Challenges of Coastal Regional Ecosystem Research & Management in the Face of Climate Change

NCCOS

Ecosystem Research and Coastal Management: Making the Connection at the Regional Scale

May 18, 2009

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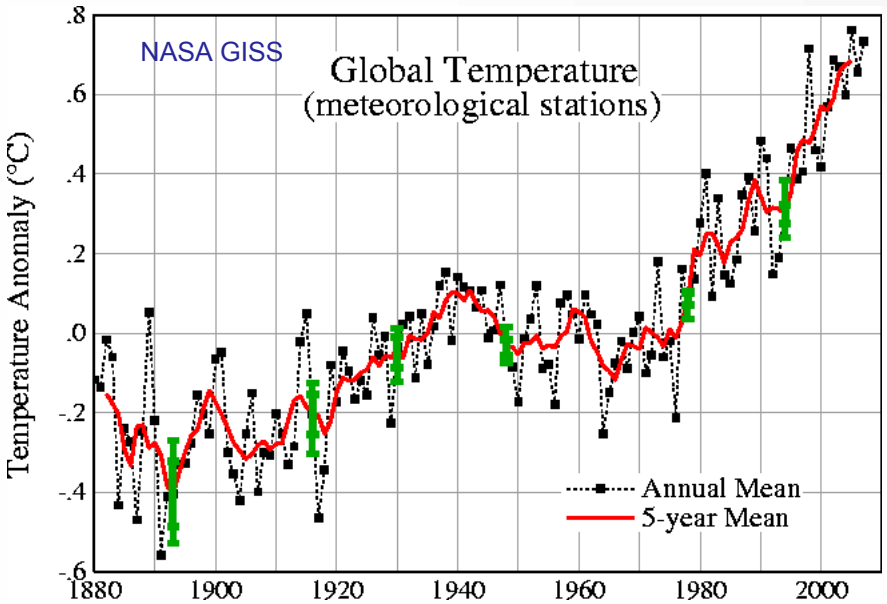
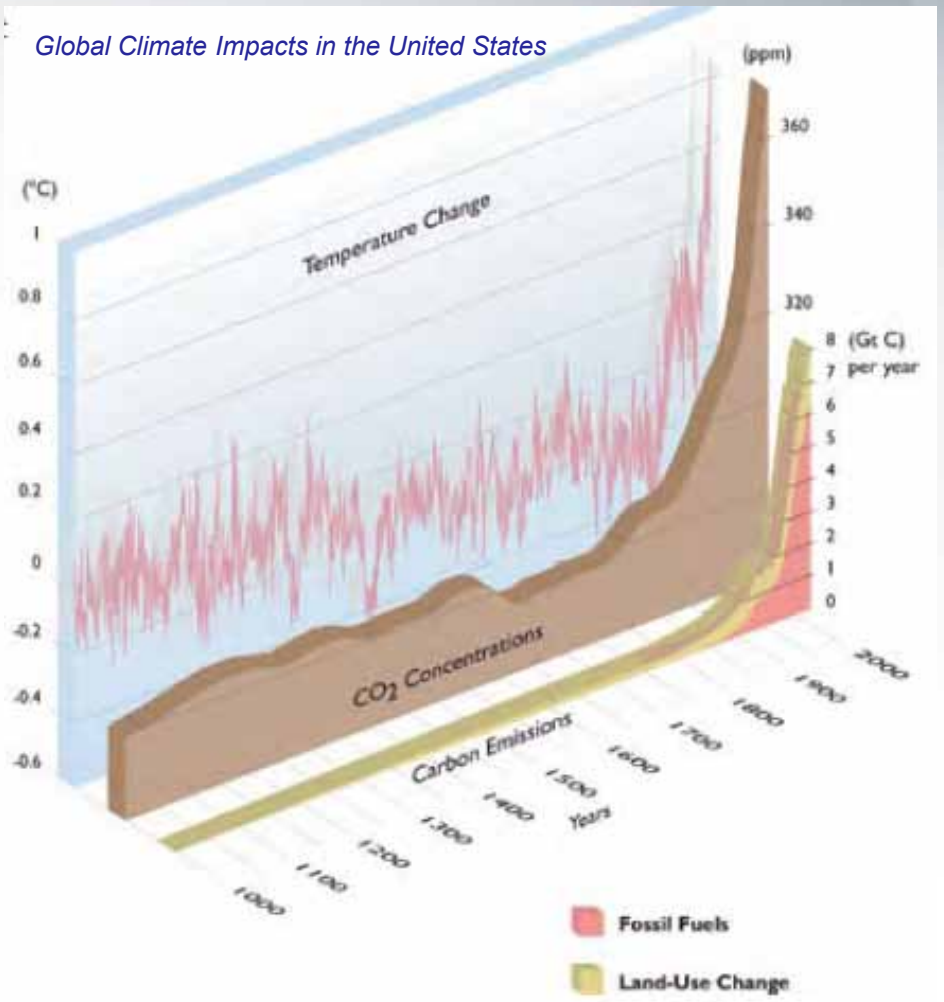
CENTER FOR ENVIRONMENTAL SCIENCE

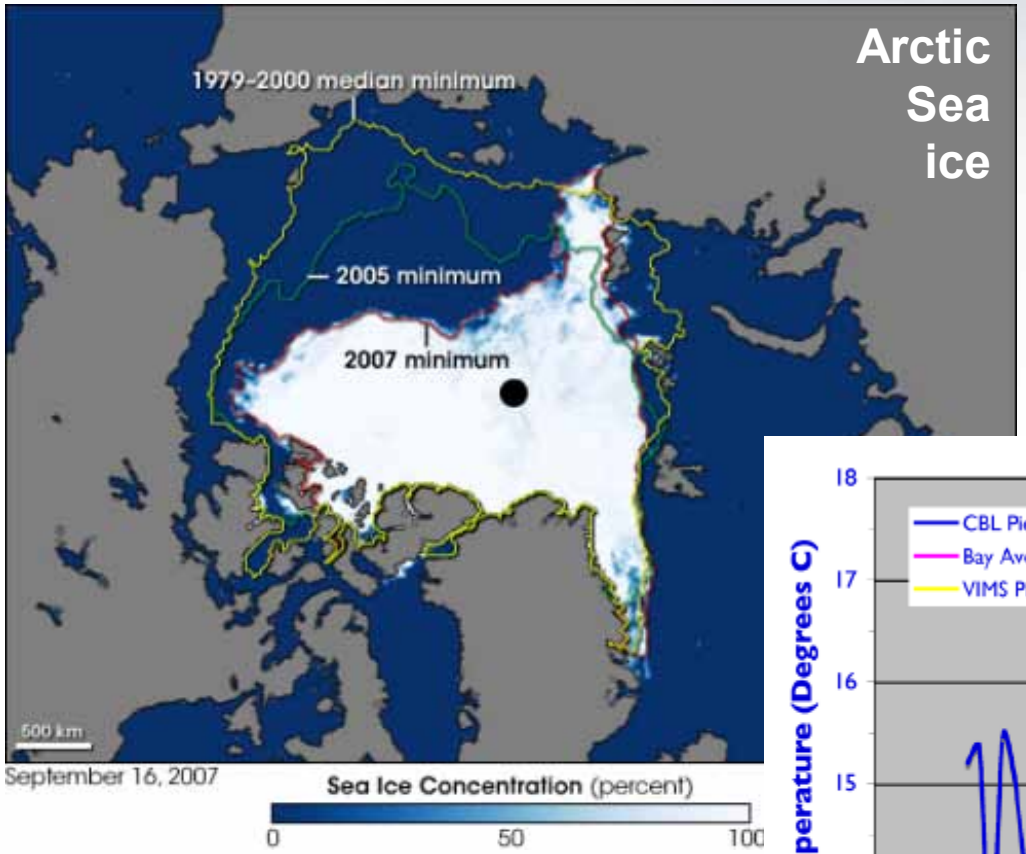
Global Warming is Unequivocal

-IPCC

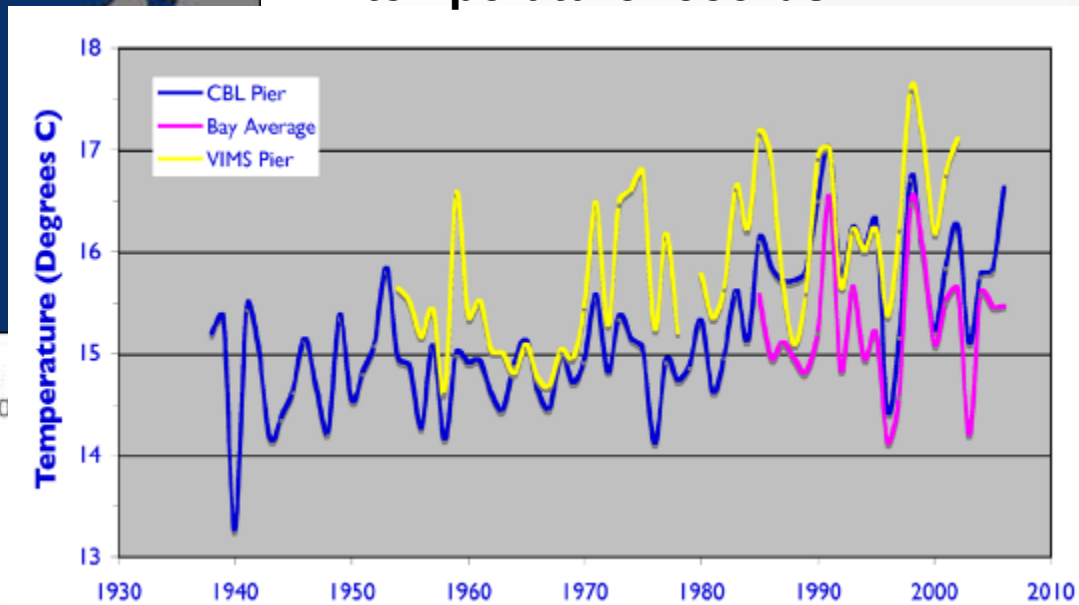




Marine Warming Is Already Here

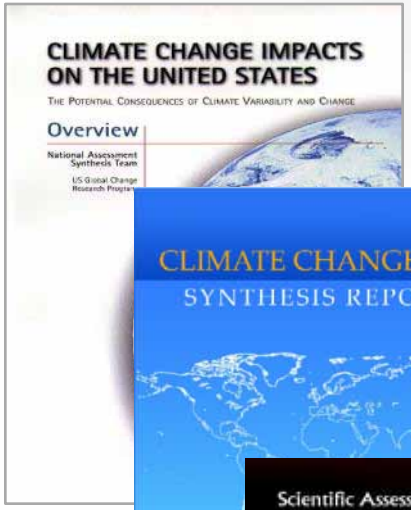


Chesapeake Bay temperature records

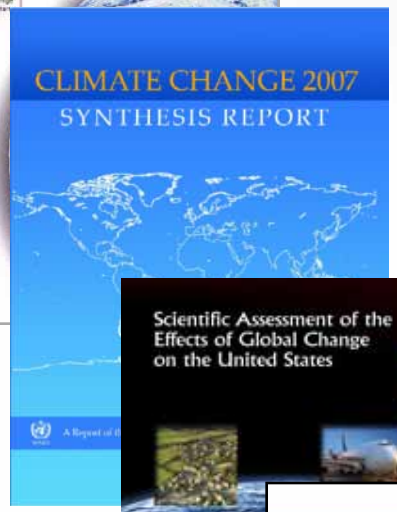


Climate Change and the Chesapeake Bay

Assessments Galore



US National Assessment 2000

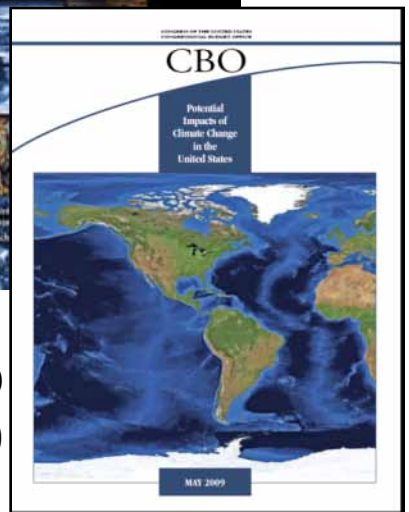


IPCC 2007

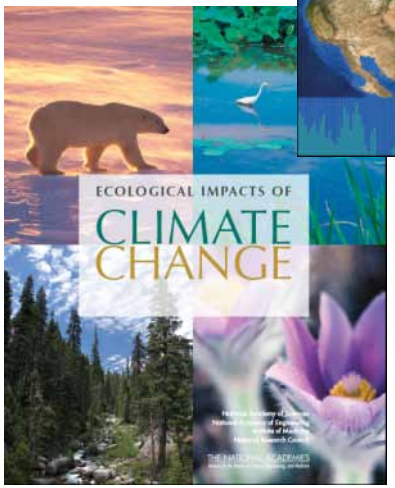
CCSP Synthesis & Assessment Products

www.climatescience.gov/

CCSP 2008



CBO 2009



NRC 2009 Ecological Impacts

CCSP 2009 "State of Knowledge" Report

Global Climate Change Impacts in U.S.

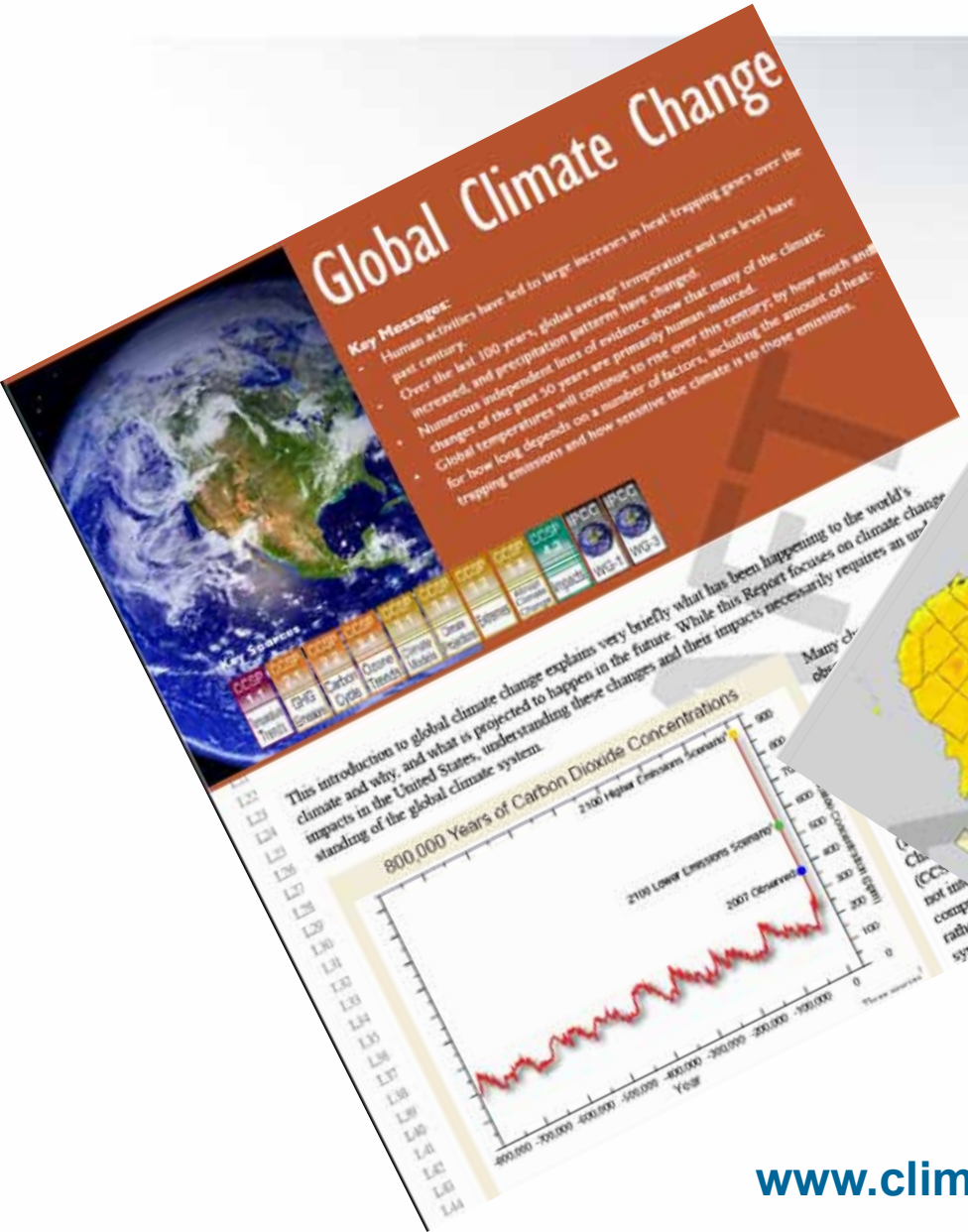
US Climate Change Science Program
www.climatescience.gov

To be released June 3.

- Synthesize the information contained in the 21 individual assessments, the recent IPCC reports, and other recent results that have appeared in the scientific literature.
- By doing so, provide a single coherent analysis of the current understanding of climate change science, summarize the contributions of the CCSP Program, and identify important gaps in the science.

www.climatescience.gov/Library/sap/usp/

Global Climate Change Impacts in U.S.



www.climatescience.gov/Library/sap/usp/

America's Climate Choices

- Conducted by the National Academies under mandate by the Congress.
- Committee and four panels.
- Examine and evaluate the actions and strategies available to **limit** the magnitude of future climate change, **adapt** to climate change impacts, **advance** climate change science, and **inform** effective decisions and actions.

http://www.americasclimatechoices.org/

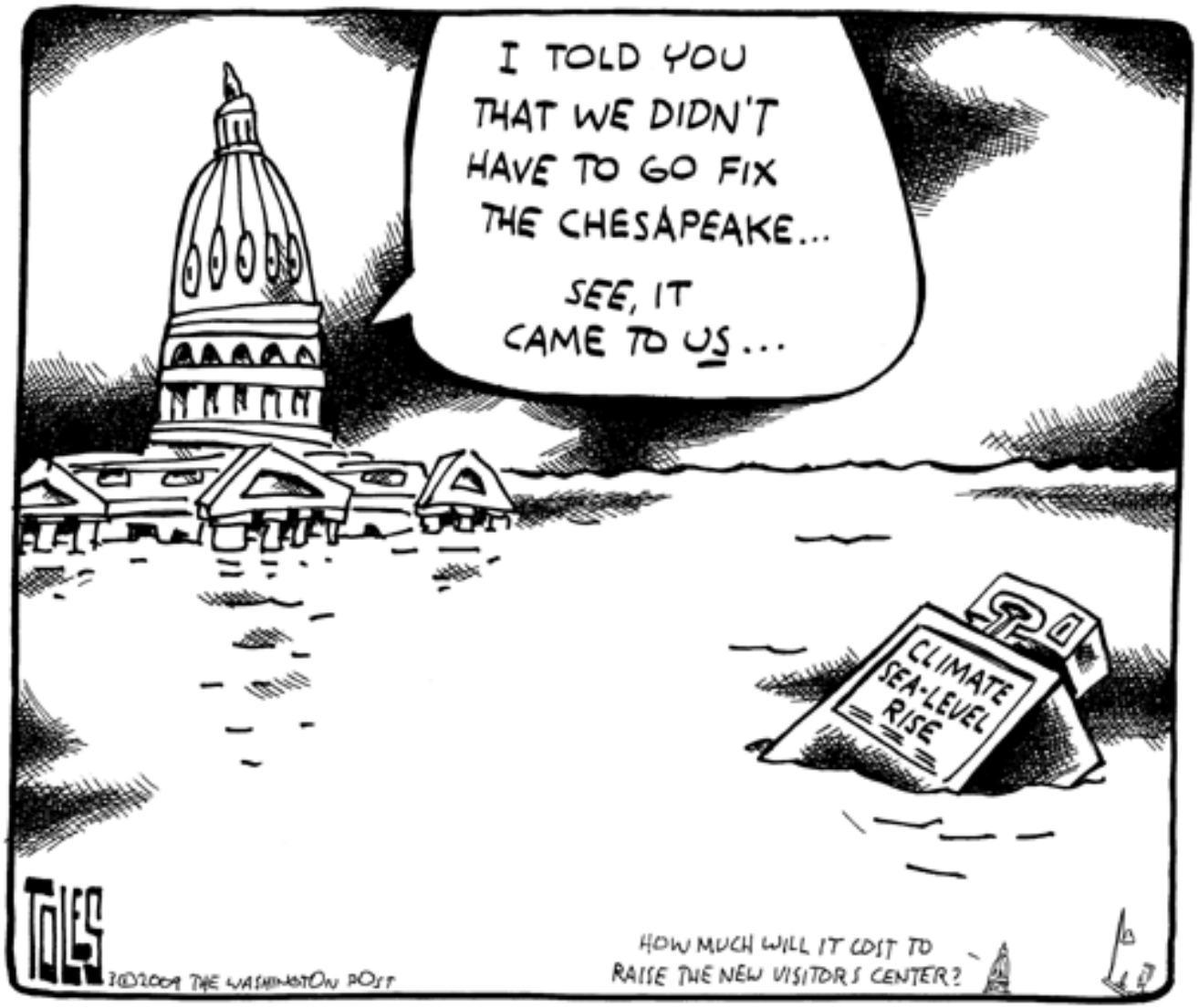
Regional Climate Impact Assessments

Sea Change in Coastal Management

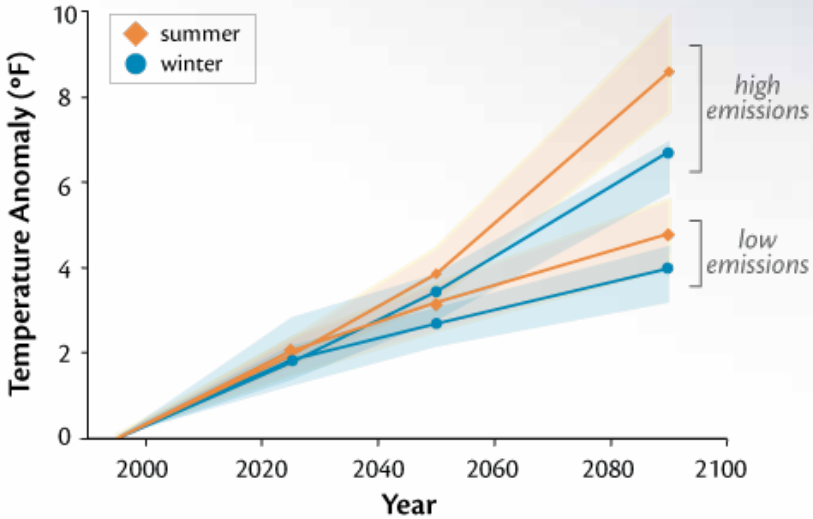
Global Climate Change

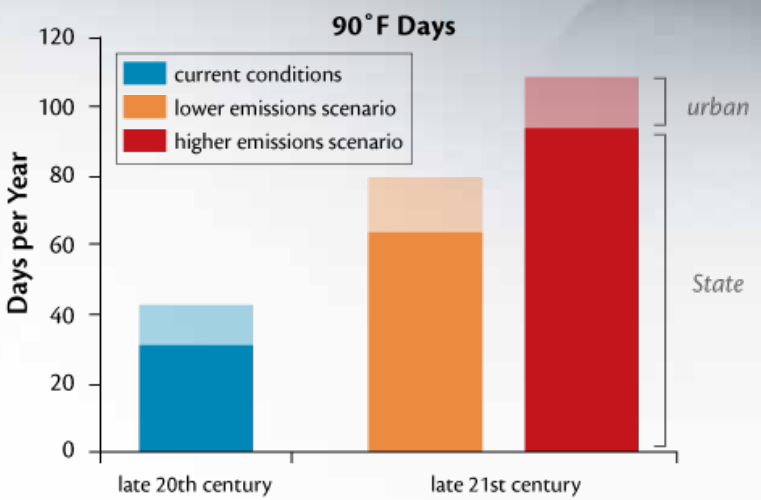
Out	In
Noise	Signal
Too politically controversial to consider	Not credible without explicit consideration
Too far in the future	Adaptation planning required now

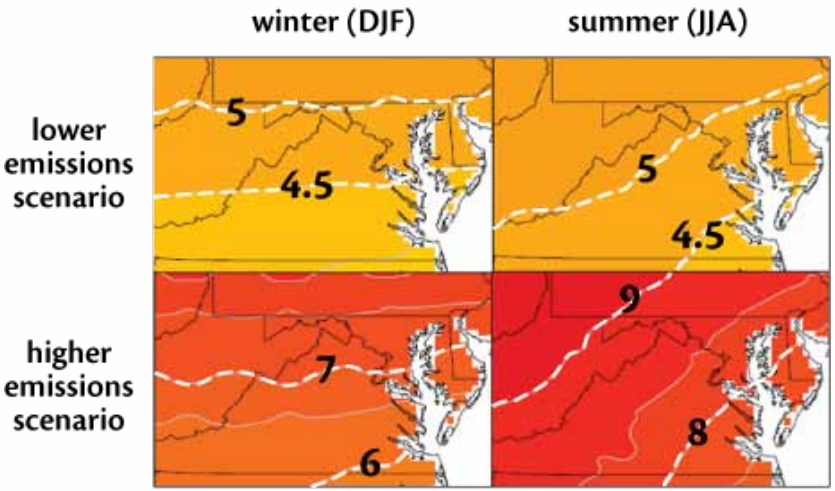
Climate Change is Coming to You

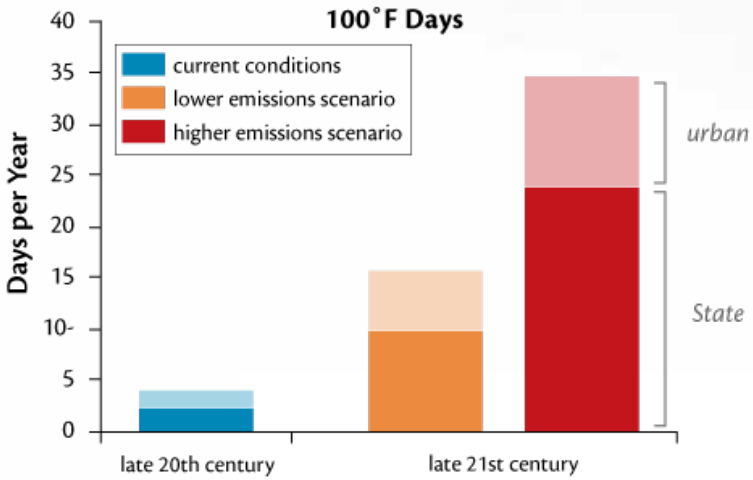


Milder Winters, Much Hotter Summers



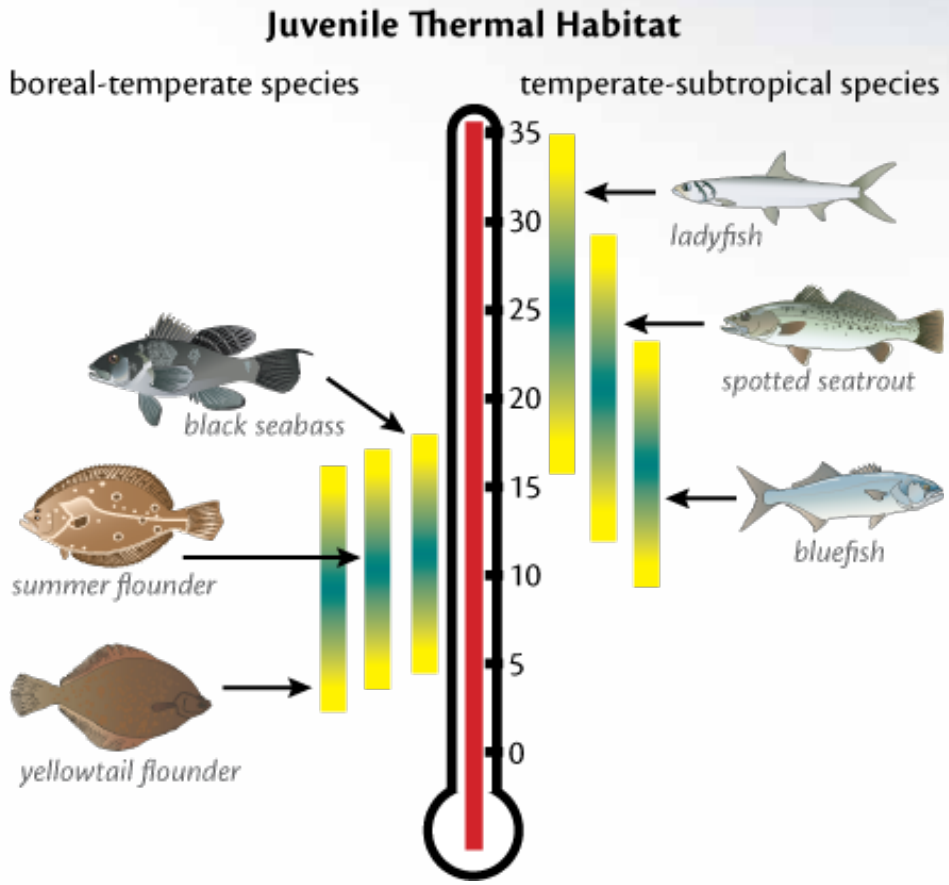


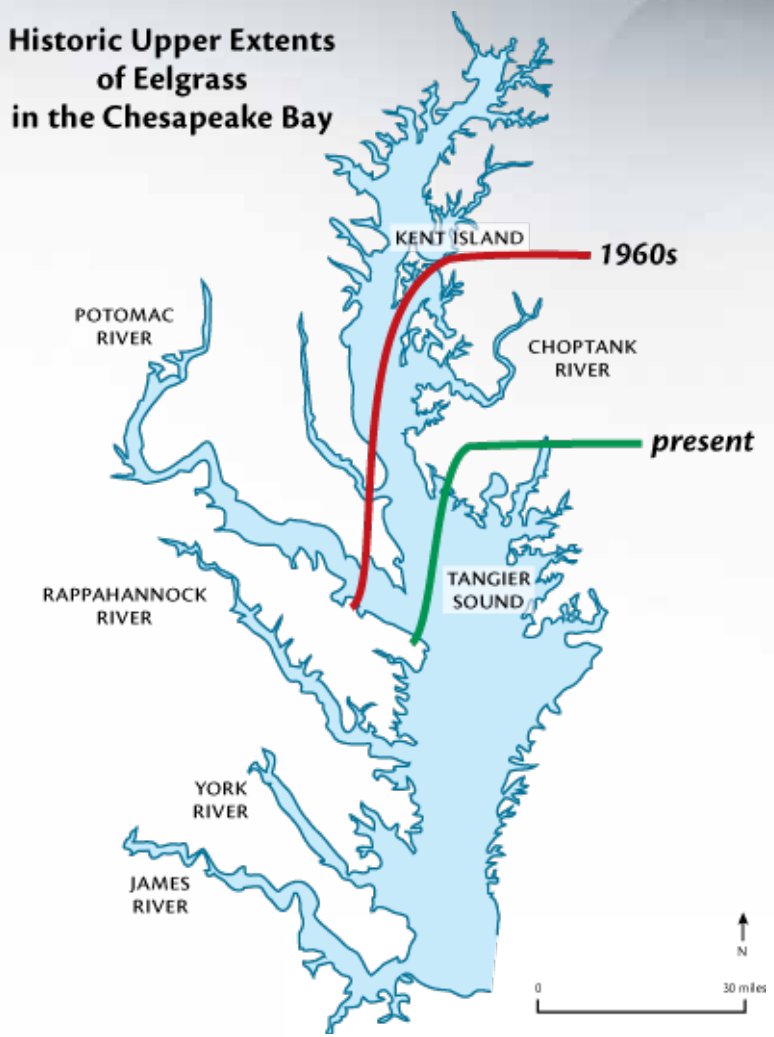




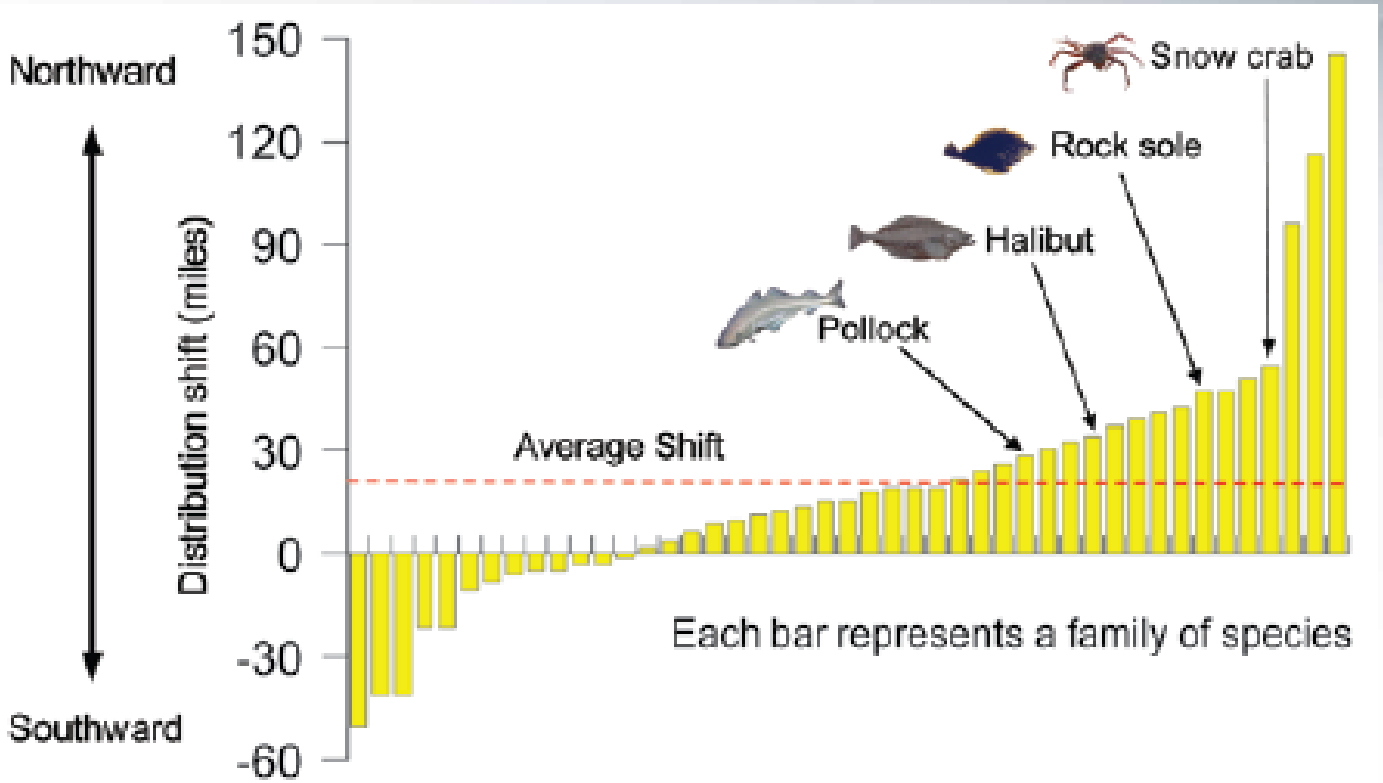
Global Warming in the Free State

The Warmer Chesapeake Bay





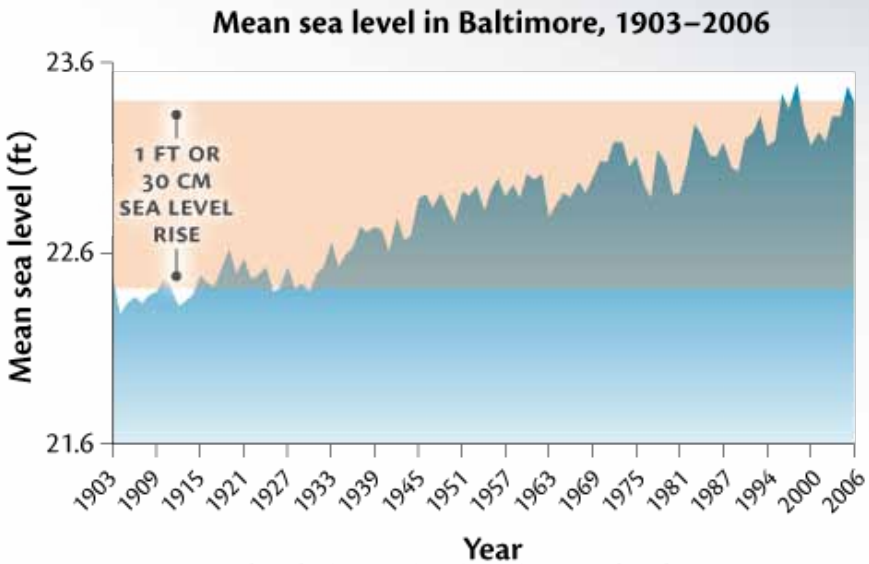
Shifting Biogeography

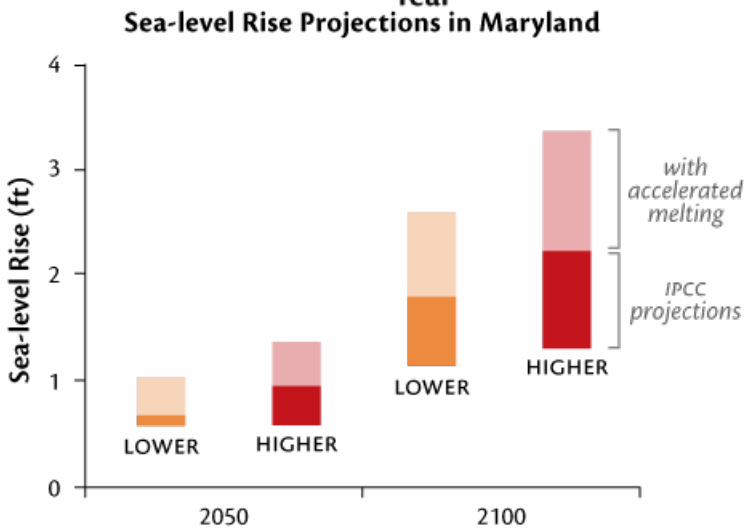


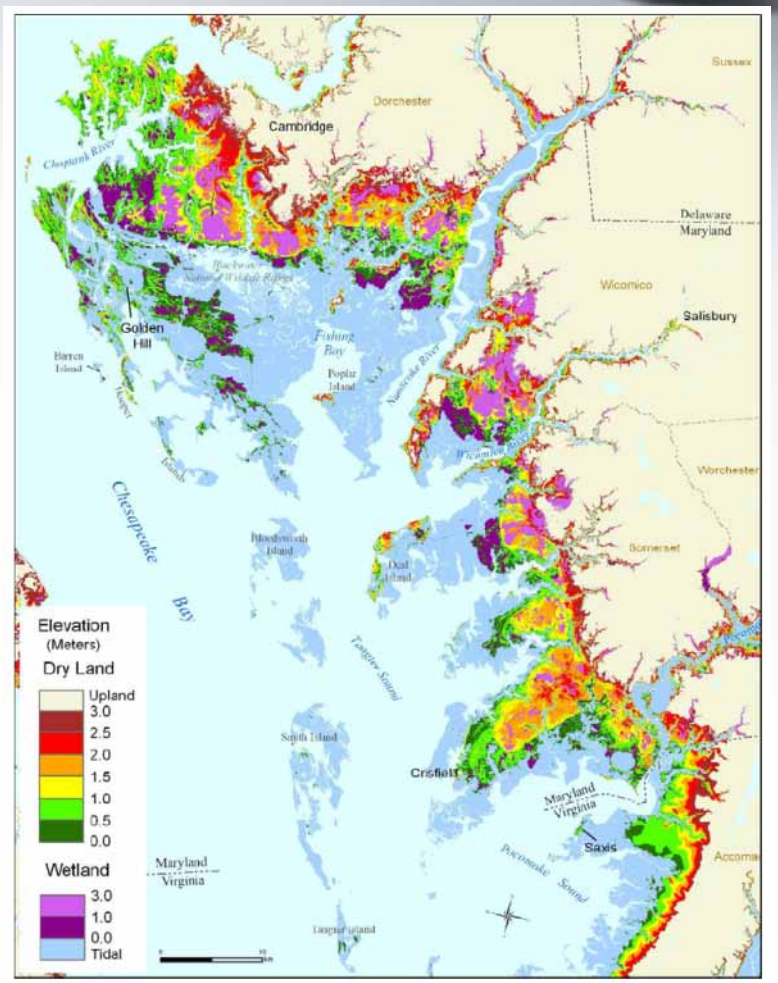
Shifts in the center of distribution of species on the Bering Sea continental shelf 1982 to 2006

Global Climate Change Impacts in the US after Mueter & Litzow (2008)

Sea-level Rise Will Redraw Maps

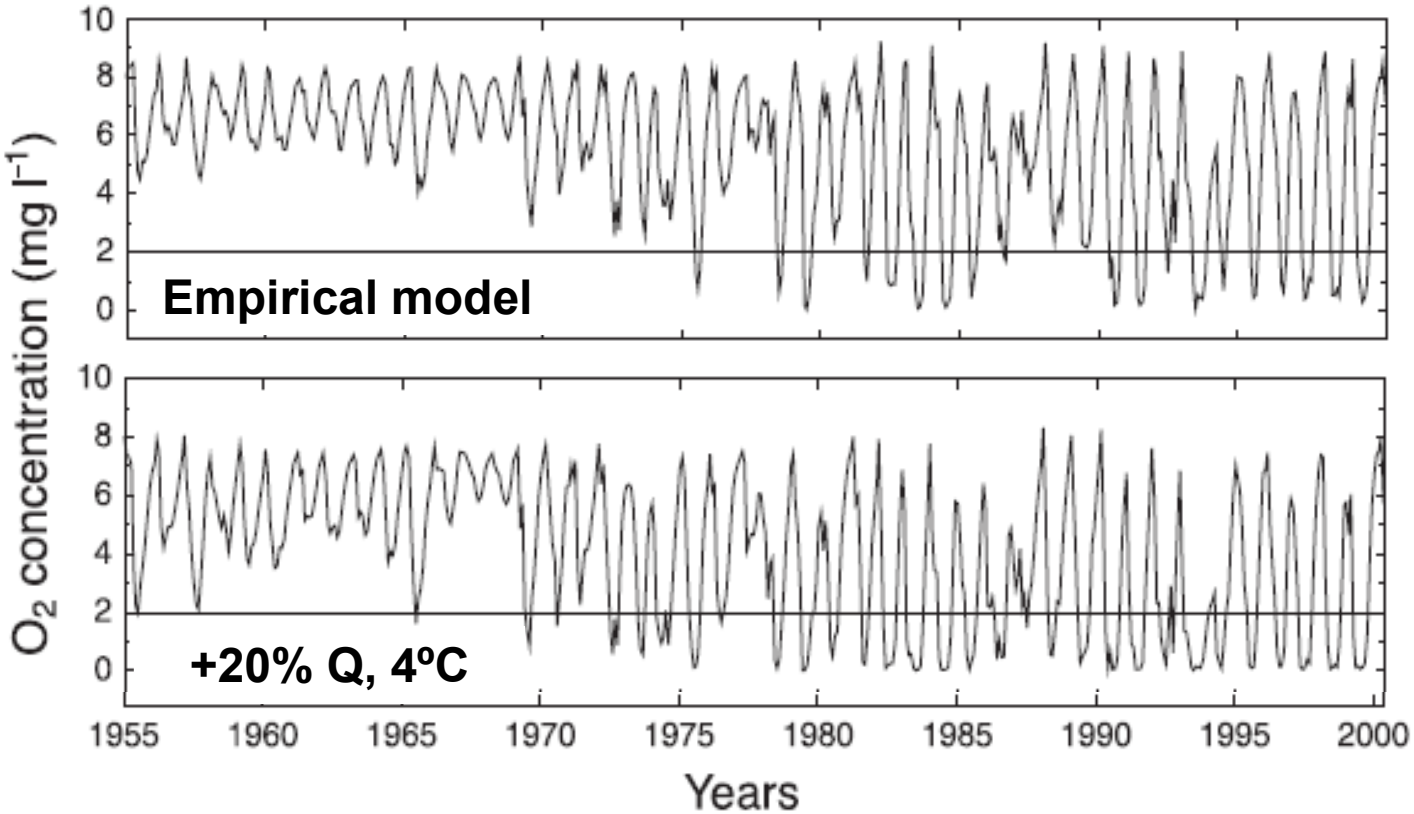






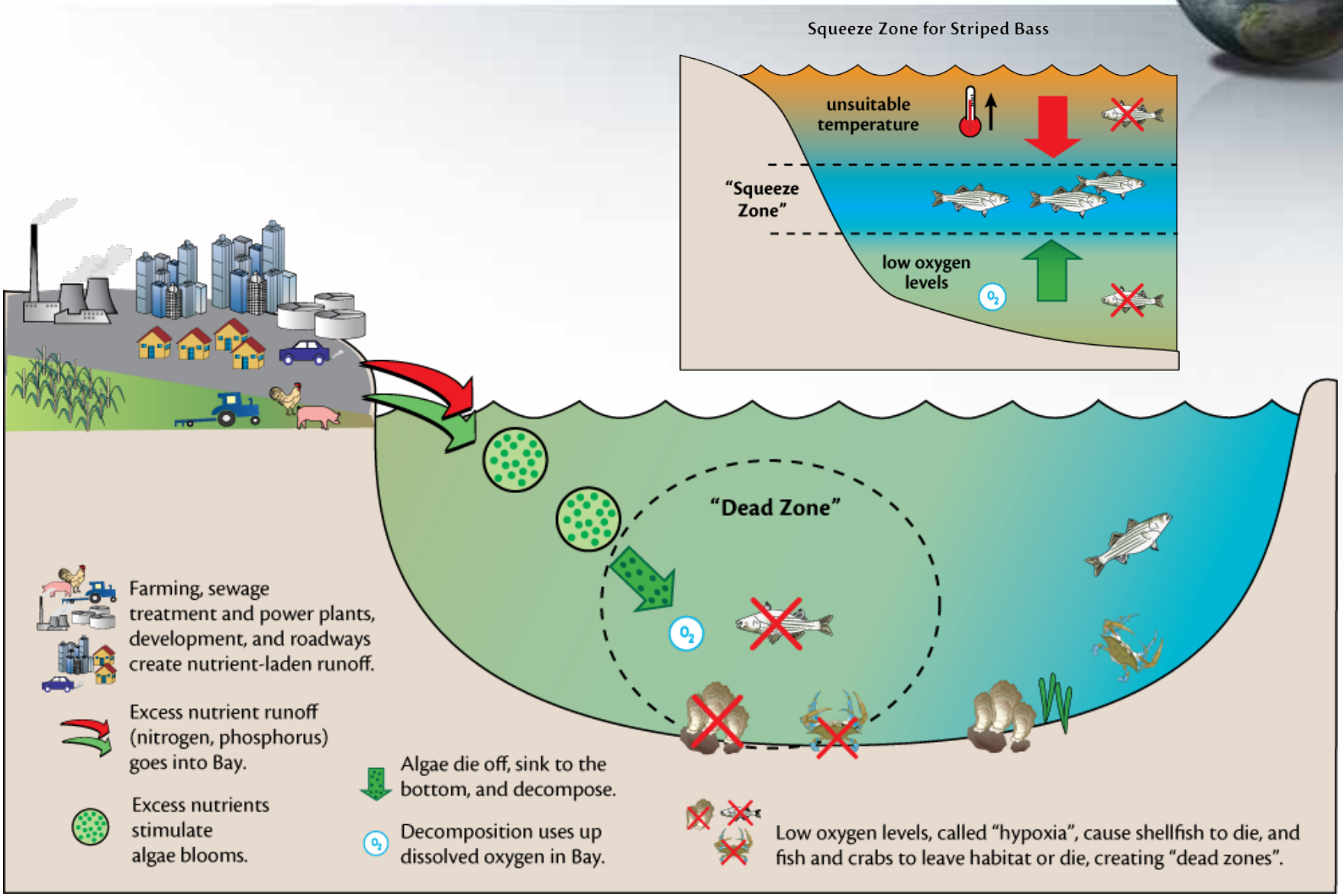
Global Warming in the Free State

Climate Change and Gulf Hypoxia



Justić et al. 2005

More Challenging Coastal Restoration

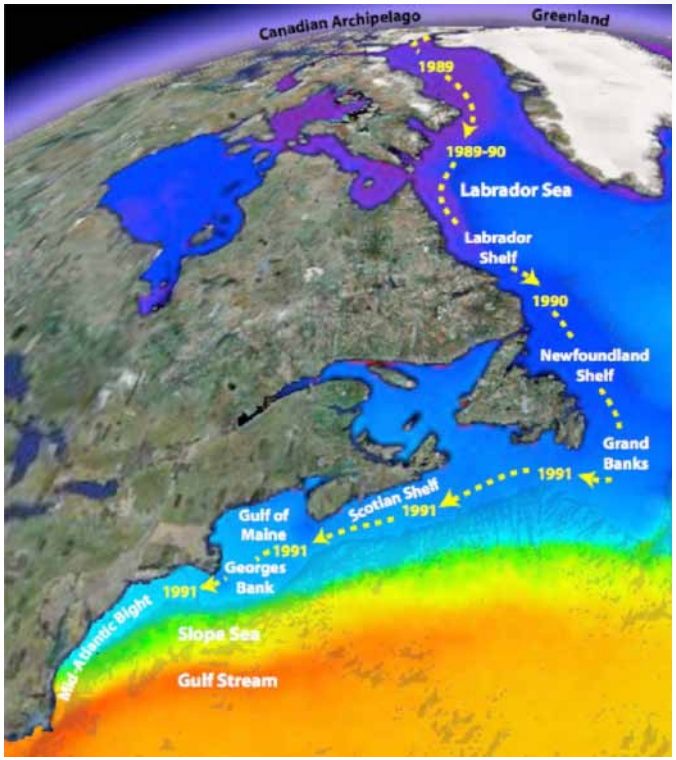


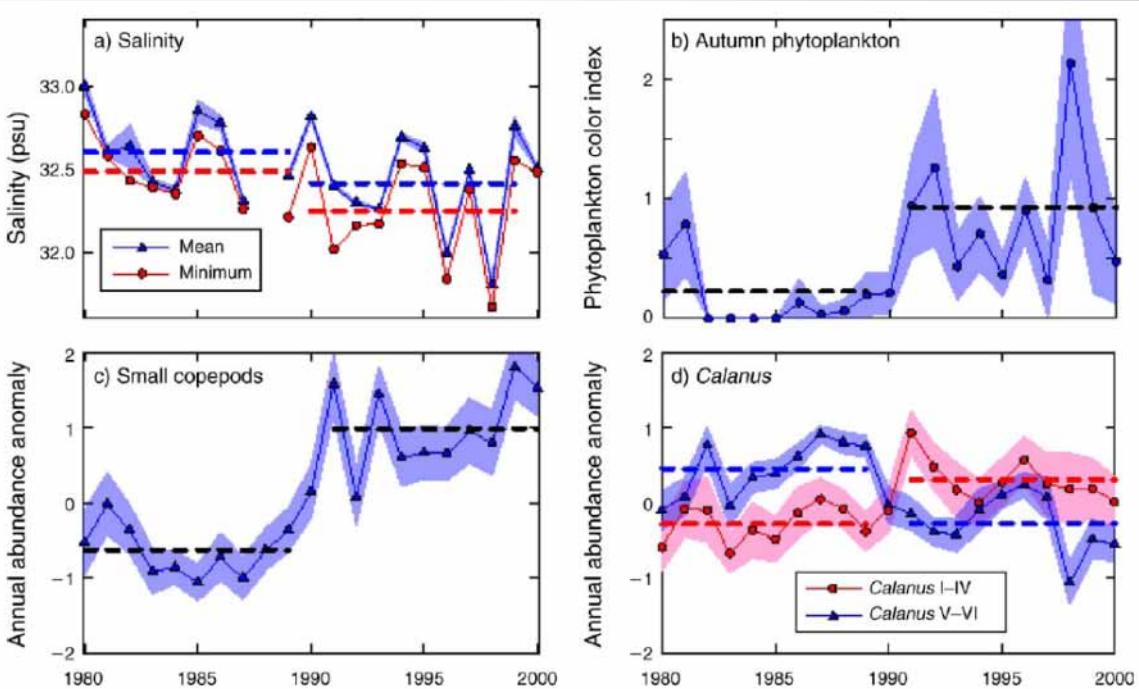
Changes in Coastal Currents and Winds

PISCO; NOAA-NWFSC; OSU/COAS[542]

Recently appearing hypoxia on the Oregon-Washington shelf

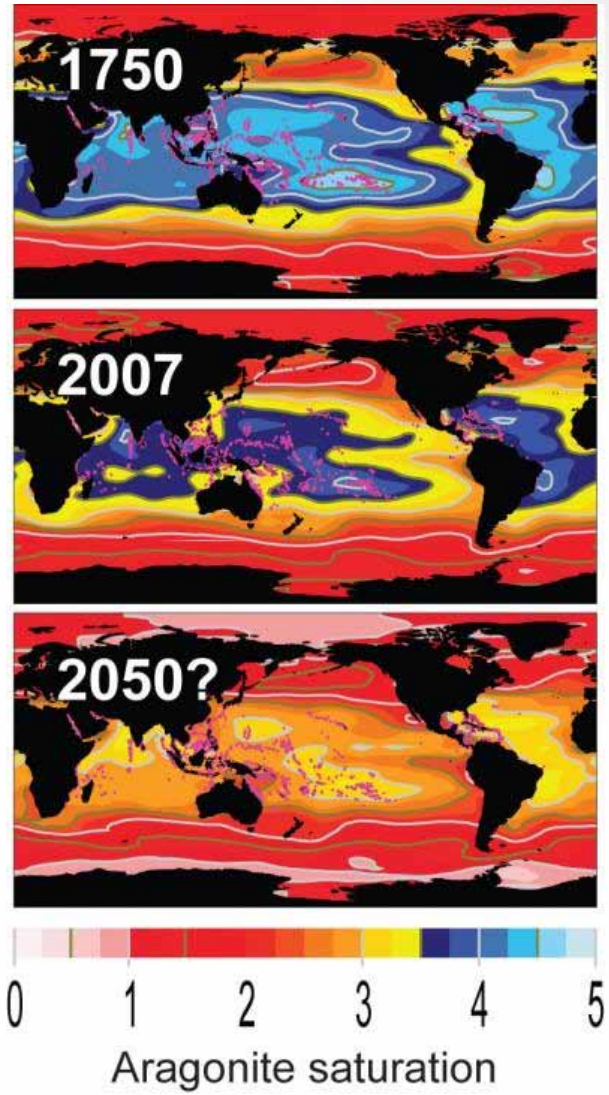
Subtle Changes, Large Consequences





Greene et al. 2008

Ocean Acidification



Examples of Transforming Climate Forces

Ecosystem	Management objective	Climate drivers
Lake Erie	Eutrophication	Greater runoff, stronger stratification
Bering Sea	Fisheries production	Loss of ice, warmer water
Micronesia	Coral reef conservation	Heat stress, acidification
Gulf of Maine	Toxic algal blooms	Warmer conditions extend range
Mississippi Delta	Wetlands, hypoxia	Sea level rise, greater discharge, stronger stratification
Southern California	Marine protected areas	Biogeographic shifts, changes in upwelling
Florida Bay	Salinity & critical habitats	Reduced Everglades flow, sea level rise
Georges Bank	Fisheries production	Surface freshening, altered seasonality

Difficulty in Incorporating Climate Change

Uncertainty about nature and pace of change

Difficulty in fully predicting consequences

Scientist

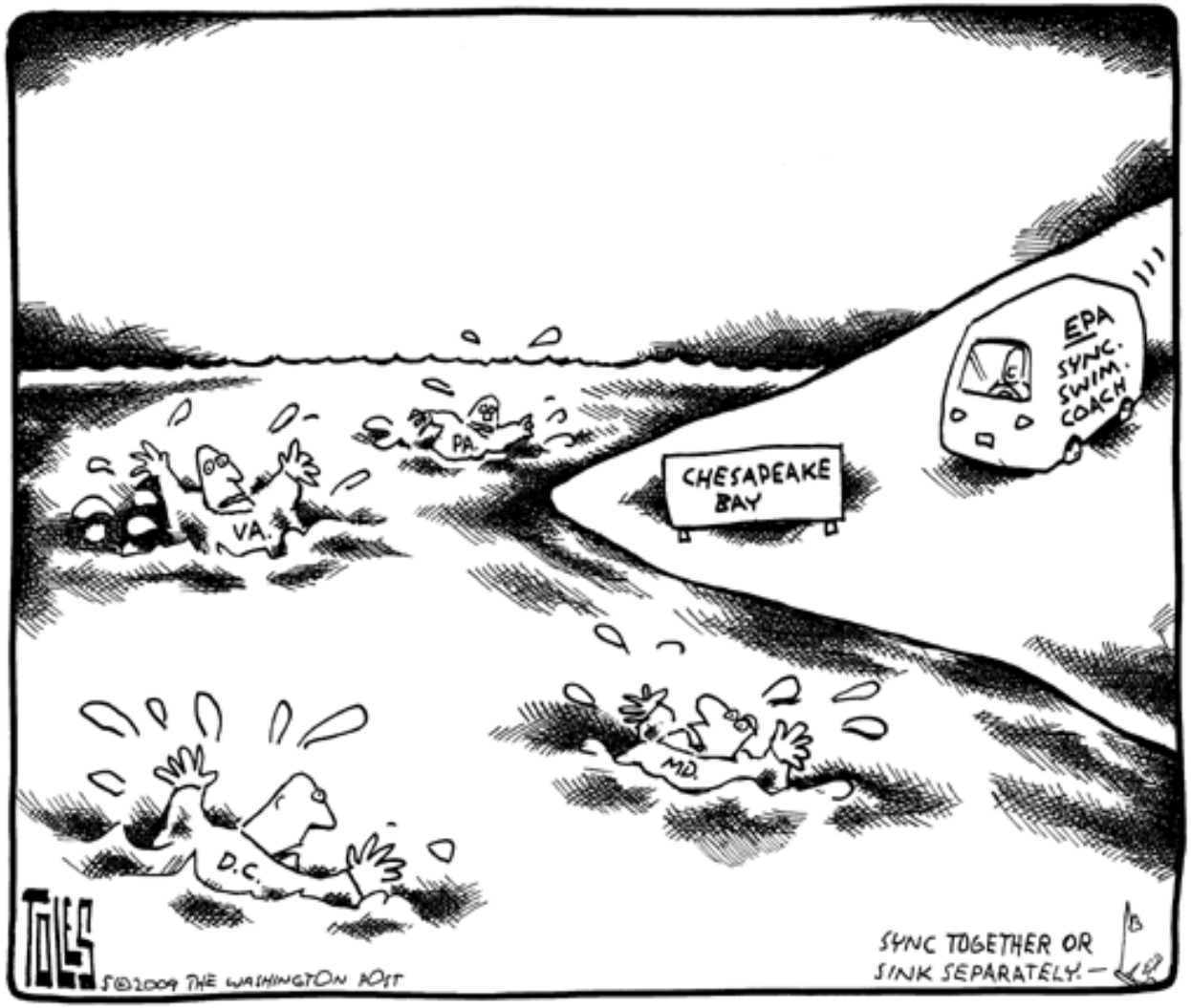
But this changes and complicates my objectives.

You tell me you're not sure?

How now to adapt?

Manager

The New Sync. Swim Coach



Questions?

- boesch@umces.edu
- www.umces.edu/president/
- www.umces.edu/climateimpacts
- www.climatescience.gov/Library/sap/usp/
- www.americasclimatechoices.org

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