CBP Climate Resiliency Management Strategy: From Development to Implementation

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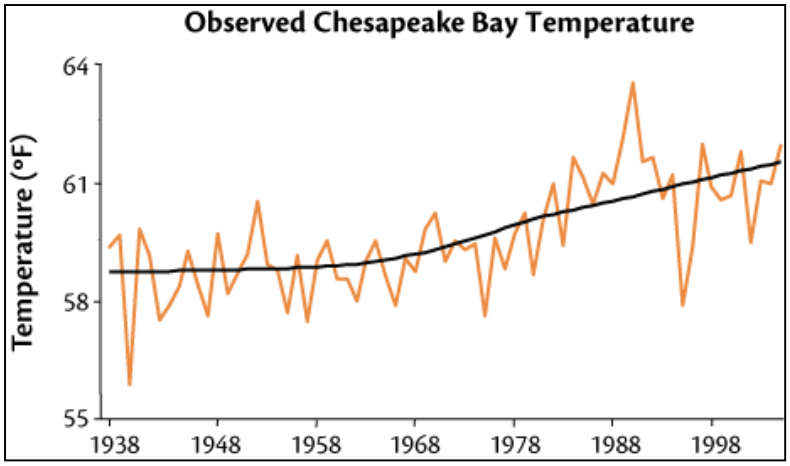
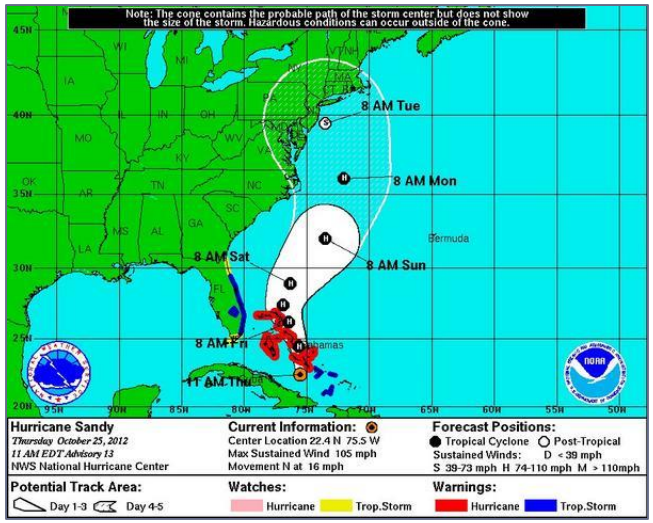
Climate Change: A Shifting Backdrop

Sea level has risen approximately one-foot in the last century.



Chesapeake Bay has warmed by more than 2°F.

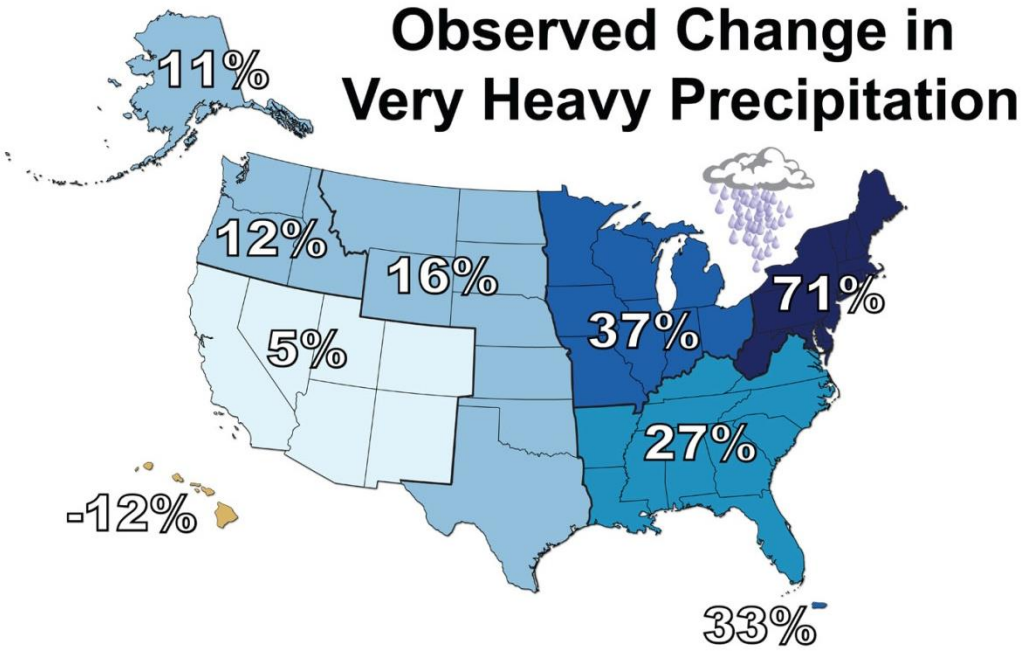


Extreme Events, such as Hurricane Sandy in 2012, foreshadow the Watersheds vulnerability to climate change impacts.

Source: www.umces.edu/climateimpacts/

Increased Precipitation & Extreme Rainfall Events

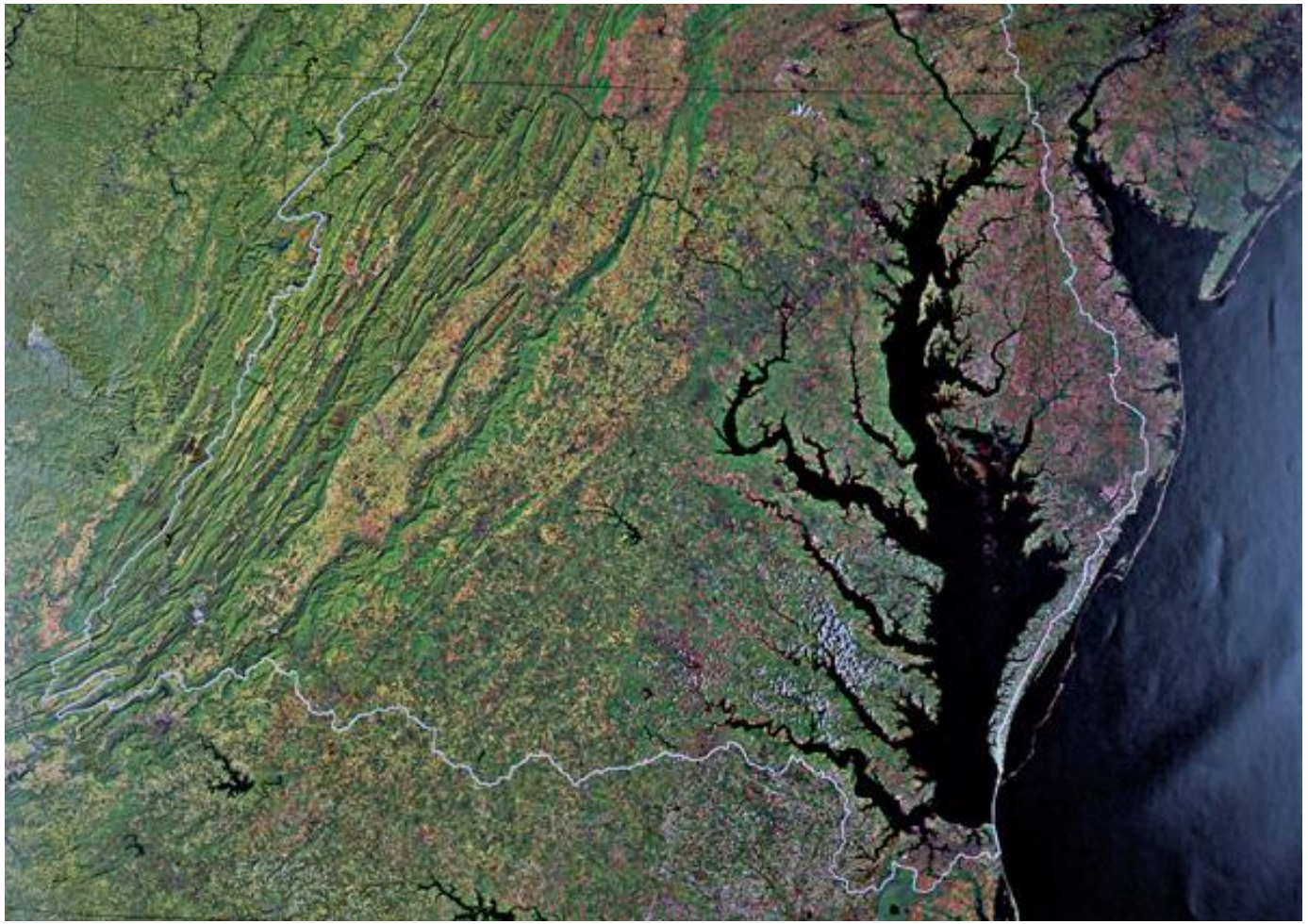
There is a clear national trend toward a greater amount of precipitation being concentrated in very heavy events, particularly in the Northeast and Midwest.



Percent changes in the amount of precipitation falling in very heavy events (the heaviest 1%) from 1958 to 2012 for each region.

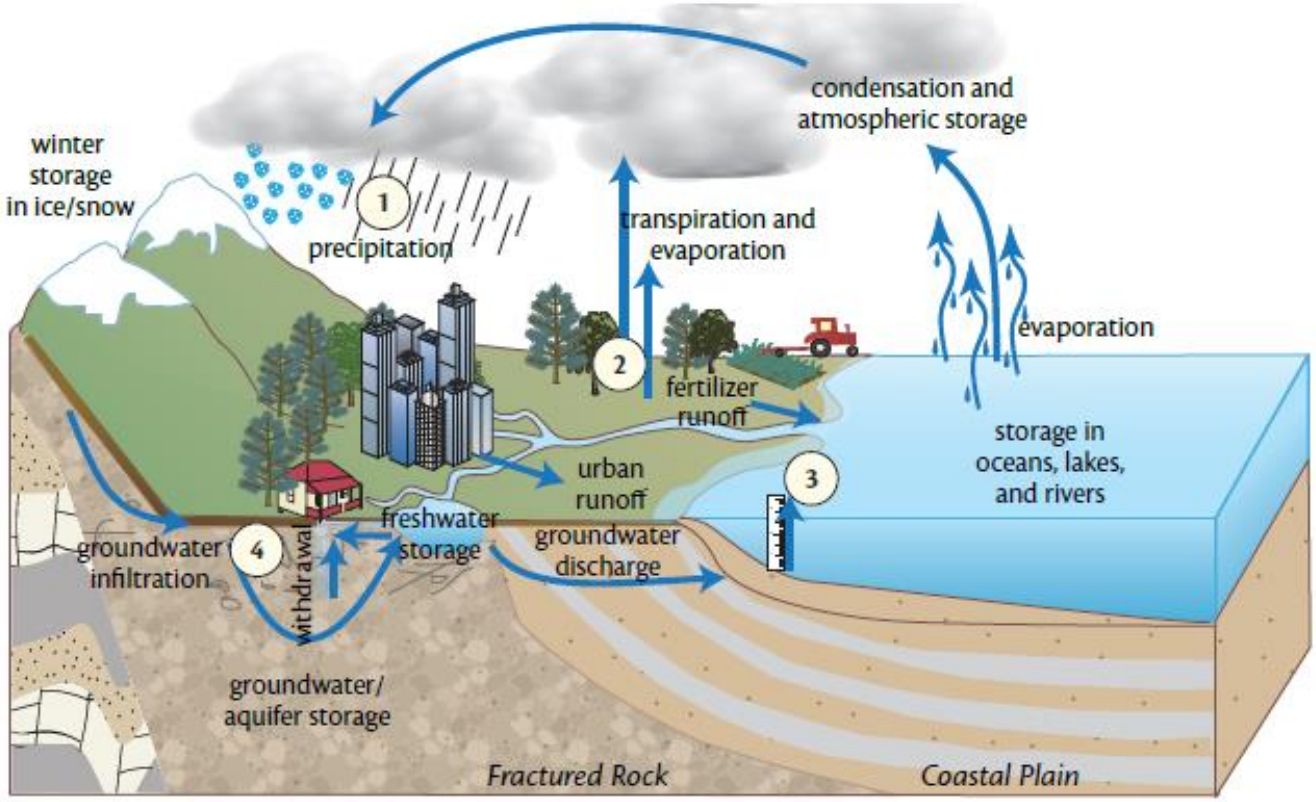
Source: National Climate Assessment (2014)

Climate Change & the Chesapeake Watershed



Source: Wikipedia

Changes to Water Supply



Climate change impacts

1. Increased frequency and variability of extreme rain may lead to flooding, surface runoff, and high energy flows, impacting water quality, stormwater infrastructure, and water and wastewater treatment infrastructure.
2. Increased likelihood of summer drought may affect stream ecosystems, lead to increased demand for irrigation, and result in water shortages.
3. Saline intrusion of freshwater resources may occur as a result of the combined effects of sea level rise and storm surge, and as a result of increased rates of groundwater withdrawal.
4. Increased withdrawal due to drought may reduce groundwater supplies.

Source: www.umces.edu/climateimpacts/

Impacts to High Quality Cold Water Resource Areas

Brook Trout, *Salvelinus fontinalis*

Source: Chesapeake Bay Program

Consequences - Impacts to Bay & Aquatic Resources

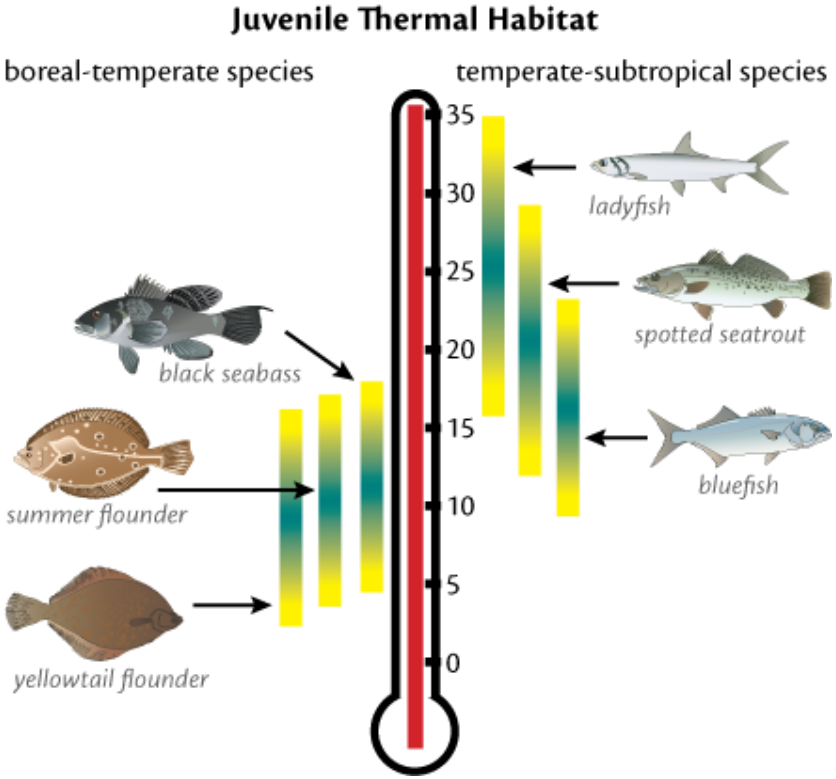


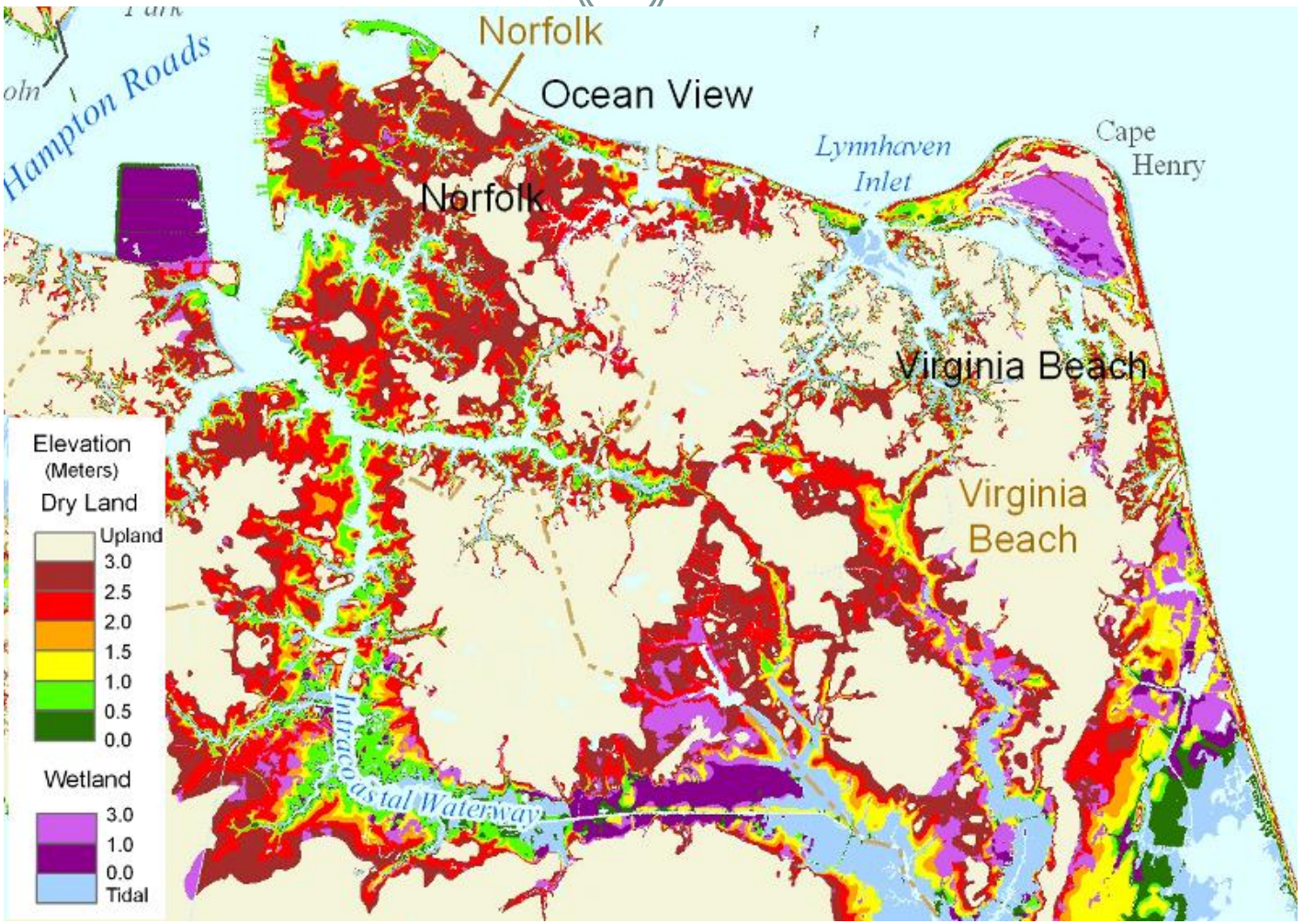
Photo: MD DNR

Source: www.umces.edu/climateimpacts/

Consequences – Loss of Vital Habitats

Photo Credit: Zoe Johnson

Coastal Community Impacts



Source: virginaplaces.org

Potential Inundation – 3.7 feet of SLR

Bay Acidification

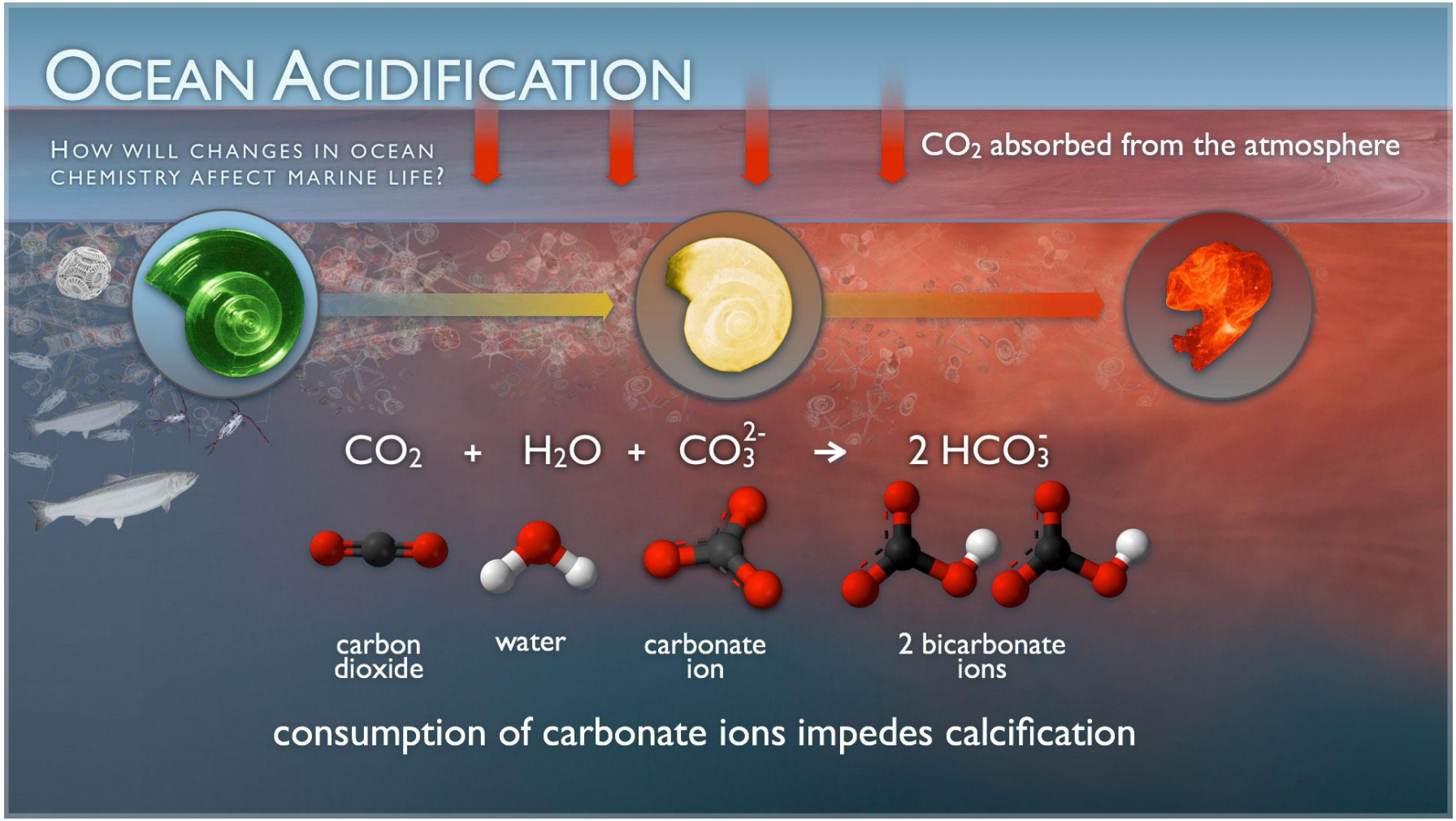


Photo Credit: UMCES, IAN

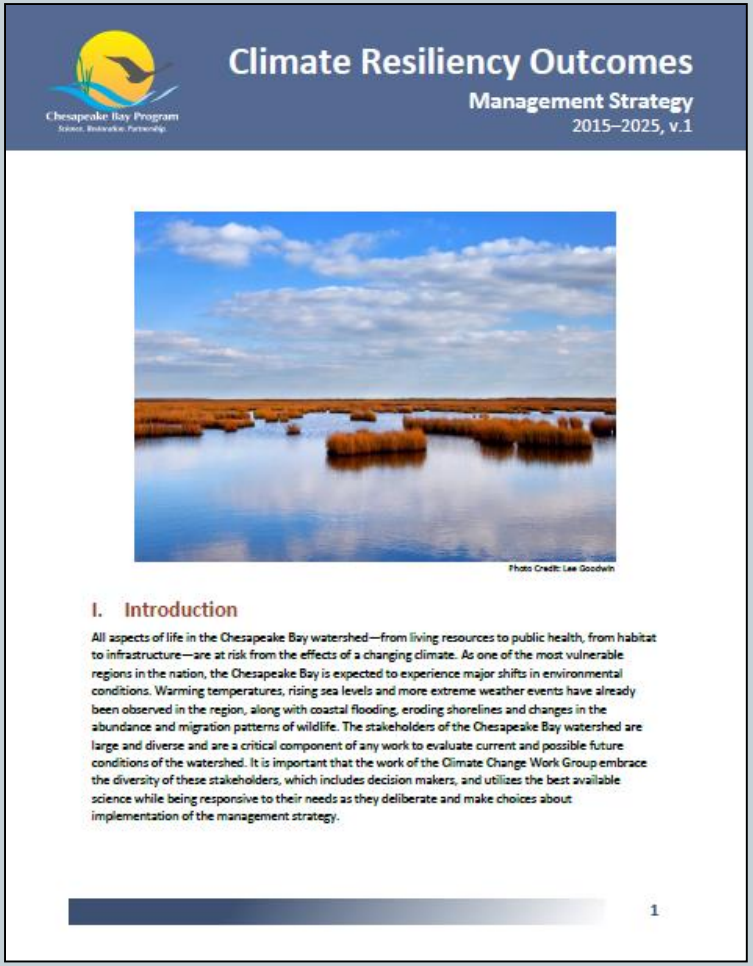
STAC Workshop: The Development of Climate Projections for Use in CBP Assessments

Take Home Messages

- The Northeast US has gotten warmer and wetter
- Precipitation has become more intense
- Trends will continue in the coming decades
- There is a large sensitivity to emissions scenarios, but not until mid-century
- Natural variability is important, particularly for precipitation
- Sea levels are rising faster than the global average and rates are increasing
- Build the capacity within the Partnership to ensure ready access to data, scenario outputs, indicators and to be able to continue to evaluate, learn, and adapt.

Key Partnership Climate Change-Related Commitments and Recommendations

- *2009 Presidential Executive Order 13508*
- *2010 Chesapeake Bay TMDL*
- *2010 Executive Order 13058: Strategy for Protecting and Restoring the Chesapeake Bay Watershed*
- *2014 Chesapeake Bay Watershed Agreement*



Chesapeake Bay Program

Climate Resiliency Outcomes

Management Strategy

2015–2025, v.1

Photo Credit: Lee Goodwin

I. Introduction

All aspects of life in the Chesapeake Bay watershed—from living resources to public health, from habitat to infrastructure—are at risk from the effects of a changing climate. As one of the most vulnerable regions in the nation, the Chesapeake Bay is expected to experience major shifts in environmental conditions. Warming temperatures, rising sea levels and more extreme weather events have already been observed in the region, along with coastal flooding, eroding shorelines and changes in the abundance and migration patterns of wildlife. The stakeholders of the Chesapeake Bay watershed are large and diverse and are a critical component of any work to evaluate current and possible future conditions of the watershed. It is important that the work of the Climate Change Work Group embrace the diversity of these stakeholders, which includes decision makers, and utilizes the best available science while being responsive to their needs as they deliberate and make choices about implementation of the management strategy.

1

2014 Chesapeake Bay Agreement

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CLIMATE RESILIENCY

GOAL: Increase the resiliency of the Chesapeake Bay watershed, including its living resources, habitats, public infrastructure and communities, to withstand adverse impacts from changing environmental and climate conditions.

- **Monitoring and Assessment Outcome:** Continually monitor and assess the trends and likely impacts of changing climatic and sea level conditions on the Chesapeake Bay ecosystem, including the effectiveness of restoration and protection policies, programs and projects.

- **Adaptation Outcome:** Continually pursue, design and construct restoration and protection projects to enhance the resiliency of Bay and aquatic ecosystems from the impacts of coastal erosion, coastal flooding, more intense and more frequent storms and sea level rise.

MANAGEMENT APPROACH

Develop a framework for engaging one-on-one with CB Partnership Goal Implementation Teams on climate related management needs.

Management Strategy	Baseline	Factor Influencing Success	Current Efforts & Gaps	Management Approach	Cross-Outcome Collaboration and Mutual Benefit	Adaptive Mgmt. & Monitoring Progress	No Mention	Rating
Water Quality		x		x	x	x		4
Black Duck		x	x	x		x		4
Brook Trout		x	x	x		x		4
Wetlands		x	x	x				3
Protected Lands		x	x	x				3
Public Access		x		x				2
Healthy Watersheds		x		x				2
Urban Tree Canopy			x	x				2
Blue Crab		x			x			2
Oyster Restoration		x			x			2
Fish Habitat		x			x			2
SAV		x						1
Diversity				x				1
Local Leadership		x						1
Fish Passage		x						1
Forage Fish		x						1
Toxics Research	x							1
Stream Health							x	0
Land Use Methods and Metrics							x	0
Land Use Options Evalations							x	0
Citizen Stewardship							x	0
Environmental Literacy							x	0
Toxics Prevention and Policy							x	0
Forest Buffer							x	0

x = climate change related element

Goal Attainment
Qualitative Factor of Risk

Goal	Outcome	Qualtitative Factor of Risk	Primary Climate Drivers
Water Quality	2025 WIP Outcome	Medium	SLR, T, P, EE
	WQ Attainment	High (over long-term)	SLR, T, P, EE
Healthy Watersheds	Healthy Waters	Varied response	T, P, EE
Vital Habitats	Black Duck	High	SLR
	Brook Trout	High	T, P
	Wetlands	Medium (non-tidal)/High (tidal)	SLR, P
	Stream Health	High	T, P
	SAV	HIgh	SLR, T, EE
	Forest Buffer	Medium	SLR, P, EE
	Urban Tree Canopy	Medium	T, P
Land Conservation	Protected Lands	Low - Medium	SLR
	Public Access	Low - Medium	SLR
Susainable Fisheries	Blue Crab	Medium	T
	Oyster Restoration	Medium	T, OA
	Fish Habitat	High	SLR, T, P, EE
	Forage Fish	High	SLR, T, P

SLR: Sea Level Rise
T: Temperature
P: Precipitation
EE: Extreme Events

Climate Resiliency Management Strategy "In a Nutshell"

- Unlike many other Bay Agreement Goals and Outcomes; it is very broad, with no numerical goals and outcomes and no established indicators.
- It's different in that it touches on both regulatory aspects of water quality and watershed restoration, as well as the need for the integration of climate considerations into many other CB Agreement goals and outcomes.
- Implementation is complicated by the fact that goal attainment requires research, monitoring, modeling, assessment, on-the-ground projects, policy and regulatory mechanisms, performance measurement, and adaptive management.
- Implementation priorities needed to be established due to the breadth of the issue; recognizing new priorities will evolve over time.
- Work Plan contains 108 actions divided between "individual signatory and partner" actions and a small set of of "collective" actions .

Key Action Focus Areas

2016-2017

- **Water Quality and the 2017 Mid Assessment**
- **Monitoring Needs and Long Term Trend Assessments**
- **Climate Data and Information Portals**
- **Communications, Outreach, Education and Capacity Building**
- **Green Infrastructure and Coastal Resiliency**
- **Research Agenda, Capacity and Needs**
- **Bay Acidification**
- **Climate Change and Diversity**
- **Climate Impact Vulnerability Assessments**
- **Climate Change Indicators and Performance Metrics**

Climate Resiliency Work Plan

"Collective" Priority Actions

- **Cross-Goal Climate Resiliency Analysis and Decision-Making Matrix –** EPA/*GIT Funded Project (2016-2017)*
- **Assessment of Monitoring Needs for 4-select workgroups -** STAR
- **The Development of Climate Projections for Use in Chesapeake Program Assessments -** *STAC Workshop (March, 2016)*
- **Technical Guidance related to the Climate Change Component of the Chesapeake Bay Mid-Point Assessment –** *CBP EPA (2017)*
- ***An Analytical Framework for Aligning Chesapeake Bay Program (CBP) Monitoring Efforts to Support Climate Change Impact and Trend Analyses and Adaptive Management (SAV, Blue Crabs and Oysters)*** *– STAC Workshop (Spring, 2017)*

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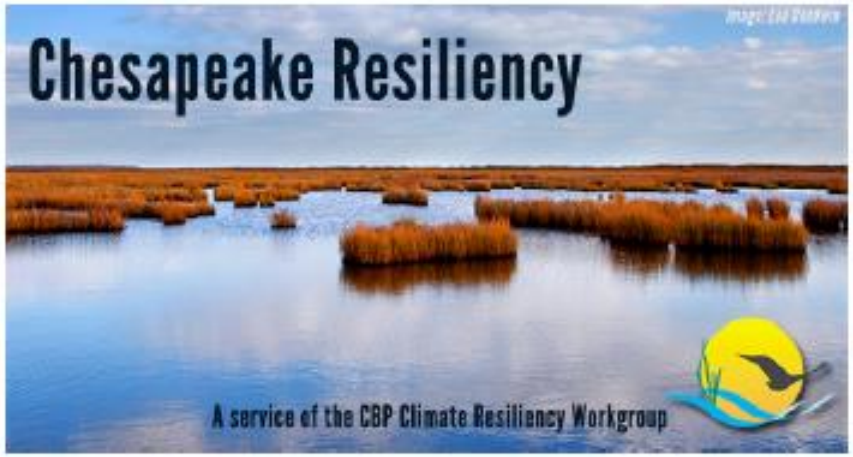

Winter 2016

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From the Bay Program

Welcome to the first edition of Chesapeake Resiliency News; a service brought to you by the CBP Climate Resiliency Workgroup. This news and information is intended to serve as a resource for Chesapeake Bay Program partners, including scientists, researchers, planners, policy-makers and practitioners working on and/or interested in learning more about climate-related efforts underway in the Chesapeake Bay watershed.

Subscribe: http://www.chesapeakebay.net/groups/group/climate_change_workgroup

Climate Change & the TMDL Mid-Point Assessment and Beyond

- Assess how climate change may affect current water quality standards (i.e., nutrient and sediment source loads over time)
  - Precipitation change (increased volume and intensity)
  - Temperature increase (air and water)
  - Sea level rise (hydrodynamics and impacts to beneficial resources (i.e., wetlands)
- Evaluate climate impacts on the effectiveness of existing water quality BMPs over time
  - BMP water quality efficiencies
  - "Climate-smart " siting and design guidance for BMP implementation
- Explore the policy response options to address projected climate-related changes in water quality standards
  - Incorporate changes into Phase III WIPS
  - Add an explicit Margin of Safety (MOS)
  - Strategically incorporate into select BMP practices (e.g., wetland restoration, storm water)
  - Defer integration
- Seek opportunities to prioritize BMP's with ancillary "climate resilience" benefits
  - Quantify climate resiliency benefit of existing water quality BMP's (storm surge and flood attenuation, shore protection)

2017 Mid Point Assessment
Timeline

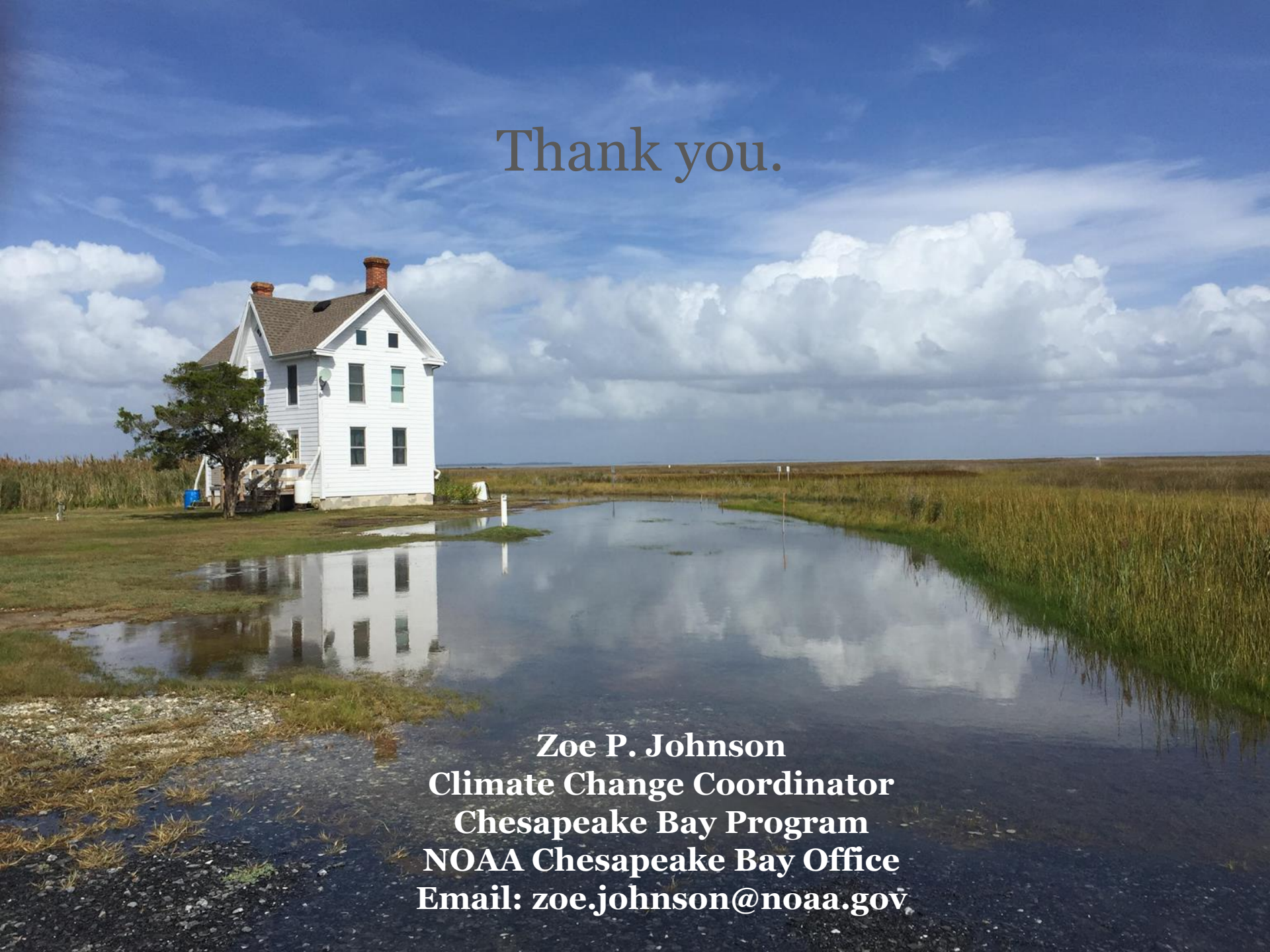
Climate Considerations

- Independent scientific peer review in summer 2016 (may occur as part of the peer review of the modeling tools) (Lead: STAC)
- Modeling team generates climate change analyses by fall 2016 to inform future policy decisions (Lead: Modeling Workgroup)
- Partnership decisions on how to factor climate change into WIPs in fall 2016-winter 2017 (Leads: WQGIT, Management Board, and Principals' Staff Committee)
- Factor climate change considerations into Phase III WIPs in 2018 (Lead: State Jurisdictions)

CBP Management Board
Areas for Future Engagement

Participation, Input, and Ideas

- Feedback on the programmatic approach to climate resiliency
- Guidance on future implementation priorities
- Advocate for more active participation among workgroup members in the implementation of "collective" priorities
- Thoughts on appropriate forums and opportunities to begin the policy dialog related to the Mid-Point Assessment, Phase III WIPS, and beyond (2050).


Thank you.
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