Oyster Futures

Stakeholder Workgroup

5TH MEETING SUMMARY REPORT

July 22-23, 2017
Horn Point Laboratory, University of Maryland
Cambridge Maryland

Summarized by:

FCRC CONSENSUS CENTER

"Facilitating Consensus Solutions, Supporting Collaborative Action."

THE FLORIDA STATE UNIVERSITY

OysterFutures Stakeholder Workgroup
July 22-23, 2017 Meeting V Summary Report

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OYSTERFUTURES WORKGROUP
5TH MEETING EXECUTIVE SUMMARY
JULY 22-23, 2017

On behalf of the Oyster Futures Research Team, Elizabeth North and Michael Wilberg welcomed the Members to the fifth meeting of the OysterFutures Workgroup and introduced the facilitation team of Jeff Blair and Bob Jones with the FCRC Consensus Center at Florida State University. Following a workgroup member roll call, the facilitator noted the importance going forward of getting as close as possible full participation in the Workgroup meetings as they develop initial recommendations to the Department of Natural Resources.

The facilitators reviewed the agenda and the Workgroup approved the agenda and the March 2017 Workgroup Meeting Summary. The facilitator then reviewed the workgroup Goal statement which was adopted at the organizational meeting in February 2016 and which calls for a package of Workgroup consensus recommendations informed by modeling collaboratively developed by the Workgroup and the OysterFutures project research team later in 2017. Dr. Troy Hartley reviewed with members the Social Science survey study that is being conducted throughout the OysterFutures workgroup process.

Mike Wilberg provided the Workgroup with an overview of the research objectives for the Population Models, OysterFutures Simulation Model, Economics Model, and Water Quality Model). He noted that estimates of abundance, exploitation and mortality rates for each region in the Choptank complex from the Population Models are the starting point for the OysterFutures Simulation Model. The modelers answered Workgroup member questions regarding the model covering the following topics: scaling compliance; effect of oyster abundance on the reefs; tracking recruitment; settlement and post settlement mortality rates; field validation on the spat set; 3D vs. flat oyster beds; shell lost in harvest; shell degradation; and harvesting impact on nitrogen removal.

Mike Wilberg provided an initial overview of the results of the 27 modeling options that were identified by the Workgroup and simulated since the March 2017 meeting. The options were captured on charts that featured the options and the related performance measures (abundance; habitat; harvest; revenue; number; seston and nitrogen) over 5 year intervals up to 25 years. Mike Wilberg presented the range of options the Workgroup had identified and refined at its earlier meetings. For each of the 27 options, the Workgroup rated its acceptability and support, discussed concerns and offered suggestions to the modelers.

Options ratings with a green shading indicate 75% or more Workgroup support. Options ratings with a yellow shading indicated between 50%-74% Workgroup support. No shading indicates between 0-49% support.

REVIEW/RATINGS OF BASELINE MODEL OPTIONS

- Model Option #1- Status quo (SQ) (5% non−compliance with size, 1% Sanctuary harvest). *(100% 9-0 (unanimous) support)*
- Model Option #1 a -Pick a current timeframe to calculate the average price. Buy-tickets from the 2016-17 fishing season. (*100% -9-0 (unanimous) support)*
- *Option #2 not rated- Status quo (SQ) (10% non−compliance with size, 1% Sanctuary harvest).*
- *Option #3 not rated- All closed area open to hand tonging (Other gears same as SQ).*

MANAGEMENT AND REGULATION OPTIONS

1. ROTATIONAL HARVEST OPTIONS

- Model Option #18- 2 year rotations no shell or spat *(33% support- ratings 4-0, 3-3, 2-4, 1-2)*
- Model Option #19- 3 year rotations no shell or spat *(44% support- ratings 4-0, 3-4, 2-2, 1-3)*
- Model Option #20- 4 year rotations no shell or spat *(33% support- ratings 4-0, 3-3, 2-3, 1-3)*
- Model Option #21 Continue to explore 2 year rotations with shell with targeting, revenue etc. *(78% support- ratings 4-0, 3-7, 2-0, 1-2)*
- Model Option 21 a. Add sanctuary area adjacent to the rotational harvest areas in the Middle Choptank into the 2-year rotation with shell (not in the shellfish closure area) *(50% support- ratings 4-2, 3-3, 2-4, 1-1)*
- Model Option #22-- Continue to explore 3 year rotations with shell with targeting, revenue etc. *(67% support- ratings 4-0, 3-6, 2-0, 1-3)*
- Model Option #23- Continue to explore 4 year rotations with shell with targeting, revenue etc. *(44% support- ratings 4-0, 3-4, 2-2, 1-3)*
- Model Option #24- 2 year rotations with spat. *(78% support- ratings 4-0, 3-7, 2-0, 1-2)*
- Model Option #25 3 year rotations with spat. *(56% support- ratings 4-0, 3-5, 2-1, 1-3)*
- Model Option #26 4 year rotations with spat. *(44% support- ratings 4-0, 3-4, 2-1, 1-4)*
- Model Option #16- Open tributaries in the Little Choptank River to hand tonging. *(1st Rating: 80% support- ratings 4-5, 3-3, 2-3, 1-0; 2nd Rating- 40% support- ratings 4-3, 3-1, 2-6, 1-0)*
- Model Option #17- Open tributaries in the Little Choptank River to hand tonging, and provide added shell (every 3 years). *(80% support- ratings 4-2, 3-6, 2-2, 1-0)*
- Model Option #9- Rotational harvest in the Middle Choptank sanctuary and Little Choptank tributaries and status quo elsewhere. *(50% support- ratings 4-1, 3-4, 2-5, 1-0) (March 2017 identified not rated)*

The Workgroup discussed and asked the modelers to consider modeling a hybrid option with a smaller amount in rotation and the remainder in status quo; options with portions of the Little Choptank sanctuary open; and options with Middle Choptank sanctuary open.

2. ENFORCEMENT OPTIONS

- Model Option #10 Full compliance with the current size limit and sanctuary regulations. *(100% support- ratings 4-8, 3-2, 2-0, 1-0)*
- Model Option #11- Low harvest in sanctuaries (.5%). *(100% support- ratings 4-9, 3-1, 2-0, 1-0)*
- Model Option #12- High harvest in sanctuaries (1.5%). *(100% support- ratings 4-7, 3-3, 2-0, 1-0)*

3. HYBRID SLOT LIMIT OPTIONS IDENTIFIED FOR MODELING AT MARCH 2017 MEETING

- Model Option #13- Implement a slot size limit for the harvesting of oysters of from 3" – 4". *(30% support- ratings 4-0, 3-3, 2-5, 1-2)*

- Model Option #14- Implement a slot size limit for the harvesting of oysters of from 3" – 4.5". *(30% support- ratings 4-0, 3-3, 2-5, 1-2)*
- Model Option #15- Implement a slot size limit for the harvesting of oysters of from 3" – 5". *(70% support- ratings 4-0, 3-7, 2-2, 1-1)*

4. LIMITED ENTRY OPTIONS

- 25% reduction in effort. *July 2017, 100% 4-10, 3-0, 2-0, 1-0) March 2017 (100%, 4-0, 3-14, 2-0, 1-0)*

5. HABITAT MODIFICATION/RESTORATION OPTIONS

- Model Option #27 Add Shell to each bar every 3 years in the Lower Choptank. *July 2017, 80%, 4-1, 3-7, 2-2, 1-0. March 2017, 100% 4-11, 3-4, 2-0, 1-0.*
- Modeling Option #6- Implement Little Choptank and Tred Avon Restoration. (6" substrate) *July 2017- 100%, 4-5, 3-5, 2-0, 1-0. March 2017, 100% 4-11, 3-4, 2-0, 1-0.*
- Modeling Option #7 Implement Little Choptank and Tred Avon Restoration. (12"substrate) *July 2017- 100%, 4-5, 3-5, 2-0, 1-0*

HYBRID OPTION MODELED

- Model Option #8- Make 3d reefs in the current shellfish closure areas for the Middle Choptank region. *July 2017- 90%, 4-0, 3-9, 2-1, 1-0. March 2017, 43% 4-0, 3-6, 2-8, 1-0.*

TESTING SUPPORT FOR MODEL COMPONENTS

The facilitator noted that at the end of the November 2016 and March 2017 meetings, the Workgroup members used an acceptability rating for each of the model components to gauge the Workgroup's understanding and support for the work being done on each. He asked the Workgroup to rate the components based on the review and refinements promised at this meeting and offer any concluding observations or suggestions.

- **HABITAT MODEL 1** *July 2017- 100%, 4-8, 3-2, 2-0, 1-0*

The Workgroup discussed the changes that modelers made in terms of addressing an initial misinterpretation of what the habitat maps meant and how they reduced the amount/quality of habitat on maps which brought model results to more reasonable levels. The modelers used professional judgment and sought the Workgroup's experience to bring validation to the model results.

- **HABITAT MODEL 2- Habitat Coding- Lower Choptank** *July 2017- 100%, 4-6, 3-4, 2-0, 1-0*
- **FISHERY/EFFORT DYNAMICS** *July 2017- 100%, 4-10, 3-1, 2-0, 1-0*
- **ECONOMICS** *July 2017- 100%, 4-7, 3-3, 2-0, 1-0*

The Workgroup discussed the meeting schedule and agreed to proceed with the meeting scheduled for September 9-10, 2017 and considered whether an additional meeting later in the Fall will be needed to reach consensus on the Workgroup recommendations to DNR. Elizabeth North noted that workgroup members decided at the March meeting to delay discussion of the communications strategy of the Workgroup results and recommendations until later in the process. Workgroup members were asked to comment on the meeting by completing meeting evaluations *(see Appendix #3). The meeting adjourned at 3:45 p.m. on Sunday afternoon.*

OYSTERFUTURES
WORKGROUP MEETING VI SUMMARY
JULY 22-23, 2017

I. OVERVIEW OF THE OYSTERFUTURES PROJECT CONTEXT

A. WORKGROUP INTRODUCTIONS & SCHEDULE REVIEW

On behalf of the OysterFutures Research Team, Elizabeth North welcomed the Members to the fifth meeting of the OysterFutures Workgroup and introduced the facilitation team of Jeff Blair and Bob Jones with the FCRC Consensus Center at Florida State University. Following a workgroup member roll call, *(See Appendix #2 for the Workgroup members list)*, the facilitator noted the importance of full participation in the upcoming Workgroup meetings as they develop consensus recommendations to the Department of Natural Resources in 2017.

B. REVIEW OF AGENDA AND WORKGROUP GOAL

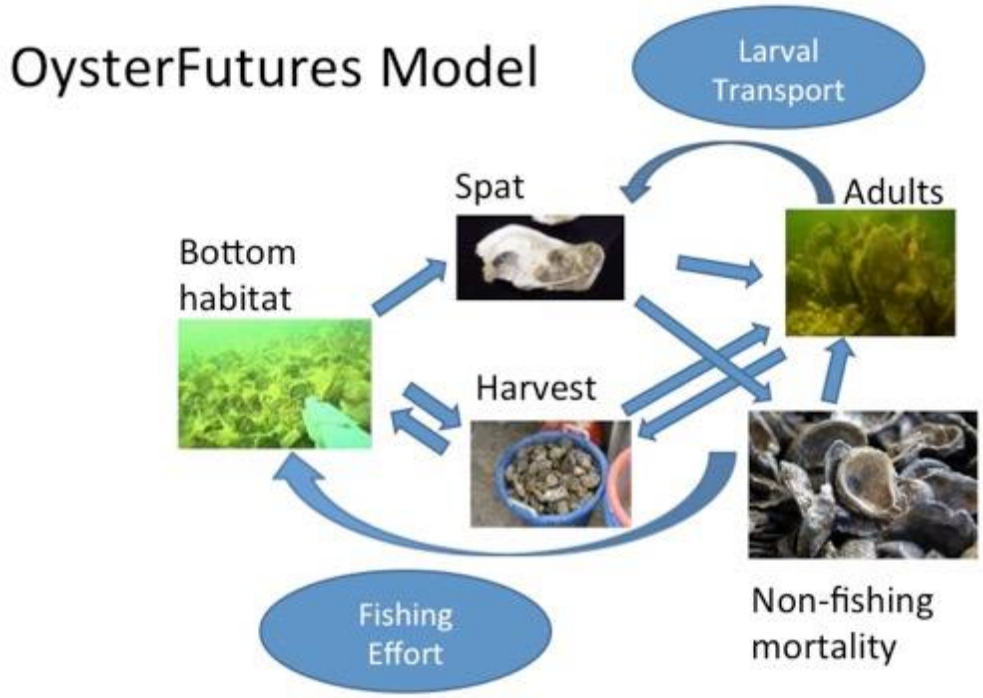
The facilitators reviewed the agenda and the Workgroup approved the agenda *(See Appendix #1)* and accepted the March 2017 Workgroup meeting summary without changes. The facilitator reminded the members of the workgroup guidelines that was adopted at the organizational meeting in February 2016 which calls for a package of Workgroup consensus recommendations informed by modeling collaboratively developed by the Workgroup and the OysterFutures project research team.

C. SOCIAL SCIENCE STUDY SURVEY

Dr. Troy Hartley reviewed with members the Social Science survey study that is being conducted throughout the OysterFutures workgroup process and members completed the survey. Members also completed a short survey after the review and rating of the modeling options on Sunday afternoon.

II. OVERVIEW OF THE OYSTERFUTURES MODELING

Mike Wilberg provided the Workgroup with an overview of the research objectives for the Population Models, OysterFutures Simulation Model, Economics Model, and Water Quality Model. He noted there are 1,132 different locations where oysters can go to in the complex Oysterfutures Simulation Model. He reviewed the model's habitat, fishing, selectivity options and performance measures. Other members of the Team reviewed the larval transport, nutrient, seston and economic model components.

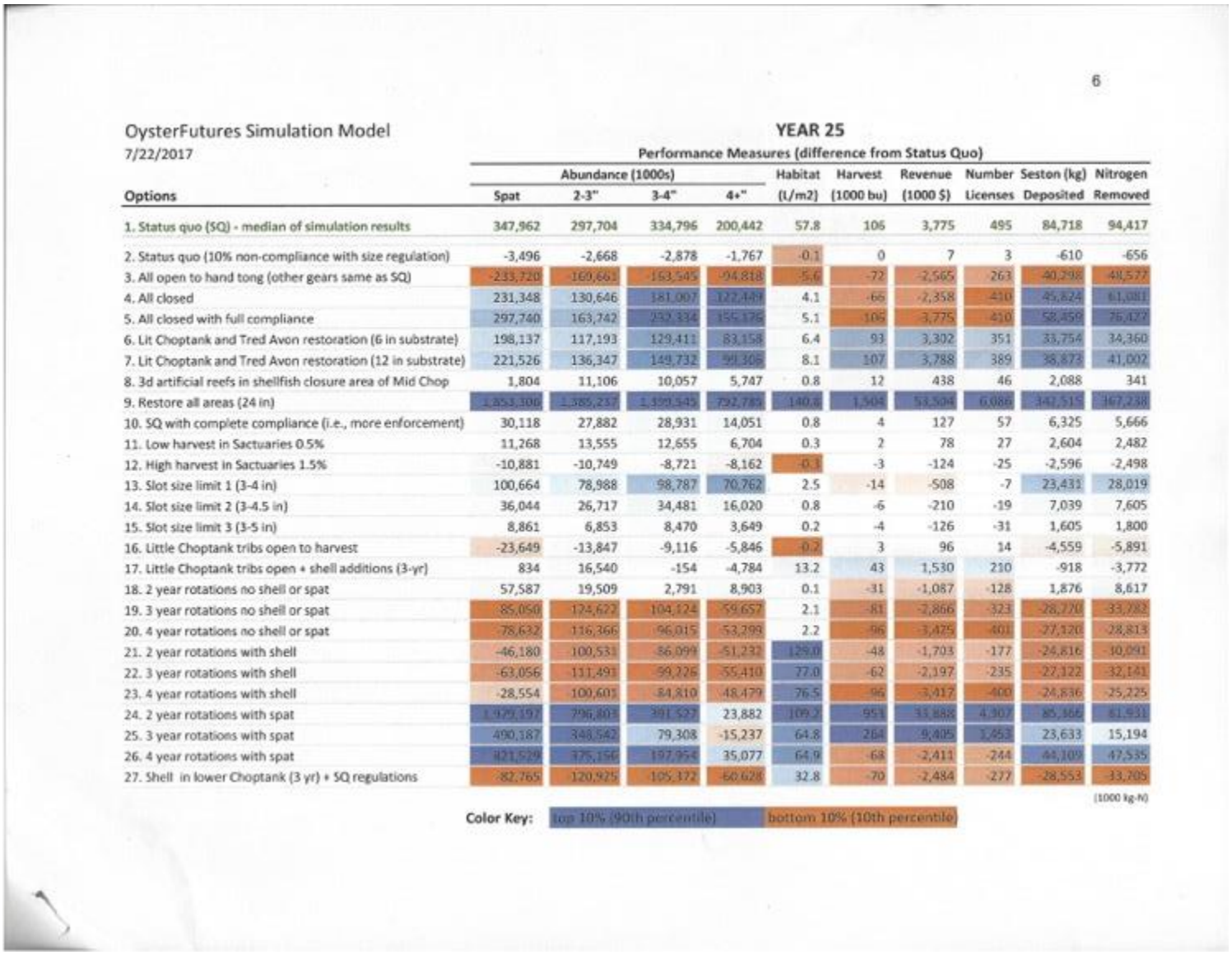


Member Questions on the Model

- Does compliance with the minimum size limit change over the course of the season? *A: No, it is applied equally across the whole season.*
- Does the model include the influence of oyster abundance and reef structure on larval settlement? *A: No it doesn't take into account the 3D nature of the reef. Only tracks water flow carrying the larvae.*
- Does the model scale the number of settled oysters based on habitat quality, applying same mortality rates across all bars? *A: No. It doesn't work that way. Bars with low quality will have a higher mortality rates. The model estimates the settlement and post settlement mortality.*
- Field validation on the spat set? *A: We haven't done this yet. The initial model predicted too many oysters. The modelers adjusted some habitat codes to be in line with observations using information on water depth and bottom type.*
- What kinds of qualities does the model show for 3D vs. flat oyster beds? Going forward we need to show the impact on quality of 3D beds. *A: In the model, the more shell in area, the more spat will settle there. With more shell, the reef taller. Only the volume of shells is tracked in the model, with more shell = better habitat. This is about as good as we can do.*
- Is the harvest included in shell loss? *A: We don't have harvest directly reducing amount of shell. Fishing effect is small compared to other effects.*
- In terms of shell degradation, do we consider reclamation by cleaning silted over shell? *A: don't have fishing affecting shell in positive or negative way. It would be hard to estimate because of lack of data.*
- Does the model account for removing nitrogen as a result of harvest? *A: No. There is information on the relationship so we can estimate this.*

To prepare for the day two acceptability rating of each of the 27 options, Mike Wilberg provided an initial overview of the results of the 27 options that were identified by the Workgroup and simulated since the March 2017 meeting. The options were captured on charts that featured the options and the related

performance measures (abundance; habitat; harvest; revenue; number; seston and nitrogen) over 5 year intervals up to 25 years.



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OysterFutures Simulation Model
7/22/2017

YEAR 25

Performance Measures (difference from Status Quo)

Options	Abundance (1000s) Spat	2-3"	3-4"	4+"	Habitat (L/m2)	Harvest (1000 bu)	Revenue (1000 $)	Number Licenses	Seston (kg) Deposited	Nitrogen Removed
1. Status quo (SQ) - median of simulation results	347,962	297,704	334,796	200,442	57.8	106	3,775	495	84,718	94,417
2. Status quo (10% non-compliance with size regulation)	-3,496	-2,668	-2,878	-1,767	-0.1	0	7	3	-610	-656
3. All open to hand tong (other gears same as SQ)	-233,720	-169,661	-163,545	-94,818	-5.6	-72	-2,565	-263	-40,298	-48,577
4. All closed	231,348	130,646	181,007	122,483	4.1	-66	-2,358	-410	-45,824	-61,081
5. All closed with full compliance	297,740	163,742	232,334	155,176	5.1	-106	-3,775	-410	-58,459	-76,477
6. Lit Choptank and Tred Avon restoration (6 in substrate)	198,137	117,193	129,411	83,158	6.4	93	3,302	351	33,754	34,360
7. Lit Choptank and Tred Avon restoration (12 in substrate)	221,526	136,347	149,732	99,308	8.1	107	3,788	389	38,873	41,002
8. 3d artificial reefs in shellfish closure area of Mid Chop	1,804	11,106	10,057	5,747	0.8	12	438	46	2,088	341
9. Restore all areas (24 in)	1,853,308	1,385,257	1,359,345	792,785	140.8	1,504	53,504	6,086	341,515	367,238
10. SQ with complete compliance (i.e., more enforcement)	30,118	27,882	28,931	14,051	0.8	4	127	57	6,325	5,666
11. Low harvest in Sactuaries 0.5%	11,268	13,555	12,655	6,704	0.3	2	78	27	2,604	2,482
12. High harvest in Sactuaries 1.5%	-10,881	-10,749	-8,721	-8,162	-0.3	-3	-124	-25	-2,596	-2,498
13. Slot size limit 1 (3-4 in)	100,664	78,988	98,787	70,762	2.5	-14	-508	-7	23,431	28,019
14. Slot size limit 2 (3-4.5 in)	36,044	26,717	34,481	16,020	0.8	-6	-210	-19	7,039	7,605
15. Slot size limit 3 (3-5 in)	8,861	6,853	8,470	3,649	0.2	-4	-126	-31	1,605	1,800
16. Little Choptank tribs open to harvest	-23,649	-13,847	-9,116	-5,846	-0.2	3	96	14	-4,559	-5,891
17. Little Choptank tribs open + shell additions (3-yr)	834	16,540	-154	-4,784	13.2	43	1,530	210	-918	-3,772
18. 2 year rotations no shell or spat	57,587	19,509	2,791	8,903	0.1	-31	-1,087	-128	1,876	8,617
19. 3 year rotations no shell or spat	-85,050	-124,622	-104,124	-59,657	2.1	-81	-2,866	-323	-28,770	-33,782
20. 4 year rotations no shell or spat	-78,632	-116,366	-96,015	-53,299	2.2	-96	-3,475	-401	-27,120	-28,813
21. 2 year rotations with shell	-46,180	-100,531	-86,099	-51,232	129.0	-48	-1,703	-177	-24,816	-10,091
22. 3 year rotations with shell	-63,056	-111,491	-99,226	-55,410	77.0	-62	-2,197	-235	-27,122	-32,141
23. 4 year rotations with shell	-28,554	-100,603	-84,810	-48,479	76.5	-96	-3,417	-400	-24,836	-25,225
24. 2 year rotations with spat	1,979,197	796,803	391,527	23,882	109.2	951	33,888	4,307	85,366	61,931
25. 3 year rotations with spat	490,187	348,542	79,308	-15,237	64.8	264	9,405	1,453	23,633	15,194
26. 4 year rotations with spat	821,529	575,156	197,954	35,077	64.9	68	2,411	244	44,109	47,535
27. Shell in lower Choptank (3 yr) + SQ regulations	-82,765	-120,925	-105,372	-60,628	32.8	-70	-2,484	-277	-28,553	-33,705

(1000 kg-N)

Color Key: top 10% (90th percentile) bottom 10% (10th percentile)

III. WORKGROUP REVIEW AND RATING OF MODELED OPTIONS

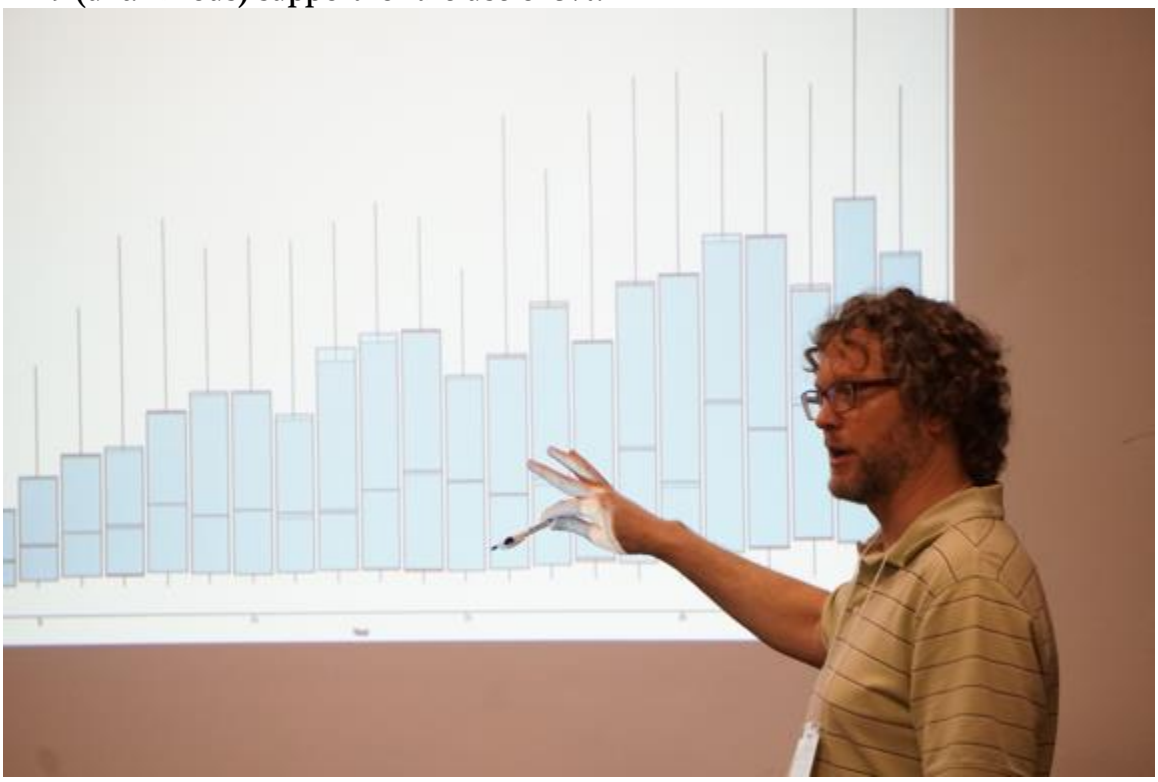
Mike Wilberg presented the range of options the Workgroup had identified and refined at its earlier meetings. For each option the Workgroup rated its acceptability and support, discussed concerns and offered suggestions to the modelers. Options ratings with a green shading indicate 75% or more support. Options ratings with a yellow shading indicated between 50%-74% ratings. No shading indicates between 0-49% support.

A. REVIEW OF BASELINE MODEL OPTIONS

Model Option #1- Status quo (SQ) (5% non−compliance with size, 1% Sanctuary harvest). *(100% 9-0 (unanimous) support the use of Option 1)*

Workgroup comments before rating

- Is the rating related to how valid this construct is? *A: Rating the 5% compliance represents what happens.*
- Currently allowed 5% in the boxes. Is that status quo? A: compliant= 3 in oyster.
- 5%= law breaking. Above the 5% bycatch.
- MW: price per bushel used. 2012-14- $35+ a bushel.
- **9 (unanimous) support for the use of 5%.**



Model Option #1 a Pick a current timeframe to calculate the average price. Buy-tickets from the 2016-17 fishing season. *100% -9-0 (unanimous) support the use of Option 1 a.*

Workgroup comments before rating

- Price per bushel? JC: $42-45 in the ball park. $50 may be too high.
- Use any # for price per bushel if all inputs/expenses equal to that season?
- Fuel costs- 2015 prices. For big markets this may work. For this market may not increase at same rate as costs are increasing. (use the price from the interviews earlier this year).
- This will impact the whole model. Very important piece.
- The higher the number, the better the picture will look.
- Pick a timeframe to calculate the average price per bushel and use this instead. If records are available. Buy tickets from fishing season just completed. 2016-17 season**.**
- When last time big influx of Gulf oysters and prices going down? Before 2011 DWH event.
- Aquaculture increased the price by increasing demand.

Option #2 *not rated*- Status quo (SQ) (10% non−compliance with size, 1% Sanctuary harvest).

Option #3 *not rated*- All closed area open to hand tonging (Other gears same as SQ).

B. MANAGEMENT AND REGULATION OPTIONS

1. ROTATIONAL HARVEST OPTIONS

Model Option #18- 2 year rotations no shell or spat *(33% support- ratings 4-0, 3-3, 2-4, 1-2)*
Workgroup comments before rating

- These aren't the precise lines?
- This one is reasonable- sail and patent tongs aren't affected. Just power dredge.
- First 2 years need to get it to grow? *A: This option doesn't have planting of spat on shell. 50% of oysters are legal size in the model.*
- Conceptually is this feasible? *A: Big concern about any kind of rotation- if you have a bad year spat set 3 years prior- limited to certain areas. E.g. top #2- limited to hang tonging- exposed to any southern wind- will shut it down.*
- Plant spat on Tred Avon? *A: County planted 3000 bushel seeds in Tred Avon. County could continue its program and keep an area open and producing.*
- Are we rating acceptability of the scenario or rating to move forward with modeling? A: *Suggest that the Workgroup doesn't worry about # of options. Will summarize at the end of the day with list of things to test further.*
- "I support the concept but the data doesn't"
- May need a process with stakeholders to adjust these lines. Option 19, 20- and other rotational options. Comparison of rotational harvest with closure, spat etc.
- #1 green area to the right, over the past 5 years has supported about 15 watermen. This option will be pushing people into spots that are hardly supporting people now. If you are doing enhancement would be a different case. (however where will money come from for enhancing spat on shell?). This is possibly making a bad situation worse. Much of these blocks for rotation are currently not supporting many watermen and this will put more pressure on these areas.
- Rotation, in general, will only work if the Sanctuary is brought into play. (works in #1). If everyone there, might get to Christmas. Things will get worse. For rotation, you will need to open more bars and spread out the area for fishing.
- Are we using this as a control with no spat/shell? Can we maintain this without resources?

Workgroup comments after rating:

- Reservations not with rotation but with the 2-year rotation and that 50% of population will be at market size in 2 years.
- Concerned about the reduction in revenue in this option.
- Doesn't seem to grow abundance and habitat over time.

Model Option #19- 3 year rotations no shell or spat *(44% support- ratings 4-0, 3-4, 2-2, 1-3)*

Model Option #20- 4 year rotations no shell or spat *(33% support- ratings 4-0, 3-3, 2-3, 1-3)*
Options Not Rated- July 2017

- 2-year rotations in the Lower Choptank, Middle Choptank and Broad Creek. *(March 2017 rating 92%)*

- Rotational harvest with limited entry. *(Identified at March 2017 Meeting)*
  Keep limited entry as a separate topic- may not be able to handle in the model

Model Option #21 Continue to explore 2 year rotations with shell with targeting, revenue etc. *(78% support- ratings 4-0, 3-7, 2-0, 1-2)*

Workgroup comments before rating

- Supplemented with shell vs. Rotational Option 18 is not.
- What is the cost of restoration/shelling for this option? *A: It is expensive running between $23 and $35 million annually. Large area of oyster bars not same every year.*
- Could use a shell budget and plug in a $$ amount?
- $23-35 million annual is out of the park- there is no money now to do this. Trying to find a million would be a step but not clear where that $$ will be coming from. Needs to be adjusted to a more realistic cost and the benefits clarified.
- Around $1.6 million for whole state for shell/spat? *Yes. This past year 300K for Talbot County. Year before 600K. This coming year it will be less. 2 years ago- 20 million spat on shell on 2 bars, grow to maximum size. Couldn't get consensus among watermen. This is a big challenge.*
- E.g. Kent County interested but it has proven to be a real challenge to create this shift.
- If you are going to divert normal funding for seed/shell and shift to rotational concept, need to figure that out with watermen input.
- Use numbers to make more reasonable? Stick with numbers/reality vs. tweak the rotation. If we reduce it, it may not work.
- Putting shell everywhere is inefficient- if we said only shell supplements on best bars in the regions, it would bring the cost down. Probably some intermediate options may work better.

- Intermediate action, e.g. if you have annual shell budget (e.g. $1.6 million), what would each of the options look like with a budget of existing funding.
- We won't have to do $23 million every year. Spend about $1 million a year. Some of these may be one time only investments.
- Targeting shells for spat sets could be helped with DNR data from the past.
- Targeting and spacing of the timing may be more like a one-time shot.
- Is there other funding- for rotation and enhancement? Have we considered aquaculture funding sources? May be other funding sources available. More targeted approach- state, federal etc.
- Modelers should take some intermediate options with current budget figures.
- Consider Turtleback and Sandy Hill (a historic bar) in an option to help with spreading out rotation.
- Sanctuary that is subject to federal investment was not modeled.

Model Option 21 a. Add sanctuary area adjacent to the rotational harvest areas in the Middle Choptank into the 2-year rotation with shell (not in the shellfish closure area) *(50% support- ratings 4-2, 3-3, 2-4, 1-1)*

Workgroup comments before rating

- Let's take time to create a realistic rotational harvest map and that may allay some concerns.
- The bottom can only handle so much pressure and harvest- (sustainable for ecology/oyster and industry)
- Model outputs are not sufficiently connected to realistic harvest.

Option Not Rated- July 2017

- Rotational harvest with shell additions. *(Identified at March 2017 Meeting)*

Model Option #22-- Continue to explore 3 year rotations with shell with targeting, revenue etc. *(67% support- ratings 4-0, 3-6, 2-0, 1-3)*

Workgroup comments before rating:

- *Estimated costs per year= 1st, $2 million; 2nd $9 million, 3rd $8 million, (Modelers will look at input file)*
- 3 and 4 year- down to 33 and then down to 25. This is a problem.

Model Option #23- Continue to explore 4 year rotations with shell with targeting, revenue etc. *(44% support- ratings 4-0, 3-4, 2-2, 1-3)*

Workgroup Comments before rating

- *Estimated costs per year= 1st, $14 million; 2nd $15 million, 3rd $13 million, 4th $19 million*

Model Option #24- 2 year rotations with spat. *(78% support- ratings 4-0, 3-7, 2-0, 1-2)*
Workgroup Comments before rating:

- *Estimated costs per year= 1st, $60 million; 2nd $89 million,*
- Shell cost estimates need to be reasonable and realistic.
- Similar to shell? 2 million range? *A 600K and 2 million*
- Public private partnership funding may be needed in order to produce that number
- Not the production capacity- will have to build hatcheries to achieve the capability. This option calls for lots more spat than what is being produced today.
- If scale down- need to clarify what would be the realistic cost and benefit.
- $ spent for spat additions- spread across rotational areas equally? *A: portions of each area getting the treatment each time.*
- Take into account how much shell is out there. If it requires more shell than what you can get, the option won't be taken seriously.

Model Option #25 3 year rotations with spat. *(56% support- ratings 4-0, 3-5, 2-1, 1-3)*
Workgroup Comments before rating

- *Estimated costs per year= 1st, $57 million; 2nd $23 million, 3rd $21 million*

Model Option #26 4 year rotations with spat. *(44% support- ratings 4-0, 3-4, 2-1, 1-4)*
Workgroup Comments before rating

- *Estimated costs per year= 1st, $35 million; 2nd $39 million, 3rd $21 million, 4th $48 million*

Option Not Rated- July 2017

4.) Rotational harvest within a single year with one-month openings. *(March 2017, identified, not rated)*

Workgroup Comments

- Probably can't model and evaluate this kind of option based on way the model is set up.

Model Option #16- Open tributaries in the Little Choptank River to hand tonging.

(1st Rating: 80% support- ratings 4-5, 3-3, 2-3, 1-0; 2nd Rating- 40% support- ratings 4-3, 3-1, 2-6, 1-0)

Workgroup comments before rating

- Areas not getting sanctuary investments, locations open to hand tong, other areas status quo.
- Major concern- enforcement implications- going through sanctuary to enforce? Another layer of difficulty.
- Currently watermen go through Sanctuaries to get to harvestable bottoms, so opening these areas would not add a new enforcement challenge.
- Madison entry area? How many different landings? Traditionally 2 landings.

Comments after rating:

- Anything expanding harvest in Sanctuary without remediation will be tough to accomplish. Wouldn't affect individual reefs. Letting the whole system recover
- This could be a productive body for environmental purposes and bring harvest opportunities.
- Good recruiting tributary. Slow to come back after you work them.

Option Not Rated- July 2017

6.) Open tributaries in the Little Choptank River to hand tonging, and provide added spat on shell. *(March 2017, identified, not rated)*

Model Option #17- Open tributaries in the Little Choptank River to hand tonging, and provide added shell (every 3 years). *(80% support- ratings 4-2, 3-6, 2-2, 1-0)*

Workgroup comments before rating

- *Estimated costs = $3.4 million every three years*
- More licenses? Will trigger more people harvesting. 43K more bushels from the area.
- Same as previous option except shell addition every 3 years.

Comments after rating:

- Will this add much net benefit at the end of the day?
- Sustainability of shell funding for this every 3 years needed for this.

Option Not Rated- July 2017

8.) Open tributaries in the Little Choptank River to hand tonging, and provide spat on shell and shell additions *(March 2017, identified, not rated)*

9) Rotational harvest in the Middle Choptank sanctuary and Little Choptank tributaries and status quo elsewhere. *(50% support- ratings 4-1, 3-4, 2-5, 1-0)* *(March 2017 identified not rated)*

Workgroup comments before rating

- Should be considered as a rotational harvest area?

- Places where no federal investment-still places to work. Help make 2-year rotation more acceptable. Need to bring in more bottom so we don't bring more pressure on what we have.
- Sandyhill, Horns Point and little Choptank as rotation areas? Status quo everywhere else.
- This would be a new rotational plan. Status quo with this alone? Adding this into the rotation system? A*: Yes. Becomes an option for the rotation.*
- #4 all closed- was this an option the Workgroup should review? Was the intent to make the areas bigger? *A: Yes*

Discussion of an additional Rotation Option

- Create more white area so there is a supplemental to the rotation. Can you put 15% in rotational harvest but leave the 85% status quo?
- Make 20% rotational and 80%. *A: easy for model to do. Hard part is drawing the lines.*
- Make more things white. Less 1 and 2 area-
- *Modelers can look at harvester reports- to identify rotational areas as a starter point.*
- Take higher % places worked and make them rotational. Or take lower % places rotational.
- Do scenarios with and without Dorchester County sanctuary? Like to see the dynamics.
- Good to see what the results would be.
- Middle Choptank sanctuary area *A: Modelers will need help in identifying the area.*
- Consider four Option variations: A. switch circles in 2-year rotation; B. 15% in rotation; C. A plus Dorchester sanctuary; D. B. plus Dorchester sanctuary.

- 2-year rotation with shell- support from morning discussion
- 2-year with spat- support- support from morning discussion
- Status quo for the southern part of Chesapeake Bay and ways to think of market issues.
- What is the question: we want to model- will rotational harvest area work? Can it be modeled. Breaking it down into how it can be implemented.
- Oyster Advisory Commission- pick areas, set rotational areas- open 2 months at a time; requires strategic placement.
- Can we model this? *A: Within season rotational closures may be tougher. Model can do it directly.*
- Virginia- rotational experience- need to address the pressures that rotational harvest brings.

2. ENFORCEMENT OPTIONS

OPTIONS IDENTIFIED FOR MODELING AT MARCH 2017 MEETING

1.) Full compliance with the current size limit regulations. *(March 2017 79% support)*
2.) Include a non-compliance factor of 0.5% for the harvesting of oysters in sanctuaries when conducting modeling simulations. . *(Identified but not rated at July 2017 meeting)*
3.) Include a non-compliance factor of 1.5% for the harvesting of oysters in sanctuaries when conducting modeling simulations. *(Identified but not rated at July 2017 meeting)*

Model Option #10 Full compliance with the current size limit and sanctuary regulations. *(100% support- ratings 4-8, 3-2, 2-0, 1-0)*

Workgroup comments after rating:

- What would happen if there was more enforcement?

Model Option #11- Low harvest in sanctuaries (.5%). *(100% support- ratings 4-9, 3-1, 2-0, 1-0)*

Workgroup comments before rating

- *This is the low end of the estimate.*
- Harvesting in sanctuary reducing overall harvest. Why? *A: Illegal harvest put into harvest total. You are seeing the change of not having illegal harvest happening.*
- Non-compliance has been getting lower each year because of teeth in enforcement over past 5 year. As years go forward this will be getting lower which suggests that enforcement is working.
- Both are really small because of the difficulty in quantifying that. Continue to look at all since they reflect reality in recent years.
- Regulations, funding for enforcement can change down the road.

Model Option #12- High harvest in sanctuaries (1.5%). *(100% support- ratings 4-7, 3-3, 2-0, 1-0)*

Workgroup comments before rating

- *The percentage used in the model is the high end of the estimate.*

3. HYBRID SLOT LIMIT OPTIONS IDENTIFIED FOR MODELING AT MARCH 2017 MEETING

Model Option #13- Implement a slot size limit for the harvesting of oysters of from 3" – 4". *(30% support- ratings 4-0, 3-3, 2-5, 1-2)*

Workgroup comments before rating

- *Idea for this regulation- protect large oysters who produce most eggs in population and get some conservation benefits (however these are under evaluated in fisheries research). Tend to add negative or small effect. Doesn't do much.*
- Analysis shows higher abundance but a negative impact on harvest? Watermen throw back the larger oysters? Larger 4 ½ -5 producing more eggs with recruitment improving over time? Some improvement in abundance but not much in the fishery. *A: If you reduce the portion of population available for harvest it will change the economics making trips less profitable. Reduce # of fishing trips. A higher density on bar is needed to make trips efficient/profitable. Don't get enough of offset for having more oysters to make it up.*
- Negative in # of licenses? Is that a good or bad thing in addressing the latent effort issue?
- Connect this with the possibility of limited entry and sustainable management- number of licenses won't fluctuate.
- It's a negative- not going as well, with less participation. If you have limited entry and this negative figure on licenses this will not be good option.
- Mortality of large oysters being placed back should be considered. *A: model assumes you can put oysters back without suffering mortality. It would decrease #s across the board. Fewer oysters, harvest lowers.*
- Slot- 3-4 and put bigger ones back. Reality hoping mother nature taking for us and it hasn't panned out. Slot limit- open up the limit when % goes above a certain size. More $$ per animal, from a business standpoint. Slot limit as a regulatory tool might make sense.
- Not quantifying ecosystem service values. A handful of options have a positive blue in last 2 columns and this is one of them. If we monetized that there might be great additional value- filtration and de-nitrification.
- Most BMPs require action prior to harvest.

Model Option #14- Implement a slot size limit for the harvesting of oysters of from 3" – 4.5". *(30% support- ratings 4-0, 3-3, 2-5, 1-2)*

Model Option #15- Implement a slot size limit for the harvesting of oysters of from 3" – 5". *(70% support- ratings 4-0, 3-7, 2-2, 1-1)*

Workgroup comments before rating

- Want to see a slot limit reviewed further and possibly part of the final recommendations. May be still a value regulatory tool. Would like to keep it alive for the Workgroup.
- This is a stand alone could look at with other special and temporal ideas.
- How many are harvested? Depends on gear and location/ nature of the area. Hand tong for big oysters.
- Broad Creek is a good recruitment area.
- Not looking at this as a one size fits all. May work differently for different areas and gears.
- Reserve area above the Bridge- 1st couple years open for several weeks to 4 inch limit and then phased out.

OTHER HYBRID SLOT LIMIT OPTIONS IDENTIFIED BUT NOT MODELED- AT MARCH 2017 AND NOVEMBER 2016 MEETINGS

1.) Implement a slot size limit for the harvesting of oysters in combination with a rotational harvest schedule. *(Identified but not rated at July 2017 meeting)*

© 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. *November 2016 [Theme A— Average Rating: 4.0, 100%] (Not rated at July 2017 meeting)*

4. USE OF ASSESSMENT OF POPULATION IN MANAGEMENT OPTIONS

Option not Rated July 2017

A.) Conduct a stock assessment of the oyster resource/fishery with involvement of the stakeholders. *November 2016 [Theme A—Average Rating: 4.0, 100%. (Not rated at July 2017 meeting)*

5. LIMITED ENTRY OPTIONS

MODELED OPTIONS ACHIEVING A CONSENSUS RATING

1.) A 25% reduction in effort. *July 2017, 100% 4-10, 3-0, 2-0, 1-0) March 2017 (100%, 4-0, 3-14, 2-0, 1-0)*

Workgroup comments before the rating

- Discussion at meeting of strategies for limited entry. Model is not organized to be able to set a certain number of fishermen and that would not be realistic because fishermen can move around throughout Maryland waters.

- Model could calculate the number of "fulltime watermen" as a performance measure- how many fishermen would the fishery support if they fished X days a year and caught their bushel limit?
- Experience in past. Limited entry by looking at proof of full time effort.
- 244 bushels a year amounts to 2.4 bushels a day. Can anyone live on that? E.g. power dredging 3-4 weeks max.
- Establish how many bushels to support watermen?
- Goal is to have a surplus to gain oysters. Needs to be addressed.
- License fees- X oysters support X licenses.
- How to define fulltime watermen- so few full time oystermen? Support the math formula to help frame conversation.
- How would performance measure different from harvest now? Scaling the harvest by a different number.
- 3500 oyster license available. 900-1000 TFL license. Pay the surcharge every year. Lose ½ to 2/3. Paying into the future of fishery.
- 15-day minimum? Can get down to a 1000 people with 600 going more than 15 days. This coming year is the time to do it.
- Need some science or mathematical information to support the reduction. Politically it could be problematic. If it gives us data and information to help with those arguments. Use the stock assessment to reassess the license system and amounts.
- Fishing effort= how much it costs for people to fish and harvest revenue. Limited entry through a license fee increase (mechanism). Economic team and workgroup talked about this.
- What about profitability, economic impact to watermen? If fee doubled still profitable to be in fishery? A: calculate a metric to address that. Couple that with other options that target resources at enhancing the oyster fishery.
- Program model to show effects is all 3500 come into the fishery and impact on fishery. A: model isn't organized to do this.
- **All support adding the performance measure**. (10-0 in favor)
- Can the model indicate what the impact on the resource would be if all license holders participated. *A: Can't think of how the model can do that.*
- How can we get to a limited entry option applied Bay-wide based on our work in the Choptank system?

Other Options
2.) A 50% reduction in effort. *(March 2017 86% 4-0, 3-12, 2-1, 1-0) (Not rated in July 2017)*
A.) Consider limiting entry to oyster fishery to watermen making the majority of their living from commercial fishing. *[November 2016 Theme A—Average Rating: 3.9]*
B.) Create a limited entry oyster fishery. *November 2016[Theme A—Average Rating: 3.75]*

6. HABITAT MODIFICATION/RESTORATION OPTIONS

Model Option #27 Add Shell to each bar every 3 years in the Lower Choptank. *July 2017, 80%, 4-1, 3-7, 2-2, 1-0. March 2017, 100% 4-11, 3-4, 2-0, 1-0.*
Workgroup comments before rating:

- *Estimated costs= $16 million per year. Overall net benefits didn't perform well.*
- Why does this reduce abundance but habitat goes up? Hard to figure this decrease abundance. *We looked into this, and it looks the model was set up correctly. Habitat is increasing, but that does not result in a large increase in abundance because much of the habitat is put into deep and muddy areas that do not get good spat sets.*
- Concern about covering up oysters by doing this? *A: Probably doesn't explain these numbers.*
- Lower Choptank? 137 NOAA code.
- Should we tweak this in terms of feasible/reasonable range of costs? Might be a useful option.
- What is distribution of gear types: power dredge, sail dredge, patent tong hand tong (little benefit).
- Target where to get the most bang for buck. This is not a high recruitment area. Is this the right place for this treatment?
- Reasoning behind this? EN's larval transport model- used initially to focus on this option/area. Close to spawning sources of Broad and Harris Creeks.
- Fall Survey- 50-100 spat set in Broad/Harris, Lower Choptank 30-50. Improving each year.

Modeling Option #6- Implement Little Choptank and Tred Avon Restoration. (6" substrate) *July 2017- 100%, 4-5, 3-5, 2-0, 1-0. March 2017, 100% 4-11, 3-4, 2-0, 1-0.*
Workgroup comments before rating

- Option simulates restoration efforts are completed. Many of these haven't been done yet. Tried to match that as closely as they could in the model.
- Total costs: $15 million- less substrate than the restoration plans.
- This one is blue across the board- a positive pattern.

Modeling Option #7 Implement Little Choptank and Tred Avon Restoration. (12"substrate) *July 2017- 100%, 4-5, 3-5, 2-0, 1-0*
Workgroup comments before rating

- *Reality is somewhere in the middle. It is a constraint of the model*
- *Estimated cost- $24 million.*

Other Options Not Rated, July 2017
2.) Add Shell to each bar every 3 years in the Lower Choptank, Middle Choptank and Broad Creek. *(March 2017 100% 4-13, 3-1, 2-0, 1-0) (Not rated in July 2017)*
3.) Add Shell to each bar every 3 years in the Lower Choptank, with 3-year rotational harvest in that area. *(March 2017 93% 4-1, 3-12, 2-1, 1-0) (Not rated in July 2017)*

7. HYBRID OPTION MODELED

Model Option #8- Make 3d reefs in the current shellfish closure areas for the Middle Choptank region. *July 2017- 90%, 4-0, 3-9, 2-1, 1-0. March 2017, 43% 4-0, 3-6, 2-8, 1-0.*
Workgroup comments before rating:

- Priced like Tred Avon/ Little Choptank. Just shell or rock
- Stone price- $21 million. 1 time cost.
- Low recruitment area- *A: increases abundance a little, scale like Little Choptank and Tred Avon restoration. Maybe not ideal place. It could be modeled elsewhere, could be changed to something else. Putting in shellfish closure area.*

- Spat on shell- 10% of cost. Maybe add spat to model. 3 foot reefs in the depth impact? Isn't this a shallow area? 6 or 12 in vs. 24 in?
- 5-25 years- positive results- right direction. Something to look at further. All white for all 5 runs.
- 6 and 7- doubled substrate but didn't double the results.
- Reef balls for much cheaper- AC production costs and foot print. 18 inches/ 24 inches. 21 million = 70K reef balls.

Comments after rating:

- 2- Big trot line area. Muddy bottom and low recruitment and return on investment not good. Needs to be a place with a minimal impact.

Other Options Not Rated July 2017

1.) Include shell additions with spat on shell. *(Identified in March 2017, Not rated in July 2017)*

2.) Fully implemented Tred Avon River and Little Choptank River restorations. *(Identified in March 2017, Not rated in July 2017)*

8. STOCKING

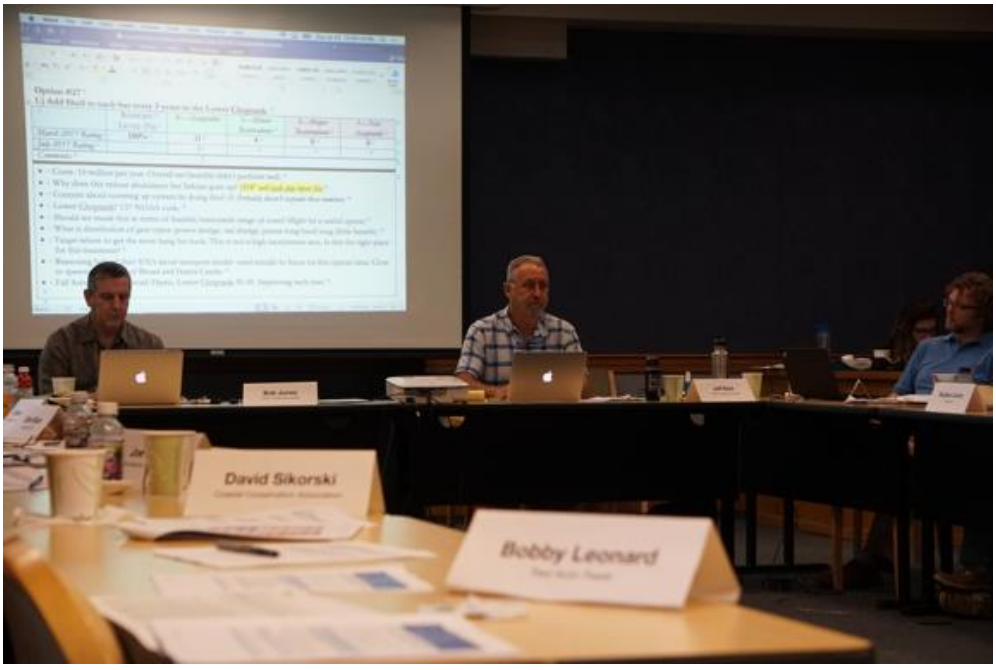
OPTIONS NOT RATED IN JULY 2017

1.) Plant spat on shell on each bar every 3 years in the Lower Choptank. *(March 2017) (93% support)*

2.) Plant spat on shell on each bar every 3 years in the Lower Choptank, Middle Choptank, and Broad Creek. *(March 2017) (93% support)*

3.) Plant spat (cultchless) on each bar every 3 years in the Lower Choptank, Middle Choptank, and Broad Creek. *(March 2017) (93% support)*

A.) Focus on strategies for increasing the funding for the use of Spat on shells everywhere not just in a few places. *(November 2016) [Theme C—Average Rating: 3.9]*



9. TESTING SUPPORT FOR MODEL COMPONENTS

The facilitator noted that at the end of the November 2016 and March 2017 meetings, the Workgroup members used an acceptability rating for each of the model components to gauge the Workgroup's understanding and support for the work being done on each. He asked the Workgroup to rate the components based on the review and refinements promised at this meeting and offer any concluding observations or suggestions.

HABITAT MODEL 1

	SUPPORT LEVEL (%)	*4—Acceptable*	*3—Minor Reservations*	*2—Major Reservations*	*1—Not Acceptable*
July 2017 Rating	**100%**	**8**	**2**	**0**	**0**
March 2017 Rating	**100%**	**13**	**0**	**0**	**0**
Nov. 2016 Rating	**79%**	**11**	**0**	**3**	**0**

Comments before Rating:

- *Seeking Input on the habitat maps- reduced the amount/quality of habitat on maps, brought to a more stable level. Did those changes work?*
- Do you feel changes made were done in a way reflecting reality? Did you make changes unrealistic to make results to make it right. *A: Subjective side of science. Used professional judgment. Changes were reasonable. We misinterpreted what the habitat maps mean when initially built the model. Jay Lazar, David Bruce- suggested more uncertainty with the habitat classification than we first assumed. Had to downgrade*
- How sure are we of the data? *A: confident of solid data- lots of information available. Held up against the Workgroup's experience. How does habitat quality affect oysters (how many settle out, oyster biology, etc.). We have less information to support the assumptions.*

HABITAT 2- Habitat Coding- Lower Choptank

	SUPPORT LEVEL (%)	*4—Acceptable*	*3—Minor Reservations*	*2—Major Reservations*	*1—Not Acceptable*
July 2017 Rating	**100%**	**6**	**4**	**0**	**0**
March 2017 Rating	**100%**	**11**	**0**	**0**	**0**
Nov. 2016 Rating	**80%**	**5**	**7**	**3**	**0**

Comments before Rating:

- Model- lower value for lower Choptank- oysters settling out. Changed the parameter down. Fix problem of abundance in Broad Creek increasing a lot if no change to this parameter.
- Moved from 10x to doubling in lower Choptank when lower the value for oysters settling out.

Comments after Rating -Minor reservations

- Could be some biological causes- variety of reasons why lower Choptank might be worse.
- Little Choptank has good spat sets.

FISHERY/EFFORT DYNAMICS

	SUPPORT LEVEL (%)	*4—Acceptable*	*3—Minor Reservations*	*2—Major Reservations*	*1—Not Acceptable*
July 2017 Rating	**100%**	**10**	**1**	**0**	**0**

March 2017 Rating	**100%**	**14**	**0**	**0**	**0**
Nov. 2016 Rating	**79%**	**11**	**0**	**3**	**0**

ECONOMICS

ECONOMICS	**SUPPORT LEVEL (%)**	***4—Acceptable***	***3—Minor Reservations***	***2—Major Reservations***	***1—Not Acceptable***
July 2017 Rating	**100%**	**7**	**3**	**0**	**0**
March 2017 Rating	**85%**	**7**	**4**	**2**	**0**
Nov. 2016 Rating	**77%**	**3**	**7**	**3**	**0**

Workgroup member comments before rating:

- *Tried to incorporate economic dynamics into the model. Levels of harvest corresponding with profitability 5-8 bushels a day depending on gear type. "profitable oysters"*
- Bushel price? *A: Using data from the last completed fishing season.*

10. WORKGROUP DISCUSSION POINTS ON COSTS/BUDGET

- At the end of the day will we have a budget in terms of recommendations? A: process allows broader ability to say find $X to implement actions.
- Workgroup will recommend and public and others will first look at what the $$ are attached to all these projects.
- Expensive to restore habitats once they are degraded.
- Department understand the Workgroup is coming with $$. Want the ideas presented and brought forward.
- After this- think out a funding plan. Low hanging cost effective etc. and what we are not going to be able to do.
- E.g. Poplar Island restoration $1.5 billion over 40 years ($37.5M/yr).
- Pp 33-34 of the outputs capture that. Revenue – costs.

Other Options Not Rated July 2017

A.) 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. *(November 2016) [Theme C—Average Rating: 4.0]*

B.) 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. *(November 2016) [Theme A—Average Rating: 3.9]*

C.) Develop a strategy that tests the effectiveness of strategically placed 3-dimensional bottoms with artificial reefs and alternative substrates. *(November 2016) [Theme D—Average Rating: 3.9]*

IV. NEXT STEPS

The Workgroup discussed the meeting schedule and agreed to proceed with the meeting scheduled for September 9-10, 2017 and consider whether an additional meeting later in the Fall will be needed to reach consensus on the Workgroup recommendations to DNR and complete the Phase I activities.

Elizabeth North reported that the videos of the presentations at the OysterFutures Sea Grant Symposium in October 2016 were still in progress and would be posted soon. She also recounted that workgroup members decided at the last meeting to delay discussion of the communications strategy of the results of stakeholder deliberations and recommendations until later in the process.

Workgroup members were asked to comment on the meeting by completing meeting evaluations *(see Appendix #3).* The meeting adjourned at 3:45 p.m. on Sunday afternoon.

Appendix #1 Workgroup Meeting III Agenda
July 22-23, 2017

WORKGROUP MEETING OBJECTIVES
✓ To Approve Agenda and Meeting IV Summary Report
✓ To Receive Update, Discuss and Provide Feedback Regarding Development of the OysterFutures Modeling Tool
✓ To Receive Preliminary Results of New and Revised Options Evaluated by OysterFutures Model
✓ To Evaluate the Level of Acceptability of the Results of Options Modeled Relative to Project Goals and Consistency With Performance Measures
✓ To Determine Whether Revisions or Additional Options and/or Performance Measures are Needed
✓ To Identify, Clarify, Discuss and Acceptability Rate Additional Options to be Modeled
✓ To Identify Needed Next Steps, Information Needs, and Agenda Items for Next Meeting

MEETING AGENDA DAY ONE—SATURDAY, JULY 22, 2017		
All Agenda Times—Including Adjournment—Are Approximate and Subject to Change		
1:30 PM		***LATE LUNCH AND SOCIAL SCIENCE STUDY SURVEY (ON CAMPUS)***
1.)	**2:00 PM**	**WELCOME AND INTRODUCTIONS**
2.)	**2:10 PM**	**AGENDA REVIEW AND APPROVAL**
3.)	**2:15 PM**	**APPROVAL OF FACILITATOR'S SUMMARY REPORT (March 24-25, 2017))**
4.)	**2:20 PM**	**UPDATE, DISCUSSION AND FEEDBACK REGARDING THE DEVELOPMENT OF THE OYSTERFUTURES MODELING TOOL (Population and Fishery Dynamics Model, Economics Model, and Water Quality Model)**
~4:15 PM		***BREAK***
5.)	**4:30 PM**	**OVERVIEW AND DISCUSSION OF PRELIMINARY RESULTS OF OPTIONS MODELED**
6.)	**6:25 PM**	**SUMMARY OF DAY ONE AND REVIEW OF DAY TWO AGENDA**
7.)	***~6:30 PM***	***RECESS AND INFORMAL SOCIAL WITH DINNER (ON CAMPUS)***

MEETING AGENDA DAY TWO—SUNDAY, JULY 23, 2017		
All Agenda Times—Including Adjournment—Are Approximate and Subject to Change		
8:30 AM		***BREAKFAST (ON CAMPUS)***
8.)	**9:00 AM**	**WELCOME**
9.)	**9:05 AM**	**DISCUSSION, EVALUATION AND ACCEPTABILITY RATING OF MODELED OPTIONS RELATIVE TO PERFORMANCE MEASURES AND PROJECT GOALS**
~10:30 AM		***BREAK***
9.)	**10:45 AM**	**EVALUATION AND ACCEPTABILITY RATING OF MODELED OPTIONS RELATIVE TO PERFORMANCE MEASURES AND PROJECT GOALS—CONTINUED**
~12:00 PM		***LUNCH (ON CAMPUS)***
10.)	**12:30 PM**	**IDENTIFICATION AND ACCEPTABILITY RATING OF REVISIONS TO OPTIONS, HYBRID OPTIONS, NEW OPTIONS, & PERFORMANCE MEASURES, AS NEEDED**
~2:00 PM		***BREAK***
10.)	**2:15 PM**	**ACCEPTABILITY RATING OF REVISIONS TO OPTIONS, HYBRID OPTIONS, NEW OPTIONS, AND PERFORMANCE MEASURES, AS NEEDED—CONTINUED**
11.)	**3:00 PM**	**GUIDANCE TO MODELING TEAM REGARDING MODEL DEVELOPMENT, PERFORMANCE MEASURES AND PROJECT GOALS**
12.)	**3:15 PM**	**ACCEPTABILITY RATING OF MODEL COMPONENTS**
13.)	**3:45 PM**	**UPDATE ON COMMUNICATION STRATEGY AND ACTIONS FOR THE PROJECT**
14.)	**3:55 PM**	**NEXT STEPS: AGENDA ITEMS AND INFORMATION FOR THE NEXT MEETING** • Review action items and assignments • Identify agenda items and any needed information for next meeting
15.)	***~4:00 PM***	***ADJOURN***

Appendix #2 Workgroup & Research Team Participation

WORKGROUP MEMBERSHIP PARTICIPATION- SATURDAY JULY 22, 2017

MEMBER (***BOLD***= *PRESENT*)	AFFILIATION
WATERMAN	
J.D. Buchanan	Preston, MD, Caroline County, Talbot County Waterman
Robbie Casho	St. Michaels, MD, Dorchester County Waterman
Jeff Harrison	Tilghman, MD, Talbot County, President Talbot Waterman's Association
Gregory Kemp	McDaniel, MD, Talbot County, Vice President Talbot Waterman's Association
Cody Paul	Church Creek, MD, Dorchester County Commercial Oyster Committee Chair
Bobby Whaples	Vienna, MD, Dorchester County Waterman
AQUACULTURE	
Bobby Leonard/MJ Dubois	Tred Avon Treats, Ruff-N-Ready, LLC.
Johnny Shockley	Hoopers Island Oyster Aquaculture Co.
SEAFOOD BUYERS	
Aubrey Vincent	Lindy's Seafood
ENVIRONMENTAL CITIZEN GROUPS	
Kelly Cox	Phillips Wharf Environmental Center
Allison Colden	Chesapeake Bay Foundation
Joe Fehrer	The Nature Conservancy
RECREATIONAL FISHING GROUP	
David Sikorski	Coastal Conservation Association (CCA)
MARYLAND DEPARTMENT OF NATURAL RESOURCES	
Dave Blazer	Maryland Department of Natural Resources
OYSTER RECOVERY PARTNERSHIP	
Ward Slacum	Oyster Recovery Partnership
FEDERAL AGENCY	
Stephanie Westby/Sean Corson	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/**Chris Hayes**	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

WORKGROUP MEMBERSHIP PARTICIPATION- SUNDAY JULY 23, 2017

MEMBER (***BOLD***= *PRESENT*)	AFFILIATION
WATERMAN	
J.D. Buchanan	Preston, MD, Caroline County, Talbot County Waterman
Robbie Casho	St. Michaels, MD, Dorchester County Waterman
Jeff Harrison	Tilghman, MD, Talbot County, President Talbot Waterman's Association
Gregory Kemp	McDaniel, MD, Talbot County, Vice President Talbot Waterman's Associatio
Cody Paul	Church Creek, MD, Dorchester County Commercial Oyster Committee Chai
Bobby Whaples	Vienna, MD, Dorchester County Waterman
AQUACULTURE	
Bobby Leonard/MJ Dubois	Tred Avon Treats, Ruff-N-Ready, LLC.
Johnny Shockley	Hoopers Island Oyster Aquaculture Co.
SEAFOOD BUYERS	
Aubrey Vincent	Lindy's Seafood
ENVIRONMENTAL CITIZEN GROUPS	
Kelly Cox	Phillips Wharf Environmental Center
Allison Colden	Chesapeake Bay Foundation
Joe Fehrer	The Nature Conservancy
RECREATIONAL FISHING GROUP	
David Sikorski	Coastal Conservation Association (CCA)
MARYLAND DEPARTMENT OF NATURAL RESOURCES	
Dave Blazer/Chris Judy	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 Workgroup Meeting Evaluation Summary

OYSTERFUTURES WORKGROUP
JULY 22 - 23, 2017—CAMBRIDGE, MARYLAND
MEETING EVALUATION SUMMARY

Workgroup members used a 0 to 10 Rating Scale Where a 0 meant Totally Disagree and a 10 meant Totally Agree. The average ranking for each statement and comments of the 9 evaluations received are noted below.

1. Please assess the overall meeting.

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

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

9.6 Update and Feedback Regarding Development of the OysterFutures Modeling Tool.
9.7 Discussion of Preliminary Results of New and Revised Options Evaluated by OysterFutures Model.
8.8 Acceptability Rating of Options Modeled Relative to Project Goals and Performance Measures.
9.7 Identification of and Discussion of Any Additional Options and/or Performance Measures.
9.9 Review of Next Steps and Agenda Items for the Next Meeting.

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

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

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

9.3 Overall, I am very satisfied with the meeting.
9.8 I was very satisfied with the services provided by the Facilitator.
9.4 I am satisfied with the outcome of the meeting.

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

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

1. What did you like best about the meeting?

- Facilitation was good- all opinions heard, accounted for and valued.
- The varying ideas and discussions
- Starting to see real numbers and performance metrics
- We had good discussion on several points that were very helpful
- Participants are being very open and expressing issues. Excellent discussion
- The food (2)

2. How could the meeting have been improved?

- Some points repeated numerous times, would be better use of time to recognize and ask to move on.
- I am worried about losing membership with less participants showing up.
- I wouldn't have changed anything.
- Having all stakeholders present.
- No input… great job! (2)
- Prime rib!

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.