Held at the Virginia Institute of Marine Science
January 7-8, 2020

Sustainable Fisheries GIT Biannual Meeting Summary

Chesapeake Bay Program
Science. Restoration. Partnership.

Overview

The two-day meeting at Virginia Institute of Marine Science (VIMS) brought together more than 50 stakeholders to learn about new research and to discuss relevant issues in fisheries science and management. The agenda was dedicated to oysters, with topics including restoration progress, new research supporting restoration, ecosystem services of restored reefs, intersections with water quality issues, nearshore habitats, and ecosystem changes affecting oysters.

Restoration Progress

All 10 tributaries for restoration under the 2014 Watershed Agreement Oyster Outcome have been selected by Maryland (MD) and Virginia (VA), and approved as of the June 2019 GIT meeting. Each tributary is in a different stage of planning, implementation, and postrestoration monitoring. Progress toward restoration is measured by the Oyster Metrics, developed to provide a Bay-wide definition of a 'restored reef' and a 'restored tributary.' See restoration update by Stephanie Westby (NOAA) and Kimberly Koelsch (USACE) for more details of restoration progress.


Photo: Oyster Recovery Partnership

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On the Horizon

- Oyster Best Management Practice Expert Panel report expected for review in Spring 2020
- Oyster Reef Ecosystem Services (ORES) Technical Memo in development

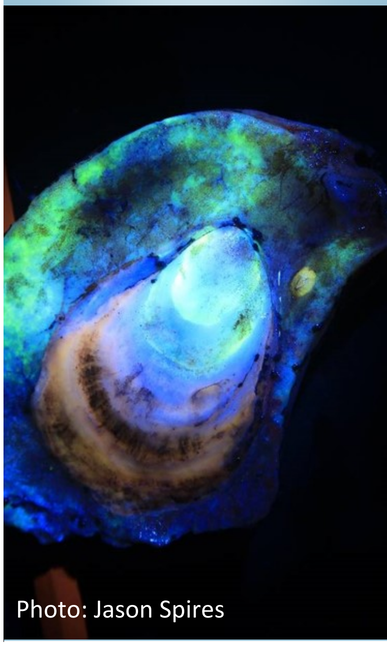


Photo: Jason Spires

Restoration Progress

Initial restoration is complete in two tributaries (Harris Creek, Lafayette) with a third expected in 2020 (Little Choptank).

Monitoring phase is under way in three tributaries (Harris Creek, Little Choptank, Tred Avon) with monitoring plans under way in Lafayette.

98% of MD monitored reefs meet Oyster Metrics minimum threshold success criteria three years post restoration, showing that tributary-scale oyster restoration is possible and returns from ecosystem services are being realized.

Andrew Button from Virginia Marine Resources Commission shared plans to restore an additional sixth tributary (beyond the five selected for restoration in VA) in the Eastern Branch of the Elizabeth River, making use of additional funding and good bottom conditions for reef construction. The Fisheries GIT congratulates the Commonwealth of VA for going above and beyond planting more oysters in the water!

See Chesapeake Progress for updates on the Oyster Outcome.

Why ORES? "An ecosystem services valuation study that quantifies the value of fish habitat would allow us to effectively communicate the economic benefits of restoration and conservation."

Did You Know?

Researchers from NOAA Cooperative Oxford Lab are using calcein fluorescent dye to make oysters glow! Initial results from a pilot study are promising for application in setting oyster larvae planted directly onto reefs. See image above.

Oyster Reef Ecosystem Services (ORES)

NOAA Chesapeake Bay Office and National Fish and Wildlife Foundation funded a suite of research projects to address the science gap for quantifying the ecosystem services of oyster reefs to communicate their value as fish habitat. The nine projects, nearing completion this year, are grouped under four themes:

- Nutrient Cycling
- Macrofauna Communities
- Fish Communities
- Economic Modeling

For more information on ORES, see David Bruce's overview. A Technical Memorandum summarizing the research is expected in 2020.

Photo: Will Parson / Chesapeake Bay Program

ORES Research Conclusions

Nutrient Cycling—Oysters enhance nutrient cycling processes and remove nitrogen from the water column. Oysters interact with tidal waters, affecting both local hydrodynamics and particle concentrations in proportion to size and density. Denitrification rates from oysters increase three times greater than background levels. See Harris et al. presentation for detail.

Macrofauna Communities—Oysters are ecosystem engineers, creating complex habitat structures for many species of macrofauna. Restored oyster reef habitat supports diverse and productive macrofaunal communities. Reef complexity and greater oyster density leads to enhanced ecosystem services. See Seitz et al. presentation. Reefs provide habitat for more than 50 species of macrofauna, including anemones, bivalves, crustaceans, fish, gastropods, tunicates, and worms. Macrofauna biomass increases with increasing oyster biomass. Reef resident macrofauna species are a significant source of prey for white perch and striped bass predators. See Kellogg et al. presentation on Harris Creek macrofauna and finfish.

Fish Communities—Although "not all restoration sites are created equal," restored reefs provide benefits for foraging and habitat as shelter from predation and support diverse, productive communities, including blue crab and silver perch. Ecosystem services provided by restored oyster reefs vary by material and by structural complexity. See Bruce et al. NOAA research. Restoration of oyster reef habitat significantly enhances resident benthic fishes diversity and abundance, increasing benefits with age and complexity of the reef. See McIninch and McCulloch research presentation. Reefs serve as foraging ground for silver perch, supporting higher trophic levels. Reefs can protect juvenile blue crabs from predation and provide foraging grounds for adult blue crabs. See Seitz et al. presentation. Fish biomass and biodiversity tend to increase as oyster reef habitat quality increases, based on sonar and underwater video surveys. See Ogburn et al. research presentation.

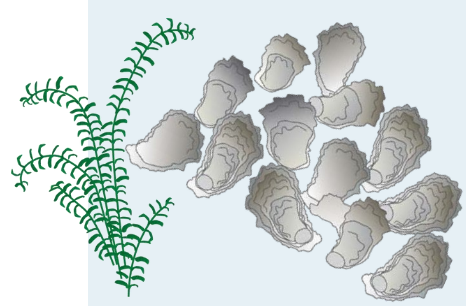
Economic Benefits

A socioeconomic analysis by Knoche et al. estimated that fully mature reefs in the Choptank complex could generate:

- A 160% increase in blue crab harvest
- Increase annual total regional economic impact by $23 million
- 319 annual jobs

Nutrient Removal

Kellogg et al. research on denitrification presented at the December 2018 GIT meeting showed that Harris Creek oysters contribute an estimated $3 million annually in nitrogen and phosphorous reductions.



Microplastic Concerns

Microplastics are an emerging issue for fishery managers to consider, as demonstrated at the microplastics workshop sponsored by the Scientific and Technical Advisory Committee (STAC) of Chesapeake Bay Program.

The Chesapeake Bay Program will form a Plastic Pollution Action Team to begin developing an Ecological Risk Assessment. See Bob Murphy's presentation.

As filter feeders, oysters are vulnerable to the presence of microplastics in the water column. Research is ongoing at the University of Maryland Center for Environmental Science (UMCES) to evaluate impacts of microplastic ingestion to larval oysters in the lab.

Oysters and Water Quality

Researchers at the NOAA Chesapeake Bay Office are using satellite data on total suspended matter as a metric for water clarity to address the question: "Does oyster restoration improve water clarity?"

Analyses suggest that there have been meaningful water quality improvements in the northwest Choptank River over the same time period that oysters have been restored in Harris Creek, and that SAV recovery also plays a role in water clarity.

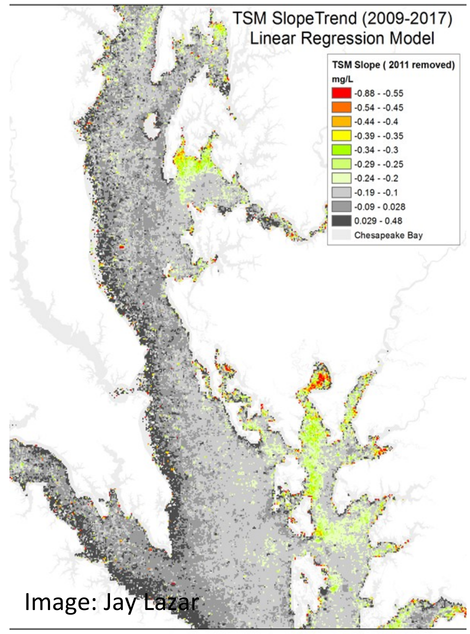


Image: Jay Lazar

Oyster Best Management Practices (BMPs)

The Expert Panel on BMPs for oyster restoration formed to understand and document the considerations associated with nutrient crediting for oyster reefs, and is expected to release a second report detailing their findings on oyster restoration in the upcoming months.

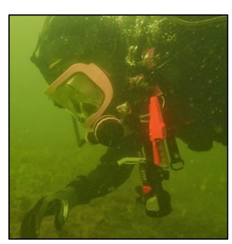
BMPs covered in this report fall under two categories: 1) licensed oyster harvest and 2) oyster reef restoration.

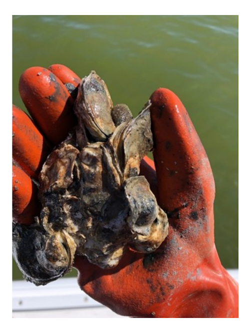
A number of qualifying conditions must be met to implement licensed oyster harvest as a BMP. Based on available science, the panel approved oyster reef restoration practices for interim BMP use (pending approval for crediting). Interim BMPs were presented at the June 2019 GIT meeting.

Approved restoration practices for interim BMP use include calculating nitrogen and phosphorus assimilation in oyster tissue and shell, based on Harris Creek data. Site-specific data are needed to estimate assimilation and enhanced denitrification for BMP crediting, with verification of enhanced denitrification rates.

The Expert Panel has worked hard to balance scientific rigor with feasibility of implementation, and looks forward to Chesapeake Bay Program cross-GIT review and approval of the final report.


Photos: Jeff Cornwell and Ward Slacum





Nearshore Habitat Restoration

The NOAA Chesapeake Bay Office is working to promote nearshore restoration for oyster reefs, intertidal marshes, and SAV habitat in the Middle Peninsula area of Virginia—defined as the York River, Mobjack Bay, and Piankatank River watersheds, and identified as a priority geography in the U.S. Army Corps of Engineers' Comprehensive Plan.

Progress is ongoing on a GIT-funded project to design a living shoreline at Penniman Spit, a site on the York River at Cheatham Annex Naval facility. An update was presented by Rom Lipcius, highlighting considerations to restore the site characterized by high wave energy and high erosion with a sand bottom. When constructed, the Penniman Spit living shoreline is expected to produce benefits by dissipating wave energy, preventing erosion, providing habitat to finfish and benthic fauna, and educating the public in a high-visibility location.

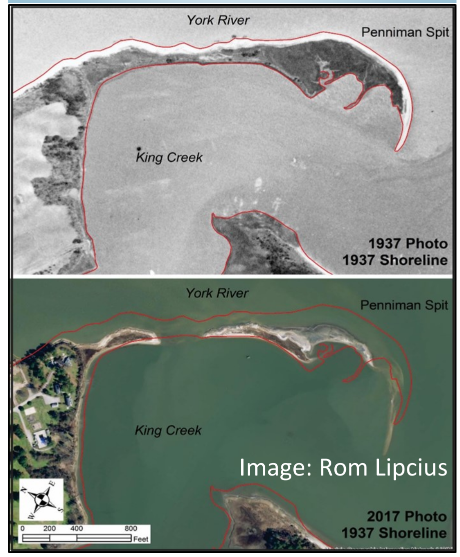


Image: Rom Lipcius

Oyster Outcome—Continually increase finfish and shellfish habitat and water quality benefits from restored oyster populations. Restore native oyster habitat and populations in 10 tributaries by 2025 and ensure their protection.

Climate Change Impacts to Oysters

Julie Reichert-Nguyen, the Climate Resiliency Coordinator, presented the projections for sea level rise, temperature increases, and precipitation increases in the Chesapeake Bay watershed, emphasizing how all factors build together to produce changes in the environment.

Disease pressure in Chesapeake Bay oysters (dermo and MSX) is at a high level of intensity, having implications for oyster abundance, longevity, fecundity, settlement, and recruitment. Under a changing climate, dermo is expected to be abundant in restoration contexts, while aquaculture practices may mitigate disease in wild and restored populations.

The low salinity levels experienced during 2018 and 2019 from above-average precipitation in the Chesapeake Bay watershed affected oyster spatset, disease, mortality, and growth rates.

Maryland reported salinity-driven declines in spatset intensity, and an overall near-average year for mortality, although localized areas experienced devastating mortality rates. For example, mortality rates were up to 100% in the upper Potomac River.

Virginia reported that restoration areas fared relatively well against the low salinity, but oysters had stunted growth rates and experienced around 50% mortality in some areas. Disease was reduced by the low salinity levels.

UMCES Horn Point Lab Oyster Hatchery reported that spat production was down from 1.28 billion spat in 2018 to 197 million spat in 2019. Low salinity was likely a stressor for spawning oysters that adapted by reducing reproductive energy. The hatchery is critical for supplying spat to oyster restoration and aquaculture in MD portions of the Bay.

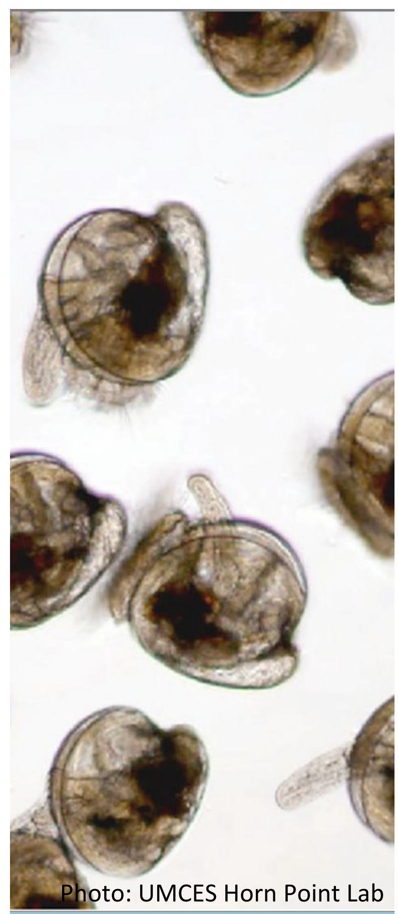


Photo: UMCES Horn Point Lab

Ocean Acidification

Ongoing research at VIMS is examining whether thresholds exist for ocean acidification impacts to oysters, and how oysters and SAV respond to ocean acidification in tandem. SAV may counter decreasing pH levels, while oysters may increase water clarity to benefit SAV, creating potential for corestoration of oysters and SAV to mitigate ocean acidification.

New 2020-2021 Logic and Action Plans

New workplans are being developed for all Fisheries GIT outcomes under the Strategy Review System adaptive management process, outlining actions that the workgroups will take on over the next two years. The Fish Habitat workplan was approved in January 2020. Blue Crab, Forage, and Oyster workplans are expected to be approved by March 2020.

For more information about the Strategic Review System, see Chesapeake Decisions.

Photo: Will Parson / Chesapeake Bay Program

The Sustainable Fisheries Goal Implementation Team (GIT) is composed of state fisheries managers from around the Bay and chaired by the director of the NOAA Chesapeake Bay Office. The Sustainable Fisheries GIT draws together a diverse group of managers and scientists to coordinate and facilitate improved management of blue crab and recovery of oysters, while promoting considerations of fish habitat and forage for key managed species like menhaden, striped bass and alosines. The GIT focuses on advancing ecosystem-based fisheries management by using science to make informed fishery management decisions that cross state boundaries.

Through this approach, the Sustainable Fisheries GIT plays a role in sustainable management and policy decisions for Chesapeake Bay fish populations, which support valuable recreational and commercial fisheries and provide for natural ecosystem function.

Institutions represented on the Sustainable Fisheries GIT include state management agencies, federal agencies, nonprofits and academic institutions. Core members form an Executive Committee that meet once per month. The full GIT membership meets in-person twice per year, typically June and December.

Resources and upcoming events can be found at Chesapeake Bay Program—chesapeakebay.net.

Photo: Leslie Boorhem-Stephenson / Chesapeake Bay Program

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