will this be clarified to not knock out family members: *A: Existing statute provides that certain relatives can pass license to and name beneficiary.*

Comments after Rating the Recommendation

- 3 rating- Minor concern that the charge is specific to Choptank Rivers system.

OysterFutures Workgroup Consensus Testing, March 23-24, 2018

D. ROTATIONAL HARVEST RECOMMENDATION AND OPTIONS

The Workgroup evaluated opening portions of sanctuaries to rotational harvest where no restoration activities have taken place or are planned.

1. The Workgroup recommends that DNR implement a 2 year hand tong rotation in Middle Choptank sanctuary paired with planting spat on shell in the closed years.
   (13 a- 3/23 Rating: 1s-1, 3s-10, 2s-3, 1s-0; 79%)

Workgroup Discussion and Rating of Rotational Havest Options

Option 13a: 2-yr hand tong rotation in Middle Choptank sanctuary (cost ~$600K/year), paired with planting spat on shell in the closed years**.**
(13 a- 3/23 Rating: 1s-1, 3s-10, 2s-3, 1s-0; 79%)
Comments before Rating

- What was changed on this? *A: This was the same option as last time.*

Comments after Rating

- No problem with restocking. Never specified- some require huge amounts of additional shell and resources. Stands alone.
- Concerned about recommended options that may compete with each other?
- Want to see how other recommendations shake out.
- Looking at entire list and dollar figures, we can't get it all done. Can we prioritize some of these?
- Recommendations to DNR will be sorted through engagement with stakeholders in terms of implementation.
- Address the concern with a derby problem with any kind of rotation other than with a dredge. Could it stay open with hand tongs to cut back on the derby effect?

- Consider Option. 13a without the rotational component in the stocking section?
- Rate these options and recommendations on the merits and let DNR figure out the resource investment questions.
- Prioritization- there should be some accompanying text regarding limited resources and DNR's consideration working with stakeholders.
- Recommendation- should it focus on rotational harvest generally with DNR's consideration of options that reached the level of "consensus" (75% or more)?
- If we look at prioritizing concepts using the level of resources, we should also make sure we are supporting more shell production and infrastructure and a more sustainable industry. We don't want to lose this as an enormous opportunity.

Option 13b: 2-yr hand tong rotation in Middle Choptank sanctuary (cost ~$2M/year), paired with planting spat on shell in the closed years**.**
(3/23 Rating: 4s-0, 3s-10, 2s-5, 1s-0; 67%)

Option 16a: 2-yr hand tong rotation in Little Choptank tributaries (cost ~$600K/yr.), paired with planting spat on shell in the closed years.
(3/23 Rating: 4s-2, 3s-9, 2s-4, 1s-0; 73%)

Option 16b: 2-yr hand tong rotation in Little Choptank tributaries (cost ~$2M/yr.), paired with planting spat on shell in the closed years.
(3/23 Rating: 4s-0, 3s-9, 2s-6, 1s-0; 60%)
Comments after Rating Option 16b

- Abundance and harvest- get more by keeping the prongs closed.
- Concern- 16 b- not much difference in economy of scale. Not getting a lot more than the 16a

E. HABITAT MODIFICATION AND RESTORATION RECOMMENDATIONS & OPTIONS

The OysterFutures Workgroup reviewed options for improving oyster habitat and restoring oyster populations, and conducted model runs to determine the impact of these options on oyster abundance, habitat, and harvest. The Workgroup found that habitat enhancement and restoration would significantly enhance the oyster resource and industry, and has the following recommendations:

1. Working in consultation with the Talbot County Oyster Shell Committee, DNR should ~~-~~increase the ~~establish an~~ annual budget ~~of $600,000-$2,000,000~~ to support adding shell each year in Broad Creek to significantly enhance the habitat, and increase oyster abundance and harvest.
   Supporting text to describe the modeling effort and the options with investments.
   (3/23 Rating: 4s-11, 3s-3, 2s-1, 1s-0; 93%)
   Comments before Rating
   - Strike the range? Leave the annual.
   - We looked at model runs. Will this be referenced with this recommendation? A: Yes. The ranges considered.

   Workgroup Discussion of Options 17a & 17b
   Option 17a: Add shell to selected bars every year in Broad Creek (cost ~$600K/year).
   Option 17b: Add shell to selected bars every year in Broad Creek (cost ~$2M/year).

- Graphs/charts- updated info, sensitivity study shows they scale higher? *A: Yes.*
- Performance for shell in Broad Creek- concerns in past meetings- model not performing to expectations. *A: Look at letters B & C sensitivity results for these options, which give some of the highest harvests for any option.*
- How to balance the new input with this?
- How does this effect the later rating in the Combos? *A: The Workgroup can consider and rate acceptability of any combination of options whether they reached consensus standing alone or not.*
- The numbers from past 10 years would be more in terms of spat recruitment. This may suggest a "bigger bang for the buck" going forward for abundance and harvest. Still going back 20 years in data in model. *A: The data DNR/ Chris Judy provided has data outside the Choptank with similar increases in the same timeframes, so the effect of clean shell has been seen elsewhere.*
- Not comfortable rating these options with such differences. Don't know where the reality is. This suggests a large disparity in the sensitivity in the model.
- Going forward, DNR should collect additional data comparing natural oyster bars and planted areas for Broad Creek.
- The model with 3.4 is more correct- there is more spat settlement on clean shell.
- Best uses of model- identify the things we don't know well that have the biggest impact. Pair recommendation for management option with a study to see how it pans out in reality.
- Recommendations should be followed with monitoring for understanding and validating the model.
- Broad range of investments is a concern. Should we vote on a $$ range vs. a single figure? DNR should figure out how much goes where in consultation with stakeholders.
- Support this as it is good idea to put fresh shell in Broad Creek.
- Sensitivity analysis- with 3.4 is more correct- more spat settlement on clean shell. *A: Didn't include in spat on shell options. Only included in shell only options. Shell only is put out at a time that catches spat, and spat on shell can be put out at times when larvae are not in the water.*

2. Working in consultation with the Dorchester County Oyster Shell Committee, DNR should open tributaries in the Little Choptank River to hand tonging, and ~~establish an~~ increase the annual budget ~~of $600,000-$2,000,000~~ to support adding ~~shell and/or~~ spat on shell ~~each~~ every three years to significantly enhance the habitat and increase oyster abundance and harvest.
(3/23 Rating: 4s-7, 3s-5, 2s-3, 1s-0; 80%)

Comments after Rating

- Delete "establish" and the range and insert "increase the annual budget."
- Delete "shell and/or and use "every three years" instead of "each."
- Keeping prongs closed gives more abundance. Does it give more harvest? *A: Yes*
- Enforcement concerns- not one clear line.
- Concern about the level of relative investment here.

Workgroup Discussion and Rating of Options

Option 18: Open tributaries in the Little Choptank River to hand tonging, and provide added shell every 3 years (cost ~$460K/year).

(3/23 Rating: 4s-0, 3s-7, 2s-8, 1s-0; 47%)

Comments before Rating

- Every 3 years? Would it increase the odds of success in spreading shells every year?

Option 18a: Open tributaries in the Little Choptank River to hand tonging, and provide added spat on shell every 3 years (cost ~$600K/year).

(3/23 Rating: 4s-5, 3s-5, 2s-4, 1s-0; 71%)

Option 18b: Open tributaries in the Little Choptank River to hand tonging, and provide added spat on shell every 3 years (cost ~ $2M/year).

(3/23 Rating: 4s-6, 3s-3, 2s-5, 1s-0; 64%)

3. DNR should work with federal partners to complete the planned restoration activities in the Little Choptank and Tred Avon Rivers.

(3/23 Rating: 4s-9, 3s-5, 2s-1, 1s-0; 93%)

Comments before Rating

- Option 19 modeled as planned. If changes made since Feb 2018, they are not reflected in the model.
- Have the official tributary plans have changed? *A: No but the implementation may be different.*
- How is status quo in the restoration plan? *A: It models various restoration actions through 2016 as having been done.*

Workgroup Discussion and Rating of Option 19

Option 19: Complete Little Choptank and Tred Avon restoration (6" and 12" substrate per restoration plan.)

(3/23 Rating: 4s-9, 3s-6, 2s-1, 1s-0; 93%)

Comments after Rating

- Concerned about substrate.

4. DNR should help coordinate stakeholder input in the permitting process to enable placement of privately-funded reefballs in the Middle Choptank River in areas that would not be in conflict with fishing activities (e.g., near/around the bridge, channel markers, etc.).

(3/23 Rating: 4s-7, 3s-8, 2s-0, 1s-0; 100%)

Workgroup Discussion and Rating of Option 23

Option 23: Place reefballs (placed near/around the bridge, channel markers, etc.) in the Middle Choptank region (reef balls, 1 foot apart, 1 time, cost ~$2M) not in conflict with fishing activities. Work with watermen for placement options. *[Note: private funding will be used for implementation of this Option]*

(3/23 Rating: 4s-7, 3s-8, 2s-0, 1s-0; 100%)

Workgroup Discussing Draft Recommendations, March 23-24, 2018

F. PLANTING HATCHERY- REARED SPAT RECOMMENDATION

The OysterFutures Workgroup reviewed options for planting hatchery-reared oysters, and conducted model runs to determine the impact of these options on oyster abundance, habitat, and harvest. The Workgroup found that planting hatchery-reared spat would enhance the oyster resource and industry. The Workgroup has the following recommendation:

1. Working in consultation with the Dorchester and Talbot County Oyster Shell Committees, DNR should <u>increase the</u> ~~establish an~~ annual budget ~~of $600,000-$2,000,000~~ to support adding spat on shell each year in the Middle Choptank River to enhance habitat and increase oyster abundance and harvest.
   (3/23 Rating: 4s-4, 3s-10, 2s-1, 1s-0; 93%)

   Comments before Rating
   - Specific to one bar (as modeled). Specify it is Turtle Back. Up to shell committees to decide.
   - Maps will be included in the final report? *A: Yes.*

   Comments after Rating
   - Same as before- not against reseeding.

   Related Options- Not Rated
   Option 26a: Add spat every year in the Middle Choptank (cost ~$600K/year).
   Option 26b: Add spat every year in the Middle Choptank (cost ~$2M/year).

G. SHELL RESOURCE RECOMMENDATIONS

The OysterFutures Workgroup recognizes the fundamental need for clean shell and substrate which will support many of their recommendations for enhancement of the oyster resource, including restoration, habitat improvement, and stocking.

1. <u>The Workgroup recommends that</u> DNR should evaluate and develop cost effective strategies ~~for increasing the funding, use and reclamation of local shells from the Chesapeake Bay and from~~

~~local watermen~~ with engagement with stakeholders for identifying sources of shells and substrate to supplement the oyster bars and increase the viability of the oyster resource.
(3/23 Rating: 4s-6, 3s-9, 2s-0, 1s-0; 100%)

Comments before Rating of the Revised Recommendation

- Does it have to be confined to shell? E.g. Small limestone etc. Use "substrate"
- Specific to any practice or recycling shell? *A: Evaluate and develop.*
- What does "Reclamation" mean. Are we talking about the Choptank System" only?
- Should we clarify "Talbot and Dorchester County waters"?
- Should we clarify that these are "non-fossil shells"?
- Is this a recommendation for "Man-O-War Shoals shells"?
- Shells from "Man-O-War" Shoals are not fossils, but buried shells.
- Should we exclude the upper Chesapeake from the recommendation?
- Should this cover any shell that could be reclaimed by traditional watermen practices?
- Does this include shell previously placed on bars?
- This issue is bigger than this room and is an ongoing conflict.
- We need acceptable language that makes this happen. The language should be general in terms of shells.
- Another problem is funding for shell and seed.
- Don't understand environmental concerns about Man–O-War Shoals.

2. DNR should review <u>the current state regulations and evaluate potential strategies including providing economic incentives to retain shell in the state of Maryland.</u>
~~including providing incentives for establishing shucking houses in Maryland to enhance the local capacity to address shell replenishment~~.
(3/23 Rating: 4s-13, 3s-2, 2s-0, 1s-0; 100%)

Comments before Rating the Revised Recommendation

- Economic analysis why there are no shucking houses in Maryland? Is there a market? Why doesn't it exist?
- The supply of oysters (national contraction of markets with the most cost efficient businesses surviving) is why the shucking houses fell off. If supply increases it may bring back the possibility of retaining shells in Maryland.
- Generally it is easy for markets to contract but much harder to expand. That's why incentives are considered.
- Maryland currently handles out-of-state buyers differently. Shucking houses couldn't compete. Out of state shucking houses provided more cost competitive shell.
- DNR should review the current state regulation.
- Without a state incentive, it is difficult for this to happen.
- "Establishing shucking houses." Maybe too specific, when what we need are incentives to get shell back into state.

Workgroup Discussing Draft Recommendations, March 23- 24, 2018

H. COMBINED OPTIONS RECOMMENDATION AND OPTIONS

WORKGROUP DRAFT RECOMMENDATION ON COMBINING OPTIONS:

1. The OysterFutures Workgroup requested combinations of the options be considered and evaluated for implementation. Model results showed that the oyster resource and fishery would significantly improve when multiple options were combined. The OysterFutures Workgroup recommends that DNR evaluate and consider combining options to take advantage of these improvements.
   (3/24 Rating: 4s-12, 3s-3, 2s-0, 1s-0; 100%)

   Among the combined options modeled and considered, the Workgroup rated the three below with 75% or greater consensus support:

   Combined Option with Rotational Harvest:

   - Option 26a+16a+19: Add spat every year in Middle Choptank $600K; 2-yr rotation in Little Choptank tributaries with spat on shell $600K; Complete Little Choptank and Tred Avon restoration.
     (3/24 Rating: 4s-0, 3s-13, 2s-2, 1s-0; 87%)

     Individual Option Ratings from 3/23:
     - *Option 26a incorporated into Planting Recommendation #1 4s-4, 3s-10, 2s-1, 1s-0; 93%*
     - *Option 16a 3/23 Rating: 4s-2, 3s-9, 2s-4, 1s-0; 73%*
     - *Option 19 Rating: 4s-9, 3s-5, 2s-1, 1s-0; 93%*

Combined Options with Planting Hatchery-Reared Spat (Stocking):

- Option 26a+19+3: Add spat every year in the Middle Choptank investing a range between $600K- $2M; Complete Little Choptank and Tred Avon restoration; full compliance with current size laws and sanctuary regulations.
  (3/24 Rating: 4s-2, 3s-13, 2s-0, 1s-0; 100%)

  Individual Option Ratings from 3/23:
  - *Option 26a incorporated into Planting Recommendation #1- 4s-4, 3s-10, 2s-1, 1s-0; 93%*
  - *Option 19 Rating: 4s-9, 3s-5, 2s-1, 1s-0; 93%*
  - *Option 3 incorporated into Enforcement recommendation #1: 4s-14, 3s-0, 2s-0, 1s-0; 100%)*

- Option 26a+17a+19+23+3: Add spat every year in the Middle Choptank $600K; Add shell to each bar every year in Broad Creek $600K; Complete Little Choptank and Tred Avon restoration; Place reefballs in the Middle Choptank region; full compliance with current size laws and sanctuary regulations.
  (3/24 Rating: 4s-6, 3s-7, 2s-2, 1s-0; 87%)

  Individual Option Ratings from 3/23:
  - *Option 26a incorporated into Planting Recommendation #1- 4s-4, 3s-10, 2s-1, 1s-0; 93%*
  - *Option 17a incorporated into Habitat Recommendation #1 - 4s-11, 3s-10, 2s-1, 1s-0; 93%*
  - *Option 19 Rating: 4s-9, 3s-5, 2s-1, 1s-0; 93%*
  - *Option 23- Rating: 4s-7, 3s-8, 2s-0, 1s-0; 100%*
  - *Option 3 incorporated into Enforcement recommendation #1: 4s-14, 3s-0, 2s-0, 1s-0; 100%*

The combined options that did not receive consensus support included:

- Option 16b+19: 2-yr rotation in Little Choptank tributaries with spat on shell ~$2M; Complete Little Choptank and Tred Avon restoration.
  (3/24 Rating: 4s-0, 3s-9, 2s-6, 1s-0; 60%)
- Option 16b+19+3: 2-yr rotation in Little Choptank tributaries with spat on shell ~$2M; Complete Little Choptank and Tred Avon restoration; full compliance with current size laws and sanctuary regulations. *[Previous Option15b+19+3 revised from a 3-year to a 2-year rotation (February 2018 Rating 64%)]*
  (3/24 Rating: 4s-0, 3s-11, 2s-4, 1s-0; 73%)

I. CONSENSUS SOLUTIONS PROCESS RECOMMENDATION

1. Based on its experience with the consensus solutions process, the OysterFutures Workgroup recommends that DNR ~~and NOAA~~ invest in and support this type of process for including stakeholders in decision making. The Workgroup has found that this type of structured engagement with stakeholders and scientists on oyster resource policies and management issues can meet the needs of industry, citizens, and government stakeholders and will result in better decisions that have the support of more groups.
   (3/23 Rating: 4s-15, 3s-0, 2s-0, 1s-0; 100%)

J. BUSINESS PRACTICES & MARKETING RECOMMENDATION

1. In recognition of the important role that the oyster industry plays in the Choptank region, the OysterFutures Workgroup recommends that DNR should work with other related Maryland, Virginia and Federal agencies to coordinate investments in marketing strategies and development of business plans that celebrate cultural heritage and support the oyster resources in the Chesapeake Bay and Choptank River system. Examples include developing a Chesapeake Oyster Trail, implementing a "True Blue" initiative for oysters, creating strategies to build on the growing consumer interest in local products, and partnering with the Working Waterfronts program.
   (3/23 Rating: 4s-14, 3s-1, 2s-0, 1s-0; 100%)

Workgroup Discussion of Recommendations

K. FEES & TAXES RECOMMENDATION

1. To assist with funding new efforts to enhance the oyster resource and industry, the OysterFutures Workgroup recommends that, in consultation with oyster resource stakeholders, DNR should evaluate and consider changes and increases of oyster fishery related fees and taxes (e.g., doubling the bushel tax and doubling the oyster surcharge) to support a thriving and healthy oyster resource for current and future generations.
   (3/23 Rating: 4s-11, 3s-2, 2s-0, 1s-0, Dave Blazer DNR and Stephanie Westby NOAA abstained from the rating ; 100%)

L. EDUCATION & TRAINING RECOMMENDATIONS

The OysterFutures Workgroup recognizes the important need to educate and train citizens about stewardship of the oyster fishery and resource, with the goal of maintaining thriving and healthy oyster resources for current and future generations. The Workgroup recommends that:

1. DNR should work with stakeholders and other agencies to support environmental education opportunities for the public and children on the important role of oyster resources in the region's economic viability, ecosystem, cultural heritage, and tourism.
   (3/23 Rating: 4s-15, 3s-0, 2s-0, 1s-0; 100%)

2. DNR, in consultation with oyster resource stakeholders, community colleges, and universities, should support educational programs which provide training and apprenticeships for the industry, fisheries science and management, and the consensus solutions process.
   (3/23 Rating: 4s-14, 3s-1, 2s-0, 1s-0; 100%)

M. RESEARCH RECOMMENDATIONS

In the process of developing the model, the Oysterfutures Workgroup identified several knowledge gaps, which if filled, would enhance management of the oyster resource. The Workgroup supports conducting and funding the following research to:

1. Better understand the efficiency of gear types and their impacts on the oyster resource, habitat quality and shell.
   (3/23 Rating: 4s-14, 3s-1, 2s-0, 1s-0; 100%)

2. Continue to address and find solutions to reduce the effects of oyster diseases.
   (3/23 Rating: 4s-15, 3s-0, 2s-0, 1s-0; 100%

3. Review data from the restoration efforts to estimate the financial and economic <u>benefits</u> ~~impact~~ of enhanced water quality, including nutrient credit trading programs.
   (3/23 Rating: 4s-15, 3s-0, 2s-0, 1s-0; 100% 3-24- All OK with change.)

4. Support research to evaluate the economic benefits and impacts of the oyster fishery and replenishment activities.
   (3/24 Rating: 4s-15, 3s-0, 2s-0, 1s-0; 100%)

5. Review best management practices and outcomes for oyster resources and study and adapt successful techniques and applications from other places and regions.
   (3/23 Rating: 4s-14, 3s-1, 2s-0, 1s-0; 100%)

6. Conduct research on the performance of shell plantings over time.
   (3/23 Rating: 4s-15, 3s-0, 2s-0, 1s-0; 100%)

7. Conduct research on alternative ways to maximize the use of shell resources in plantings and restoration, e.g. cultchless seed setting.
   (3/24 Rating: 4s-15, 3s-0, 2s-0, 1s-0; 100%)

N. Final Vote on the Consensus Package of Recommendations

The Workgroup made a motion to adopt the package of consensus recommendations with direction to the Research and Facilitation Team to provide introduction language consistent with the Workgroup's discussion and direction at the March 23-24 meeting.

The Workgroup unanimously adopted the Consensus Recommendations

Yes= 15 **No= 0**

IV. NEXT STEPS

A. Workgroup's Report and Recommendations to DNR

1. Executive Summary

Elizabeth North reviewed a draft executive summary with the Workgroup. Following the discussion, the Workgroup agreed that all of the consensus recommendations should appear in the Executive Summary. There were also suggestions to:

- Simplify the cover text;
- Seek images that represent every user group participating on the Workgroup(including intergenerational pictures). Workgroup members agreed to share photos for use in the report;
- Build a story of the last 100 years of the Choptank oyster fishery and why OysterFutures came together to work on charting a course for the future;
- Use the OF vision and purpose statements;
- Provide personal member reflections (written and on video) about the OysterFutures consensus process.

2. Full Report & Dissemination Plan

For the full report, the Research and Facilitation Team should review the discussion comments at the final meeting regarding explanatory text in the context of the recommendations. The Workgroup agreed that the report should be delivered to Secretary Belton, DNR in April (three weeks before the Oyster Advisory Commission) and be presented publicly at the Oyster Advisory Committee meeting on May 14, 2018. The Research Team would work with UMCES public relations office to develop a press and roll out strategy that would be coordinated with DNR. The Workgroup agreed the final report should include:

- The OysterFutures statement of purpose, project description, and short history of the Choptank fishery, and the stakeholders recommendations.
- A description of the consensus solutions process and on the level of trust that was built among stakeholder. *A: The facilitators will draft a description of the process.*

- A description of the participatory modeling process and stakeholders input on the model. *A: Mike Wilberg will draft a description using some images. A public website will be built to include all the model files and results and the OysterFuture meeting summaries. The team will deliver all the files to DNR when it submits the final report.*

Bob Jones mentioned an invitation to present the OysterFutures as a case study at a national facilitator conference on June 14, 2018 in Arlington VA. He promised to send Workgroup members an invitation and more information on the conference. Elizabeth North noted the possibility of covering travel costs of members to the conference.

Chris Hayes, a member of the OF Research Team described a research project to document the consensus process and requested to follow up with short phone interviews. Stakeholders agreed to participate in a 20 minute call from Chris Hayes.

B. Discussion of Oyster Futures Phase 2 Focus and Funding

1. OysterFutures Phase Two- Water Quality Model

Rasika Gawde, member of the OysterFutures Research Team, presented the results of the water quality model that focused on nutrient reduction and water clarity by oysters. She noted that the results appear to provide accurate results in the shallow regions of the Choptank system. The model results focused on a 2-week window in July and captures and validates the range of value and trends in terms of patterns in TSS (total suspended solids – the particles in the water) and chlorophyll (which indicates the amount of algae in the water). The model is labor intensive in terms computational time, taking seven days to complete one model run from April-December.

Workgroup Comments

- Would it be possible to create as baseline using input from 200 years ago? *A: We could incorporate historical abundances of oysters if we had that information.*
- Where does "up river" start? *A: The model goes up to water with a salinity of 0.5. It does not go to Denton.*
- Can the 2010 cruise be replicated in 2020? *A: Yes, but we would need to get funding to do the same cruise and replicate the data.*
- How are you dealing with water clarity that has changed from 2010? *A: We can review the monthly data from the EPA Chesapeake program station in the Choptank to see what has changed. Also Riverkeeper and MDE are doing monitoring and we could use their data too.*

Rasika Gawde presenting the Water Quality Modell Results

- Was there a turbidity test on each sample in 2010? *A: Yes and they were validated.*
- *We have good data from 2010-12 because of the TRANSPORT program funded by NSF which focused on oyster larvae transport.*
- Can the model address temperature changes and other future changes? *A: Yes.*
- How does the model deal with too much sediment? *A: The model will shut oyster filtration down when the sediment exceeds a certain measure because oysters have been found to stop filtering when sediment concentrations get too high.*

2. Oyster Futures Phase Two Focus and Process- Nutrient Trading, Ocean Acidification and Climate Change.

The Workgroup discussed what the Phase 2 might feature and focus on. Elizabeth North noted the plan was to focus on future trends and impacts on the oyster resource such as nutrient trading, sea level rise, temperature changes, and ocean acidification.

Workgroup Comments

- Can the Phase 2 address sea level rise? Will there be an opportunity to do any modeling associated with that? Might look at the effort to model this in North Carolina. *A: Yes, if stakeholders want us to do so.*
- The OysterFutures could look to other efforts that are focused on researching coastal inundation.
- Ocean Acidification. There is a NOAA funded program on ocean acidification in the Choptank region. Considering the impact of CO2 on the oyster resource.

- Phase II also could focus on Denitrification credits, best management practices and ecosystem services. Currently we are limited in crediting nitrogen, and stakeholders could ask for expert advice on what types of policies could be possible in the state of Maryland.
- Counties are looking at using nitrogen crediting for spat on shell as part of their TMDL pollution reduction goals and implementation plans. Have to be careful about not double crediting. Scientific justification for data has to be precise and pass muster.
- Sea level rise has the potential to affect bottom line impacts for those working on the water. This may cause a shift over time in aquaculture. DNR Coast Smart Communities program might have information we should look at. This will affect the industry, if not the oyster themselves.
- Bring experts to help the OF Workgroup deal with "what ifs." Use the model to clarify impacts and decide if we want to make recommendations to DNR and MDE.
- We should see if Talbot /Dorchester county planners could provide some information on land use changes that may impact the oyster resource and the industry.
- Do we have the right 16 members to address these issues? *A: A MDE representative should probably be added as a representative or included as an expert on the research team.*
- Do we need counties and municipalities represented? *A: It might be possible to bring their perspectives to the table without creating additional OysterFuture members if they become advisors on the research team.*
- Members expressed a willingness to do 3 additional one-day meetings if the topics are relevant and important and the facilitated consensus process is used.

3. Oyster Futures Phase Two Funding

Elizabeth North noted that in discussions with NSF, the program officers understand and accept the importance of successfully completing Phase 1, but have indicated they are not able to provide supplemental funding for the project's Phase 2. To move into Phase 2 it will be necessary to seek additional funding. Elizabeth mentioned the Research team had been invited to submit a pre-proposal to The Campbell Foundation (focusing on nutrient trading, sea level rise and temperature changes on the oyster resource) and could craft a proposal to the Sloan Foundation (especially focusing on fuel/prices and transportation changes impacting the oyster resource). Elizabeth North noted that 10 years ago The Campbell Foundation helped develop an economics-type oyster optimization model, so they have historical interest in this topic.

Workgroup Comments

- The Campbell Foundation is run by someone-who wants to use stakeholder engagement. For example, the TNC has received Campbell Foundation support to work with poultry companies in a non-adversarial process to explore nutrient reduction with no strings attached. The experience has been The Campbell Foundation does not direct, but looks for water quality outcomes achieved through cooperation. They want industry and environmental interests to work together on solutions.
- The Campbell Foundation recognizes the need for cooperation among stakeholders on water quality issues. It funds cooperative efforts and not conflict and advocacy driven efforts.
- Thanks for bringing this up. There is always a worry about the funding and whether there are strings attached or influence sought over the outcomes of the process. If they are willing to

invest in the OysterFutures stakeholder driven process with the balanced Workgroup and Research and Facilitation team assembled for Phase 1 it would be acceptable.

- There are concerns were raised about bringing in new groups who are not willing to compromise or engage in a consensus building process. Should we invite to table an organization advocating for a complete moratorium on wild caught oysters? This would undermine the trust built to date.
- We are building an industry with watermen and rising aquaculture industry. We need to partner with those who have been traditional adversaries to ensure clean water and a sustainable oyster fishery as the way forward. We can build the power around our common interest in the resource.
- If we are making general statements and recommendations about future trends and issues that is one thing. But if we are going to modify the consensus results of Phase I that would not be acceptable.
- Elizabeth North said that she would return funding if the current process was not respected and independent and it looked like the funding agency was trying control the outcome.
- The facilitation team stated that they would not participate in a process that was required by a funder to produce a particular outcome. That would be contrary to a stakeholder driven consensus process and would be unacceptable. The assessment conducted in advance of the Oyster Futures project was designed to bring a balanced set of representatives to the table who were willing to listen and were interested in exploring and finding consensus solutions.

The Workgroup agreed that the Team could pursue the proposal to The Campbell Foundation on the condition they are willing to invest in and support the OysterFutures consensus solutions process with no strings attached, with no specific outcomes required, and without tinkering with the OysterFutures process including the Workgroup, Research and Facilitation Team that worked together to build trust and reach consensus in Phase 1.

C. Closing Comments and Meeting Evaluation

Workgroup members thanked the Team for a job well done and each other for the respectful dialogue and the willingness to engage on these important oyster resource issues over the course of 2 years. Dave Blazer noted, "Once we sit down and talk, we can help build a model that has helped us come up with good recommendations and options."

Workgroup members were asked to comment on the meeting and the overall Phase 1 process by completing meeting evaluations *(see Appendix #3).* The Research Team agreed to circulate a contact list (phone numbers and email addresses) of OysterFutures Workgroup Members, Research and Facilitation Team. *The meeting adjourned at 12:00 p.m. on Saturday afternoon.*

A Consensus Toast to the Future of OysterFutures

Appendix #1 Workgroup Meeting IX Agenda, March 23-24, 2018

OYSTERFUTURES WORKGROUP
MEETING IX—FRIDAY-SATURDAY, MARCH 23-24, 2018
Horn Point Laboratory—AREL Conference Room
2020 Horns Point Road—Cambridge, Maryland

WORKGROUP MEETING OBJECTIVES		
✓ To Approve Agenda and Meeting VIII Summary Report		
✓ To Receive Results of New and Revised Options Evaluated by OysterFutures Model		
✓ To Rate the Results of Options Modeled Relative to Project Goals and Performance Measures		
✓ To Adopt Final Package of Consensus Recommendations for Submittal to Maryland DNR		
✓ To Discuss Draft of Workgroup's Report and Recommendations		
✓ To Discuss Communication and Distribution Strategy for Workgroup's Report		
✓ To Receive Preliminary Results of Social Science Study		
✓ To Identify Needed Next Steps, Information Needs, and Agenda Items for Next Meeting		
MEETING AGENDA DAY ONE—FRIDAY, MARCH 23, 2018		
All Agenda Times—Including Adjournment—Are Approximate and Subject to Change		
12:30 PM		***Lunch and Social Science Study Survey (On Campus)***
1.)	**1:00 PM**	**Welcome and Introductions**
2.)	**1:10 PM**	**Agenda Review and Approval**
3.)	**1:15 PM**	**Approval of Facilitator's Summary Report (February 4, 2018)**
4.)	**2:20 PM**	**Overview and Discussion of the Results of Options Modeled**
~3:30 PM		***Break***
5.)	**3:45 PM**	**Evaluation and Acceptability Rating of Modeled Options Relative to Performance Measures and Project Goals**
6.)	**5:55 PM**	**Summary of Day One and Review of Day Two Agenda**
7.)	***~6:00 PM***	***Recess and Informal Social With Dinner (On Campus)***
MEETING AGENDA DAY TWO—SATURDAY, MARCH 24, 2018		
All Agenda Times—Including Adjournment—Are Approximate and Subject to Change		
8:30 AM		***BREAKFAST AND SOCIAL SCIENCE STUDY SURVEY (ON CAMPUS)***
8.)	**9:00 AM**	**Welcome**
9.)	**9:05 AM**	**Evaluation and Acceptability Rating of Modeled Options Relative to Performance Measures and Project Goals, As Needed**
~10:30 AM		***Break***
10.)	**10:45 PM**	**Discussion, Evaluation, and Adoption of Workgroup's Package of Consensus Recommendations for Submittal to Maryland DNR**
~12:30 PM		***Lunch (On Campus)***
10.)	**1:00 PM**	**Adoption of Workgroup's Package of Consensus Recommendations for Submittal to Maryland DNR—Continued**
~3:00 PM		***Break***
10.)	**3:15 PM**	**Adoption of Workgroup's Package of Consensus Recommendations for Submittal to Maryland DNR—Continued**
11.)	**3:45 PM**	**Acceptance of Workgroup's Report and Recommendations Draft**
12.)	**4:15 PM**	**Discussion of Communication and Distribution Strategy for Workgroup's Report and Recommendations**
13.)	**4:45 PM**	**Closing and Final Steps**
14.)	***~5:00 PM***	***Adjourn***

Appendix #2 Workgroup & Research Team Membership & Participation- Meeting IX

WORKGROUP MEMBERSHIP PARTICIPATION- FRIDAY, MARCH 23, 2018	
MEMBER *(**Bold**=* Present*)*	**AFFILIATION**
WATERMAN	
J.D. Buchanan	Preston, MD, Caroline County, Talbot County Waterman
Robbie Casho	St. Michaels, MD, Dorchester County Waterman
Jeff Harrison	Tilghman, MD, Talbot County, President Talbot Waterman's Association
Gregory Kemp	McDaniel, MD, Talbot County, Vice President Talbot Waterman's Associat
Cody Paul	Church Creek, MD, Dorchester County Commercial Oyster Committee Ch
Bobby Whaples	Vienna, MD, Dorchester County, President Dorchester Seafood Heritage A
AQUACULTURE	
Bobby Leonard	Tred Avon Treats, Ruff-N-Ready, LLC.
Johnny Shockley	Hoopers Island Oyster Aquaculture Co.
SEAFOOD BUYERS	
Aubrey Vincent	Lindy's Seafood
ENVIRONMENTAL CITIZEN GROUPS	
Kelly Cox	Phillips Wharf Environmental Center
Allison Colden	Chesapeake Bay Foundation
Joe Fehrer	The Nature Conservancy
RECREATIONAL FISHING GROUP	
David Sikorski	Coastal Conservation Association (CCA)
MARYLAND DEPARTMENT OF NATURAL RESOURCES	
Dave Blazer	Maryland Department of Natural Resources
OYSTER RECOVERY PARTNERSHIP	
Ward Slacum	Oyster Recovery Partnership
FEDERAL AGENCY	
Stephanie Westby	National Oceanic and Atmospheric Administration (NOAA)
PROJECT SCIENTISTS AND FACILITATORS	
NAME *(**Bold**=* Present*)*	**AFFILIATION**
UNIVERSITY OF MARYLAND CENTER FOR ENVIRONMENTAL SCIENCE	
Elizabeth North	Fisheries Scientist
Mike Wilberg	Fisheries Scientist
Jeffery Cornwell/Melanie Ja	Estuarine Biogeochemist
Raleigh Hood/**Rasika Gawde**	Biological Oceanographer
Lisa Wainger/Chris Hayes	Environmental Economist (Social Scientist)
Michael Wilberg	Fisheries Scientist
Dylan Tallie/Emily Nastase Jamie Currie	Science Communication
VIRGINIA INSTITUTE OF MARINE SCIENCE	
Troy Hartley	Environmental and Natural Resource Policy (Social Scientist)
FCRC CONSENSUS CENTER, FLORIDA STATE UNIVERSITY	
Jeff Blair	Workgroup Facilitator
Robert Jones	Workgroup Facilitator

WORKGROUP MEMBERSHIP PARTICIPATION- SATURDAY, MARCH 24, 2018	
MEMBER (***Bold***= Present, *Italics= Absent)*	**AFFILIATION**
WATERMAN	
J.D. Buchanan	Preston, MD, Caroline County, Talbot County Waterman
Robbie Casho	St. Michaels, MD, Dorchester County Waterman
Jeff Harrison	Tilghman, MD, Talbot County, President Talbot Waterman's Association
Gregory Kemp	McDaniel, MD, Talbot County, Vice President Talbot Waterman's Associat
Cody Paul	Church Creek, MD, Dorchester County Commercial Oyster Committee Ch
Bobby Whaples	Vienna, MD, Dorchester County, President Dorchester Seafood Heritage A
AQUACULTURE	
Bobby Leonard	Tred Avon Treats, Ruff-N-Ready, LLC.
Johnny Shockley	Hoopers Island Oyster Aquaculture Co.
SEAFOOD BUYERS	
Aubrey Vincent	Lindy's Seafood
ENVIRONMENTAL CITIZEN GROUPS	
Kelly Cox	Phillips Wharf Environmental Center
Allison Colden	Chesapeake Bay Foundation
Joe Fehrer	The Nature Conservancy
RECREATIONAL FISHING GROUP	
David Sikorski	Coastal Conservation Association (CCA)
MARYLAND DEPARTMENT OF NATURAL RESOURCES	
Dave Blazer	Maryland Department of Natural Resources
OYSTER RECOVERY PARTNERSHIP	
Ward Slacum	Oyster Recovery Partnership
FEDERAL AGENCY	
Stephanie Westby	National Oceanic and Atmospheric Administration (NOAA)
PROJECT SCIENTISTS AND FACILITATORS	
NAME	**AFFILIATION**
UNIVERSITY OF MARYLAND CENTER FOR ENVIRONMENTAL SCIENCE	
Elizabeth North	Fisheries Scientist
Jeffery Cornwell/Melanie Ja	Estuarine Biogeochemist
Raleigh Hood/**Rasika Gawde**	Biological Oceanographer
Lisa Wainger/Chris Hayes	Environmental Economist (Social Scientist)
Michael Wilberg	Fisheries Scientist
Dylan Tallie/Emily Nastase Jamie Currie	Science Communication
VIRGINIA INSTITUTE OF MARINE SCIENCE	
Troy Hartley	Environmental and Natural Resource Policy (Social Scientist)
FCRC CONSENSUS CENTER, FLORIDA STATE UNIVERSITY	
Jeff Blair	Workgroup Facilitator
Robert Jones	Workgroup Facilitator

Appendix #3 Workgroup Meeting Evaluation Summary

OYSTERFUTURES WORKGROUP
MARCH 23-24, 2018—CAMBRIDGE, MARYLAND
MEETING IX EVALUATION SUMMARY

Members used a 0 to 10 Rating Scale where a 0 meant Totally Disagree and a 10 meant Totally Agree. 13 members in attendance submitted evaluation forms. The average ratings and comments are featured below.

1. Please assess the overall meeting.

9.4 The background information was very useful.
9.3 The agenda packet was very useful.
9.5 The objectives for the meeting were stated at the outset.
9.5 Overall, the objectives of the meeting were fully achieved.

2. Do you agree that each of the following meeting objectives was achieved?

9.4 Discussion of the Results of New and Revised Options Evaluated by the OysterFutures Model.
9.3 Acceptability Rating of Options Modeled Relative to Project Goals and Performance Measures.
9.8 Adoption of Final Package of Consensus Recommendations for Submittal to Maryland DNR.
9.7 Discussion of Workgroup's Draft Report and Recommendations.
9.7 Discussion of Communication and Distribution Strategy for Workgroup's Report.
9.6 Review of Project's Phase I Final Steps and Phase II Next Steps.

3. Please tell us how well the Facilitator helped the participants engage in the meeting.

9.8 The members followed the direction of the Facilitator.
9.7 The Facilitator made sure the concerns of all members were heard.
9.9 The Facilitator helped us arrange our time well.
9.9 Participant input was documented accurately in Facilitator's Summary Report (last meeting).

4. Please tell us your level of satisfaction with the meeting?

9.6 Overall, I am very satisfied with the meeting.
9.5 I was very satisfied with the services provided by the Facilitator.
9.5 I am satisfied with the outcome of the meeting.

5. Please tell us how well the next steps were communicated?

9.4 I know what the next steps following this meeting will be.
9.4 I know who is responsible for the next steps.

6. What did you like best about the meeting?

- The group coming to consensus with well thought out and reasonable recommendations and options.

- Finishing! Reaching final consensus on package!
- Organized throughout, good information.
- Well thought out discussion.
- Run very well.
- Cooperation.
- The people involved. Very good.
- Dinner salmon was excellent!
- Finishing early was good too!

7. How could the meeting have been improved?

- Quicker.
- I felt that during this meeting most of the concerns expressed by stakeholders were answered with "that won't be a problem" or "it won't be used that way," rather than fully discuss.

8. Do you have any other comments on the overall OysterFutures process?

- Well done to the team! You all did excellent. The facilitators were professional and the science team did a great job presenting the information in an understandable way.
- The facilitators were excellent.
- Great end to a well throughout process on a tough topic. Everyone had their voices heard and the consensus solutions process worked well.
- Great experience. Excellent job to Jeff and Bob.
- Outstanding in every way!
- Great job overall throughout the process.
- Opportunity to get to know stakeholders personally.
- The people

Appendix #4 Oyster Futures Workgroup Purpose, Goal and Project Summary

STATEMENT OF PURPOSE. The goal of Oyster Futures is to develop recommendations for oyster policies and management that meet the needs of industry, citizen, and government stakeholders in the Choptank and Little Choptank Rivers.

With funding from the National Science Foundation, we will hold a series of workgroup meetings with a representative group of stakeholders. Through these meetings, the stakeholders will produce a collective vision for the future of oysters in this region and build consensus on policy and regulatory options which will be informed by stakeholder and scientific knowledge and by the joint development and use of a modeling tool. The Maryland Department of Natural Resources has agreed to evaluate the consensus recommendations that result.

The stakeholders participating on the workgroup will be representatives from the key interest groups that affect and are affected by the oyster fishery. Researchers from the University of Maryland Center for Environmental Science and the Virginia Institute of Marine Science will serve as consultants to the stakeholders. Professional independent facilitators with experience in fisheries issues will convene the stakeholder meetings. The facilitators will ensure that a consensus-based approach which includes the input of diverse stakeholders is used to develop the collective vision and recommended actions for a sustainable and profitable future for the oyster industry in the Choptank and Little Choptank Rivers.

WORKGROUP'S ADOPTED GOAL STATEMENT: *(Adopted Unanimously February 26, 2016)* The goal of the Oyster Futures Workgroup is to develop a package of consensus recommendations informed by a model collaboratively developed by the Workgroup and the Oyster Futures project research team. The model will be designed so that it can be used to evaluate oyster fishery practice and management options and restoration policies in the Choptank and Little Choptank Rivers. The Workgroup's recommendations will be directed to Secretary Mark Belton of the Maryland Department of Natural Resources. The project's ultimate goal is to ensure that the regulation and management of the oyster fishery, and oyster restoration polices are informed by the best available science and shared stakeholder stewardship values, resulting in an economically viable, healthy and sustainable Choptank and Little Choptank Rivers oyster fishery and ecosystem.

PROJECT SUMMARY. Achieving effective natural resource management is challenging because of the multiple and often competing objectives of different stakeholder groups, a limited set of policy options, and uncertainty in the performance of those options. Yet, managers need policies that allow continued use of natural resources while ensuring access for future generations and maintenance of ecosystem services. Formal approaches are needed that will assist managers and stakeholders in choosing policy options that have a high likelihood of achieving social, ecological, and economic goals. The goal of this project, Oyster Futures, is to address this need by improving the use of predictive models to support sustainable natural resource policy and management. A stakeholder-centered process will be used to build an integrated model that combines estuarine physics, oyster life history, and the ecosystem services that oysters provide (e.g., harvest, water quality) to forecast outcomes under alternative management strategies. Through a series of facilitated meetings, stakeholders will participate in a science-based collaborative process which will allow them to project how well policies are expected to meet their objectives using the integrated model. This iterative process will ensure that the model will incorporate the complex human uses of the ecosystem as well as focus on the outcomes most important to the stakeholders. In addition, a study of the socioeconomic drivers of stakeholder involvement, information flow, use and influence, and policy formation will be undertaken to improve the process, enhance implementation success of recommended policies, and provide new ideas for integrating natural and social sciences, and scientists, in sustainable resource management. In this presentation, the strategy for integrating natural system models, stakeholder views, and sociological studies as well as methods for selecting stakeholders and facilitating stakeholder meetings will be described and discussed.

Appendix #5 Oyster Futures Project Schedule

OYSTER FUTURES WORKGROUP MEETING SCHEDULE		
PHASE I MEETING SCHEDULE—2016 AND 2018		
I.	February 26 - 27, 2016	Horn Point Laboratory
II.	April 30 – May 1, 2016	Horn Point Laboratory
--	October 23, 2016 (*Oyster Symposium*)	St. Michael's Maritime Museum
III.	November 5 - 6, 2016	Horn Point Laboratory
IV.	March 24 – 25, 2017	Horn Point Laboratory
V.	July 22 – 23, 2017 (Management Options)	Horn Point Laboratory
VI.	November 10 -11, 2017 (Management Options)	Horn Point Laboratory
VII.	January 5-6, 2018	Horn Point Laboratory
VIII.	February 4, 2018	Horn Point Laboratory
IX.	March 23-24, 2018	Horn Point Laboratory

PROJECT WEBPAGE (URL): https://Oyster Futures.wordpress.com/
PROCESS DESIGN AND PROJECT FACILITATION: Process design and meeting facilitation by Jeff Blair and Bob Jones from the FCRC Consensus Center at Florida State University. Information at: http://consensus.fsu.edu/