Forage Action Team Meeting Minutes
July 30, 2020 10:00am – 12:00pm

Participants:

Peter Himchak	Troy Tuckey	Ed Houde	Shalom Fadullon
Tom Ihde	Ryan Woodland	Bruce Vogt	Mandy Bromilow
Chris Moore	Angie Wei	Marty Gary	
Somers Smott	Katie Lankowicz	Julie Reichert-Nguyen	
Rochelle Seitz	Jim Uphoff	Brooke Goggins	

- **Forage Indicator Development Plan**
  - NCBO's summer intern, Brooke Goggins, presented a draft document outlining the FAT's previous efforts and future plans for indicator development.
    - Members of the FAT have made significant progress in conducting research that can inform forage indicators; there are enough data to start developing an initial suite of indicators
    - A tiered forage indicator framework was developed
      - Tier 1: Time series of forage abundance – least complex
        - Benthic invertebrates (polychaetes)
        - Pelagic finfish (bay anchovy)
        - Structure-dependent finfish (Atlantic croaker)
      - Tier 2: Times series/status of environmental factors that affect forage abundance – more complex
        - Availability of suitable habitat (bay anchovy)
        - Springtime warming (bay anchovy)
        - Percent hardened shoreline (blue crabs, forage fish)
      - Tier 3: Time series of predator consumption – most complex
        - Diet profiles of key predators (striped bass)
      - Focal species for the initial suite of indicators were determined based on management interest, importance as prey, and data availability
    - Ideally post indicators on Chesapeake Progress and provide updates to the Fish GIT and other interested parties as needed
    - Next steps:
      - Continue working with CBP's GIS team to develop map of hardened shorelines
      - NCBO will develop abundance indicators for benthic and finfish prey species
      - Fish GIT submitted forage project for FY20 GIT funding to develop climate (springtime warming) indicators
  - Discussion
    - General agreement among participants that this is a good plan for indicator development and the focal species seem appropriate
      - Plan to develop additional indicators for other species in the future to improve assessment of forage status in the Bay
    - Fabrizio et al. habitat suitability model is on track to finish this fall and excited to present and apply the results
    - How will the map of shoreline condition be used as an indicator?
      - Creating a map with a GIS layer that will identify areas where the percent hardened shoreline threshold determined by Seitz et al. (30%) is exceeded to inform planning and management

- Climate Resiliency Workgroup is developing climate indicators focused on Bay temperature; should stay in touch on development of environmental forage indicators
- Want to use the suite of indicators to tell a story about forage status in the Bay
  - Continuous effort to ensure that indicators get used by management; initial focus will be CBP priorities and then fishery management later
  - Want to get initial suite out and part of conversations within the CBP
- CBF interested in understanding how climate change will affect predator-prey interactions in the future; will be a bigger issue moving forward

- *Action: Provide feedback on the forage indicator development plan to Brooke and Mandy by August 12*

- **Science Informing Forage Indicators**
  - Katie Lankowicz (UMCES) presented her PhD research on using sonar imaging to characterize forage fish distributions in MD tributaries.
    - Information about fine-scale distributions of forage fishes is lacking, particularly in shallow waters
    - Sonar imaging can be used to estimate school characteristics (e.g. density) and supplement traditional survey methods in shallow tributaries
    - Significant interannual variability in school morphology, but have more data to examine before drawing conclusions about the cause
    - More schools were found in creeks compared to channels, and there was greater fish density in the creek schools compared to channel schools
      - Schools appeared to cluster at the heads of creeks in particular
    - Most schools had < 100 fish and were in waters 2-6m deep
    - Next step would be to develop machine learning methods to count fish and cut down on image processing time
  - Discussion:
    - These methods could potentially fill the shallow water monitoring gap
    - Can these methods be applied over structured habitats (e.g. SAV, oysters)?
      - Would be difficult to see fishes in habitats that provide refuge like SAV
      - Could possibly be used to examine fish use of oyster reefs
      - Considering using AUVs to supplement sonar images
    - Need to come up with better effort correction to account for differences in transect length
    - Are environmental parameters (e.g. temperature, salinity) considered when looking at fish density?
      - Higher densities would suggest there is a refuge or preferential conditions but haven't found a biologically significant explanation for the differences between creeks and channels in terms of water quality
    - The sonar images don't provide enough detail to determine species, especially of smaller fish, but can sometimes tell based on schooling behaviors and what's seen at the surface
    - These methods could possibly be used to examine fish habitat use along restored shorelines to measure ecological change as a result of restoration
    - Could also be used to examine co-occurrence of predators and prey at fine scales

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- Angie Wei (CBP) presented the CBP GIS team's efforts in mapping percent armored shoreline along the coast of Chesapeake Bay.
  - Calculated the percentage of armored shoreline per 1 km in VA using VIMS shoreline data
    - Planning similar effort for MD but still determining best data source
      - VIMS shoreline data for MD won't be available until the end of the year
    - This scale is compatible with next generation tidal models
  - 9% of shorelines in VA and 17% of shorelines in MD are armored
  - 24% of shoreline/km is armored on average
    - Curious if scale and map categories are useful to the FAT
- Discussion:
  - Best option for MD shoreline data is to wait for VIMS inventory to be updated; would ensure same methods are used and directly comparable
  - Is the scale of the analysis appropriate given the results of the FAT's forage-shoreline threshold study?
    - Difficult question because sampling was conducted at a finer scale and forage fish move, but probably still useful; these results can also be scaled up to tributary level if needed
  - A condition category of % hardened shoreline < 30% would be useful to the FAT based on the thresholds for several forage species
  - This work would also be of interest to the Wetland Workgroup, particularly in relation to land use
  - Should follow up on providing updates to Management Board, applications beyond the FAT, and determining where this map will live

- **Member Updates**
  - PEARL has 6 citizen scientists sampling on the Magothy River this summer. A new online data entry form is now being used to make the process more self-service. There have been conversations about additional sampling sites around the Bay. Let Tom Ihde know if you are interested in partnering on this effort.
  - SERC is making progress on its summer flounder and striped bass habitat studies despite COVID setbacks. Field sampling and tagging efforts continue, and lab-based diet analyses are expected to pick back up in the fall.
  - Plan on quarterly FAT meetings for indicator and research updates.