Rancocas Creek
Major Flooding
April 2007

Presented by

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

609-261-6602 x222 (office) / 609-320-7205 (cell)
Gary.szatkowski@noaa.gov
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

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
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 inlands 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)
  - 6th worst on record

- Vincentown – Crest 9.20 (2.20 feet above flood stage)
  - 2nd worst on record
# 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


G.M. Bonnin, D. Martia, B. Lin, T. Parzybok, M. Yekta, and D. Riley
NOAA, National Weather Service, Silver Spring, Maryland, 2004

Extracted: Wed Apr 18 2007

| 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  |

* 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

- 6th highest crest on record
South Branch at Vincentown

2\textsuperscript{nd} highest crest on record

Worst since 2004
Southwest Branch at Medford

- New gage
Tides didn’t help

NOAA/NOS/CO-OFS
Preliminary Water Level (A1) vs. Predicted Plot
8545240 Philadelphia, PA
from 2007/04/16 – 2007/04/20
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) 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?
2004 flood was three feet higher
Things to keep in mind

• 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

- 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\textsuperscript{th} (48 hours before flooding)
- Flood warnings issued Sunday morning, April 15\textsuperscript{th} (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
- Use AHPS (Automated Hydrologic Prediction System)
AHPS – Mt. Holly service area

Updated 06:45 PM EDT Jun 01 2005
Latest observed value: 11.76 ft at 8:30 PM EDT - 17-Apr-2007. Flood Stage is 7.0 ft.
Latest observed value: 26.89 ft at 7:45 PM EDT 17-Apr-2007. Flood Stage is 28.0 ft.
Contact information

- Gary Szatkowski - Meteorologist-in-Charge
- Email 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