

# CHESAPEAKE BAY OYSTER SUMMIT

## SUMMARY REPORT

February 18th-19<sup>th</sup>, 2016

Fredericksburg, VA

Hosted by the NOAA Chesapeake Bay Office

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### EXECUTIVE SUMMARY

More than 100 people attended the two-day Oyster Summit, drawing from a diverse set of stakeholders representing industry, restoration, and science from across the Chesapeake Bay region. Summit sessions were designed to encourage networking and sharing experiences to broaden awareness, improve understanding of issues, and support progress on addressing priority needs of the oyster community. These objectives were met over the two days, as attendees from many sectors and jurisdictions learned from one another and made new professional connections. This collaboration and collective interest holds promise for follow-through on next steps and new initiatives.

The Summit was organized around four topics identified as high priority by multiple sectors within the oyster community. Each session topic was introduced by a panel of presenters who provided an overview, highlighted key issues, presented tangible examples, and addressed questions from participants. Meeting participants then had time to discuss the session topic either in small groups or with all attendees. Meeting facilitators took note of recurring themes from each of the four discussion sessions and presented them in summary to all meeting participants. The Summit culminated with breakout sessions where meeting participants identified some specific next steps under the themes summarized by the meeting facilitators. Proposals emerging from these breakout sessions provide a foundation towards action in the future that fall into three broad categories of research, policy and communication:

#### Research:

- Increase use of alternative substrates by clarifying which types of substrates work best for different purposes and oyster growing scenarios. Consider new materials such as geotextiles and other synthetics. Promote jurisdictional collaboration in research and logistics of acquiring and applying substrate materials.
- Develop a full accounting of the sources of shell and alternative substrates, including both supply and demand from each sector (aquaculture, restoration, public grounds). Model the shell budget (processes of gains and losses) before making decisions of how to use the supply.
- Identify, test, and establish a system(s) for setting larvae on alternative substrates.
- Establish community group and scientist partnerships to advance understanding and monitoring of oyster activities in the Bay.

#### Policy:

- Incentivize, promote, and increase shell recycling programs across the Bay region.
- Balance hatchery research and development with production to meet overall demand for larvae.
- Conduct an analysis to determine the total (bay-wide) demand for larvae from all sectors (restoration, aquaculture, commercial harvest). Establish a long-term vision or business model to optimize hatchery support for demand from all sectors.
- Promote partnerships between aquaculture industry and community-based oyster growing programs building on existing models such as Lynnhaven River Now.
- Utilize energy of community-based oyster growing program members to engage policymakers in recovering oyster populations.

#### Communication:

- Consider establishing a regional science advisory mechanism to address larval production challenges.
- Create a communication network for community-based oyster growing programs Baywide.

These proposals highlight the wide variety of activities that can mutually benefit the broad community of oyster stakeholders and oyster populations for the future.

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## INTRODUCTION

The Oyster Summit was designed to achieve several overarching objectives, detailed below. In addition to these more content-driven objectives, the Summit also set the stage for open-minded, collaborative dialogue between the diverse group of attendees, maintaining optimism and encouraging tangible visions of the future.

- Share knowledge and identify common objectives for increasing the number of oysters.
- Identify needs and opportunities with near-term actions that would benefit Bay oyster populations for all sectors.
- Chart a course for sharing needs, opportunities and suggestions that emerge from the Summit broadly to stakeholders in Maryland and Virginia for input and consensus-building.
- Distribute the results of the Summit and next steps to appropriate audiences, tailored for Maryland and Virginia, as appropriate, e.g., scientists, industry, policymakers and jurisdiction management agencies.

These objectives, and much of the planning of the Summit agenda, was completed collaboratively with a diverse group of twenty steering committee members from across jurisdictions, interests, and sectors of the oyster community. The steering committee envisioned that the outcomes

of the Summit would be useful to specific audiences who could carry new ideas forward. They scoped potential agenda topics to ensure that some of the biggest impediments to increasing the number of oysters in the Bay were addressed. The steering committee started with a list of ten possible topics:

- Oyster Population (status, dynamics, etc.)
- Shell availability and alternative substrates
- Larvae availability and resilience
- Activity and policy coordination and partnerships
- Applying new science and industry developments
- Economic and market forces
- Water quality (in particular, sediment and nitrogen)
- Enforcement and poaching
- New areas that do not currently, but could, have oysters
- Community involvement

They ultimately prioritized four topics (shell availability and alternative substrate; larval availability and resilience; policy coordination; community-based efforts), while acknowledging that all topics listed above require attention via other forums or mechanisms. Some topics are already being addressed in other venues, and future collaborations could bring more attention to them, as appropriate.

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## SUMMIT SESSIONS

The Summit was attended by over 100 people from federal and state agencies, aquaculture operations, hatcheries, academic institutions, nongovernmental organizations, and community groups. Summit sessions were designed to encourage networking and sharing experiences to broaden awareness, improve understanding of issues, and support progress on addressing priority needs of the oyster community. To this end, the meeting included several small group discussions that included a mix of people from the various stakeholder sectors. There were notably few representatives from the wild harvest sector. The Summit planners and participants recognize the need to include this stakeholder group on post Summit actions.

This document represents a summary of the Summit discussions and proposed next steps. It should serve as a reference for those who could not attend, for those who want a reminder of the many issues discussed, and for the network of people who will build on suggestions generated by the Summit moving forward. The suggestions presented here do not represent a prescription for solving all challenges facing oysters and the oyster community in the Bay. The suggestions do serve as a seed bank of ideas and as a set of initial steps to carry the ideas forward. The remainder of this document is organized based on the Summit agenda. Each section highlights the main messages from presentations, major discussion points, and results of breakout groups.

## OPENING PLENARY

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*Speakers: Mark Luckenbach (VIMS) and Donald Boesch (UMCES)*

Each of the opening keynote speakers provided food for thought for subsequent discussions at the Summit, including how we might think about the oyster community moving forward. Mark Luckenbach (VIMS) started off the Summit reminding attendees of both great successes and challenges around oysters in the Bay, and the value of lessons learned from each. He suggested that oyster programs should be reflective and adaptive. Donald Boesch (UMCES) followed with a challenge to think of oyster-related decisions not as experiments or set in stone, but somewhere in between—“learning by doing.” This is especially important for planning at least 20-30 years into the future to include new challenges in a changing environment and climate. He posed a question for reflection on the current situation: “can you have a sustainable fishery of a sessile, reef-building organism?” The science is still unsettled, but it took thousands of years to create historic oyster reefs, so it will likely take a long time to return to even a fraction of that previous state.

## CONCEPTUAL MODELING

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*Facilitators: Jim Vasslides (Barnegat Bay Partnership), Howard Townsend (NOAA), Amy Freitag (VASG/NOAA)*

As part of a participatory modelling exercise, meeting attendees were asked to consider how they understood the relationship between important components of the oyster social and ecological system in the Bay. Attendees were given a brief introduction to the concept of cognitive mapping, whereby the relationships between important components of a system, as perceived by the individual, are diagrammed as nodes and connectors. The attendees were asked to consider the relationships between the ten topics identified by the Summit steering committee (page 2), adding “fishing” to that list. In some cases, participants included additional concepts of their own.

Once completed, 62 individual maps were submitted and combined into stakeholder group maps based on the individual’s affiliation as provided during registration. The stakeholder groups were Academia (16 individuals), Aquaculture (5 individuals), Environmental nongovernmental organization (ENGOS) (16 individuals), Governmental agencies (17 individuals), Hatcheries (3 individuals), Wild harvesters (0 individuals), and Others (5 individuals). All of the individual maps were combined into a single “community” map (Figure 1).

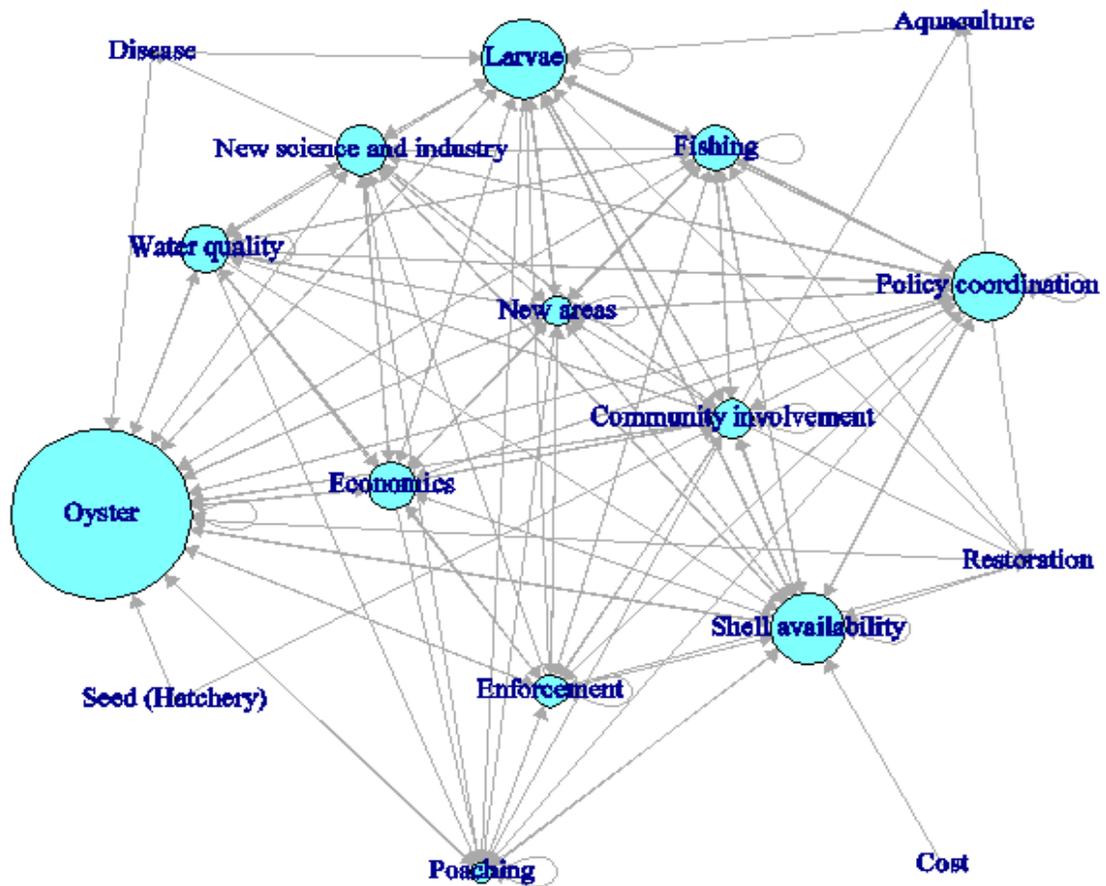


Figure 1. A conceptual map illustrating the relationship between important components of the oyster social and ecological system in the Bay based on responses from meeting attendees. The larger the circle, the more importance attendees ascribed to a subject.

There were differences in the way the stakeholder groups structurally think about the system, with maps developed by participants from government agencies and ENGOs drawing more connections between the concepts than the aquaculture and hatchery groups drew. Despite the differences in the structure between the stakeholder groups, there was a shared perception of the importance of the oyster population, larval supply, shell availability, and policy coordination. New Science and Industry and Economics were also important factors for some stakeholder groups. The oyster population was the most important concept for each group, but the relative importance of the remaining concepts varied (Table 1).

**Table 1: The five most important concepts in each of the stakeholder group conceptual models.**

Academia	Aquaculture	Gov't	ENGO	Hatcheries	Others
Oyster	Oyster	Oyster	Oyster	Oyster	Oyster
Policy coordination	Policy coordination	Shell availability	Shell availability	Larvae	Fishing
Larvae	Economics	Larvae	Larvae	Shell availability	Water quality
Shell availability	Larvae	Economics	Water quality	New science and industry	Policy coordination
New science and industry	Fishing	Policy coordination	Policy coordination	Policy coordination	Economics

## SHELL AVAILABILITY AND ALTERNATIVE SUBSTRATE

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### SENSE OF THE SCIENCE

*Panelists: Ward Slacum (ORP), Eric Weissberger (MD DNR), Angie Sowers (USACE), Jim Wesson (VMRC), Missy Southworth (VIMS)*

The discussion of shell availability and alternative substrate (a long standing issue for oyster management) included several lessons learned from over the years. Historical experiments demonstrate that oyster spat will settle successfully on many kinds substrates (referred to collectively as “alternative substrate”) other than shell, as well as on mixes of alternative substrate/shell. These findings have not significantly altered in-the-field practices for growing oysters – shell remains the preferred material. In addition, while there is wide recognition of a shell shortage, shell is not a free market, increasing the complexity of resulting decisions. Each state caps the price they will pay for a bushel<sup>2</sup> of shell, which has significantly increased over the last decade to \$2 per bushel<sup>2</sup>. This is not enough to compete on the open market where aquaculture and other uses have increased demand for shell. The combination of

these factors creates a menu of options for finding substrate that shifts over time as different resources are used up, including shell, fossil shell, other kinds of shell such as clam, and alternative substrates such as concrete and rock. Yet, there has not been a clear delineation of or consensus on the most appropriate substrate for different applications (e.g., sanctuaries, wild harvest bars, aquaculture, etc.).

## DISCUSSION POINTS

The discussion in this session was structured into small discussion groups of 8-10 participants, followed by full group discussion. Reaction to the fact that oyster larvae will settle successfully on many types of substrate was varied, illustrating a need for more education and investigation into what kinds of substrate work best in each situation. In addition, the capacity of shell recycling programs is far below both the demand for shell and the potential for shell recovery, so there is a need to consider how to bolster shell recycling efforts. Aquaculture also offered some new options, such as microcultch, to make more efficient use of what little shell is available. One suggestion was to consider managing shell from oyster farms to the shucking house/restaurant and back again to the oyster farms as a closed-loop system. Most agreed that shell availability is probably the biggest resource constraint at the moment, and that we may be able to better manage it as we prioritize the use of shell and pursue other solutions. An overall budget of the substrate resources needed for oyster production would be helpful here.

## PROPOSALS FOR NEXT STEPS

The problem of shell availability is not a new one. Small groups on Day 1 discussed previous shell recommendations from the past decade and added new ideas for what steps should be taken moving forward. All Summit participants then voted on which ideas they most supported out of the full list of ideas generated from all discussion groups. The three ideas with the most votes became the focus for the rest of the Summit. Those three ideas are listed below with associated proposed next steps generated by small breakout groups on Day 2.

1. Increase use of alternative substrates by clarifying which substrates work where and for what purposes. Consider new materials such as geotextiles and other synthetics. Promote jurisdictional collaboration in research and logistics of acquiring and applying substrate materials.
  - a. Proposal 1: Combination of a stakeholder review in developing alternative substrates and a public outreach campaign in order to move beyond institutional barriers and stakeholder conflict.
  - b. Proposal 2: Determine which type of substrate is best for particular needs. This could lead to restricting shell to specific uses.
2. Incentivize and increase shell recycling programs.
  - a. No discussion group chose to focus on identifying specific next steps here, but there was much support in the room for supporting existing program needs like staff, funding, education/outreach to consumers, and reaching out to more inland communities where

product is shipped. This support could come from tax incentives for participation or other fee-based programs that value the shell at all points in production.

3. Develop a full accounting and budget of shell and alternative substrate resources, including both supply and demand from each sector (aquaculture, restoration, public grounds). Model the shell budget before making decisions of how to use the supply.
  - a. Proposal 1: First develop a tributary trial model to test the accounting, using data that might exist within state monitoring. Consider if there is a way to simultaneously incentivize recycling as part of this exercise and figure out how much buried shell exists in the Bay as a resource.
  - b. Proposal 2: Identify the major supply sources and user demands, and partner with those groups to determine their shell accounting. Potentially use this budget to help guide a tax or business contracts to better reflect the cost of shell.
  - c. Proposal 3: Tally needs by sector (aquaculture, public grounds, restoration) and determine accuracy of these estimates; compare to both absolute need and ideal need.
  - d. Proposal 4: Develop an interjurisdictional, cross-sector shell budget workgroup with stakeholder review; use their findings to fund small grants for innovative ideas and government initiatives that will address the greatest needs.

## LARVAL AVAILABILITY AND RESILIENCE

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### SENSE OF THE SCIENCE

*Panelists: Stan Allen (VIMS), Mike Congrove (Oyster Seed Holdings), Mutt Merritt (Horn Point Hatchery)*

The presentations focused on larvae producers and their capacity to meet demand for both restoration and aquaculture applications. Hatchery oyster production in the Chesapeake Bay has substantially increased over the last decade. The science is still evolving and there remain some unanswered questions. For example, larvae survival is by nature variable and, as the larvae age, this variability increases. There is also a typical “slump” in summer production, and while no one knows exactly why, low pH seems to be associated with these low production times. It is important to remember that for a wide variety of reasons, no hatchery functions at 100% of its capacity, so there’s probably more latent capacity residing in the current system.

While much more research and development is needed, panelists also discussed the different business models that exist in Maryland and Virginia and how both research/development as well as production goals are achieved in the Bay. Public hatcheries like Horn Point can be compared to agricultural experiment models that address critical research and development in addition to some production for private industry. Private hatcheries, on the other hand, are primarily focused on production to support private industry. They could also serve in this research/development capacity, but may find it more challenging than a state-supported institution. Overall, there is a need for more active

decision-making on who gets the larvae that are produced, especially in low production years. Potential models include letting the market drive supply and demand or reserving a percentage for restoration projects. The business models of the Chesapeake are not the only ones to consider—for example, what can be learned looking at France and China, both of which have orders of magnitude higher production?

## DISCUSSION POINTS

Both private and public hatcheries play an important role in meeting demand for larvae across sectors in the Bay. As demand continues to increase their respective roles become increasingly important. The decrease in production during the summer and the overall variability within larvae production highlight the need for more monitoring and research to determine why these phenomena occur. This might include learning from worldwide operations.

The larvae discussion is not entirely separate from shell, as it is also a limiting factor in the production of more oysters. Unlike the shell/substrate topic, larvae production tends to be a less visible part of the oyster industry and recovery efforts, so learning on both the production and consumption end is needed to be able to appropriately manage and address challenges. In addition, hatcheries in the Bay are currently designed for setting larvae on shell; none are currently designed to use alternative substrates that could be used in restoration and sanctuary applications.

## PROPOSALS FOR NEXT STEPS

Summit facilitators summarized three recurring themes based on the panel presentations and resulting full-group discussion. The proposal breakout session on Day 2 offered more time to generate ideas to make these themes more specific and action-oriented.

1. Consider establishing a regional science advisory mechanism to address larval production challenges.
  - a. Proposal 1: Identify a working group across the main larvae issues (production and water quality) and some grant money to pursue ideas and incentivize workgroup member participation.
2. Identify, test and establish a system(s) for setting larvae on alternative substrates.
  - a. Proposal 1: Start with a pilot study (or several) testing setting on alternative substrates in hatcheries for feasibility and citizen science for field applications. If successful, determine a way to scale up to demand. There is potential for creative funding streams, like disposal fees for the substrate, venture capital or the recipients of the spat-on-substrate.
3. Balance research and development with production to meet overall demand.
  - a. Proposal 1: Include science collaborations throughout the production process, including investigating bad years to continue to narrow down causes, continuing to increase production capacity, and possibly even new tools such as stockpiling larvae.

- b. Proposal 2: Establish an experimental research hatchery that can quickly respond to issues as they arise and have more flexibility in structure than hatcheries built for production. Possibly model after agricultural experiment stations or USDA research programs (also for funding).
4. Determine the total demand for larvae from all sectors. Establish a long-term vision or business model to optimize hatchery support for demand from both aquaculture and restoration.
  - a. Proposal 1: Split hatchery production over several producers to split risk and specialize in certain kinds of larvae. Short-term, this might mean collaborating with other states or leveraging cooperative extension network to meet demand.
  - b. Proposal 2: Utilize extension agents or other researchers to complete a market analysis now and in the future; create workgroup to decide how to meet future demand with both private and public hatchery representation.

## COMMUNITY-BASED OYSTER PROGRAMS

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### SENSE OF THE SCIENCE

*Panelists: Mike Sanders (TOGA), Laurie Sorabella (Lynnhaven River NOW), Len Zuza (SMOCS), Chris Judy (MGO), Larry Jennings (CCA Cape St. Claire), Rick Elyar (CCA Central Maryland)*

Short presentations from six different community groups highlighted the wide variety of reasons community members get involved in oysters, from having a delicious meal to protecting their property from erosion. They also demonstrated the potential impact these kinds of groups can have both increasing oysters in the Bay and increasing public support and understanding of larger oyster projects. For an example of lessons learned from each group:

- Southern Maryland Oyster Cultivation Society (SMOCS) demonstrates what is needed to support large-scale community efforts.
- Lynnhaven River NOW shows how starting small and increasing activities according to community desires can respond to emerging issues quickly. It also highlights the importance of citizen science.
- Coastal Conservation Association (CCA) Cape St. Claire chapter highlights the potential for oysters in a variety of settings to protect from erosion and the need for community/science partnerships to rigorously document their oyster efforts.
- CCA Central Maryland chapter shows how an inland community can take up the oyster cause and support both aquaculture and reef restoration efforts downstream.
- Marylanders Grow Oysters (MGO) shows how a tributary-based approach can reach a wide variety of unusual partners, contribute to citizen science, and support sanctuary development.
- Tidewater Oyster Gardeners Association (TOGA) demonstrates how gardeners become advocates for aquaculture and how partnerships with scientists can advance both science and community efforts.

Overall, there were some shared themes among the different groups despite their widely varying goals. These include high engagement with the school population and outreach through youth-focused programming at public events, both of which serve an important educational role and build support for future efforts. Themes also include the strong benefits of partnering with scientists or participating in citizen science. These partnerships promote the rigorous documentation of the benefits of member efforts and leverage the spatial distribution and time commitments of volunteers to better understand oyster reefs.

## DISCUSSION POINTS

The panel served to increase exposure for these community groups to the broader community of oyster stakeholders and to each other. While these groups have different missions and work with different communities, there is an opportunity for sharing strategies, knowledge, and experiences. As of now, there is no Baywide network to help make that happen. Many were also surprised at the collective impact of what these groups are accomplishing at a local scale, which is important but often forgotten when talking about Chesapeake regional efforts.

Community groups' relationship with industry also provided questions to consider. On one hand, community groups want a stronger connection with aquaculture and see their members becoming strong advocates for industry, championing their product. On the other hand, there are some concerns about oversight of citizen actions, especially within public health –what if people grow their own oysters in condemned areas or do not follow public health rules resulting in illness? This could result in unintended negative perception or consequences for the aquaculture industry. Both questions speak to a potential need for collaboration in outreach, education, and marketing between community groups and oyster farmers.

## PROPOSALS FOR NEXT STEPS

The structure of the discussion for the community groups mirrored the larvae discussion, with questions and discussion from the full group on Day 1, and more in-depth discussion on Day 2 around recurring themes from the presentations and discussion.

1. Create a communication network among community groups Baywide.
  - a. Proposal 1: Create an email list serve to share ideas and facilitate discussion.
  - b. Proposal 2: Hold annual meetings and develop a web presence, possibly led by Sea Grant or another community facilitator. Especially useful for responding to new issues, educating on food safety concerns and rallying policy support when needed.
  - c. Proposal 3: A neutral facilitator (ex: NOAA Chesapeake Bay Office) could organize workshops on important issues like grant writing and information sharing.
  - d. Proposal 4: Pursue more collaboration overall, measure collective impact and connect to government, large nonprofits, and industry groups.

- e. Proposal 5: Hold an annual meeting (like MD DNR organizes) and develop a webpage for resource sharing.
2. Promote aquaculture and community group partnerships building on existing models (and remembering human health concerns).
    - a. There were two proposals in the communication network category that also apply here (d and e above) in making stronger partnerships and leveraging existing models as part of building a strong communications network.
  3. Utilize energy of community group members to engage policymakers
    - a. Proposal 1: Building a network of community groups will increase leverage for policy and offer a way to quantify their collective impact, Continue holding community events around oysters and educating the public at-large about issues, including policy-related issues, as they emerge.
  4. Build community group and scientist partnerships to advance understanding and monitoring of oyster activities in the Bay.
    - a. No group worked on a specific proposal for this theme. From the presentations, there are already a number of existing partnership models that could be transferred or expanded, depending on the needs of individual groups and potential science partners.

## THE LEGAL AND POLICY LANDSCAPE

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### SENSE OF THE SCIENCE

*Presenters: Amy Freitag (NOAA/VASG); College of William and Mary Public Policy Students: Amber Will, Jacob Darr, Julia Snouck-Hurgronje, Isaac Irby; Moderator: Ann Swanson (Chesapeake Bay Commission)*

The physical landscape of where certain oyster-related regulations apply is complicated, across many jurisdictions, levels of government, and agency responsibilities. Depending on what topic one is concerned with (public health, fishing restrictions, property rights, etc.), management within this complex landscape is fairly streamlined. Importantly, there are also mandated points of collaboration to ensure that different policy streams remain in conversation with one another.

Looking at the code of Maryland and Virginia, which is where the majority of regulation is written, there are some significant differences in how each state chooses to implement certain kinds of rules (ex: scale at which gear restrictions are applied, required buffer zones around sanctuaries, etc.). These differences are often pointed to when people perceive jurisdictional differences, yet the differences largely represent different approaches to shared goals. Those shared goals are largely supported by informal communication networks across jurisdictional and sector boundaries. These lines of communication and collaboration should be preserved or enhanced, including being carried through staff changes and agency reorganization.

The partner to the policy landscape is the legal landscape, or what happens when people challenge those policies or when the policies must be interpreted. Oyster-related cases go to court less often than one might expect (probably due to standing issues), but when they do the case is most often over property rights.

In a tangible example of how multiple aspects of oyster policy are planned in coordination with each other, the Potomac River Fisheries Commission has more flexibility to pursue new management programs and policy options in a small geographical area. The Commission has authority over the Potomac River (excluding tributaries) and is comprised of nine commissioners. Marty Gary, Executive Secretary of the Commission, discussed some of the current efforts and programs the Commission is pursuing, including an aquaculture model that involves watermen, fishery closures to protect spat, and science based identification of potential restoration areas.

## DISCUSSION POINTS

The full group discussion largely focused on clarifying questions and more details about the spatial differences in oyster policy throughout the Bay. However, two main points emerged in thinking about how policy fits into the broader oyster efforts of Summit attendees. First, in considering any change in policy, one must be careful of unintended consequences and conscious of potential impacts on a group of people not directly implicated in the policy issue. Second, addressing the challenges discussed at this Summit may require or have the opportunity for policy change. Understanding the policy landscape, culture, and practice is embedded within the more specific issues of shell, larvae, and the role of community groups.

This session's moderator Ann Swanson, Executive Director of the Chesapeake Bay Commission, provided closing thoughts on the discussion and the role of policy around oysters. She acknowledged the ongoing need for funding, and urged stakeholders to articulate funding needs as specifically as possible to help policymakers understand how funding supports oyster efforts. She also encouraged stakeholders to consider policy opportunities to enhance current efforts and overcome the challenges discussed at this Summit.

## CLOSING PLENARY FROM DELAWARE BAY

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*Presenters: David Bushek, Lisa Calvo, Kathryn Ashton-Alcox (Rutgers University Haskin Shellfish Research Lab)*

Closing the Summit and reflecting on the Chesapeake Bay-specific discussions, a team from Rutgers University provided an outside perspective on oyster management from the Delaware Bay. The presentation urged Summit attendees to remember that "oysters beget oysters" so every oyster in the water has an exponential effect towards meeting oyster-related goals. The presentation discussed the Delaware Bay oyster population and the associated fishing, aquaculture and conservation interests. Key summary points from Delaware Bay include:

- Education programs related to oyster research and restoration have been very successful and critical to building stewardship and awareness.
- The aquaculture industry is still small, but with large potential. The industry faces challenges including regulatory issues, user conflicts and endangered species considerations.
- Restoration does not lead to a sustainable harvest, but creating a sustainable harvest may provide ecological services of oyster reefs by not allowing depletion of the resource.
- Historically, disease has been a major factor affecting oyster abundance, but the Delaware Bay fishery was able to adapt and has been sustainably managed. Fishing mortality has remained a small fraction (about 2%) of the whole-stock oyster abundance<sup>1</sup>.
- Management of the oyster fishery includes several key strategies and drivers, including biological reference points, area management, quantitative surveys, abundance-based quotas and direct marketing.
- A formal, peer-reviewed stock assessment is conducted annually via a cooperative process including scientists, fishery managers, and industry.
- Restoration is largely based on shell planting, and is partly funded by a self-imposed industry bushel<sup>2</sup> tax.
- While the wild fishery, aquaculture, and restoration have distinct interests, they do have overlapping goals that partners can focus on.

There was interest among Summit participants in further exploring how lessons learned from the Delaware Bay could potentially be considered for the Chesapeake Bay region in the future.

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## CONCLUSIONS

### HIGH-LEVEL OUTCOMES

The objectives for the Chesapeake Bay Oyster Summit were met. Learning took place both across sectors and across jurisdictions, aided by the fact that these particular combinations of people rarely have a chance to meet in person. Members of different sectors learning from one another provided a shared understanding of a larger oyster community and provided common ground on which to base future discussions of next steps. In addition, this understanding will aid everyone in being able to better anticipate the unintended consequences of oyster-related actions and help identify potential cross-sector win-win opportunities.

Learning also occurred across jurisdictions and a range of activities, from the local scale to the regional scale. The broad representation of those at the meeting highlighted where there might be value in some cross-jurisdiction or regional-scale discussions, where decisions are appropriate at the state level, as well as situations where local efforts may be the most effective. The Summit highlighted the value in all three kinds of approaches as well as the need to consciously choose which one might be the most effective for a given activity or project.

Through both official discussions and informal networking, the Summit also offered an opportunity to form new collaborations and partnerships and to discuss progress with colleagues. Many attendees commented that they appreciated this opportunity for networking. The many discussions with diverse participants reaffirmed the need for the Summit to help identify shared goals within the Chesapeake Bay oyster community, like increasing the total number of oysters in the Bay.

Across subject areas, there were a few key takeaways. For example, there is an evolving understanding of the benefits of three-dimensional reefs—this appeared during the opening plenaries and again during many of the breakout sessions. The state of the science on reef structure and ecosystem services is still relatively new, but early studies are already informing oyster efforts and will continue to do so in the future.

#### WHERE DO WE GO FROM HERE?

The Summit was intended as a starting point for new conversations. We envision that attendees will use the proposals to generate new approaches and build on current efforts. We also encourage the collaboration and networking to continue to help address the issues we discussed and respond to new issues as they arise. As next steps are considered, it is important to include not just Summit attendees, but also additional stakeholders and partners whose input will be critical moving forward.

#### ACKNOWLEDGEMENTS

The NOAA Chesapeake Bay Office would like to thank all the attendees for their time and participation in the Summit. They extend an additional thank you to all the presenters, panelists, steering committee and facilitators for sharing their expertise and promoting productive discussions. Finally, thank you to Amy Freitag (VASG/NOAA) for leading the preparation of this summary report.

Available meeting materials, including the agenda and list of attendees, can be found at the following link: <http://www.chesapeakebay.net/calendar/event/23465/>

<sup>1</sup> Correction from original report: fishing mortality in Delaware Bay is <2% of the whole-stock oyster abundance, not 2% of all mortality as stated in the original report.

<sup>2</sup> The volume of one bushel varies among jurisdictions. One New Jersey bushel is equal to one US standard bushel. One Maryland bushel is larger than a standard bushel, and one Virginia bushel is larger than one Maryland bushel.