

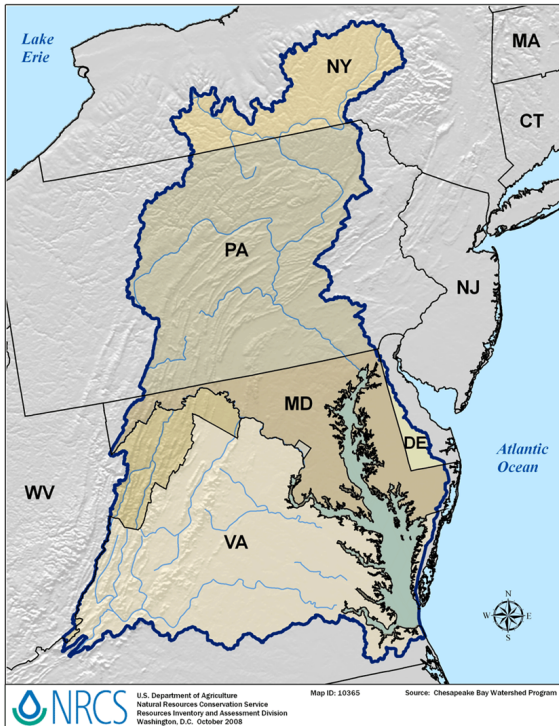
# University of Maryland Center for Environmental Science



Role in Guiding our State and Region in  
Restoring Chesapeake Bay



# Chesapeake Bay is Economically and Culturally Important to Maryland



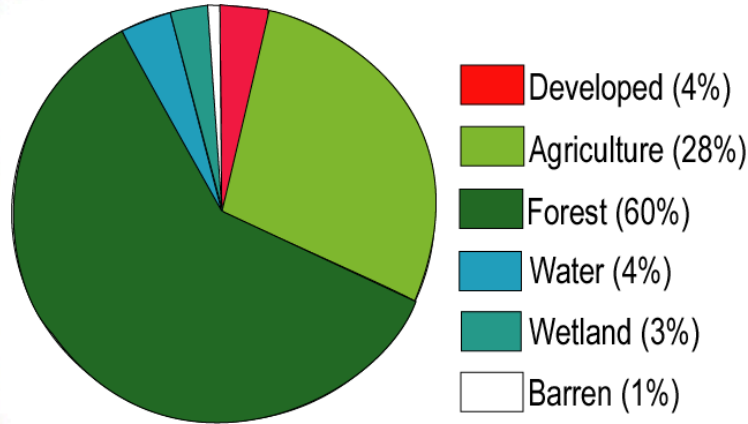
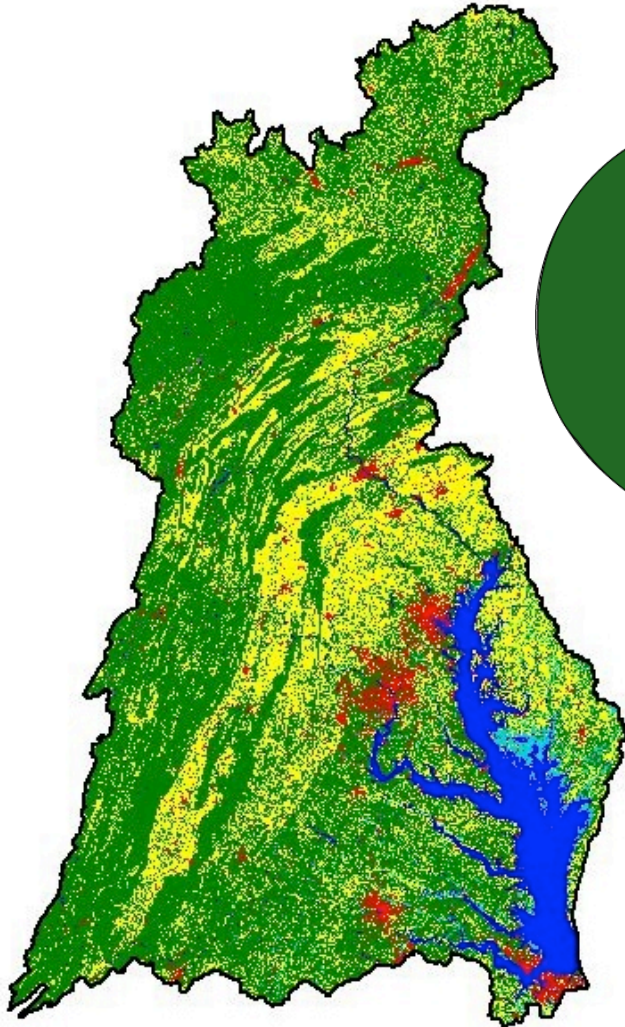
**INVESTMENT:** \$1 of water and sewer infrastructure investment increases private output (Gross Domestic Product) in the long term by \$6.35.

**FISHERIES:** Commercial seafood industry in Maryland and Virginia contributed \$3.39 billion in sales, \$890 million in income, and almost 34,000 jobs to the local economy. (2009 Fisheries Economics of the U.S. report)

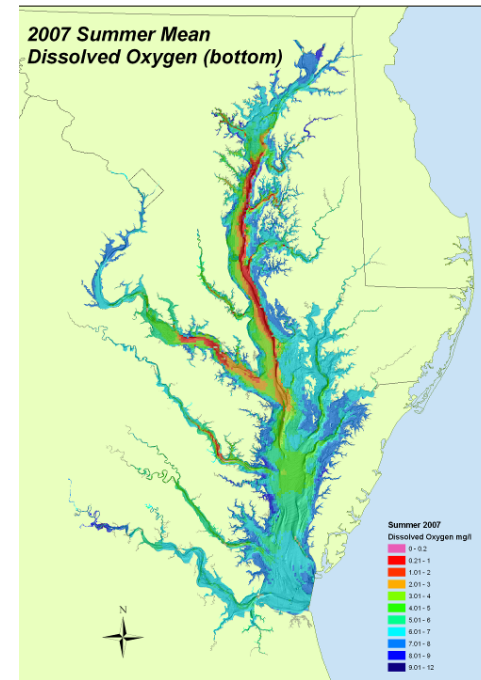
**PROPERTY VALUES:** An EPA study indicated that clean water can increase the value of single family homes up to 4,000 feet from the shoreline by up to 25 percent.



# A Shallow Bay with a Large Watershed



Watershed: 166,000 km<sup>2</sup>  
Ave Depth: 6 m  
Max Depth: 50 m  
Population: 17 million



# Science Advisory Role Written into Legislative Mission

*“The University of Maryland Center for Environmental Science shall conduct a comprehensive program to **develop and apply predictive ecology** for Maryland to the **improvement and preservation of the physical environment**, through a program of research, public service, and education.”*



# Academia's Role in Bay Restoration

- Formal Role:
  - Member of the Maryland's "Governors Chesapeake Bay Cabinet"
  - Serve on Chesapeake Bay Program Science and Technical Advisory Committee
  - Specifically inserted in Maryland Law to Provide Services
- Focus on the Big Challenges
- Apply adaptive management principles
  - Analyze and assess Bay health
  - Provide advice to the management community
  - Identify new problems and challenges
- Remain engaged with restoration programs for the long-term
- Provide advice to emerging challenges in a timely manner



# UMCES Science Advisory Role Written into Legislation

- President is a member of the **Governor's Chesapeake Bay Cabinet**
- President is member of the **Maryland Commission on Climate Change**
- President is member of the **CoastSmart Council**
- UMCES must develop **Sea Level Rise** projections every five years
- UMCES was tasked with developing an **Oyster Stock Assessment** with the resource agency



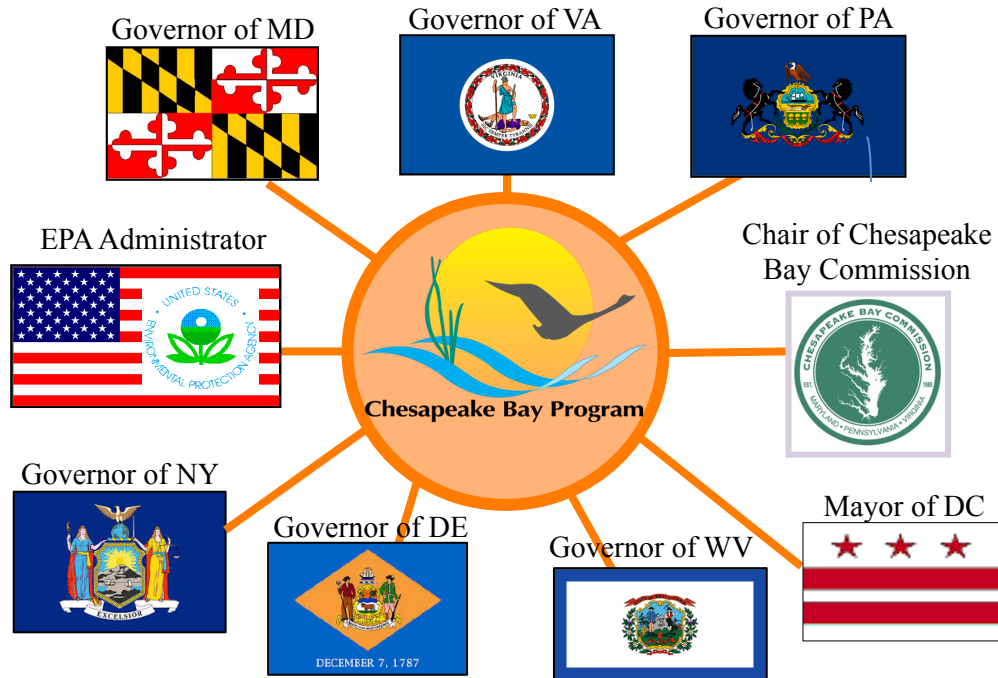
# Academia's Role in Bay Governance

## Maryland's Chesapeake Bay Cabinet



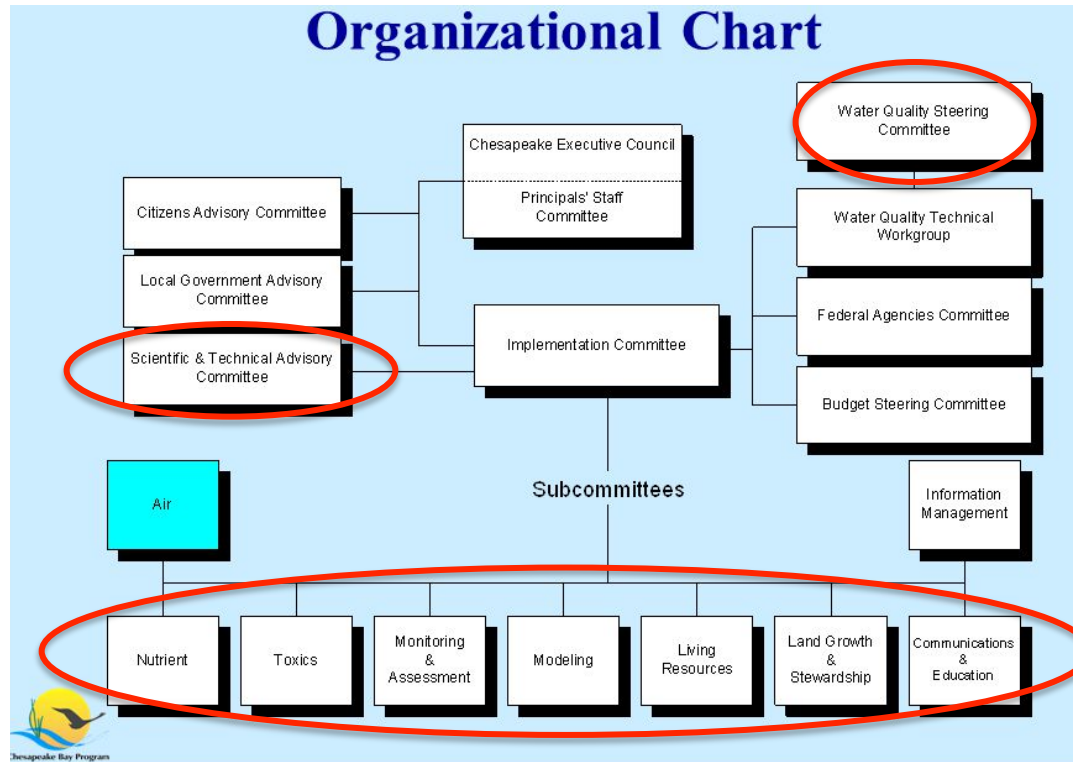
- Advises Governor of Maryland
- Focused Upon:
  - Restoration Progress, New Policies, Interagency Coordination
  - Emerging Issues
  - Communication Challenges
  - Meets every 6-8 weeks
  - Subcabinet Group (Bay Workgroup) meet at least monthly

# Chesapeake Bay Program





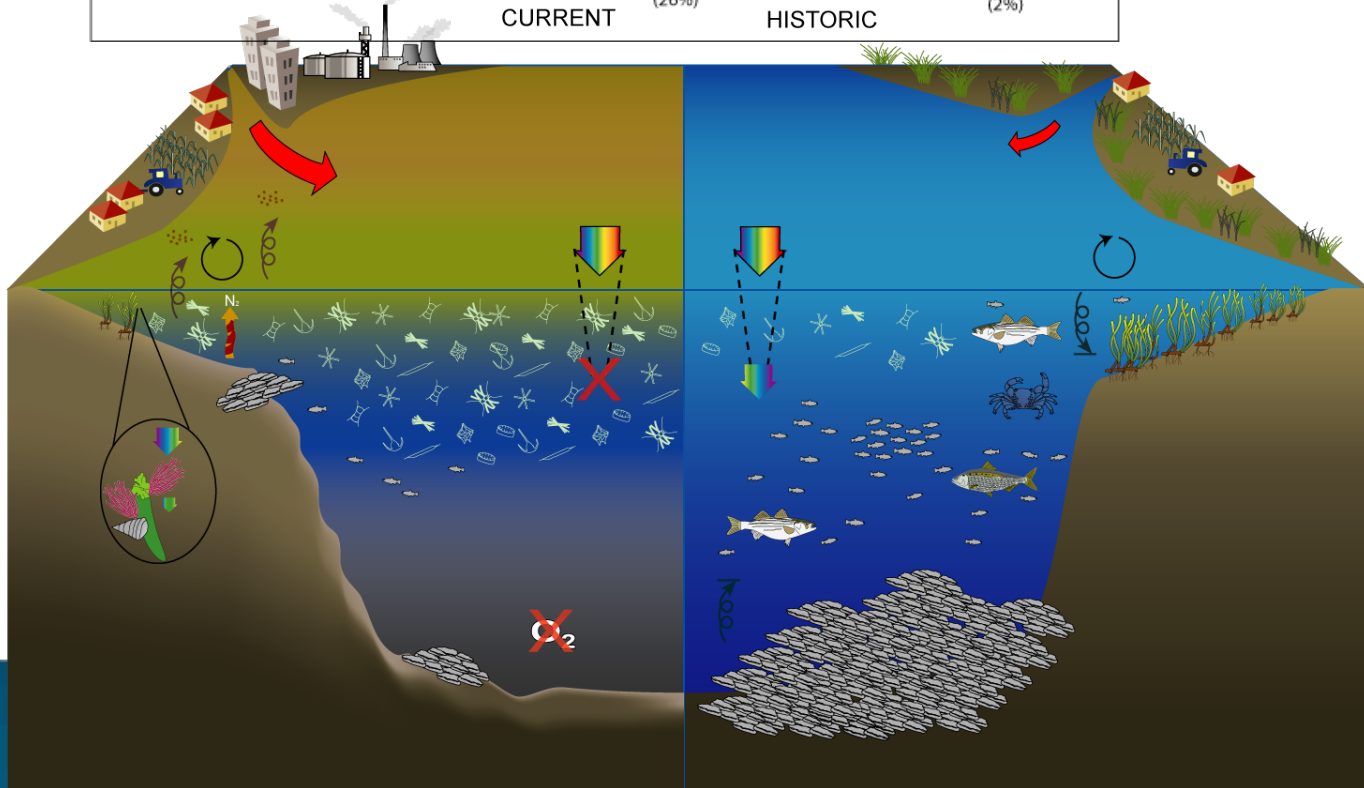
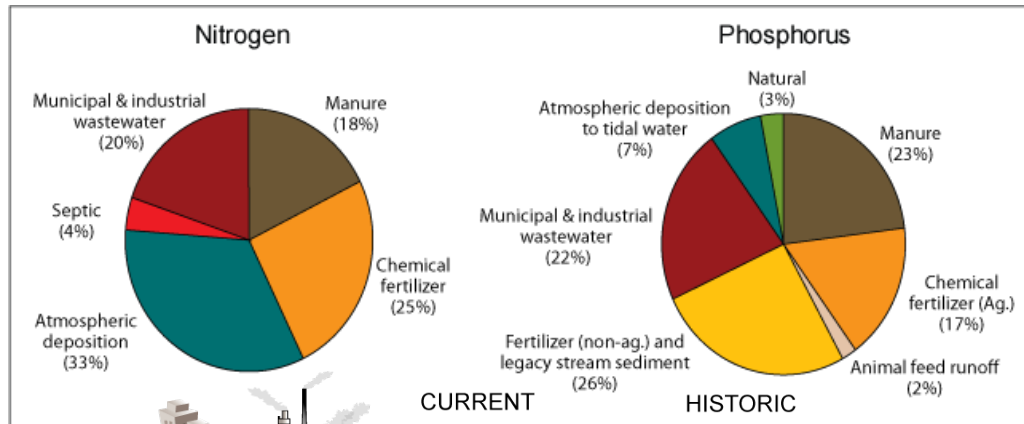
# Academia's Role in Chesapeake Bay Program



- **STAC Membership:** Leading scientists from various universities and agencies
  - Convenes workshops and develops technical reports and papers
  - Reviews projects and programs



# Big Challenge: Nutrient Over-enrichment



# Big Challenge: Decline of Key Habitats

- Seagrass beds have declined
  - Currently rebounding

Seagrass beds are important

- Fishery nursery grounds
- Reduce resuspension
- Limit shoreline erosion
- Increase water clarity
- Act as nutrient filter



# Big Challenge: Decline of Key Habitats

- Oysters are at 0.3% of historic populations
  - Decline caused by overfishing and disease
  - Focus on sanctuaries and targeted restoration programs

Oyster reefs are important

- Only natural hard substrate
- Filtration of water
- Increase biodiversity
- Economic potential



# Applying Adaptive Management Principles



# Adaptive Management: Monitor and Measure Bay Health

- Track changes over time to determine responsive to management actions
- Develop metrics that addresses both the habitat and biological response
- Communicate results to a broad audience
- Improve scientific understanding and impact of management actions

**EYES ON THE BAY**

EOTB HOME | CURRENT CONDITIONS | STATUS & TRENDS | HARMFUL ALGAE | SATELLITE MAPS | MORE

### Eyes on the Bay - Home

[Eyes on the Bay Mobile for Real-Time Data](#)  
[Email us comments, follow our Twitter feed, or visit us on Facebook.](#)

Click a station for more info and data

**Monitoring Types & Stations**

- Continuous Monitoring
- Long-Term Monitoring
- Partners / Other Data Providers
- State Highway Admin. Weather/Road Conditions

-Click Arrow to Expand Legend  
-Checkbox: Removes/Adds Layer  
-Link Returns Program Info

Select Another Year for Map Display:  
2014

Submit

**Station Legend**

- Long-Term Fixed Station
- ★ Dataflow / Water Quality Mapping Segment
- Continuous Monitoring Station with Real-time Telemetry
- Continuous Monitoring

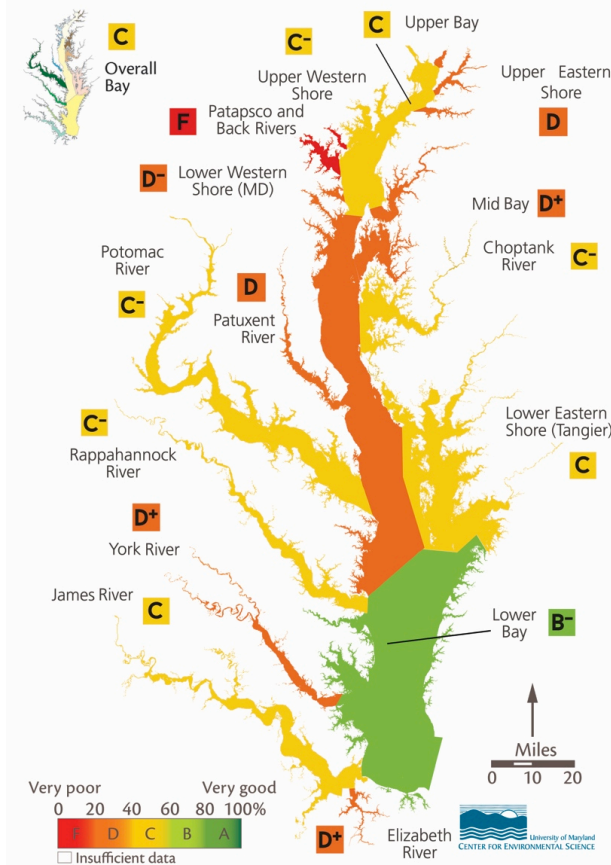
Map based on tools provided by [GPSVisualizer.com](#)  
Map data ©2014 Google | 20 km | [Terms of Use](#) | [Report a map error](#)

[Virginia Estuarine and Coastal Observing System \(VECOS\)](#)  
[Susquehanna River Basin Commission Remote Water Quality Monitoring Network](#)  
[Delaware Natural Resources and Environmental Control Water Quality Monitoring Network Data Portal](#)

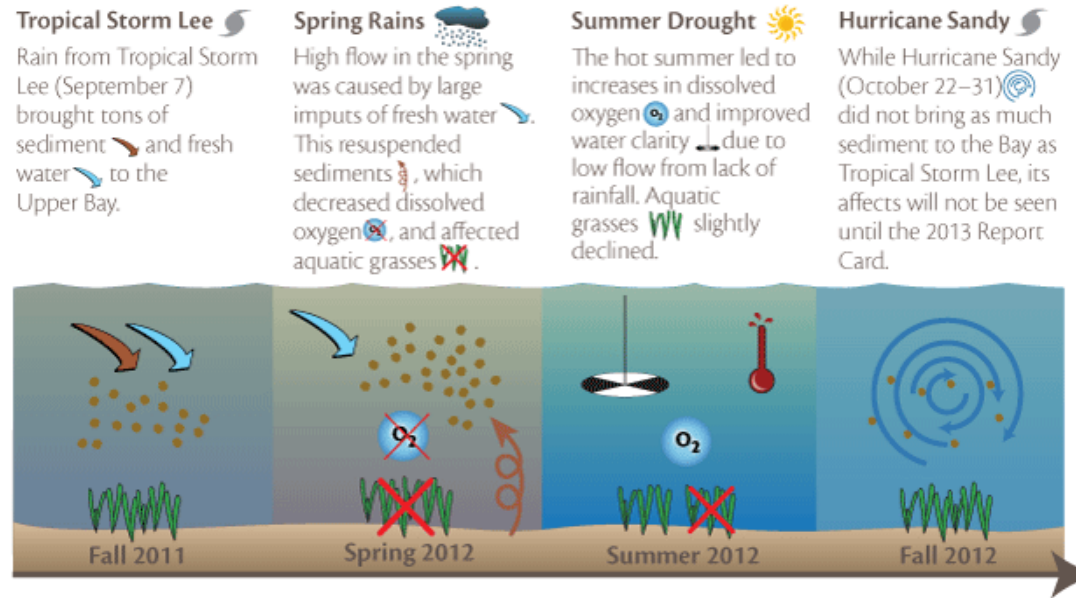
# Adaptive Management: Analyzing and Integrating Monitoring Data

## Improve Understanding

Bay Health Index 2013

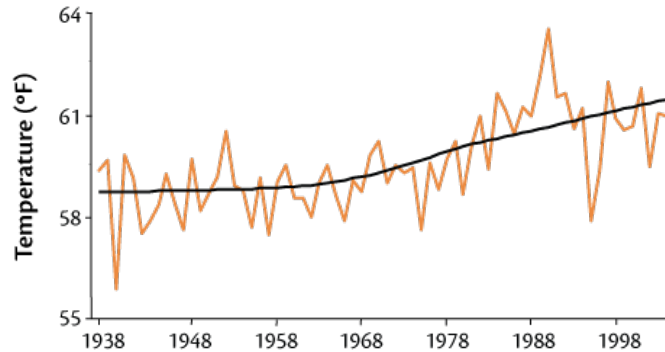


A sequence of events contributed to 2012 health



# A Warmer Chesapeake Bay

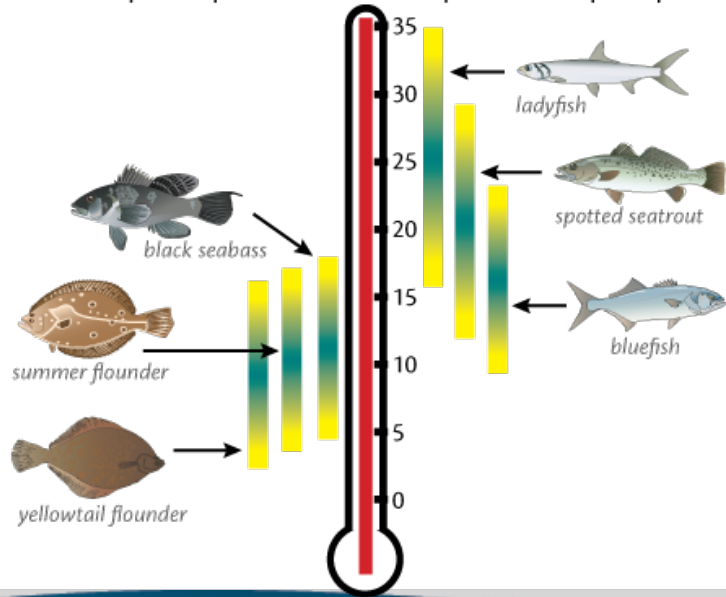
Observed Chesapeake Bay Temperature



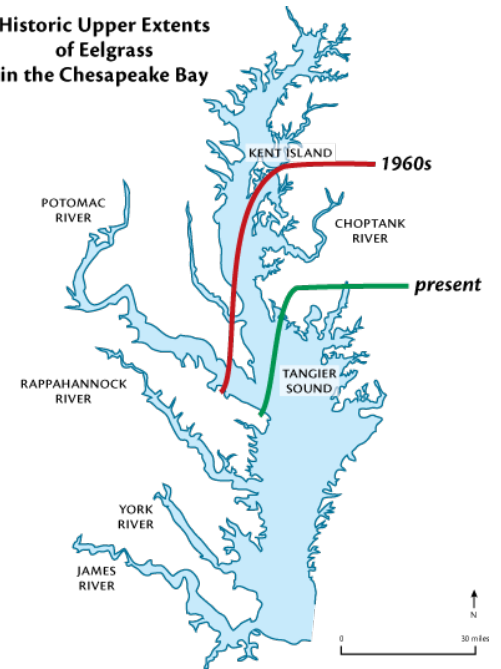
Juvenile Thermal Habitat

boreal-temperate species

temperate-subtropical species

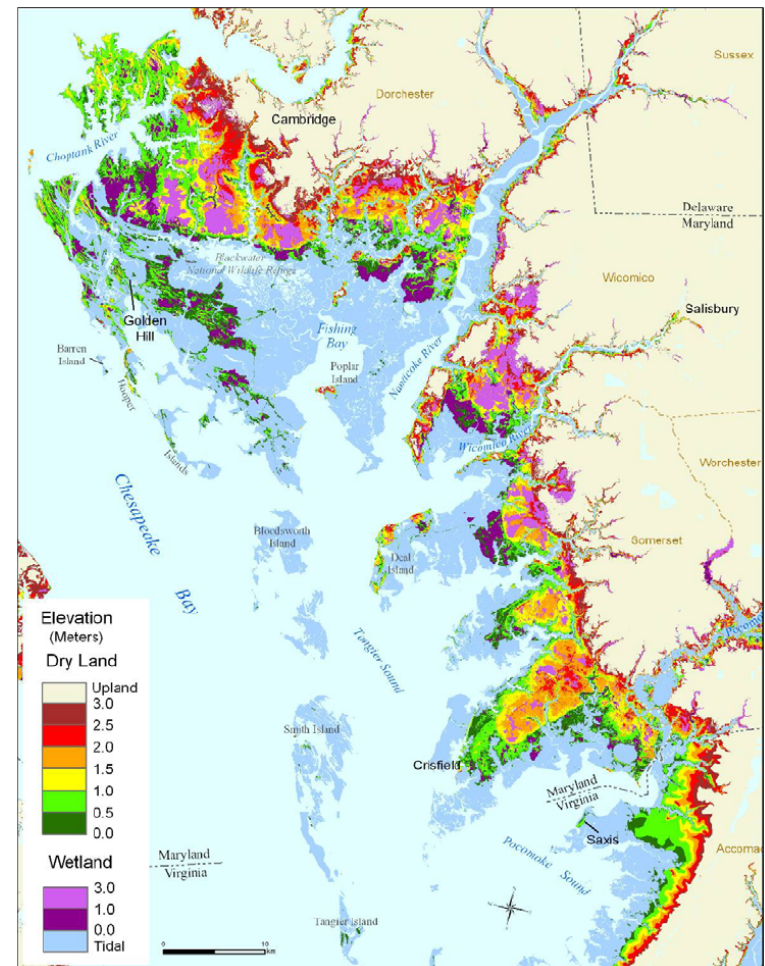
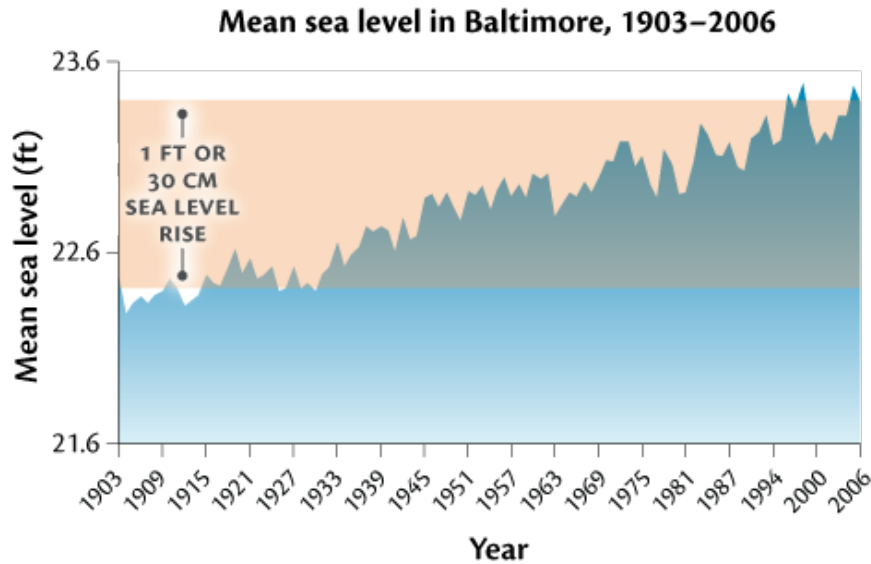


Historic Upper Extents of Eelgrass in the Chesapeake Bay





# Sea-level Rise Will Redraw Maps



# Provide Scientific Leadership to Emerging Challenges

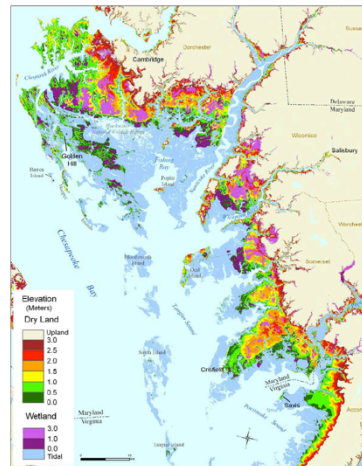
Organize scientific panels to provide consensus on causes and solutions

Engage the management community in the deliberations

Provide reports in a public friendly manner to communicate the problems and solutions to a broad audience



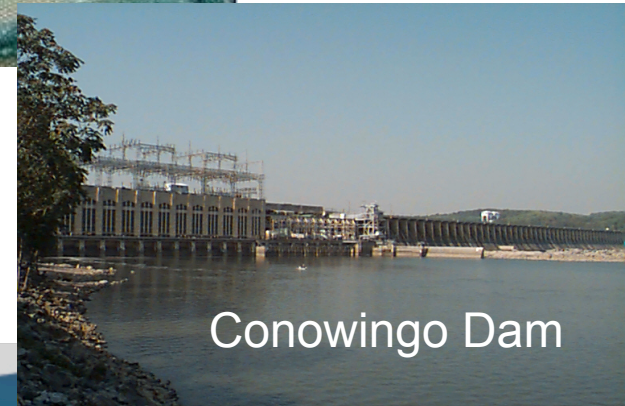
Harmful Algal Blooms



Sea Level Rise



Introduced Species



Conowingo Dam



**Dave Nemazie**  
**nemazie@umces.edu**

**谢谢你**

**Websites for more info:**  
**[www.umces.edu](http://www.umces.edu)**  
**[www.chesapeakebay.net](http://www.chesapeakebay.net)**





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