

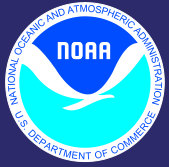
# **Rancocas Creek Major Flooding April 2007**



**Presented by**

**Gary Szatkowski  
Meteorologist-in-Charge  
NOAA's National Weather Service  
Philadelphia/Mt. Holly NJ Forecast Office**

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Gary.szatkowski@noaa.gov**



# Mission statement

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- “The **National Weather Service (NWS)** provides weather, **hydrologic**, and climate **forecasts and warnings** for the United States, its territories, adjacent waters and ocean areas, **for the protection of life and property** and the enhancement of the national economy. NWS data and products form a national information database and infrastructure which can be used by other governmental agencies, the private sector, the public, and the global community.”





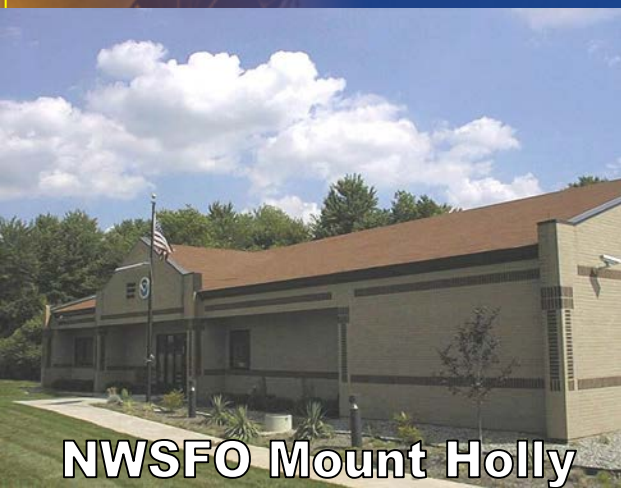
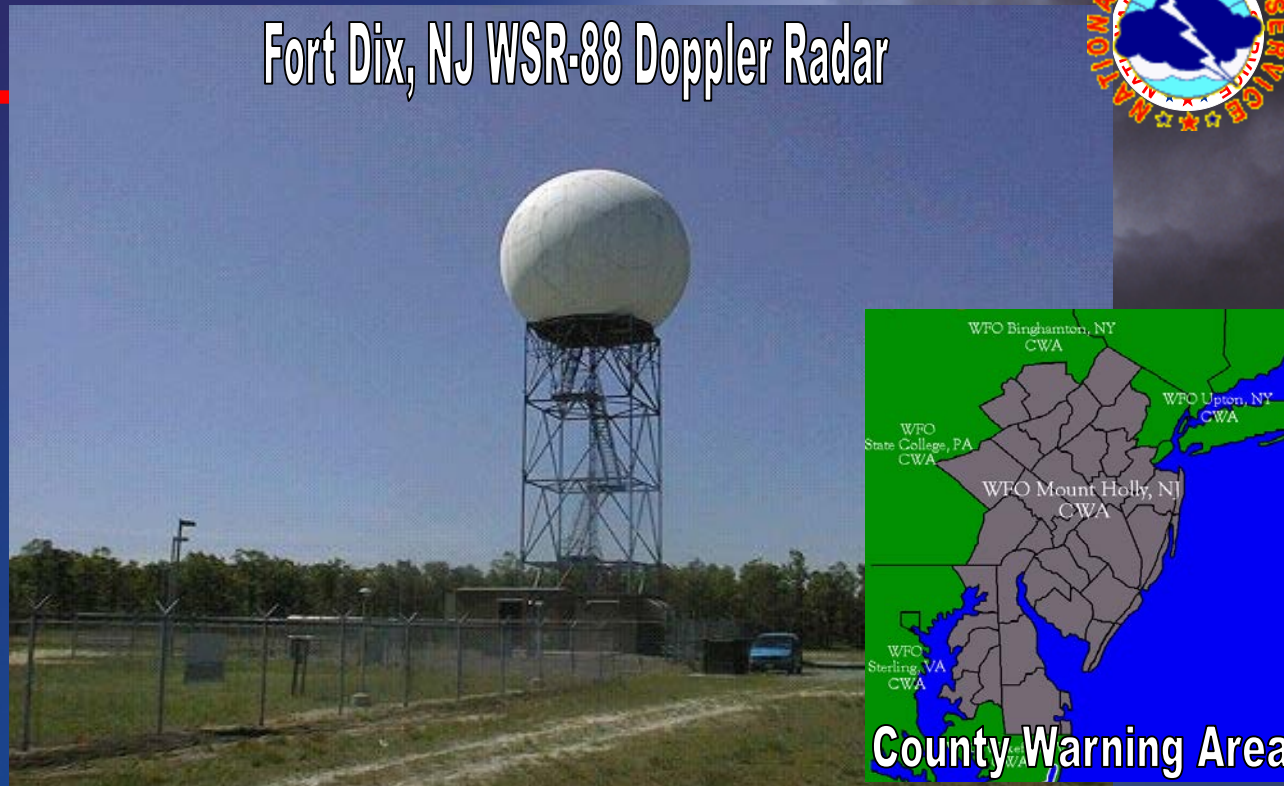
# NWS Forecast Office - Mount Holly, NJ



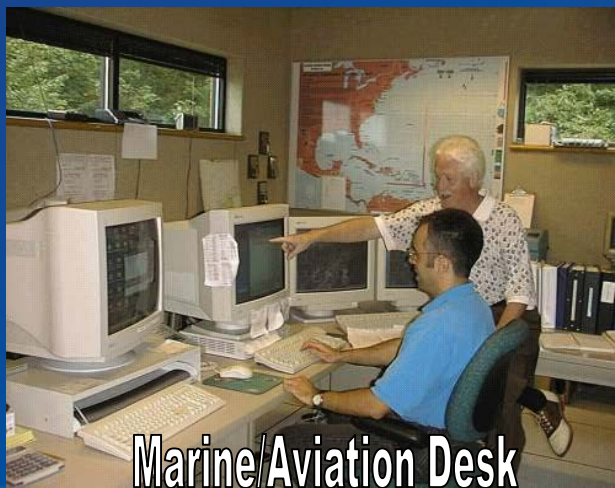
## Fort Dix, NJ WSR-88 Doppler Radar

### NWS Mount Holly Personnel

- Senior Forecasters : 5
- General Forecasters: 5
- Meteorological Interns: 3
- Hydrometeorological Technicians: 1
- Electronic Technicians: 3
- Hydrologist: 1
- Management: 5
- IT position: 1
- Administrative support: 1
- Total Personnel: 25



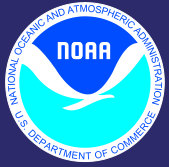
NWSFO Mount Holly



Marine/Aviation Desk



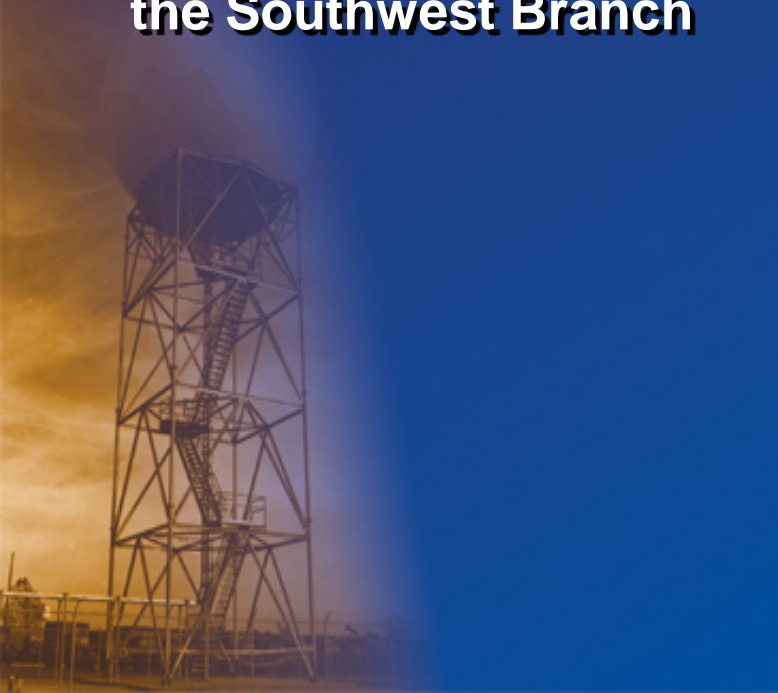
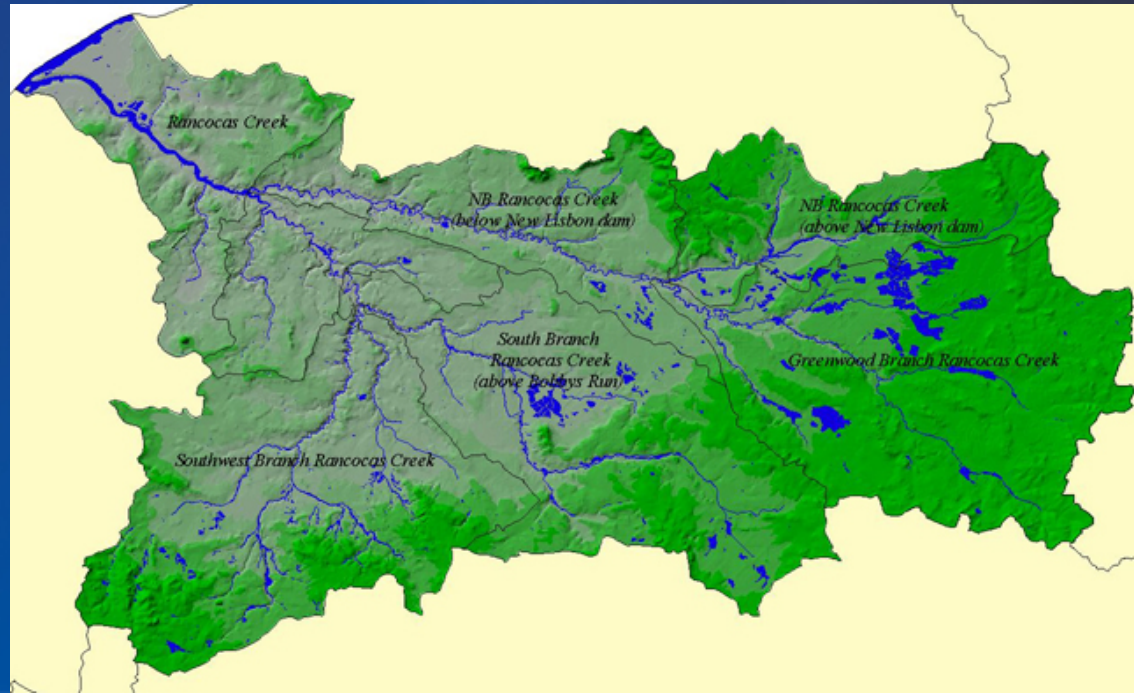
ASOS



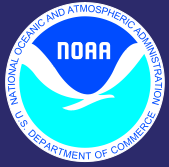
# Rancocas Creek watershed



- Covers 360 square miles
- Affects 33 municipalities in three counties
- North branch drains 167 square miles; south branch drains 144 square miles
- Tidal influence extends inland to the dam at Mount Holly on the North branch, Vincentown on the South Branch, and Kirby Mills on the Southwest Branch





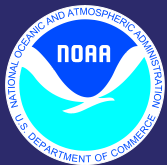


# Major Flooding



- **What Does It Take?**
- **Usually preceded by a wet period that “sets the stage” or an above normal snowpack.**
- **Often preceded a few days before by a “precursor flood event” that results in very wet soils and above normal river levels.**
- **Requires unusually heavy rain covering most of the river basin.**





# Flood 2007 – What Happened



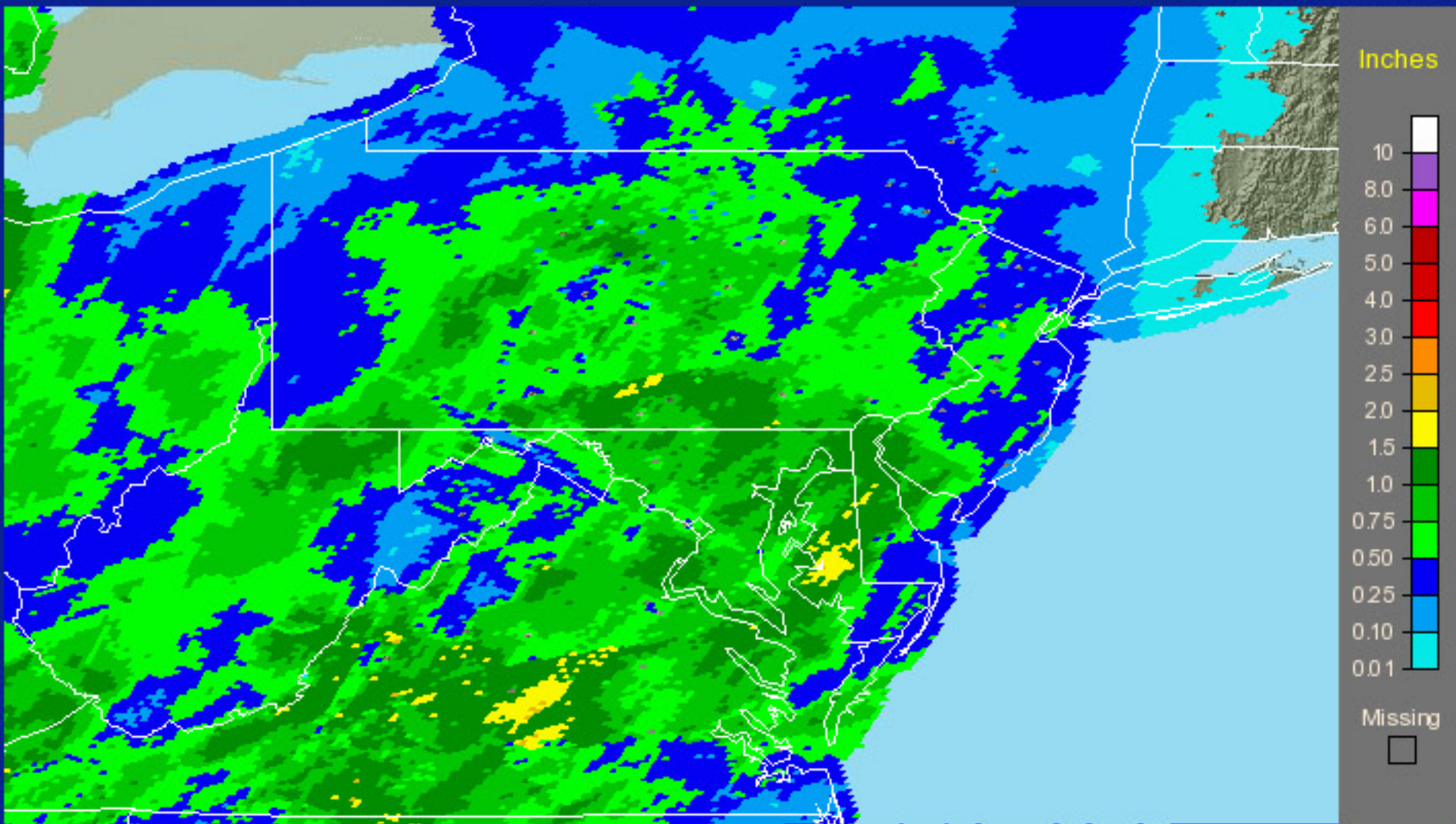
- A unusual late season nor'easter impacted the region in mid-April with rain, snow, high winds, and coastal flooding.
- Impact – heavy rainfall over the Rancocas basin – worsened by unusually high tides - culminating in significant flooding.
- Pemberton - Crest 3.67 (1.67 feet above flood stage)
  - *6<sup>th</sup> worst on record*
- Vincenttown – Crest 9.20 (2.20 feet above flood stage)
  - *2<sup>nd</sup> worst on record*



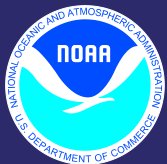


**Middle Atlantic RFC State College, PA**  
**1-Day Observed Precipitation - Valid 4/12/2007 1200 UTC**

*Click on the image to zoom in*  
*Click on "States" to zoom out*

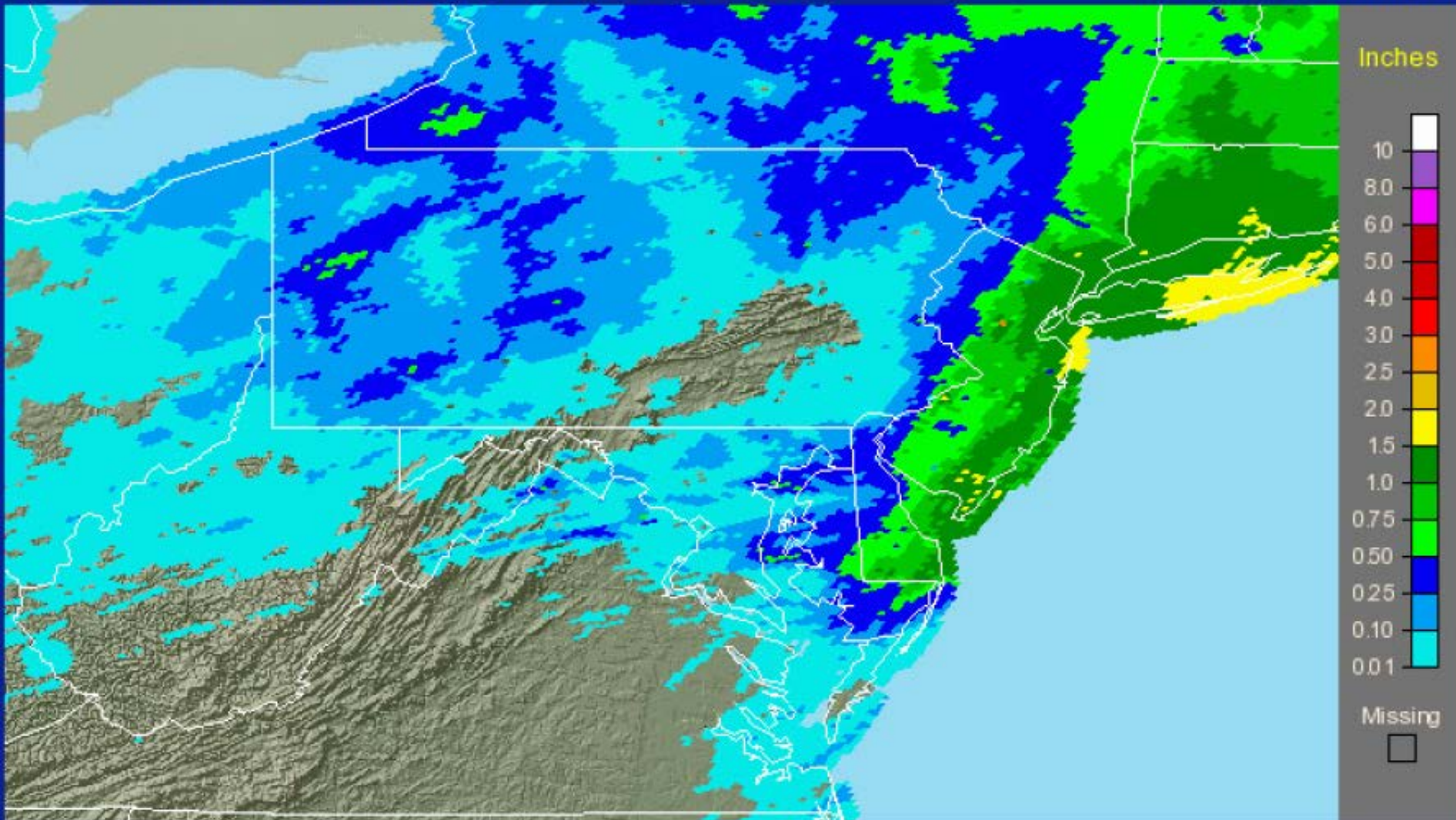




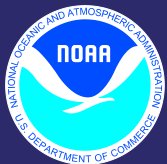


**Middle Atlantic RFC State College, PA**  
**1-Day Observed Precipitation - Valid 4/13/2007 1200 UTC**

*Click on the image to zoom in*  
*Click on "States" to zoom out*

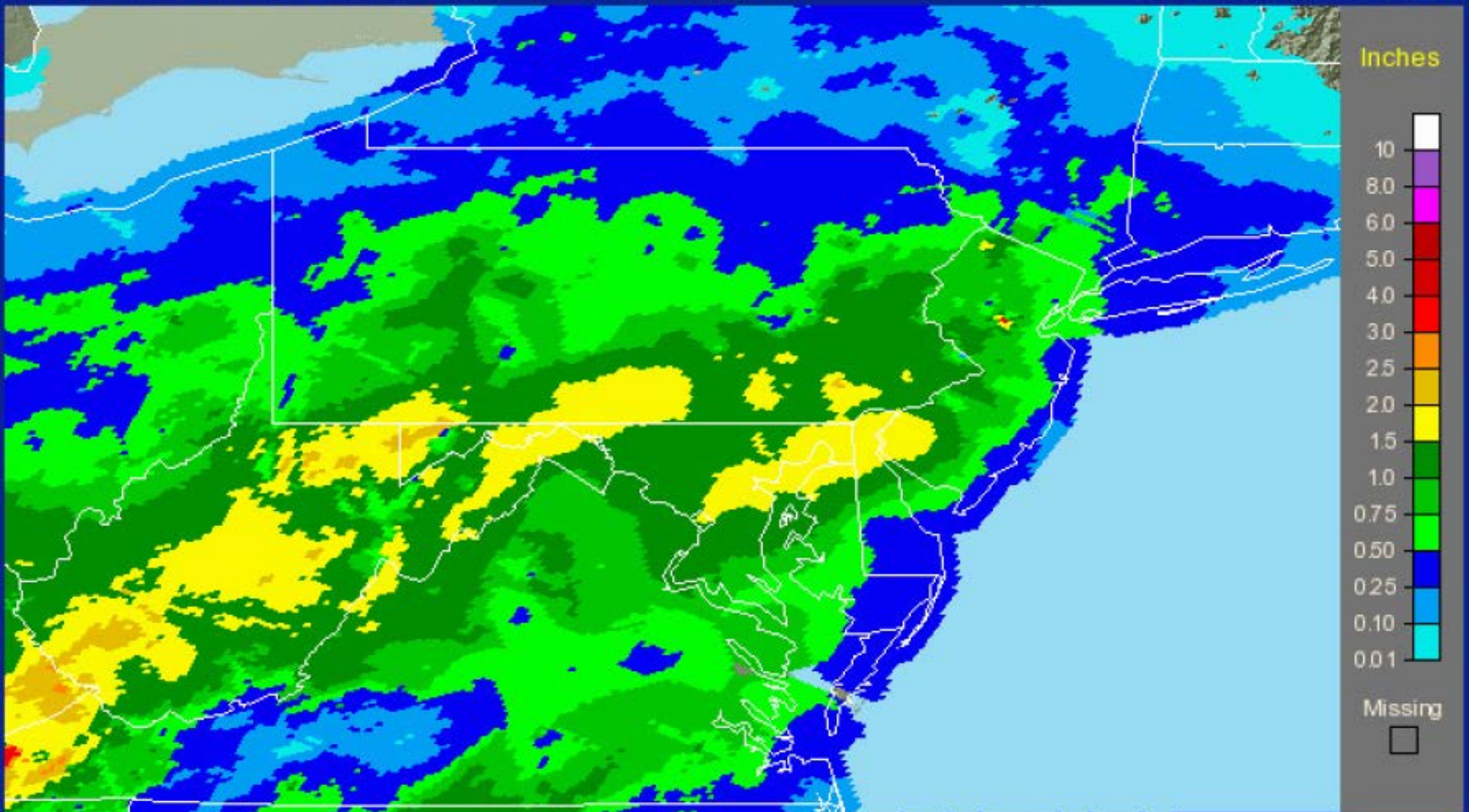




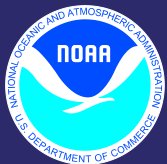


**Middle Atlantic RFC State College, PA**  
**1-Day Observed Precipitation - Valid 4/15/2007 1200 UTC**

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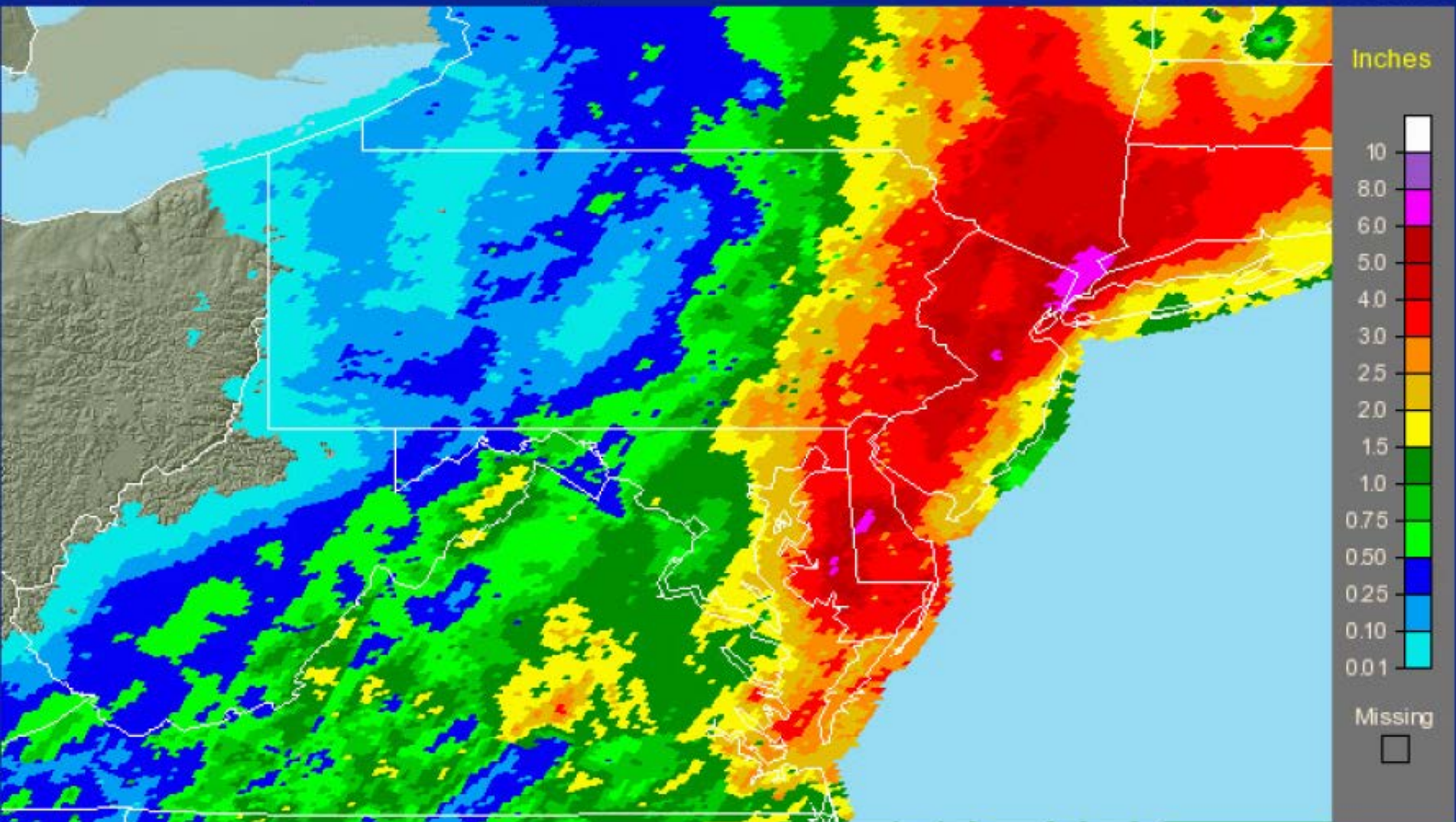




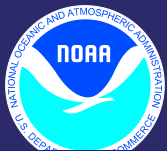


**Middle Atlantic RFC State College, PA**  
**1-Day Observed Precipitation - Valid 4/16/2007 1200 UTC**

*Click on the image to zoom in*  
*Click on "States" to zoom out*

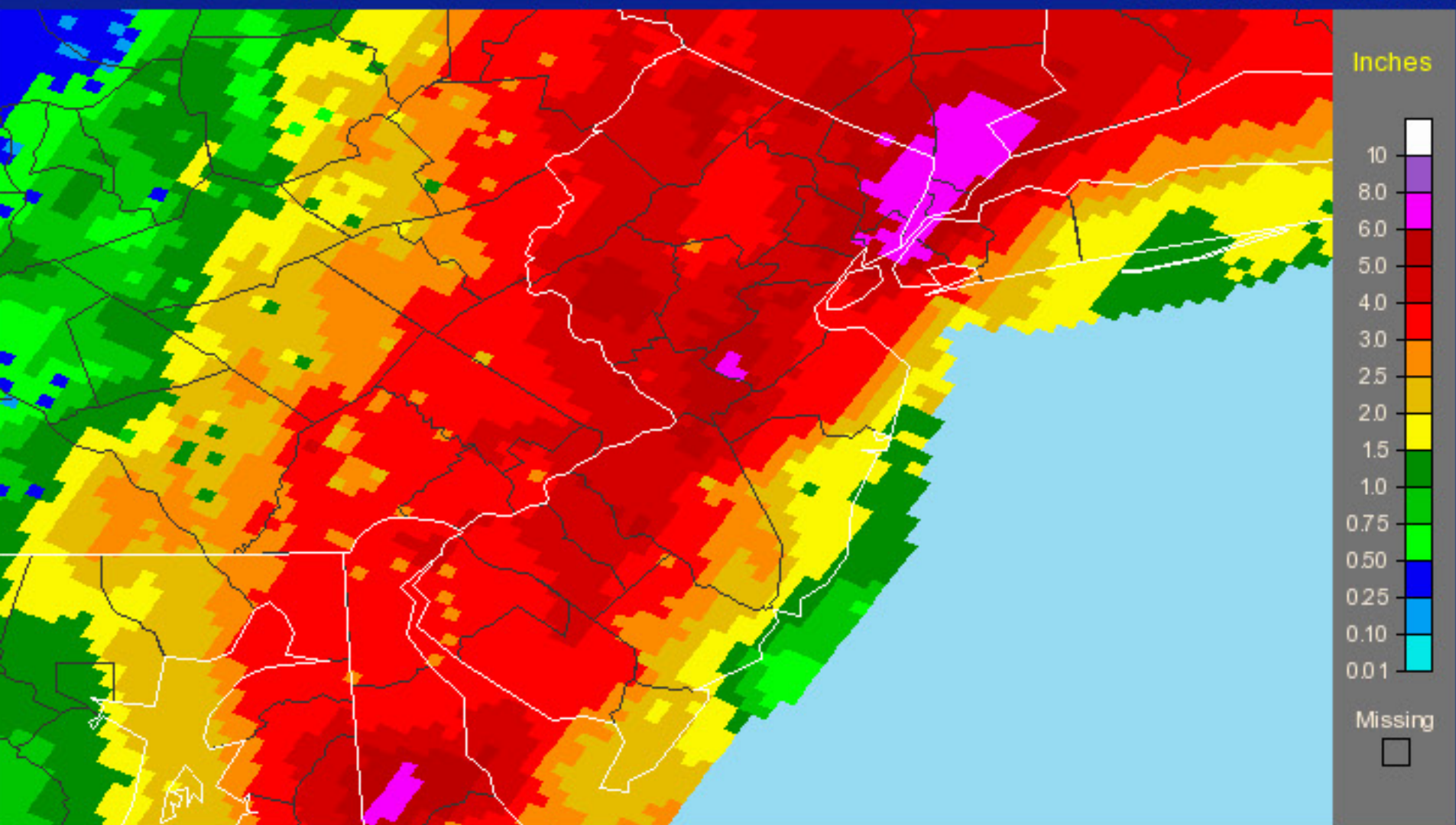






**New Jersey**  
**1-Day Observed Precipitation - Valid 4/16/2007 1200 UTC**

*Click on the image to zoom in*  
*Click on "States" to zoom out*

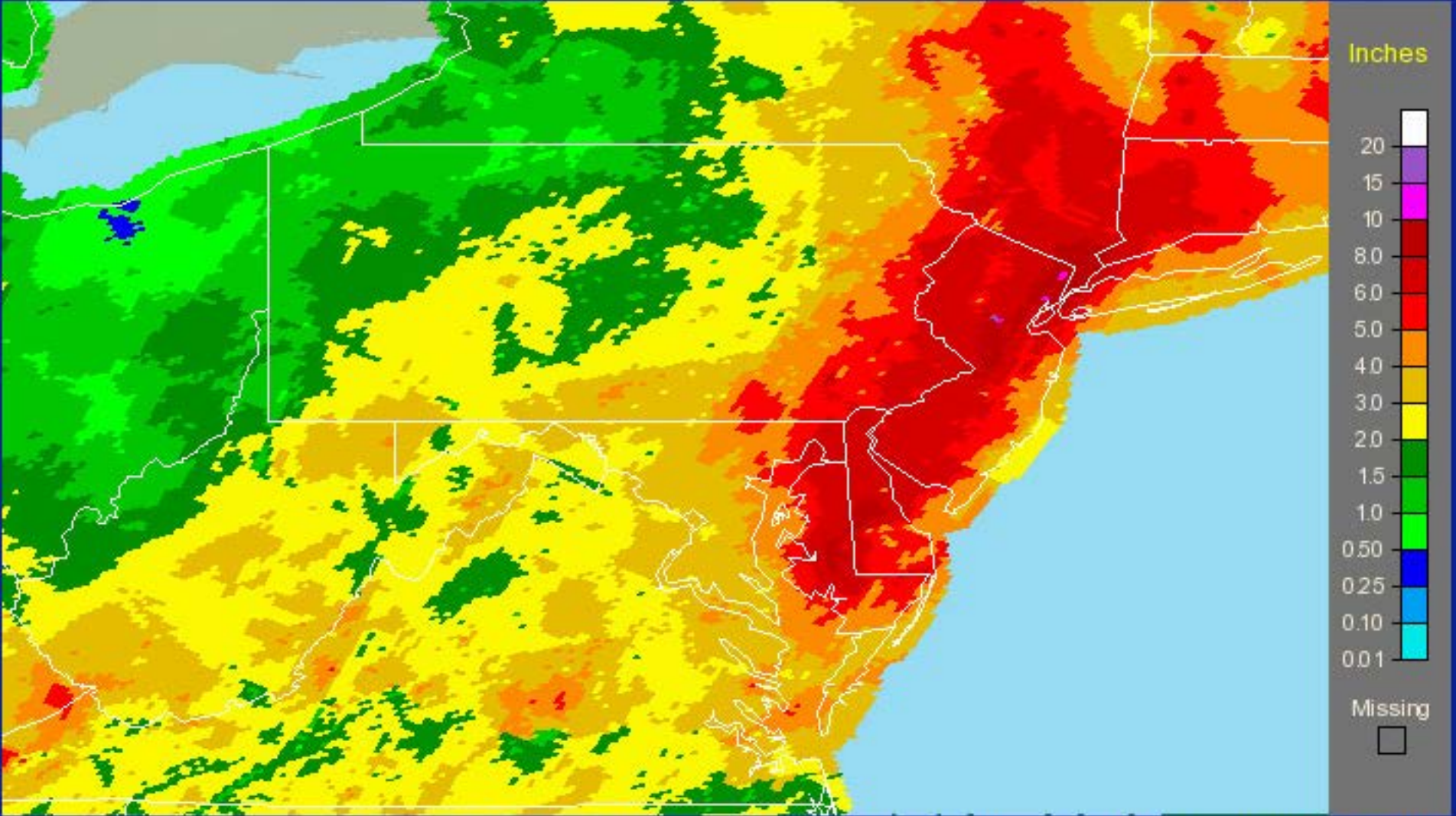




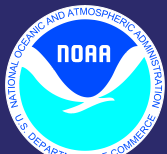


**Middle Atlantic RFC State College, PA**  
**14-Day Observed Precipitation - Valid 4/23/2007 1200 UTC**

*Click on the image to zoom in*  
*Click on "States" to zoom out*

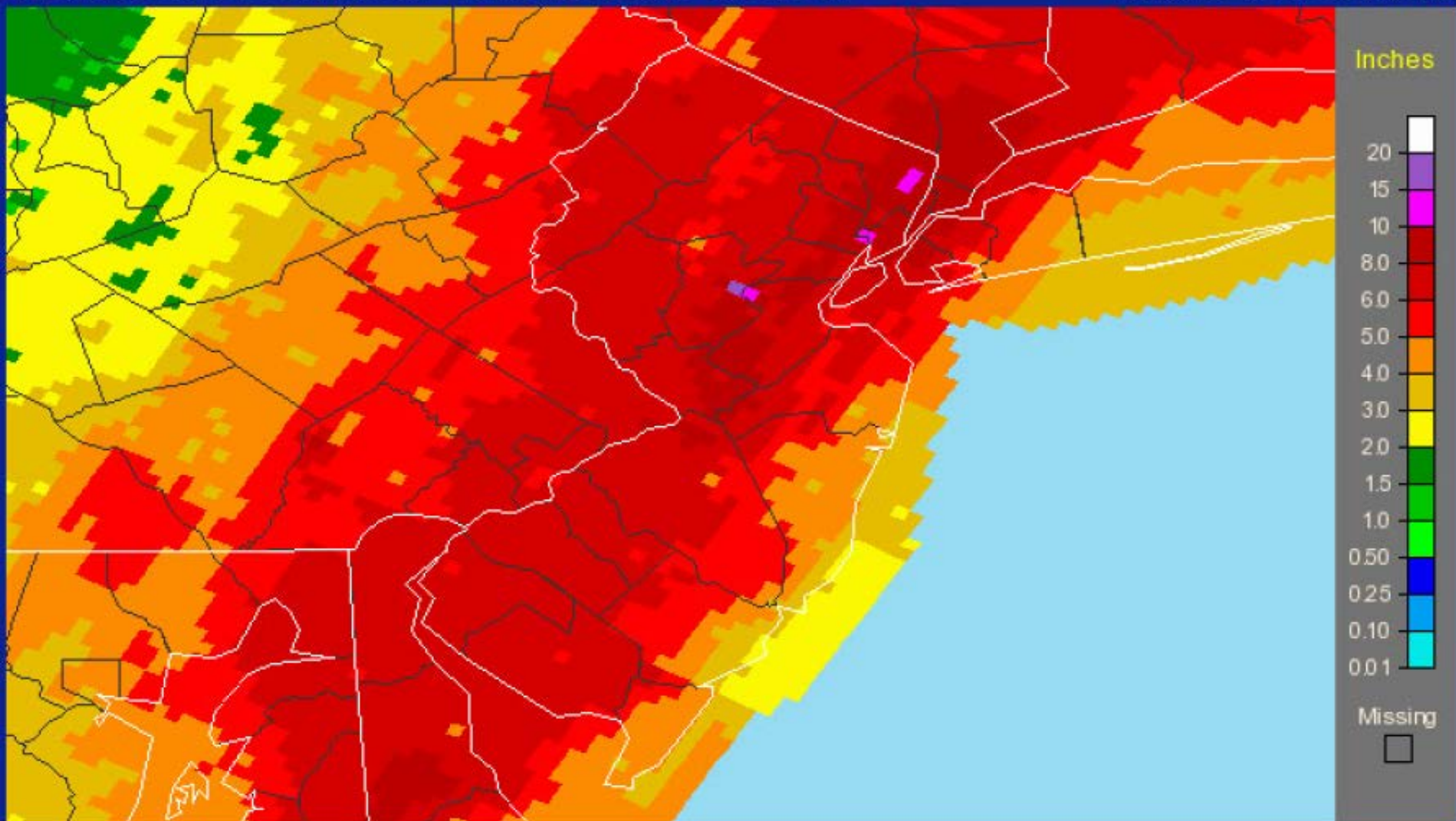


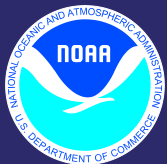




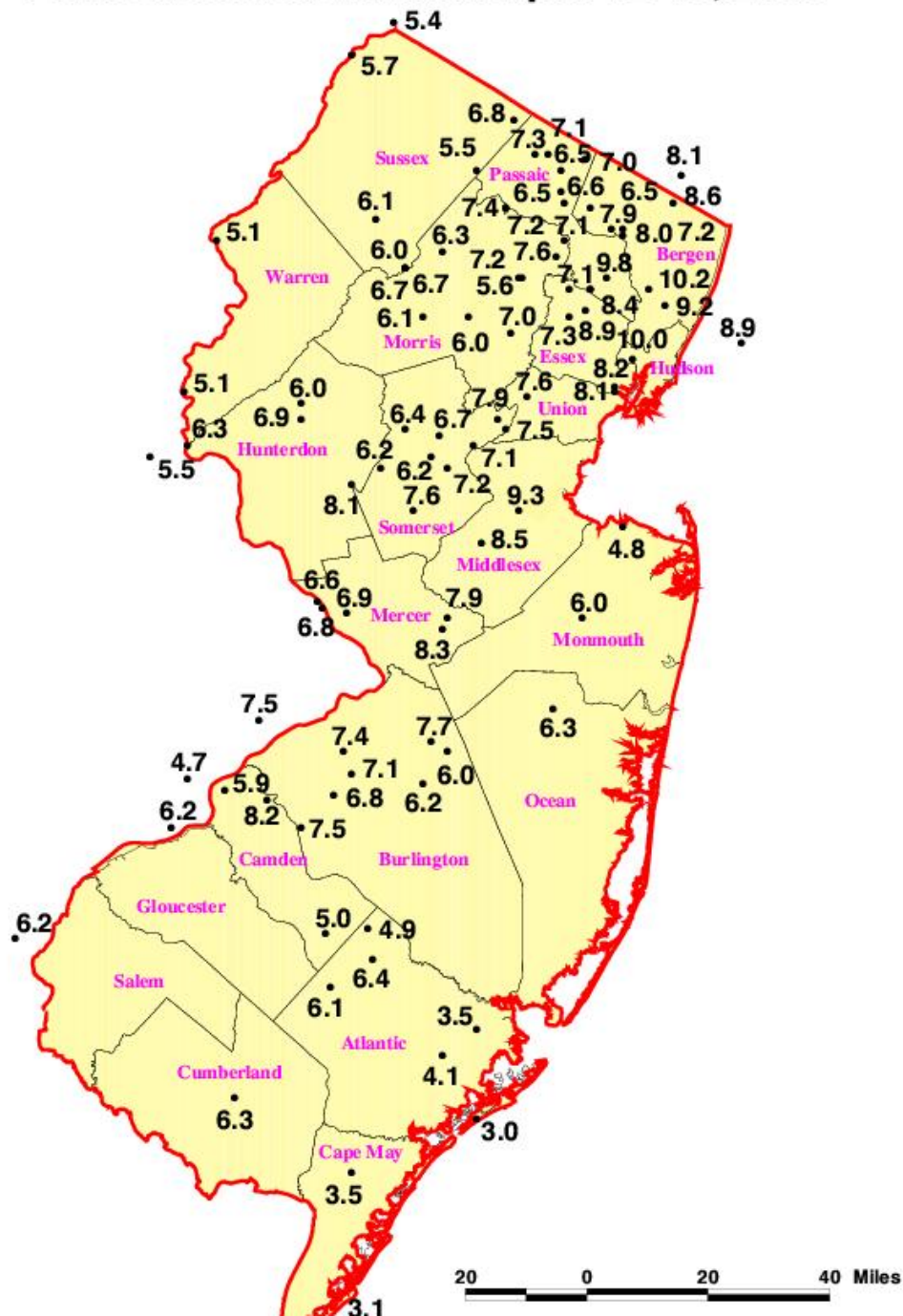
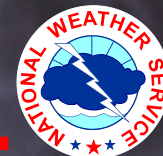
**New Jersey**  
**14-Day Observed Precipitation - Valid 4/23/2007 1200 UTC**

*Click on the image to zoom in*  
*Click on "States" to zoom out*

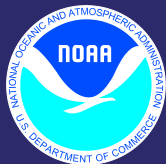




# Total Observed Rainfall April 12-17, 2007







# Rainfall – a 25 year event



## POINT PRECIPITATION FREQUENCY ESTIMATES FROM NOAA ATLAS 14



**MOUNT HOLLY, NEW JERSEY (28-5866) 39.9833 N 74.8 W 16 feet**  
from "Precipitation-Frequency Atlas of the United States" NOAA Atlas 14, Volume 2, Version 3

G.M. Bonnin, D. Martin, B. Lin, T. Parzybok, M. Yekta, and D. Riley

NOAA, National Weather Service, Silver Spring, Maryland, 2004

Extracted: Wed Apr 18 2007

Confidence Limits

Seasonality

Location Maps

Other Info.

GIS data

Maps

Help

Docs

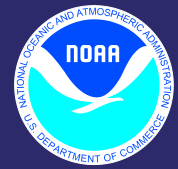
U.S. Map

### Precipitation Frequency Estimates (inches)

ARI* (years)	5 min	10 min	15 min	30 min	60 min	120 min	3 hr	6 hr	12 hr	24 hr	48 hr	4 day	7 day	10 day	20 day	30 day	45 day	60 day
1	0.35	0.56	0.70	0.96	1.19	1.44	1.58	1.97	2.40	2.74	3.16	3.52	4.12	4.68	6.34	7.87	10.05	12.03
2	0.42	0.67	0.84	1.16	1.45	1.75	1.92	2.40	2.91	3.32	3.83	4.26	4.95	5.61	7.53	9.29	11.83	14.12
5	0.50	0.79	1.00	1.43	1.83	2.22	2.43	3.02	3.69	4.26	4.92	5.41	6.20	6.91	9.05	10.96	13.73	16.23
10	0.55	0.88	1.12	1.62	2.11	2.57	2.83	3.54	4.36	5.07	5.84	6.37	7.24	7.98	10.26	12.27	15.18	17.79
25	0.62	0.99	1.26	1.86	2.48	3.06	3.39	4.28	5.36	6.28	7.21	7.76	8.76	9.50	11.93	14.02	17.04	19.76
50	0.68	1.07	1.36	2.05	2.78	3.45	3.84	4.89	6.23	7.33	8.38	8.94	10.03	10.75	13.26	15.38	18.44	21.21
100	0.73	1.16	1.46	2.24	3.08	3.85	4.32	5.56	7.18	8.51	9.67	10.23	11.41	12.07	14.61	16.75	19.78	22.57
200	0.78	1.23	1.55	2.41	3.39	4.27	4.81	6.27	8.24	9.81	11.10	11.63	12.91	13.47	16.01	18.12	21.08	23.86
500	0.84	1.32	1.66	2.65	3.80	4.84	5.50	7.30	9.82	11.79	13.24	13.68	15.09	15.47	17.91	19.93	22.73	25.45
1000	0.88	1.39	1.75	2.83	4.13	5.30	6.07	8.16	11.19	13.51	15.07	15.41	16.92	17.20	19.41	21.32	23.95	26.60

Text version of table

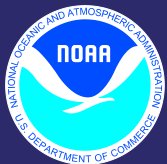
\* These precipitation frequency estimates are based on a partial duration series. ARI is the Average Recurrence Interval. Please refer to the [documentation](#) for more information. NOTE: Formatting forces estimates near zero to appear as zero.



# Flooding - How the creek responded



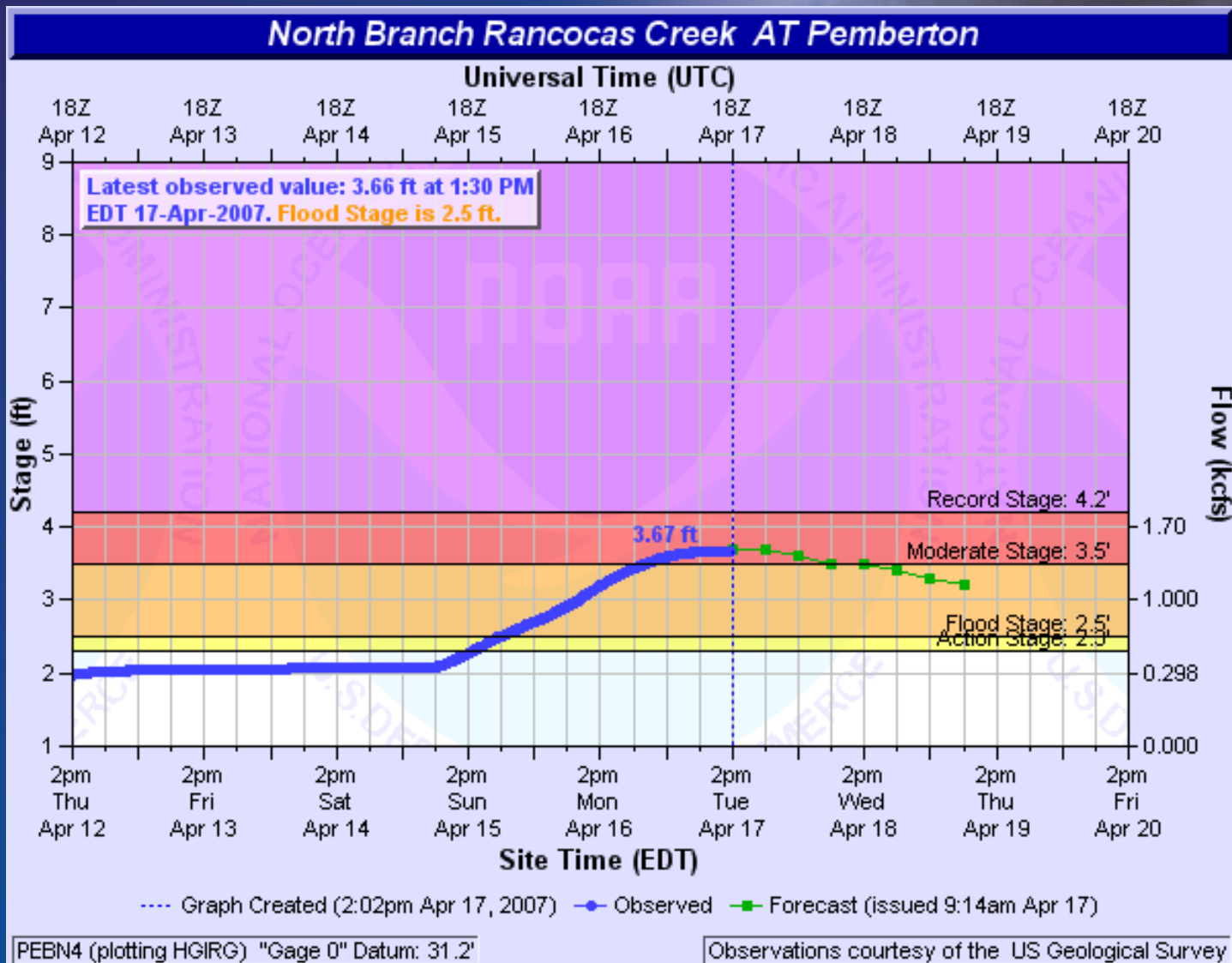


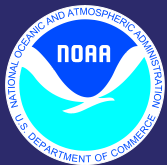


# North Branch at Pemberton

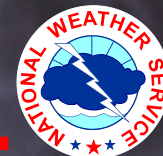


6<sup>th</sup> highest crest on record



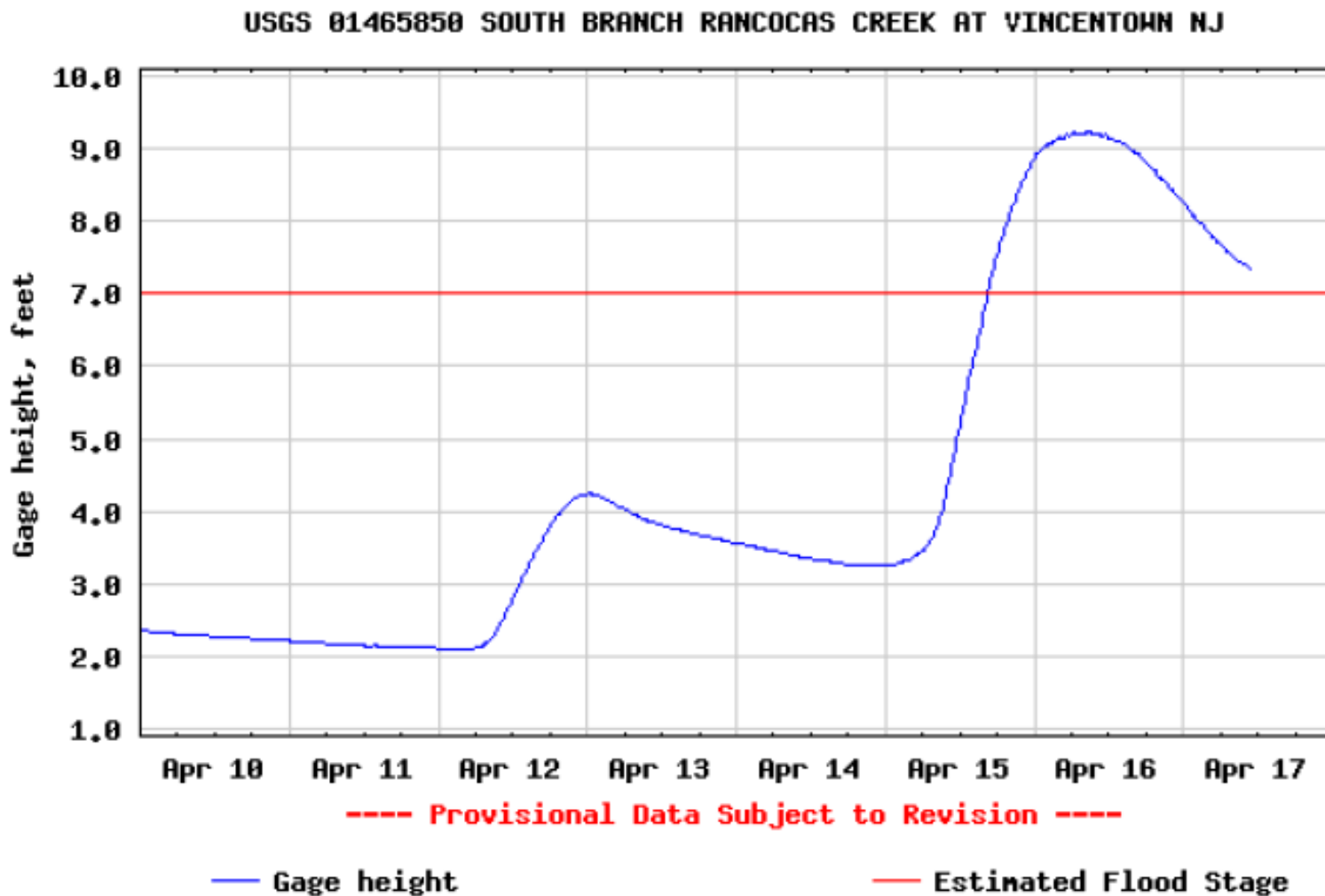


# South Branch at Vincentown

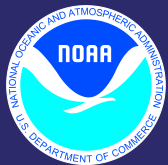


2<sup>nd</sup> highest  
crest on  
record

Worst since  
2004







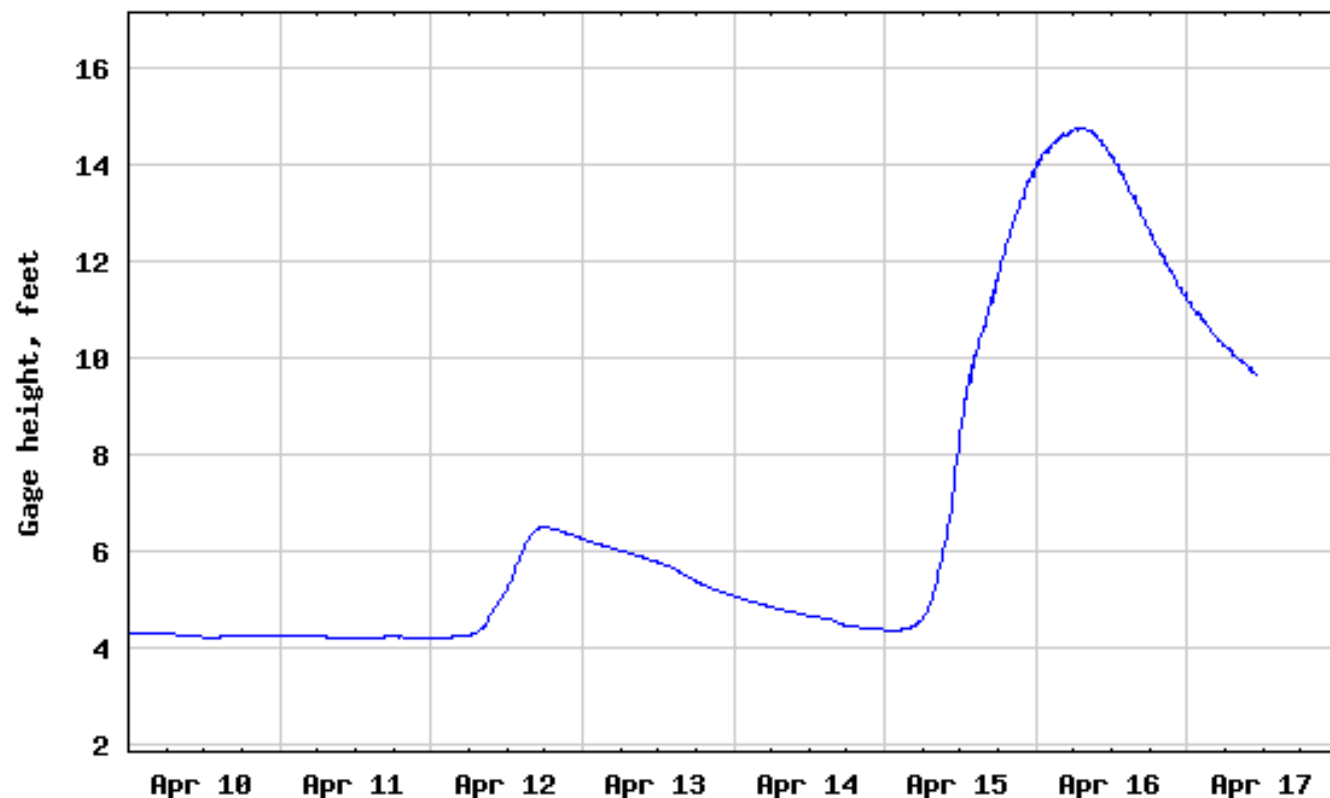
# Southwest Branch at Medford



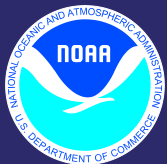
- **New gage**



USGS 01465880 SOUTHWEST BRANCH RANCOCAS CREEK AT MEDFORD NJ



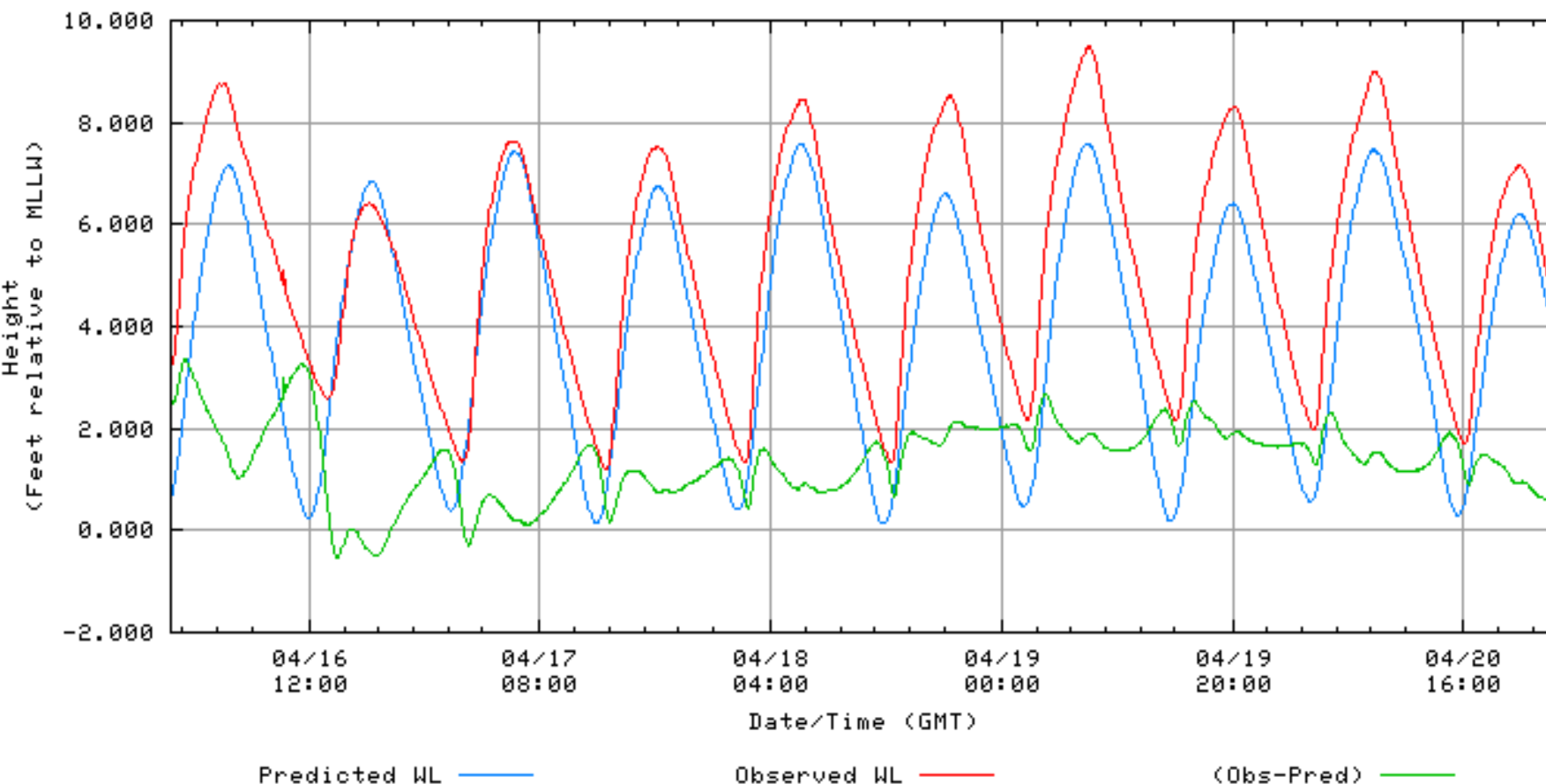
----- Provisional Data Subject to Revision -----



# Tides didn't help



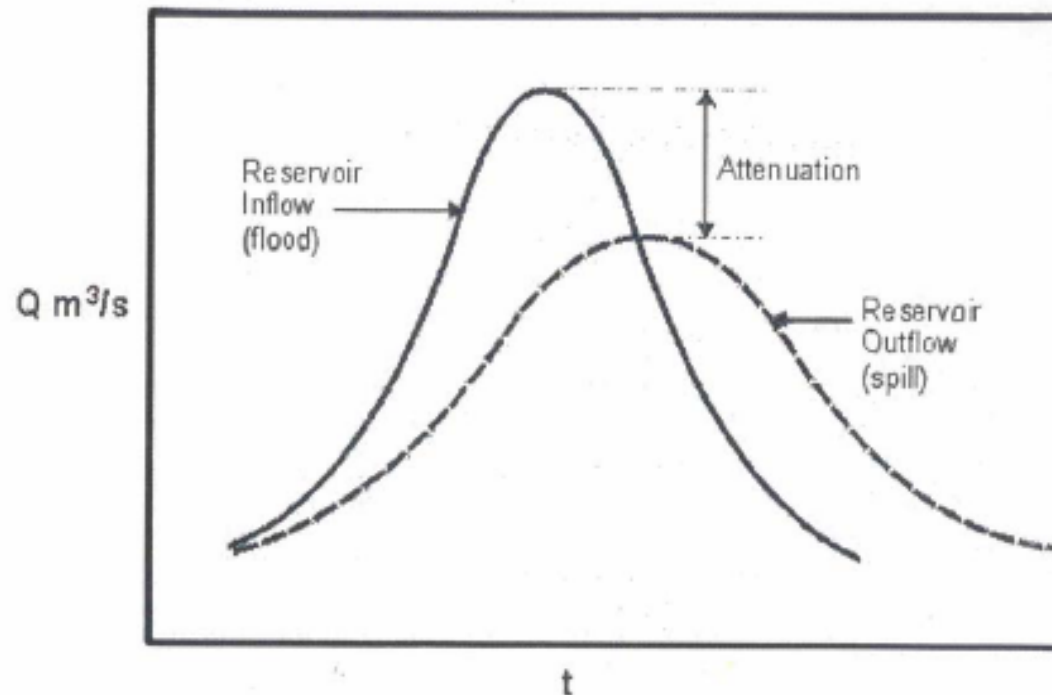
NOAA/NOS/CO-OPS  
Preliminary Water Level (A1) vs. Predicted Plot  
8545240 Philadelphia, PA  
from 2007/04/16 - 2007/04/20



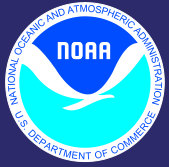


# Reservoir Attenuation

- Reservoirs provide attenuation even when full.



From "A Review of the Role of Dams in Flood Mitigation", a paper submitted to the World Commission on Dams ([www.dams.org](http://www.dams.org)) in March 2000 by Peter Hawker



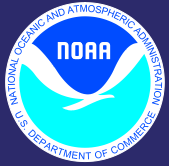
# Flooding – What was the Cause



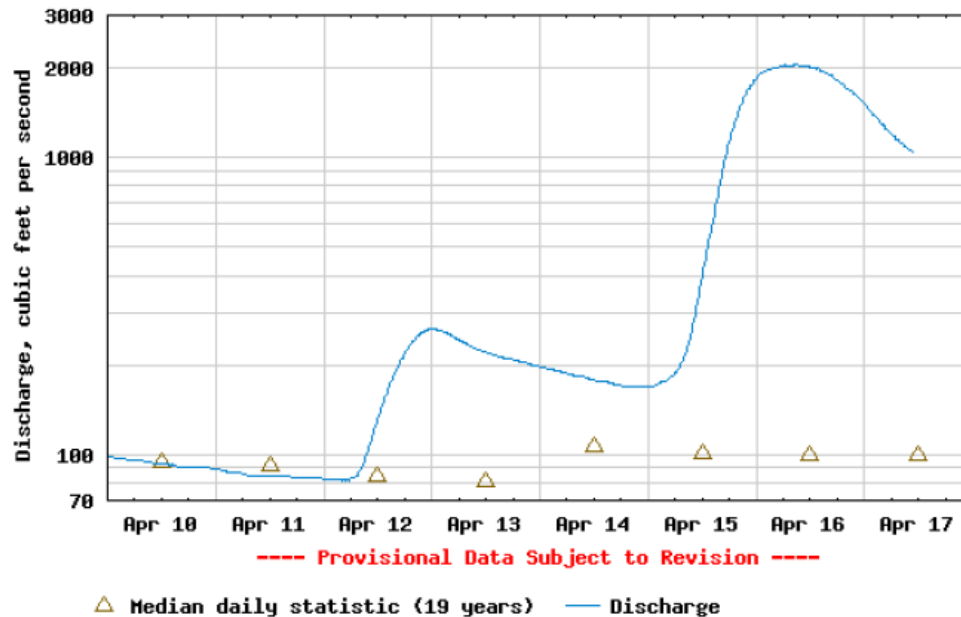
- A '25 year rainfall event'
- Lighter amounts came first several days earlier
  - *Raised stream levels, ground was nearly saturated*
- Heavy rain (main event) fell on nearly saturated ground, very high level of runoff
- Abnormally high tides (due to nor'easter and new moon) contributed to flooding along tidal sections of the creek (e.g., Mount Holly, Lumberton)
- Any dams along South and Southwest branch still not functional due to 2004 flood would contribute to higher flood crests



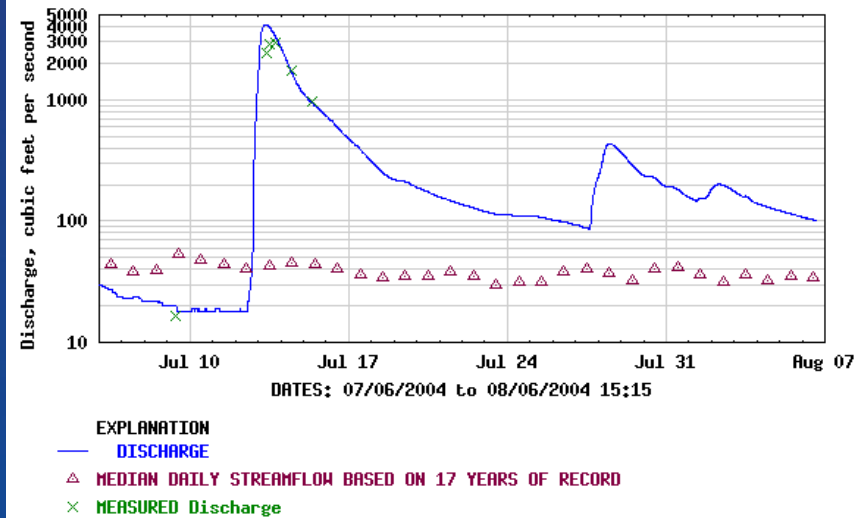
# How does this compare to the floods of 2004?



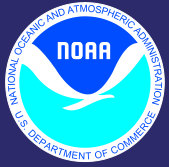
USGS 01465850 SOUTH BRANCH RANCOCAS CREEK AT VINCENTOWN NJ



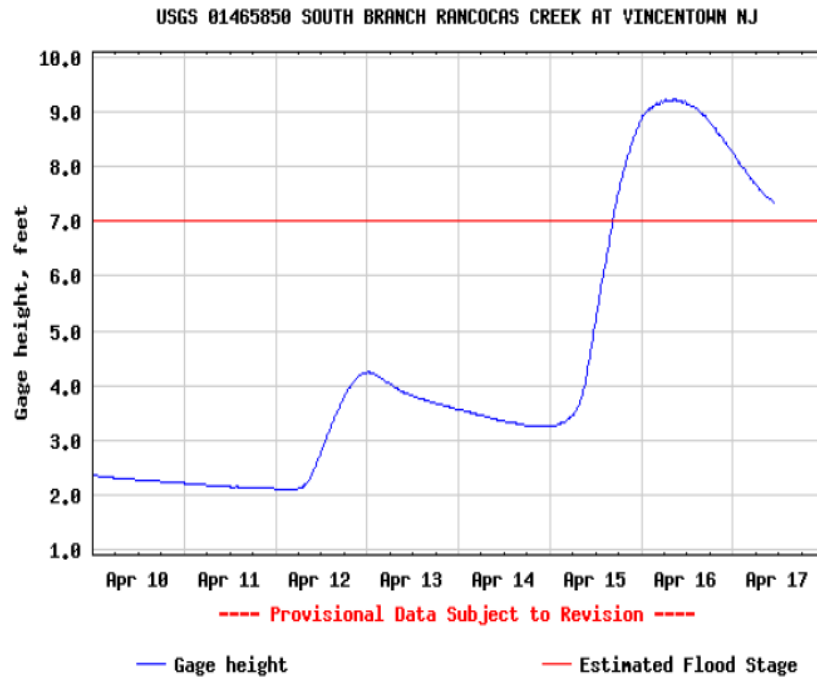
USGS 01465850 SOUTH BRANCH RANCOCAS CREEK AT VINCENTOWN NJ



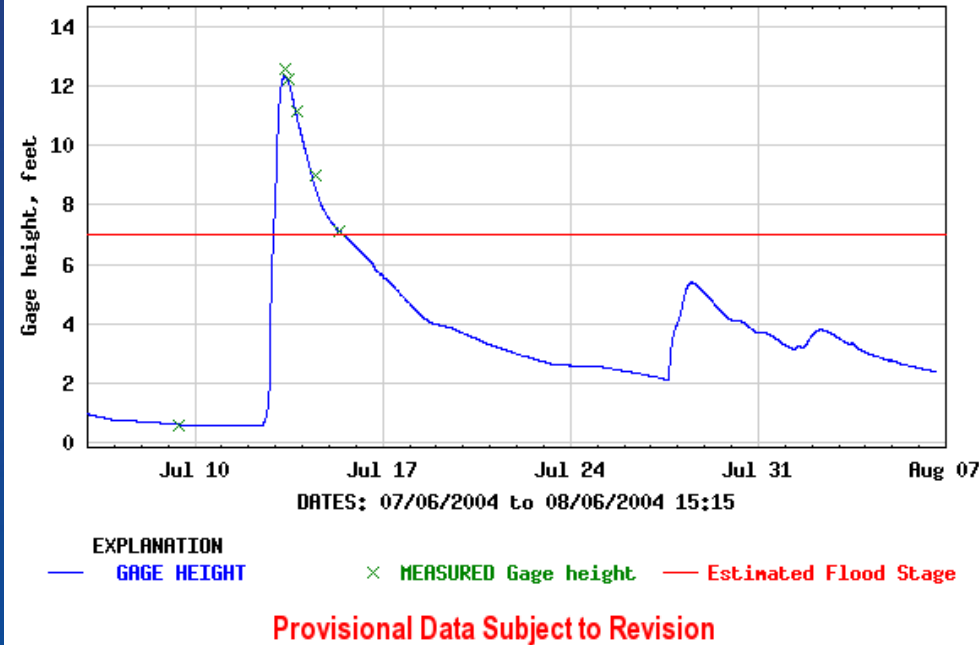
Provisional Data Subject to Revision



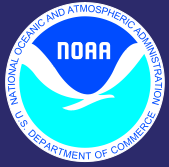
# 2004 flood was three feet higher



USGS 01465850 SOUTH BRANCH RANOCAS CREEK AT VINCENTOWN NJ



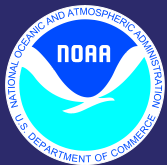




# Things to keep in mind

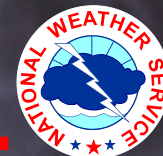
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- No individual weather event can be attributed to global warming or climate change
  - *You cannot say that a 'hurricane' or a 'heat wave' or a 'flood' was caused by global warming*
- We have been in an active pattern for Atlantic basin hurricanes since 1995
  - *We expect that pattern to continue for another 15 to 20 years*



# Services provided by NWS

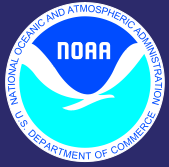
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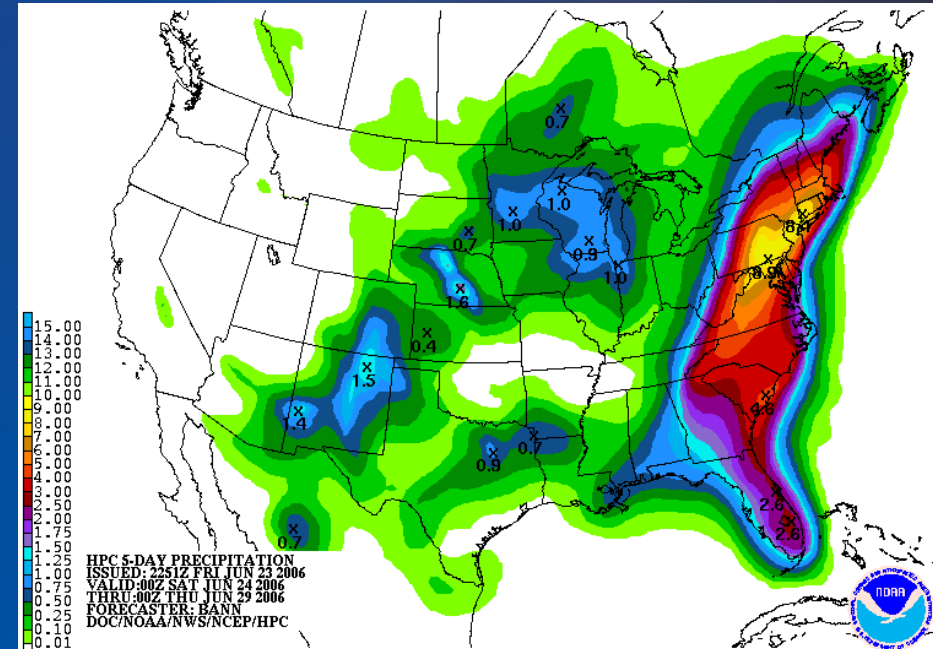
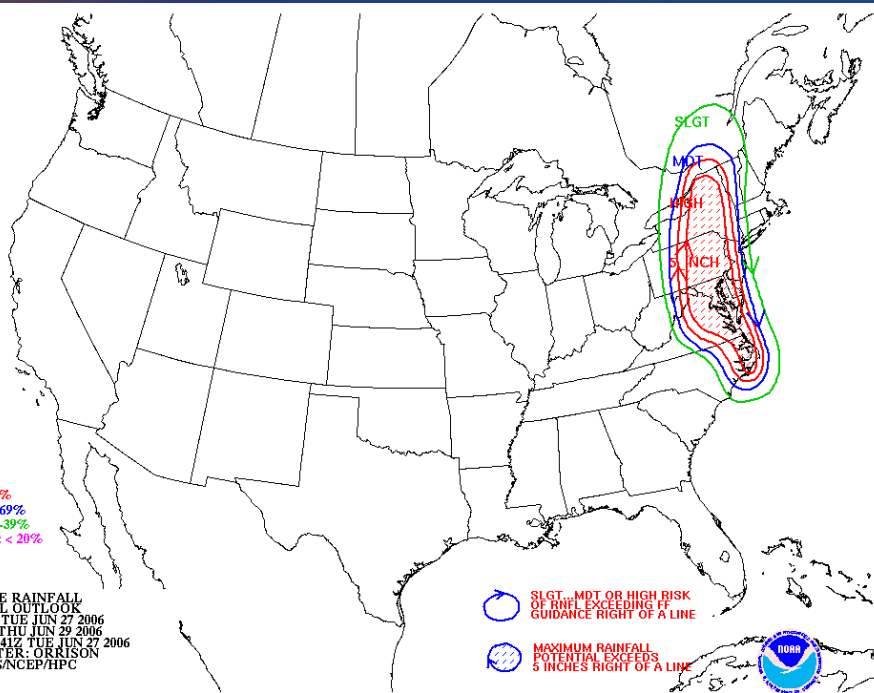
- **National Weather Service in Mount Holly provides 24 hour a day, seven days a week coverage for the area.**
- **Flood Watch issued Friday afternoon, April 13<sup>th</sup> (48 hours before flooding)**
- **Flood warnings issued Sunday morning, April 15<sup>th</sup> (4-12 hours before flooding)**
- **Over a dozen briefings provided to NJ Office of Emergency Management for this event**

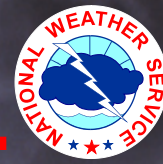
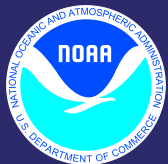


# How to prepare for the next big flood?

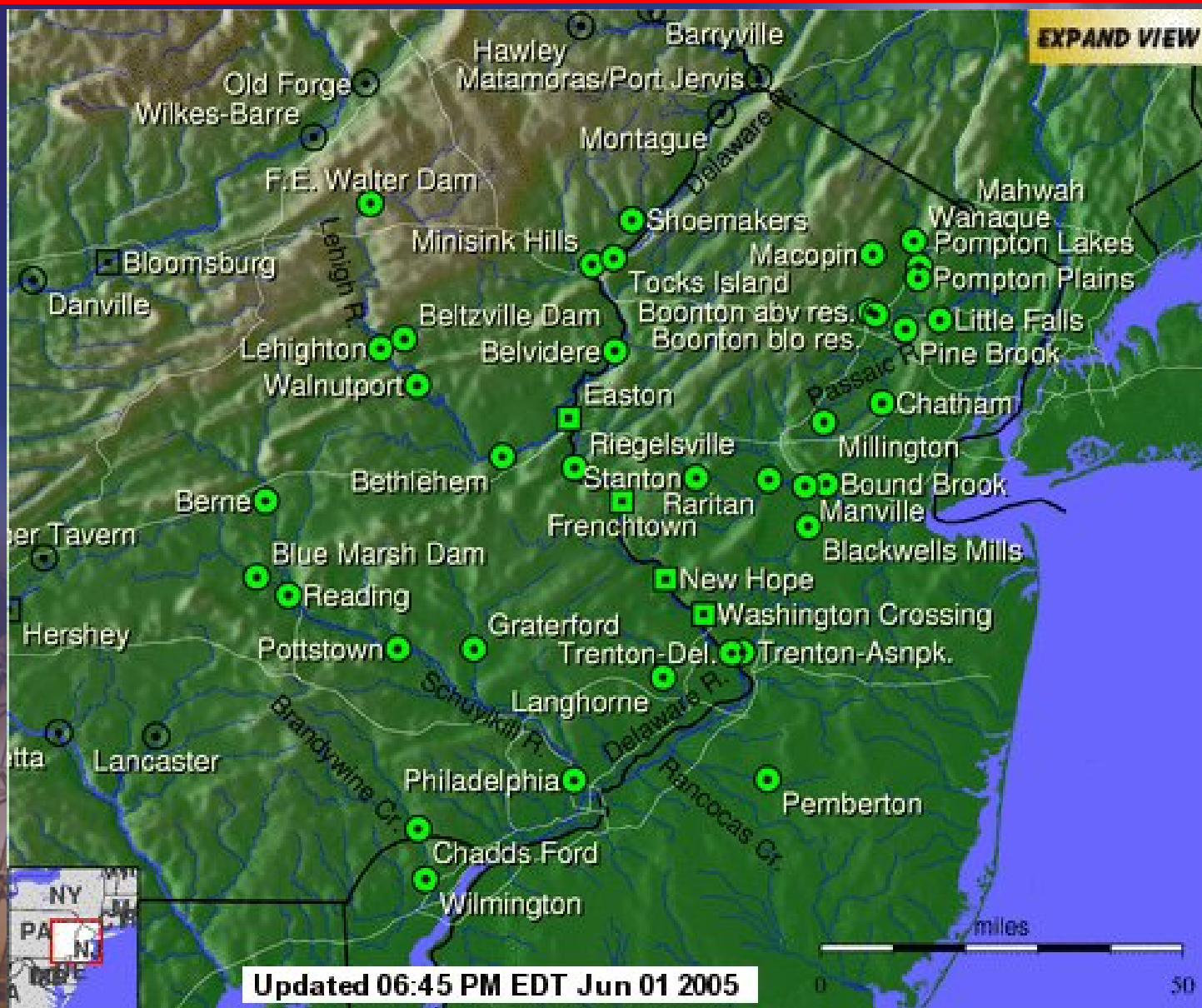


- Stay informed – [weather.gov/phi](http://weather.gov/phi)
- Use AHPS (Automated Hydrologic Prediction System)





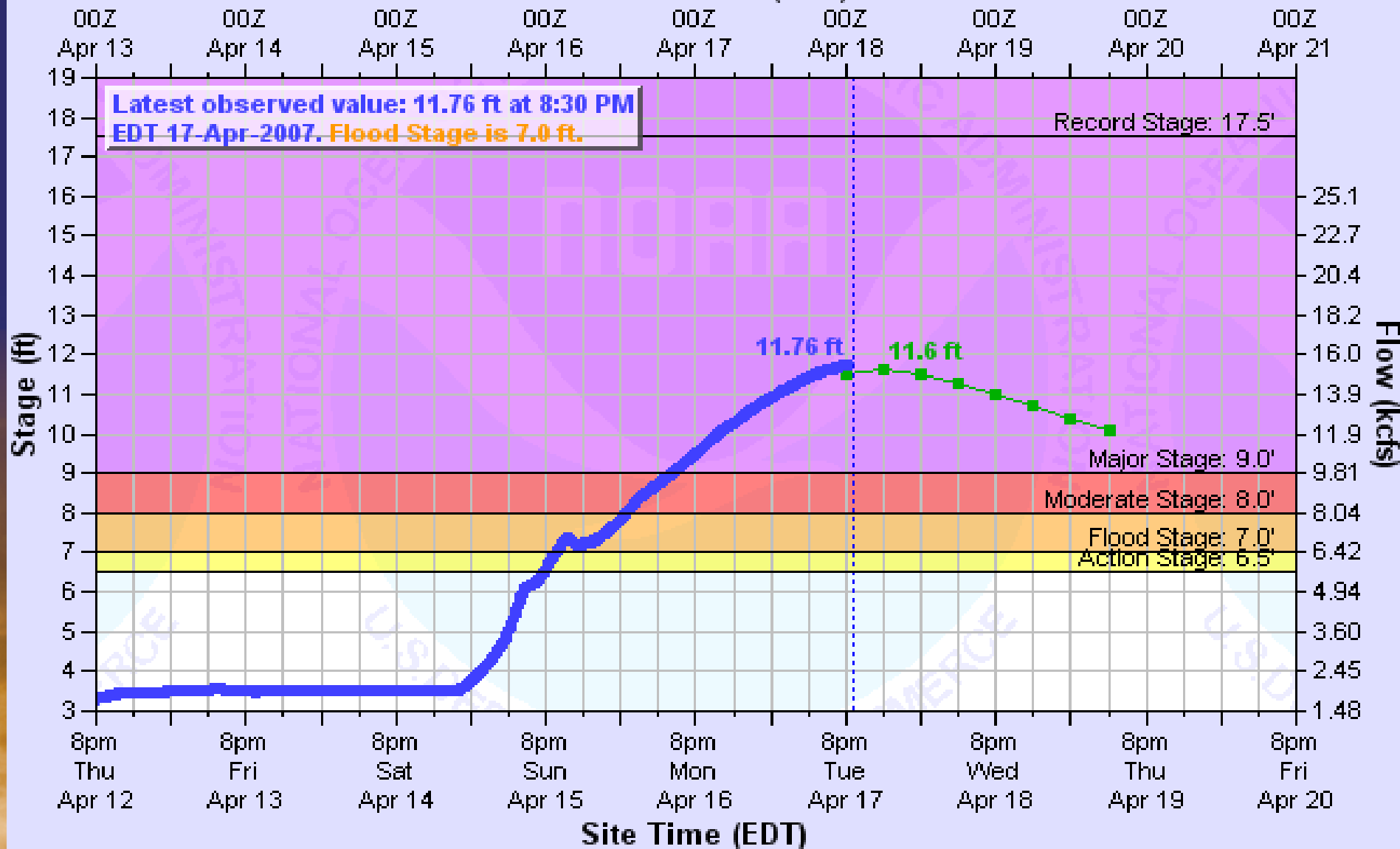
# AHPS – Mt. Holly service area





# PASSAIC RIVER AT Little Falls

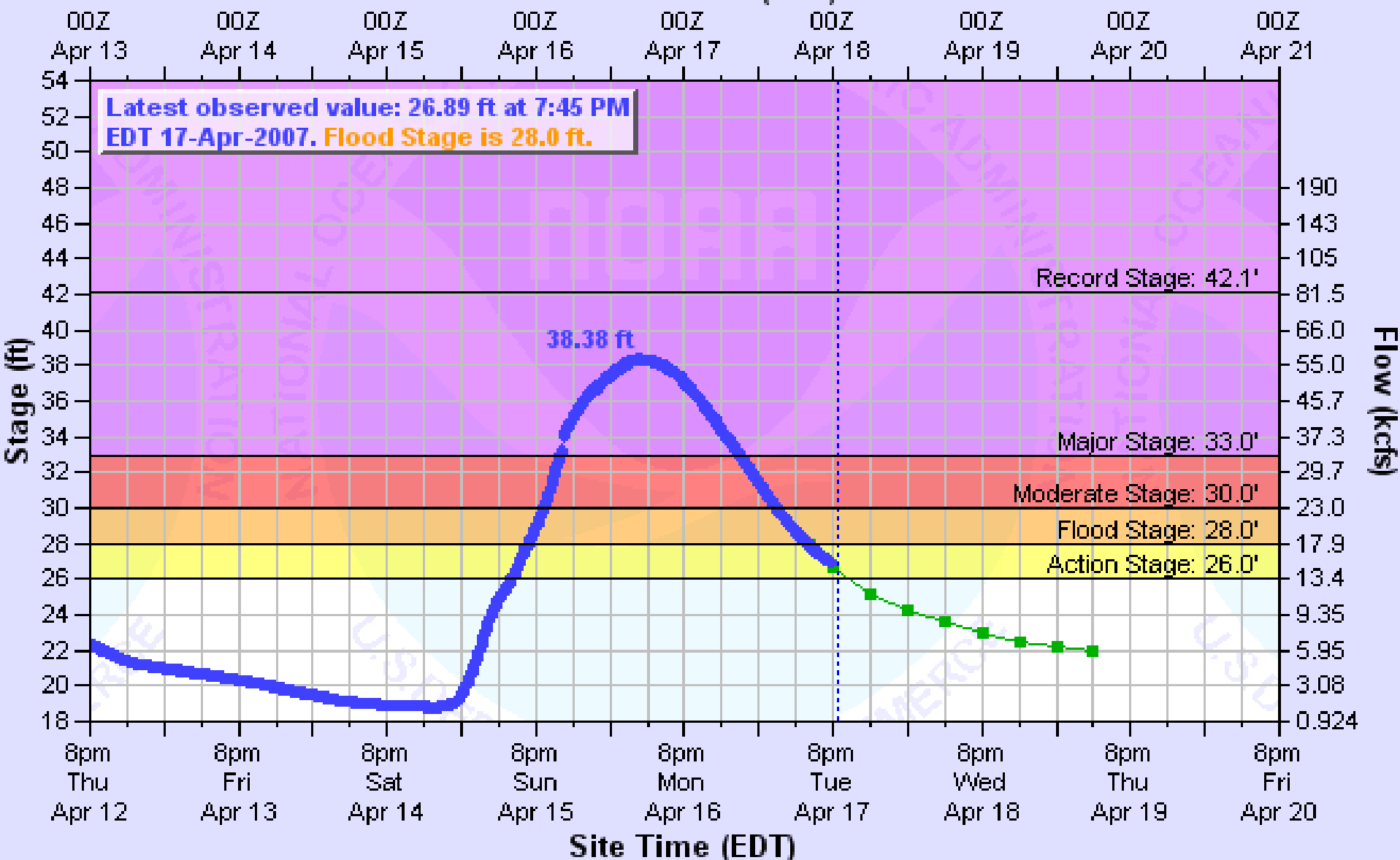
Universal Time (UTC)



--- Graph Created (9:04pm Apr 17, 2007) --- Observed --- Forecast (issued 2:26pm Apr 17)

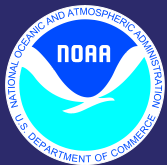
# RARITAN RIVER AT Bound Brook

Universal Time (UTC)



--- Graph Created (8:39pm Apr 17, 2007)    ◆ Observed    ■ Forecast (issued 2:26pm Apr 17)



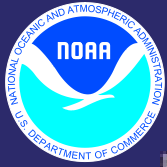


# Contact information

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- **Gary Szatkowski - Meteorologist-in-Charge**
- **Email [gary.szatkowski@noaa.gov](mailto:gary.szatkowski@noaa.gov)**
- **Work 609-261-6602 x222**
- **Cell 609-320-7205**
- **Internet website**
  - ***Weather.gov/phi***
    - **Mt. Holly weather office web page**
- **NOAA Weather radio**
- **609-261-6600 – phone recordings**



# The End

