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THE STATE UNIVERSITY OF NEW JERSEY

Climate Change in New Jersey

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New Jersey State Climatologist
Rutgers University

New Jersey Clean Water Council
Public Hearing
December 7, 2009

Outline

1. NJ's precipitation regime
2. NJ climate: past and present
3. NJ climate: what lies ahead
4. Impacts of a changing climate on NJ water quality
5. Keeping a watchful climate eye

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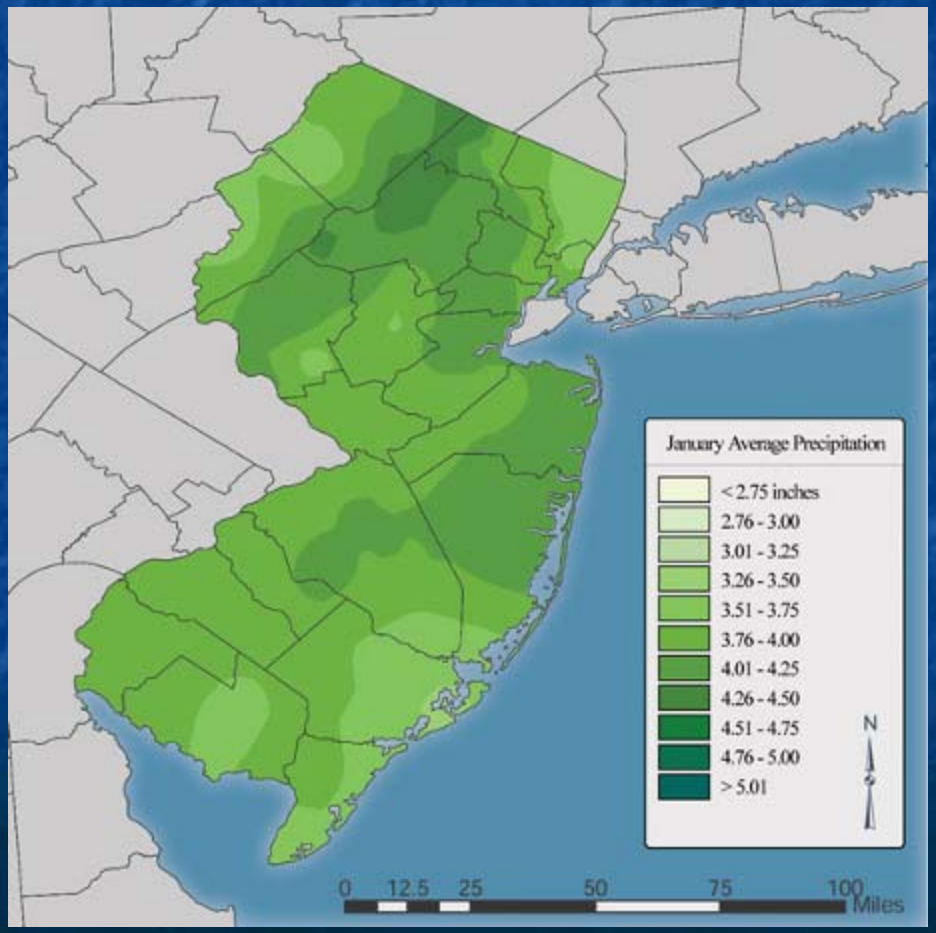
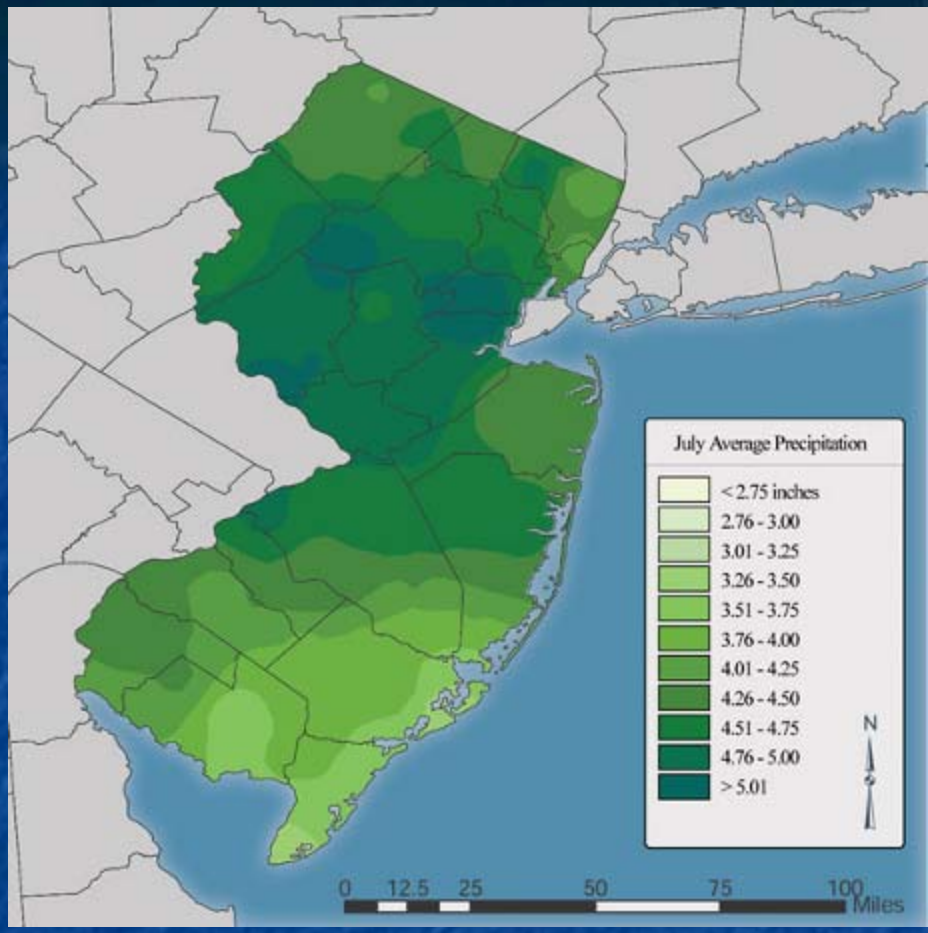
A precipitation rich state……





……most often

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Sometimes too much……

Nor'easter
April 15-16, 2007

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Sometimes too little……

Pinelands: May 2007

Spruce Run Reservoir: March 2002

Delaware River: November 1963

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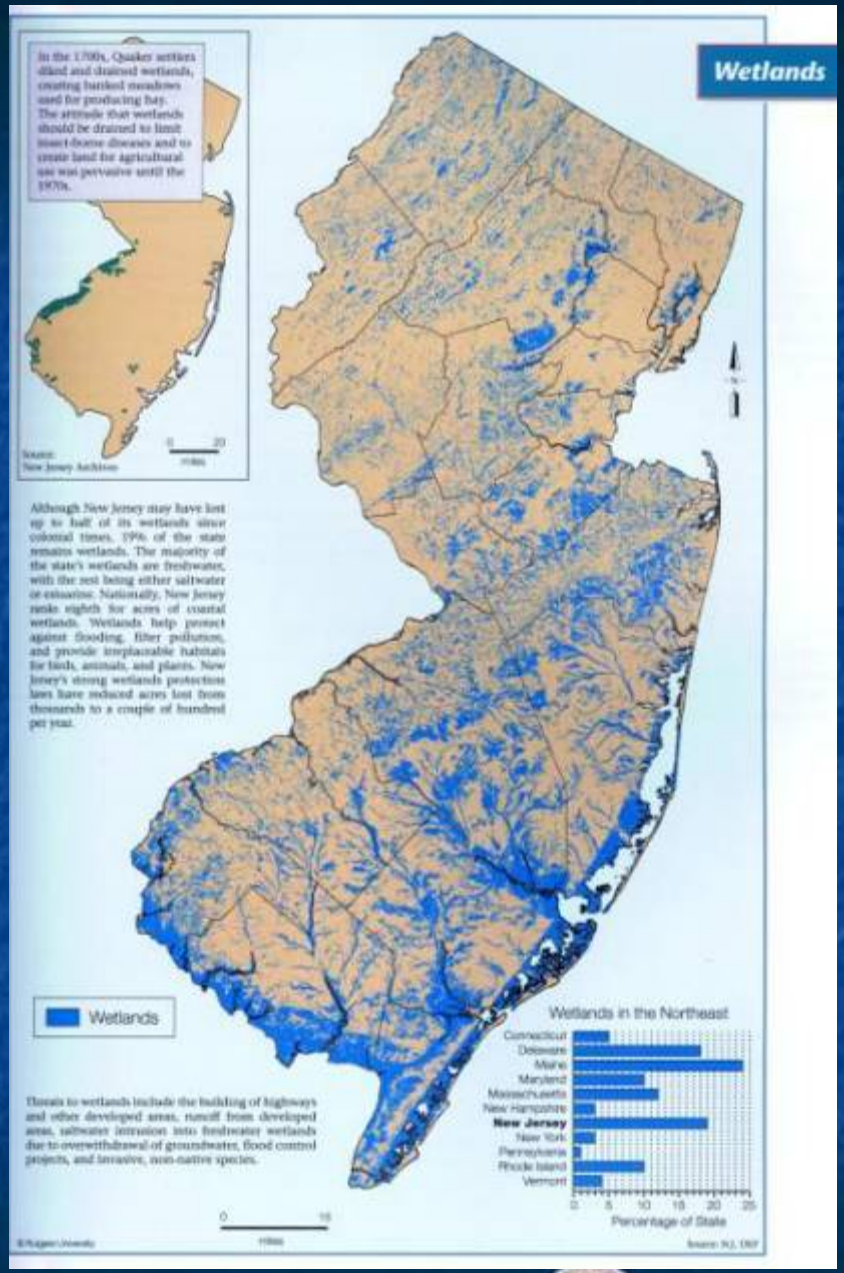
Enough to:

Sustain freshwater wetlands



Mapping NJ, 2009

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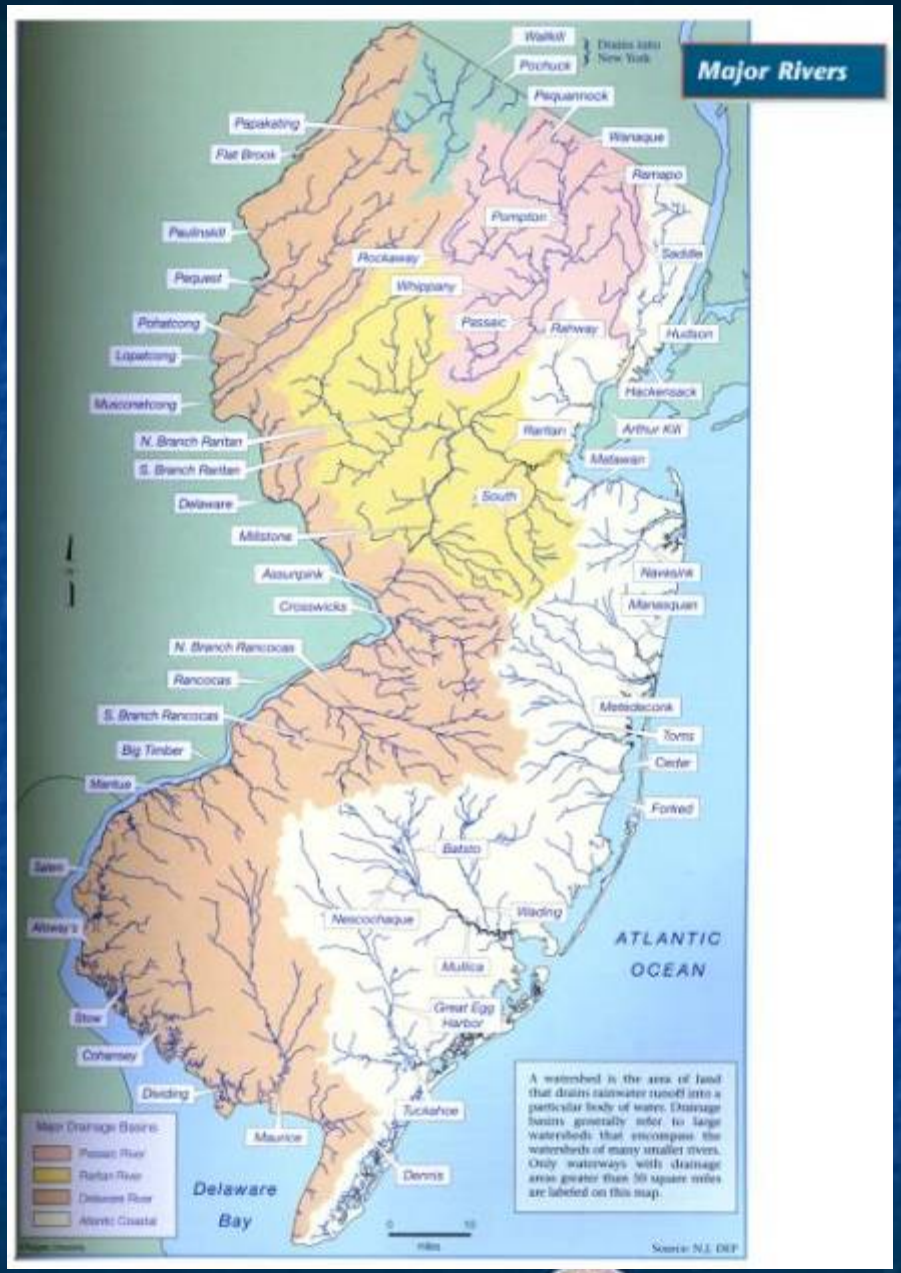
Sustain river flows



Mapping NJ, 2009

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Sustain ground water and surface reservoirs

But at what levels.....

yesterday,

today,

and tomorrow?

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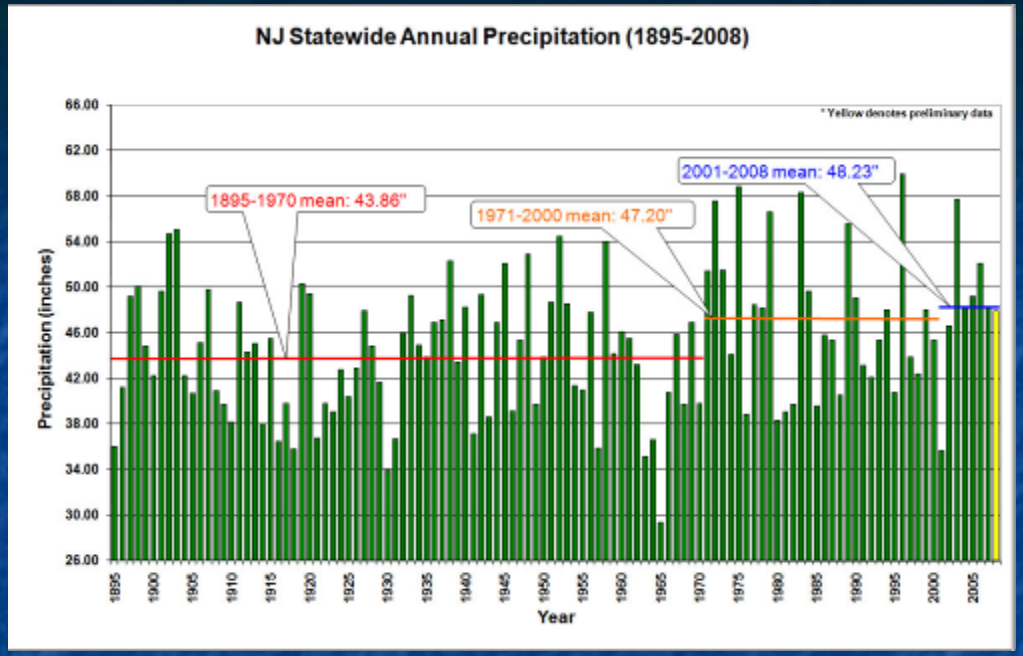
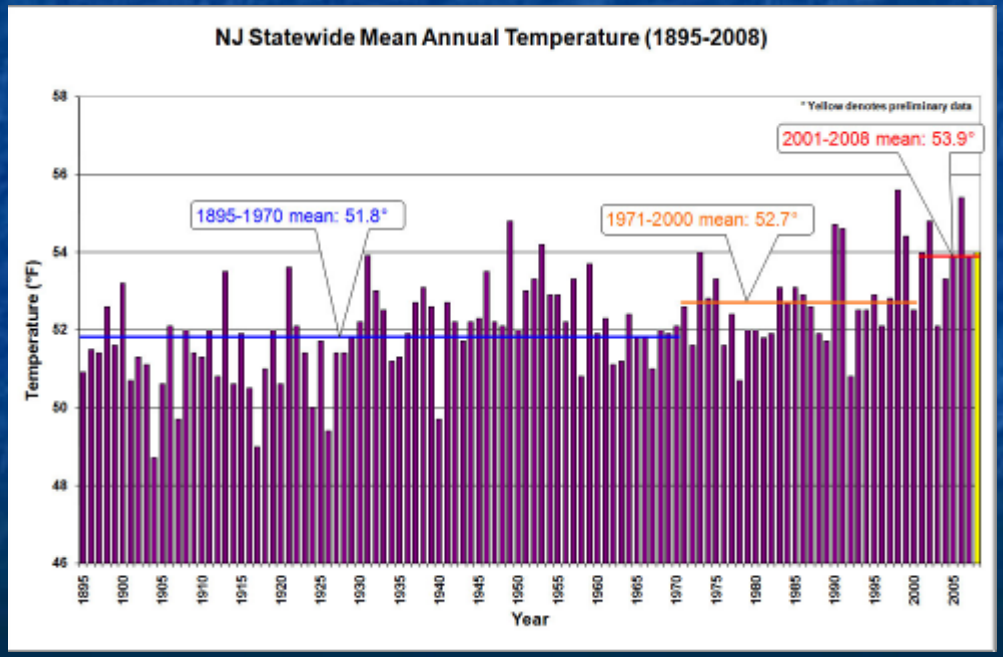
Where have we been?





Past century of NJ climate variability

http://climate.rutgers.edu/stateclim_v1/data/index.html

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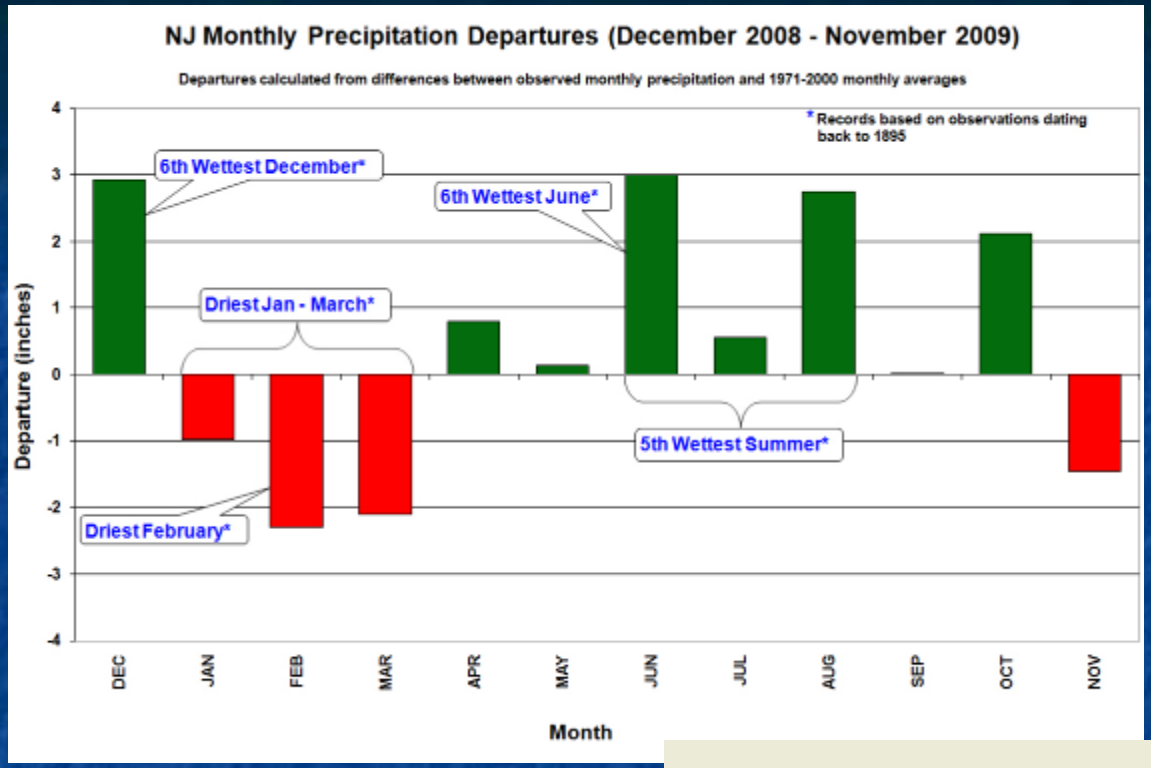

Where are we today?

http://climate.rutgers.edu/stateclim

http://www.njdrought.org

Northwest Drought Region

Updated: November 25, 2009

Drought Status Indicators

90-day precipitation	90-day streamflow	DRBC Res.	ground water	
	20	S		near or above normal
20			2	moderately dry
				severely dry
				extremely dry

Res=reservoir DRBC=Delaware River Basin Commision
ground water refers to unconfined ground water
= The number in each colored dot is the number of weeks the specific indicator in that region has been in that status.

Declared Drought Status

S	normal
	watch
	warning
	emergency

Printing Note

Where are we headed?

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THE 21st CENTURY IN NEW JERSEY

- **General agreement in model studies:**

Temperature (C)	Precipitation (%)	Runoff (%)
+3 to +5 C	0 to +20%	-25% to +20%

Less confidence in regional precipitation/runoff than temperature

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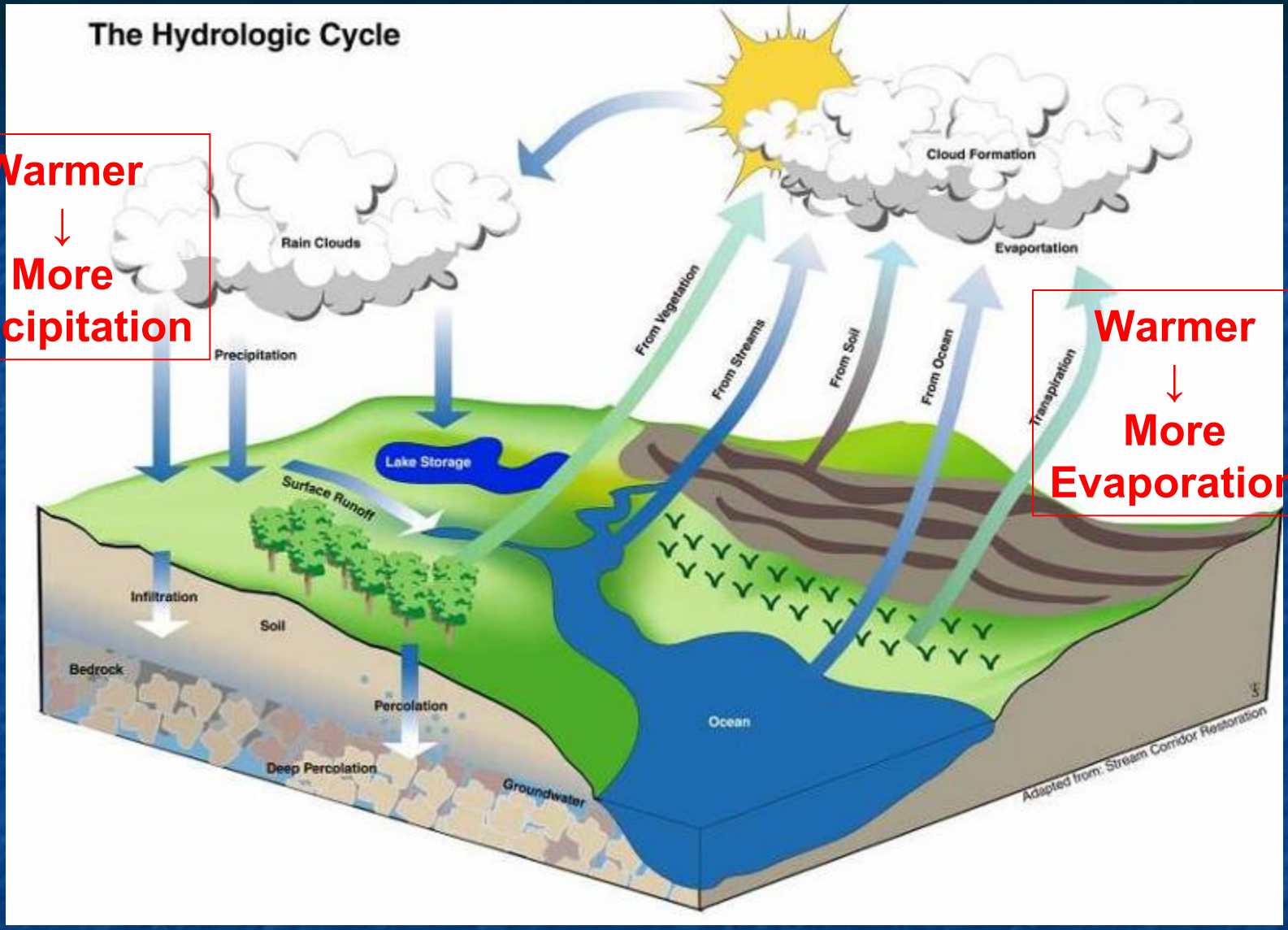

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THE 21st CENTURY IN NEW JERSEY

- Temperature (C) Precipitation (%) Runoff (%)
  +3 to +5 C 0 to +20% -25% to +20%

Less confidence in regional precipitation/runoff than temperature

- **Regardless of sign of precipitation change, significant changes expected in:**
  annual streamflow cycle, soil moisture, and snowpack;
  more hot days; more variability

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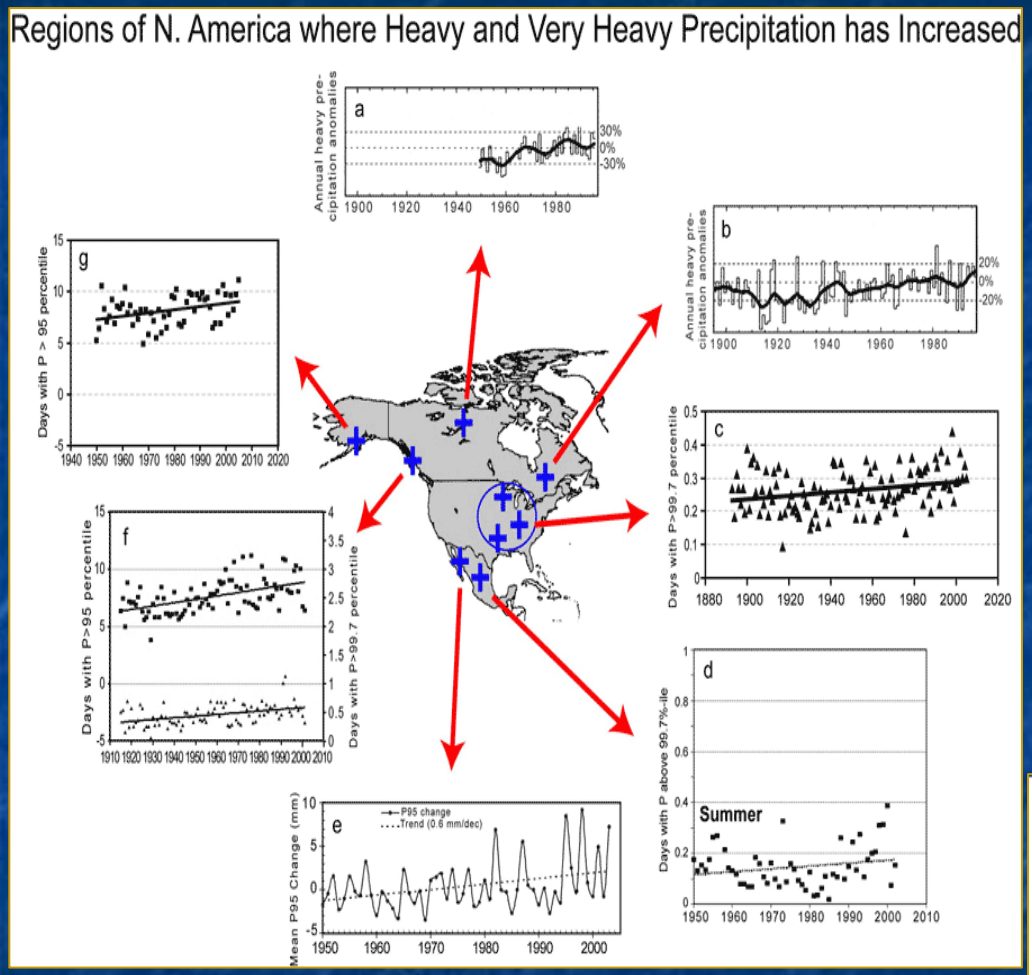
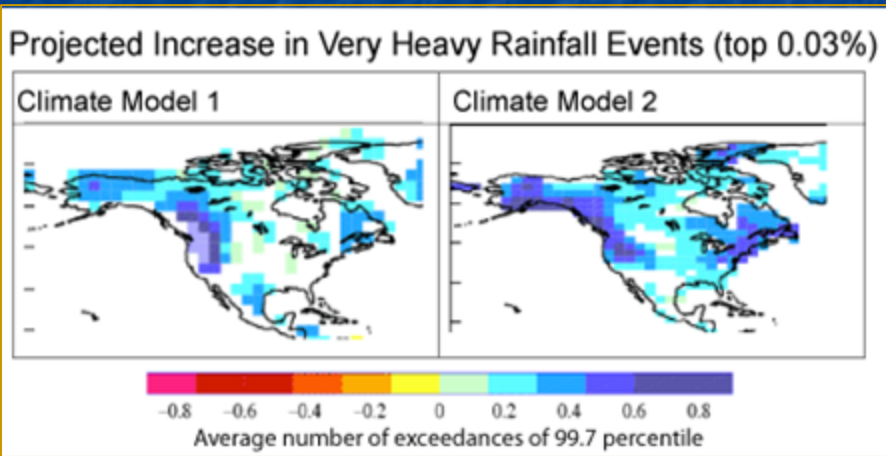
Precipitation Extremes



- Intense precipitation (heaviest 1%) increased 20% over the past century - total precipitation increased by 7%
- Overall, precipitation will likely be less frequent but more intense
- 1-in-20 yr precipitation - projected to occur 1-in-8 years by 2100 over much of eastern N. America (mid-range emission scenario)



More floods and droughts

Spruce Run Reservoir:
March 2002

Easton-Phillipsburg
Bridge: June 2006

Delaware River: Sept. 2004

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THE 21st CENTURY IN NEW JERSEY

- **General agreement in model studies:**

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Less confidence in regional precipitation/runoff than temperature

- **Regardless of sign of precipitation change, significant changes expected in:**

annual streamflow cycle, soil moisture, and snowpack;
more hot days; more variability

- **Main Uncertainties**:
  1. Will it rain enough to make up for increased evapotranspiration under warmer conditions?
  2. How much will sea level rise?
  3. Will water demand change?
  4. Economic, ecological, and other effects?

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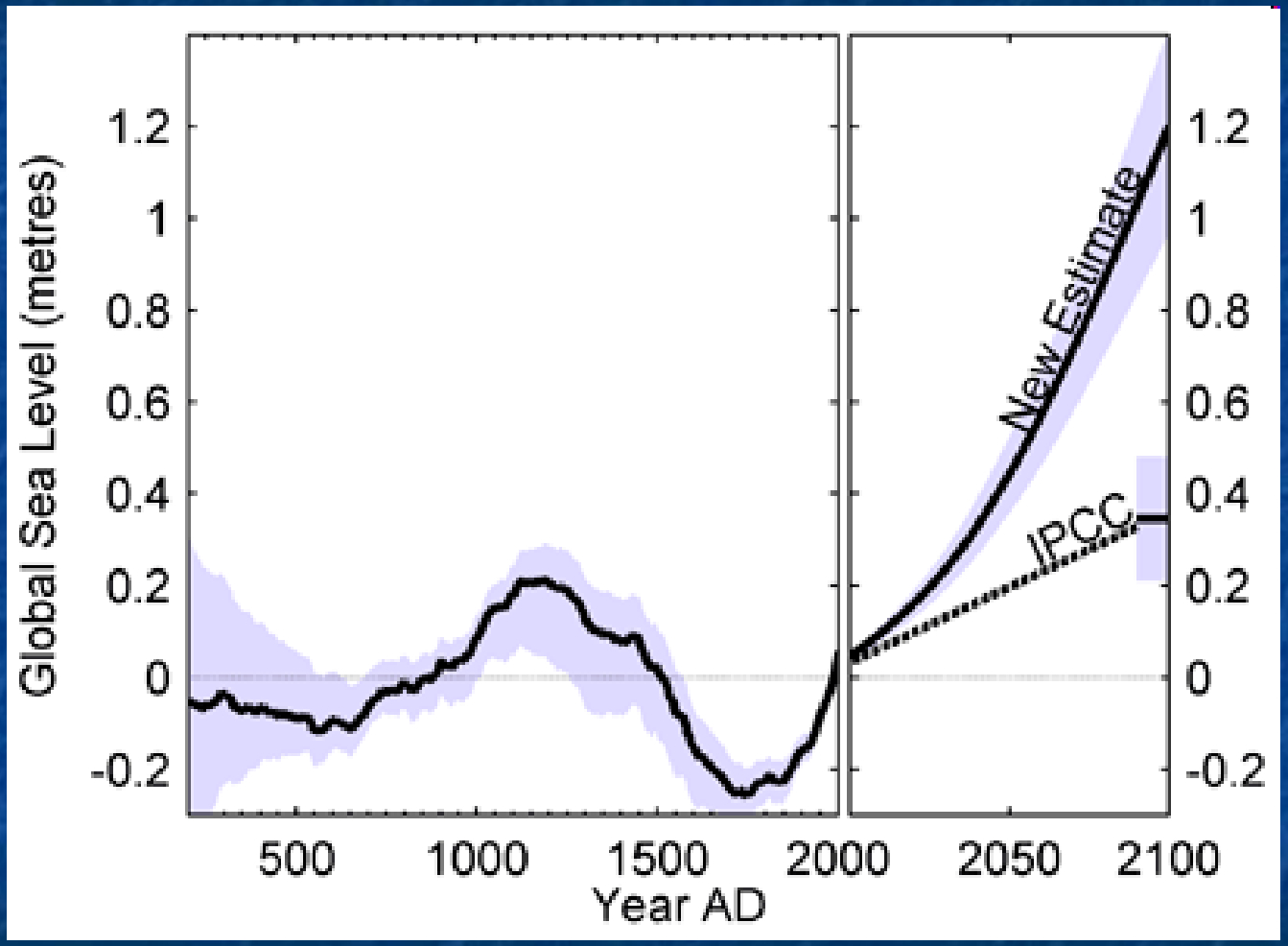
A recent view of global mean sea level changes



Reconstructing sea level from paleo and projected temperatures 2000 to 2100 AD

Grinsted, Moore and Jevrejeva, Climate Dynamics, 2009

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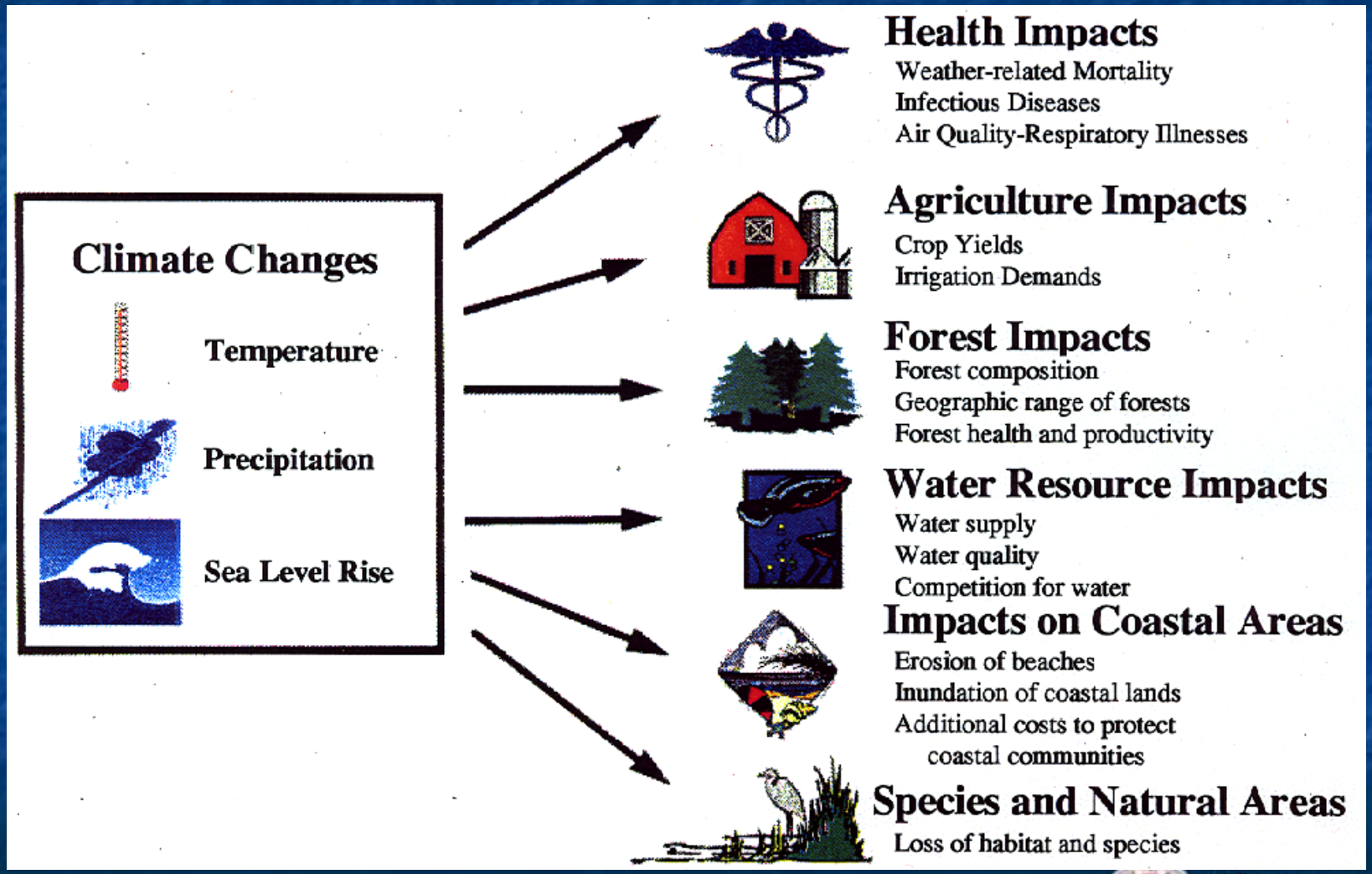
Potential climate change impacts



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Water Quality Risks from a Changing Climate

Variability of ground water, base flow, surface flow

Sustaining an adequate supply

Movement of non-point source pollutants into streams

Stream chemistry changes

Ecosystem effects

Increasing erosion

Sea level rise

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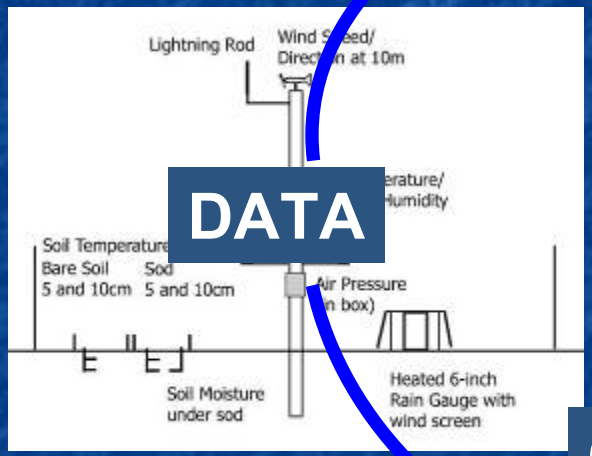
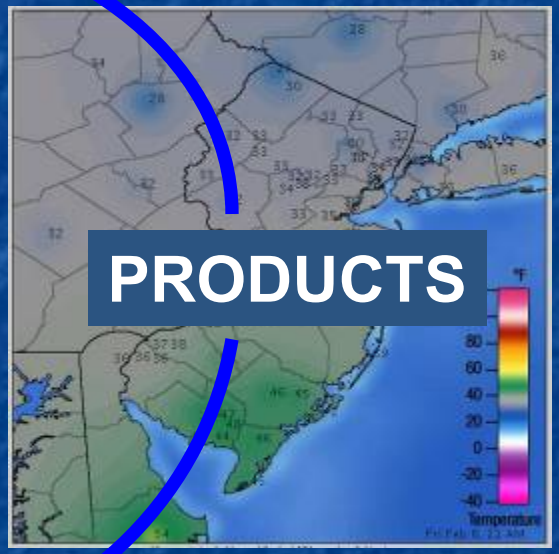
The ONJSC: Keeping a watchful climate eye

DECISION MAKERS



DATA

PRODUCTS



OUTREACH & TRAINING

NJ State Climatologist, Office of the, Rutgers University

Rutgers University

http://climate.rutgers.edu/stateclim_v1/njwaterwatch.html

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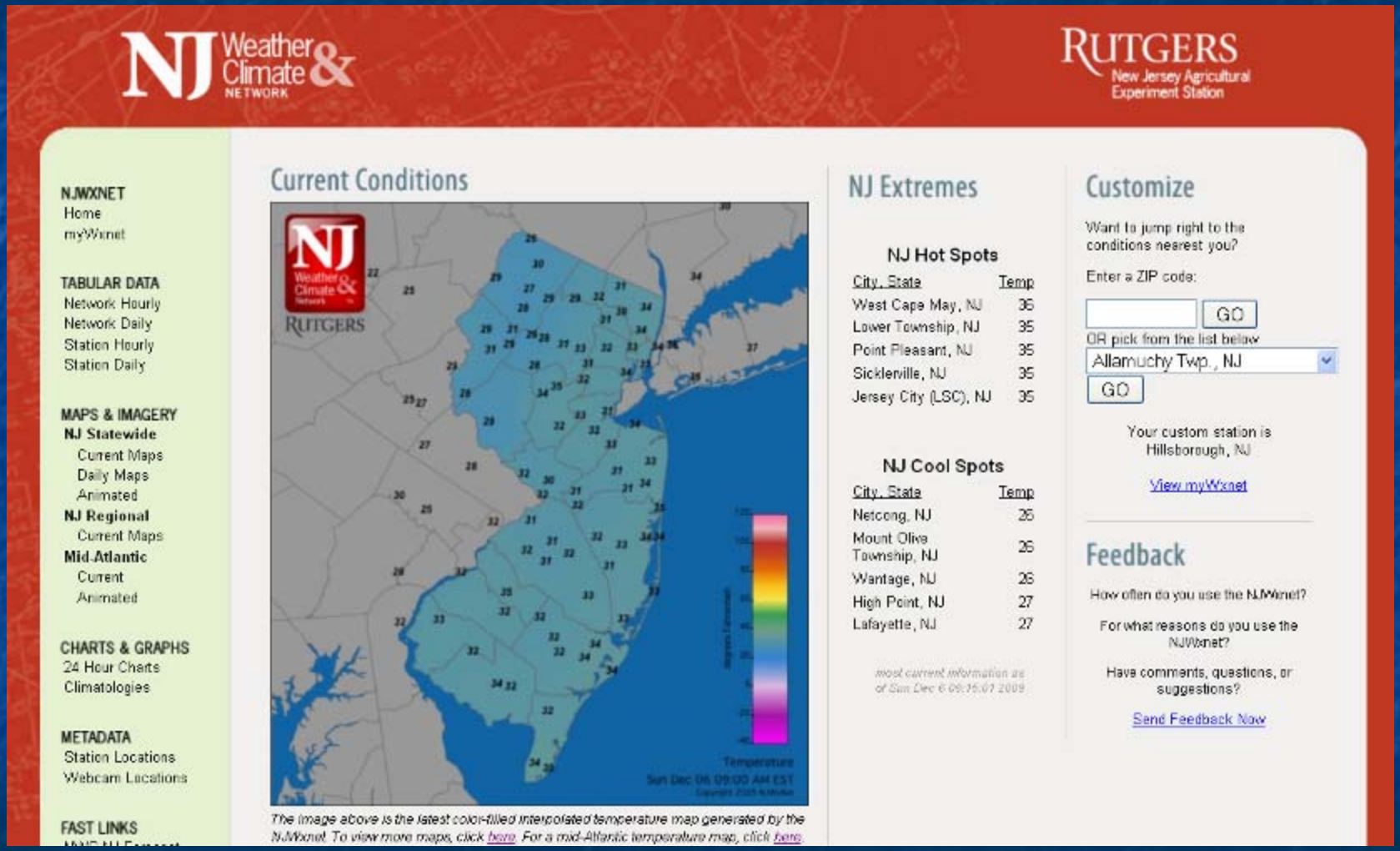
NJ Weather & Climate Network



http://climate.rutgers.edu/njwxnet

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NJ Community Collaborative Rain, Hail and Snow Network

Daily observations by trained volunteers of all ages

Augmenting automated precipitation observations

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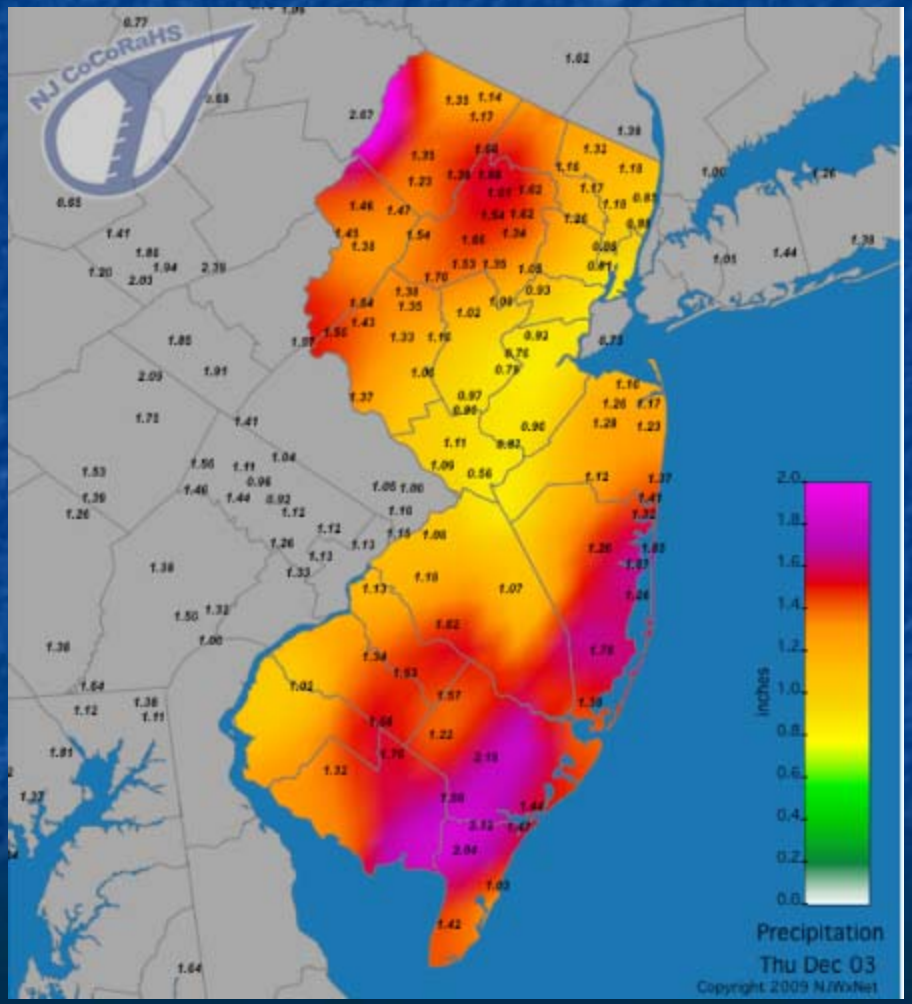
CoCoRaHS

http://cocorahs.org



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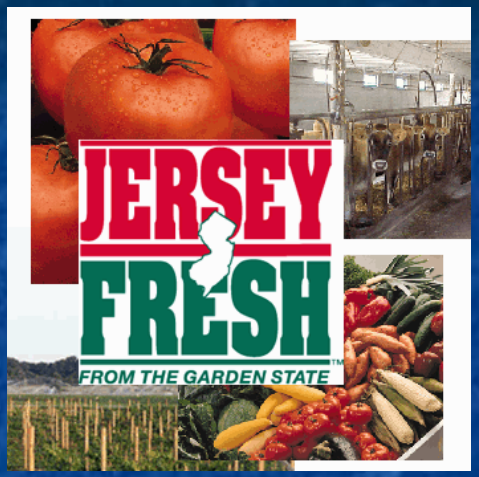
Thank you for the opportunity to speak this morning



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