



Stakeholder Workgroup

2ND MEETING
SUMMARY REPORT

April 30-May 1, 2016
Horn Point Laboratory, University of Maryland
Cambridge Maryland

Summarized by:



CONSENSUS CENTER

“Facilitating Consensus Solutions, Supporting Collaborative Action.”



THE
FLORIDA STATE
UNIVERSITY



Oyster Futures Workgroup



Oyster Futures Workgroup, Facilitators and Research Team

**OYSTERFUTURES STAKEHOLDER WORKGROUP
2ND MEETING SUMMARY REPORT**

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OYSTERFUTURES WORKGROUP 2ND MEETING EXECUTIVE SUMMARY APRIL 30-MAY 1, 2016

On behalf of the Oyster Futures Research Team, Elizabeth North welcomed the Members to the 2nd meeting of the OysterFutures Workgroup and re-introduced the facilitation team of Jeff Blair and Bob Jones with the FCRC Consensus Center at Florida State University

Dr. Mike Wilberg presented an overview of the oyster harvest statistics for Maryland Oyster Harvest for the Choptank River Complex on both harvest and effort (i.e. license days). He pointed out that this data was for wild harvest only and hand tongs were the most dominant gear with sail and power dredge following. The oyster value was calculated with dockside value and adjusted for inflation. He asked the Workgroup if the gears and locations looked right based on their experience. The Workgroup members' discussion covered the following topics: Harris Creek misreporting; Consider the sanctuary closures impact on harvest; Productivity of areas; One piece of the puzzle; How many years of consistent harvest data; Incentives to falsify reporting; and Benchmark early "healthy" fishery.

Dr. Elizabeth North reviewed the named oyster bars in the Choptank River and presented data on what is known of oysters in the Choptank complex. She concluded that a preliminary review suggest there is no solid answer to where the oysters are currently located in the Choptank complex. In response to Workgroup member questions of what percentage of the oyster bars in the Choptank complex are now in Sanctuaries, she noted the data suggests that about 40% of the area of oyster bars is located in Sanctuaries. Dr. North indicated the team will try to put together a unified map for review at the next meeting and the workgroup can circle what is missing and what looks wrong. The Workgroup members discussion covering the following topics: changes in habitat; oyster habitat decline; oyster bars in Sanctuaries; and bottom mapping.

Dr. North reviewed the larval transport model in the Choptank River complex which predicts the transport of oyster larvae in each study area. This model is used to link different reefs in the population model being developed. However, the larval transport model doesn't indicate how many larvae are spawned. It needs to be adjusted to account for environmental conditions and for how many oyster larval are spawning. The model suggests that larval in Little Choptank generally stays in the area with a few making it to the main Choptank. The Lower Choptank collects larval from many areas. The Workgroup members discussion covering the following topics: Focus on the middle Choptank; Need the population model to add to the larval model; Depict the spat sets more clearly; Tool to predict or confirm; DNA work to verify family lines. Correlate how larvae moving. Little Choptank; and What are the good areas to plant seeds and the best time to put shell.

Mike Wilberg opened his presentation describing how population models are used to provide estimates of abundance and fishing mortality rates and how effort relates to fishing mortality. He noted that these estimates will be used to build the simulation model that can evaluate options and help to describe how the population is expected to change over time. The data for the model will include: Harvest; an estimate of reporting rate (50-80%?); Trends in oyster and box density from the MD DNR fall dredge survey; Size and disease prevalence/intensity data; Patent tong and diver survey data; Numbers stocked; and Amount of shell placed (or other materials). Dr. Wilberg provided the following depiction of how the population model will function and presented a picture of oyster abundance from 1980 to 2010 (“We’ve gone from billions to 800 million oysters.”) and oyster mortality (“there is more uncertainty for natural vs. harvest mortality.”).

The Workgroup members discussion covering the following topics: Fall dredge survey; Relative density; Assess the living reef; Focus on oyster bottom habitat; Patent tong surveys and abundance; Natural mortality; and Future research needs.

Dr. Wilberg provided a briefing on the simulation modeling tool components and initial assumptions. It will be designed to address oyster abundance and mortality, larval transport, and harvest and fishing effort. He noted that the Team will be running this model forward 10 to 15 years over time and every option will be run many times. He reviewed the link between the options as well as the performance measures being developed for the model. The Workgroup members discussion covering the following topics: Aquaculture and the model; Economics; Aquaculture impact on oyster habitat; Non fishing mortality; Disease; DNA family lines and disease resistance; and Climate change.

Dr. Wilberg provided an overview of how the Team sorted the management and regulation options identified at the last meeting into the following different categories: Management and Regulation Options That Can Be Modeled; Marketing and Business Practices Options That Can Be Modeled; Options That Can’t Be Modeled; Options To Be Considered In Phase II of the Project; Issues Discussed Without Identification of Explicit Options, and Options That Could Be Moved to the Vision; and Options Rated Not Achieving Consensus. The Workgroup reviewed 10 options to help identify potential modeling ideas.

1. Rotational Harvest Option(s)

Mike Wilberg and Elizabeth North opened the discussion noting there are different ways to organize a rotational system. Virginia conducts two different types of rotations in two different locations. The Workgroup members’ discussion covered the following topics: Focus on Choptank complex; Divide into 3 sections; Re-establish shucking industry; Expand seasons earlier and later; Clear harvest goal; Biological triggers to open/close rotational harvest; Pilot test different size plots with watermen; Contribute shell and spat; Salinity areas; Different gears and rotational harvest; Aquaculture; 3 dimensional reef system; Include Sanctuaries; Public fisheries business plan; and Local access for rotational harvest?

Workgroup modeling option ideas identified included:

- Consider dividing the Bay into 3 sections: upper, middle and lower. Determine what they are. Open area in each section for 1 month. 6 areas in each section. Keeping watermen spread out is very important. Open new area each month. If area appears to be overharvested, you may need a 7th area.

- Only 7% of the 24% area Baywide that was taken for Sanctuaries has been invested in. Start with and focus on the 17% areas in sanctuaries that haven't had an investment would be a good place to start.
- Can we provide local access for rotational harvest in Choptank for local watermen?
- Pilot test different size plots with watermen participation
- Use the most productive bars we have to do this.
- The rotational regime should be able to contribute what is needed back in terms of shell and spat.
- 3-dimensional reef systems should be seeded and strategically placed so all can benefit to develop future lines. This should be built into the plan.
- Consider opening and closing flexibility in the modeling.
- Consider some biological triggers to close and open: e.g. How much harvest can the area withstand this year and next year? Measure Oyster density/biomass? How much can be removed and continue reproducing?
- Survey/assessment- before the season. Open and allow X bushels for this many days/weeks. More oyster areas might be open longer.
- How many watermen it will support? For how long? How much money do you have to support it at different sizes, e.g. 200 acres vs. 40 acres to both kick it off and sustain over time?
- Consider hand tong oyster gears only. If everyone had to hand tong there would be less harvest.

2. Enforcement Options

Mike Wilberg and Elizabeth North opened the discussion asking what kinds of enforcement are being provided and how much non-compliance is happening now. Workgroup members' discussion covered the following topics: Targeting undersized oysters; Enforcement presence and effectiveness; Policing the buyers; Rotating enforcement schedule; Tagging system; Compliance issues; Aquaculture and enforcement needs; Matching buy tickets, harvest reports and bushel tax report; Define poaching vs. going over limit; and Enforcing Sanctuaries vs. public bottoms/bars.

Workgroup modeling option ideas identified included:

- Consider rotating the enforcement schedule.
- Target enforcement presence to places where oysters are unloaded at wharf.
- Target policing buyers and buyer stations
- Match buy tickets, harvest reports and bushel tax report and look at Virginia program for accomplishing this.

3. Use of Population Assessment in Management Options

Mike Wilberg and Elizabeth North opened the discussion noting that in federal fisheries regular stock assessments are conducted to set a management and individual quota regarding annual harvest. The Workgroup members' discussion covered the following topics: Quota; Clarify scope of effort; Collaborative effort needed; Stock assessment; Clarify any link to Management Decisions; Assessment tool for the industry; Model population assessment in locating sanctuaries; and a dynamic vs. a static model

Workgroup modeling option ideas identified included:

- Include stock assessment in model to test performance.
- Can population assessment inform setting the location of sanctuaries?
- Can it inform where to shell and seed?
- Can it be used in a rotational harvest option?

4. Limited Entry Options

Workgroup members' discussion covered the following topics: 2500 possible licenses; "Use it or lose it": License Surcharge; Cap the number of licenses; Aquaculture; Disease; Apprenticeship program through DNR; "Buy back" license programs; Limited entry; and Recreational oyster license.

Workgroup modeling option ideas identified included:

- Model different surcharge levels in terms of limiting entry
- Model capping the number of licenses.

5. Habitat Modification/Restoration Options

In terms of modeling issues, Mike Wilberg noted we will need to explore what modifications are needed in terms of where to put shell, how much, how often. Workgroup members' discussion covered the following topics: Placement of restoration projects; Restore harvestable bottom; Focus on improving unproductive bars; Bag-less dredge; Buried shell in the Choptank; Reclaiming shells; Funding and Economics; Habitat restoration work; Sanctuary plan; Health regulations; and Determine the need for shells.

Workgroup modeling option ideas identified included:

- Model rehabilitation of oyster bars not doing well and targeting areas doing well to ensure they continue.
- Model a shell reclamation program
- Model closures of public oyster bars due to health regulations.

6. Fee & Tax Options

The model will need to use concrete number, such as doubling the bushel tax surcharge. Workgroup members' discussion covered the following topics: Model raising (at least doubling) the per bushel amount; Model pricing with return of shells built in; Model taxing suppliers; Model tax credit for shell collection; Connect with rotational harvest.

Workgroup modeling option ideas identified included:

- Model raise the per bushel amount.
- Model pricing that builds in costs for return of shells
- Model taxing suppliers
- Model a tax credit for shell collection.

7. Spatial Options

Workgroup members' discussion covered the following topics: Better mapping tools from DNR; Locating restoration projects; Avoid splitting bars in half; Gear types; Gears and % of harvest; Gear type return on investment; Hand tong and spat recruitment; Hand tonging in Sanctuary headwaters; Locating sanctuaries; Sanctuaries and disease resistance; Modeling enforcement; Ongoing dialogue needed.

Workgroup Modeling Option Ideas

- Model both increasing and reducing Sanctuaries to see if what are the ecological benefits?
- Model enforcement of bigger and smaller Sanctuary pieces
- Model limited entry and gear specific areas
- Model increasing harvest through hand tonging in Sanctuary headwaters
- Model locating sanctuaries where they can enhance public fishery
- Model ecosystem services that Sanctuaries provide
- Model, if possible, impact of sanctuaries on disease resistance

8. Options on Regulations Related to Specific Gear

Workgroup members' discussion covered the following topics: Open/Close of seasons; Small oyster harvest later in season; Limited entry for certain gear types; and Impacts of concentrating harvest efforts.

Workgroup Modeling Option Ideas

- Model different opening and closing dates for opening up to power dredging and skip jack across the region.
- Model this into April. Consider time for a resting period.
- Model small oysters being taken later in the season.
- Model limited entry for certain gear types.
- Model impacts of concentrating harvest efforts in different areas.

9. Stocking Options

Workgroup members' discussion covered the following topics: Continue looking at different options regarding stocking.

10. Aquaculture Options

Workgroup members' discussion covered the following topics: Modeling aquaculture; Modeling enforcement; Fishery as a cooperative; Public aquaculture program? Model current effort with increasing productivity; Health concerns; Water temperature levels option; Business plan for sustainable oyster industry.

Workgroup Modeling Option Ideas

- Model spat on shells on harvestable bottom.
- Water temperature levels option? A: *Modeling can address the handling.*
- Consider modeling the entire fishery a cooperative?
- Model different enforcement options?
- Take a piece of public bottom and lease it to sector of public fishery via a cooperative. Include some of bottom in Sanctuary?

The Workgroup reviewed five categories of performance measures including: harvest; economics; population; habitat; and ecosystem services. The modeling team thought that the options below spoke to performance measures instead of modeling options including:

- Incorporate ecosystem services into management regimes. [Rated 3.6—Theme A]
- Develop clear measures of economic viability and sustainability. [Rated 4.0—Theme C]
- Understand the full suite of what we are and are not getting for sanctuaries to further refine the management of the Sanctuary Program. [Rated 4.0—Theme D]
- Develop a strategy working with watermen and other stakeholders to help protect a brood stock to enhance disease resistant oysters. [Rated 4.0—Theme D]

The Workgroup discussed the meeting schedule and agreed on dates for future meetings and for an OysterFutures public symposium. They discussed workgroup communication and what kinds of outreach and communication made sense. Finally they discussed what information they needed before the September Workgroup meeting. At the conclusion of the meeting the Workgroup members completed meeting evaluations. The meeting adjourned at 3:45 p.m.



**OYSTERFUTURES WORKGROUP
2ND MEETING SUMMARY
APRIL 30- MAY 1, 2016**

I. INTRODUCTION

On behalf of the Oyster Futures Research Team, Elizabeth North welcomed the Members to the 2nd 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 who asked Workgroup member to introduce themselves.

The facilitator reviewed with the Workgroup the consensus and meeting guidelines (*See Appendix #6*). Following this review the Workgroup adopted the February 26-27, 2016 Workgroup Organizational Summary without changes and the proposed meeting agenda.

The facilitator reviewed the Workgroup Guiding Principles adopted at the Organizational Meeting reflecting the broad values and philosophy that will guide the operation of the Workgroup and the behavior of its members throughout its process regardless of changes in its goals, strategies or membership:

- Workgroup members will strive to work together collaboratively, and seek to understand and respect differing perspectives.
- The Workgroup will strive to achieve consensus on the evaluation and development of recommendations submitted to the research team and relevant management and/or regulatory agencies.
- The Workgroup will operate under policies and procedures that are clear, concise and consistently and equitably applied.
- Workgroup members will serve as accessible liaisons between the stakeholder groups they have been appointed to represent and the OysterFutures Workgroup, and should strive to both inform and seek input on issues the Workgroup is addressing from those they represent.

The facilitator reviewed the goal statement adopted at the Organizational Meeting:

“The goal of the OysterFutures Workgroup is to develop a package of consensus recommendations informed by a model collaboratively developed by the Workgroup and the

OysterFutures 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.

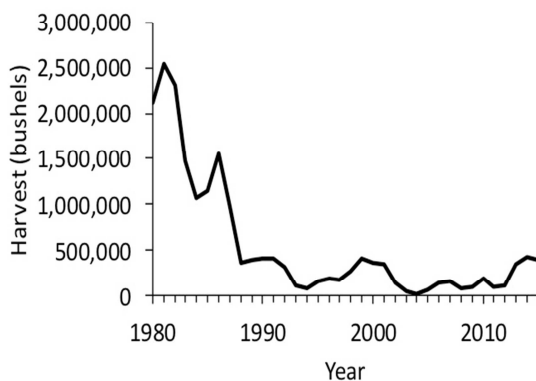
The project’s ultimate goal is to ensure that the regulation and management of the oyster fishery and oyster restoration policies are informed by the best available science and shared stakeholder stewardship values, resulting in an economically viable, healthy and sustainable Choptank and Little Choptank Rivers oyster resource and ecosystem.”

II. WORKGROUP REQUESTED PRESENTATIONS

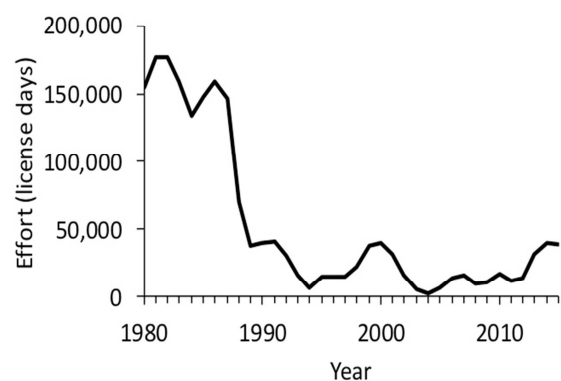
A. OYSTER HARVEST STATISTICS FOR THE MARYLAND PORTION OF CHESAPEAKE BAY AND THE CHOPTANK RIVER COMPLEX

Dr. Mike Wilberg presented an overview of the oyster harvest statistics for Maryland Oyster Harvest for the Choptank River Complex on both harvest and effort (i.e. license days).

Maryland Oyster Harvest



Maryland Oyster Effort



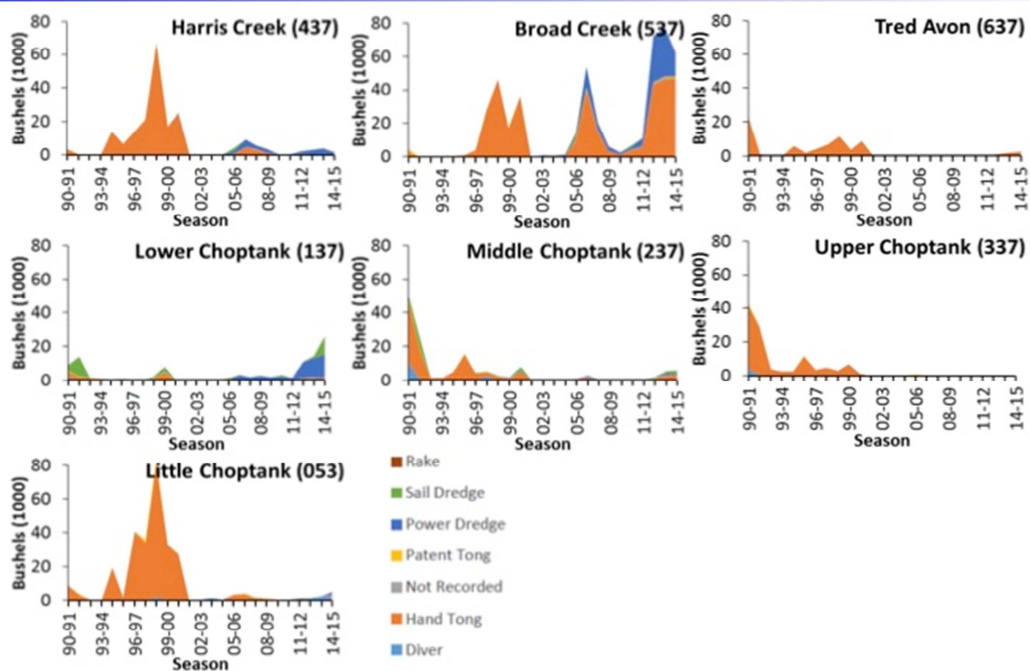
He pointed out that this data was for wild harvest only and hand tongs were the most dominant gear with sail and power dredge following. The oyster value was calculated with dockside value and adjusted for inflation. He asked the Workgroup if the gears and locations looked right based on their experience.

Workgroup Member Comments and Questions

- **Harris Creek misreporting.** Patent tong in Harris Creek is not allowed. Area can be misreported.
- **Consider the sanctuary closures impact on harvest.** We can’t assume this is all the Choptank complex is putting out in terms of potential oyster harvest as 80% of it is closed.
A: These statistics are not trying to estimate how many oysters in the region.
- **Productivity of areas.** Careful how you interpret this- doesn't mean anything about productivity of areas.

- **One piece of the puzzle.** This represents one piece of the puzzle in terms of data on oysters. We need to provide the appropriate caveats going forward. *A: We will be using harvest data later as part of this modeling effort. Need to know if there are major problems with catch recording data.*
- **How many years of consistent harvest data?** Is 25 years worth of data enough of a time span to use? *A: The short answer is this is long enough for what we are thinking of using the data for. The farther back we can get good data, the better. However it is hard to go back earlier than 1980 as there was no log book data and that data will be both harder to get and use. It is important to have access to consistent reporting amount of harvest daily. We can take into account the presence of disease in the fishery that resulted in less fishing in the 1980s. 2002—03 were bad years with almost no watermen on the water. It would be helpful to know from watermen if there is a threshold amount of oysters you need to harvest in order to go out. We plan to base the model on the rate of participation and the rate of effort.*
- **Incentives to falsify reporting.** Be aware of the incentives to falsify data in terms of the tax on bushels depending on the area they came from.
- **Benchmark early “healthy” fishery.** It will be valuable to look back in the early good days of the oyster industry in terms of effort and production to benchmark what is “healthy” fishery and what it should look like.
- Power dredging began in 2000.

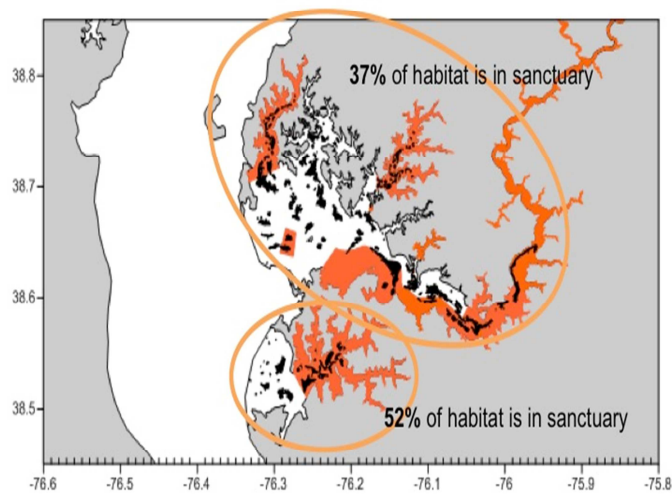
Choptank Complex Harvest by Area



B. STATUS OF OYSTER REEFS IN THE CHOPTANK AND LITTLE CHOPTANK RIVERS

Dr. Elizabeth North reviewed the named oyster bars in the Choptank River and presented data on what is known of oysters in the Choptank complex. She concluded that a preliminary review suggest there is no solid answer to where the oysters are currently located in the Choptank complex. In response to Workgroup member questions of what percentage of the oyster habitat in the Choptank complex are now in Sanctuaries, she noted the data suggests about 40% of the oyster habitat is located in Sanctuaries, with 37% in the Choptank in sanctuary and 52% in the Little Choptank in sanctuary.

In both the Choptank and Little Choptank, 40% of oyster habitat is in sanctuary



Preliminary – need to update habitat polygons

She observed that the Maryland Bay Bottom Survey conducted in the late 1970s and early 1980s used a chain that was dragged supplementing by tonging. This survey covered the entire Chesapeake Bay on the Maryland side and took over five years to complete. The present oyster habitat has been determined using acoustic mapping from 2010 and the oyster habitat area outside of the acoustic mapping area is currently uncertain. The data represents the hard bottom and areas with some shell indicating where oysters could be. In response to Workgroup comments she agreed that there should be a major investment in conducting a new survey in areas that have not been surveyed. Dr. North indicated the team will try to put together a unified map for review at the next meeting and the workgroup can circle what is missing and what looks wrong.

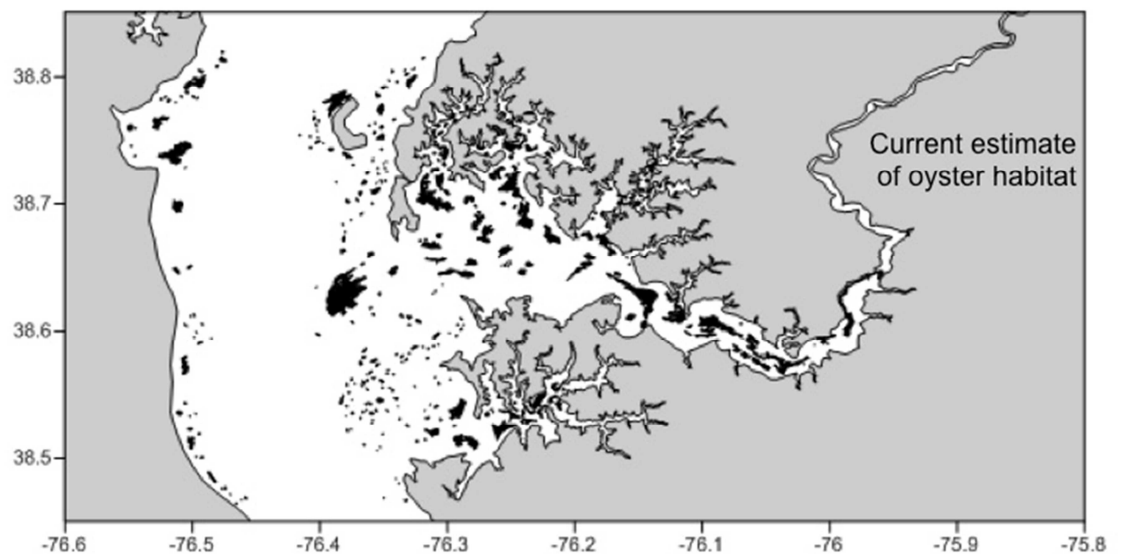
Workgroup Member Comments and Questions

- **Changes in habitat?** It is not credible to use the current area of named oyster bars and the area of cultch habitat from 1970s-80s surveys to estimate the reduction in habitat.

- **Oyster habitat decline.** While there is less oyster habitat today than in the 1980's using specific percentages may be misleading because of the uncertainties in the data.
- **Oyster bars in Sanctuaries.** Concerns were expressed that these maps be misleading based on incomplete data and watermen believe that the sanctuaries cover 50-60 % of the harvestable oyster bar.
- **Bottom mapping.** Now looking for more or different surveys? Where are they doing bottom mapping today? *A: Focuses on certain areas with no concerted effort on a bay-wide comprehensive effort.*
- How accurate are the NOAA sonar surveys? *A: surveys not comprehensive and some areas may have been too shallow to survey.*
- There has been an effort to create more bottom in Sanctuaries, e.g. in Harris Creek 200 more acres of bottom were created. There is an additional 200-400 acres of bottom in sanctuary of the Little Choptank River.
- For every oyster bar acre in sanctuary, there should be an allocation back to oyster harvesting.

C. OYSTER LARVAL TRANSPORT MODEL

Present-day oyster habitat was used in oyster larval transport model



Dr. North reviewed the larval transport model in the Choptank River complex which measures oyster retention for each study area. This model is used to link different reefs in the population model being developed. However, the Larval transport model doesn't indicate how many larvae are spawned. It needs to be adjusted to account for environmental conditions and for how many oyster larvae are spawning. The model suggests that larvae in Little Choptank generally stay in the area or are transported south, with a few making it to the main Choptank. The Lower Choptank collects larval from the creeks and rivers that are upstream of it.

Workgroup Member Comments and Questions

- **Focus on the middle Choptank.** Put the larvae in the middle to let tide take. Spend money in the middle.
- Run a scenario for the lower Choptank to see how it disperses.
- **Need the population model to add to the larval model.**
- MW: This is what the model is trying to do.
- **Depict the spat sets more clearly.** Fall survey- overlay the 2 for spat sets with color. (did for Harris Creek to help to more clearly show. 2010 chart shows it came out of Broad Creek not Harris Creek.
- **Tool to predict or confirm?** Using it as a tool. Would it be possible to use as a tool, predictor or confirmation of work? *A: Calibration- hydrodynamic model predicts where the water flows level. Vertical migration behavior in model pretty solid. Haven't put them in the creek and follow them in reality vs. model. Will provide at next meeting where spat has settled over time in the Choptank.*
- JS: foundation- good work. Working tributaries- see and the need for developing family lines in Choptank and Little Choptank.
- **DNA work to verify family lines. Correlate how larvae moving.**
- Jeff H: 6 years ago saw a larval transport model in VA. Used to find where the best places to put their shells.
- Lower Choptank is a seed collector and gets some mainstem water reducing growth.
- **What are the Good areas to plant seeds and the best time to put shell.**
- EN: load data- dissolved oxygen surveys at the bottom.
- Low DO happens in Lower Choptank.
- Use this data to compare models against.

D. POPULATION ASSESSMENT OF OYSTERS IN THE CHOPTANK RIVER COMPLEX

Mike Wilberg opened his presentation describing how population models are created to provide estimates of abundance and fishing mortality rates and how effort relates to fishing mortality. He noted that these estimates will be used to build the simulation model that can evaluate options and help to describe how the population is expected to change over time.

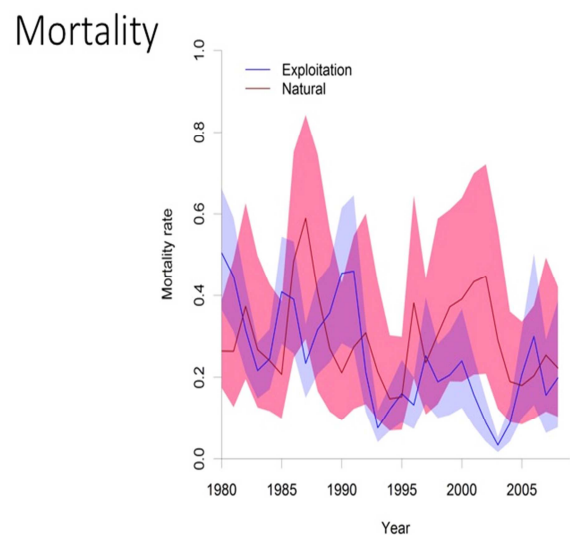
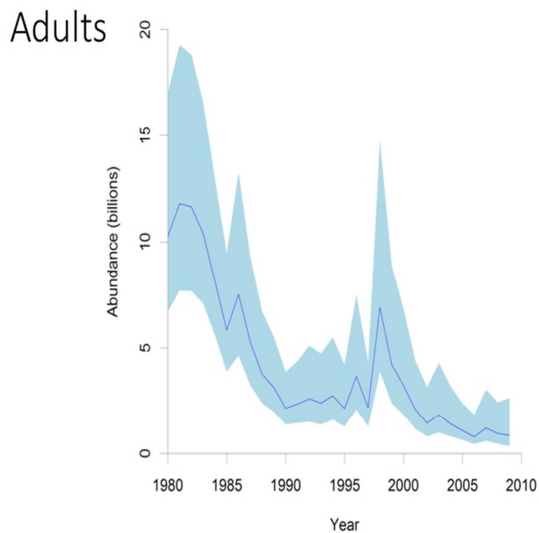
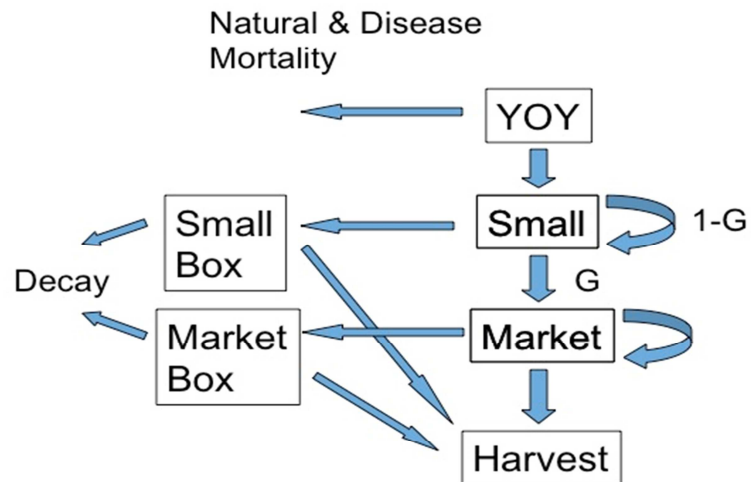
The process will involve “tuning” the model until it fits the data that are being provided to it and it will then serve to provide “best estimates” of oyster abundance and mortality rates from harvest reporting areas in 7 regions the Choptank complex. The data for the model will include:

- Harvest
- An estimate of reporting rate (50-80%?)
- Trends in oyster and box density from the MD DNR fall dredge survey
- Size and disease prevalence/intensity data
- Patent tong and diver survey data
- Numbers stocked
- Amount of shell placed (or other materials)

Dr. Wilberg provided the following depiction of how the population model will function noting the YOY stands for “young (not yet one year old) spat” and that it will distinguish harvest vs. non

fishing mortality. He presented a picture of oyster abundance from 1980 to 2010 (“We’ve gone from billions to 800 million oysters.”) and oyster mortality (“there is more uncertainty for natural vs. harvest mortality.”).

Population Model



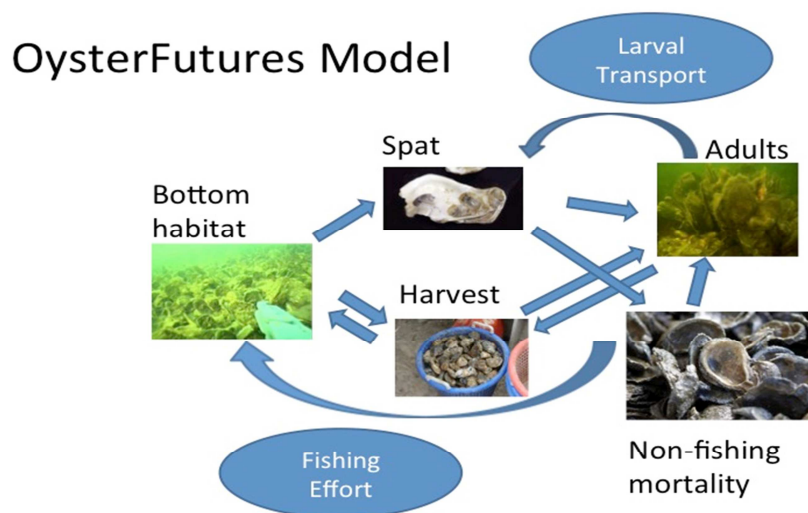
Workgroup Member Comments and Questions

- **Fall dredge survey.** What does fall dredge actually measure? How much associated with certain shells came up. How many oysters? *A: The survey doesn't provide an number for oysters but does provide relative change in numbers at each station over time.*

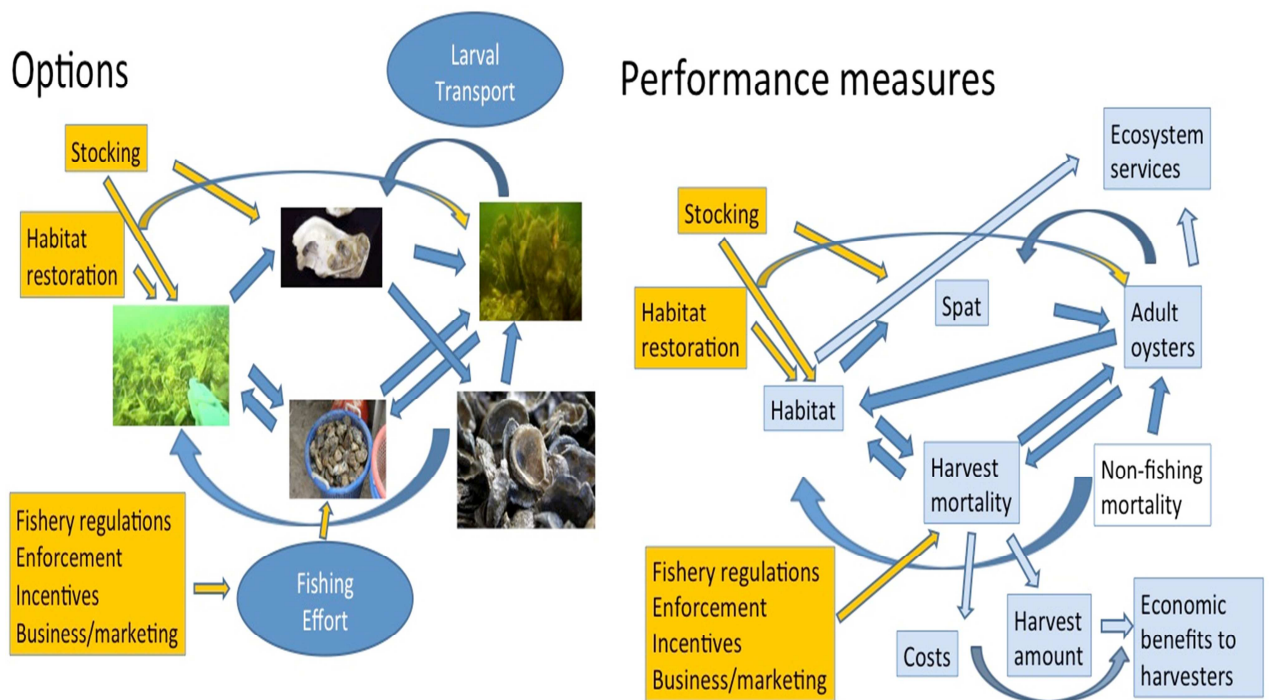
- Fall survey picks up first spat set in July and August. We need to look at 2nd spat set that may not be picked up. Have been seeing that for last couple years.
- **Relative density.** Does relative density = relative health? *A: It shows how much of the shells are there.*
- **Assess the living reef?** Can this model assess the 3rd dimension, the living reef itself? *A: That is tough to do as we don't have many repeated looks with sonar mapping over time.*
- **Focus on oyster bottom habitat.** The biggest problem for oysters in the Choptank is the habitat. We should focus and pay attention to that.
- **Patent tong surveys and abundance.** In the Choptank complex do patent tong surveys help with determining abundance? *A: Not very helpful as they don't catch all oysters in each location.*
- Eliminate Patent tong surveys? Shouldn't base a survey on one dip of the patent tong, use technology to do dives with factual samples.
- **Natural mortality.** In terms of natural mortality we have a good handle on disease vs. other natural mortality causes. *A: Counting boxes is what estimates will be based on. Don't estimate spat mortality since they don't leave behind boxes.*
- **Future research needs.** Will this workgroup be recommending future research needs? *A: Yes, and hopefully suggest which research would be the most useful to have.*

E. BRIEFING ON THE DEVELOPMENT OF THE MODELING TOOL AND INITIAL ASSUMPTIONS

Dr. Wilberg provided a briefing on the modeling tool components and initial assumptions. It will be designed to address oyster abundance and mortality, larval transport, and harvest and fishing effort as is reflected in the slide below:



He noted that the Team will be running this model forward 10 to 15 years over time and every option will be run many times. He reviewed the link between the options as well as the performance measures being developed for the model:



Workgroup Member Comments and Questions

- **Aquaculture and the model.** How is aquaculture plugged into the model? *A: Good question. We will try to answer at the next meeting.*
- How would it be incorporated? Want more oysters in water- they have some. How does it fit into the model. It has spat and adult oysters and potential ecosystem services in terms of filtering water. *A: Aquaculture may be more variable.*
- In a public fishery mortality is both harvest and non harvest, while in aquaculture it is 100% mortality.
- Do we know how much aquaculture should be occurring?
- **Economics.** The most significant measure for all of this is bottom line economics. Aquaculture will put more oysters in the mix. We need to figure out the benefits and costs from every component: eco-services, jobs, aquaculture, public fisheries with tax dollars financing the entire project?
- 86 million spat on shell a year should have some effect. Amount of spat put in helps the public supply. It is about 3 spat to 1 for every oyster we harvest.
- **Aquaculture impact on oyster habitat.** Spat by aquaculture does impact habitat. Does it off set effort in the public fishery over time?
- **Non fishing mortality.** Why is “non fishing mortality” not filled in? *A: We are not at a level of understanding of various things such as environmental, etc. and wont be able to model this.*
- **Disease.** Concerned about future disease events that have averaged every 8-12 years resulting in severe mortality. How will this be handled in the model? *A: Will be variability built into the model. What is relevant for where we think we are going in the future. Past 15 years not so*

bad. Something changed? Or a run of luck? The VIMS research on oyster disease resistance suggests it is not currently adversely affected as in the 80s with DERMO.

- **DNA family lines and disease resistance.** We need a tool to use DNA family lines to be part of the overall analysis. This state could get a good idea- evolving to resist disease?
A: The Lab has a new faculty member, Lewis Plough, whose area is oyster genetics and the team will ask him for guidance on the most recent work on genetics and family lines.
- **Climate change.** Will climatic events be incorporated into model, e.g. rain? *A: Not directly, but will have built in environmental variability- spat survival and non-fishing mortality. Won't have a climate model for drought, etc. Phase II of Oyster Futures will explore making predictions about climate changes in the region.*

III. REVIEW OF MODELING OPTIONS IDENTIFIED AT THE WORKGROUP ORGANIZATIONAL MEETING

A. OVERVIEW OF THE ORGANIZATION OF OPTIONS IDENTIFIED BY THE WORKGROUP

Mike Wilberg provided an overview of how the Team sorted the management and regulation options identified at the last meeting into the following different categories:

- Management and Regulation Options That Can Be Modeled
- Marketing and Business Practices Options That Can Be Modeled
- Options That Can't Be Modeled
- Options To Be Considered In Phase II of the Project
- Issues Discussed Without Identification of Explicit Options and Options That Could Be Moved to the Vision
- Options Rated Not Achieving Consensus

The list of options the Workgroup reviewed to help identify potential modeling ideas included the following:

1. Rotational Harvest Option(s)	6. Fee & Tax Options
2. Enforcement Options	7. Spatial Options
3. Use of Population Assessment in Management Options	8. Options on Regulations Related to Specific Gear
4. Limited Entry Options	9. Stocking Options
5. Habitat Modification/Restoration Options	10. Aquaculture Options

B. MANAGEMENT AND REGULATIONS OPTIONS AND POTENTIAL MODELING IDEAS

1. Rotational Harvest Option(s)

“Consider developing a rotational harvesting strategy that features monitoring and builds upon lessons from other fisheries and addressing questions such as:

- Data collection involving watermen and the state to inform management;
- Criteria to ensure a standing stock for when to open or close an area;
- Strategies to avoid concentration of harvest in few areas;
- Significant changes in management approaches;
- Providing local access for rotational harvest;
- Enforcement and compliance strategies; and
- Investments needed to jump start initiatives.”

(Acceptability Rating 3.6 of 4, February 26-27 2016)

Mike Wilberg and Elizabeth North opened the discussion noting there are different ways to organize a rotational system. Virginia conducts two different types of rotations in two different locations. The kind of questions that can help with modeling are:

- What are the areas and how often are they open? It will be easier to develop the model with a range of specific options vs. changing the model later in the game.
- Some of these options are not mutually exclusive.
- Rotational harvest with stocking is a possible combination for a future model run.
- How big of an area is needed for the rotational site? 10 vs. 40 acres? Can we get some idea of the range in terms of acreage?
- Are they Choptank-wide or specific to DNR designated Sanctuaries?
- Are Sanctuaries included in the rotational option?

a. **Workgroup Discussion Points**

- **Focus on Choptank complex.** Choptank complex vs. Chesapeake Baywide? *A: Just the Choptank complex and regions within the Choptank.*
- **Divide into 3 sections.** Consider dividing area into 3 sections: upper, middle and lower. Determine what they are. Open area in each section for 1 month. 6 areas in each section. Keeping people spread out is very important. Open new area each month. If area appears to be overharvest, may need a 7th area.
- Rotational areas in the Choptank. How to divide up regions?
- Use the most productive bars we have to do this.
- **Re-establish shucking industry.**
- **Expand seasons earlier and later.** Will keep shell. (fit in stocking and habitat restoration?)
- **Clear harvest goal.** Clear goal needed for harvest necessity. Come up with numbers initially as a guess.
- **Biological triggers to open/close rotational harvest.** Consider some biological triggers to close and open- how much harvest can the area withstand this year and next year. Oyster density/biomass? How much can be removed and continue reproduce? Survey/assessment- before the season. Open and allow X bushels for this many days/weeks. More oysters might be open longer.

- Virginia's rotation system is not set to strict timelines as there is opening and closing flexibility. This should be factored into the modeling.
- Consider when you close- variations on what might work- shell seeding? If a good spat set, should we be able to reopen the area after this?
- **Pilot test different size plots with watermen.** Rotational harvest- managed by a subset of the watermen community. E.g. a 40 acre plot could be dedicated akin to a size of tributary we are restoring. Openings and closing- 3 years, 15 acres a year.
- How many watermen it will support? For how long. How much money do you have to support it at 200 acres vs. 40 acres to kick it off and sustain?
- How small an area is rotational harvest possible?
- Look at a couple different ranges and scenarios- big, small and in the middle.
- **Contribute shell and spat.** Should be consideration- coop or rotational regime should be able to contribute what is needed back in terms of shell and spat.
- **Salinity areas.** Should salinity areas and oyster growth be a basis for a rotational system? VA has 3 year and 2 year rotations, e.g. every 2 years in lower, every 3 years in mid and upper. *A: MSX mortality rates vs. growth rates have guided the basis for the VA rotation system in different years.*
- **Different gears and rotational harvest.** How do you address the 5 groups using different gears? Divers, hand tongers, power dredging, etc. If everyone had to hand tong we would have less harvest.
- **Aquaculture.** Commercial hatchery-aquaculture to produce oysters and eventually family lines. Make oyster seed from part of shell. Mid bay and upper bay- industrialized state run aquaculture in these areas.
- List aquaculture on the program- eligible for Federal funding. Public fishery/statewide perspective. Lots of interest in this in DC today.
- **3 dimensional reef systems-** seeded- to develop future lines- build this into the plan. Strategically placed. So all can benefit.
- **Include Sanctuaries?** Sanctuaries shouldn't be included in the short term? 5, 10 years? Give them time to develop with protection from harvest in the short term.
- 24% of bottom taken. Only 7% utilized. Start with the 17% not being utilized. Start there? Starting with places in Sanctuaries that haven't had an investment would be a good place to start.
- Figure out a name for the 7% sanctuaries? Sanctuaries where money has been spent on. These are 3 sanctuaries out of the 24.
- Model can look at different options and approaches.
- Who has the say as far as taking the Sanctuaries out of the picture? *A: The state government has authority – if federal \$\$ spent- it is up to the state but may have legal implications.*
- Suggestion to take the Sanctuary-where hasn't been invested in and model it?
- Will you be modeling the full range of these options covering every acre of the tributary?
- Other 17% of the sanctuaries-over past 20 years for different areas.
- We should be prepared to look at what implications for rotational harvesting the 5-year Sanctuary review provides.
- **Public fisheries business plan.** Develop a business plan- for the public fisheries that is sustainable. Recommendations have to clarify responsibilities. Look at from a business perspective

- **Local access for rotational harvest?** Will it be possible to provide or restrict to local access in Choptank for local watermen? Not currently the case.
- We can't project policies. 5 years is not enough to understand the impacts.
- Nowhere to rotate? Not the currently open part.
- Before doing this, we need to open up more areas.
- Model all scenarios. Look at a different suite of options.
- If an area is economically feasible we might try to jump start the rotational system there.
- We will need to consider the time line for such an effort.
- The Potomac River is doing some form of rotational system. Should we look at how they structured it?

b. Workgroup Modeling Option Ideas

1. Consider dividing the Bay into 3 sections: upper, middle and lower. Determine what they are. Open area in each section for 1 month. 6 areas in each section. Keeping watermen spread out is very important. Open new area each month. If area appears to be overharvested, you may need a 7th area.
2. Only 7% of the 24% area Baywide that was taken for Sanctuaries has been invested in. Start with and focus on the 17% areas in sanctuaries that haven't had an investment would be a good place to start.
3. Can we provide local access for rotational harvest in Choptank for local watermen?
4. Pilot test different size plots with watermen participation
5. Use the most productive bars we have to do this.
6. The rotational regime should be able to contribute what is needed back in terms of shell and spat.
7. 3-dimensional reef systems should be seeded and strategically placed so all can benefit to develop future lines. This should be built this into the plan.
8. Consider opening and closing flexibility in the modeling.
9. Consider some biological triggers to close and open: e.g. How much harvest can the area withstand this year and next year? Measure Oyster density/biomass? How much can be removed and continue reproducing?
10. Survey/assessment- before the season. Open and allow X bushels for this many days/weeks. More oyster areas might be open longer.
11. How many watermen it will support? For how long? How much money do you have to support it at different sizes, e.g. 200 acres vs. 40 acres to both kick it off and sustain over time?
12. Consider hand tong oyster gears only. If everyone had to hand tong there would be less harvest.

Mike Wilberg noted that the modeling team will propose how this might look. Look at different scenarios on this to provide info. Help to stimulate additional thoughts.

2. Enforcement Options

A.) Address and provide funding for enforcement presence on the water (both in increasing numbers and quality through training) to address poaching and support strategies such as focusing on the buyer level. (Note this is covered in another option and recommended to be removed from this location. [Theme A] (*Acceptability Rating 4.0 of 4, February 26-27 2016*))

Mike Wilberg and Elizabeth North opened the discussion asking what kinds of enforcement is being provided and how much non-compliance is happening now? How much of the harvest is currently undersized? Can we use # of citations issued, #s in penalties, kinds of infractions charged.

a. Workgroup Discussion Points

- **Targeting undersized oysters.** 5%-10%? It is a small element but there are certain areas there are more people doing wrong things. End of season there may be a higher percentage- upwards of 30% +
- Happens at the end of the year- pushed into a small area and having gone over the big ones early.
- Selling undersized oysters is the issue. Next year's crop. Losing filtration.
- 50 bushels of undersized oysters would be 100 bushels the next year.
- **Enforcement presence and effectiveness.** Saw some enforcement presence after the last Workgroup meeting for a week. We need a presence of law enforcement. It changes everything and affects bad behavior.
- Review the Oyster Commission Enforcement Subcommittee report and relevant recommendations.
- Personnel have been fundamental problem. We need new officers and training.
- Shortage of law officers 40-60 boats working- little presence- maybe frustrated by the court experience. DNR needs to address this.
- Helicopter presence is effective.
- Enforcement/tickets that go to court, gets thrown out or a small fine with a good lawyer. \$500 per bushel if no tags.
- DNR Officer in Courts- need to be educated/trained as to what bars they observed. These get thrown out.
- Consider having the State Attorney General assign a lawyer to ride the circuit.
- DNR has put in place a positive change with all DNR cases being presented on one day and being prepared for all them.
- There are adequate laws- state can take your license. Not well or strictly enforced. Penalties range from 30 days for next season to losing your license.
- Marine police need to do a better job. Stop it at the trucks- at the buyer stations.
- A major investment in improving enforcement is needed. Fund it and create a position to address the buyers.
- **Policing the buyers-** at the buyer stations. Buyer level is where the focus should be.
- Taking little oysters and putting in aquaculture cages and selling after the season.
- DNR should be inspecting the buyers. If they fail to pay the oyster tax this hurts the industry. It has been many years since an officer enforced the buyers and taxes.
- **Rotating enforcement schedule.** Consider rotating the enforcement schedule.

- Certain places where oysters unloaded at wharf. That is a good place for enforcement presence.
- **Tagging system** has helped in terms of catching over your limit.
- DNR officers on Thursday mornings-in court so that's when illegal activity occurs.
- **Compliance issues.** People going out early and taking 2 limits per day. From sanctuary and from public bottom.
- Enforcement of crossing line into restricted areas should consider whether intentional and non-intentional.
- **Aquaculture and enforcement needs.** Aquaculture needs enforcement too.
- How many buyers for each county? Estimate 6-8 for each county? *A: The Team will try to get data on buyers in Choptank complex.*
- **Matching buy tickets, harvest reports and bushel tax report.** Buy ticket info (smallest data set), harvest reports and the bushel tax reports don't always match. In VA making them match. Violations to both buyer and watermen if they don't match.
- **Define poaching vs. going over limit.** "Poacher" vs "accidents" pushing you over 5%- if trying to do the right thing, you shouldn't be labeled a poacher. Starting early. Bad rap in the papers and from other groups (e.g. River Keepers uses the term). Find a common ground on when it is appropriate to characterize behavior as poaching.
- Use the word "non compliance"
- **Enforcing Sanctuaries vs. public bottoms/bars-** Have to commit police with more effort in watching the Sanctuaries than the public bottoms/bars.

b. Workgroup Modeling Option Ideas

1. Consider rotating the enforcement schedule.
2. Target enforcement presence to places where oysters are unloaded at wharf.
3. Target policing buyers and buyer stations
4. Match buy tickets, harvest reports and bushel tax report and look at Virginia program for accomplishing this.

3. Use of Population Assessment in Management Options

A.) Conduct a stock assessment of the oyster resource/fishery with involvement of the stakeholders. Note this is the same another option and recommended to be eliminated as a separate option (*Acceptability Rating 4.0 of 4, February 26-27 2016*)

Mike Wilberg and Elizabeth North opened the discussion noting that in federal fisheries regular stock assessments are conducted to set a management and individual quota regarding annual harvest. They shared the following questions:

- Include the possibility of a stock assessment in the model to see how it performs?
- Limited entry and use to evaluate how to expand the entry and use?
- How many people could catch their limit the whole season?
- This project will not work like stock assessment in other fisheries. It wouldn't be a counting but a modeling exercise of existing data (e.g. Fall Survey), sampling to tune the

model and expose areas where we don't have good data. This data and model won't be used to establish a quota, although it could be used to understand the effect of a quota.

a. **Workgroup Discussion Points**

- **Quota.** What about the difference between individual transferable quota vs. management quota.
- **Scope of effort?** Concerns about the scope of an effort. Would this cover every oyster bar in bay? What would be the estimated costs? How long will this take? How it will be done?
- **Collaborative effort.** This has to be a collaborative effort. We don't know what's out there and an important step will be to get a baseline to figure out a sustainable harvest.
- **Stock assessment.** As a fisheries management tool this might inform management of oyster fisheries. The legislation doesn't address how to apply this. The more information, the better.
- Stock assessments look at functioning of the fishery not just the numbers.
- Timing of an assessment is important. April 1
- Where would the number come from? Where would the starting number come from?
- Using the abundance estimate from multiple data sources as a starting point.
- Important number: how many and where.
- Terminal date of a stock assessment-
- Major concern- past experience with sampling.
- **Link to Management Decisions?** Concerned about accuracy of assessment and basing management decisions on it.
- Stock assessment- how would management using stock assessment information behave vs. management that doesn't
- Can it inform where to shell and seed? Assessment tool will take a while before it is refined and ready for use by management.
- **Assessment tool for the industry.** Need an assessment tool for the industry. Use as many parameters as we can- give the model time to develop over the years before using a management tool.
- The management tool needs to be proven.
- We need the tools before we put it into the model.
- **Model population assessment in locating sanctuaries.** Model how it could be used as to where sanctuary programs should be located.
- Use to find better areas for rotational harvest options
- E.G. 1st blue crab stock assessment had real problems. Done 4 of them and have work to improve the tool.
- Model- running for 15 years. Keep same management strategy. Or management strategy, if population gets high enough, then speed up rotation, if low enough, slow down rotation.
- *Run it with the same management strategy vs. putting in information to make it more dynamic?*
- Population assessment- more dynamic management tool.
- Targeting bars and programs.
- Rate of harvest and rate of effort- input for the model.
- **Is this a dynamic model vs. a static model?** *A: A Dynamic model*

b. Workgroup Modeling Option Ideas

1. Include stock assessment in model to test performance.
2. Can population assessment inform setting the location of sanctuaries?
3. Can it inform where to shell and seed?
4. Can it be used in a rotational harvest option?

4. Limited Entry Options

Consider limiting entry to oyster fishery to watermen making the majority of their living from commercial fishing. [Theme A] (*Acceptability Rating 4.0 of 4, February 26-27 2016*)

Create a limited entry oyster fishery. [Theme A] (*Acceptability Rating 3.75 of 4, February 26-27 2016*)

a. Workgroup Discussion Points

- **2500 possible licenses** out there. If the fishery is healthy, they are going to jump in.
- Of 1189 there are about 400 part-time.
- Statewide figures- 1134 surcharges in 2015. 745 more than 100 bushels harvested. 400 less than 100 bushels.
- **“Use it or lose it”**: Why leave them hanging over your head. “Use it or lose it.”
- **License Surcharge**. Limiting Surcharges is the good focus. Good way to control entry.
- \$300 surcharge was an industry initiated and supported effort.
- \$300 surcharge should be an “intent to harvest” and good only for 1 year.
- \$300 not enough for license. Increase this surcharge to address unused license. This would replace the funds that may be lost from the “use it or lose it” approach.
- Base it on income- majority of your income working on the water.
- Legal complication with the “use it or lose it”
- Resource recovery is good for everyone. Value of license will increase. If we get the license down we should keep it down. If you don’t have landings in 3-5 years lose the license.
- Provide for exemptions or exceptions for e.g. health reasons,
- \$300 buys some hatchery seed/spat but mostly spent on shell
- **Cap the number of licenses**. If we build a strong public fishery with unlimited entry will there be more than 2500 license holders out there? Cap the licenses with the numbers today participating in the industry.
- **Aquaculture**- no limit- hard to compete with. Getting all advantages. E.g. DERMO experience with 2 ½ inches. Watermen asked but didn’t get. Aquaculture pressed and it happened.
- Aquaculture not given a free ride- not getting public bottom. Lots of hoops to get through.
- Lots of variation in what is meant by aquaculture.
- Aquaculture- is really a gear type. Future is in growing seafood.
- **Disease**. We are all battling the problem with disease-
- **Apprenticeship program** through DNR? Used to have. Did it work? Why did they get rid of it?
- Consider reinstating a program to bring young people into the industry.
- **“Buy back” license programs** considered? Look at Texas e.g.

- Build this into it- in order to sustain the traditional. Carry both processes and industries to the room. Wild harvest, aquaculture and restoration are what this project is about.
- **Limited entry**- TFLs limiting. Not just that. Gil net, these are for many waters.
- Part timers- abundant resource allowing this. We are here because we have a limited resource and need to work together to reach goals we share. Main objective- stable livelihood and healthy fishery for the full time watermen.
- **Recreational oyster license?** This is a small % of users. Probably not an area that will help to focus on.
- We can revisit the # periodically in light of the abundance and health of the fishery.
- Do we know how much /what % is harvested is wild/natural?
- Can commercial fishing have an additional recreational option?
- What is the part of harvest of natural spat that was set on shells planted by program or that set on natural bottom? Natural spat set could have been helped by a prior investment.

b. Workgroup Modeling Option Ideas

1. Model different surcharge levels in terms of limiting entry
2. Model capping the number of licenses.

5. Habitat Modification/Restoration Options

Increase productivity of existing bottoms by improving habitat and structure. Increase the potential productivity per acre of existing bottoms by smartly managing them and doing it right. [Theme A] (*Acceptability Rating 3.9 of 4, February 26-27 2016*)

Focus on strategies for increasing the funding, use and reclamation of local shells from the Chesapeake Bay and from local watermen to supplement bars and increase the viability of the oyster resource. [Theme C] (*Acceptability Rating 4.0 of 4, February 26-27 2016*)

Develop a strategy that tests the effectiveness of strategically placed 3-dimensional bottoms with artificial reefs and alternative substrates. [Theme D] (*Acceptability Rating 3.9 of 4, February 26-27 2016*)

In terms of modeling issues, Mike Wilberg noted we will need to explore what modifications are needed in terms of where to put shell, how much, how often. Hatchery reports of 20% survival, but for how long (e.g. till the next year or until market size?). May model rehabilitation of oyster bars not doing well and targeting areas doing well to ensure they continue.

a. Workgroup Discussion Points

- **Placement of restoration projects.** Putting restoration projects where there is the most spat. Need to look for good spat set
- Broad creek- has received most of shell - 30K bushels of shell
- Mouth of Harris Creek has received some additional shell
- 2014-15- harvested 390K bushels, 250 per bushels- \$642mil- \$118mil put on un-harvestable bottom. 20% survival rate of spat on shells.

- Reserve areas above the bridge on the Sanctuary (Bolling Brook). Don't get spat sets on these. Move down to Broad Creek to get spat sets.
- **Restore harvestable bottom.** Restoration of harvestable bottom. Focus on getting more spat on shells put on harvestable bottom.
- **Focus on improving unproductive bars.** Important to prepare unproductive bars now and enhancing the bars we have.
- Getting shells out of the mud on public oyster bars that are not very productive.
- **Bag-less dredge-** 30 years ago- state studied it and said it didn't work. Did it for several weeks (Tred Avon was one site).
- **Reclaiming buried shell** in the Choptank- 2005 study pointed to a couple of different ways to do this.
- **Reclaiming shells** is a good idea- deserves public support financially.
- **Funding and Economics.** Address some funding concerns- business plan with aquaculture may enable funding.
- Build economics back into the industry- shortage of shell is the focus of conversation.
- **Habitat restoration work-** private and public funding combined. Looking for a net gain of oysters in the bay. Potential for agreement.
- **Sanctuary plan-** brood stock long enough to be resistant to diseases. Watermen said increase shell program and power dredging.
- Industry bringing resistance from James River up to here. Don't have to wait for 20 years.
- **Health regulations.** What % of public bars in Choptank complex closed due to health regulation? If significant, is it possible to remove shell and place on other bars to build substrate. *A: Health concern is for human consumption.*
- Place sanctuaries in these non-harvestable buffer zones. Leave the bars where they are.
- Explore where it would be feasible to bring shell up. *A: Team will look for data on this.*
- **Determine the need for shells.** Come together to determine how much shell we need etc. build both an economic and ecological sustainability model- adding to community resilience.
- Build industry, bring processing back to Maryland and strategically use the shell to enhance the entire resource. Can make oysters without fossilized shell.
- Lots of science and technology- current and in the future. We should be open to it.

b. Workgroup Modeling Option Ideas

1. Model rehabilitation of oyster bars not doing well and targeting areas doing well to ensure they continue.
2. Model a shell reclamation program
3. Model closures of public oyster bars due to health regulations.

6. Fee & Tax Options

Evaluate and consider changes/increases of oyster fishery related fees and taxes. [Theme A] (*Acceptability Rating 3.9 of 4, February 26-27 2016*)

MW: Concrete numbers e.g. doubling the surcharge. E.g. doubling the bushel tax to see what it might raise.

MW: Are wild oysters being labeled as aquaculture to avoid tax? A: For the most part no.

a. Workgroup Discussion Points

- **Model raising (at least doubling) the per bushel amount**
- Increasing surcharges can be tough to get through in face of public opposition.
- Increasing taxes will probably come out of watermen pockets.
- **Model pricing with return of shells built in.** Where shells end up- return % where they came from. VA- \$5 a bushel with transport figured in. we need more shells shucked in state.
- Relate to surcharges and limited entry?
- **Model taxing suppliers.** Is there way to model taxing suppliers to the restaurants- box oysters? Once out of state, we don't get back.
- **Model tax credit for shell collection.** Can we model a tax credit for shell collection.
- Before tax, shucked in Maryland- shell had to go the next day. CN does this.
- Watermen- could take shell back the same place in a new designated area.
- **Connect with rotational harvest.** Can connect this to rotational harvest ideas.
- Industry would be willing to participate (or provide a fee so someone can do it in their stead).
- *Are wild oysters being labeled as aquaculture to avoid tax?* A: For the most part, no.

b. Workgroup Modeling Option Ideas

1. Model raising the per bushel amount.
2. Model pricing that builds in costs for return of shells
3. Model taxing suppliers
4. Model a tax credit for shell collection.

7. Spatial Options

Consider modifying regulations so a single bar is not divided between gear types or open and closed. [Theme A] (*Acceptability Rating 3.9 of 4, February 26-27 2016*)

Modify the shapes of sanctuaries so that whole tributaries are not closed. [Theme A] (*Acceptability Rating 3.6 of 4, February 26-27 2016*)

In restoring tributaries provide limited access to the fishery that can allow fishermen the opportunity to work on that river while the restoration plan is developed. [Theme D] (*Acceptability Rating 3.6 of 4, February 26-27 2016*)

Continue the Sanctuary program with some modification that may include providing for maintenance including the potential for limited harvest in tributaries and assessing the state of oyster bars within sanctuaries. [Theme D] (*Acceptability Rating 3.4 of 4, February 26-27 2016*)

a. Workgroup Discussion Points

- **Better mapping tools from DNR.** We need better maps to let watermen know where they are supposed to be/not supposed to be. They need these tools.

- DNR's website hard to find lines- improve this. Specific formats? GPS, phone, print outs.
- **Locating restoration projects.** Put the restoration projects where they can enhance the public fisheries. Need to consider both the economic and environmental returns.
- **Avoid splitting bars in half.** Consider moving the line to where it won't split the bar in half.
- Harris Creek *line*, Broad Creek hand tong and power dredge line should be moved off the bar. Move a couple 100 yards over.
- Never do what we did in Harris Creek. Could have been done in other places to enhance the public fisheries.
- **Gear types.** Sail dredge and power dredge line in the Choptank?
- Connect with limited entry and gear specific areas. So many divisions and complexity with all the gear types.
- Reclaim power dredge for hand tongs?
- **Gears and % of harvest.** What is the percentage caught on hand tong vs. power dredging? How much is produced per/acre for each gear?
- **Gear type return on investment.** What is the return on investment for gear types?
- Hand tonging in Dorchester County 11% of harvest- 6600 bushels. 96 hand tongs. 10-15% of Dorchester County considered hand tongs.
- **Hand tong and spat recruitment.** Do hand tong areas have better spat recruitment?
- More hand tonging vs. power dredging? You can hand tong any bottom.
- **Hand tonging in Sanctuary headwaters.** Get part of the Sanctuary headwaters back for hand tonging? More suitable in small bodies of water.
- 67% impact on hand tong for the Sanctuary program. E.g. the upper part of Tred Avon? Opening it up in the model?
- **Locating sanctuaries.** Where do you think sanctuary could be? Are the upper branches of Little Choptank still an option?
- Increasing harvest in the sanctuary areas?
- Model increasing sanctuaries and reducing Sanctuaries to see if we still get the ecological benefits?
- 15 years of sanctuaries- spread around haphazardly with little criteria. Big one off Plum Point in a compromised area.
- Watermen got no funding and received little economic benefit when the Sanctuaries were established.
- Concept in 2010 was a targeted tributary plan addressing the "connectedness" that had been missing in earlier efforts. Now looking at establishing a network of functioning self sustaining reefs.
- Model ecosystem services that Sanctuaries provide?
- Need to keep in mind overall objectives of self sustaining network of reefs-
- **Sanctuaries and disease resistance.** What it will take to make the sanctuaries sustainable and resistant to disease? A? *Will look at whether the model can address this*
- Structure will continue to be there. Living reef vs. living oyster.
- **Modeling enforcement** of bigger and smaller pieces. Other piece is enforcement- smaller pieces are harder to enforce.

- **Ongoing dialogue needed.** In the past didn't talk about it at a table like this. We need all of this to be sustainable- economic, ecological. Making this initiative sustainable.
- Establish an ongoing dialogue-table process to guide the implementation of recommendations going forward.

b. Workgroup Modeling Option Ideas

1. Model both increasing and reducing Sanctuaries to see what are the ecological benefits?
2. Model enforcement of bigger and smaller Sanctuary pieces
3. Model limited entry and gear specific areas
4. Model increasing harvest through hand tonging in Sanctuary headwaters
5. Model locating sanctuaries where they can enhance public fishery
6. Model ecosystem services that Sanctuaries provide
7. Model, if possible, impact of sanctuaries on disease resistance

8. Options on Regulations Related to Specific Gear

Conduct more and better research to inform regulations and better understand the efficiency of gear types and their impacts on the fishery. [Theme B] (*Acceptability Rating 3.9 of 4, February 26-27 2016*)

- *MW: e.g. different seasons for different gears? Spatial places where gears are allowed.*

a. Workgroup Discussion Points

- **Open/Close of seasons.** Look at the price cut when power dredging comes on. Putting off for 2 weeks.
October 15? November 1 for power dredging?
- Skip jack- Nov 1.
- Move to April 15 and October 15 or November- consider time for a resting period.
- Different opening and closing dates across the region?
- Market gets good end of March. We could model this into April?
- **Small oyster harvest later in season.** Consider the situation with small oysters being taken later in the season.
- **Limited entry for certain gear types?**
- **Impacts of concentrating harvest efforts.** Consider the impacts of concentrating efforts into different areas.

b. Workgroup Modeling Option Ideas

1. Model different opening and closing dates for opening up to power dredging and skip jack across the region.
2. Model this into April. Consider time for a resting period.
3. Model small oysters being taken later in the season.
4. Model limited entry for certain gear types.
5. Model impacts of concentrating harvest efforts in different areas.

9. Stocking Options

Focus on strategies for increasing the funding for the use of Spat on shells everywhere not just in a few places. [Theme C] (*Acceptability Rating 3.9 of 4, February 26-27 2016*)

a. Workgroup Discussion Points

- Continue looking at different options regarding stocking.

10. Aquaculture Options

What are the modeling options? What information and tracking is available on aquaculture in the Choptank? What if we modeled a part of bottom that is poorly performing now, and included intensive rehabilitation and allowed limited entry area?

a. Workgroup Discussion Points

- **Modeling aquaculture.** Aquaculture needs to play into the model. Spat on shells on harvestable bottom.
- Is putting spat on shells as each County has done considered aquaculture? *A: Yes it is a process but not a program. We need to make it a "program"*
- **Modeling enforcement.** Needs to be regulated and enforced the way the public fishery is enforced.
- **Fishery as a cooperative.** Consider the entire fishery a coop?
- Take a piece of public bottom and lease it to a sector of public fishery via a cooperative. Include some of bottom in Sanctuary?
- Would this take away from public bottom? Modeled after the current lease bottoms.
- **Public aquaculture program?** Test in 2 tributaries. You might get USDA support. This could bring resources to the table to help the industry and the public fisheries.
- DNR/ORP- looking for funding and seeking the involvement of watermen.
- **Model current effort with increasing productivity.** Model keeping as it is now but increasing aquaculture productivity. Aquaculture needs a structure around the whole idea.
- **Health concerns.** 5 years back. 3 people sick considered an "outbreak" Hurt the industry. Couldn't sell the product. Sell in the months without an R? Global warming. If someone got sick, the whole thing can collapse.
- The aquaculture industry shares concerns of watermen on this issue.
- **Water temperature levels** option?
- **Business plan for sustainable oyster industry.** Needs a clear business plan- with jobs a priority.
- The future of maintaining a sustainable oyster industry will depend on working together to make everyone successful.

b. Workgroup Modeling Option Ideas

1. Model spat on shells on harvestable bottom.
2. Water temperature levels option? *A: Modeling can address the handling.*
3. Consider modeling the entire fishery a cooperative?
4. Model different enforcement options?

5. Take a piece of public bottom and lease it to sector of public fishery via a cooperative. Include some of bottom in Sanctuary?

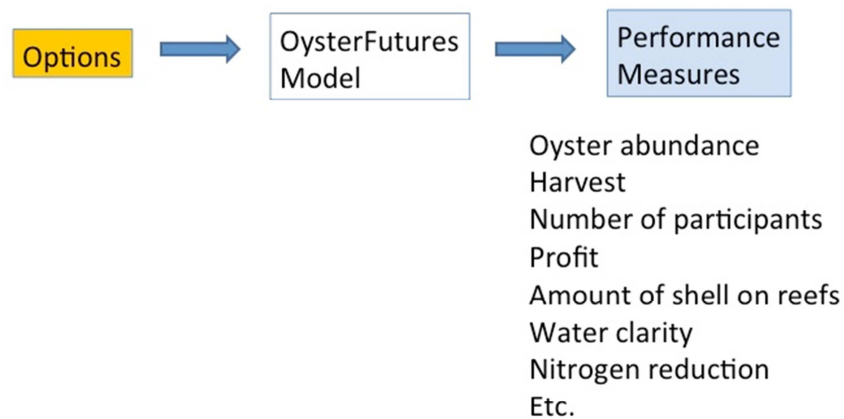
C. PERFORMANCE CATEGORIES & MEASURES

Mike Wilberg and Elizabeth North introduced the concept of performance measures and the five categories of performance measures for review including: harvest; economics; population; habitat; and ecosystem services. The modeling team thought that the options below spoke to performance measures instead of modeling options including:

- Incorporate ecosystem services into management regimes. [Rated 3.6—Theme A]
- Develop clear measures of economic viability and sustainability. [Rated 4.0—Theme C]
- Understand the full suite of what we are and are not getting for sanctuaries to further refine the management of the Sanctuary Program. [Rated 4.0—Theme D]
- Develop a strategy working with watermen and other stakeholders to help protect a brood stock to enhance disease resistant oysters. [Rated 4.0—Theme D]

As such, potential performance measures to address these ideas have been included in the lists below.

Oyster Futures Model



DRAFT PERFORMANCE CATEGORIES AND MEASURES

1. Harvest

- Total harvest in bushels
- Harvest by size category

- Harvest by location
- Timing of harvest during the fishing season
- Harvest per waterman
- Effort expended harvesting
- Amount of illegal harvest

Workgroup Comments

- Is harvest by gear type possible?
- Harvest per waterman? How will that be done?

2. Economics

- Frequency of harvest that meets an economic minimum for sustainability
- % of oysters in the local market
- Cost/value per bushel
- Number of fishermen participating in the fishery
- Revenue per harvester (and perhaps its distribution)
- Travel time and distance costs
- Cost of management measures (e.g., restoration efforts)
- Revenue raised in fees/bushel taxes
- Restoration costs avoided
- Social benefits (value of ecosystem benefits)
- ***Performance metric for economic sustainability of the community?***

Workgroup Comments

- How quick you can catch them?
- Depends on market price and overhead- if market not there you aren't going out.
- Distance to oystering locations? How fixed is the starting point for watermen?
- Distance to marina?
- Gear type and weather issues affect selection of locations.
- Don't give up your slip at home.
- Slip availability has become an issue. Longer drives or longer trips on water because can't get close to where they are harvesting.

3. Population

- Abundance of oysters in the population
- Size/age of oysters by location/region (e.g., reef, NOAA code, gear type/sanctuary)
- Number of large oysters (>5") by location/region (e.g., reef, NOAA code, gear type/sanctuary)
- Biomass of the population
- Amount of brood stock (spawning stock biomass) in the population
- Spat production (Recruitment)

Workgroup Comments

- Density on a reef? Another way to look at abundance information.
- Sanctuary uses density and biomass together.
- Small to market ratio? 2 buckets- small to markets. Tells the immediate future of the bar. Once you have smalls, translates into future market.
- Oysters that produce ecosystem benefits vs. market benefits.
- Why oysters grow differently in different places- lots of uncertainty.

4. Habitat

- Amount of shell on each reef
- Reef structure
- Habitat quality

Workgroup Comments

- Nutrient uptake? (below Ecosystem Services).
- Exposed shell? Yes. Takes into account siltation factor.
- Subsurface shell with some value- potential habitat. May be harder to get at.
- How much of the bar/habitat is silted over?
- Dissolved Oxygen as a habitat factor? Model not intended to have DO component. Mortality rate on bars may be included.
- Comparison between public bars and sanctuary? *Yes. Will try to work with. Siltation process will be a challenge.*
- pH? Phosphorous effects on spat? Issues of setting and survival. *A: That will be in the 2nd phase. Get an update from the ongoing NOAA research at UMCES in Spring 2017.*

5. Ecosystem Services

- Area of the bottom (<6ft deep) with enough light to support sea grass
- Water clarity
- Reduction in suspended matter
- Reduction in nitrogen
- Biomass of reef creatures supported

Workgroup Comments

- In the Biomass- Commercially viable species (blue crab, rock fish etc.)? Possible? Yes but couldn't do well. Lack of data and understanding of the system.
- Reef structure applicable here as well as habitat? Physical effect of flow on regimes due to 3-D. Causes mixing, etc.. *A: some measures can do double duty.*

IV. COMMUNICATION STRATEGY AND NEXT STEPS

A. Symposium- September 2016

Elizabeth North asked the stakeholder group how the research team could help them engage the communities that they represent and discuss communications strategies for this project. Members

asked the research team to put out a press release about OysterFutures help get the word out. They also discussed the idea of convening a symposium that would provide an opportunity for reviewing ideas and educating the participants on the challenges facing the oyster industry and the OysterFutures process. The Workgroup members discussed potential dates and asked the Team determine whether the Chesapeake Bay Maritime Museum in St. Michaels may be able to host the Symposium.

Workgroup Comments

- The symposium focus should be on the public fisheries and aquaculture.
- Try to involve local people in the 2 counties represented by the Workgroup and others involved with the industry.
- Committee with reps from the working group would be formed to help the research team develop the symposium program and to make contacts with speakers in Virginia and the Pacific Northwest.
- Bring some experiences from other states however be careful not to offer a “loaded” panel.
- Note that “one size does not fit all” and other places may be able to learn from us.
- Help our peers understand the OysterFutures process.
- Set the date soon.

B. UPDATE ON COMMUNICATION STRATEGY AND ACTIONS FOR THE PROJECT

- Strategy: close workgroup meetings to all but workgroup members and have press releases and symposium.
- Check on October dates for symposium
- Facebook and Web page. List of documents?
- EN will draft press release and send to members
- Ask letters of support from the workgroup members for a proposal to raise funds for a symposium. EN will check back.

C. NEXT STEPS AND AGENDA ITEMS FOR THE NEXT MEETING

- Review Workplan action items and assignments
- September 10-11. (Note: meeting was postponed until Nov. 5-6.)
- Preliminary version of the model with some options run in it. Talk through what went into model.
- Next meet will start on Saturday at 2 p.m. and be a full day on Sunday.
- NOAA- most sanctuary work is on hold pending the Sanctuary assessment.
- DNR is planting seed now in existing constructed habitat- seed planting is continuing.
- No more fossilized shells from Florida being brought by DNR.
- Identify agenda items and any needed information for next meeting

Appendix #1 Workgroup Organizational Meeting Agenda

<p>OYSTERFUTURES WORKGROUP MEETING II SATURDAY – SUNDAY, APRIL 30 – MAY 1, 2016</p> <p>Horn Point Laboratory—AREL Conference Room 2020 Horns Point Road—Cambridge, Maryland</p>

WORKGROUP MEETING OBJECTIVES	
✓	To Approve Regular Procedural Topics (Agenda and Workshop I Summary Report)
✓	To Receive Requested Presentations: Harvest Statistics; Reef Status, Oyster Population Status
✓	To Receive a Briefing Regarding Development of the Modeling Tool
✓	To Identify and Discuss Options for Modeling and Associated Performance Measures
✓	To Evaluate Level of Acceptability of Assumptions and Options to be Modeled
✓	To Identify Needed Next Steps and Information, and Agenda Items for Next Meeting

MEETING AGENDA DAY ONE—SATURDAY, APRIL 30, 2016		
<i>All Agenda Times—including Adjournment—are Approximate & Subject to Change</i>		
2:00 PM		LATE LUNCH WITH DESSERT BAR, AND SOCIAL SCIENCE STUDY SURVEY
1.)	2:30 PM	WELCOME AND INTRODUCTIONS
3.)	2:40 PM	AGENDA REVIEW AND APPROVAL
3.)	2:45 PM	APPROVAL OF FACILITATOR’S WORKSHOP SUMMARY REPORT (Feb. 26-27, 2016)
4.)	2:50 PM	STAKEHOLDER REQUESTED PRESENTATIONS <ul style="list-style-type: none"> • Harvest Statistics and Reef Status in the Choptank • Population Status of Oysters in the Choptank
~4:00 PM		BREAK
5.)	4:15 PM	BRIEFING ON THE DEVELOPMENT OF THE MODELING TOOL AND INITIAL ASSUMPTIONS
6.)	4:45 PM	REVIEW OF STAKEHOLDER PROPOSED MODEL OPTIONS RELATIVE TO DEVELOPMENT OF THE MODELING TOOL A. MANAGEMENT & REGULATIONS- REFINING OPTIONS FOR MODELING (A-J)
7.)	6:25 PM	SUMMARY OF DAY ONE AND REVIEW OF DAY TWO AGENDA
8.)	~6:30 PM	RECESS AND INFORMAL SOCIAL WITH DINNER

MEETING AGENDA DAY TWO—SUNDAY, MAY 1, 2016		
<i>All Agenda Times—including Adjournment—are Approximate & Subject to Change</i>		
8:00 AM		BREAKFAST ON CAMPUS
1.)	9:00 AM	WELCOME AND AGENDA REVIEW
2.)	9:05 AM	REVIEW OF STAKEHOLDER PROPOSED MODEL OPTIONS RELATIVE TO DEVELOPMENT OF THE MODELING TOOL B. HARVESTING/FISHING PRACTICES- REFINING OPTIONS FOR MODELING (A-B)
~10:00 AM		BREAK
3.)	10:15 AM	REVIEW OF STAKEHOLDER PROPOSED MODEL OPTIONS RELATIVE TO DEVELOPMENT OF THE MODELING TOOL C. SUSTAINABLE & ECONOMICALLY VIABLE OYSTER FISHERY- REFINING OPTIONS FOR MODELING (A-C)
4.)	11:00 AM	REVIEW OF STAKEHOLDER PROPOSED MODEL OPTIONS RELATIVE TO

		DEVELOPMENT OF THE MODELING TOOL D HEALTHY AND PRODUCTIVE ECOSYSTEM -REFINING OPTIONS FOR MODELING (A-D)
	~12:00 PM	LUNCH (ON CAMPUS)
5.)	12:30 PM	REVIEW OF STAKEHOLDER PROPOSED MODEL OPTIONS RELATIVE TO DEVELOPMENT OF THE MODELING TOOL E. THRIVING COMMUNITY/REGION- REFINING OPTIONS FOR MODELING (A-B)
6.)	1:15 PM	REVIEW OF STAKEHOLDER PROPOSED MODEL OPTIONS RELATIVE TO DEVELOPMENT OF THE MODELING TOOL F. EDUCATION INITIATIVES- IDENTIFYING OPTIONS FOR MODELING
7.)	2:00 PM	REVIEW OF PERFORMANCE MEASURES
	~3:00 PM	BREAK
8.)	3:15 PM	REVIEW OF PERFORMANCE MEASURES (CONTINUED)
9.)	3:45 PM	UPDATE ON COMMUNICATION STRATEGY AND ACTIONS FOR THE PROJECT
10.)	4:15 PM	NEXT STEPS AND AGENDA ITEMS FOR THE NEXT MEETING <ul style="list-style-type: none"> • Review Work plan action items and assignments • Identify agenda items and any needed information for next meeting
11.)	~4:30 PM	ADJOURN

Appendix #2 Workgroup Membership and Representation

MEMBER	AFFILIATION
WATERMAN	
<i>Billy Abey</i>	<i>East New Market, MD</i>
J.D. Buchanan	Preston, MD
Geoff Harrison	Tilghman, MD
Gregory Kemp	McDaniel, MD
<i>Logan Rippons</i>	<i>Cambridge, MD</i>
Cody Paul	Woolford, MD
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
Bill Goldsborough	Chesapeake Bay Foundation
Mark Bryer/ Joe Feher	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	Estuarine Biogeochemist
Raleigh Hood	Biological Oceanographer
Thomas Miller	Fisheries Ecologist
Lisa Wainger	Environmental Economist (Social Scientist)
Michael Wilberg	Fisheries Scientist
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 OysterFutures Workgroup Meeting Evaluation Summary

OYSTERFUTURES WORKGROUP FEBRUARY 26 - 27, 2016—CAMBRIDGE, MARYLAND MEETING EVALUATION SUMMARY

Members used a 0 to 10 rating scale where a 0 meant Totally Disagree and a 10 meant Totally Agree. 15 evaluation forms were received.

1. Please assess the overall meeting.

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

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

- 9.8 Review of the Scope and Purpose of the Workgroup.
9.7 Adoption of Participation Guidelines and Consensus-Building Procedures.
9.7 Adoption of Workgroup Guiding Principles and Goal Statement.
8.9 Review of Current Fishery Status, and Management and Angling Practices.
9.4 Agreement on Shared Long Term Vision of Success for the Oyster Fishery.
9.3 Identification of Key Vision Themes and Related Issues Regarding Fishery Practices and Outcomes.
9.1 Overview of Fishery Modeling Principles and Goals.
8.6 Discussion of Preliminary Options for Modeling and Evaluation of Key Topical Issues.
9.5 Review of Next Steps and Agenda Items for Next Meeting.

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

- 9.7 The members followed the direction of the Facilitator.
10.0 The Facilitator made sure the concerns of all members were heard.
9.8 The Facilitator helped us arrange our time well.

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

- 9.7 Overall, I am very satisfied with the meeting.
9.9 I was very satisfied with the services provided by the Facilitator.
9.8 I am satisfied with the outcome of the meeting.

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

- 9.6 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?

- Respectful dialogue and information presented.
- Civil communication among stakeholders
- The opportunity to communicate with multiple stakeholders.
- Collaborative spirit.
- Enjoyed insight from different stakeholders and educated on new information.
- People.
- Felt very comfortable, good forum for sharing. Felt free to express opinions.
- Good food.
- I thought it was well done and am looking forward to future meetings.
- Great that young watermen are speaking up.
- The communication.
- Civil discussion.

7. How could the meeting have been improved?

- Rib eye and baked potato dinner
- None
- Very good
- Nothing.

8. Do you have any other comments?

- Great job!
- Thank you for having us. I really enjoyed the facilitation style.

Appendix #4 OysterFutures Workgroup Purpose and Project Summary



STATEMENT OF PURPOSE. The goal of OysterFutures 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.

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, OysterFutures, 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 OysterFutures Workgroup Meeting Schedule

PROJECT SCHEDULE

WORKGROUP MEETING SCHEDULE		
MEETING SCHEDULE—2016 AND 2017		
I.	February 26-27, 2016	Horn Point Laboratory
II.	April 30 – May 1, 2016	Horn Point Laboratory
III.	–November 5-6, 2016	Horn Point Laboratory
IV.	January 20 – 21, 2017	Horn Point Laboratory
V.	March 24 – 25, 2017 (Management Options)	Horn Point Laboratory
VI.	TBD	
VII.	TBD	
VIII.	TBD	

PROJECT WEBPAGE (URL): <http://northweb.hpl.umces.edu/research/OysterFutures.html>

PROJECT FACILITATION: The meetings are facilitated by Jeff Blair and Bob Jones from the FCRC Consensus Center at Florida State University. Information at: <http://consensus.fsu.edu/>



Appendix #6 OysterFutures Workgroup Consensus Guidelines

WORKGROUP CONSENSUS-BUILDING PROCEDURES

DEFINITIONS

Consensus is a **Process**, an **Attitude** and an **Outcome**. Consensus processes have the potential of producing better quality, more informed and better-supported outcomes.

As a **Process**, consensus is a problem solving approach in which all members:

- Jointly share, clarify and distinguish their concerns;
- Educate each other on substantive issues;
- Jointly develop alternatives to address concerns; and then
- Seek to adopt recommendations everyone can embrace or at least live with.

In a consensus process, members should be able to honestly say:

- I believe that other members understand my point of view;
- I believe I understand other members' points of view; and
- Whether or not I prefer this decision, I support it because it was arrived at openly and fairly and because it is the best solution we can achieve at this time.

Consensus as an **Attitude** means that each member commits to work toward agreements that meet their own and other member needs and interests so that all can support the outcome.

Consensus as an **Outcome** means that agreement on decisions is reached by all members or by a significant majority of members after a process of active problem solving. In a consensus outcome, the level of enthusiasm for the agreement may not be the same among all members on any issue, but on balance all should be able to live with the overall package.

Levels of consensus on a committee outcome can include a mix of:

- Participants who strongly support the solution;
- Participants who can “live with” the solution; and
- Some participants who do not support the solution but agree not to veto it.

For Workgroup purposes, **consensus recommendations** shall be defined as any option/recommendation achieving a 75% or greater number of 4s and 3s in proportion to 2s and 1s based on the results of all members present and voting.

WORKGROUP CONSENSUS-BUILDING PROCEDURES

The OysterFutures Workgroup (Workgroup) will seek consensus on its recommendations for options to be evaluated using the Project's Model. General consensus is a participatory process whereby, on matters of substance, the members strive for agreements which all of the members can accept, support, live with or agree not to oppose. In instances where, after vigorously exploring possible ways to enhance the members' support for the final package of recommendations, and the Workgroup finds that 100% acceptance or support is not achievable, final consensus recommendations will require at least 75% favorable vote of all members present and voting. This super majority decision rule underscores the importance of actively developing consensus throughout the process on substantive issues with the participation of all members and which all can live with. In instances where the Workgroup finds that even 75% acceptance or support is not achievable, publication of recommendations will include documentation of the differences and the options that were considered for which there is more than 50% support from the Workgroup. The report that will be a product of the Workgroup process will clearly describe the level of agreement between

Workgroup members on each specific recommendation as well as on the suite of recommendations as a whole.

The Workgroup will develop its recommendations using consensus-building techniques with the assistance of the facilitators. Techniques such as brainstorming, ranking and prioritizing approaches will be utilized. The Workgroup’s consensus process will be conducted as a facilitated consensus-building process. Workgroup members, staff, and facilitators will be the only participants seated at the table. Only Workgroup members may participate in discussions and vote on proposals and recommendations. The facilitators, or a Workgroup member through the facilitators, may request specific clarification from a member of the public in order to assist the Workgroup in understanding an issue. Observers/members of the public are welcome to speak during the public comment period provided at each meeting, and all comments submitted on the public comment forms provided in the agenda packets will be included in the facilitators’ summary reports.

Facilitators will work with OysterFutures research team and Workgroup members to design agendas that will be both efficient and effective. The OysterFutures research team will help the Workgroup with information and meeting logistics.

To enhance the possibility of constructive discussions as members educate themselves on the issues and engage in consensus-building, members agree to refrain from public statements that may prejudice the outcome of the Workgroup’s consensus process. In discussing the Workgroup process with the media, members agree to be careful to present only their own views and not the views or statements of other participants. In addition, in order to provide balance to the Workgroup process, members agree to represent and consult with their stakeholder interest groups.

ACCEPTABILITY RATING SCALE FOR OPTIONS AND RECOMMENDATIONS

During the evaluation of proposed options Workgroup members will be asked to develop and rate the acceptability of options. Members with concerns about an option should be prepared to offer specific refinements or changes to address reservations. Following discussion and refinement, members may be asked to do additional acceptability ratings of an option or options if requested. In general, 4s and 3s are in favor of an option and 2s and 1s are opposed. Once rated for acceptability, options(s) with a 75% or greater number of 4s and 3s in proportion to 2s and 1s will be considered preliminary consensus recommendations for inclusion in the final package of recommendations.

At any point during the process, any option may be re-evaluated and rated at the request of any Workgroup member. The status of a rated option will not be final until the final Workgroup meeting, when a vote will be taken on the entire package of consensus ranked recommendations.

The following scale will be utilized for acceptability rating exercises:

Acceptability Rating Scale	4 = Acceptable, I agree	3 = Acceptable, I agree with minor reservations	2 = Not Acceptable, I don't agree unless major reservations addressed	1 = Not Acceptable
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