Leveraging Climate Change Research to Support Policy Analysis and Risk Communication

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EPA Environmental Research Program Review

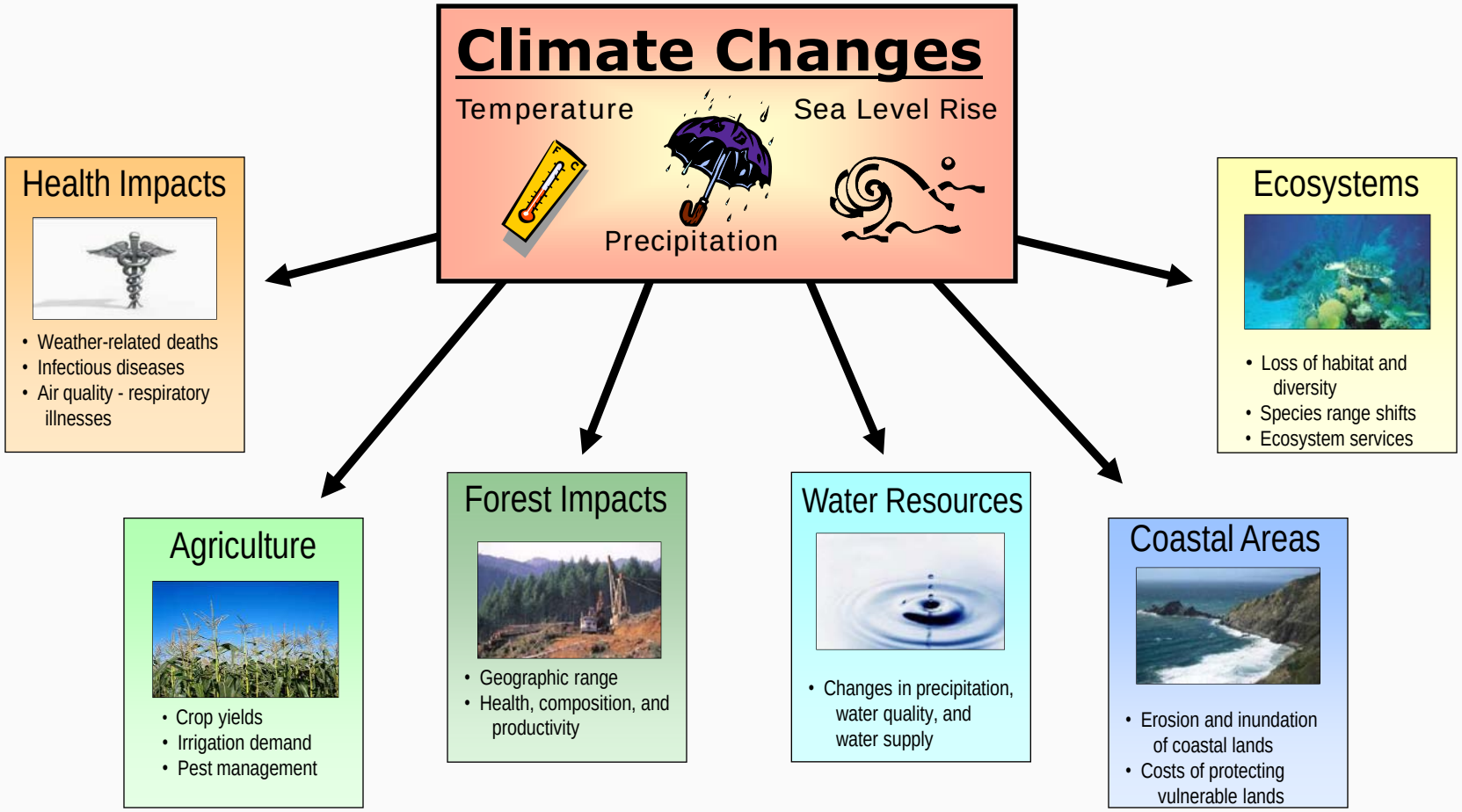
Consequences of Global Climate Change: Water Quality Impacts, Ecological Impacts and Nonlinear Responses

Improved Analytic Capabilities Important to Support Evolving Policy/Programmatic Needs

- The endangerment finding under the Clean Air Act focused on whether or not there is a threat due to GHGs.

- Further policy development is informed by:
  - How do we manage, avoid, and adapt to the threat?
  - How do we measure the benefits (i.e. avoided impacts and risks) of mitigation and adaptation options?
  - How do we improve current tools, and develop metrics, to best inform these questions?
    - Within the analytic community
    - For the public and policy makers

Different impacts require different modeling approaches: *challenge is bringing together in consistent fashion*

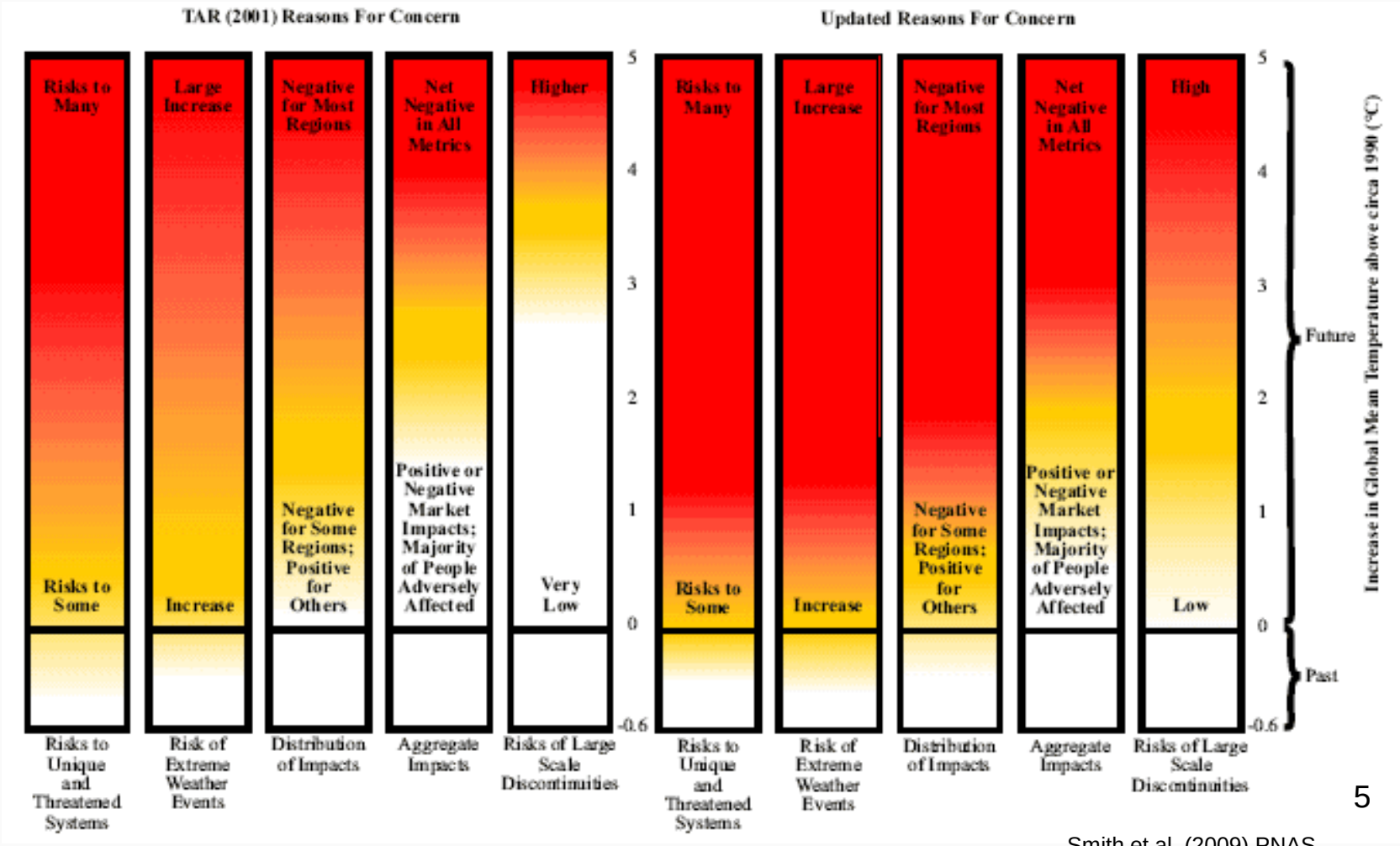


Leveraging Research to Support Policy Analysis

- How do the suite of impacts and risks change over time from the reference case to a policy case?
- Develop metrics to quantify (where possible) and communicate the impacts of climate change and the benefits (i.e., avoided impacts/risks) of mitigation and adaptation.
- Develop and apply estimates/models of specific (avoided) impacts.
- Integrate estimates into broader analytical frameworks to tell as comprehensive a story as possible (integrated assessment)
- Supplement economic benefits estimates with physical metrics that can be communicated to policymakers and the public.
  - Climate change indicators
  - Moving toward risk-based management analytical approaches (probabilities)

Communicating Multiple Metrics/Risk Indicators:

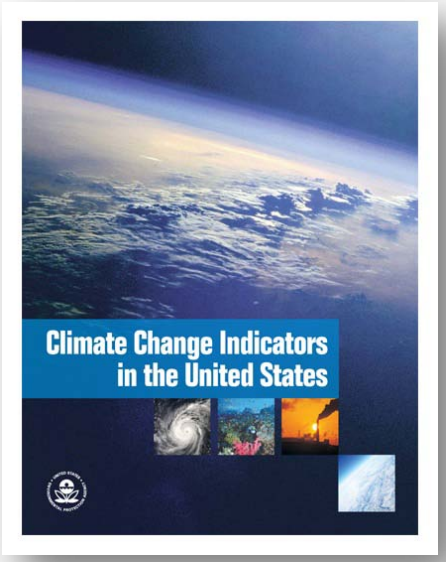
Not only what's presented, but how we present it is important



Smith et al. (2009) PNAS

EPA's *Climate Change Indicators in the United States* Report

- Primary purpose:
  - To communicate the causes and effects of climate change
  - Present multiple, independent lines of evidence of observed changes
  - Provide input to broader programmatic accountability efforts
- Leverages existing climate science to effectively convey indicators of observed change.
- Contains 24 key indicators….
- Includes data from EPA, other government agencies (e.g. NOAA, NASA, USGS, and CDC), research institutions, universities, and NGOs.



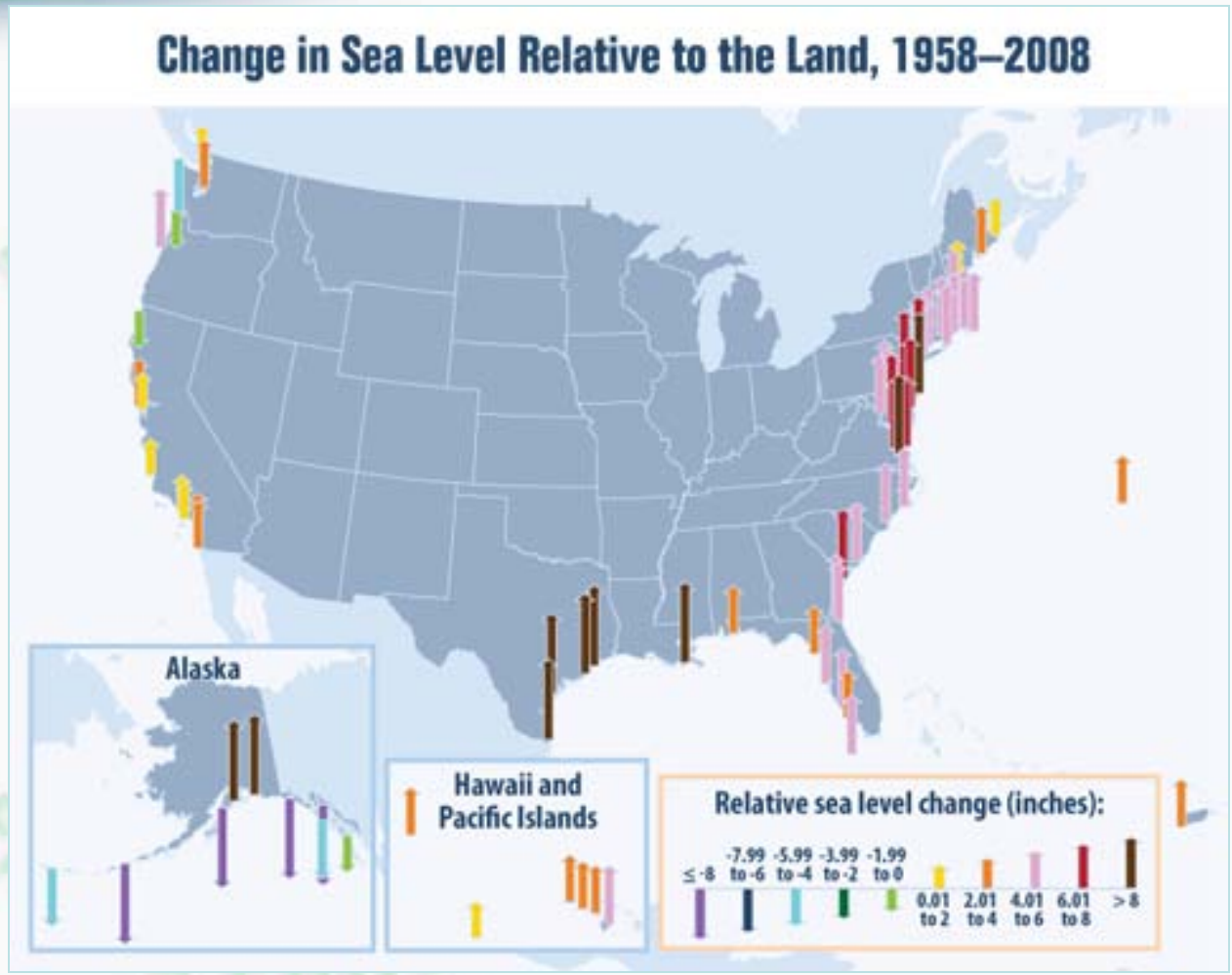
EPA's Indicators effort continued…

- **Major strength of the report is multi-organization contribution and collaboration.**
  - Enhances coordination among partners
  - Provides credibility
  - Helps contributors see how their efforts (analytical research, observational networks) are utilized
  - EPA is largely the 'client' of the analytical science and therefore can focus on messaging

Example from 2010 Indicators Report: Sea Level

After about 2,000 years of little change, average sea levels rose worldwide throughout the 20th Century (with an accelerated rate of increase in recent years).

Relative sea level rose along much of the U.S. coastline, particularly the mid-Atlantic and some Gulf regions.



Relative sea level is the height of the ocean relative to land elevation at a particular location.

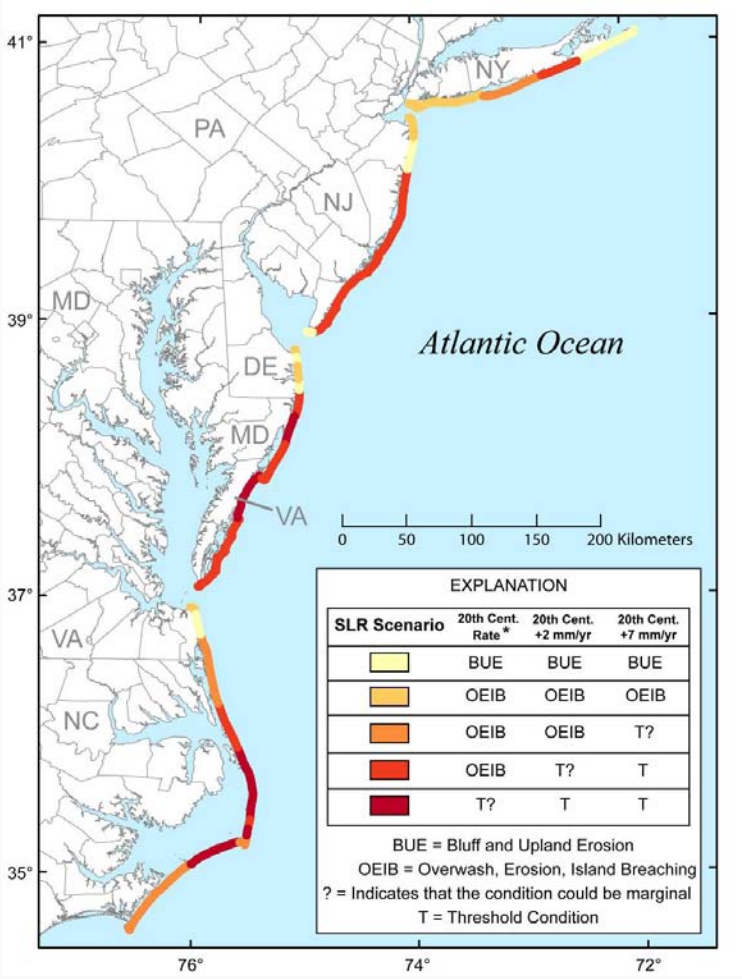
Data Source: NOAA, 2009 Tides and Currents: (http://tidesandcurrents.noaa.gov/sltrends/slrmap.html)

Coastal Sensitivity to Sea-Level Rise:
A Focus on the Mid-Atlantic Region

I. Physical and Environmental Effects
II. Impacts on Society
III. Adaptation Opportunities
IV. Research Needs

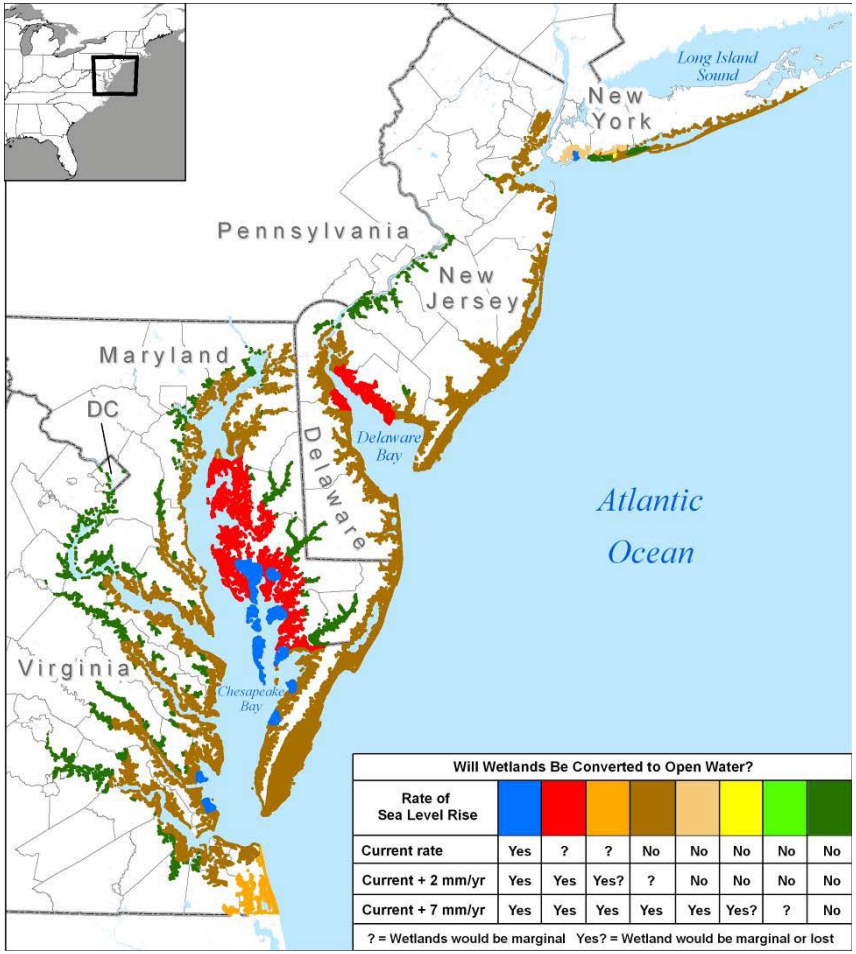
U.S. Climate Change Science Program
Synthesis and Assessment Product 4.1

Risk of fundamental changes to barrier islands and back-barrier estuaries



- Shades of red ➔barrier island may disintegrate for 50 or 100 cm rise in sea level.
- Shore protection or allow nature to take its course?
- Species threatened by loss of barrier islands.
- Still Need to know
  - Impact of sea level rise on estuaries and species
  - Change in flood risk
  - Costs of lost property, shore protection, value of species
  - Implications for policies to sustain barrier islands as sea rises (e.g. *Rolling Easements*)

Quantifying Wetlands Loss



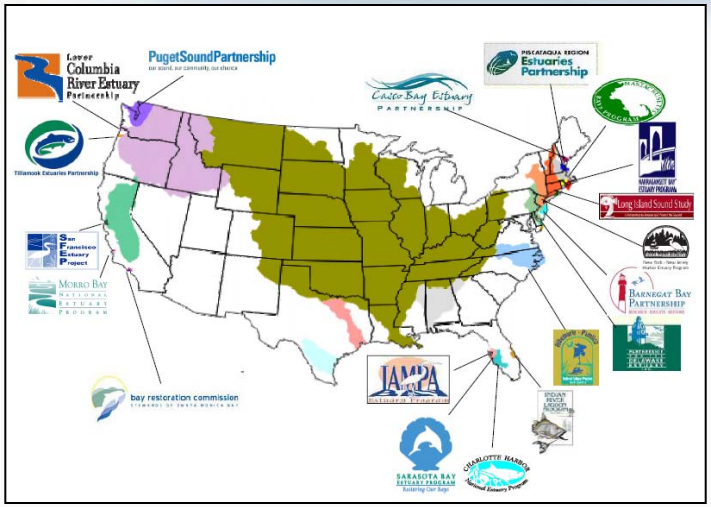
Will Wetlands Be Converted to Open Water?								
Rate of Sea Level Rise								
Current rate	Yes	?	?	No	No	No	No	No
Current + 2 mm/yr	Yes	Yes	Yes?	?	No	No	No	No
Current + 7 mm/yr	Yes	Yes	Yes	Yes	Yes	Yes?	?	No

? = Wetlands would be marginal Yes? = Wetland would be marginal or lost

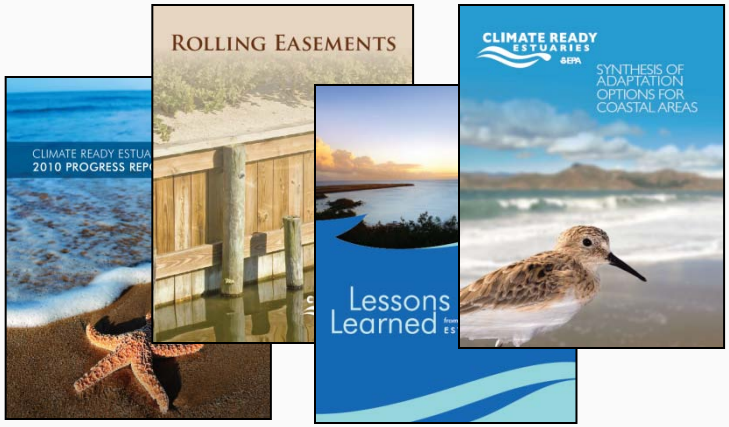
- Can wetlands keep pace?
  - Brown→Loss with 1 m rise
  - Blue/Red→ loss with 50 cm rise
  - Green→ Probably can keep pace
- Will there be vacant land for habitat to migrate inland?
- Species that depend on the wetlands
- Still Need to know
  - Impact of habitat loss on those species
  - Monetary values
  - Implications for policies to sustain wetlands as sea rises

CLIMATE READY ESTUARIES

EPA



- Partnership between NEPs and EPA
  - CRE focuses on building capacity in the NEPs to adapt to climate change.
  - Cross office participation (OW, OAR, ORD, Regions)
  - 19 of the 28 NEPs are working under CRE.
  - 31 total projects between 2008-present.



- Program focus is to form partnerships to support adaptation in NEPs:
  - ORD-NCEA supported 2 NEPs in conducting vulnerability assessments.
  - CRE/CRWU supporting 2 NEPs in working with water utilities on vulnerability analyses.
  - Ongoing collaborations with NOAA.

www.epa.gov/cre

CLIMATE READY ESTUARIES
EPA

Leveraging Research to Support Policy Analysis

Some take-away messages:

- Leveraging *quantitative* analyses most useful for further application in valuation and policy analysis.
- Moving toward risk management and probability-based outputs.
- Striving for clear and simple communication of risk, including confidence.

Thank You!

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www.epa.gov/climatechange

On a lighter note: Impact of Climate Change on Footwear