

Remarks
Superstorm Sandy Symposium
American Meteorological Society Conference 2014
Thursday, February 6, 2014
Atlanta, GA

Kathryn D. Sullivan, Ph.D.
Acting Under Secretary of Commerce for Oceans and Atmosphere and NOAA
Administrator

Thank you for inviting me to participate in today's Sandy Symposium. Sandy was unprecedented in many ways, including its track, post-tropical evolution and landfall impacts.

We have now had a little over a year to review, assess, and discuss this historical event and I'm glad to address it with you today.

NOAA is an agency built to match the planet we live on. We're a science-based services agency, here to provide local communities, states, businesses and individuals with the information each needs to make smart decisions when it comes to the oceans and atmosphere. I call this information environmental intelligence. And, at heart, those of us who call NOAA our home are stewards of the living marine resources that our National Marine Fisheries Service is responsible for managing and protecting; of the climate data record that helps us predict changes afoot; and of the natural storm barriers along our coasts that buffer our communities from damage during a storm. We forecast the weather. We manage and protect marine mammals. We help communities build coastal resilience. We promote ocean and environmental literacy. We turn science – observations, models, understanding of the earth system and marine ecology - into environmental intelligence that can inform decisions our communities deal with each and every day. These are the decisions that determine our comfort and our safety; that affect the immediate profitability and long-term sustainability of communities and businesses. And this is a service our nation needs now more than ever.

Just like the "intelligence" in the defense arena, this environmental intelligence is a combination of data, information, analysis, modeling, and assessment.

Sandy is the type of event that NOAA was built to confront. Every one of our Line Offices – what we call each of our divisions at NOAA – rose to meet the challenges that this unique storm presented. We're well known for our role before a storm, but at NOAA we have responsibilities to deliver services and stay engaged before, during, and after an event like Sandy.

I want to share with you what we at NOAA learned during and after Sandy, and how we're working each and every day to make sure that we're even more prepared and better positioned to help communities respond in the future.

I've said it before and I'll say it again, the National Weather Service is government at its best.

Forecasting this storm was *hard*.

When the public thinks of Sandy they remember lower Manhattan underwater, the Rockaways ravaged by storm surge, and everything from a roller coaster to fishing vessels tossed around the New Jersey shore line like toys. Those images were seared in our minds.

But I remember a number of other things just as vividly.

I remember ten days out when the National Hurricane Center first flagged a tropical system developing off the coast.

And five days out when the National Center for Environmental Prediction showed me ensembles that had the "left hook" back into land.

I remember when the Acting Director of the National Weather Service made the call to start launching twice as many radiosondes everywhere from Seattle to San Juan because she foresaw that this one was going to be different and knew we needed more data so we could provide more certainty in our forecasts.

I remember being really glad we had the Suomi NPP satellite sending us data, and that we had our GOES satellites keeping constant watch.

And that dual pol radar had gone live that year at most of our locations.

I remember when our local West Virginia weather office put out the first forecast for over 30 inches of snow. And, just like that, we were warning for a storm with both blizzard and hurricane-like impacts.

I remember looking at the first storm surge product that showed 11 feet of water in lower Manhattan, and the realization sinking in that we were looking at catastrophic flooding in the most densely populated metropolis in America.

I remember wondering if NOAA's tide gauges along the New Jersey coast and throughout New York Harbor would manage to continue sending data. They did for a long time, only yielding to Mother Nature at the very height of the surge.

And yes, I remember when we realized that this storm was likely not going to be a "hurricane," from a purely scientific point of view, when it came ashore. And so we had to decide how best to communicate with the public, the emergency management community, and our partners about the grave hazards it would pose nonetheless.

Here are some other things I saw from where I sat:

We were able to assure those living south of North Carolina that they didn't have to implement costly and burdensome evacuations, which events would prove unnecessary.

We gave FEMA the lead time and the certainty they needed to prepare New York, New Jersey, and Connecticut coastal areas.

Power crews got underway *days before* the storm from as far away as Texas, and so were pre-positioned outside the hardest hit areas before any damage was done.

Many thousands of people evacuated.

The New York subways shut down, and the buses were moved to higher ground.

Connecticut moved its railcars to higher ground, saving millions of dollars in capital assets.

NOAA's National Ocean Service prepositioned our Navigation Response Teams and readied our hydrological vessels for response efforts well before any rain fell or wind hit.

I remember my staff updating me on how Facebook and Twitter were lighting up, sometimes with photos or jokes, but more often than not as a way to share forecasts and preparedness information or encourage loved ones to take action.

In fact, local first responders reported after the storm that they monitored Twitter to know who was in need of water rescue during the event.

And who could forget our Mt. Holly Meteorologist-in-Charge, who put out one of my all-time favorite Powerpoint slides, giving the public his cell phone number and urging, pleading with them to evacuate now and inviting them to yell at him later if it was a false alarm. That single slide surely saved lives.

Think about the certainty it takes to put out a slide like that, to issue evacuations days out, to call in power crews from Texas and California, to move railcars and shut down mass transit. That certainty is built on the quality of our observations and models. And our forecasting skills. It is underpinned by literally decades of research. And its value depends on the relationships our people have with emergency managers, with decision makers in the field, and with our partners in the weather enterprise.

I'm betting the folks in this room remember those moments as well and had similar thoughts of their own as Sandy approached land fall.

Predicting the threats and impacts of a storm transitioning from a tropical system to an intensifying low pressure system, one which would deliver record rainfall and snow inland while simul-

taneously impacting our densely populated coastlines with storm surge and coastal inundation, wasn't easy.

But the men and women of the National Weather Service – of all of NOAA - don't show up each day expecting their work to be easy. The hard days are where we show our value, and we did that with Sandy.

This storm was well forecast days in advance.

The Emergency Management community, our main customers and key partners in an event of this magnitude, reported back they were all well aware of the serious threat posed by Sandy. Importantly, they were well aware nearly a week in advance, so they could reliably and expertly direct preparedness across the Eastern Seaboard. They could move and stabilize infrastructure, prepare for evacuations, and preposition response assets.

The early awareness of the significance of this storm enabled key decision makers to stand up Emergency Operations Centers long before landfall. And the National Weather Service's emerging focus on decision-support services meant we embedded our people in some of those Operation Centers. Just as this storm changed and developed, the most important decision makers had real-time information and the expertise of an NWS meteorologist sitting at their side.

The National Weather Service is NOAA's main access point for information before any major storm. The Weather Service gave emergency personnel and the public a dead-on track forecast full four days before Sandy's October 29 landfall.

Four days of confident advance notice is not just a victory for NOAA. It is truly a national victory, and something that was not possible in previous decades.

Whether you were following events via your smartphone, TV or print media, *every* forecast you saw during this event relied on NOAA's observations, data, and products.

Broad public awareness of the storm undoubtedly translated into lives and property saved. But that awareness was absolutely not due to NOAA alone!

The products and services of the entire weather enterprise generated this awareness and prompted people to act. NOAA cannot achieve the aims of our mission – the protection of lives and

The briefings that had been led by the National Weather Service at NOAA before the storm were now led by our National Ocean Service.

Maritime traffic resumed more quickly thanks in large part to NOAA's regional navigation teams, including the Navigation Managers who were embedded in maritime command centers to aid in this phase of decision making, as well as the survey crews who collected the data.

NOAA was instrumental in opening the New York-New Jersey port complex. I'm sure we all remember the early concern about fuel supplies in New York right the day after Sandy passed. It was the NOAA Ship Thomas Jefferson that hurried out from its hurricane haven mere hours after storm passage to conduct the surveys that allowed that barge to dock and deliver her load of fuel.

Our survey planes and scientists conducted coastal and aerial surveys of the affected areas and immediately published the photos online, allowing emergency managers and residents to examine the damage even before ground inspections were possible.

These surveys are vital to FEMA assessment teams and other on-the-ground responders. We provide the data to FEMA in a format that feeds directly into their damage assessment protocols, speeding the assessments needed to commit Federal aid and lowering the per-house cost of assessment from around \$150 to under \$10.

To date, over 3,000 miles of coastline have been surveyed and over 10,000 images processed to document coastal damage and impacts to navigation.

So in the days immediately following Sandy, our briefings shifted from a focus on storm track forecasts and QPFs to reports on marine debris removal, oil and chemical spill responses, and the number of miles of coastline surveyed.

And today – one year later - our work continues.

Our teams are remapping the shore line in affected areas. We're investing in more powerful high performance computing to improve both our research and our operational modeling. We're studying the best ways to communicate during extreme weather events.

We all know that preparedness cannot be wished into existence in the days or hours leading up to extreme weather. Preparedness must be built over years.

At NOAA, this means two things: All across NOAA we are investing in programs that help communities build long-term resilience to climate change.

And we are committed to the Weather-Ready Nation initiative, which will help us align our resources to strengthen our ability to provide decision support during critical weather events.

Since Sandy, NOAA has led an interagency effort that created a sea level rise planning tool for coastal communities. With a team of Federal agencies (NOAA, FEMA, US Army Corps of Engineers, Council on Environmental Quality, and the US Global Change Research Program), we partnered to create an interactive sea level rise mapping and calculator tool that helps city planners identify and prepare for future flood risks.

We're investing both research dollars and operational people power to help local communities grapple with increased coastal erosion and inundation hazards.

We're engaged in the Northeast to promote greater use of "green" infrastructure – nature's own defenses, like marshes and barrier islands – in concert with the traditional "grey" infrastructure to rebuild after a storm because green infrastructure can protect our coasts for longer and grows stronger over time.

I'm very proud of the many, many things NOAA did right during Sandy. But we also learned a lot about what we can and must do better.

We learned a couple of big lessons about communications during Sandy.

First, our products and services must communicate impact-based risks clearly — That means clearly to the target user audiences, not just fellow weather folks or professional scientific colleagues.

And second, they must be consistent – consistent across all of our products and services and all the weather service outlets which provide them.

For some people, this storm was a monumental flooding event. To others, a torrential rain and dangerous wind event. And to others still, a major snow event. Few of us in this room or any affected communities know what six inches of rain in a day looks like, or what 11 feet of storm surge on top of a full moon high tide means to our everyday world. What will my street look like? Where can I not go, what can I no longer do?

We cannot require people to learn our vocabulary. We must connect with people on their terms. And we must be consistent among ourselves! It does no one any good when our products don't align with each other because of administrative boundaries within the agency. Consistent products that communicate impact-based risks are the most effective products, and we cannot afford not to move aggressively in this direction.

Sandy highlighted again the growing power and potential of social media to aid in severe weather events. Our private sector partners are making great strides on social media that I encourage and want us to learn lessons from. Not in order to compete with them, but to align wisely with them and learn from their work how we can better fulfill our role.

Our storm surge products and services clearly have to get better.

Sandy brought unprecedented levels of storm surge. But it is only a matter of time before some other community is hit with coastal inundation and storm surge that set records for that locale and pose grave threats to lives and livelihoods.

That's why we're investing this year in improvements to our storm surge suite of products.

With the help of Sandy Supplemental funding, the National Weather Service and National Ocean Service are working together to develop a higher resolution and larger-scale storm surge model. This model will also be able to handle both tropical storms and extratropical storms like Nor'Easters.

The National Ocean Services' AdCirc model will be used operationally by the NWS by 2016. It will bring greater resolution to near-shore and on-shore storm surge. That, along with NWS' SLOSH models, will greatly improve NOAA's abilities to forecast storm surge and inland flooding.

And, during this hurricane season, the National Hurricane Center will issue the Potential Storm Surge Flooding Map as an experimental product for areas along the Gulf and Atlantic coasts. Developed over the course of several years in consultation with emergency managers, broadcast meteorologists, and others, this new map will show geographical areas where inundation from storm surge could occur and how high above ground the water could reach in those areas.

Finally, we've got to figure out how to be more nimble in the face of highly unusual weather events, the likes of which we rarely see.

Sandy posed real challenges to our standard operating procedures for communicating our products and services.

Just before landfall, the storm lost its tropical characteristics and was no longer scientifically considered a tropical storm. The models predicted this change, and NOAA and NWS did our best to handle this very rare event, unprecedented for our current watch teams- turn of events.

We made the decision to issue non-tropical watches and warnings well in advance of the storm's landfall, after conversations with emergency managers stressed that the most important factor was to pick one set of watches and warnings and stick with them throughout the entire storm.

And so, as the event unfolded we were criticized for opting to rely on non-tropical watches and warnings for New York and New Jersey, rather than tropical products.

We took those critiques to heart and re-examined the tensions embedded in this one very tough decision. We've worked *and debated* with many in this room over the past year to extract the right lessons for the future.

Having said that, let me restate the most important point very clearly: I am confident that we communicated effectively the significant nature of this storm and the dangerous and damaging impacts it would bring to the East coast.

In the short term, we have adjusted our operational policy for this coming season so that the National Hurricane Center will continue to issue advisory products and be the go-to place even after a tropical cyclone becomes post-tropical in cases where the system still poses a significant threat to life and property. Affected local NWS offices will handle specific impact messaging in their service territories.

And, in the long term, we're investing now in efforts to understand the social science behind impact-based messaging and the best practices we should adopt.

We've all spent more than a year studying and gleaning productive lessons from Superstorm Sandy. There is more still to learn, and many more lessons are yet to be applied. We must not let the attention and focus wane on how to prepare for "the next Sandy."

I was very proud of NOAA during Sandy.

The type of reliable, actionable information NOAA provides every day is needed more now than ever. And I am both proud and excited to be leading those of you who call NOAA home –you're the best in the business.

I'm also excited to deepen our partnerships and leverage the work we've done together as an enterprise over the past many years to serve the nation even better in the years to come.

All of us here share a passion to understand our planet and a commitment to serve society. We're fortunate to have AMS providing this opportunity for us to meet, to share, to debate and - together as an enterprise - to harvest lessons from events like Sandy that equip us to be better prepared for the next one.

Thank you.

###