December 2018 Fisheries GIT Meeting Summary

The Mariners' Museum in Newport News, VA
December 17-18, 2018

Chesapeake Bay Program
Science. Restoration. Partnership.

The Sustainable Fisheries Goal Implementation Team (Fisheries GIT) draws together a diverse group of inter-jurisdictional fishery managers, scientists, and other stakeholders to improve management and recovery of oysters, blue crab, forage fish, and fish habitat in the Chesapeake Bay. The group focuses on advancing ecosystem-based fisheries management by using science to inform sustainable fishery management decisions across state boundaries.

The December 2018 Biannual Meeting focused mainly on progress toward the oyster outcome, including new research results and voting to approve St. Marys River as the ninth tributary selected for restoration. Executive Committee members also voted to endorse cost-effective monitoring methods for oyster restoration, discussed the continued role of Invasive Catfish Task Force (ICTF), and considered next steps following the recent blue crab stock assessment updates.

This summary provides an overview of meeting outcomes and resources.

Key Takeaways

Oyster restoration is progressing and research demonstrates the benefits provided by restored reefs, including improved water quality, increased blue crab productivity, and enhancements to the local economy.

Based on monitoring results thus far, restored reefs are meeting the oyster success metrics. Going forward, standardized monitoring will continue to be a critical part of achieving the oyster outcome.

The Fisheries GIT should share and communicate oyster restoration success stories to the public.

Continued roles for the ICTF could be to communicate research results, coordinate across jurisdictions, and identify multi-stakeholder objectives.

The blue crab stock assessment update shows that existing reference points are still working and that a full benchmark assessment is not needed at this time.

Meeting Topics

Day 1:

- Restoration Progress for Oysters
- Oyster Monitoring Performance
- Benefits of Restored Oyster Reefs
- Remaining Challenges for Oyster Restoration
- Emerging Issues for Oyster Management

Day 2:

- Oyster Stock Assessment Results
- Current Challenges to the Chesapeake Bay
- Forage Fish Outcome
- Invasive Catfish Task Force
- Blue Crab Stock Assessment Update

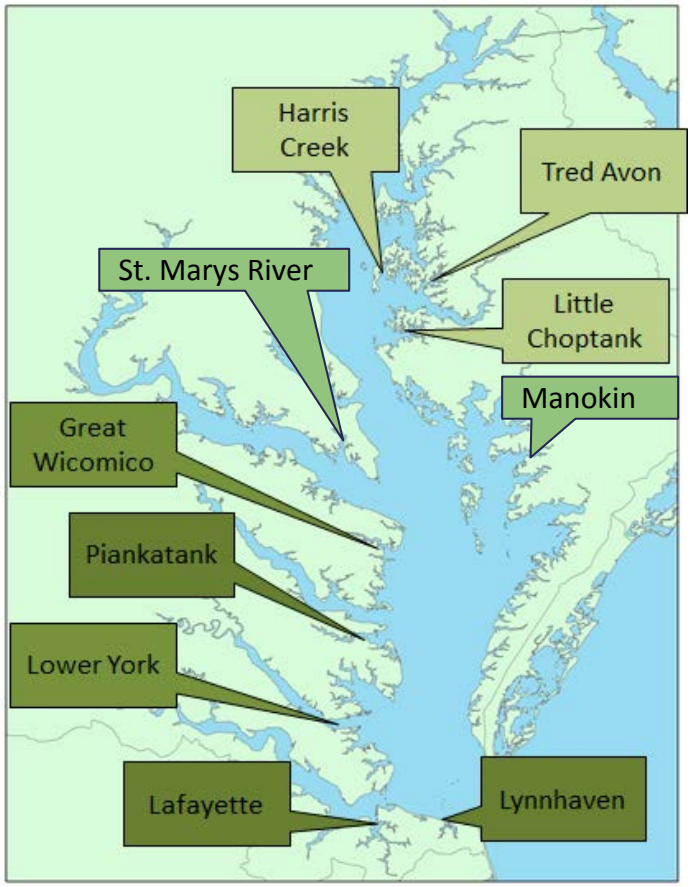
All meeting materials and presentation slides can be found on the Chesapeake Bay Program calendar.

Oysters 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.

Restoration Progress for Oysters

Restoration is progressing toward the outcome

- Nine of ten tributaries are selected.
- Manokin River is being considered as the tenth tributary for restoration, and work is under way to determine suitability.
- Six tributary plans are completed.
- Two tributaries are considered restored (Choptank and Lafayette rivers).



Decision: *St. Marys River endorsed as the ninth tributary selected for restoration under the oyster outcome*

Maryland Highlights

- Harris Creek is the largest oyster sanctuary restoration project in the United States, and is showing positive monitoring results.
  - In Harris Creek, 98% of reefs met minimum threshold oyster density and biomass and 75% met the higher target oyster density and biomass.
- In 2019, work will be completed in Little Choptank with seed-only technique, and continue in Tred Avon with seed for remaining <5 acres.

Virginia Highlights

- Lafayette restoration was completed in 2018 and a coordinated monitoring plan is now being developed.
- Lynnhaven blueprint was finalized in 2018 and restoration continues with funding from National Fish and Wildlife Foundation (NFWF).
- Efforts under way in Piankatank, Great Wicomico, and Lower York rivers are each in different stages of planning and construction .

View Stephanie Westby and Alicia Longalbo's presentation for more detailed information about each tributary's progress.

Restored reefs are evaluated against oyster restoration success metrics to determine if restoration is working. Metrics include oyster density and biomass (minimum threshold and target levels), presence of multiple year classes, and shell budget (stable or increasing). Monitoring is conducted every three and six years after construction, and is evaluated on the reef level.

Monitoring Performance of Restored Reefs

Based on monitoring results from the Choptank complex, restoration is working. We are especially seeing positive results in Harris Creek, the tributary furthest along in restoration progress and first of the ten tributaries considered restored.

- Reefs constructed with alternate substrate have higher oyster average density than other enhanced and non-enhanced reefs.
- Remaining questions:
    - What are the costs of restoration? What resources are needed to complete projects and continue monitoring at three and six year milestones for each tributary?
        - Varies based on what you want to achieve
        - Substrate, partnerships, and location matter

Given the growing costs of long-term monitoring for ten selected tributaries, the Oyster Recovery Partnership (ORP) was commissioned to research new cost-effective monitoring procedures. Monitoring protocols were evaluated for accuracy, precision, and total cost (overhead + patent tong effort + diver effort) using the oyster density metric.

- Monitoring at the budget levels evaluated attained sufficient sample sizes to provide acceptable relative margin of error calculations to estimate oyster density by shifting to a stratified random sampling approach.
- Total sampling per gear type is reduced by at least 30%.
- Monitoring is recommended at reef level with a cap on diver effort.

Decision: *Support the Maryland Workgroup's decision to adopt recommended monitoring methods that reduce sampling costs in the interim*

To review Ward Slacum's monitoring updates and recommendations from ORP research, see presentation slides.

New research shows that oyster restoration provides valuable ecosystem services to the Chesapeake watershed and economic benefits to the local community, including benefits to other fisheries (e.g. blue crabs) and to water quality (nitrogen, phosphorous, and sediment removal). This session demonstrated that there is a need to better communicate benefits from restoration.

Benefits of Restored Reefs

Researchers from Morgan State University's Patuxent Environmental Aquatic Research Lab (PEARL) has developed an ecological trophic model for the Choptank River complex to compare commercial fisheries harvest and regional economic impacts across different management approaches for oysters. Several policy scenarios were compared: 1) young restored reef, 2) mature reef with filter feeders, and 3) no oyster sanctuary with filter feeders remaining. Model results indicated that:

- Mature oyster reefs support increased commercial oyster harvest by 80% and increased blue crab harvest 160% relative to a fished-down scenario.
- Oyster-associated filter feeders matter for fisheries harvest.
- Economic benefits from mature reefs relative to a fished-down scenario are more than $20 million per year for the Choptank area.

A Virginia Institute of Marine Science (VIMS) research team quantified the water quality benefits of tributary-scale oyster reef restoration in Harris Creek, as part of a larger suite of projects assessing oyster reef ecosystem services (see ORES update). Oysters contribute to nutrient cycling of nitrogen (N) and phosphorous (P) through assimilation, denitrification, and burial. A user-friendly web interface was created to allow users to run their own scenarios. Model results showed:

- Other dominant filter feeders, sea squirts and hooked mussels, contribute to average daily filtration, and *Alitta* polychete worm is the best single predictor of N flux.
- The estimated value of Harris Creek nutrient removal (N and P) is more than $3 million per year.

Source: Tom Toles (2013) The Washington Post

Presentations are available for Tom Ihde and Scott Knoche's socioeconomic analysis and Lisa Kellogg's research on water quality. Both projects are a part of research on Oyster Reef Ecosystem Services (ORES).

Remaining Challenges for Oyster Restoration in 10 Tributaries

A discussion of lessons learned through oyster restoration was guided by representatives from Maryland and Virginia. Their presentations provided a chance to reflect on progress made and consider potential challenges to meeting the oyster outcome by 2025. This session will inform the Fisheries GIT's adaptive management process through the Chesapeake Bay Program.

Maryland

represented by Dave Blazer from Maryland Department of Natural Resources

- Goal is to balance interests of restoration, public fishery, and aquaculture
- Spread out sanctuaries to form a network, with science-based selection of areas for restoration, and considering alternative substrate use
- Need for communication across interest groups to address challenges and highlight successes and benefits to justify costs of restoration

Virginia

represented by Andrew Button from Virginia Marine Resources Commission

- Large-scale restoration provides dual benefits for stakeholders within and outside the restored tributary
- Need to identify opportunities for reducing costs and leverage funding
- Having scalable options with projects ranging in cost is important to continue moving forward when funding is variable
- Keep in mind alternative substrates and monitoring costs

Discussion focused on the overarching need to communicate effectively to public audiences and ways that the GIT can support oyster restoration, including highlighting science to get the message out that restoration works, leveraging funding, and monitoring.

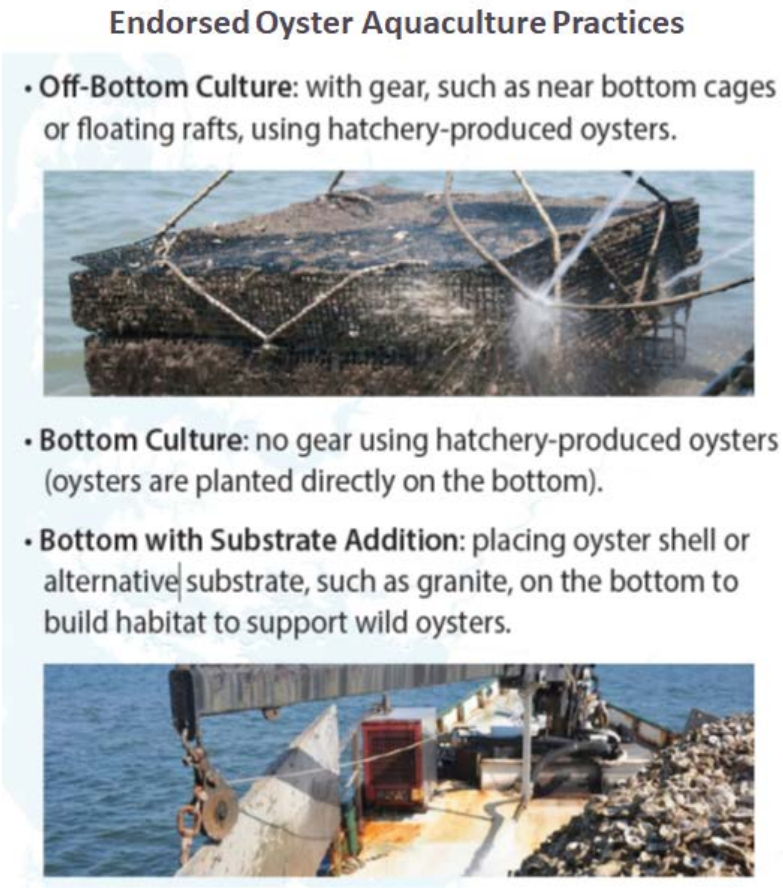
See Maryland and Virginia presentations on lessons learned.

Emerging Issues for Oyster Management

Jeff Cornwell from the University of Maryland's Center for Environmental Science (UMCES) presented on behalf of the Oyster Best Management Practices (BMP) Expert Panel to share progress toward a second report, building on the panel's first report decision framework to evaluate nutrient and suspended sediment reduction effectiveness of oyster practices. The Expert Panel was charged with determining nutrient and suspended sediment reduction effectiveness for oyster BMPs using available science. The report will include recommendations on the practice-protocol combinations where there are knowledge gaps, including:

- N and P assimilation in shell of harvested oysters from private oyster aquaculture and licensed public harvest practices
- N reduction via enhanced denitrification associated with oysters for private oyster aquaculture and licensed public harvest practices

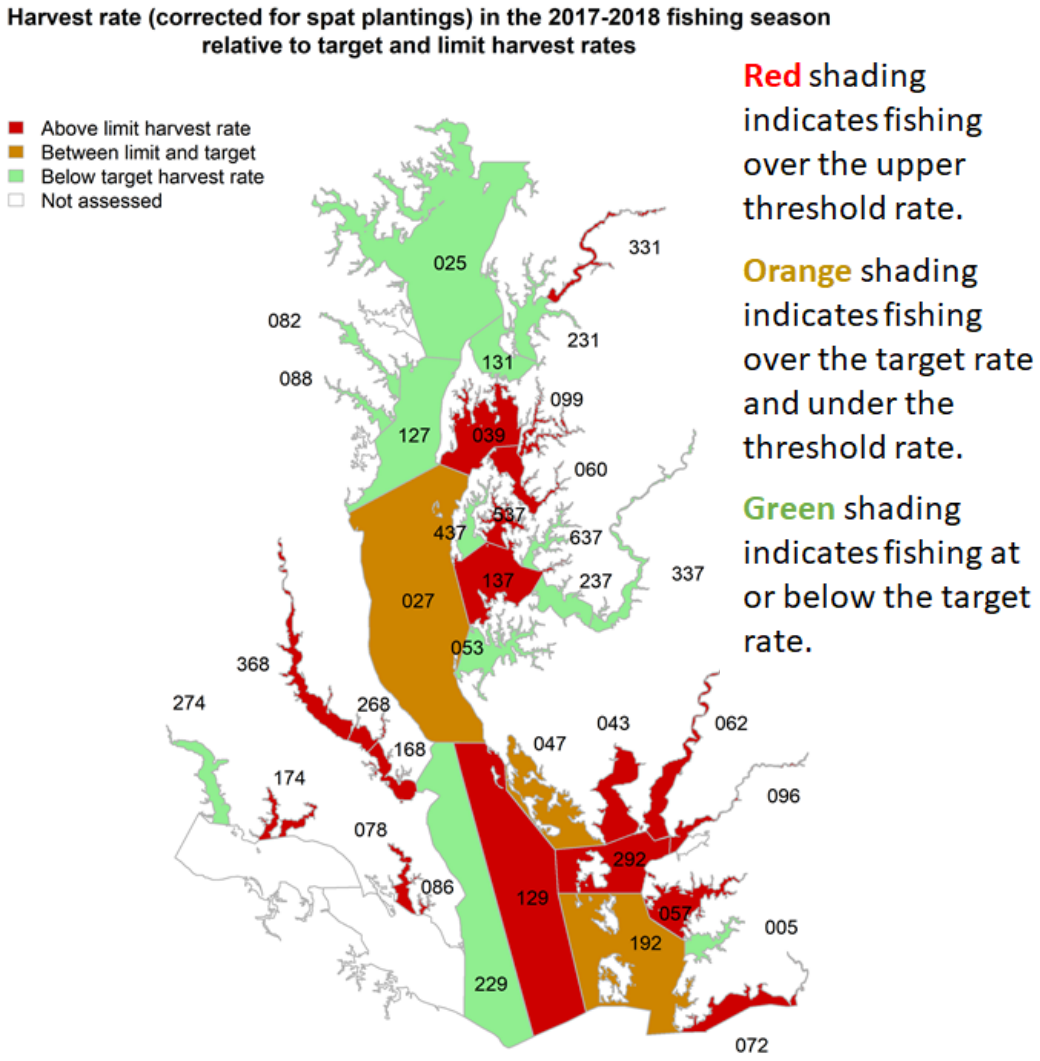
A final report will be presented for CBP approval by June 2019.



The figure above shows private oyster aquaculture BMPs that were approved by the Chesapeake Bay Program in 2016, providing estimates for the amount of N and P stored in oyster tissue for various sized harvested oysters from private oyster aquaculture practices.

View Jeff Cornwell's presentation for more detailed information about the second oyster BMP report.

Maryland Oyster Stock Assessment Results



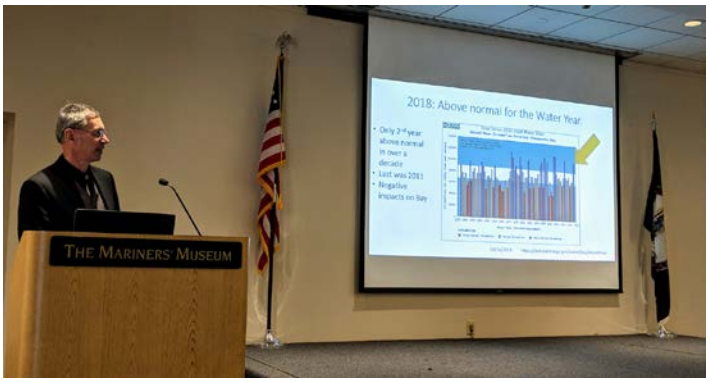
The first state-wide oyster stock assessment in Maryland was commissioned by Maryland Department of Natural Resources and recently released by UMCES researchers. The analyses used maximum sustainable yield to develop biological reference points (target and threshold fishing rates) for 36 NOAA code areas grouped into six regions. Based on biological reference points, the team was then tasked with identifying management strategies to achieve a sustainable oyster population and fishery.

- Spatial differences were observed in mortality rates.
- Majority of NOAA code areas were estimated over threshold fishing rate.
    - If conditions remain the same, population levels will remain low.
- Aquaculture oysters are a small portion (3% of overall population estimate in Maryland), but on sanctuary bars 18% to 30% oysters are from hatchery seed sources planted at restoration sites.

This session emphasized the need for long-term planning for Chesapeake Bay oysters, with a balance between fishery harvest, aquaculture, and ecological health. Understanding of spatial connectivity between regions, and how much restoration in one area contributes to population growth Bay-wide, is limited.

See Mike Wilberg's presentation for more detail.

Current Challenges to the Chesapeake Bay

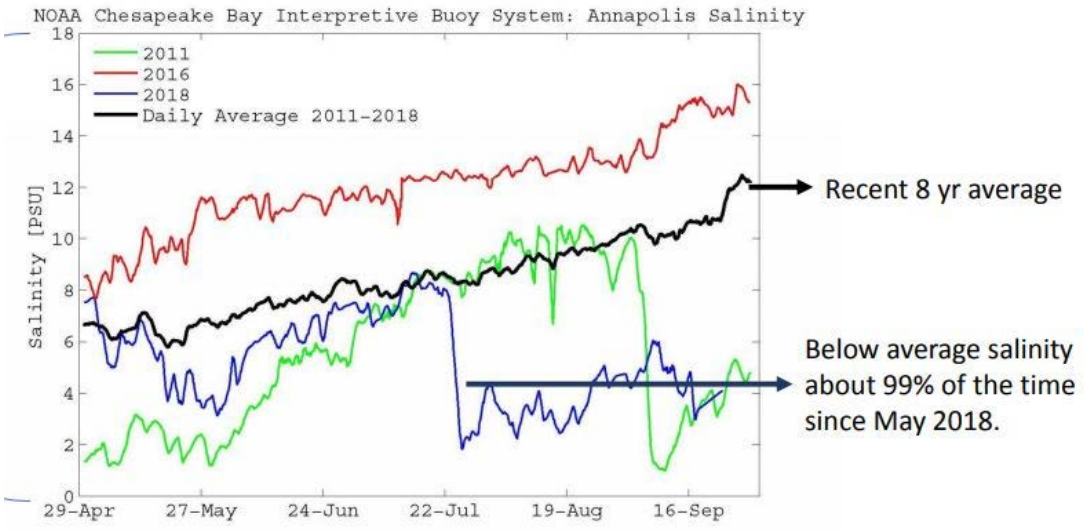


Peter Tango presenting at the Mariner's Museum on Precipitation Impacts to Chesapeake Bay Fish and Habitats

Precipitation over 2018, particularly in the summer months, was unusually high for the Chesapeake Bay watershed. River flows were above normal levels from May through October, with monthly flow records in August, September, and November. In the Susquehanna River, the greatest July and November river flows on record were observed. The volume of debris seen at Conowingo Dam was the largest in 20 years.

Considering a time series of streamflow, 2018 was only the second year above normal levels in over a decade. In previous high-flow years, more nutrients and sediments were delivered to the Bay, which typically leads to lower dissolved oxygen levels. However, we do not yet know how recently approved Best Management Practices (BMP) may have affected conditions in 2018. In fact, wind-driven mixing may have reduced hypoxia to average levels for this year. Additionally, the large influx of freshwater reduced salinity throughout much of the Chesapeake Bay, as measured by the NOAA Chesapeake Bay Interpretive Buoy System (see figure below).

Based on early observations and past high-flow events, impacts to fisheries could include loss of SAV beds, oyster mortality but reduced disease prevalence, reduced growth of oysters, blue crabs migrating further south, finfish moving to stay within salinity ranges, and expansion of invasive blue catfish distribution into mainstem regions of the Bay.



To learn more, see Peter Tango's presentation.

Forage Fish Outcome: Continually improve the Partnership's capacity to understand the role of forage fish populations in the Chesapeake Bay.

Forage Fish Outcome

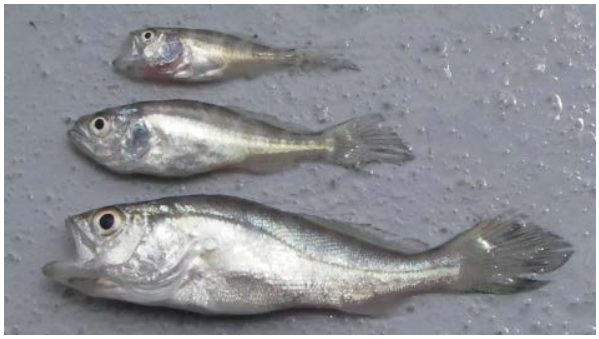
Two research teams at the Virginia Institute of Marine Science (VIMS) are determining a shoreline development threshold at which forage species will be negatively impacted. A Bay-wide approach led by Dr. Rochelle Seitz involves a meta-analysis of datasets from 39 subestuaries throughout the Chesapeake Bay. The researchers will test the following hypotheses:

- Shoreline impacts will interact with upland development impacts.
- Some forage species (e.g., those linked to shoreline) will show threshold responses, declining with shoreline hardening.
- Forage species not closely related to shoreline (e.g., free-swimming fishes) may respond positively to developed shorelines.
- Non-linear relationships will occur.

Previous studies used linear regressions to describe the relationship of species like blue crab, spot, and croaker to hardened shorelines. The new analysis will explore nonlinear curves and incorporate additional datasets.

An estuary-level approach focusing on the York River watershed and led by Dr. Troy Tuckey will develop metrics of upland and shorescape condition to evaluate the effects of armored shorescapes and land use on forage species using relative abundance, size, and community composition as measures of forage quality. The study will also identify threshold values of the shorescape metrics above which forage quality is compromised and compare outcomes of this approach with those of Seitz et al. Using data from the VIMS Juvenile Striped Bass Seine Survey and the VIMS Juvenile Fish Trawl Survey, researchers will take a temporal perspective.

For more information, see Troy Tuckey's presentation and Rochelle Seitz's presentation.



Sara Coleman presented on progress made toward a forage indicator following a May 2018 discussion. Members of the Forage Action Team have determined that considering abundance of finfish species like bay anchovy, spot, and weakfish, as well as invertebrates such as polychaetes and amphipods, will give managers a comprehensive view of food available to key predators. Based on previous studies by researchers at UMCES, a simplified indicator using existing data sources can be used to describe the forage base on an annual basis. Discussion following the presentation raised many important points, including what management actions may be linked to an indicator and the need to include invertebrates from a variety of habitat types in the metric.

For more information on developing a forage indicator, view Sara Coleman's presentation.

Invasive Catfish Task Force

Photo Credit: Virginia Sea Grant

Bruce Vogt gave an overview of progress of the Invasive Catfish Task Force (ICTF) since it was established in 2014. The recent release of two reports provided an opportunity for the Fisheries GIT to reassess its approach on this topic.

- Updated recommendations in 2014 Invasive Catfish Task Force Report
- 2017 Invasive Catfish Symposium Report

Blue and flathead catfish have greatly expanded in population size and range since their introductions in the 1960s-70s. The original charge to the ICTF was to recommend science, management and communication actions all jurisdictions could take to reduce the spread and ecological impacts of blue and flathead catfish. Only a few recommendations have been implemented. Competing interests among stakeholders (commercial industry, recreational fishery, and conservation) have been identified but not addressed, further limiting application of the recommendations consistently across the jurisdictions. In a November 2018 letter to the Fisheries GIT Executive Committee, the ICTF concluded that without clearly defined outcomes developed by managers and stakeholders, forward progress would continue to be limited. The ICTF suggested development of an interjurisdictional fishery management plan to define these outcomes. The Fisheries GIT Executive Committee and broader membership do not support development of a fishery management plan at this time but do agree the ICTF has fostered collaboration and should continue to play an information exchange and coordination role. The ICTF will work with the Executive Committee to modify its current role and modify its membership accordingly.

Decision: *Maintain the Invasive Catfish Task Force with updated role and objectives*

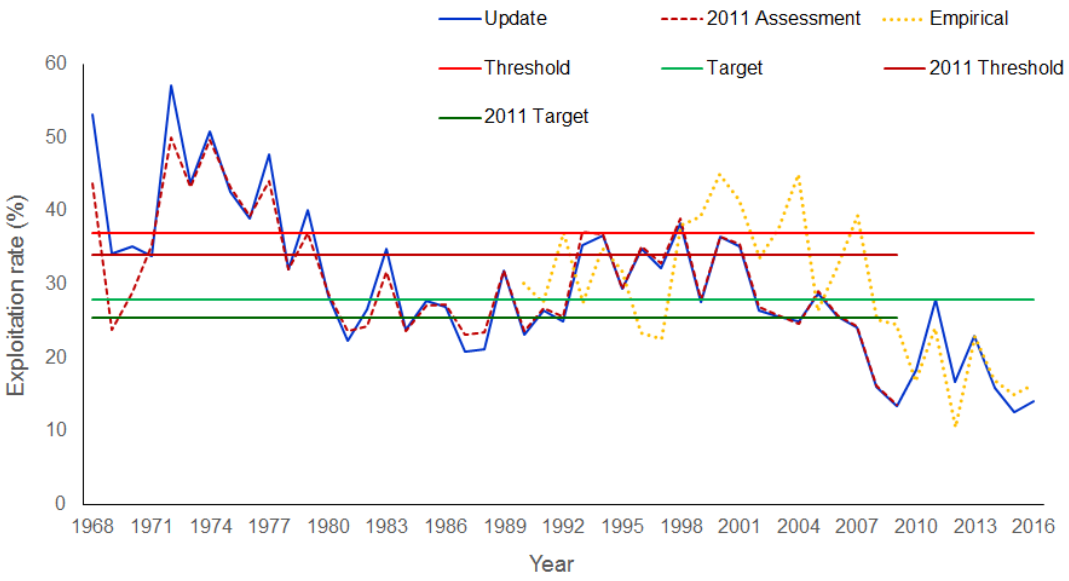
For more information, see Bruce Vogt's presentation.

Blue Crab Abundance Outcome: Maintain a sustainable blue crab population based on the current 2012 target of 215 million adult females. Refine population targets through 2025 based on best available science.

Blue Crab Stock Assessment Update

Lynn Fegley presented the results of a blue crab stock assessment update, which utilized the model developed by Miller et al. in 2011 and incorporated new datasets through 2017. Sensitivity runs were used to understand the stability of the model, but had minimal effect on model estimates of reference points and stock status. The model fit was improved by adjusting some parameters, for example increasing the female fraction at age 0 from the observed 0.52 to 0.6, setting M higher for males than females, and setting gear efficiency to 0.2 (average for all vessels over the time series.) Results of the stock assessment update concluded that a benchmark stock assessment is not urgently needed because:

- No new information on crab life history or new integrated analyses that would prompt a benchmark have emerged
- Adding new data in the update had little impact to estimates of reference points or to stock status
- The current management framework is effective



Decision: *No benchmark stock assessment is needed at this time*

Photo Credit: Chesapeake Bay Program

For more information on the blue crab stock assessment update, see Lynn Fegley's presentation.

Fisheries GIT Updates

RFPs for GIT-Funded Projects are open through February 14, 2019! This year, the Fisheries GIT is supporting three cross-GIT collaborative projects:

- An ecosystem approach to living shorelines project design
- Support for Inventory & Evaluation of Environmental and Biological Response Data for Fish Habitat Assessment
- Pilot a cost-effective, real-time dissolved oxygen vertical monitoring system for characterizing mainstem Chesapeake Bay hypoxia

Information for potential bidders can be found at the Chesapeake Bay Trust.

The Chesapeake Bay Program is currently working across all GITs, STAC, and the Scientific, Technical Assessment and Reporting (STAR) team to prioritize science needs that have been recorded from the SRS process. High-priority science needs will be brought to Management Board to seek opportunities for leveraging resources of the partnership toward filling gaps in knowledge that are critical to achieving Chesapeake Bay Program outcomes.

Executive Committee members will continue regular monthly meetings, scheduled for the following dates:

- February 25
- March 25
- April 22
- May 20

Meeting materials and notes will be posted on the Chesapeake Bay Program calendar. Please reach out to Fisheries GIT leadership for more information about any topics discussed at these meetings.

As a reminder, the Fisheries GIT will undergo the Chesapeake Bay Program's Strategic Review System (SRS) adaptive management process in 2019. We will incorporate feedback from this meeting and continue gathering input from the Fisheries GIT.

THANK YOU to presenters, attendees, and GIT members for your active engagement during this meeting!

Important Dates

February 14, 2019 - RFPs closed for GIT-Funded projects

February 22, 2019 - STAC workshop proposals due

March 13-14, 2019 - SRS Biennial Meeting in Richmond, VA

March to April - SRS preparation for Fish Habitat outcome

May 9, 2019 - present SRS Fish Habitat outcome to Management Board

June to July - SRS preparation for Oyster, Blue Crab, and Forage outcomes

August 15 - present SRS Oyster, Blue Crab, and Forage outcomes to Management Board