Forage Action Team Meeting Minutes
February 16, 2017; 2:00 pm to 4:00 pm
http://www.chesapeakebay.net/calendar/event/24883/

Participants

Alexis Park	Bruce Vogt	Charlie Poukish	Ed Houde
Emilie Franke	Geoff Smith	Jim Uphoff	Kara Skipper
Katie May Laumann	Mary Fabrizio	Nancy Butowski	Peter Tango
Ryan Woodland	Tom Ihde		

Background

Forage Action Team Role

The Forage Action Team is responsible for advancing the Forage Outcome under the Chesapeake Bay Program to "Continually improve the Partnership's capacity to understand the role of forage fish populations in the Chesapeake Bay. By 2016, develop a strategy for assessing the forage fish base available as food for predatory species in the Chesapeake Bay."

Recent Activity

- The University of Maryland Center for Environmental Science Chesapeake Biological Laboratory (UMCES-CBL) developed a report on forage indicators and predator consumption profiles in the Chesapeake Bay.
- The Forage Action Team convened quarterly meetings in June 2016 and September 2016.
- Chesapeake Bay Program developed and produced a video on forage in the Chesapeake Bay.
- Collaborating with an undergraduate student to test forage sampling gear in different habitats.
- Working with the Habitat Goal Implementation Team (GIT) to develop a pilot study to determine if forage monitoring can be incorporated into citizen monitoring of submerged aquatic vegetation (SAV).
- Provided public comment support the Mid-Atlantic Fishery Management Council (MAFMC) forage amendment.

Click the image above to see the forage video produced by the Chesapeake Bay Program and narrated by forage expert Dr. Ed Houde.

February 16th Meeting Goals

- To learn about Maryland Department of Natural Resources' (MD DNR) work on developing indicators for major forage status and well-being of striped bass in Maryland's portion of the Chesapeake Bay.
- To learn about the analysis and preliminary results of the GIT-funded study investigating drivers of forage population trends and consumption patterns through an evaluation of environmental, spatial and temporal patterns in Chesapeake Bay forage population distributions and predator consumption.
- To establish and approve a strategy for the Forage Action Team that pulls together our foundational science, priorities and efforts.

Drivers of forage population trends and consumption patterns: Environmental, spatial and temporal patterns in Chesapeake Bay forage population distributions and predator Consumption – Ryan Woodland and Ed Houde (UMCES-CBL)

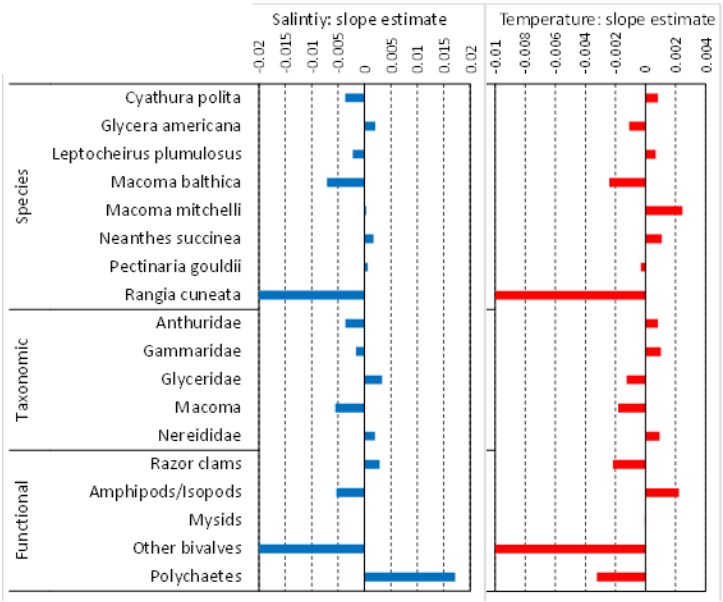
Project Goals

Objective 1 – Identify environmental gradients associated with spatial and temporal patters in relative abundance of forage taxa in Chesapeake Bay

Objective 2 – Explain how spatial and temporal gradients in environmental variables control consumption of forage taxa and quantify the effect of forage abundance on consumer populations

Preliminary results are derived from generalized linear models, generalized additive models, and dynamic factor analysis to evaluate forage and predators at spatial scales and areas of interest. Forage evaluated in the study include amphipods, isopods, young-of-year fish, menhaden, silversides, and anchovy. Consumers of interest include croaker, spot, white perch, striped bass, summer flounder.

Preliminary results for invertebrates suggest that local densities of major forage groups are influenced by dissolved oxygen availability and temperature. Groups such as *Macoma* spp., razor clams and polychaetes show negative relationships with temperature. A positive relationship with water column DO was observed in all functional groups. Additional results and information are available in Ryan's presentation.



Forage-environment analysis for invertebrates

Discussion:

Clarifications:

- The completed version of the study will include regional model runs and the results can be used to note how these variables drive forage populations trends.
- The Chlorophyll *a* time frame was determined using measurements taken from February to May from water monitoring stations in each month and year to estimate annual mean chlorophyll levels (Spring chlorophyll bloom)
- Chlorophyll levels were previously studied by UMCES for menhaden and were a driving force for menhaden populations
- To determine connection between prey response and predators, we will look at density dependent analyses to see how it relates to the Chesapeake Bay forage.

Recommendations:

- Forage members suggested that researchers should consult with benthic ecologists, Rochelle Seitz and Lisa Kellogg if possible.

- Forage members suggested developing a graphic that relays how these dynamics play together for communications to the CBP
- The Forage Action Team and researchers should have more interactions with the habitat groups in the Chesapeake Bay for better application of these study results (both for this and the previous UMCES study)

Actions:

- Share slides and research findings with the Habitat GIT and relevant workgroups to make interactions happen. Ryan will send updated slides to Kara for distribution.
- Ryan and his team will continue analysis and provide presentations at the June 2017 Sustainable Fisheries GIT meeting, the American Fisheries Society Tidewater meeting, and at the Coastal and Estuarine Research Federation conference.

Indicators of Major Forage Status and Well-Being of Striped Bass in Maryland's portion of Chesapeake Bay – Jim Uphoff (MD DNR)

Striped Bass Indicator Need and Development

Maryland's work focuses on resident striped bass and its forage as an indicator. Menhaden consumption by striped bass has seen increased demand in more recent years. Weight drops, emaciation, lesions and disease were observed in striped bass following the moratorium. Scientists developed several potential hypotheses: 1) the increase in bass limits forage, 2) the environment (pollution, climate, etc.) limits forage, 3) pollution results in reduces striped bass well-being or 4) no issue exists. The first two hypotheses suggest forage would be the main driver regardless of top-down or bottom-up approach.

Maryland's data draws from several indices to determine what forage is being eaten, quantify the amount of forage to sustain healthy striped bass, and identify or develop monitoring programs which can be used to inexpensively evaluate forage for striped bass.

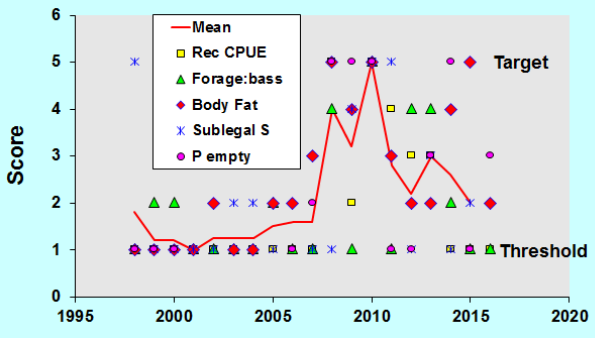
Through data analysis, targets and thresholds for the proposed indices were developed (at right) along with the mean scores for each year. Each indicator was scored according to its proximity to the threshold or target (1 = at threshold, 2 = near threshold, 3 = avoids threshold, 4 = approach target, 5 = at target). Further information on the individual indices can be found in Jim Uphoff's presentation.

These indicators both demonstrate and quantify local forage issues for stakeholders in the Chesapeake Bay and aid in the decision-making process. However, there are limitations to this approach.

Targets and thresholds based on time period means
Empty guts data missing 2001-2005

Index	Time-series	Target	Threshold
Bass abundance	1981-2015	2008-2010	1998-2004
Major forage-to-bass	1983-2015	1983-1993	1996-2004
Empty stomachs	1998-2015*	2008-2010	1998-2000
Body fat	1998-2015	1990 (Jacobs)	1998-2004
Age 3 relative survival	1985-2015	1985-1995	1996-2004

Mean forage score based on targets and thresholds; maximum = 5
Summarizes all indices status



Discussion:

Clarifications:

- Body fat was quantified through visual observations. Four classes are distinguished based on how much of the internal organs are covered.
- Maryland DNR is interested in using this data, but has not implemented it into their management at this time. However it has received positive reception.

Recommendations:

- Jim Uphoff and Katie May Laumann should discuss how this approach could be extended to include Virginia data to allow for a Bay-wide analysis.
    - Katie requested guidance on how this approach could be applied in Virginia.

Actions:

- Jim and Katie will discuss the striped bass indicator approach and potential development in Virginia.
- Jim and Katie will provide a recap of their conversation on incorporating Virginia data at our next Forage Action Team meeting.

Forage Strategy – Emilie Franke (NOAA/ERT)

The Forage Outcome states that we will develop a strategy for assessing the forage fish base available as food for predatory species in the Chesapeake Bay. The Sustainable Fisheries Goal Implementation Team members emphasized the need to utilize past reports/data analysis/indicator options, background information, and our next steps into this strategy.

Emilie designed a strategy which will function as a framework for our approach and future efforts. This strategy can be applied to multiple species, will be adaptive in nature, and is designed to translate the Forage Team's work into communication and recommendations to managers.

Discussion:

Clarifications:

- The strategy should emphasize that foundational science is a necessary component that will need to be frequently revisited and expanded.
- Proposed strategy structure needs to be altered to allow for adaptive management.

Recommendations:

- Incorporate management input into the structure; need to ensure managers are engaged in discussions.
    - Consider if facilitated workshops would be effective to discuss management objectives and priorities
- Identify most important water quality parameters or data that is needed. Use this structure to close those data gaps.
    - Use Denise Breitberg's synthesis of nutrient levels and fish production.
- Request three questions from managers to guide conversations moving forward.
    - Specify whether we are looking at a top-down or bottom-up approach or both.

Actions:

- Emilie will revise the strategy to clarify language and incorporate adaptive management into the strategy structure. (Proposed Revised version is above)