The initial purpose of our project NSF #1322088 RAPID: Communication and Understanding of Hurricane Sandy Storm Surge Forecast and Warning Information can be summarized by this excerpt from the NSF abstract.

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> This Rapid Response Research Grant (RAPID) provides funding to put a team of experienced researchers in the field to collect important time-sensitive data related to Tropical Storm/Hurricane/Superstorm Sandy. The severe aftermath of this storm put new urgency on the need for better understanding of and improvement in forecast and warning communication. The accurate forecast from the National Hurricane Center provided sufficient warning time for people to take action. For many, however, realization of the need to act came too late. This storm transitioned from tropical storm to hurricane to extratropical (ET) storm as it approached landfall in the New York City area. That transition resulted in operational changes in responsibilities within the National Weather Service (NWS) along with possible changes in how media and emergency management interpreted the storm's hazards. During the Friday to Sunday time before Monday landfall, when critical decisions had to be made, Sandy was barely a Category 1 hurricane, possibly leading people to think it would not have a dangerous storm surge. Its major impact was on an area not highly accustomed to planning for major hurricanes and having experienced one, Irene, with very different characteristics the year before. These factors may have contributed to response delay, but research is needed to find out what actually happened in the forecast communication process and make recommendations for improvement.
>
> Results gathered will contribute to investigating ways for improving storm forecast communication to promote public safety and reduce hurricane costs.

Data collection so far has focused on the four day time period before Sandy's landfall on October 29. Project PIs Betty Morrow and I (Hugh Gladwin) spent four weeks in December, January, and February doing qualitative interviews with forecasters, media, emergency management officials, and the USACE staff in order to construct a timeline for the communication of forecast information and emergency management decisions during the four days before landfall. From analysis of these qualitative interviews and partial analysis of television coverage of the storm as it approached, we were able to design a telephone survey.

The survey instrument includes many items from post-event surveys we have done after Hurricanes Andrew, Georges, Ivan, Katrina, and Irene (both 1999 and 2011). For the Sandy survey we added questions derived from the qualitative interview data focusing on the understanding of forecast risk and evacuation decisions made and their timing. Questions covered expected vs actual severity of different types of impacts (surge, wind, wave impact, and inland flooding) and questions comparing Sandy and Irene the year before.

There are two samples for the survey, both probability samples of geocoded landline telephones: 1) a panel restudy of 272 people interviewed in 2012 [1] after Hurricane Irene who live in the Irene watch/warning area and were also threatened or impacted by TS/Hurricane Sandy; and 2)

1,000 people living in high surge risk census block groups in coastal New Jersey and New York (NYC and Long Island). High risk was defined as block groups within one km of the coastline or inland tidal water body and having a median elevation of less than 4 meters. In addition block groups in evacuation zone A in NYC not meeting this criterion were included.

So far we have completed 607 interviews in NJ and NYC. When those were completed we stopped to compile results needed for the NOAA Sandy assessment team (see http://www.nws.noaa.gov/os/assessments/, our results cited there as [2]). We plan to resume interviewing next week for the Long Island sample and the Irene panel restudy.

A couple of interesting findings so far:

1. In the high surge risk block groups of our sample, the reported evacuation rate for Sandy (33%) was nearly the same as the rate for Irene (30%). This agrees with previous findings that have found that the "cry wolf" is minimal for people living in evacuation zones and are informed about the nature of surge risk.

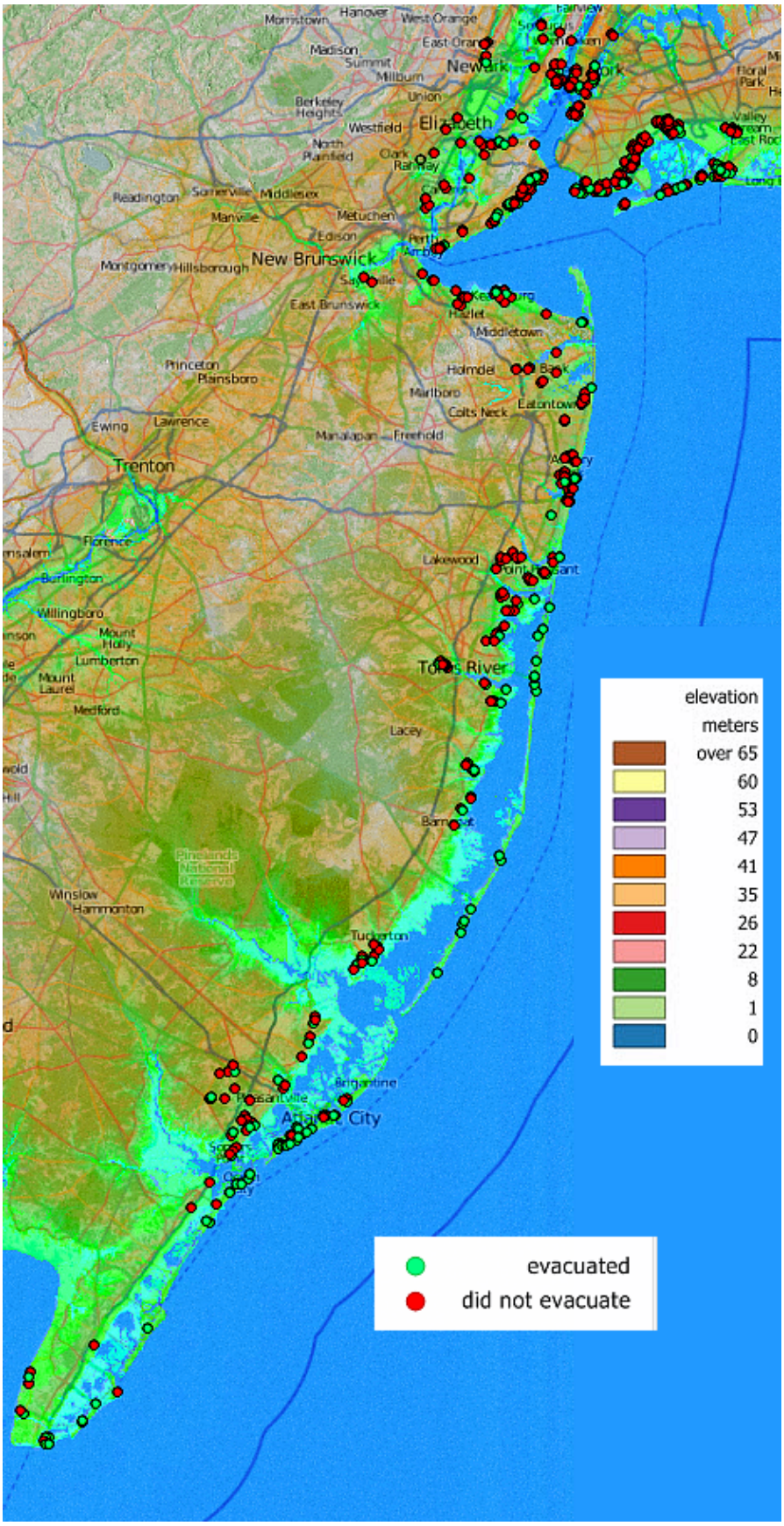
2. The fact that there was no hurricane warning posted for Sandy in the NYC northern coastal New Jersey area did not seem to be a reason why many people the surge risk from Sandy seriously. In fact, almost everyone who took the surge danger seriously thought there was a hurricane warning.

More at the workshop, particularly GIS analysis.

[1] Lazo, J.K.; Morrow, B.H. Survey of coastal U.S. public's perceptive on extra-tropical tropical cyclone storm surge information. NCAR Societal Impacts Program. January 7, 2013.

[2] Gladwin, H.; Morrow, B.H.; Lazo, J. Communication and Understanding of Hurricane Sandy Storm Surge Forecast and Warning Information. Advance results communicated March 2013.

Fig 1 below location of 607 interviews (many overlapping) and evacuation status for Sandy


elevation
meters
over 65
60
53
47
41
35
26
22
8
1
0
evacuated
did not evacuate
New Brunswick
Trenton
Toms River
Atlantic City
Newark
Elizabeth
Lakewood
Lacey
Princeton
Plainsboro
Middletown
Holmdel
Marlboro
Freehold
Manalapan
Colts Neck
Eatontown
Lawrence
Ewing
Florence
Burlington
Willingboro
Mount Holly
Lumberton
Mount Laurel
Medford
Winslow
Hammonton
Tuckerton
Brigantine
Pinelands National Reserve
Morristown
Madison
Summit
Millburn
Union
Berkeley Heights
Westfield
North Plainfield
Clark
Rahway
Readington
Somerville
Middlesex
Manville
Metuchen
Edison
Perth Amboy
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Hillsborough
Sayreville
East Brunswick
Hazlet
Keyport
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Pleasantville
Ventnor City