

Delaware Basin Flooding Past. Present. Future?

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Delaware River Basin
Flood Warning User Forum

Easton, PA
September 21, 2010



Outline

1. The ONJSC
2. Past Delaware flooding
3. Liquid extremes
4. What the future holds
5. A watchful eye



Office of the NJ State Climatologist

Our mission:
Monitor
Understand
Inform

<http://climate.rutgers.edu/stateclim>

ONJSC
at Rutgers University
Office of the New Jersey State Climatologist · Rutgers University · 94 Joyce Kilmer Avenue · Lucy Stone Hall B221 · Piscataway, NJ 08854

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Latest from the NJWebNet

Latest temperatures across NJ appear in the above map. Click on the map or here: the [New Jersey Weather and Climate Network](#) for much more information.

Interested in becoming a volunteer weather observer? Click the banner below for more information.

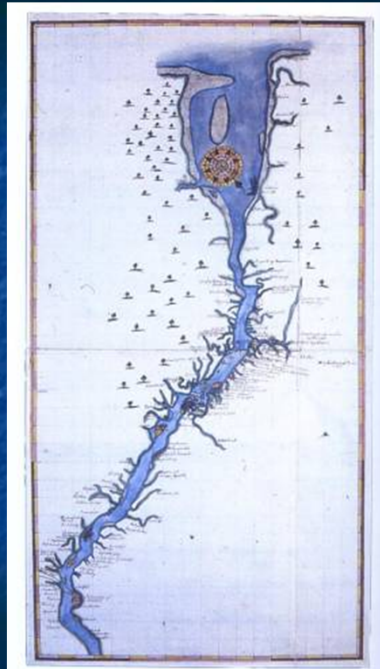
Frequently Updated Climate Data
[Winter 2009-2010 Snow Event Totals](#)
[Monthly and Annual Statewide \(1895-Present\)](#)
[Monthly Station](#)
[Monthly Maps](#)

Latest News

Wind damage in Bergenfield and flooding in Millstone as a result of the March 12-15 nor'easter. Photos by Rudy Nickmann and Dave Robinson

Washout!

CoCoRaHS March Madness 2010



1653-1655 Delaware Basin

Pier Lindstrom, Map of New Sweden, 1653-1655.

This early map of New Sweden reverses our expectations by placing Delaware Bay, which is south, at the top. It was drawn by Pier Lindstrom (1632-1691), a Swedish military engineer and clerk for the colony in 1653-1655. He explored the "south river" and recorded as best he could the creeks emptying into it, the depth of the water, and the channels in the bay, noting that the river was navigable up to the "Falls Asinpinck," today's Trenton. He left a manuscript account of his travels in the area, *Geographia Americae*, which was translated into English and printed in 1925.

SOURCE: National Archives of Sweden; photographed by Kurt Eriksson.

Mapping NJ 2009 Rutgers U. Press



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Delaware River



Trenton train station, September 23, 1882



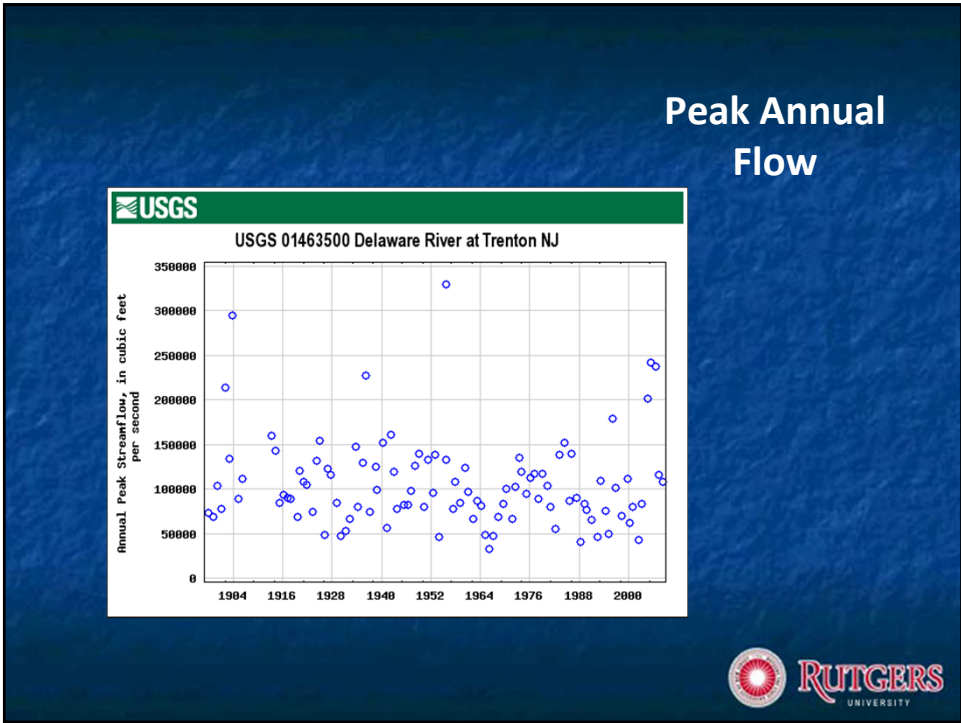
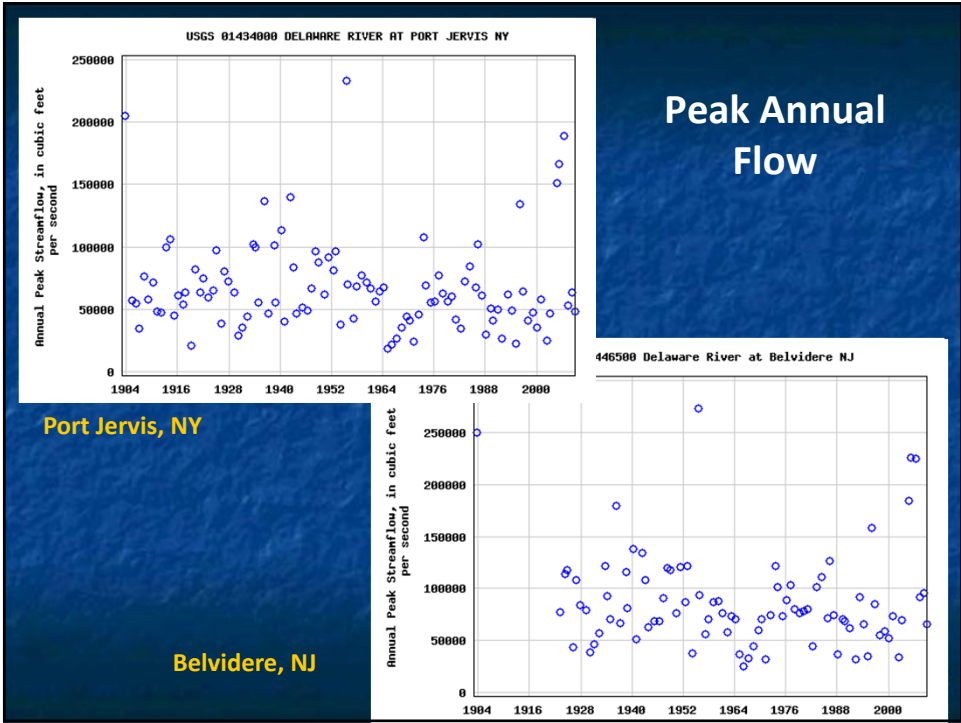
Easton, PA, August 1955



September 2004



Easton-Phillipsburg
Bridge: June 2006

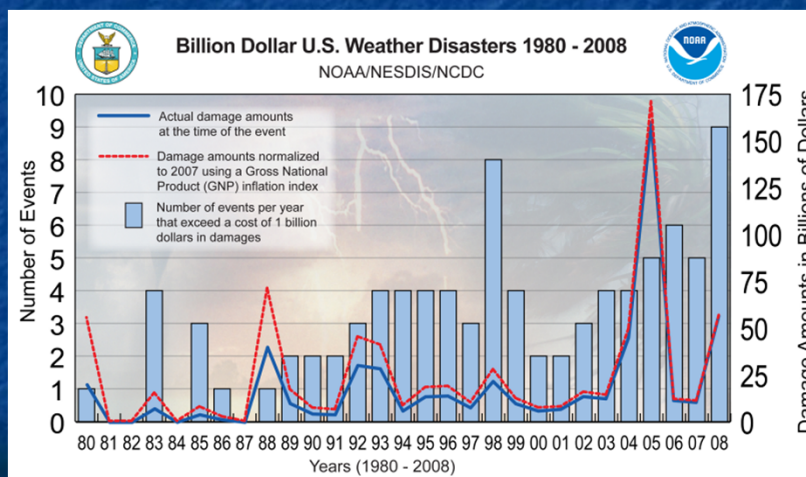


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Weather and climate extremes are among the most serious challenges to society in coping with global climate change



How do we define extremes?

- Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report Glossary:

“an extreme weather event is an event that is **rare** at a particular place and time of year”

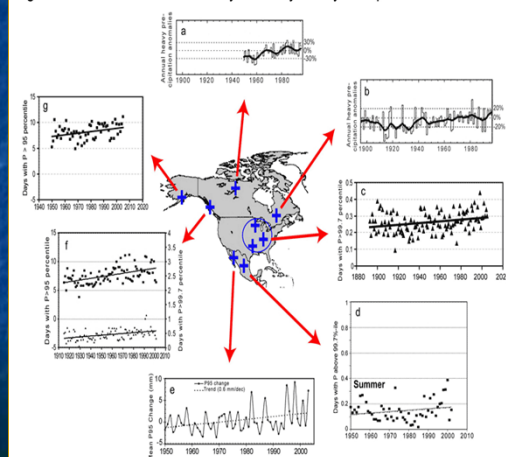
- “rare” is defined as the highest or lowest 10%



Precipitation Extremes

Extreme precipitation episodes (heavy downpours) have become more frequent and intense in recent decades over most of North America

Regions of N. America where Heavy and Very Heavy Precipitation has Increased

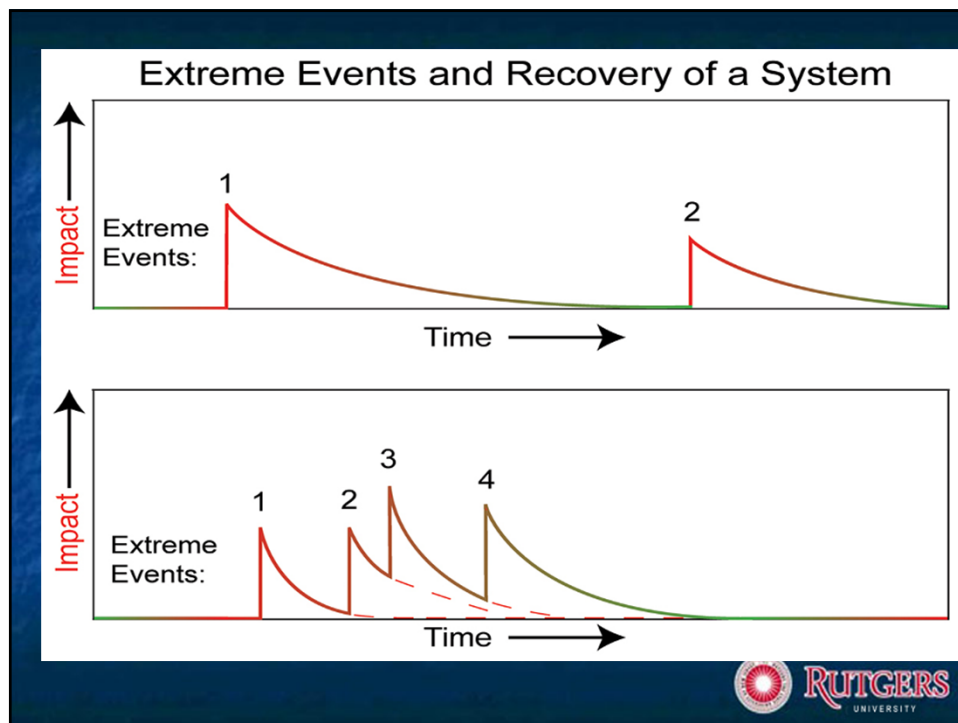


- Intense precipitation (heaviest 1%) increased 20% over the past century
- total precipitation increased by 7%



Multiple and Compound Extreme Events

- Multiple events: when additional events occur before a system has fully recovered.
- Compound events: when two or more events occur simultaneously in the same location.



Tropical Storm Tracks Associated with Delaware Flooding 1933-2004

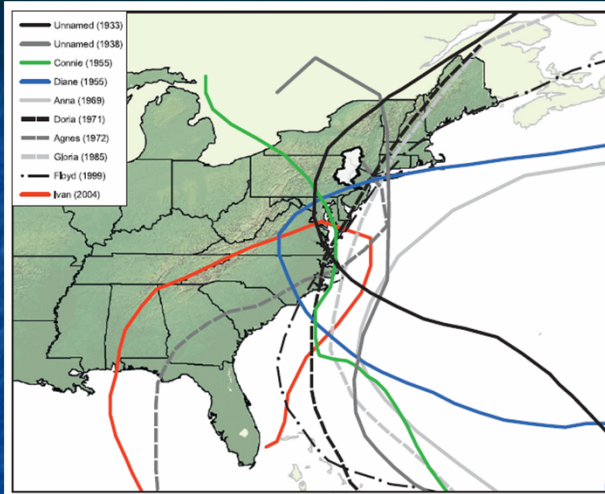


FIG. 4. Storm tracks for tropical cyclones producing annual flood peaks in the Delaware River at Trenton (see Fig. 3). The solid red line shows the track for Ivan, which makes first landfall on the Gulf Coast. The green and blue lines show the tracks of Connie and Diane, respectively, which produced extreme rainfall in the Delaware River basin during August of 1955.

Smith et al. 2010, J. Hydromet.



September 2004

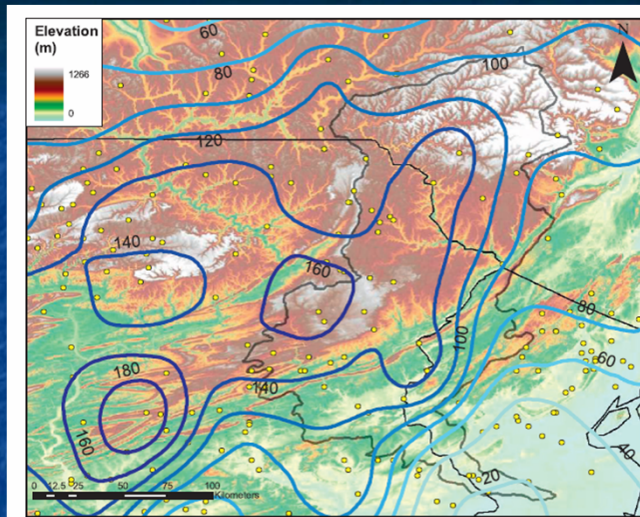


FIG. 5. Storm total accumulation field (mm) derived from the operational rain gauge network for the September 2004 storm. Yellow circles denote the locations of gauges.

Smith et al. 2010, J. Hydromet.



April
2005

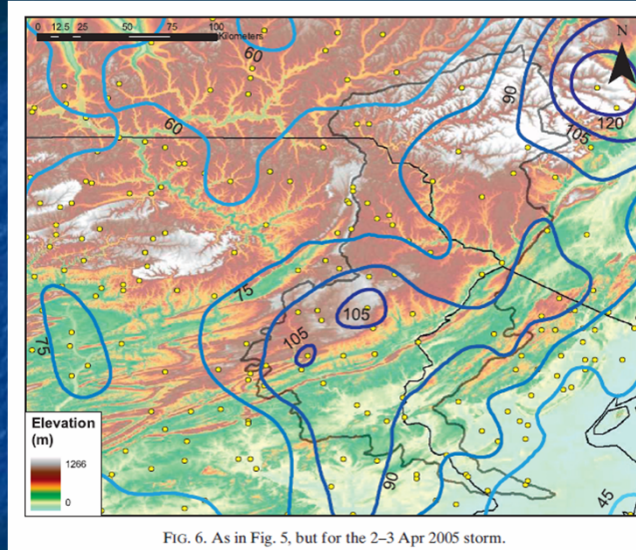


FIG. 6. As in Fig. 5, but for the 2–3 Apr 2005 storm.

Smith et al. 2010, J. Hydromet.



February 12, 2010
MODIS image



June
2006

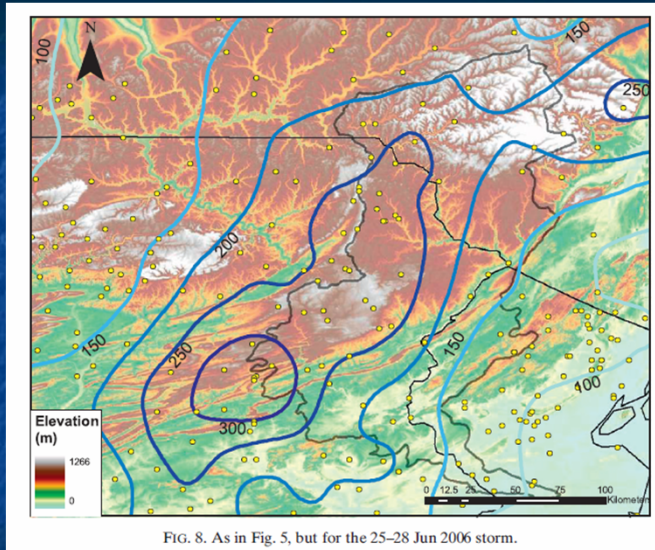


FIG. 8. As in Fig. 5, but for the 25–28 Jun 2006 storm.

Smith et al. 2010, J. Hydromet.



Sometimes
too little.....



Delaware River: November 1963



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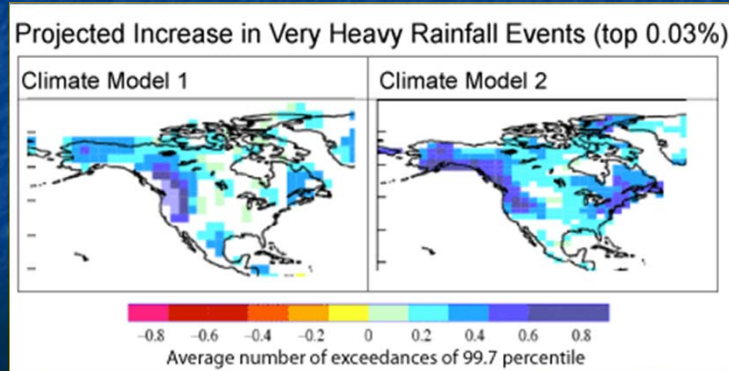
New Jersey's future climate

- Rising temperatures
- Rising sea level
- Steady or increasing precipitation
- Increasing variability and extremes
 - heat, storms, drought, and FLOOD



Precipitation Extremes

- 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)

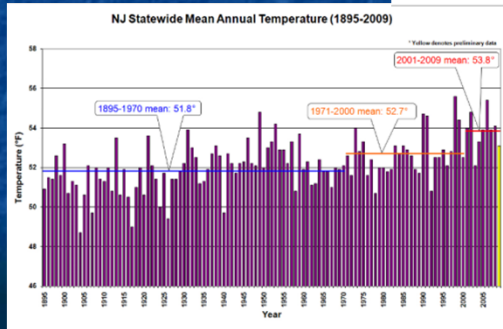
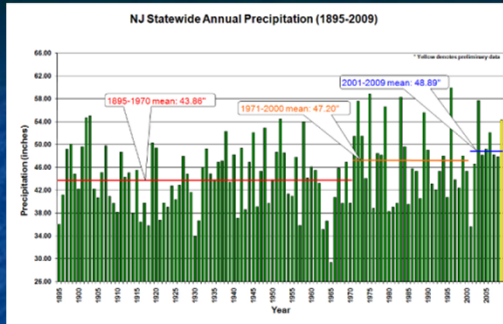


Outline

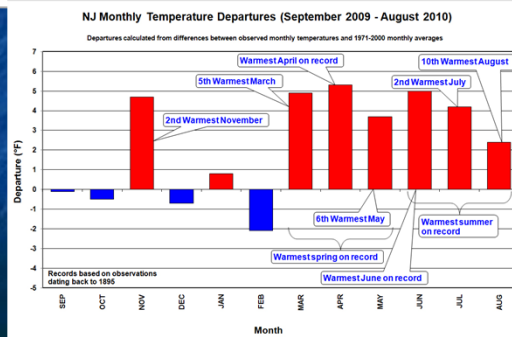
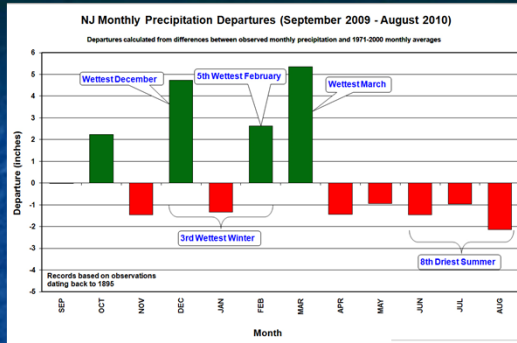
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Past century of NJ climate variability



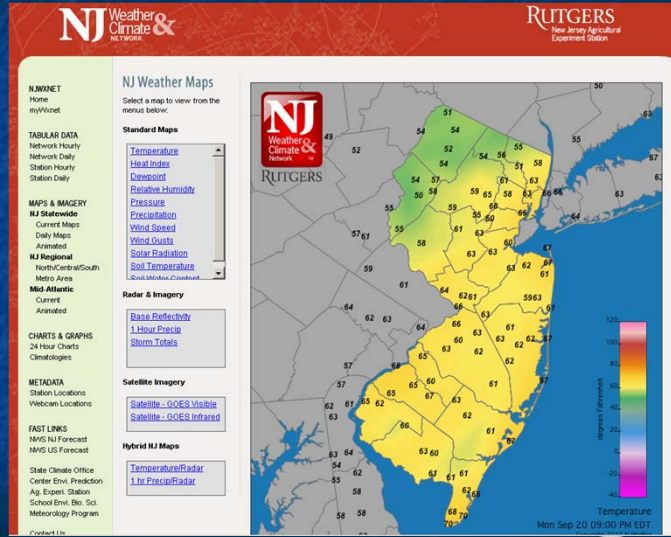
Climate Observations



Past 12 months of NJ's climate

NJ Weather & Climate Network

<http://climate.rutgers.edu/njwxnet>



NJ Weather and Climate Network stations

Station Locations

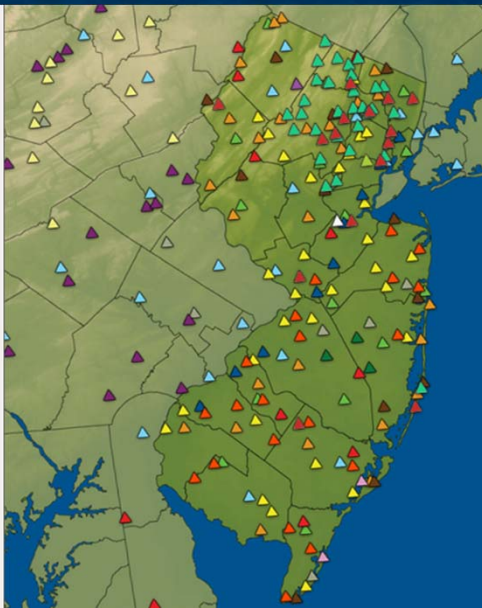
Each station is associated by color with a sub-network, identifiable using the key in the lower right hand corner of the map.

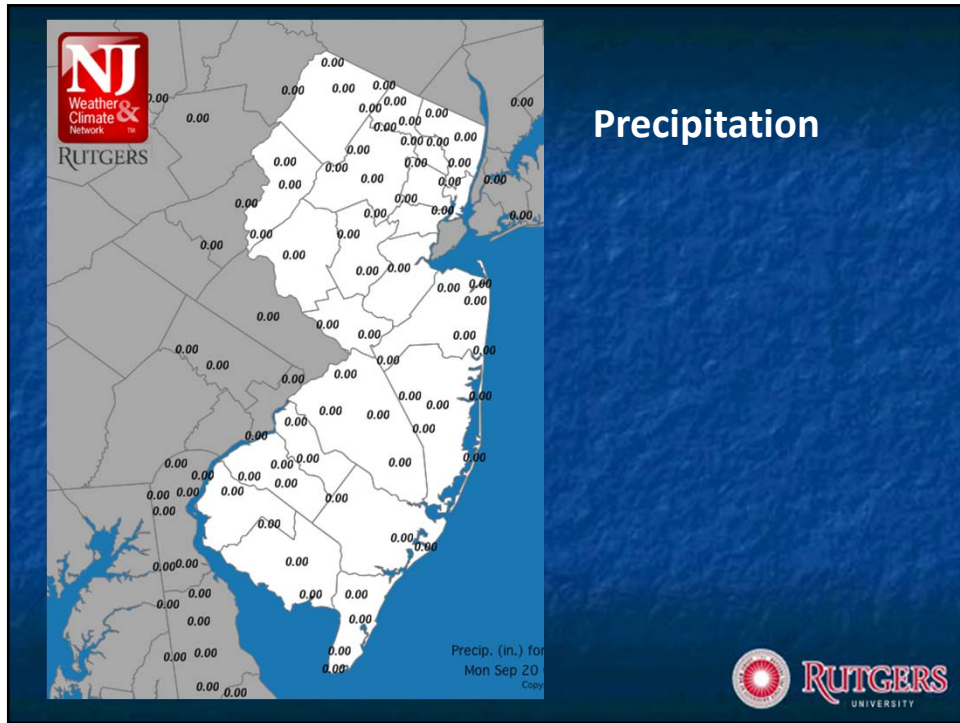
Using your mouse, hover over a station to find out the name/location. Clicking on a station will take you to the kiosk/home page for that specific station.

You can also click the names of the station networks on the legend below to toggle the visibility of that network on the station map.

Hide All Show All

- Mesonet
- Safetynet
- ASOS
- AWOS
- NJ DOT
- NJ Turnpike
- CEP
- RAWS
- USFS
- USGS
- Stevens Tech
- PA DEP
- PA DOT
- SCWN
- RISE
- Kean
- FLOWS
- ...





Custom web portals



Real-time Monitoring Console

Latest Statewide Conditions

Most recent information collected as of October 16, 2009, 9:53 am

Site	County	Air Temp	Dew Point	Pressure	Precip Amt	RH	Wind Speed	Wind Dir	Peak Gust
Atlantic City Airport	Atlantic	45	43	29.87	0.01	90	13	N	
Haworth	Bergen	38	35	29.93	0.00	88	5	NNE	15
Mount Holly	Burlington	39	37	29.90	0.00	89	9	NNE	21
Oswego Lake	Burlington	42	40	29.92	0.00	92	7	NE	15
Sicklerville	Camden	40	38	29.86	0.01	93	11	NNE	16
Woodbine	Cape May	44	42	29.88	0.00	94	14	NNE	17
Millville	Cumberland	43	39	29.85	0.00	89	12	NE	23
Upper Deerfield	Cumberland	39	38	29.83	0.00	94	8	NE	18
Caldwell	Essex	37	34	29.96	0.00	87	5	NE	
Newark	Essex	39	34	29.94	0.00	82	14	N	
Clayton	Gloucester			29.91	0.00		8	ENE	12
Jersey City (LSC)	Hudson	39	35		0.01	86	7	NE	23
Pittstown	Hunterdon	35	34	29.92	0.00	94	10	ENE	15
Trenton	Mercer	39	36	29.92	0.00	87	12	ENE	18
New Brunswick	Middlesex	38	37	29.94	0.00	96	3	NNW	14
Cream Ridge	Monmouth	39	36	29.93	0.00	88	4	N	13
Sea Girt	Monmouth	45	43	29.88	0.01	92	26	NE	32
Netcong	Morris	33		29.92	0.01			WWW	
Berkeley Twp.	Ocean	41	39	29.89	0.01	92	9	N	15

Management Resources

will launch in new window

Latest Radar	Latest Temperatures
Latest Winds	Latest Wind Gusts
Latest Precip	USGS Flood Conditions
USGS Coastal	

NJ Community Collaborative Rain, Hail and Snow Network



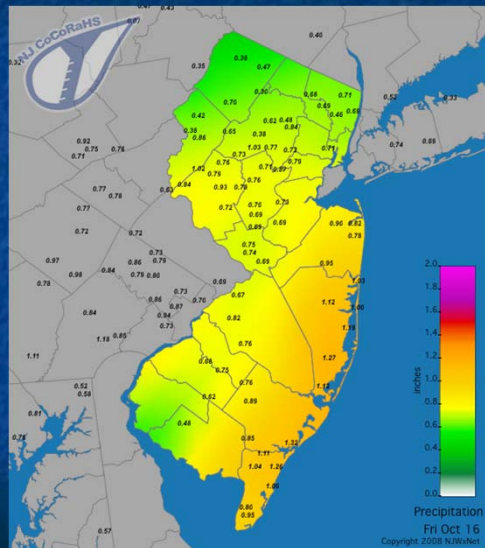
Daily observations by
trained volunteers of
all ages



Augmenting automated precipitation
observations



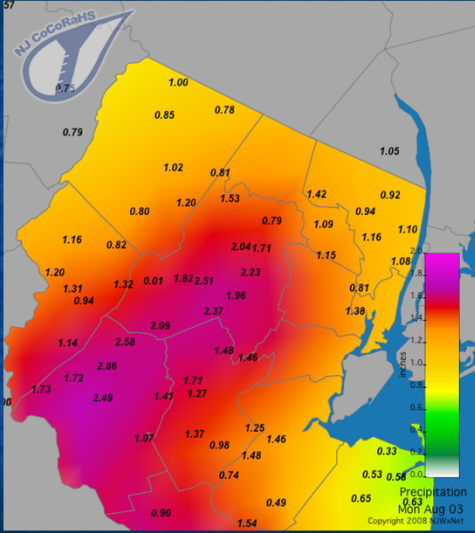
<http://cocorahs.org>



October 16, 2009



7AM August 2
to 7AM August 3, 2009



- High Bridge: 3.51
- Califon: 3.10
- Bethlehem Twp: 2.51
- Franklin Twp 1: 3.00
- Franklin Twp 2: 2.92
- Kingwood: 3.41
- Stockton: 2.72
- Pittstown: 3.08
- Stewartsville: 2.59
- Readington: 1.56
- Flemington: 1.54



Thanks
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<http://climate.rutgers.edu>

