

# They Had the Facts, Why Didn't They Act?

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Understanding and Improving Public  
Response to National Weather Service's  
Coastal Flood Forecasts

Rachel Hogan Carr  
December 3, 2015



# THE NURTURE NATURE CENTER

Nurture Nature Center is a non-profit organization in Easton, PA, that has been working to educate the public about flooding. NNC has undertaken several projects with NOAA and NWS, including its “Focus on Floods” education campaign, to understand and share information about how the public perceives and acts upon flood risk.



**What's your number?**  
Knowing your river's flood stage is the first step in flood preparedness.

New York  
Pennsylvania

Knowing your river's flood stage is the first step in flood preparedness.

**What's your number?**

FLOOD STAGE \_\_\_\_\_ FT.

RIVER MILE \_\_\_\_\_

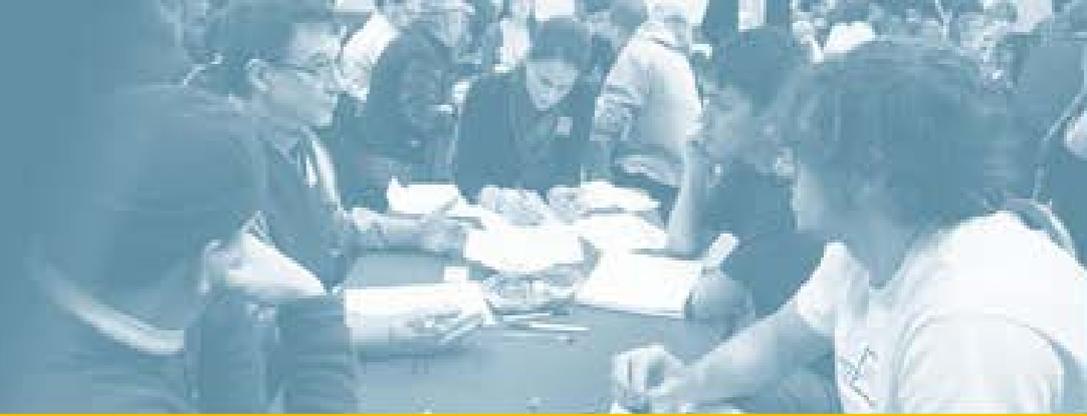
To find the first stage you need to know, visit the National Weather Service at: <http://water.weather.gov/whpf/>

**Floods happen. Lessen the loss.**

**HAVE A PLAN**

**HAVE A PLAN**  
What's the plan?

Having a flood readiness plan will make you better prepared for a flood or other emergency event. A plan can be a simple, one-page plan that lists safe evacuation routes, determines where you will meet up during a flood event (a meeting place outside your home or in a room from flooding), and lists family and contact phone numbers. More elaborate plans include the river level at which certain access roads to your property begin to close, and the level at which property begins to be affected by flood waters. You should also consider how you will protect documents, computer harddrives, and other important items. What about your family? Make a plan to store important items in a safe place, such as in the attic or in a safe in the house, and decide which items you will take with you in an emergency. You should also note where you've stored your valuables, and what it contains. An inventory of items you own, and a list of items you might need in case you need to evacuate, is also important. Although modern river flooding is rare, you will often have at least one flood, weather...



## Social Science: A Key Step in Building a Weather-Ready Nation

- In 2012, NNC received one of four social science projects awarded to look at decision-making during extreme weather events. Projects are managed through the Office of Weather and Air Quality in the NOAA Office of Oceanic and Atmospheric Research with funding from the U.S. Weather Research Program and the NOAA National Weather Service (NWS).
- In 2014, NNC was awarded a grant from NOAA Sea Grant and the New Jersey Sea Grant Consortium to study NWS coastal flood forecast and warning tools.

This presentation was prepared by Nurture Nature Center using federal funds under the Coastal Storm Awareness Program (NOAA awards NA13OAR4830227, NA13OAR4830228, NA13OAR4830229) from the National Sea Grant College Program, National Oceanic and Atmospheric Administration, U.S. Department of Commerce. The federal funds were provided via appropriations under the Disaster Relief Appropriations Act of 2013 (P.L.113-2) and the Sea Grant Act (33 U.S.C. 1121 et seq.) Funding was awarded to the financial hosts of the Sea Grant College Programs in Connecticut, New Jersey and New York via their financial host institutions, the University of Connecticut, the New Jersey Sea Grant Consortium, and the Research Foundation of State University of New York respectively. The statements, findings, conclusions, and recommendations are those of the author(s) and do not necessarily reflect the views of the National Sea Grant College Program, National Oceanic and Atmospheric Administration, the U.S. Department of Commerce, nor any of the other listed organizations.



## Partners:

- East Carolina University
- Rutgers University/Jacques Cousteau National Estuarine Research Reserve
- RMC Research Corporation (evaluators)



# What Is the Issue?

NWS flood forecast and warning tools offer tremendous amounts of timely, accurate data.

***But: People often don't respond the way they should to protect life and property.***

## FLOOD RISK AND UNCERTAINTY PROJECT



**Gary Szatkowski**

Chief Meteorologist, National Weather Service Forecast Office Mt. Holly, NJ/Philadelphia

“What we need now is to package and communicate weather warning information so that people understand it and take the right action with the time they are given.”

Gary Szatkowski, Meteorologist in Charge of the NWS Philadelphia, PA/Mt. Holly NJ WFO

# Questions:

- What tools (NWS and other) are coastal populations in New Jersey using to understand their coastal flood risk?
- What role can the emergency briefing play in communicating coastal flood risk and motivating protective actions among residential populations?

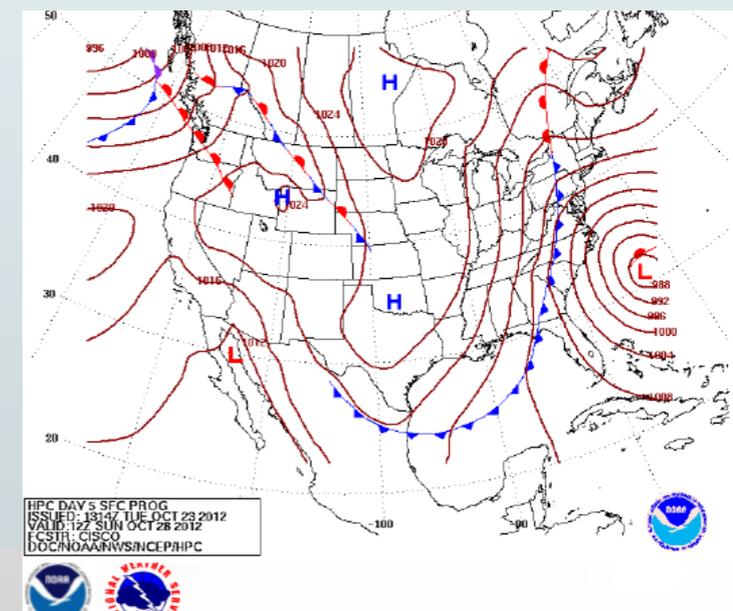
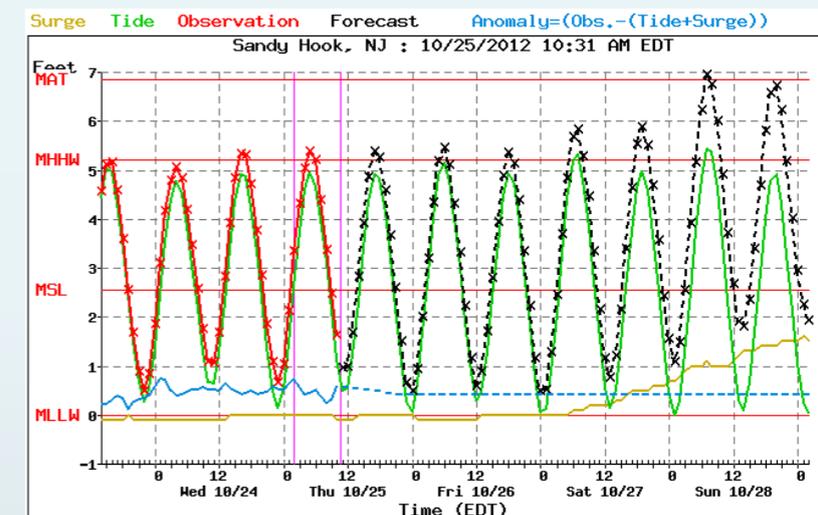


- Tropical Storm Sandy is expected to reach hurricane strength on Wednesday.
- It will continue to move northward.

# What Are the Tools?

## NWS Coastal Flood Forecast and Warning Tools:

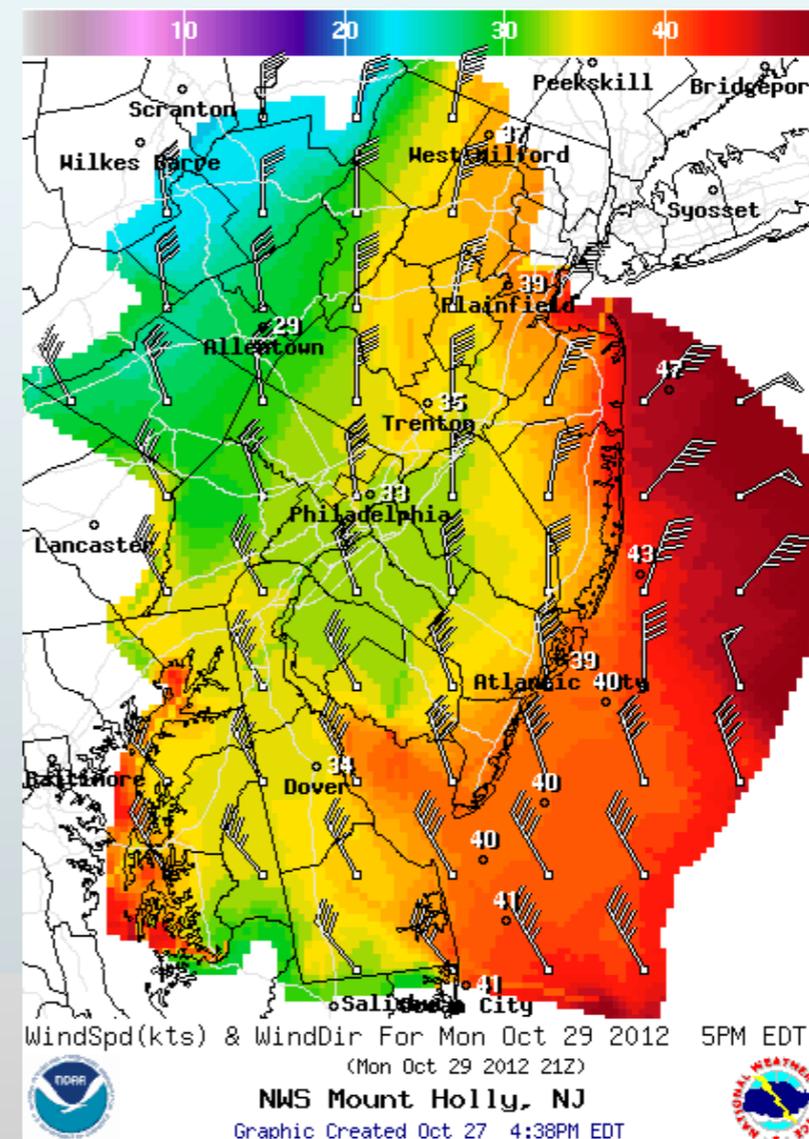
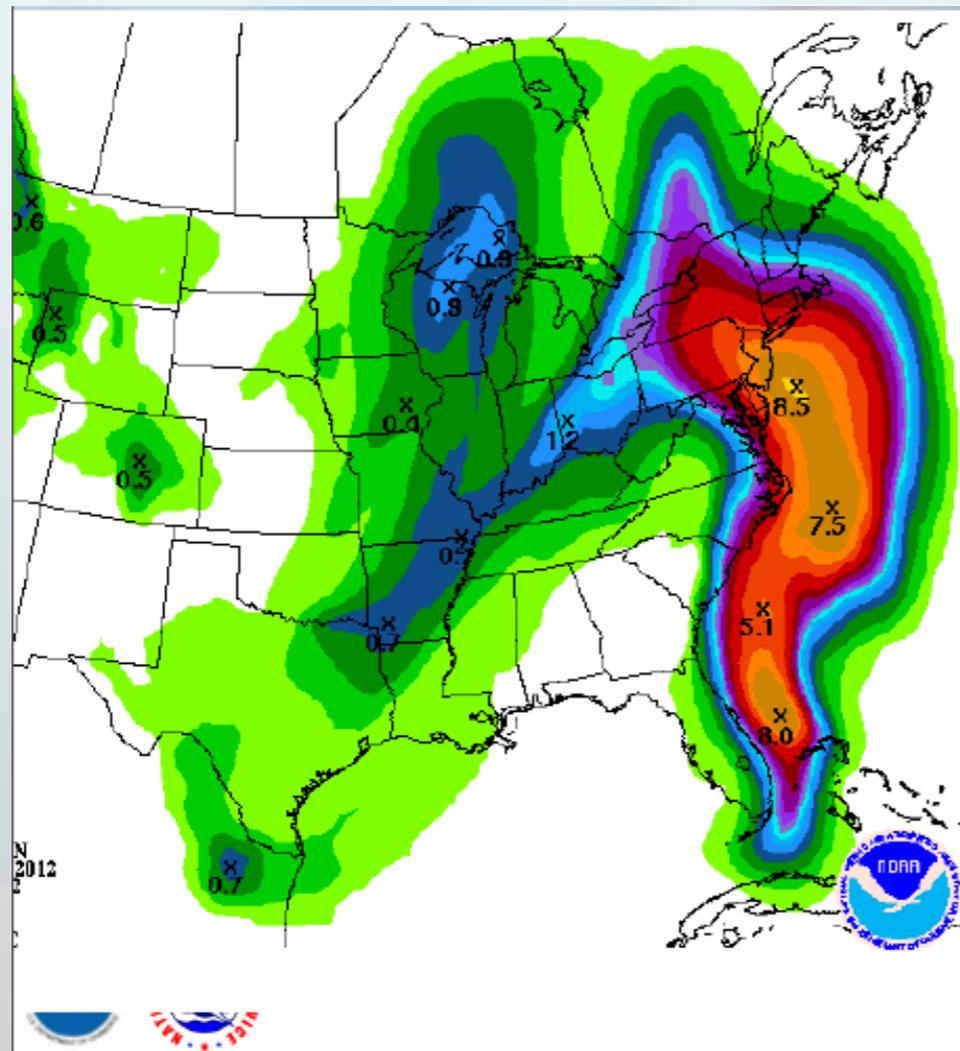
- Extra-Tropical Surge Graphic
- Surface Prognosis Maps



# Tools Continued...

## NWS Coastal Flood Forecast and Warning Tools:

- Quantitative Precipitation Forecasts
- Wind Speed and Direction Maps

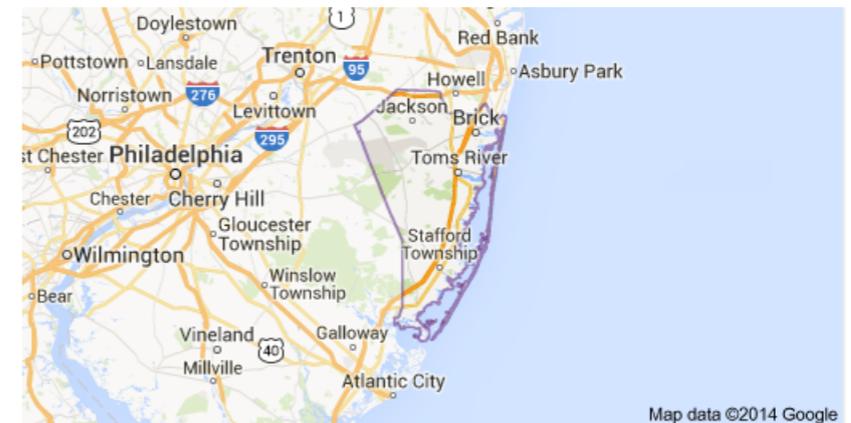
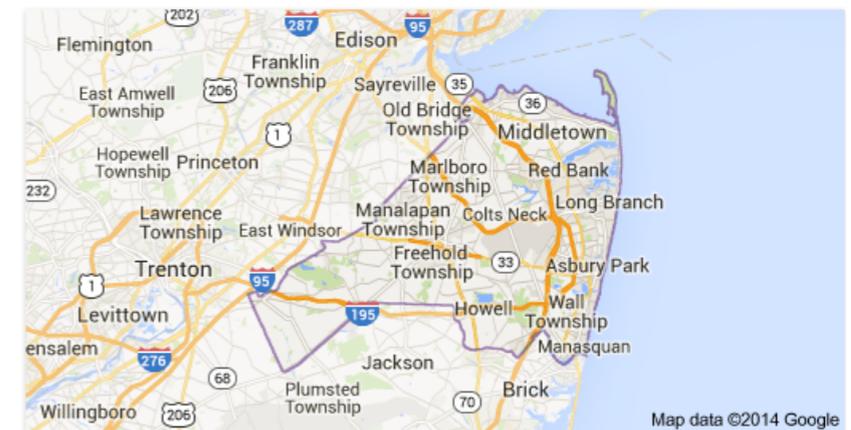


# What Methods Are We Using?

## Focus groups, surveys and interviews

Participants respond to flood tools presented through a scenario format based on the actual products issued during Superstorm Sandy, including briefings.

- Total of five focus groups
- Four with Ocean/Monmouth County residents
- One focus group with emergency managers
- Surveys
- Broadcast Meteorologist Interviews



# Focus Groups:

## A facilitated discussion about the tools

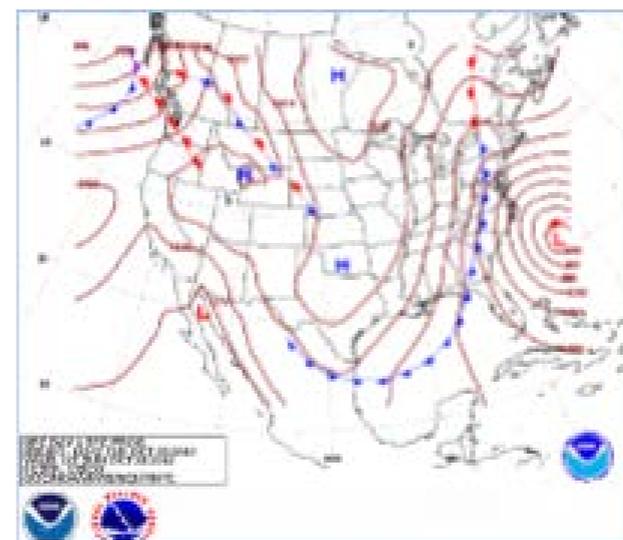
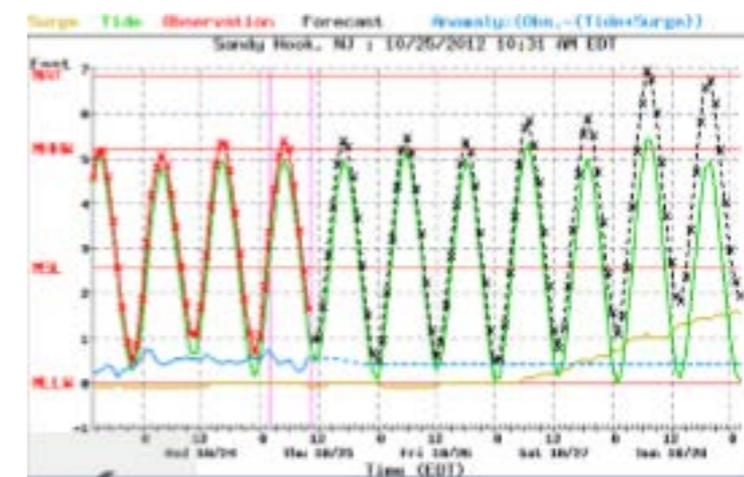
- 15 participants per session, average, flood-affected individuals

## Participants give feedback about:

- Timing of products
- Graphic design and visual clarity
- Ways the products motivated action
- How they share the information with others

### Personal Plea

- **If you are being asked to evacuate a coastal location by state and local officials, please do so.**
  - Sandy is an extremely dangerous storm. There will be major property damage, injuries are probably unavoidable, but the goal is zero fatalities.
  - If you are reluctant to evacuate, and you know someone who rode out the '62 storm on the barrier islands, ask them if they would do it again.
  - If you are still reluctant, think about your loved ones, think about the emergency responders who will be unable to reach you when you make the panicked phone call to be rescued, think about the rescue/recovery teams who will risk their lives to rescue you if you are injured, or recover your remains if you do not survive.
  - If you think the storm is overhyped and exaggerated, please err on the side of caution. You can call me up on Friday (contact information is at the end of this briefing) and yell at me all you want.
  - I will listen to your concerns and comments, but I will tell you in advance, I will be very happy that you are alive & well, no matter how much you yell at me.
  - Thanks for listening.
  - Gary Szatkowski – National Weather Service, Meteorologist-in-Charge, Mt. Holly, NJ
- \*\*Please share this briefing with friends, family, and neighbors.\*\***



# What did we learn?

- ALL GROUPS valued the emergency briefing package
- Local specificity is critical for motivating action
- Residents want to hear detailed action steps
- Day T-5 and T-4 were critical times to receive information through briefings and other means
- Broadcast meteorologists rely upon the briefings for confirmation of their forecasts
- Visual design and language choice can create barriers for people trying to understand and use NWS coastal flood forecast products
- Scenarios appear to be an effective engagement and teaching strategy

# Emergency Briefings: An Important Resource!

Briefings:

Keep them short!

Put action steps up front

Keep storm details to the back

Consider having municipalities distribute



National Weather Service Briefing  
for  
**\*\*VERY DANGEROUS**  
**HURRICANE SANDY\*\***  
October 28 – 31<sup>st</sup> 2012

**\*Alert\***  
**Confidence is high that Sandy will hit our region.**  
**This is a dangerous situation. Take protective actions now to reduce**  
**loss of life and property. Details inside.**

Prepared NOON EDT on Sunday, October 28, 2012 by  
Gary Szatkowski, NOAA's National Weather Service Forecast Office  
In Philadelphia/Mt. Holly NJ (weather.gov/phi)

The image shows a National Weather Service briefing for Hurricane Sandy. It features the NOAA logo in the top left and the National Weather Service logo in the top right. The text is centered and includes the title 'National Weather Service Briefing for \*\*VERY DANGEROUS HURRICANE SANDY\*\* October 28 – 31<sup>st</sup> 2012'. Below this, it states '\*Alert\*' and 'Confidence is high that Sandy will hit our region. This is a dangerous situation. Take protective actions now to reduce loss of life and property. Details inside.' At the bottom, it states 'Prepared NOON EDT on Sunday, October 28, 2012 by Gary Szatkowski, NOAA's National Weather Service Forecast Office In Philadelphia/Mt. Holly NJ (weather.gov/phi)'. The background is a solid blue color.

# Emergency Briefings: Connecting to the forecaster



## Personal plea

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- If you are reluctant to evacuate, and you know someone who rode out the '62 storm on the barrier islands, ask them if they would do it again.
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- Gary Szatkowski – National Weather Service Mount Holly



National Weather Service  
Philadelphia/Mt. Holly

## Briefings:

Inclusion of a “Personal Plea” was highly motivational

Briefings can convey tone, and prioritize risk

# Emergency Briefings: Clear, direct summaries

## Briefings:

Focus on delivering most critical information right up front

Use of color to emphasize important information

### Actions You Should Take Now to Prepare

- **It is time to prepare.** Review your Family Emergency Plan and update as needed.
- **Be prepared to evacuate** if local officials instruct you to do so.
- Be prepared for potential **long-term power outages.**
- To reduce flooding impacts, clear leaves and any other obstructing materials from storm drains before this storm arrives.
- **\*\*Share this briefing with friends, family and neighbors.\*\***

## Summary Of Weather Situation

**Hurricane Sandy will have a severe impact on our region during the next several days.**

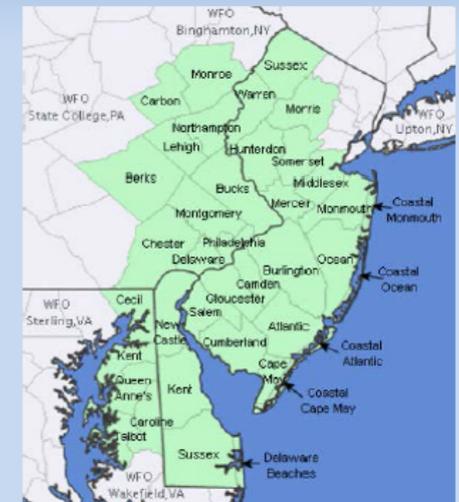
- Strong, damaging sustained winds 35 to 50 mph over a prolonged period of time (24-48 hours) with gusts up to near hurricane strength. Strongest winds are expected south and east of the I-95 corridor.
- Extremely heavy rainfall
- Major to record stream and river flooding
- Major coastal flooding (full moon occurs Oct. 29)

Confidence increases that the storm will hit our region. **The focus of efforts should be on when Sandy hits, not if it hits, our region.**

**WHAT TO DO:** People in this region should be finishing preparations, evacuating if told, and monitoring local forecasts carefully as the storm progresses at [weather.gov/phi](http://weather.gov/phi).

*Next briefing will be issued at 6 p.m. Sunday, Oct. 28*

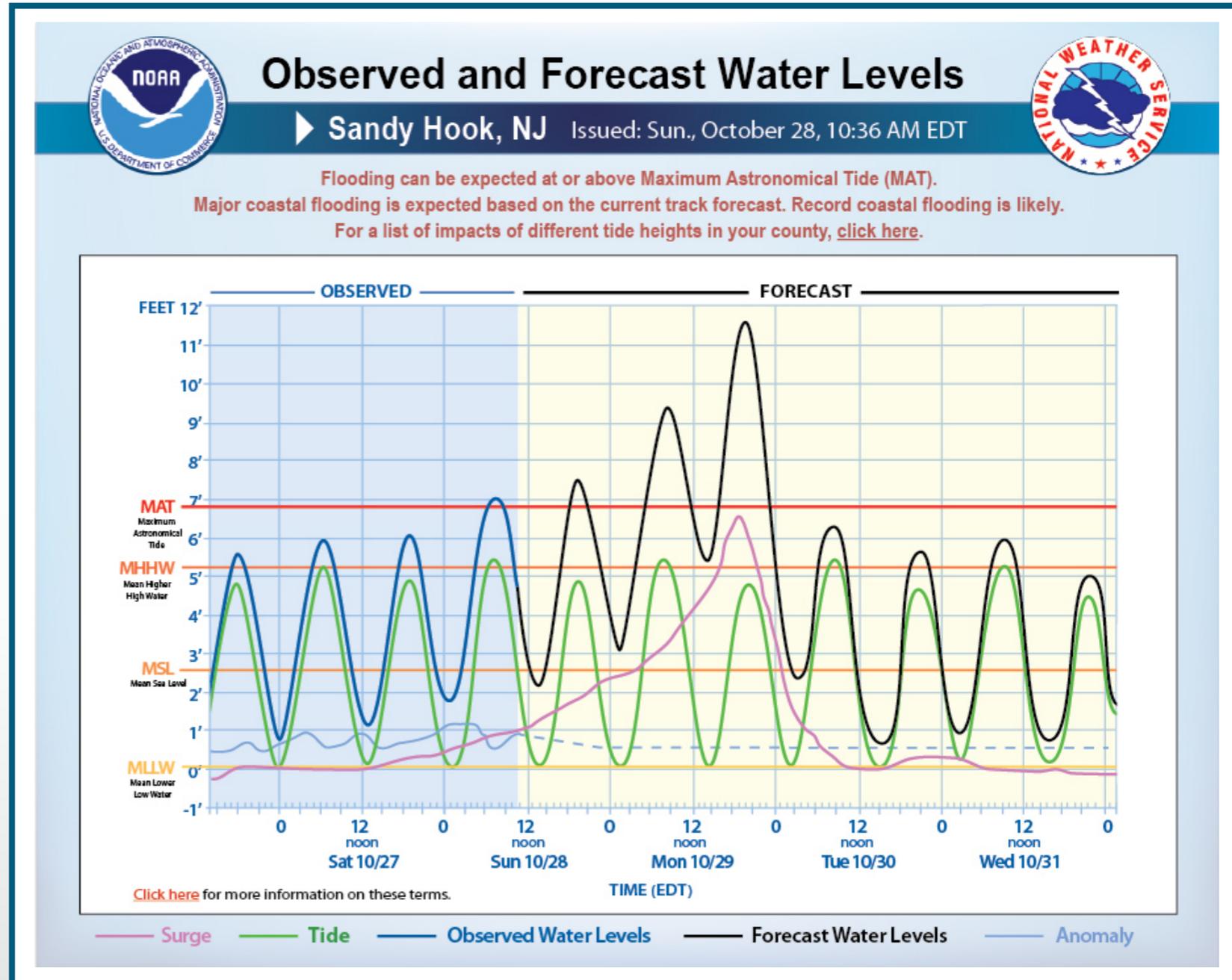
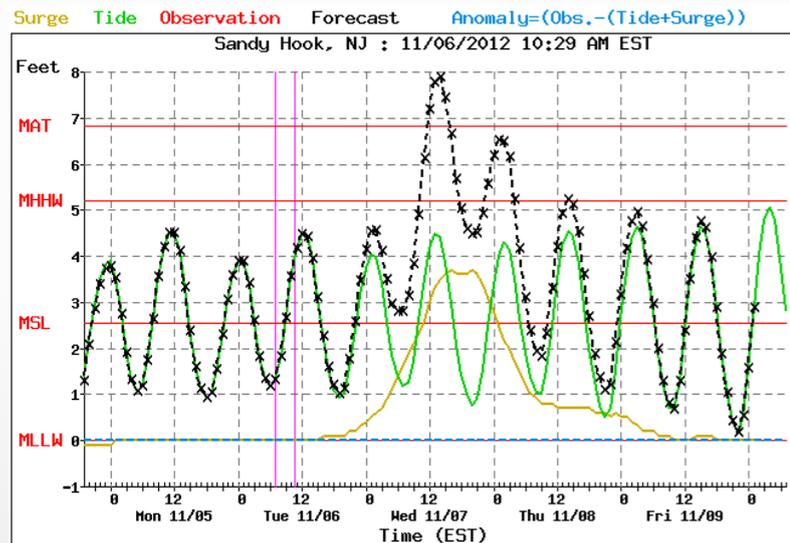
Briefing for:  
NWS Forecast Office Service Area  
Shown in Map Below



National Weather Service Forecast Office  
Philadelphia/Mt. Holly

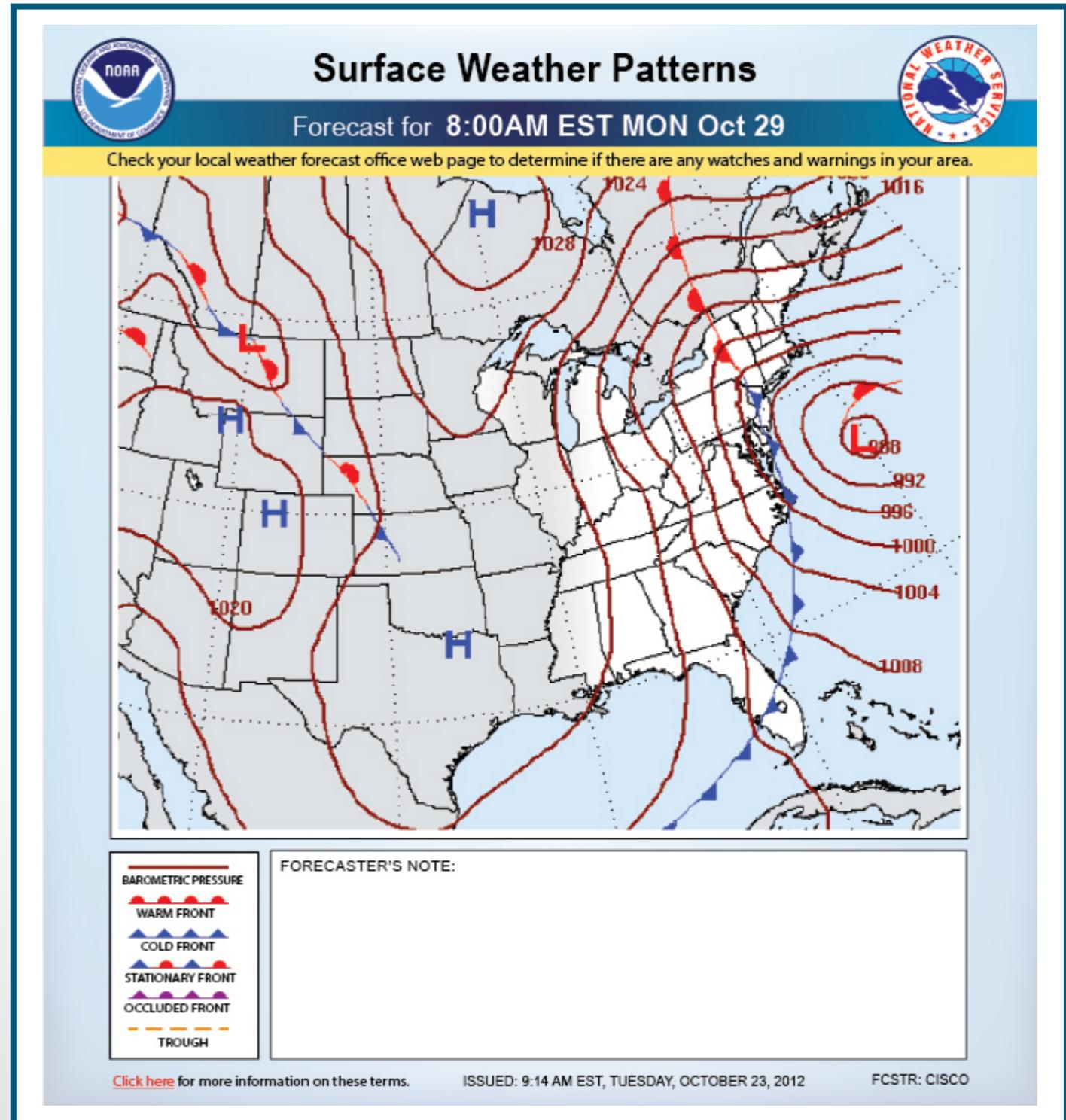
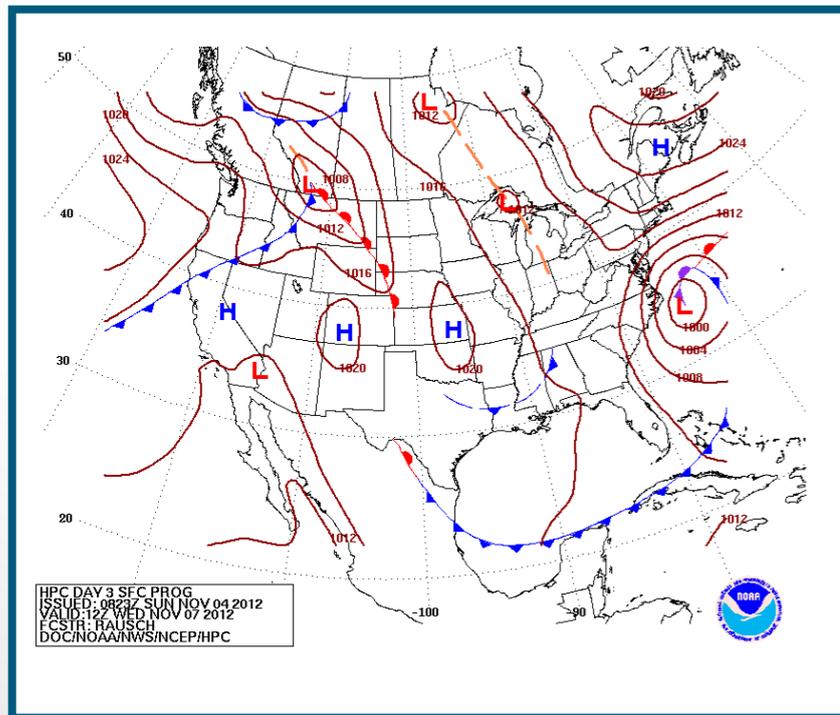
# OTHER PRODUCTS

## Extra-Tropical Surge Graphic



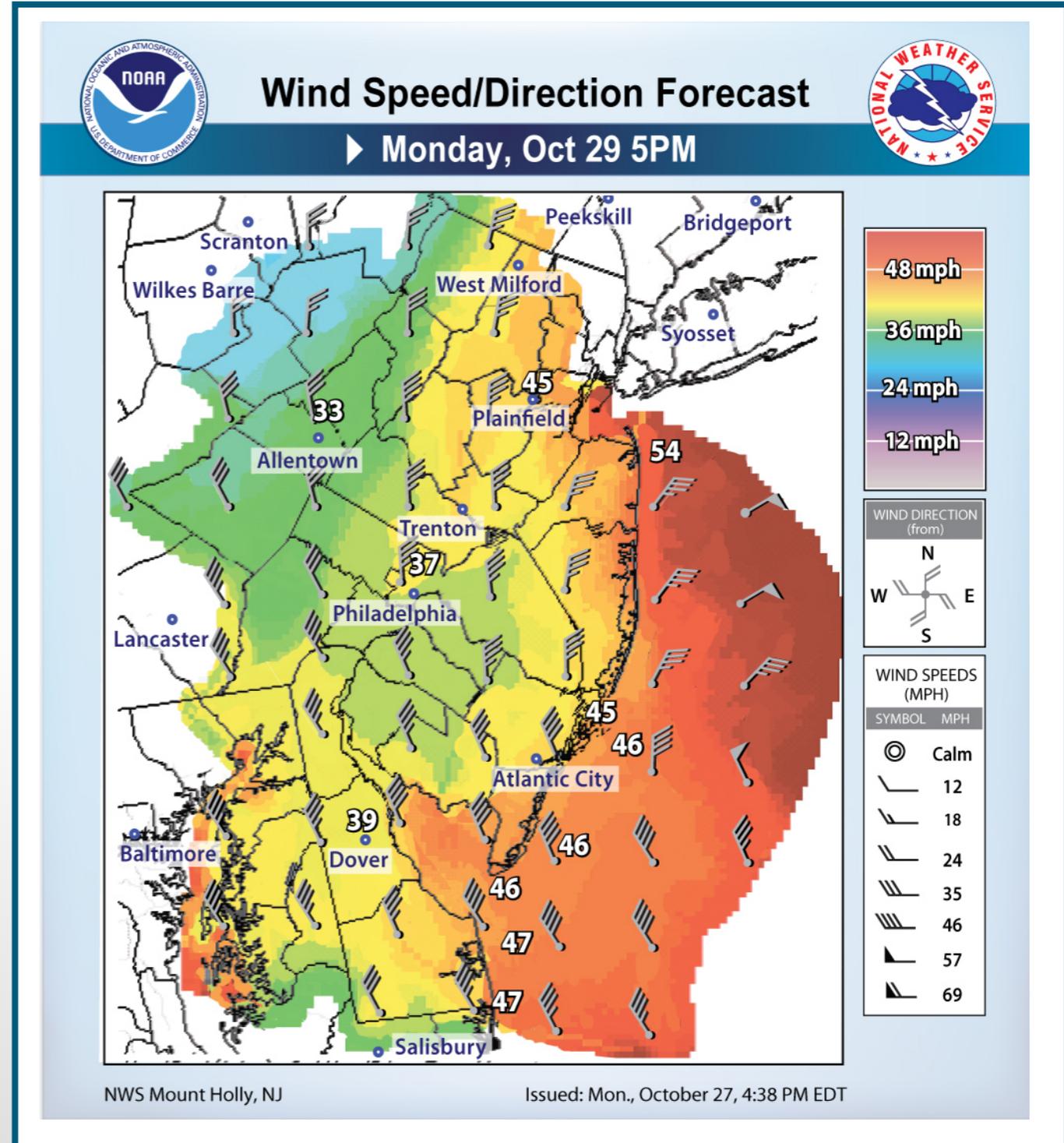
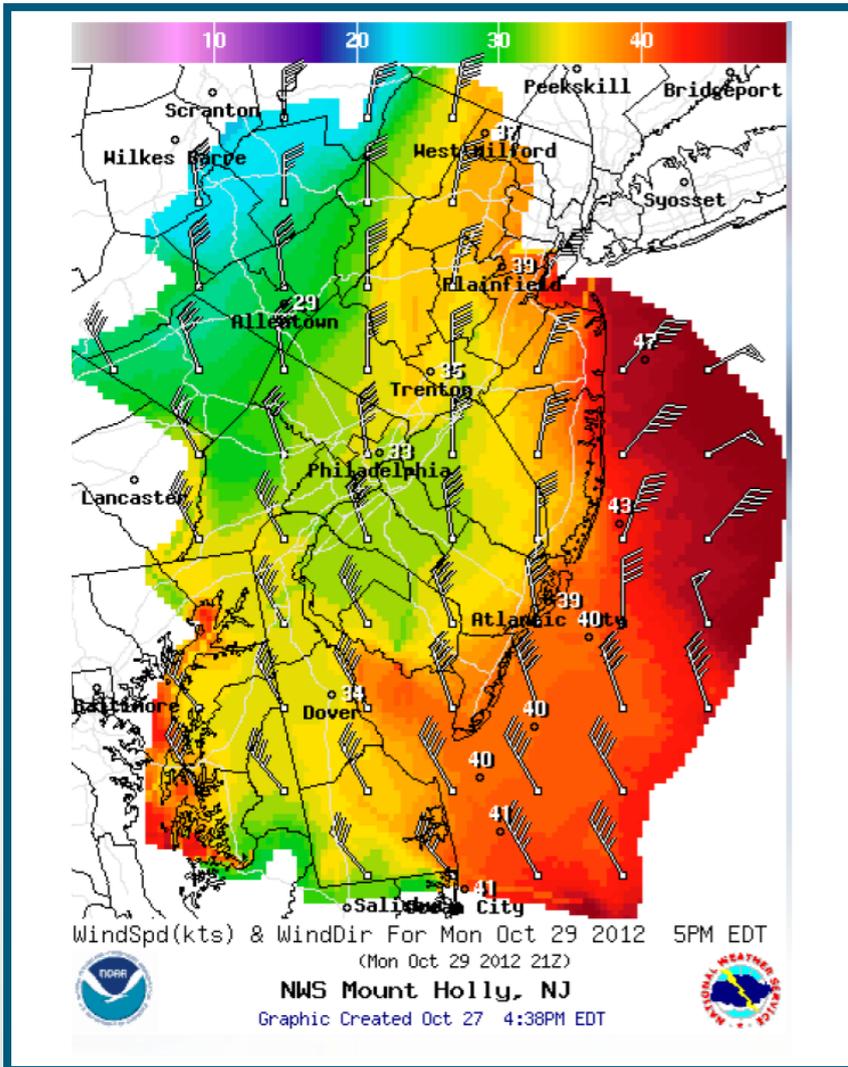
Clarifies geographic specificity, differentiates between observed and forecast flood levels, provides clearer legend and definition of terms, provides summary at top in red, along with cautionary language and a link to local impacts.

# Surface Prognosis Maps



Renamed to Surface Weather Patterns, adds geographic specificity through focus on key areas, provides more detailed legend explaining symbology, adds area for forecaster's note, and links to watch and warning on yellow bar at top.

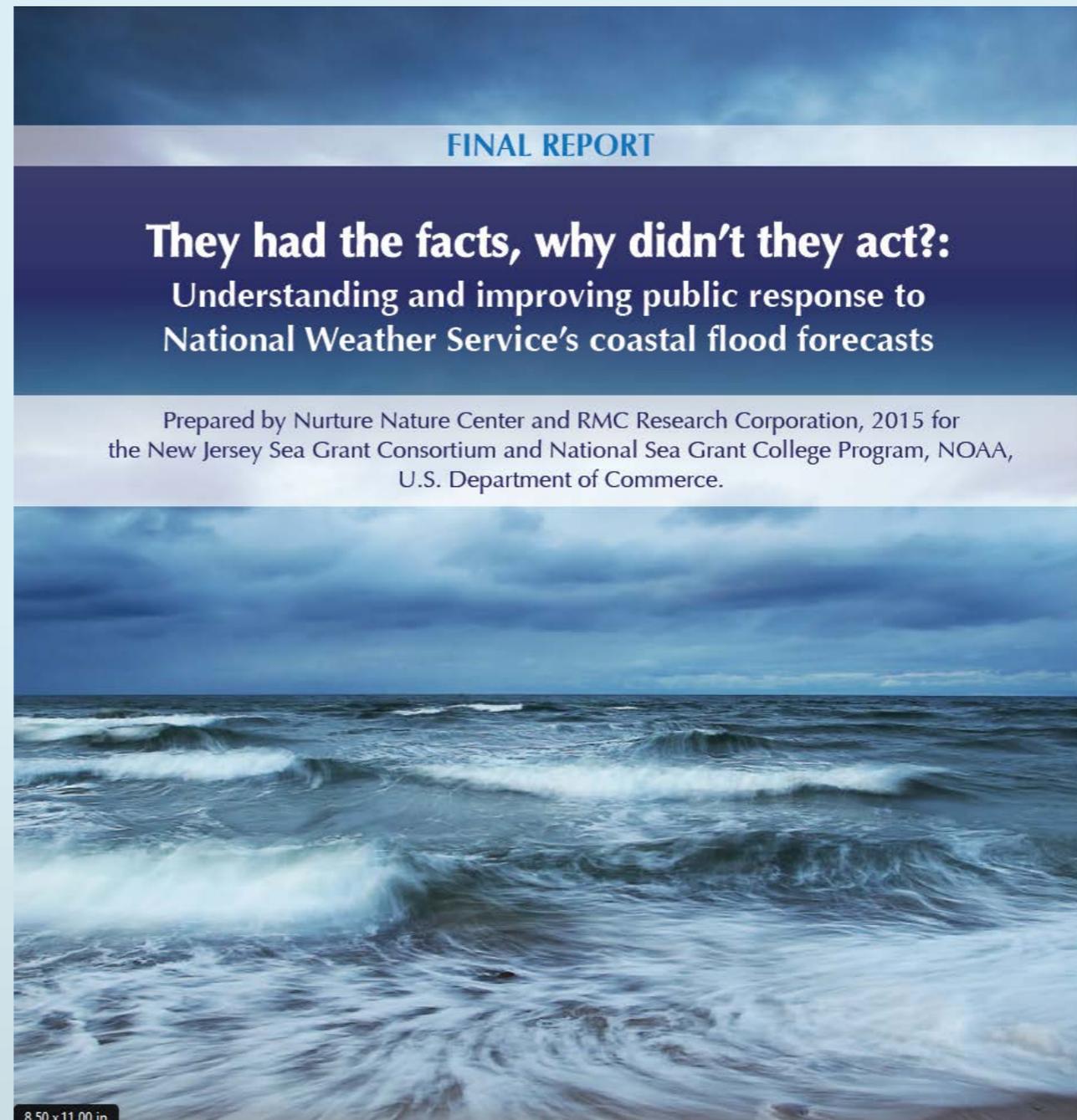
# Wind Speed/Direction Maps



Adds a more detailed legend that provides more explanation of wind barbs and flags, calls out key community names in white, enlarges font size for temperature. But doesn't go far enough!

# Full Report

- **Details information about how people prefer to receive information (internet and television, e.g.)**
- **Details about when people prefer to receive information**



# Socialscience.Focusonfloods.org

**Can Social Science Help Improve Public Use of Flood Forecast Tools?**

The National Weather Service (NWS) offers many flood forecast and warning tools that individuals can use during a predicted flood event. From tools that allow users to monitor projected river heights to flood inundation maps that show which areas in the community will be underwater during floods, the capability and accuracy of flood forecasting has increased dramatically in recent years. Despite this, many people still fail to understand and respond properly to flood forecasts and warnings issued by NWS.

Beyond technological advances in forecast lead-time and accuracy already achieved, what else can NWS do to improve its flood forecast and warning tools so they better motivate flood preparedness and warning response? In partnership with Nurture Nature Center ([nurturenaturecenter.org](http://nurturenaturecenter.org)), NWS is undertaking a social science research study in the four-state Delaware River Basin. The study will ask individuals living in flood-affected communities to participate in focus group interviews to help answer two questions:

- How do people living in the Delaware River Basin use NWS flood forecast and warning tools in understanding their flood risk?
- How can these tools be improved so they better motivate flood preparedness and warning response?

"Given the frequency and intensity of flooding not only in this region, but across the country, improving how people prepare for flooding is critical to reducing losses," said NNC Director Rachel Hogan Carr. "This project provides an excellent opportunity to help NWS understand how the public uses its flood forecast and warning tools, and what further refinements might improve public preparedness as people respond to news of impending flood events."

Nurture Nature Center, Inc. is a non-profit organization in Easton, Pennsylvania, with a focus on flooding issues. NNC's social science project, "Flood Risk and Uncertainty: Assessing the National Weather Service's Forecast and Warning Tools," supports NOAA's new Weather-Ready Nation initiative, designed to help the nation become better equipped to prepare for and respond to weather events.

## Includes :

- Findings
- Research bibliography on social science related to flooding
- Project information

# Coastal.Focusonfloods.org

- Project information
- Videos
- Resources

**Communicating About Coastal Flood Risk**

For communities facing coastal flooding, receiving timely, accurate information about flood risk is critical to making good decisions. But to be truly effective, that information must come in formats people can understand, with clear messages about how to respond, and must be easily shared with friends, family and neighbors.

This site is designed for coastal floodplain residents, floodplain managers, emergency managers and anyone else interested in understanding more about coastal flood risk, and how to improve community response to coastal floods. Visitors to this site will find a growing resource of information about coastal flooding, including resources for coastal floodplain property owners trying to learn more about their risk and ways to prepare and reduce losses.

Nurture Nature Center is a non-profit organization in Easton, Pennsylvania, that has been working for the past several years to educate the public about flooding, and to understand the most effective ways to motivate the public to prepare. Through social science and education and outreach projects, NNC has been working to improve flood risk communication and to help communities become more resilient in the face of flooding.

**News**

[coastal.focusonfloods.org](http://coastal.focusonfloods.org)



# FOCUS ON FLOODS COASTAL

Science, education and dialogue

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[Social Science](#)

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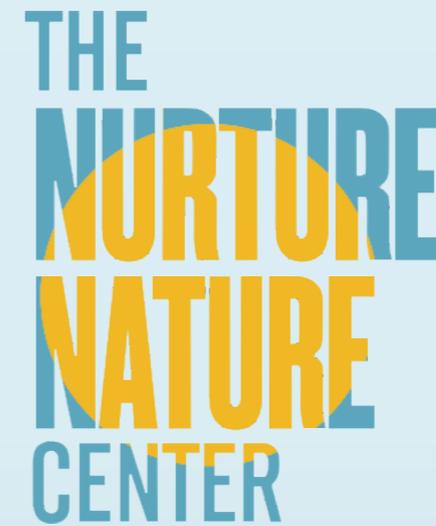
[Focus on Floods Main Site](#)



**Communicating About Coastal Flood Risk**

# Thank you!

**Rachel Hogan Carr**  
**Director**  
**Nurture Nature Center**  
**Easton, PA**



[www.nurturenaturecenter.org](http://www.nurturenaturecenter.org)

[www.focusonfloods.org](http://www.focusonfloods.org)

[socialscience.focusonfloods.org](http://socialscience.focusonfloods.org)

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