Fish GIT Activities: Connections to Climate and Habitat

Justin Shapiro, Fisheries Goal Team Staffer

Considerations When Prioritizing Habitat Restoration for Fish and People

# Impacts on Fish Abundance from Shoreline Hardening

- **2015 NOAA/SERC study:**
  - Looked at 85 sites, quantified influences of shoreline change on ecosystem health. Shoreline development was linked to decline in a number of species.
  - Can we establish thresholds? Leading to...
- **These layers were developed in response to a VIMS GIT-funded study - "Threshold effects of altered shorelines and other stressors on forage species in Chesapeake Bay"**
  - Shoreline hardening of 10-30% (17% mean) as a threshold number for species decline of seven analyzed forage species
  - Juvenile blue crab showed general decline with an increase in shoreline development
- **Additional information:**
  - Final Report: Chesapeake Bay Program Website
  - Project Contacts: Rochelle Seitz, Rom Lipcius, Troy Tuckey, Donna Bilkovic (VIMS)

Products: Mapping Layers for Maryland and Virginia

- **CBP GIS team used shoreline inventory data from VIMS SMM to develop maps**
  - VA: Layers complete (Using 2018 inventory data)
  - MD: Four counties complete
    - **Anne Arundel, Dorchester, Talbot, and Calvert**
    - Layer development near completion for **nine** additional counties
- **Recent Applications**
  - Provided maps to support bay-specific narrative for NOAA's 2021 State of the Ecosystem Report
  - Simple calculations for now: ~12% of VA shorelines are above 30% threshold corresponding to negative impacts on forage
- **Additional information:**
  - Completed layers: Maryland & Virginia
  - GIS Team Contact: Angie Wei (CBPO)
  - VIMS Shoreline Inventory SMM Contact: Karinna Nunez
- In the future:
 - Guiding restoration projects (Ex. Protect areas <10%, restore areas between 10%-30%
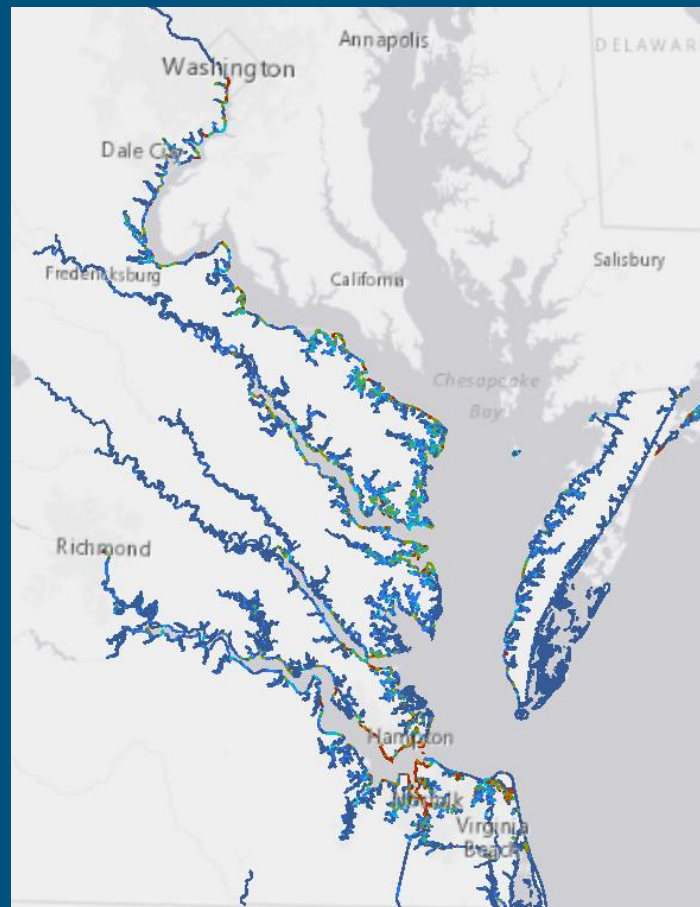
Characterizing Nursery Habitat Use of Juvenile Fishes

- Purpose of study:
  - Understanding the dynamic nature of spatial nursery habitats for managed species - summer flounder and black sea bass
  - Finer scale visualization of "sea scape" dynamics shifting from under climate change
  - **Key for prioritizing restoration strategies**
- Structured habitat use:
  - Explored oyster reef, marsh, sea grass, and soft bottom use in western and eastern shore tributaries and coastal bays
  - Summer flounder relative abundance is highest in marsh habitat, highlighting importance of juvenile fish use when siting marsh projects
  - Juvenile flounder were larger in Choptank system, potentially connected to significant oyster restoration investment

- Thermal conditions:
  - Temperature and salinity were important predictors of fish relative abundance and growth.
  - Temperatures below 25.9 C were established as suitable (SF). Suitable conditions down by more than 50% over last two decades
- Next steps:
  - Coordinating with CRWG to explore how insights gained can be considered for future restoration siting/ranking
- Project contact:
  - Mary Fabrizio & Troy Tuckey, VIMS

Changes in Bay Utilization by Resident Species

- Explores fundamental question of relationship between relative abundance in the bay and coast-wide stocks
- Of eight species investigated (using ~20 years of survey data), most showed declines in bay usage compared to coast-wide
- Declines in bay relative use were coupled with increased utilization of coastal ocean and Delaware Bay. Continued warming temperatures will likely contribute to these continued trends of northward movement
- Project contacts:
  - Adena Schonfeld & Jim Gartland, VIMS
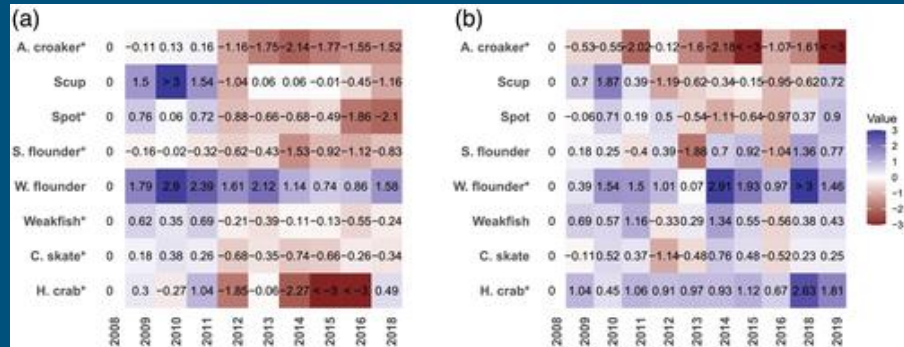
Courtesy of Jim Gartland, VIMS

Ongoing Science and Research: Forage

- Background:
  - Team utilizing 2014 STAC report to prioritize forage species of interest: development plan)
    - Is there enough?
    - How are environmental conditions impacting populations
- Summarizing what we have learned: Forage Status and Trends Report
  - Habitat suitability modeling
  - Springtime warming and climate change implications

Tier 1: Abundance	Species of Interest
Benthic Invertebrates	Polychaetes
Demersal Finfishes	Atlantic croaker
Pelagic Finfishes	Bay anchovy Atlantic menhaden
Tier 2: Habitat and Environmental Factors	**Species of Interest**
Springtime Warming	Bay anchovy Polychaetes
Habitat Suitability Index	Bay anchovy
Hardened Shorelines	Juvenile blue crabs
Tier 3: Predator Consumption	**Species of Interest**
Diet Profiles	Striped bass

Science/Research Needs Continued

- Oyster Restoration Workgroup:
  - Next generation restoration: Coupling restoration with coastal resilience (NOAA funding VIMS project explore viability in Mobjack Bay)
  - Co-location of oysters and SAV
- Fish Habitat Action Team:
  - Collect available data/trends to explore temporal/spatial changes in spawning. Mismatches between these changes and management restrictions
- Chesapeake Bay Stock Assessment Committee:
  - Impacts of marsh/SAV loss on blue crab abundance
 - Oceanic conditions changing at the bay mouth

Bringing this all together

NCBO Seasonal Summaries

- Quarterly reports using existing environmental observational data to craft narratives about impacts on living resources
  - Water temperature/Sea surface temperature anomalies
  - Salinity
  - Flow
- Growing this product in the future…
  - More observational data and insights gained from fisheries research
  - Species-specific risk assessment useful for bay/regional managers
- Perhaps opportunity for climate team to collaborate?
  - Connection to temperature indicator?
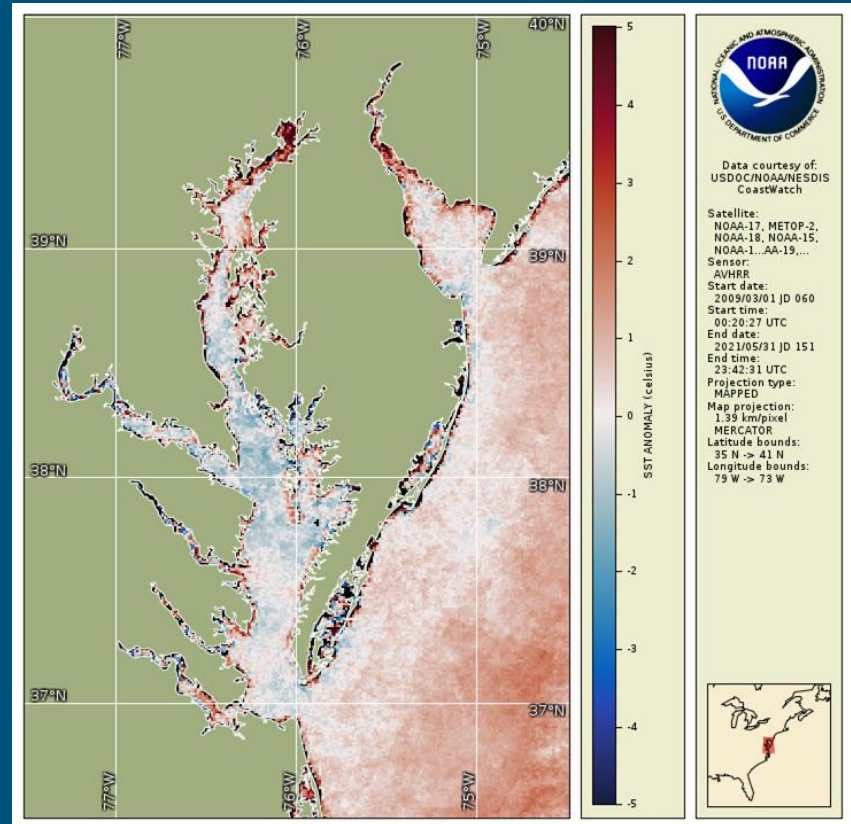
Thank You! Questions? Discussion?

- Team Contacts:
  - Fisheries GIT Coordinator: Bruce Vogt, NCBO
  - Fisheries GIT Staffer: Justin Shapiro, NCBO,CRC
  - Seasonal Summary Lead: Mandy Bromilow, NCBO

- *Research Acknowledgements:*
  - *Karinna Nunez, VIMS*
  - *Angie Wei, CBPO*
  - *Troy Tuckey, VIMS*
  - *Mary Fabrizio, VIMS*
  - *Ryan Woodland, UMCES*
  - *Jim Gartland, VIMS*
  - *Adena Schonfeld, VIMS*
  - *Rob Latour, VIMS*