

# Working to Insure Sustainable Fisheries in Chesapeake Bay

STAC Quarterly Meeting/Retreat  
Rose Haven, MD  
27 March 2012

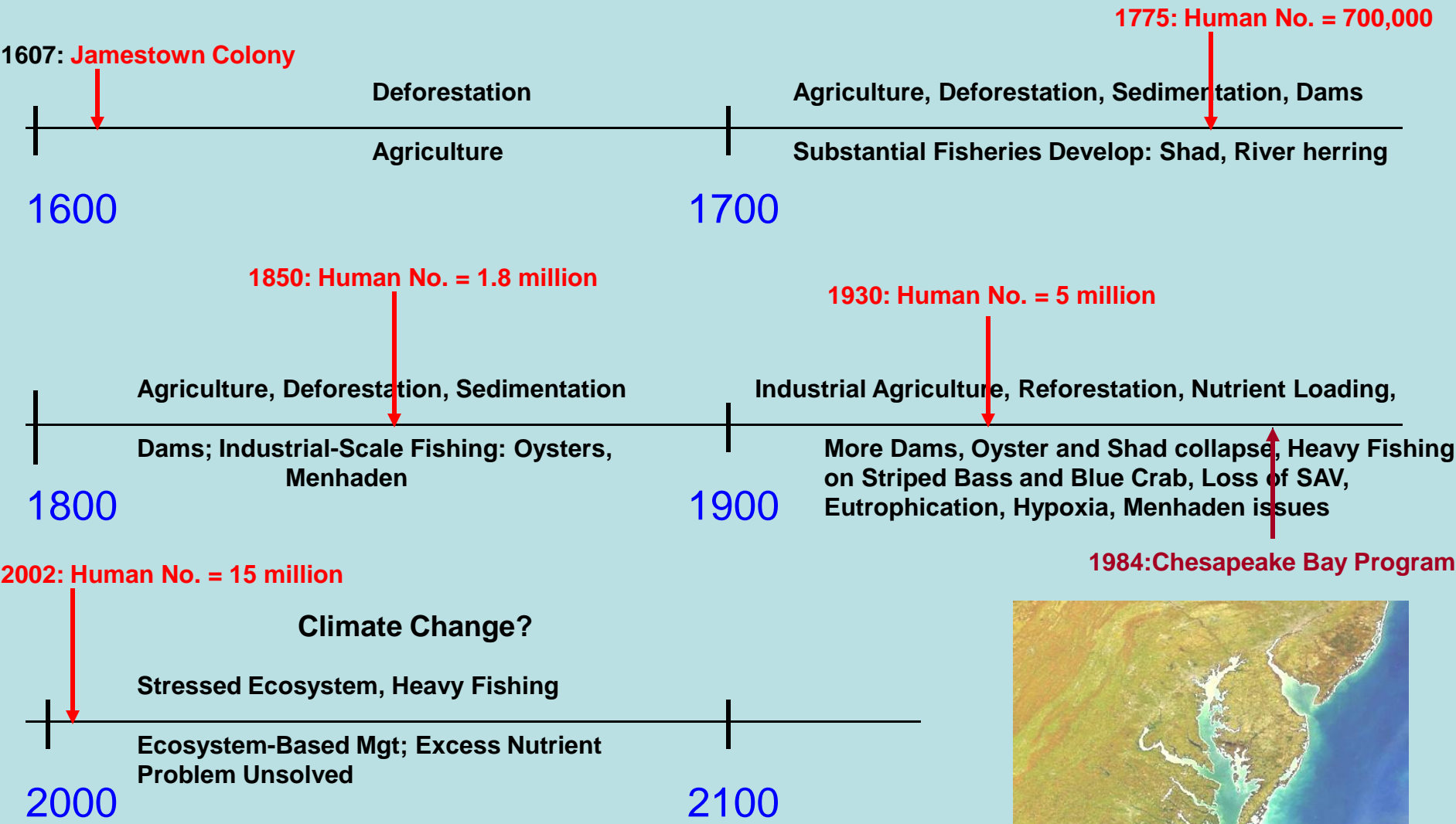
E. D. Houde

University of Maryland Center for Environmental  
Science

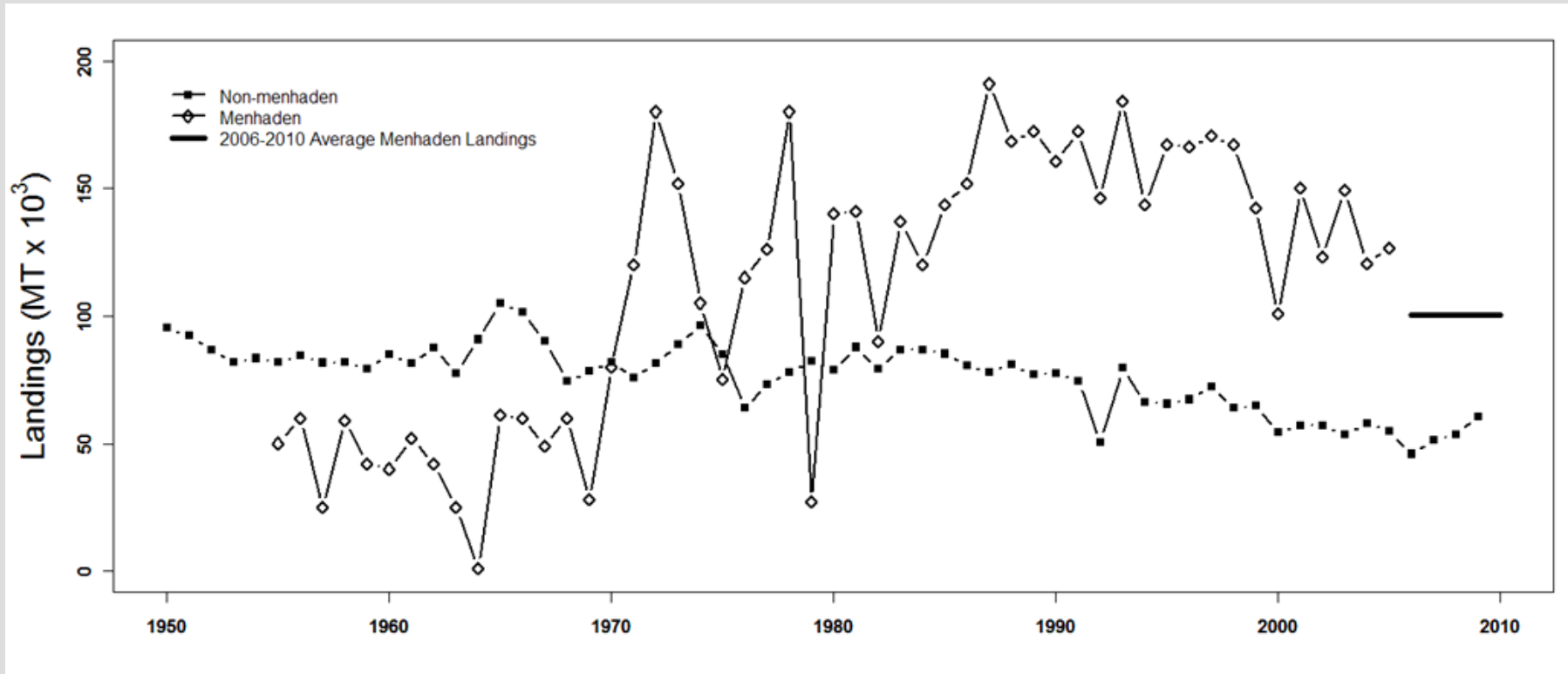
Chesapeake Biological Laboratory  
Solomons, MD



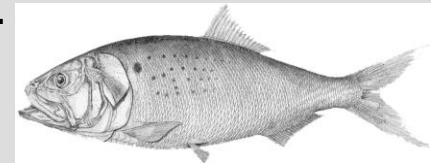
# Chesapeake Bay: Timeline of Events and Trends

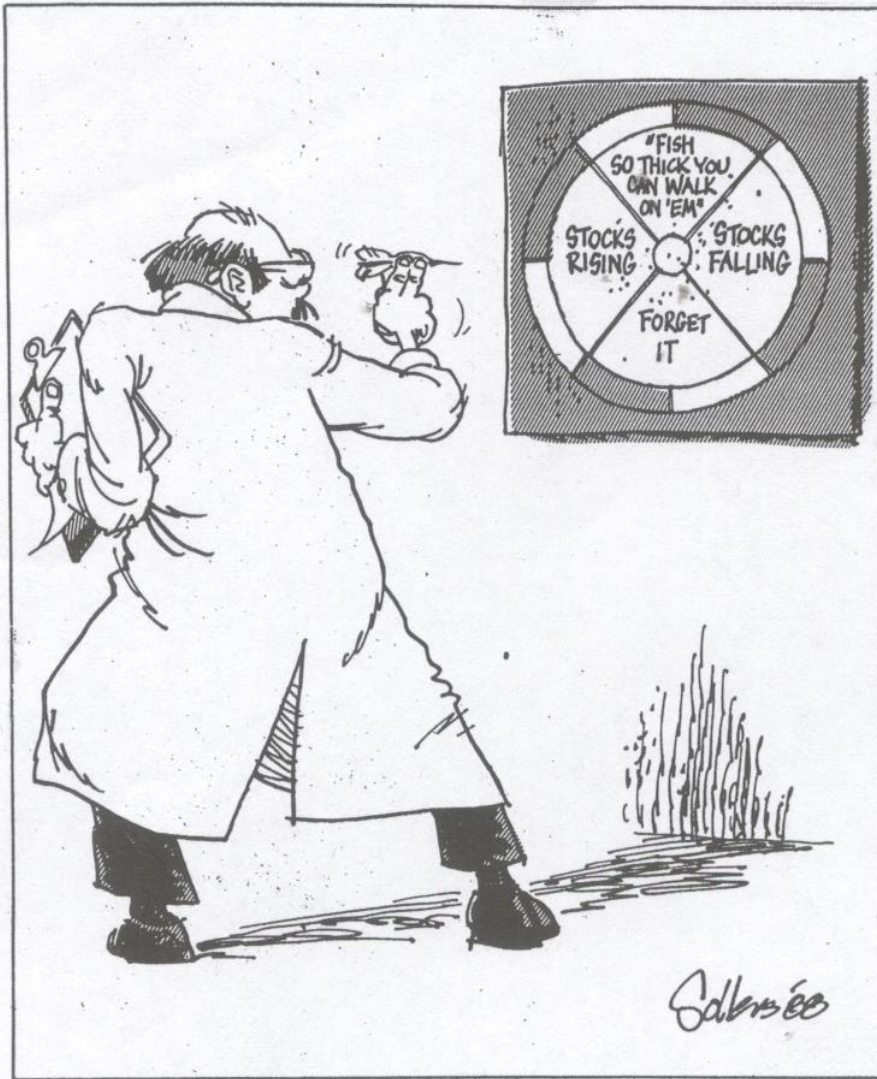


# Commercial Fisheries Landings, Chesapeake Bay



- Menhaden fishery now accounts for >60% of Bay commercial landings
- Total commercial catches reach nearly 300,000 tons in 1970s and 80s
- Blue crab is second largest fishery, >30,000 tons
- Ratio of pelagic to demersal species in the catch is increasing.





Do we have appropriate fishing policies?

Is management reliable?

How good are stock assessments?

Is the science sufficient?  
Is it reliable?

Observations

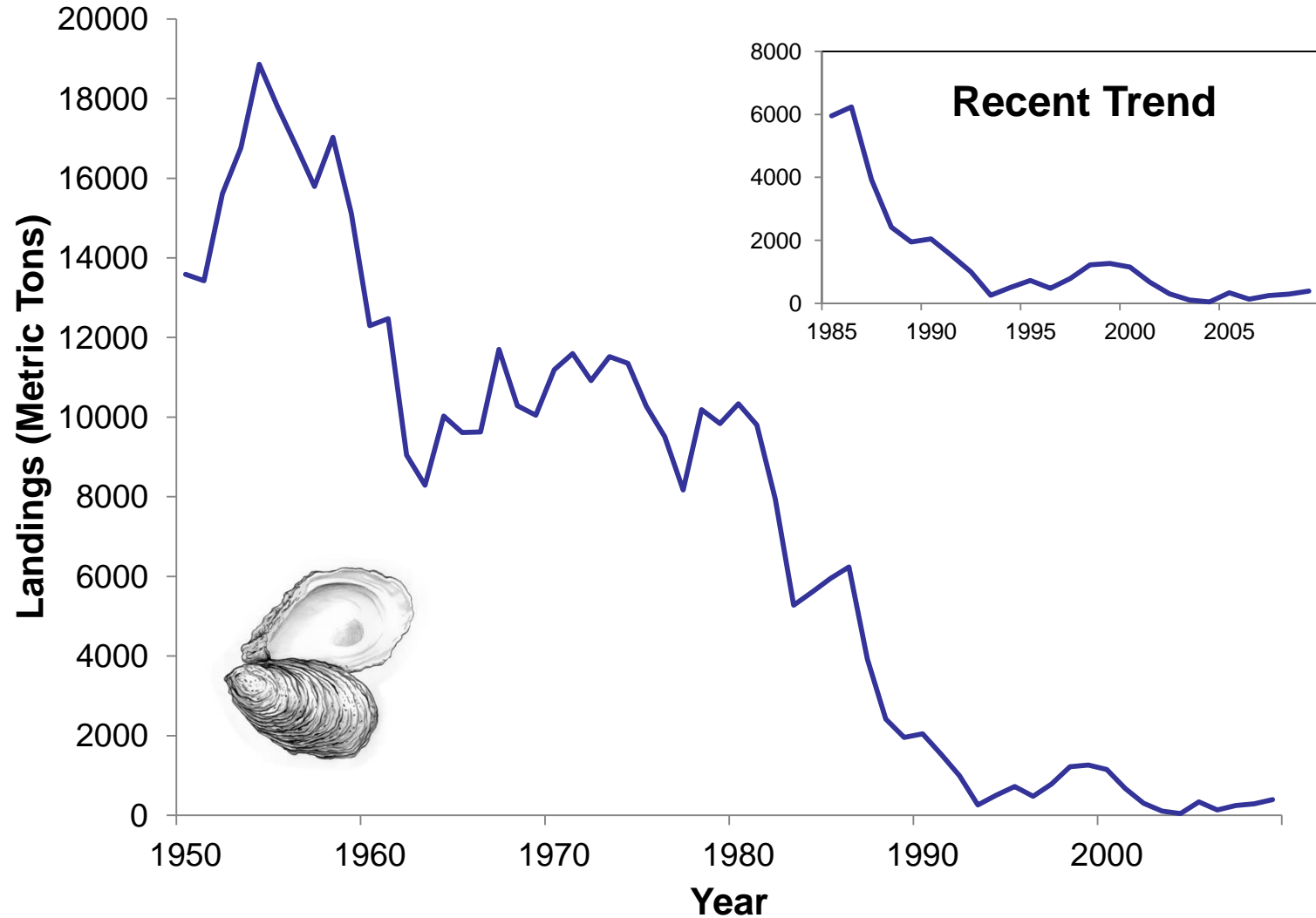
Data

Models

Uncertainty

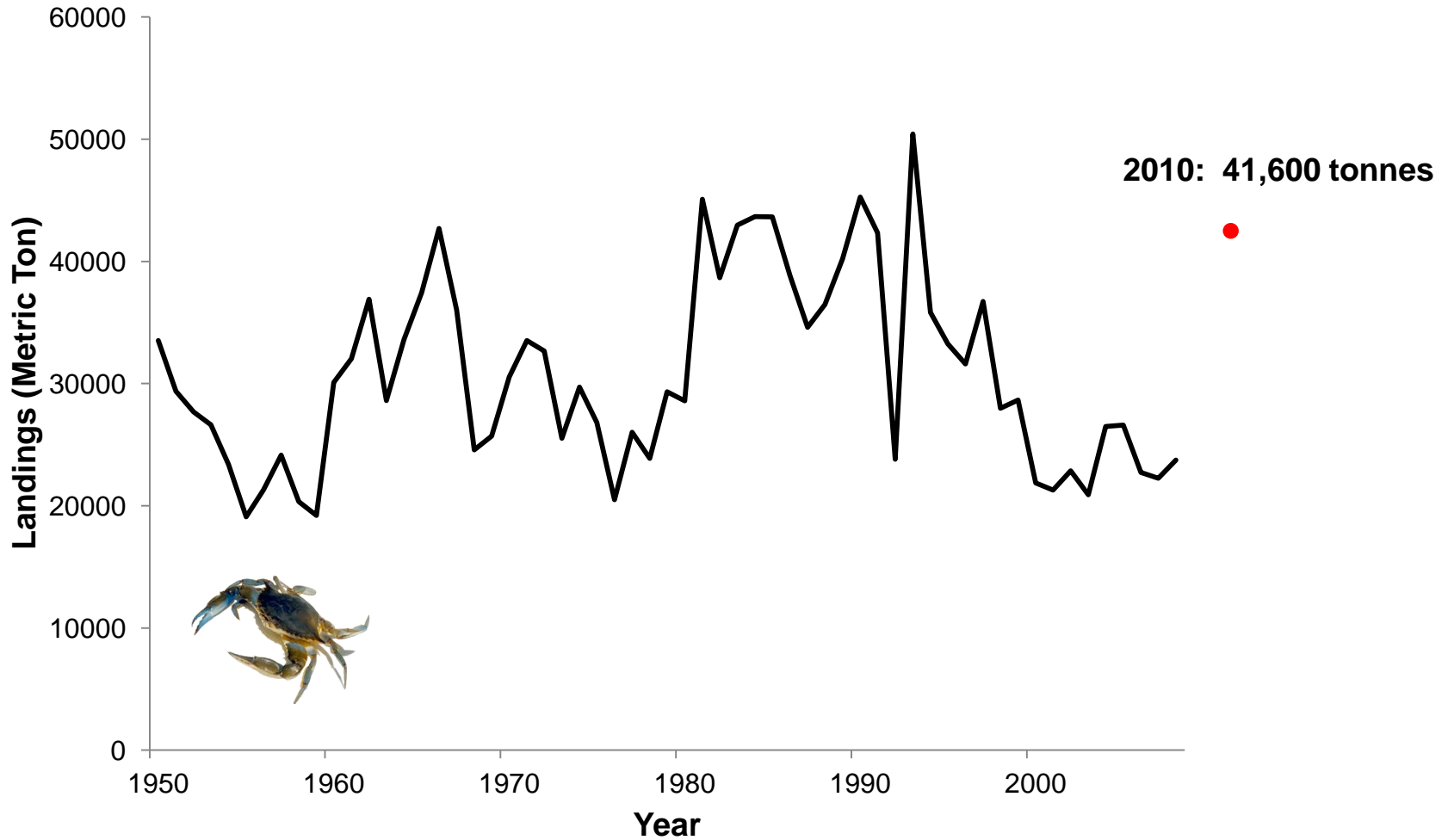
Risk

# Eastern Oyster: Landings, Chesapeake Bay



Can any amount of Science or Management reverse this trend and restore the oyster?

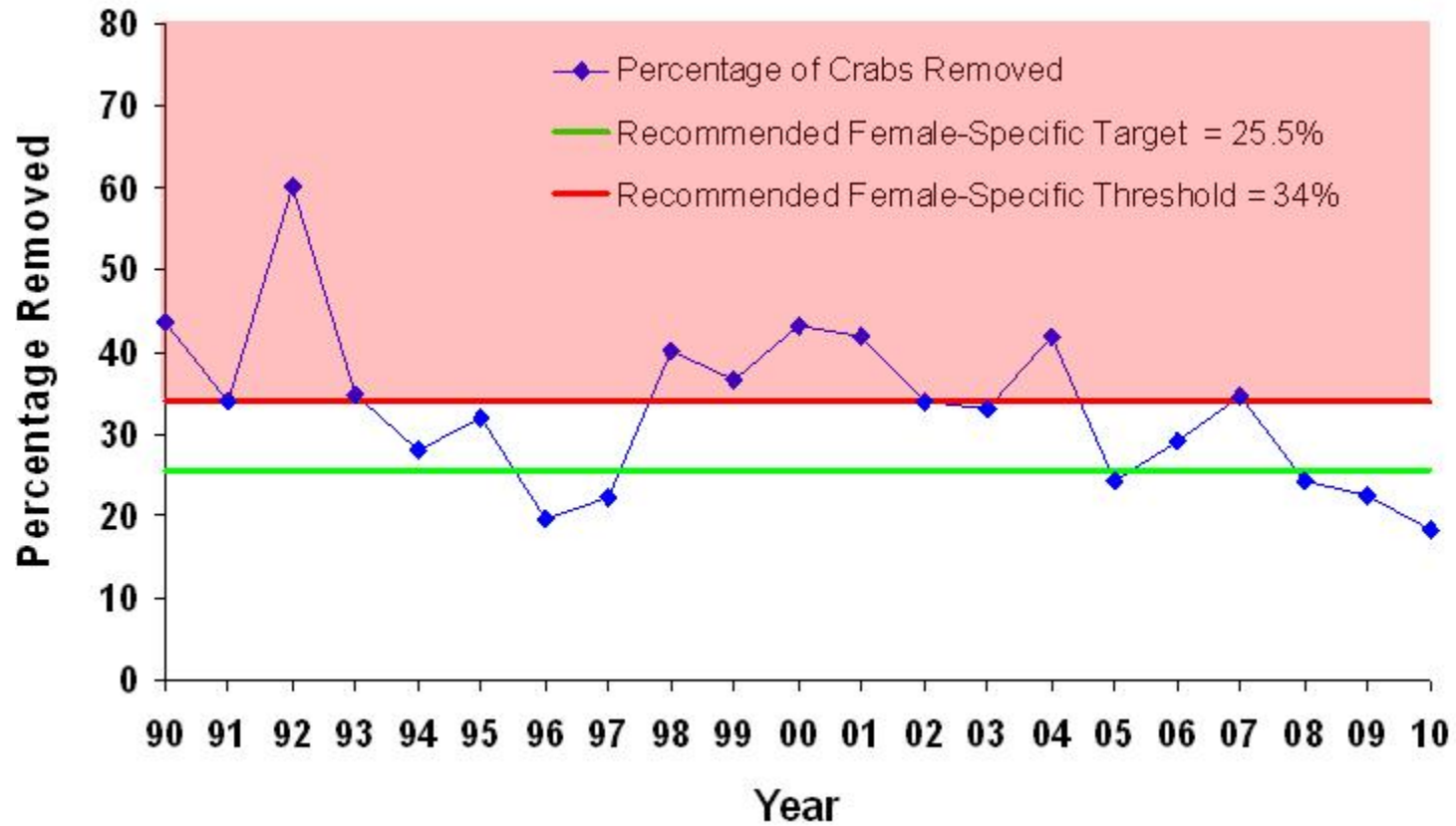
# Blue Crab Landings: Chesapeake Bay Resiliency in the Face of Over-exploitation



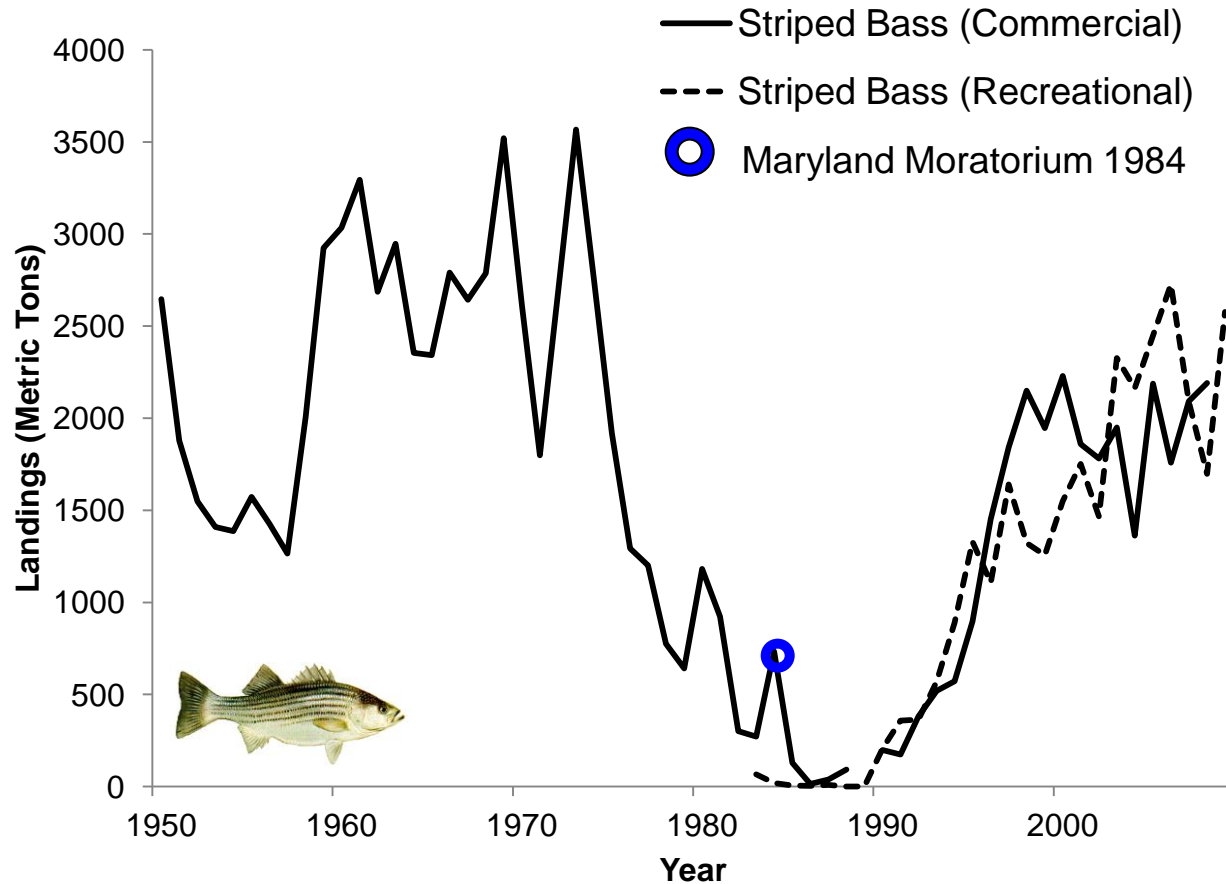
What went right?

Science? Management? Good Luck?

# Blue Crab: Exploitation Rate. Hitting the Target

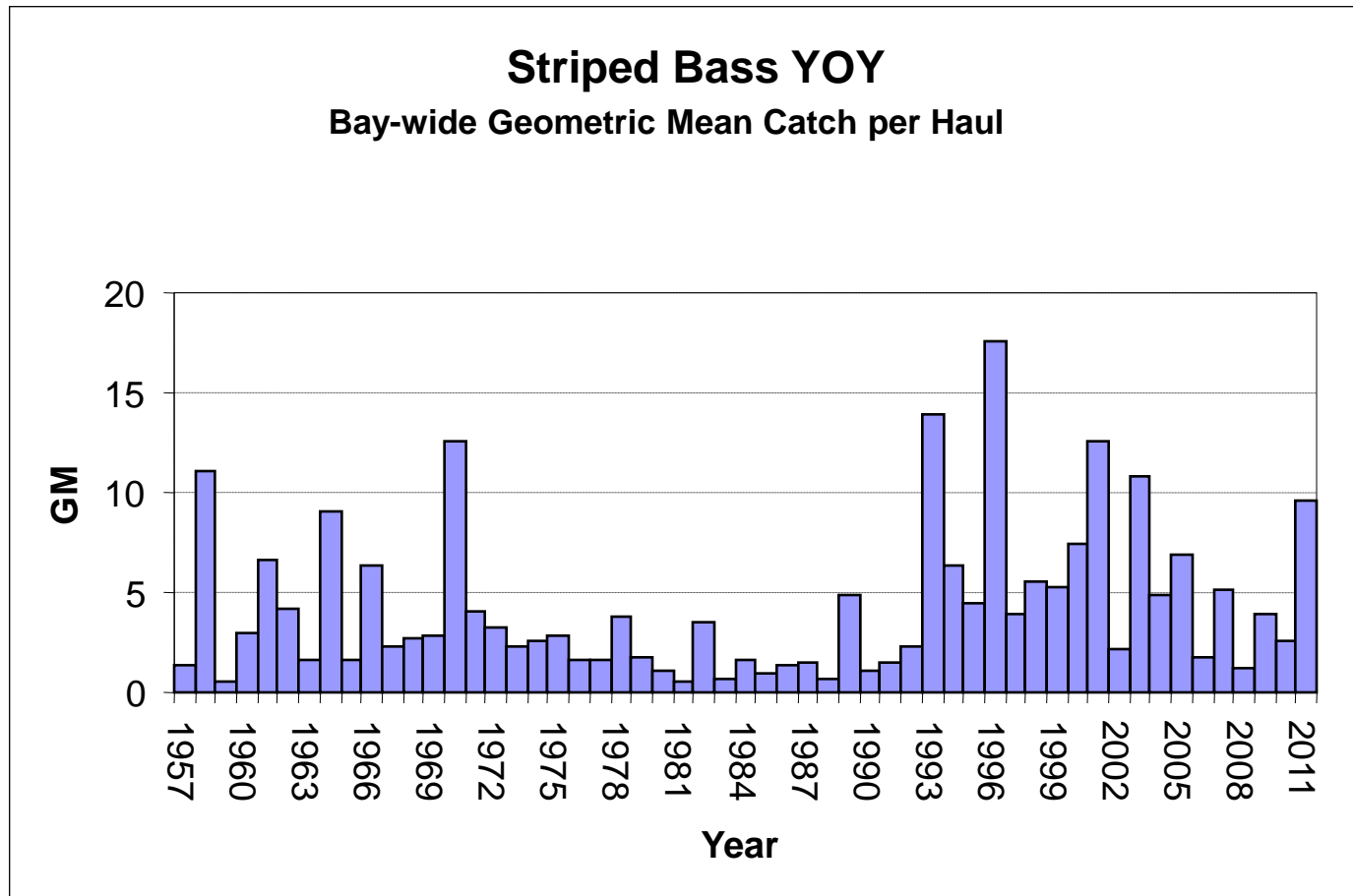


# Striped Bass Landings: Commercial and Recreational Chesapeake Bay



Another case of management success

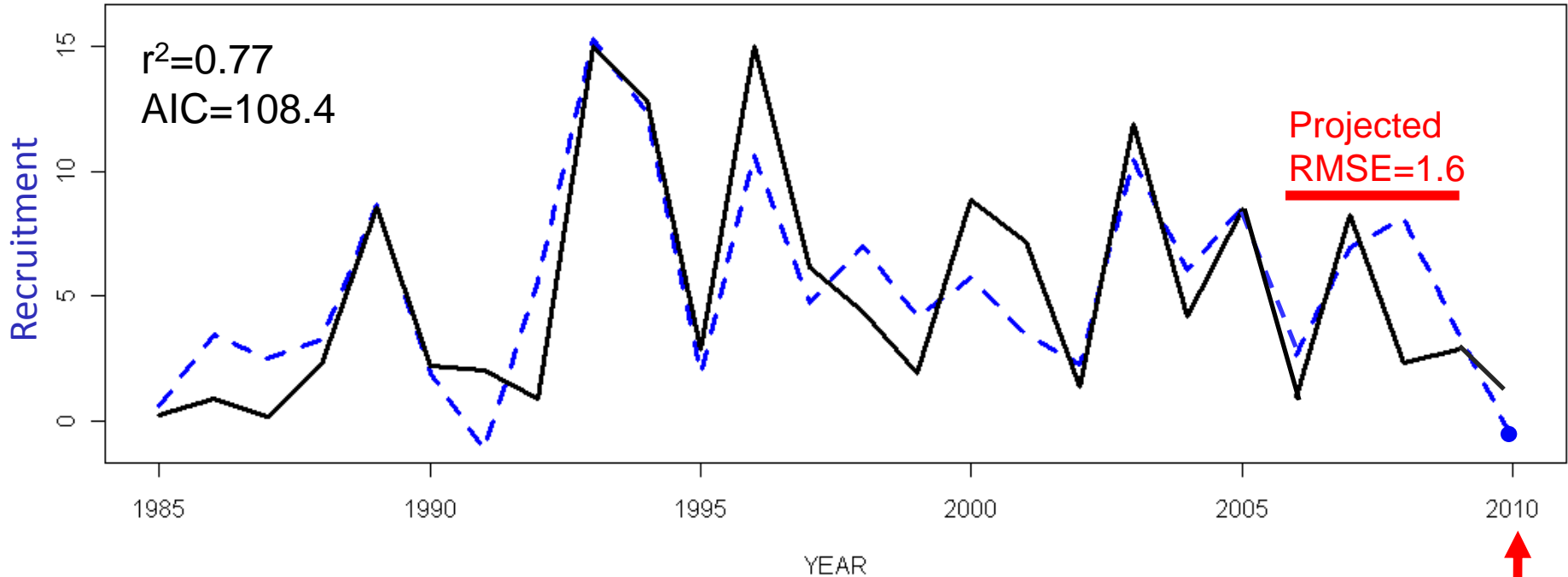
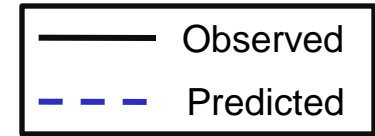
# Recruitment Variability: Young-of-the-year Striped Bass, Chesapeake Bay



Periodic high recruitment success is the rule. We understand factors that contribute to recruitment variability



# Striped Bass Recruitment Forecast



Recruitment model based on hydroclimate conditions  
& lower trophic level structure and function

Successful 2010 forecast for low recruitment

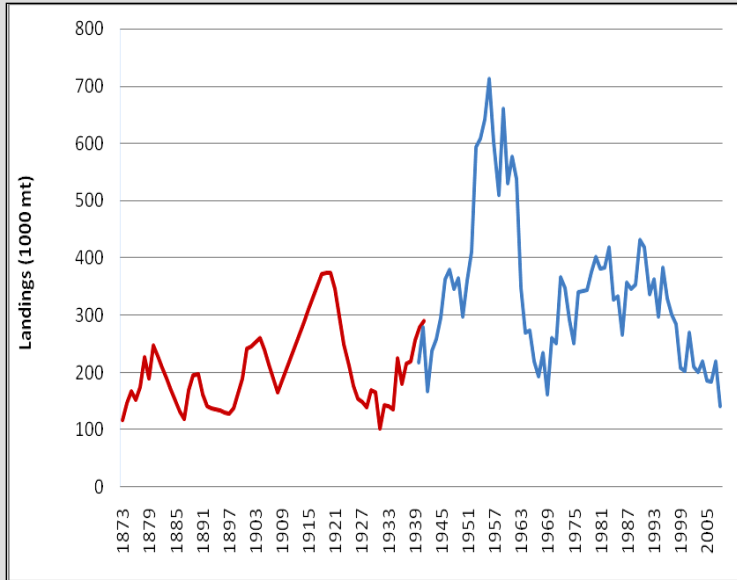
↑  
**2010 Projection  
= Below Average**



Working with **NMFS-NEFSC** to Improve Striped Bass Assessment

# Atlantic Menhaden: Coastwide Landings

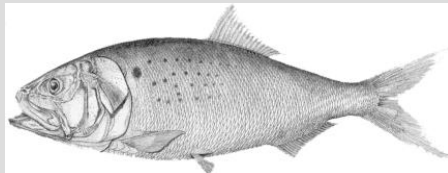
## Historical Coastwide Landings: From MDSG 2009



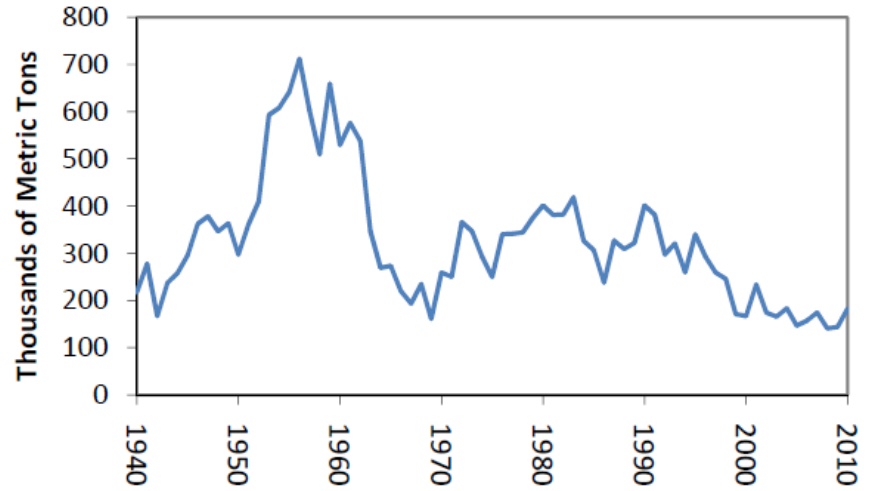
Total Landings are declining.

Landings for bait are increasing.

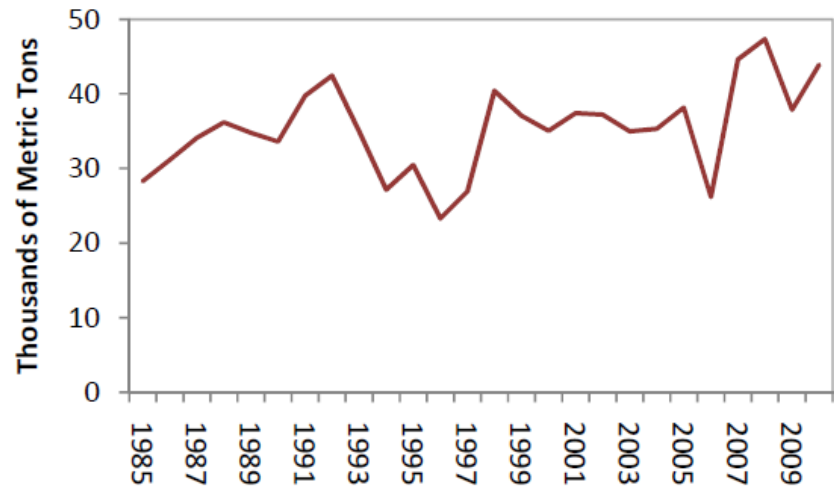
Is menhaden abundance declining?



## Atlantic Menhaden Reduction Landings



## Atlantic Menhaden Bait Landings



# The Fish

Atlantic Menhaden, *Brevoortia tyrannus*, Family Clupeidae



**Juvenile Menhaden (age-0 and age-1 Eat Mostly Phytoplankton)**

**Does their filtering provide a substantial benefit to nutrient sequestration or cycling in the Chesapeake Bay?**

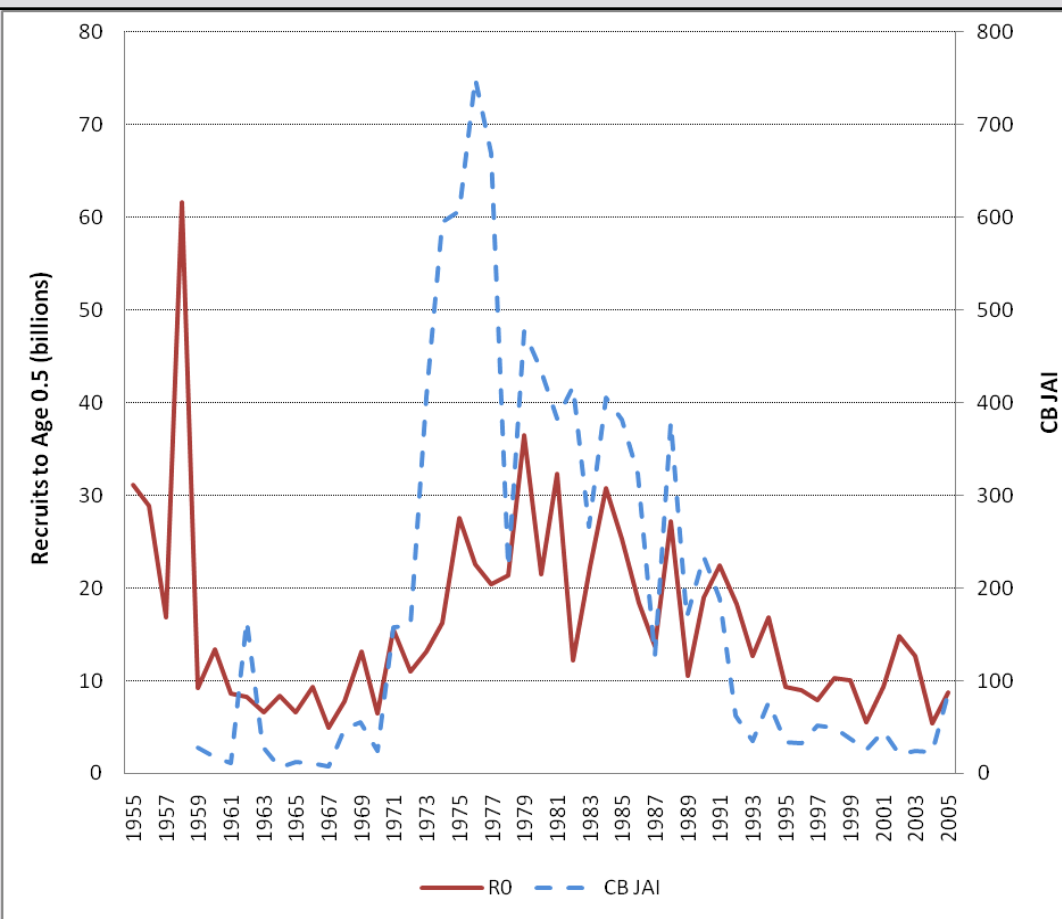
**Are levels of primary production and phytoplankton biomass related to growth and production of menhaden?**

**Are there sufficient menhaden in Chesapeake Bay to support its predators?**

# Recruitment Trends

Atlantic Menhaden

--- Chesapeake Bay YOY Index  
— Coastwide Recruitment



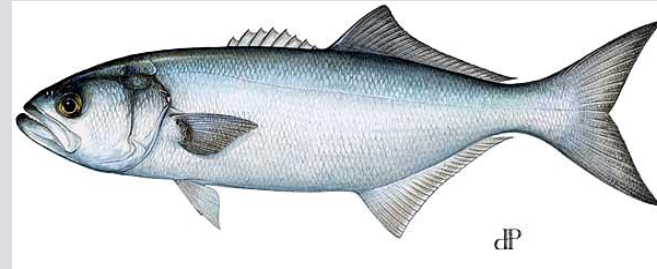
Historically, > 65% of coastwide recruitment came from the Chesapeake Bay

Despite declining recruitment coastwide and in Chesapeake Bay, coastwide abundance of menhaden had held at a reasonably high level because fishing mortality also had been trending downward until 2006.

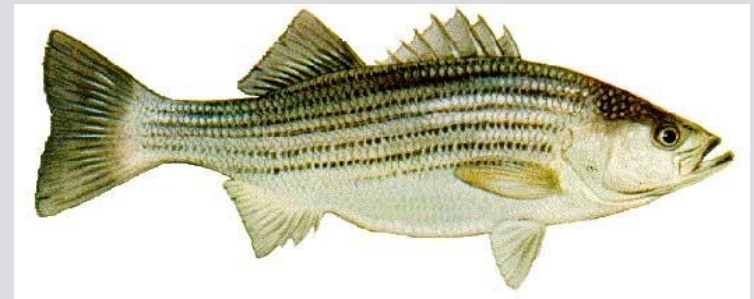


Commercial Fishery

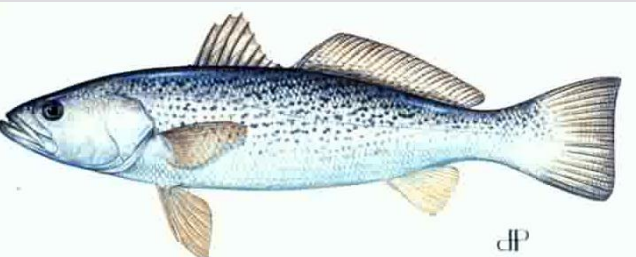
Bluefish



Predators/Piscivores



Striped Bass



Weakfish



Osprey

What is a “Fair” Allocation Plan?

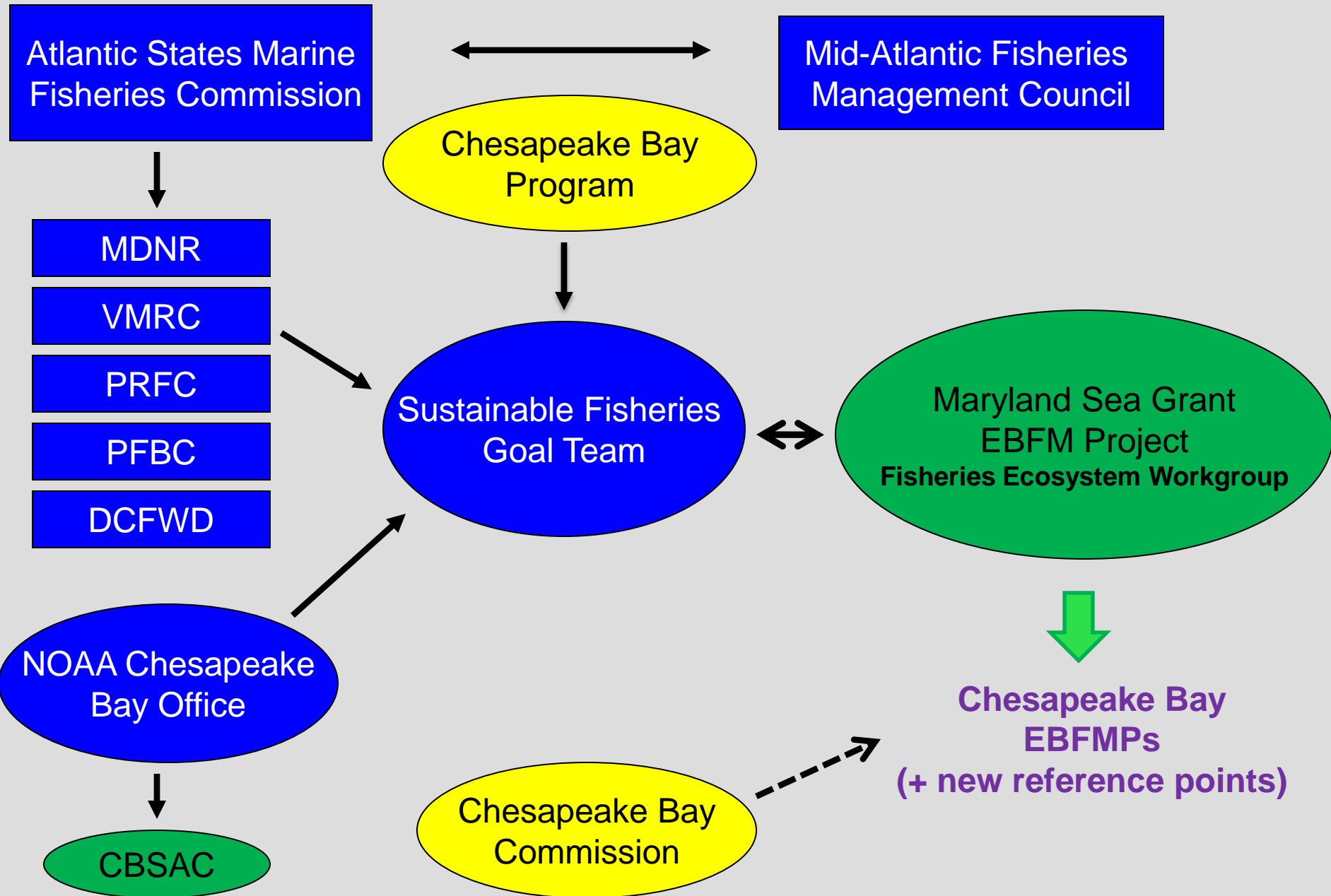
Can Humans Cause  
“Localized Depletion” of Menhaden?



Recreational Striped Bass Fishing

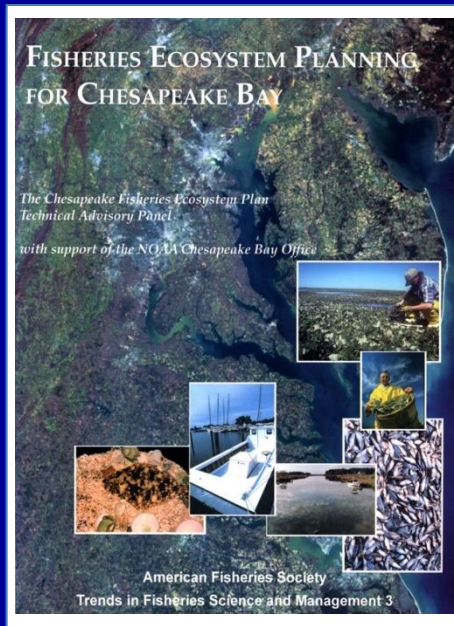
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# Fisheries Management in Chesapeake Bay



# A Shift in Management Priorities and Perspectives — A Wider View than Single Species Management

The FEP



*Conserve the Productivity, Structure and Resiliency of the Ecosystem*

Respect Uncertainties

Precautionary Principles/Approach

Preserve Options for the Future

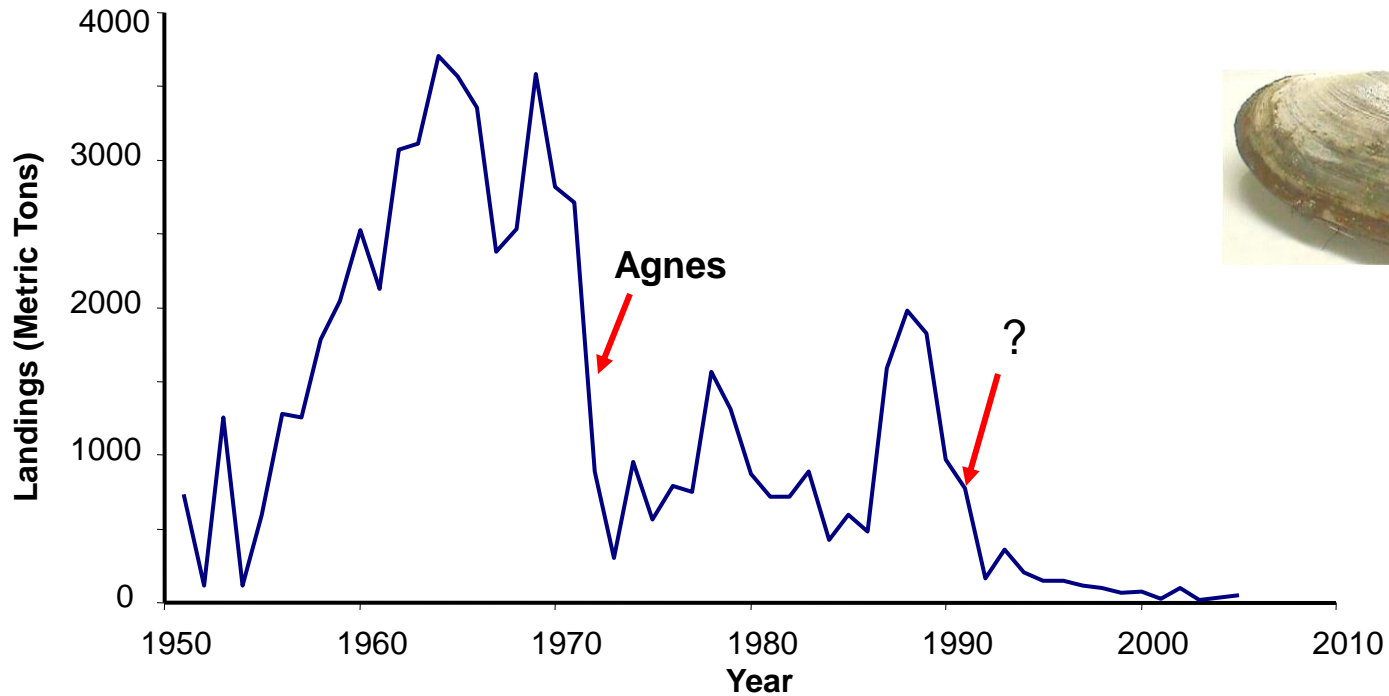
**FISHERIES ECOSYSTEM PLANNING FOR CHESAPEAKE BAY 2006.**  
**The Chesapeake Fisheries Ecosystem Plan Technical Advisory Panel**  
**with support of the NOAA Chesapeake Bay Office**

*Am. Fish. Soc., Trends in Fisheries Science and Management 3, Bethesda, MD*

# Threats and Concerns

- Fishing
- Nutrients, Eutrophication, Dissolved Oxygen
- Habitat Loss
- Watershed Practices (other than nutrients)
- Diseases
- Invasive Species
- Contaminants
- Climate Change and Associated Factors

# Softshell Clam: Commercial Landings

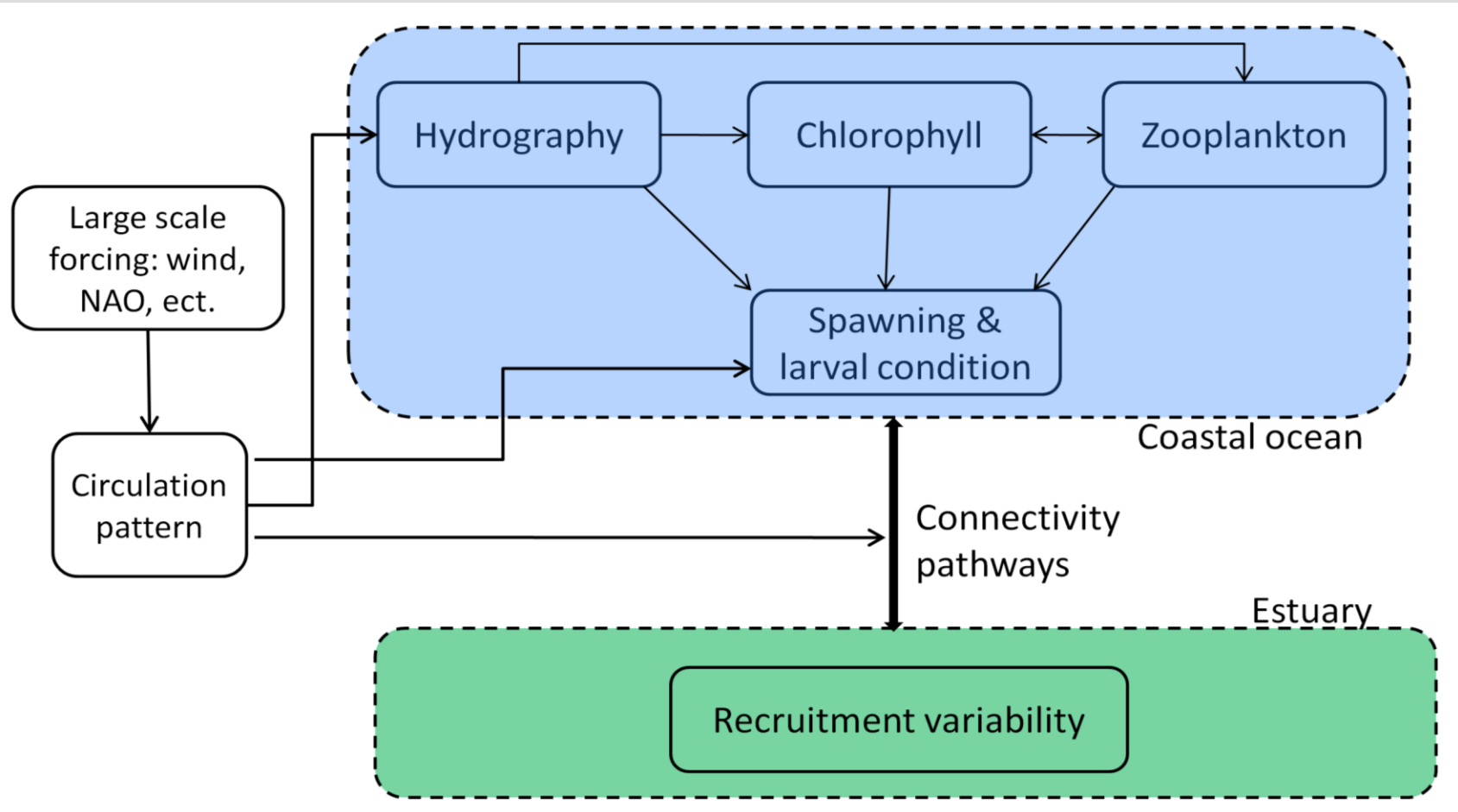


Climate Change and Disease Threaten Extirpation

# Science Needs

- Baywide, Fishery-Independent Surveys
- Ecosystem Structure and Function
- Carrying Capacity of the Bay Ecosystem
- Total Removals by Fishing
- Recruitment Forecasting
- Causes of Alosine and American Eel Declines
- Determining Oyster Restoration Potential
- Ecosystem-Based Approaches: Indicators and Reference Points
- Linking the Coastal Ocean to the Bay
- Role of Diseases
- Understanding Effects of Climate Change

# Atlantic Menhaden: Conceptual Model of the Recruitment Process



# Need for New Indicators and Reference Points in EBFM

- Indicators of Trophic State of the system relative to the target species (predator and prey balance)
- Biomass and Production Measures of Target Species Relative to its Prey and Predators (productivity status of the ecosystem)
- Diversity measures (richness of the ecosystem)
- Size spectra measures (state of the ecosystem; predator and prey balance)
- Some reference points will be compound and complex (ordination, multivariate)
- Habitat and Water Quality Indicators keyed to status of the target resource (habitat suitability)

# Prognosis

- Oyster: Outlook not optimistic for a sustainable fishery on wild oysters; aquaculture potential high.
- Blue Crab: Outlook favorable for a sustainable fishery; resilient and tolerant; good example of coordinated, collaborative management across jurisdictions.
- Striped Bass: Outlook very favorable for sustainable fishing; competent across-sector, regional management; need to be on guard to control fishing mortality.
- Menhaden: Outlook favorable for a sustainable fishery; need to consider conserving its ecosystem services; catches should be lower than in the past. What should be our policy?
- Shads and River Herring: No sustainable fishery possible under present conditions; steep declines coastwide and in the Bay. Multiple factors likely responsible.
- Threatened Species: American eel, Atlantic sturgeon, shortnose sturgeon. Outlook not good for any of them, but there is hope. Some positive signs for Atlantic sturgeon.