



U.S. Global Change Research Program  
**National Climate  
Assessment**

# The National Climate Assessment

**Fred Lipschultz**

**Senior Scientist & Regional Coordinator**

**National Climate Assessment  
US Global Change Research Program**





## United States Global Change Research Program

Global Change Research Act (1990):

“To provide for development and coordination of a comprehensive and integrated United States research program which will assist the Nation and the world to **understand, assess, predict, and respond** to human-induced and natural processes of global change.”



13 Federal Departments & Agencies +  
Executive Office of the President

More information at

<http://www.globalchange.gov>



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# The USGCRP Strategic Plan 2012-2021



**Goals:**  
**Advance Science**  
**Inform Decisions**  
**Sustained Assessments**  
**Communicate and Educate**

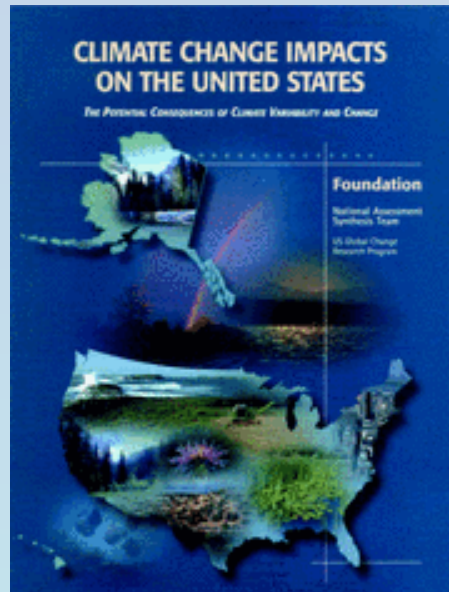
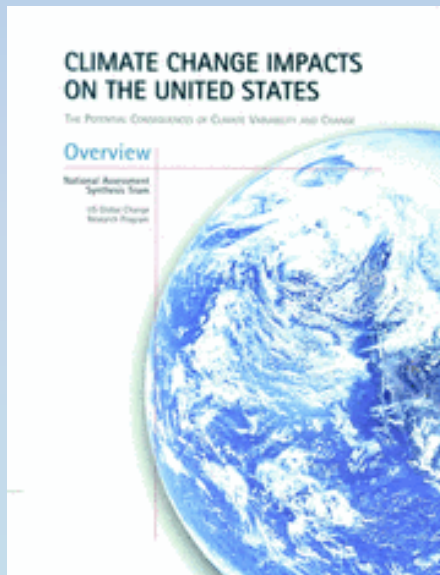
More information at:  
<http://www.globalchange.gov>



# Previous National Climate Assessments

U.S. GCRA (1990), Section 106: **...not less frequently than every 4 years**, the Council... shall prepare... an assessment ....

## Climate Change Impacts on the United States (2000)



## Climate Change Impacts in the United States (2009)



# Assessment = Products + Process

## Goal

- Enhance the ability of the United States to **anticipate, mitigate, and adapt** to changes in the global environment.

## Vision

- Advance an **inclusive, broad-based, and sustained process** for assessing and communicating scientific knowledge of the impacts, risks, and vulnerabilities associated with a changing global climate in support of decision-making across the United States.



# Goals for the “new” NCA

- A **sustained process** for informing an **integrated research program**
- New approaches to development and use of **scenarios at multiple scales**
- **Evaluation** of the implications of alternative **adaptation and mitigation options**
- **Community building** within regions and sectors that can lead to enhanced resilience



# Outcomes of the NCA

- **Ongoing, relevant, highly credible analysis** of scientific understanding of climate change impacts, risk, and vulnerability
- Enhanced timely **access to Assessment-related data** from multiple sources useful for decision making
- **Systematic evaluation** of progress towards reducing risk, vulnerability, and impacts
- **National indicators** of change and the capacity to respond



# The Sustained National Climate Assessment

**Foundational reports, e.g.,**

Scenario development • Indicators • Valuation

**Improved use-based science, e.g.,**

CMIP 5+ • Decision support tools

**Other assessment efforts, e.g.,**



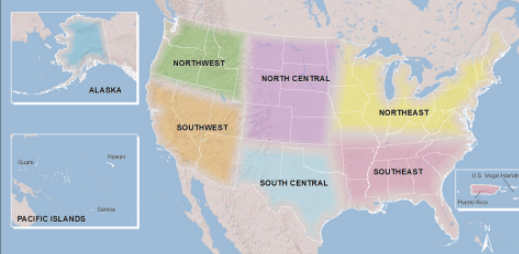
**Special topics reports, e.g.,**

Food security • International • Drought

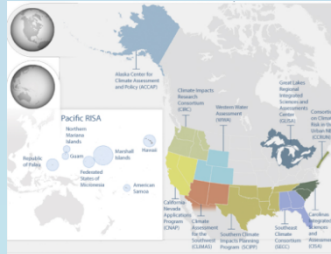
**Technical inputs, e.g.,**

Regional analyses • Literature reviews • Data & model results

**Connecting to and building networks, e.g.,**



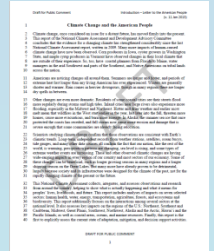
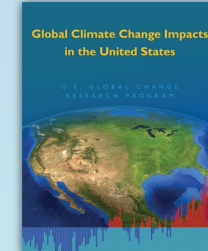
DOI Climate Science Centers



Regional Integrated Sciences & Assessments (RISA)

**NCAnet:  
Partners in  
Assessment**

**Quadrennial National Climate  
Assessment Reports**



# Foundational and Special Topics

- Foundational Topics (supportive of 2017 synthesis report and beyond)
  - **Sustained assessment (underway)**
  - **Indicators (underway)**
  - Valuation
- Special topics “experiments”
  - **Food security (underway)**
  - International context
  - Water and drought
  - Large biophysical regions (e.g., Arctic or Mississippi Watershed)

# New Foundational Investments

- Scenarios – a way of visualizing potential future conditions in a rigorous and consistent way
  - Regional climate trends and projections products (see [scenarios.globalchange.gov](http://scenarios.globalchange.gov))
  - Global sea level rise guidance
  - Regional land-use (EPA-ICLUS)
- Indicators – keeping track of the rate of change and the capacity to respond
- Global Change Information System – semantic web
- Partnerships, e.g., NCA Network – a network of public, private and NGO partners who are engaged in the NCA on an ongoing basis (see [ncanet.usgcrp.gov](http://ncanet.usgcrp.gov))



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# National Climate Assessment Indicators

The goals for the NCA indicators are to:

- Provide meaningful, authoritative climate-relevant measures about the status, rates, and trends of key physical, ecological, and societal variables and values
- Inform decisions on management, research, and education at regional to national scales
- Identify climate-related conditions and impacts to help develop effective mitigation and adaptation measures
- Provide analytical tools by which user communities can derive their own indicators for particular purposes

# New Risk & Decision-Support Framing

- Importance of underlying vulnerabilities
- Assessments of the state of Adaptation, Mitigation and Decision Support
- Inter-sectoral links and cascading effects
  - Water, Energy & Land
  - Biogeochemical Cycles
  - Tribal Resources
  - Land Use & Land Cover
  - Rural Communities
  - Urban Systems, Infrastructure and Vulnerability
  - Coastal Zones, Development and Ecosystems
  - Oceans and Marine Resources – new topic for NCA



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## What's New about Format?

- E-book – the first major government publication of its type to be submitted this way
- Traceable accounts – the process & rationale the authors used in coming to conclusions and their confidence in those conclusions
- Global Change Information System – focused on helping people get electronic access to data, tools and experts associated with NCA who can help with climate-related decisions

# Outline for Third NCA Report

- Letter to the American People
- Executive Summary: Report Findings
- Introduction
- Our Changing Climate
- Sectors & Sectoral Cross-cuts
- Regions & Biogeographical Cross-cuts
- Responses
  - Decision Support
  - Mitigation
  - Adaptation
- Agenda for Climate Change Science
- The NCA Long-term Process
- Appendices
  - Commonly Asked Questions
  - Expanded Climate Science Info



**Oceans and  
Marine Resources**

**Coasts,  
Development,  
and Ecosystems**

# Sectors

- Water Resources
- Energy Supply and Use
- Transportation
- Agriculture
- Forestry
- Ecosystems and Biodiversity
- Human Health



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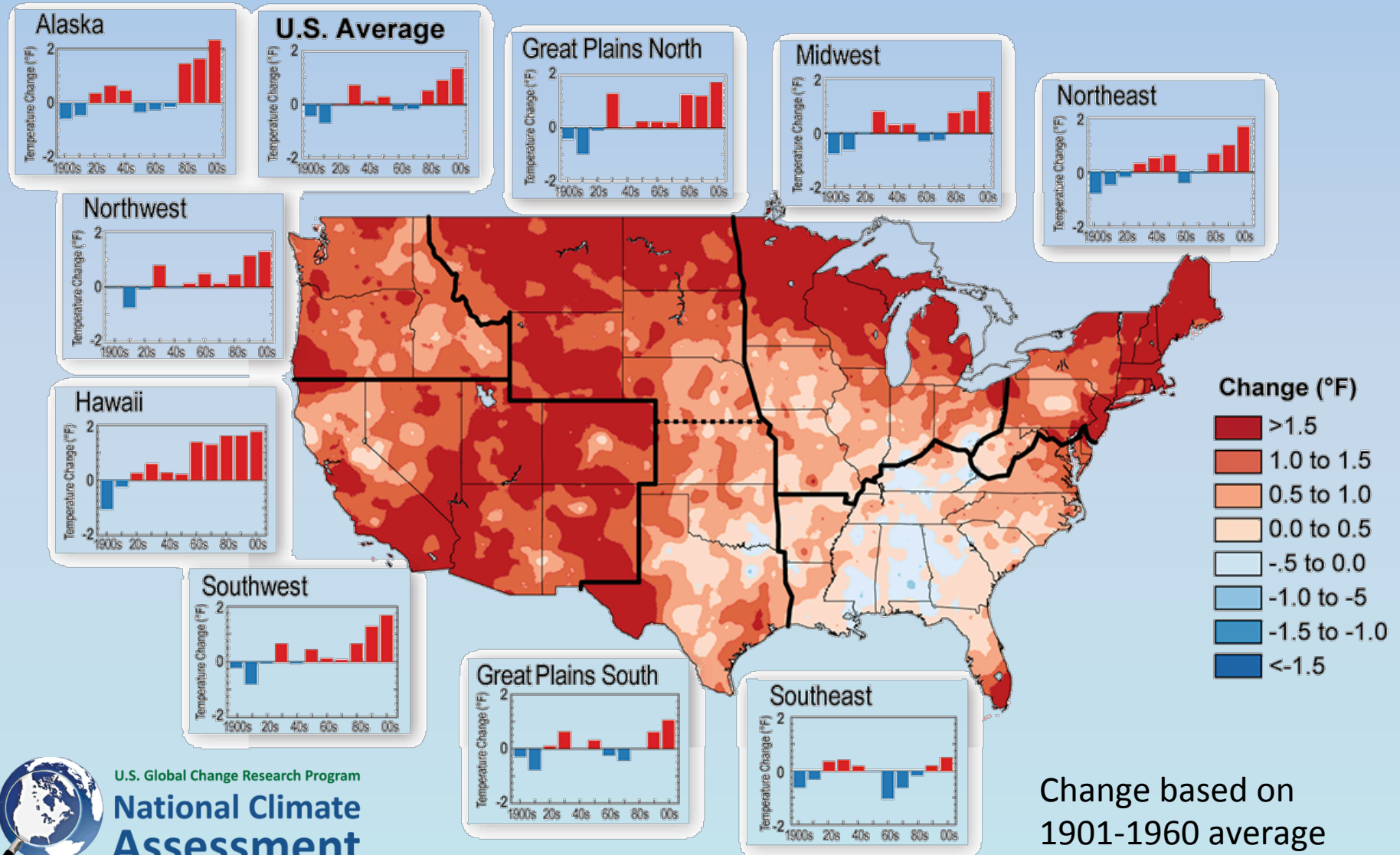
# Sectoral Cross-Cuts



- Water, Energy, and Land Use
- Urban Systems, Infrastructure, and Vulnerability
- Impacts of Climate Change on Tribal, Indigenous, and Native Lands and Resources
- Land Use and Land Cover Change
- Rural Communities
- Biogeochemical Cycles

# Change is Apparent Across the Nation

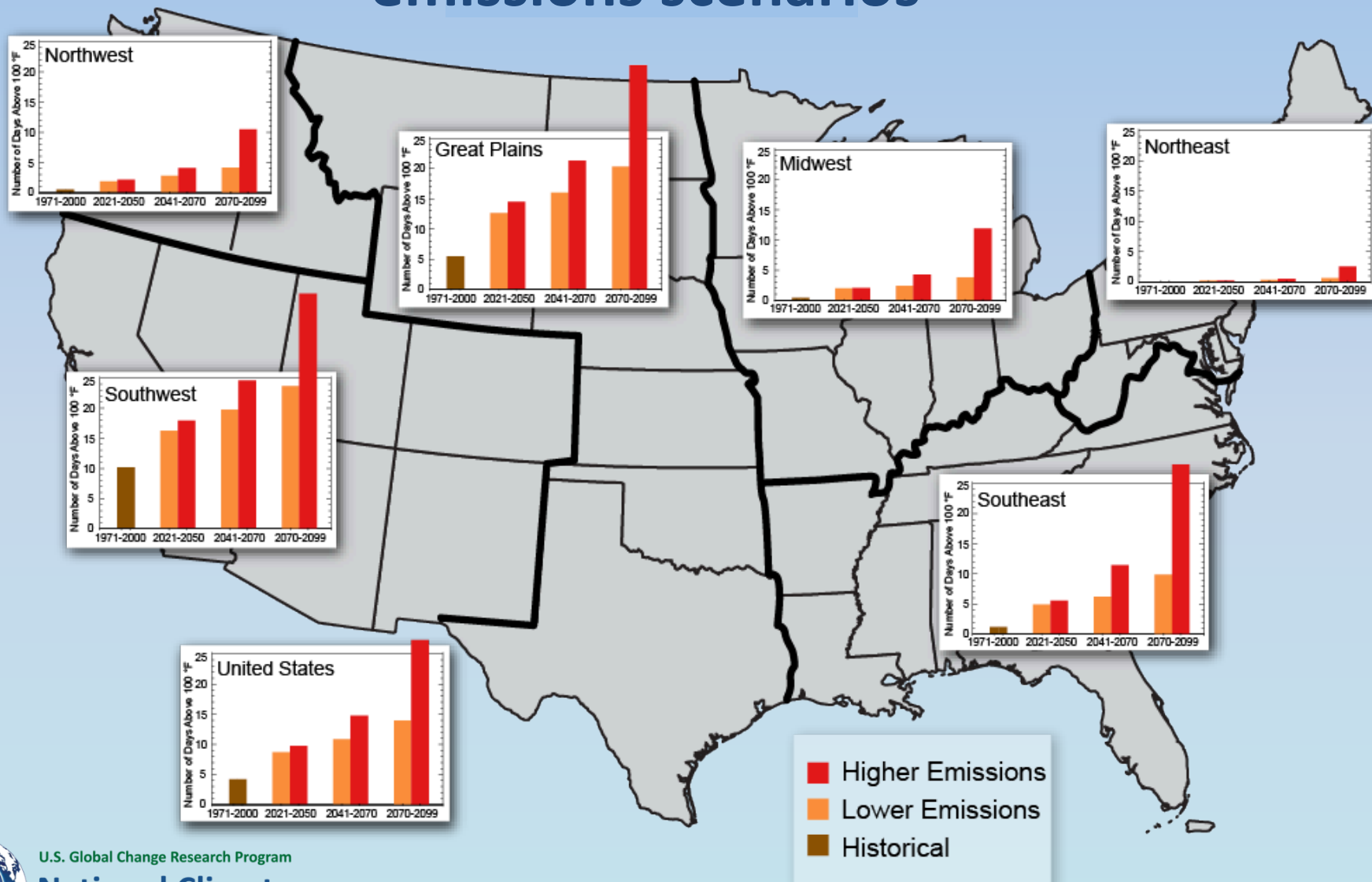
## Observed U.S. Temperature Change



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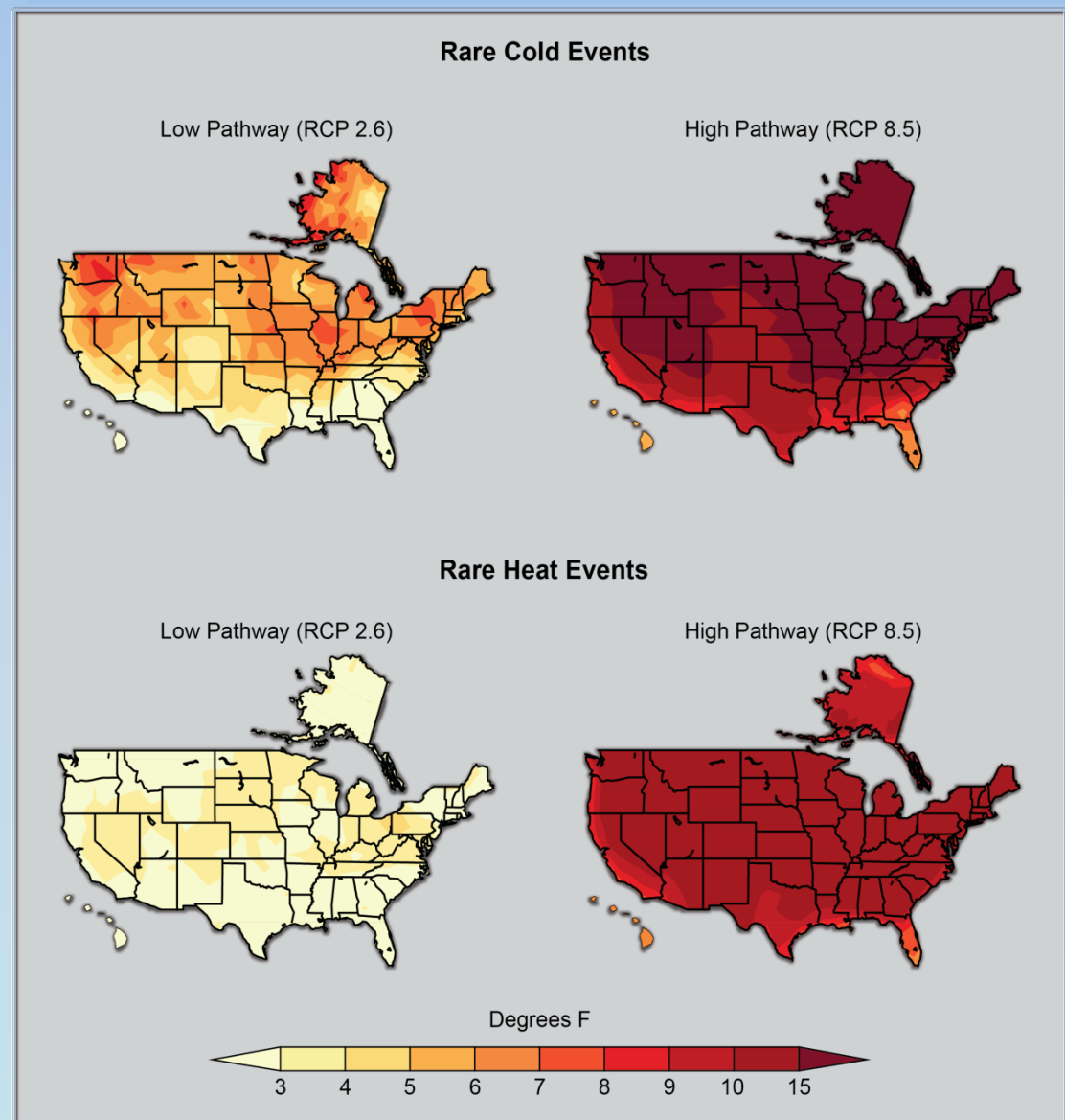
Change based on  
1901-1960 average

# Days Over 100°F under different emissions scenarios



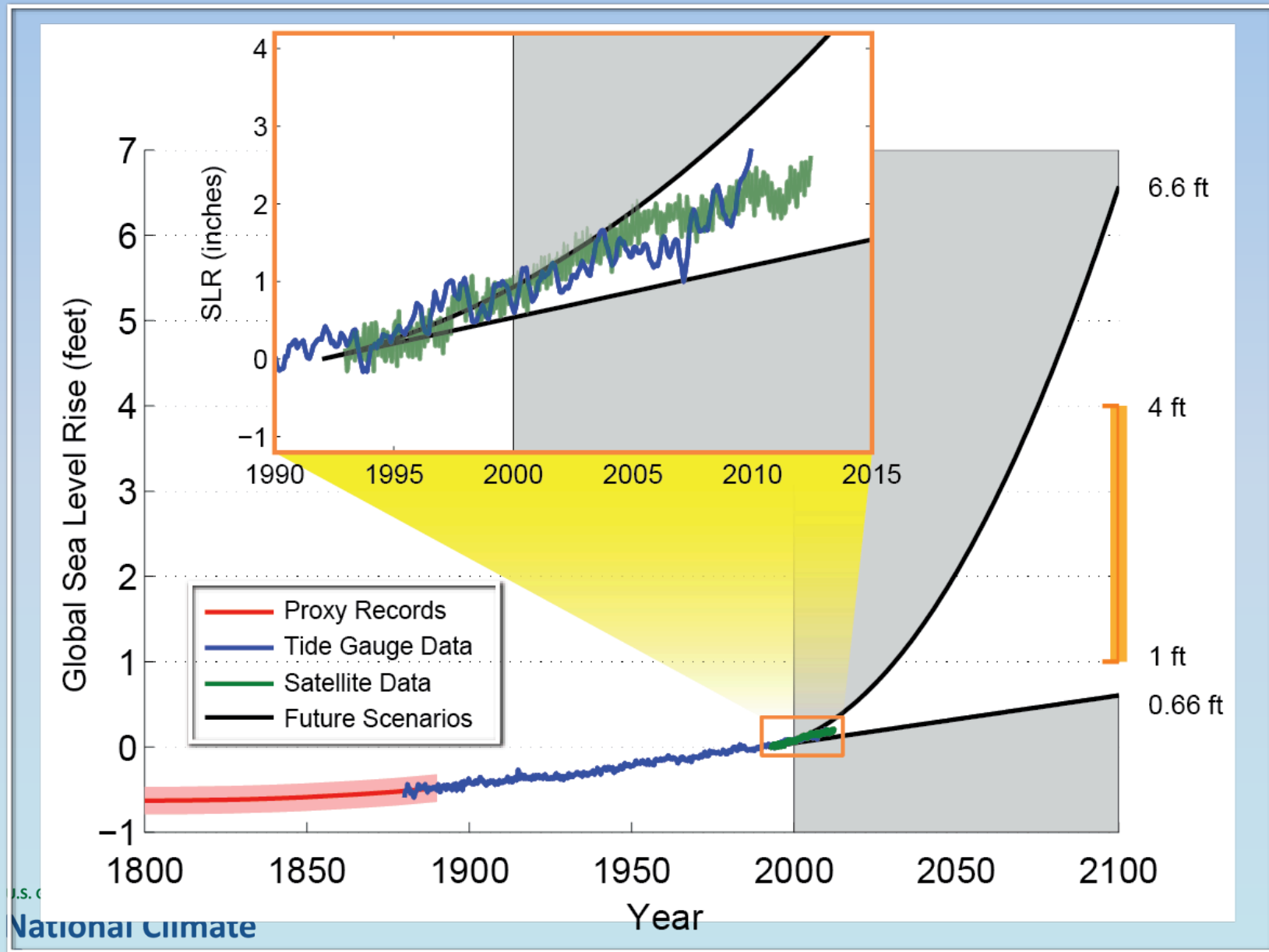
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**Projected changes  
in rare temperature  
events (5% chance)  
under different  
scenarios – both  
hottest and coldest  
days are projected  
to be warmer**



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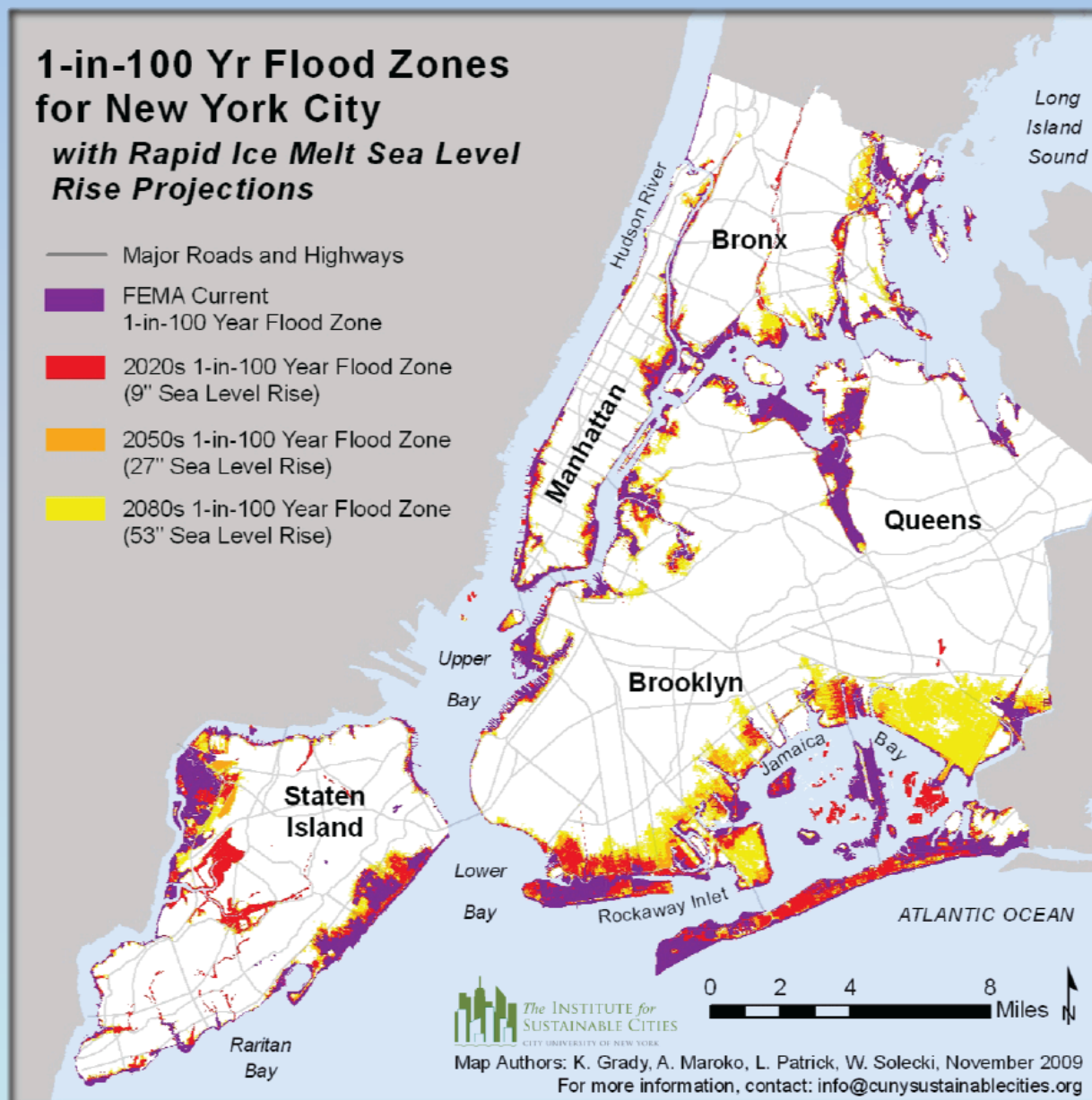
# Sea Level Rise: Past, Present, Future



# Infrastructure Affected

## 1-in-100 Yr Flood Zones for New York City *with Rapid Ice Melt Sea Level Rise Projections*

- Major Roads and Highways
- FEMA Current 1-in-100 Year Flood Zone
- 2020s 1-in-100 Year Flood Zone (9" Sea Level Rise)
- 2050s 1-in-100 Year Flood Zone (27" Sea Level Rise)
- 2080s 1-in-100 Year Flood Zone (53" Sea Level Rise)

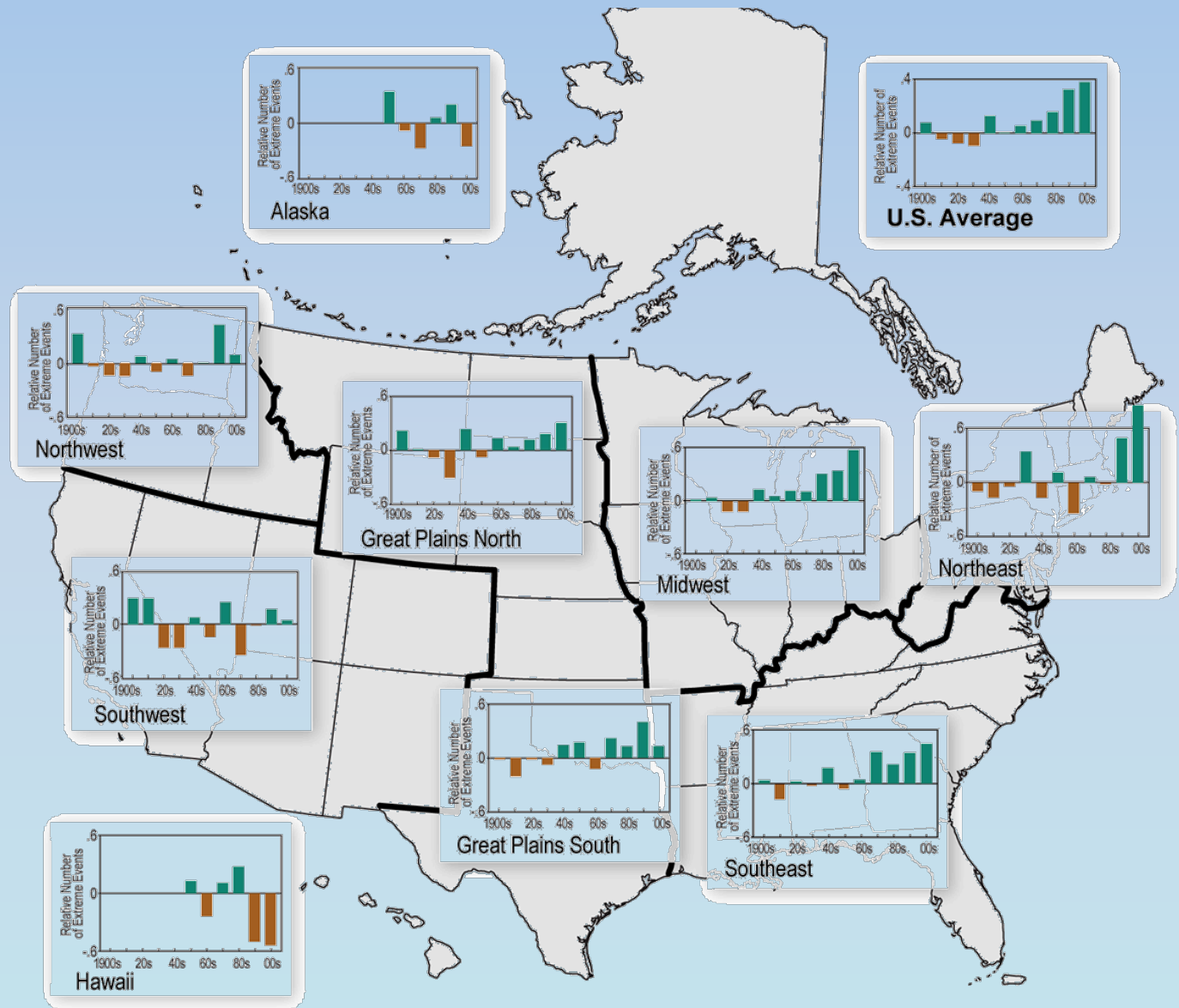


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# Extreme Weather Nationally

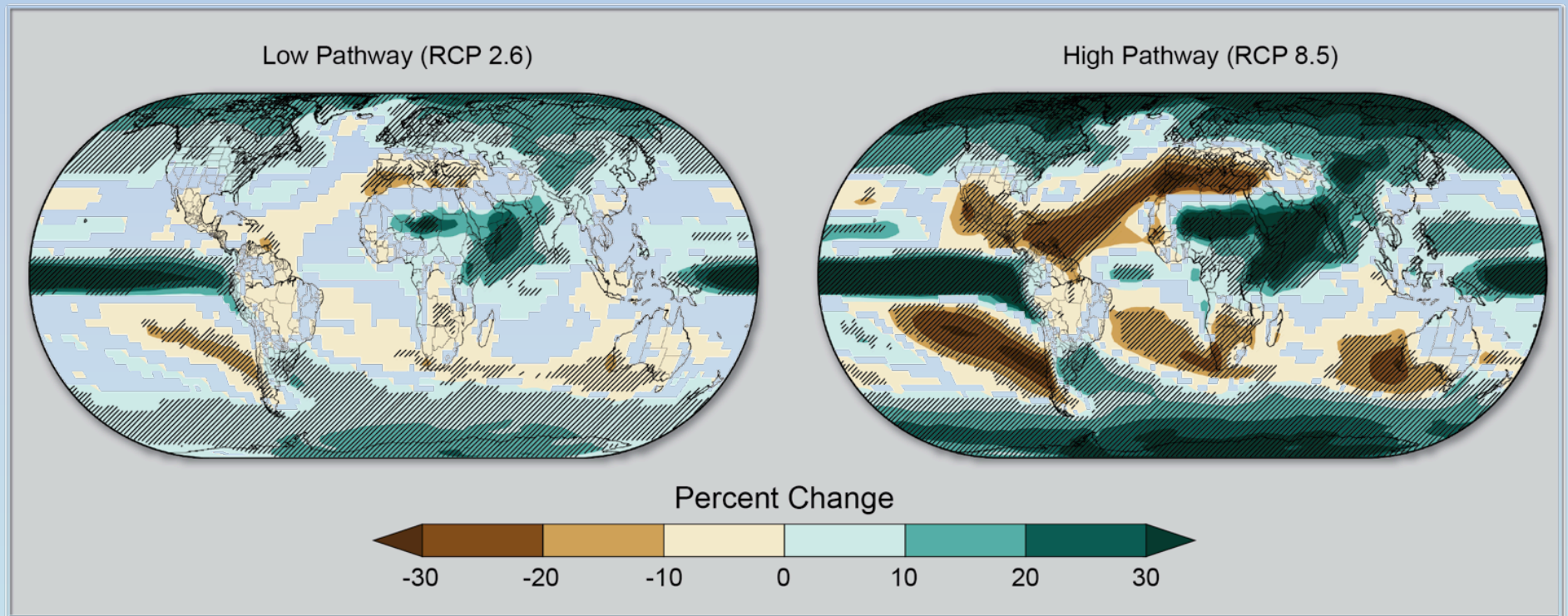
very heavy  
**precipitation**  
events,  
defined as the  
heaviest 1% of  
all daily  
events from  
1901 to 2011  
for each  
region



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# Projected precipitation change under different emissions scenarios

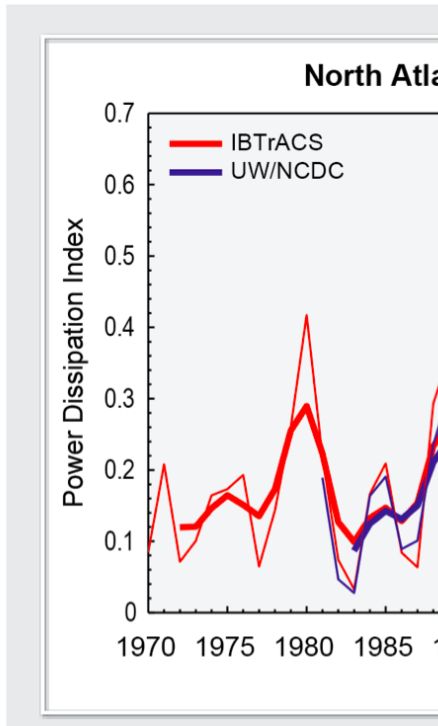
Generally, Wet Get Wetter and Dry Get Drier



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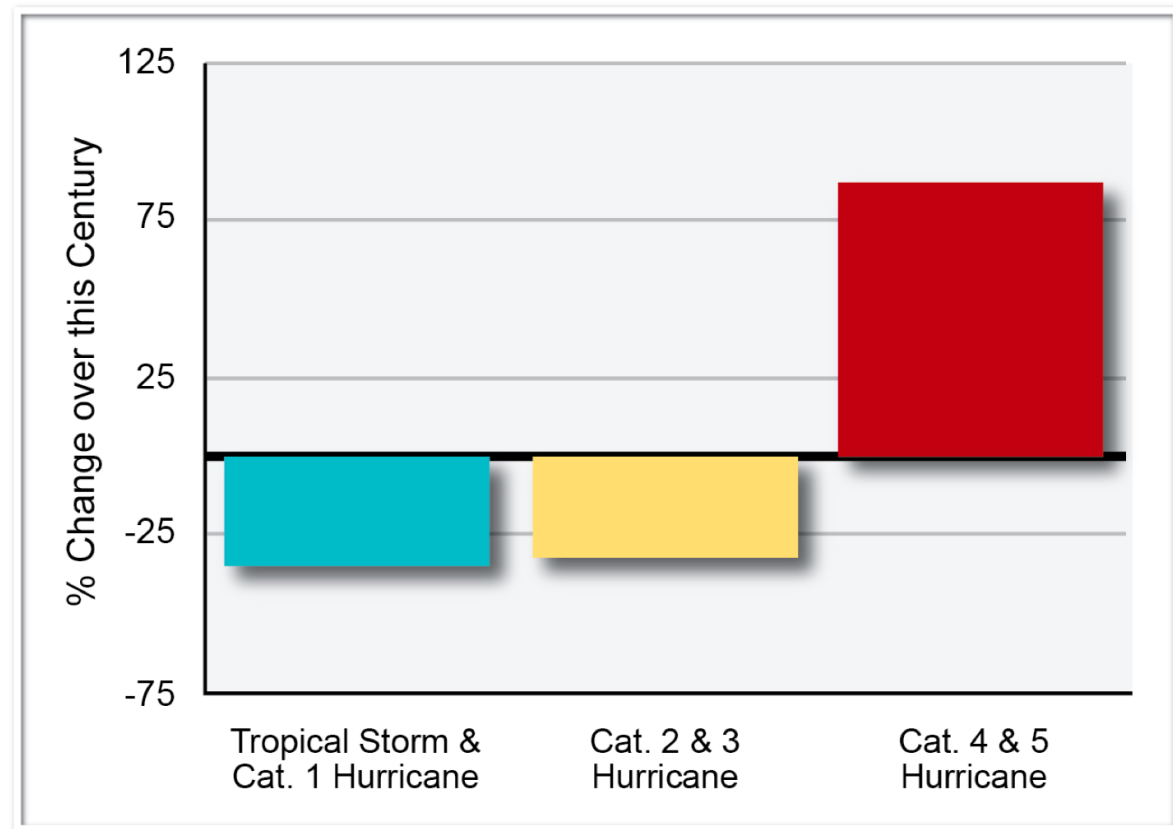
# Hurricanes

## Observed Trends in Hurricane Intensity



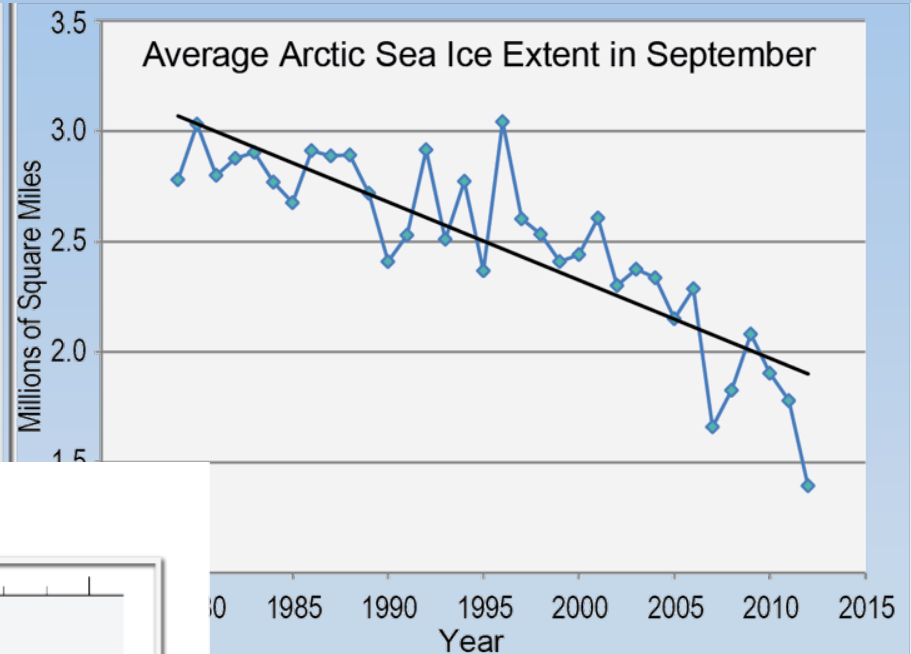
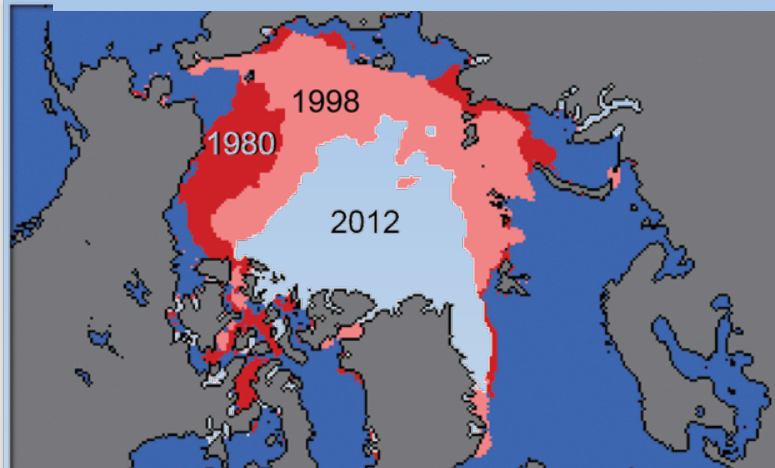
**Figure 2.23: Observed**

## Projected Changes in Atlantic Hurricane Frequency by Category

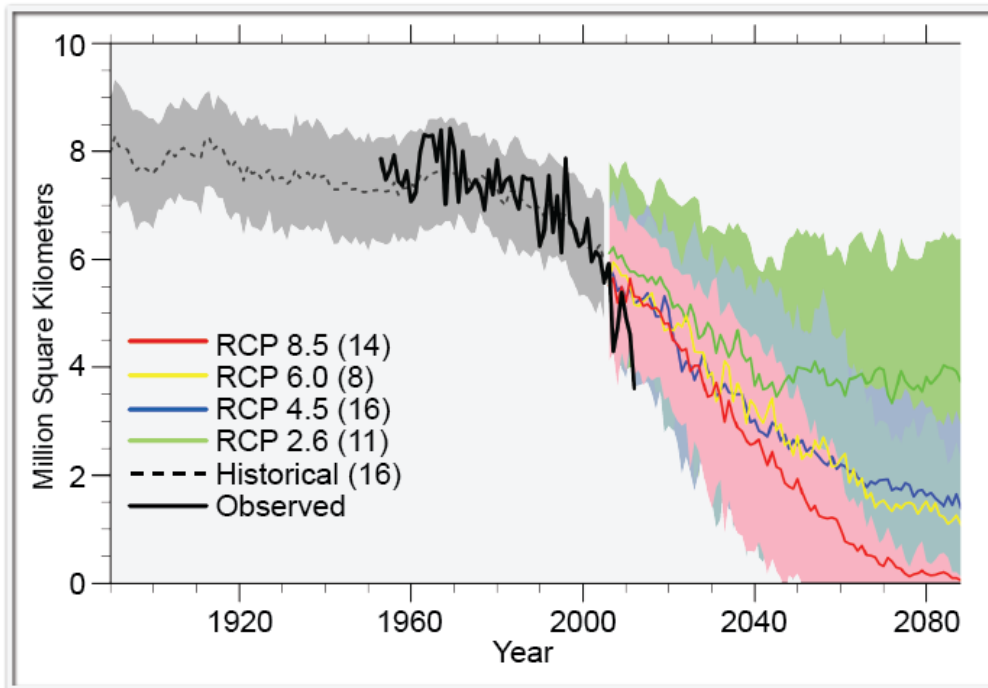


**Figure 2.24: Projected Changes in Atlantic Hurricane Frequency by Category by 2081-2100 relative to 2001-2020.**

# Change is also Apparent Across the Arctic



Projected Arctic Sea Ice Decline



Sea ice extent in 2012 was 40% below recent median

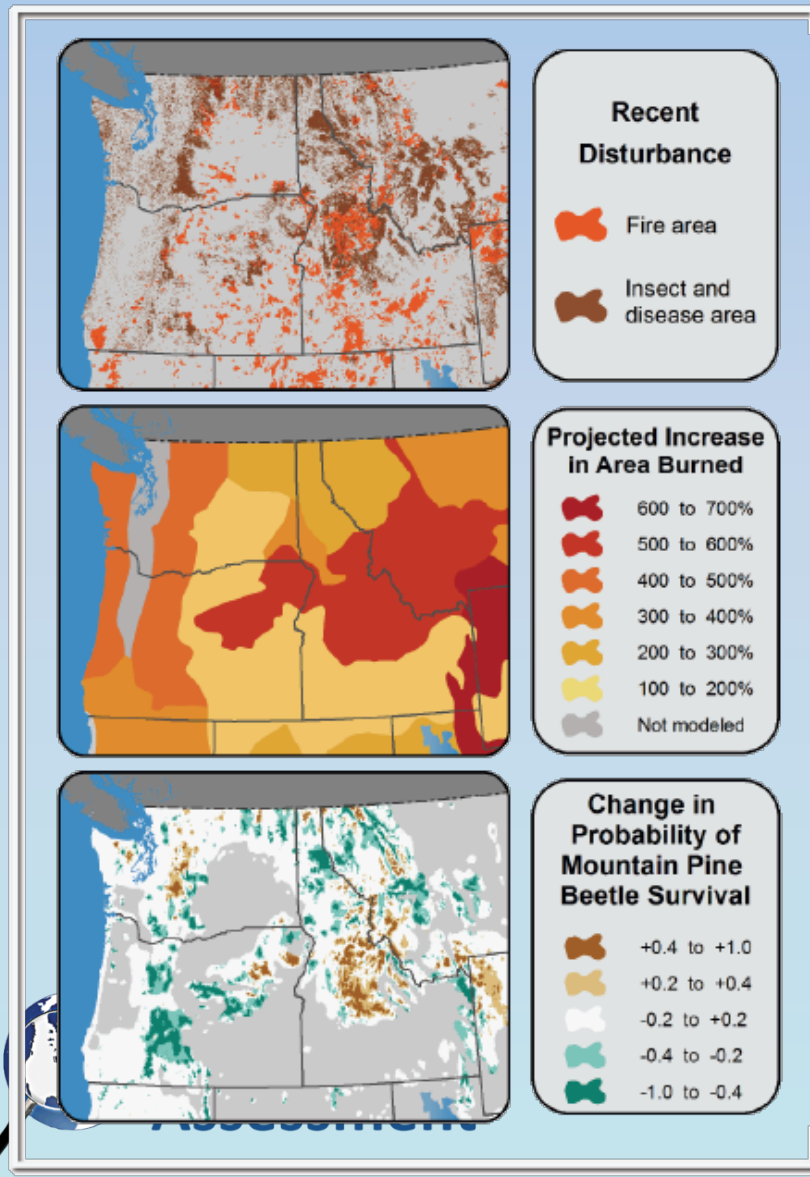
# Natural Ecosystems Affected

## Insects and Fire in Northwest Forests

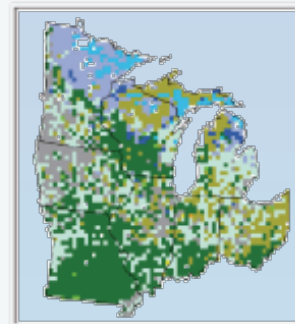
## Drying Lakes and Changing Habitat



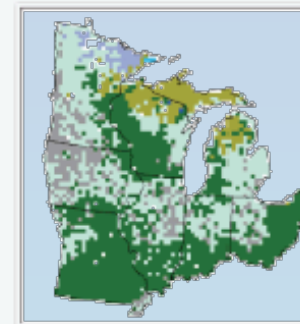
## Forest Composition Shifts



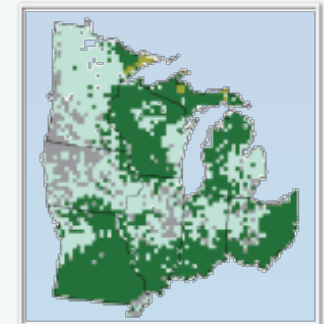
### Current



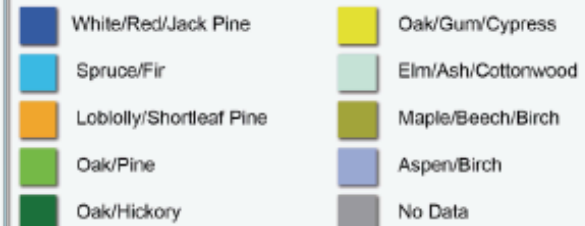
### Lower Emissions



### Higher Emissions



### Forest Types

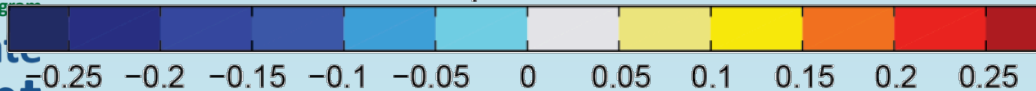
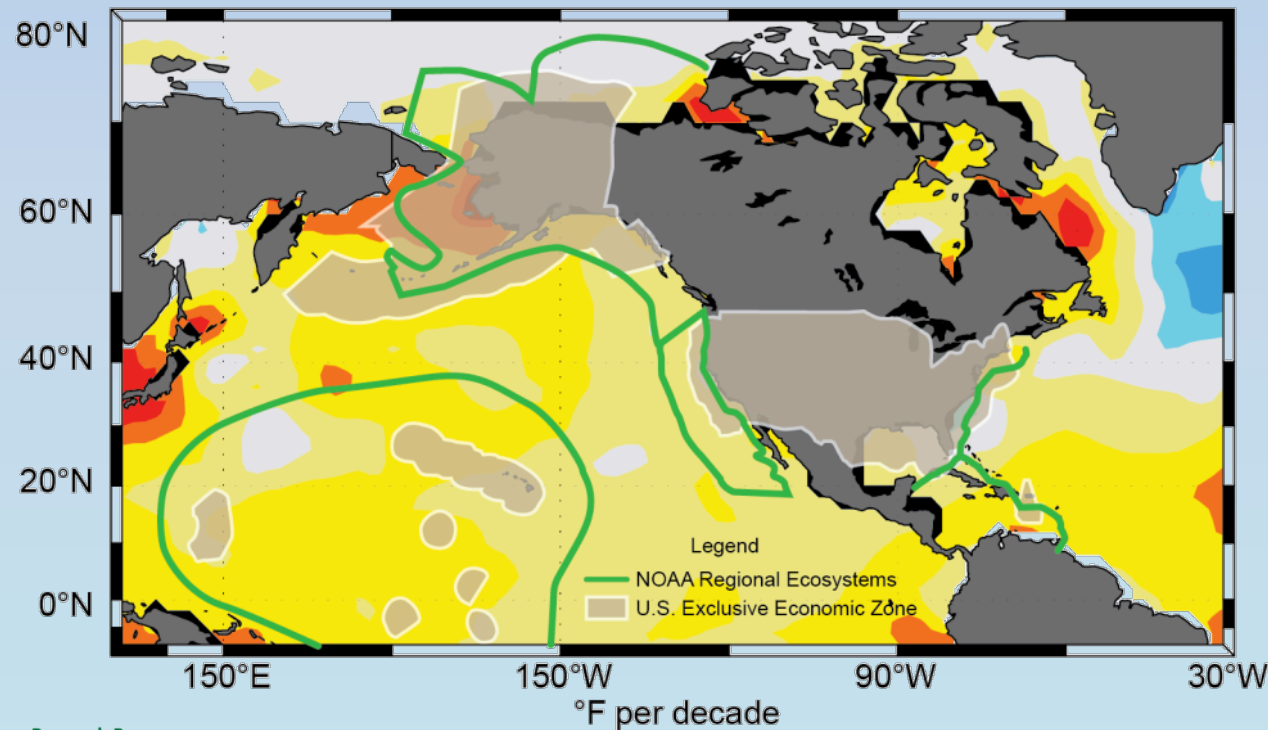
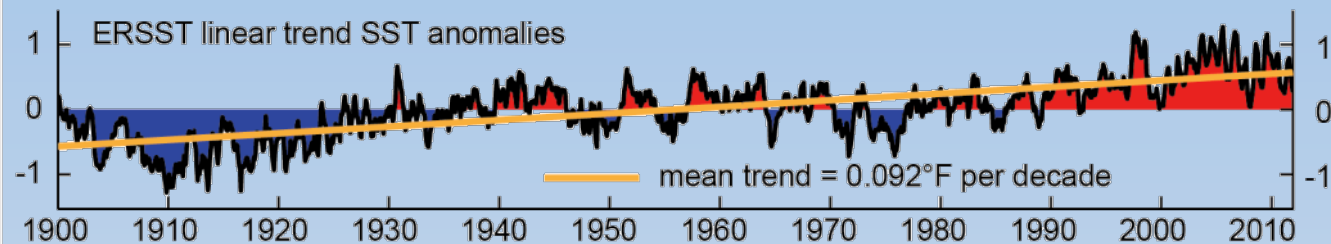


# Warmer Ocean



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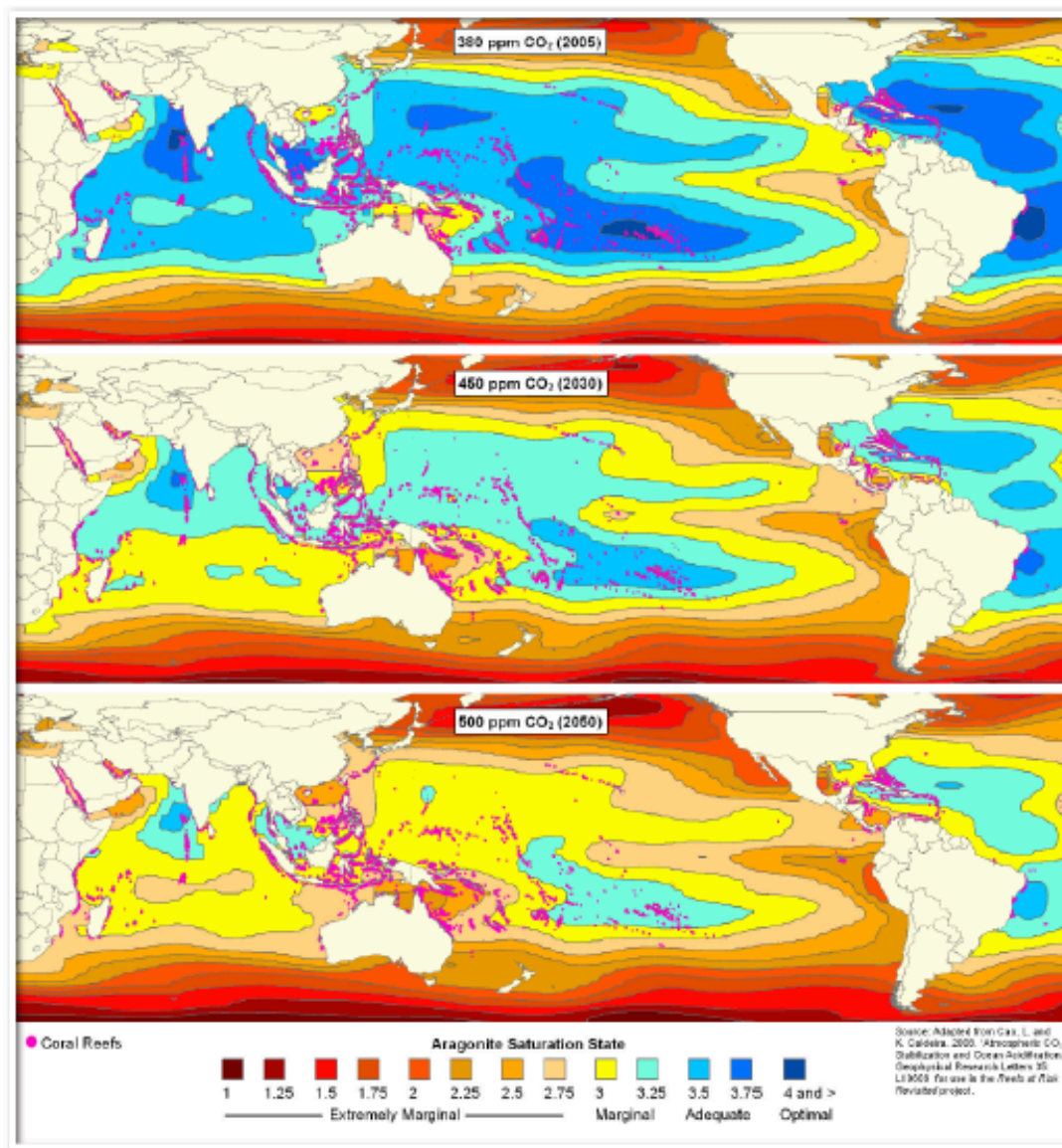
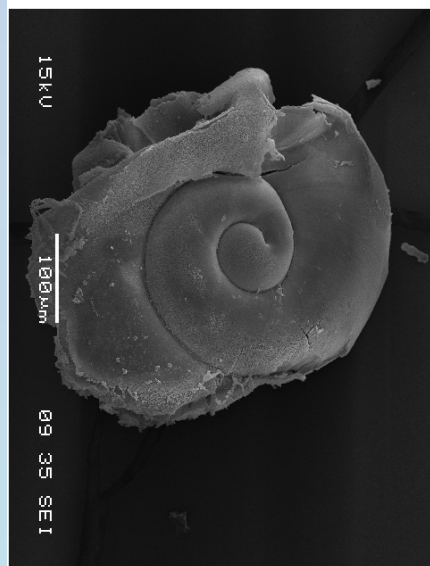
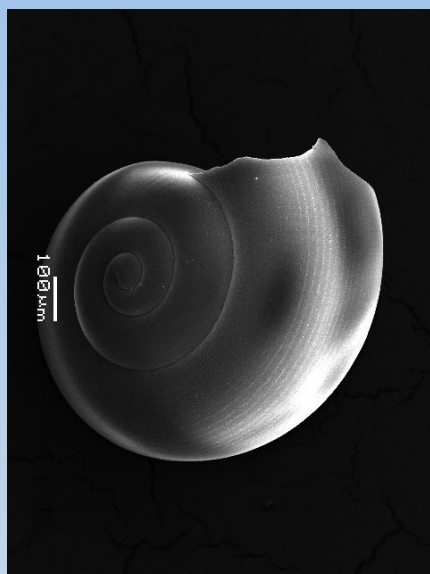


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# More Acidic Ocean

## Projected Impacts from Ocean Acidification



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# Positioning for 2017 Assessment

- Technical input leadership
- Pool of expert authors
- Topical reports and state of knowledge
- Scenarios
  - Regional climate trends and projections
  - Global & local sea level rise
  - Regional land-use (ICLUS)
- Indicators
- Global Change Information System
- Partnerships – (see [ncanet.usgcrp.gov](http://ncanet.usgcrp.gov))



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# Thank you!

For more information:

<http://assessment.globalchange.gov>

- or -

Fred Lipschultz

[flipschultz@usgcrp.gov](mailto:flipschultz@usgcrp.gov)

