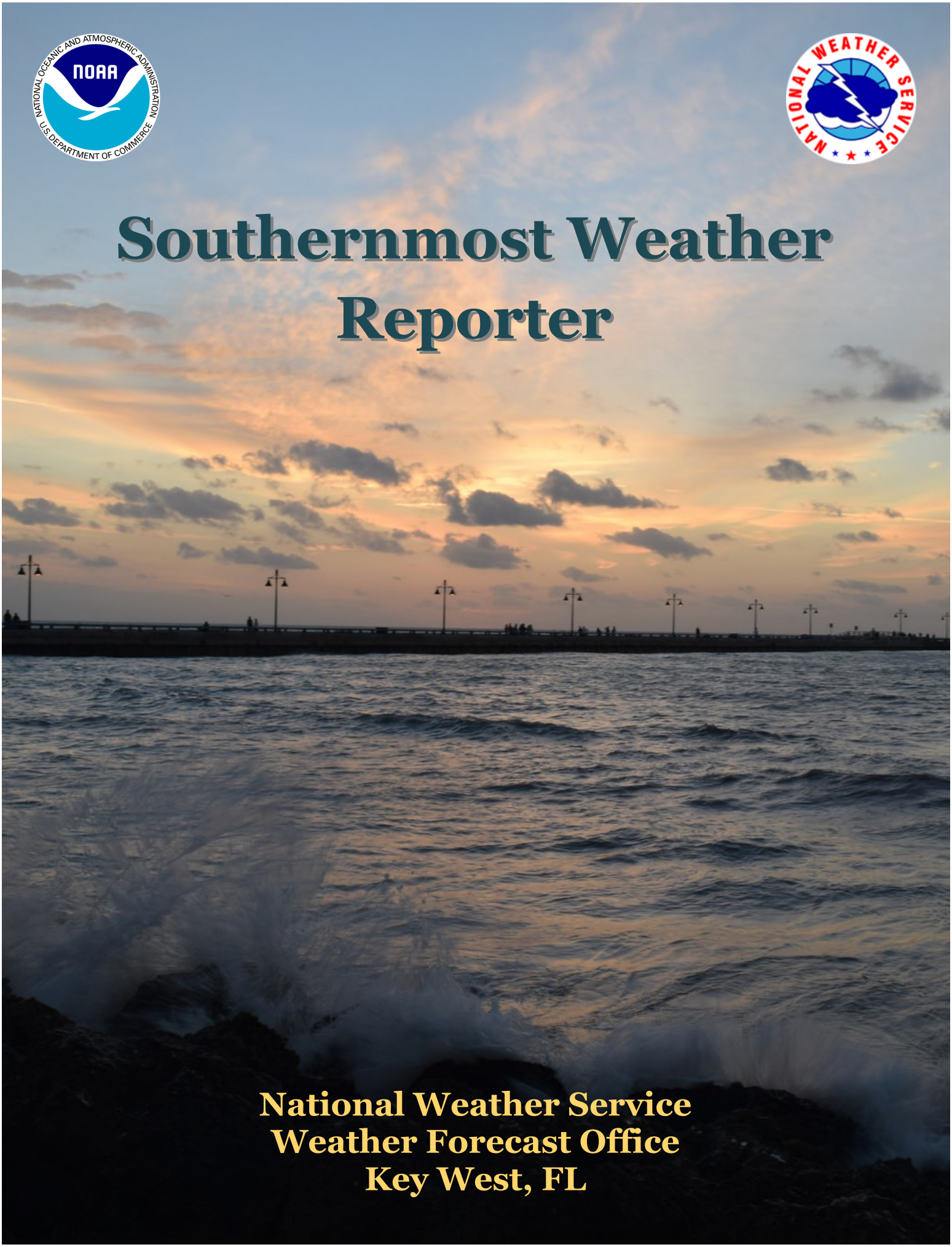

Southernmost Weather Reporter

National Weather Service
Weather Forecast Office
Key West, FL

Southernmost Weather Reporter

National Weather Service ~ Key West, FL

Welcome to Our First Report!

May 2016

Welcome to the inaugural report of the Florida Keys National Weather Service (NWS). This report details activities from the Florida Keys NWS office, as well as our many outreach and customer service initiatives.

Many interesting weather events occurred during this last year:

- We ended 2015 as the warmest year on record in Key West.
- We had a small scare with Tropical Storm Erika that threatened south Florida in late August.
- We saw persistent coastal flooding affect the Keys in September and October.

In addition, our office accomplished several major outreach and customer service initiatives of which I am quite proud:

- We hosted our first office open house ("Science Saturday") event in five years. We had total attendance of almost 800, and this is something we are planning to make an annual event.
- We hosted over 50 national and international scientists at our office, as part of a large international science workshop on marine forecasting held in Key West.
- We commemorated the anniversary of two of the strongest hurricanes on record to affect the Keys: Labor Day Hurricane (1935) & Hurricane Wilma (2005).
- We redesigned our office operations area.
- We worked on GIS projects to benefit our partners.

The NWS is a taxpayer-funded federal organization, so it is our duty and privilege to keep you up to date on our activities. I want to thank Krizia Negrón for her leadership on this project, along with Laura Kasper, Andy Devanas, and Christopher Rothwell who helped with editing of the report. I would also like to thank the meteorologists that helped contribute articles for this first report. As always, I welcome your feedback on how the Florida Keys National Weather Service can continue to better serve our partners, residents, and visitors of the Florida Keys.

Sincerely,

Matt Moreland

Meteorologist-In-Charge
Florida Keys National Weather Service

Inside this Report:

Meet our new Meteorologist-in-Charge!

By: Krizia Negrón

I sat down with Matt Moreland on the one-year anniversary of his arrival for a questions and answers session.

Q. Why did you become a meteorologist?

I became interested in meteorology at an early age. My earliest memory dates back to the summer between third and fourth grade. That summer I was living in Houston, Texas and Hurricane Alicia struck in August 1983. My parents reminisce about me watching the forecasts closely and going and telling the neighbors the latest updates. The hurricane had a big impact on the Houston/Galveston area. I knew that I had found a calling.

Q. You have been the Meteorologist-in-Charge at the Florida Keys National Weather Service for a year. Before Key West, where were you living and what were you doing? What is your area of expertise?

My previous position was an Emergency Response Specialist at the NWS New Orleans/Baton Rouge office. Staff from that office deployed and provided on-site weather support for a number of major events (e.g. New Orleans Navy Week, the January 2014 ice storm, Hurricane Isaac, Mardi Gras, Super Bowl XLVII, and the Boy Scout Jamboree). Some of our major accomplishments included strengthening and increasing partnerships in the area, testing new software, and developing a decision support training plan for the office. The most important part of that role was helping our office move toward a "whole-office" model for decision support. The model we developed there is currently being researched by the NWS as the "ideal" model of operations for the future NWS office.

Prior to that position, I worked at the Houston/Galveston NWS office for nearly 14 years in several forecasting positions. I have spent my entire career at local coastal NWS offices, and have worked 17 tropical cyclone events.

Q. What has been the most rewarding experience you have had while working for the NWS?

The most rewarding experience for me was the work I did to help expand decision support at the NWS New Orleans/Baton Rouge office. Following the deployments for Hurricane Isaac and the January 2014 ice storm which impacted New Orleans, I received letters of commendation from the state emergency management director and the mayor of New Orleans respectively. There is nothing more rewarding to me than a core partner telling you that your efforts have helped them make critical life-or-death decisions or saved their agency money.

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Meet our new Meteorologist-in-Charge! *(cont)*

Q. The Florida Keys National Weather Service is responsible for the safety of life and property for all the Florida Keys and its coastal waters. Since the population is small compared to the other 121 National Weather Service Offices, what makes this office important?

The Florida Keys National Weather Service is critical for many reasons, the most obvious being hurricanes. We are a highly vulnerable location, with only one highway connecting a 120-mile long chain of narrow islands. On a day where a tropical cyclone threatens, there are 100,000 or so individuals in the Keys that might have to be evacuated via airplane, boat, or on a single highway, well in advance of a storm. There is a huge Federal presence in the Keys (including but not limited to the Coast Guard, Navy, and Joint Interagency Task Force South). In addition we have the third largest barrier reef in the world and several other protected habitats, and many agencies we work with that are responsible for looking over these. While our population is small, we have over four million visitors a year. The Coast Guard here has a huge, weather-dependent, search-and-rescue mission. Forty percent of the world's commerce passes through our coastal waters. Finally, we have an increasing number of major events linking the Keys and Cuba, along with the emergence of flights and ferry service between the two.

Q. The National Weather Service, as every other federal agency, is in constant change. What direction do you see the agency moving in the coming years?

I think the role of the NWS meteorologist is going to change over the next few years. Forecasting is not going to go away, but some aspects of it are going to change. The emphasis in forecasting will shift to the short-term periods with a greater focus on "targeted opportunities" where the meteorologist can provide tailored data to help core partners make critical decisions. Newly arriving meteorologists are going to be expected to have both communication and technical skills in their pocket. On top of this, all of the NWS mission-critical areas (such as fire weather, aviation, warning operations) will continue. The expectations on the future meteorologist are going to be huge, and the job will look very different. The changes are going to be slow and difficult, but necessary for evolution of the NWS.

Q. In your opinion, which are the biggest challenges for the weather and forecast "business" in 2016?

In my opinion, this would be the "culture shift" taking place in the NWS. What do we need to do to move forward in helping build a Weather-Ready Nation? How do we shift from the "legacy" way of doing business to the new business model, while keeping workload at a reasonable level? How do we provide even further support to our partners as demands increase? How do we better incorporate the newest technology into our daily operations? How do we ensure that our workforce is properly trained toward all the skills that will be needed in the future?

Q. What do you like the most about the island life?

I love the weather! In all seriousness, I love the year-round outdoor aspect to living here, especially running and biking. Key West has a great selection of restaurants and arts which I love to partake in too. To me - the food scene here easily rivals New Orleans. I have a five minute walk to work everyday, something that I've never had any other time in my life. The Keys are a place that people love to visit - and it's nice to have friends and family drop in to enjoy it with you!

NOAA Science Saturday Returns to WFO Key West

By: Bill Cottrill

After a five year hiatus, Florida Keys National Weather Service opened its doors to the public during NOAA Science Saturday. The event was held on Saturday, February 6, 2016 between 10 a.m. and 2 p.m. This was a cooperative event with our partners at the Florida Keys National Marine Sanctuary (NMS). The NMS raised funds for the Mooring Buoy Foundation, which supports maintenance of more than 500 mooring buoys across the Florida Keys marine environment.

In attendance were many of our partners, including the City of Key West Fire Department, Dry Tortugas National Park, Turtle Hospital, Seacamp, Reef Environmental Education Foundation, Key West Botanical Garden, and of course the Florida Keys National Marine Sanctuary. Also in attendance was John Morales from NBC 6 in Miami, and many of the Florida Keys media outlets were in attendance. A big thanks to the local businesses that helped to support the event.

Tours of the building began at the National Weather Service booth under the yellow tent where Meteorologists Brandon Fling and Elizabeth Vickery displayed some of the tools that we use in our observation program. Tours were guided by Meteorologist Krizia Negron which included a brief discussion by Meteorologist Alan Albanese on our day to day operations. These discussions included topics such as forecast methodology, dissemination of the forecast through our web site, All Hazards Radio, and social media. Meteorologist Chip Kasper spoke of the office mission, history, functions, and staff. The last stop on the tour was the office lobby where Meteorologist-In-Charge Matt Moreland and Warning Coordinating Meteorologist Jon Rizzo held a question and answer session. Over 800 weather enthusiasts enjoyed live music from C.W. Colt while munching on hot dogs or hamburgers prepared by our Meteorologist and "chef" Stephen Chesser.

Bill Cottrill thanks the entire staff at the Florida Keys National Weather Service for their help in organizing this event.

Top left: Meteorologist Alan Albanese provides a brief insight on the daily operations at the Florida Keys National Weather Service.

Bottom right: Meteorologists Brandon Fling and Bill Cottrill prepare to launch an upper air balloon for the enjoyment of all the kids and family present.

For a complete gallery of the event, visit our Facebook Page or go to https://goo.gl/IlqUfx.

Weather Decision Support Services Enhancing Public Safety in the Florida Keys

By: Jon Rizzo

In the Florida Keys, emergency managers help plan preparedness and coordinate actions to protect the health and safety of Monroe County's residents and visitors. Meteorologists at your local National Weather Service (NWS) office communicate critical weather information to these important officials through special, on-demand decision support services, or simply *DSS.*

Over the past year, eight major weather events required DSS for the Florida Keys. DSS provided by the Florida Keys NWS conveys information on the timing, potential impact and level of certainty from hazardous weather, including strong winds, storm or tide-induced coastal flooding, heavy rainfall, dangerous lightning, and even cold wind chills. This information is used by emergency managers and government agencies to decide both the timing and appropriate actions to take to prepare residents and visitors for potentially dangerous weather. Most often, DSS takes the form of phone briefings and emailed one-page weather forecast impact sheets. These briefings are used to focus decision-makers on critical thresholds that require enhanced staffing and public safety actions, rather than a lengthy discussion of weather features or weather education. For long-duration weather hazards, including hurricanes, DSS evolves into multi-media briefings or the deployment of meteorologists to the local emergency operations center, where emergency managers can ask specific questions to help make their best operational response decisions.

DSS is also provided in support of major public events. In late October of each year, your Florida Keys NWS provides twice-daily a one-page weather impact matrix graphic covering multiple potential hazards in support of Fantasy Fest public safety. About 75,000 visitors attend the 10-day annual Fantasy Fest celebration, which includes two major street festivals, a bicycle fun ride, two parades, and dozens of public events hosted by the Key West restaurant and lodging industry. The Weather Impact Matrix is a one-stop shop for the emergency management and first responders to quickly understand potential impacts that may affect the safety of large crowds, the timing and routing of parade floats, and ability to respond to emergencies during Fantasy Fest's many outdoor events.

DSS is continuously enhanced through frequent meetings with emergency managers and other core partners, and practiced through drills. NWS meteorologists are deployed locally in support of the annual Turkey Point Nuclear Power Plant radiological emergency and the Florida hurricane drills.

Available on-demand from your NWS, decision support services provide critical information on potential weather hazards to help public safety officials protect life and property throughout your community.

On the right is an example of the weather impact matrix graphics that the staff at the Florida Keys NWS creates covering multiple potential hazards in support of major outdoor events in the Florida Keys.

Fantasy Fest Week

Key West Weather Impact Matrix

as of Tue 10/21/2014 at 0900 hrs EDT

Impacts		Today 10/21	Wed 10/22	Thu 10/23	Fri 10/24	Sat 10/25	Sun 10/26
Flooding	Rain	Low Impact	Low Impact	Moderate Impact Thu Night	Moderate Impact Daytime	Low Impact	Low Impact
	Tide	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	Total	Very Low	Very Low	Low Impact	Low Impact	Very Low	Very Low
Lightning Impact		Low Today / Moderate Tonight	Moderate Impact	Moderate Daytime / High Nighttime	High Daytime / Low Nighttime	Very Low Impact	Very Low Impact
Wind Impact		SE Gusts to 12 mph	E to SE Gusts to 15 mph	E Gusts to 20 mph	NE Gusts to 25 mph	NE Gusts to 25 mph	NE Gusts to 20 mph
Severe Storms & Tornadoes		No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
Temperatures & Max Heat Index (HI)		83/75 HI: 88	84/76 HI: 90	84/76 HI: 90	83/76 HI: 89	84/75 HI: 88	84 HI: 87

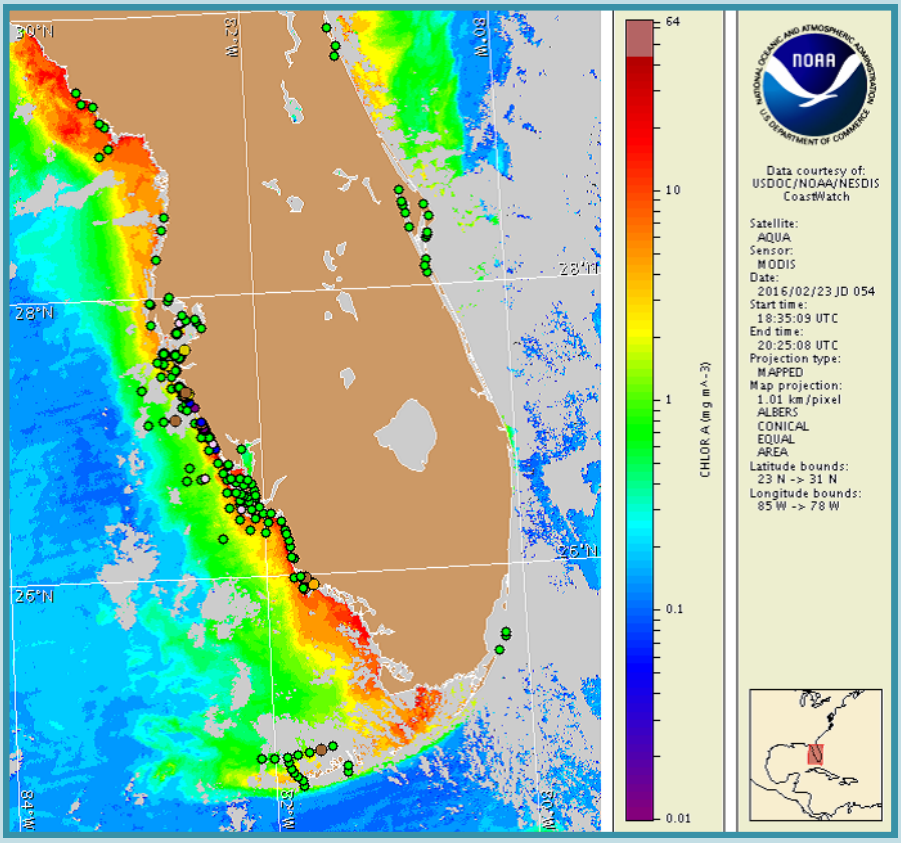
Beach Hazard Statements for Harmful Algal Blooms

By: Christopher Rothwell

At the request of the National Ocean Service (NOS) and National Weather Service (NWS) Headquarters, and embracing the spirit of OneNOAA, Florida Keys NWS and NWS Miami will help disseminate Beach Hazard Statements (BHSs) for respiratory irritation associated with Harmful Algal Blooms (HABs). The BHS has been used by NWS Tampa Bay for several years due to the prevalence of HABs in Southwest Florida. HABs can, and do, impact areas outside the County Warning Area (CWA) of NWS Tampa Bay. Expanding the coverage of the BHS to include the NWS Miami and Florida Keys NWS CWAs will improve Decision Support Services for the customers and partners in South Florida and the Florida Keys.

What is a HAB? A HAB is the rapid growth of toxic or nuisance algae. Impacts may include discolored water and limited light availability, which may negatively affect organisms such as coral; hypoxia (low dissolved oxygen), which may result in the death of fish; death of mammals, reptiles and birds exposed to toxins; human illness; and economic impacts such as reduced seafood sales and tourism. The HABs which affect the Gulf of Mexico (GOMX)--more specifically, the southeastern GOMX--are composed of *Karenia brevis*. *K. brevis* is known colloquially as Florida Red Tide and produces a neurotoxin called brevetoxin. People who eat shellfish that have accumulated these brevetoxins can become sick. The parts of finfish (snapper, grouper, etc.) that people usually eat (muscle) do not accumulate brevetoxin.

Where and how often do HABs occur? *K. brevis* blooms have been documented in the GOMX since at least the 1700s and are most frequent in Southwest Florida. There has been at least one bloom in the GOMX, almost every year, for the past 30 years. The bloom "season" is August 1 to early February. Blooms can last weeks, months, or even a year. From 1957-2004, there have been 14 documented *K. brevis* blooms in the Florida Keys (return period 3.4 years). Since 2009, there have been 4 "High" respiratory irritation forecasts which have impacted the Florida Keys.



When will NWS Key West issue a BHS for a HAB? A BHS for a *K. brevis* HAB will be issued if all of the following apply: the NOS' HAB-Ocean Forecast System team issues a public conditions report or update; confirmed *K. brevis* concentrations >50,000 cells/L present in a WFO's area of responsibility; and NOS' HAB-OFS team forecasts "high" respiratory impacts in a WFO's area of responsibility.

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NOS forecasters use satellite derived chlorophyll to locate HABs. Cell concentration sampling data shown as red (high), orange (medium), brown (low b), yellow (low a), blue (very low b), purple (very low a), pink (present), and green (not present). Colored dots represent locations where samples have been taken.

Beach Hazard Statements for Harmful Algal Blooms *(cont.)*

The expansion of the BHS into the operations at Florida Keys NWS was a two year process. Implementation included Service Change Notice 14-29 for the use of BH.S Valid Time Event Code (VTEC) within the MIACFWKEY product architecture. The MIACFWKEY has been used in the past for Coastal Flood Warnings and Statements, and will now include the BHS. VTEC will help to automate the dissemination of the BHS. Additionally, multiple partners from state, federal, and local agencies attended an August 2014 stakeholder meeting in Marathon to answer questions and alleviate concerns. Several meetings and conference calls between NOS, NWS Headquarters, and the local NWSs hashed out various technical details. Finally, "HAB-101" training was provided twice for the operations staff at Florida Keys NWS.

Data Acquisition Award

By: Brandon Fling

The Florida Keys National Weather Service (NWS) was awarded a Certificate of Recognition for completing the Fiscal Year 2015 with less than 2% missing Cooperative Observing Program data and a station visitation rate in excess of 125%. The NWS Cooperative Observing Program is the Nation's weather and climate observing network of, by, and for the people. More than 8,700 volunteers take observations on farms, in urban and suburban areas, national parks, seashores, and mountaintops across the nation. The data are truly representative of where people live, work and play. Cooperative observers record daily temperature and precipitation, which help measure the long-term climate changes, as well as support forecast, warning and other public service programs of the NWS.

There are eight Cooperative sites across the Florida Keys, stretching over 180 miles, from Key Largo to the Dry Tortugas National Park which is located 70 miles west of Key West in the Gulf of Mexico. NWS personnel travel to each site to conduct periodic and emergency visits, as well as perform annual inspections to ensure accurate and reliable data is reported. Below is a picture of the Florida Keys NWS Meteorologist-In-Charge Matt Moreland (on the right) presenting the award to Meteorologist Brandon Fling.

World Ocean Wave Experts Come to Key West

By: Kennard "Chip" Kasper

Over 50 of the world's leading oceanographers, hydraulic engineers, and wave modelers visited Key West in November for the "14th International Workshop on Wave Hindcasting and Forecasting", a continuing series of international workshops on all aspects of ocean waves, including measurements, modeling, prediction, and climate. In addition, two additional symposia on coastal hazards and storm surge were held during the week. Florida Keys National Weather Service meteorologists Andrew Devanas, Chip Kasper, and Matt Moreland attended the workshop, and gave presentations highlighting National Weather Service tropical and marine weather products and services, and some of the operational challenges facing Florida Keys weather forecasters, including the lack of a wave-measuring buoy in any of the coastal waters adjacent to South Florida. The attendees broke from the workshop Wednesday afternoon, and visited the Florida Keys National Weather Service on White Street in Key West. Moreland and Kasper led a tour of the facility, which included a discussion of the 145-year history of the National Weather Service in Key West, and a demonstration of the highly acclaimed "Nearshore Wave Prediction System" on the operations floor.

Part of the group of national and international scientists that toured the Florida Keys NWS. Photo by Krizia Negrón.

That's the Spirit!

By: Krizia Negrón

As the 2015 holiday season approached, the shopping lists grew, decorations were hung, and celebrations were planned. However, some of our staff agreed that extending a hand to people in need was part of the holiday spirit. On December 6, 2015, Meteorologists Elizabeth Vickery, Stephen Chesser, and Krizia Negrón (pictured on the right) volunteered at the Monroe Association for ReMARCable Citizens (MARC House) in Key West. They sold Christmas trees, where the money collected from the sales went directly to fund the MARC House. The MARC House "provides their clients with dignified, compassionate, professional care in a family environment for the duration of their needs". The NWS staff enjoyed the opportunity to help out and the interaction with the community.

The Tenth Anniversary of Hurricane Wilma

By: Bill South

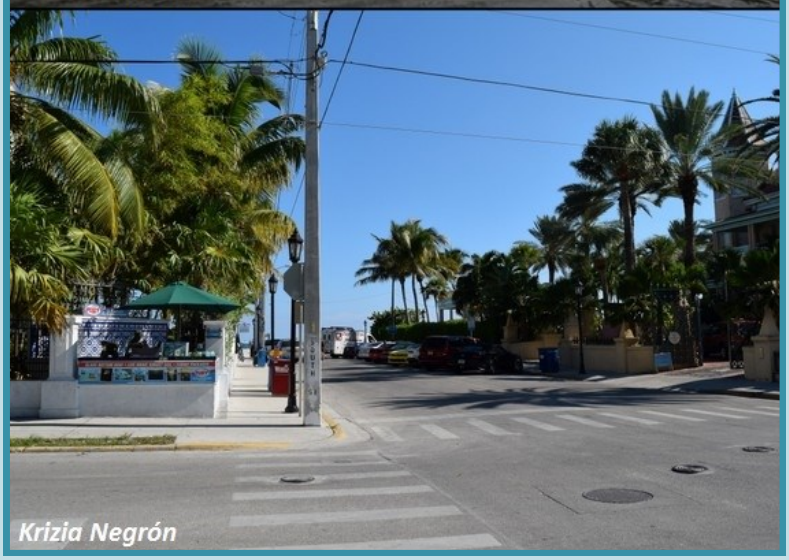
Hurricane Wilma was the 25th tropical cyclone and 12th hurricane of the record-setting 2005 Atlantic Hurricane Season. Hurricane Wilma tracked across the extreme southeast Gulf of Mexico and south Florida peninsula during the early morning hours of Monday, October 24, 2005, producing hurricane-force winds and the highest storm surge observed in the Florida Keys since Hurricane Betsy in 1965. Hurricane Wilma is the most recent hurricane to make landfall in Florida.

Peak storm tides of around 6.5 feet above mean sea level (AMSL) occurred in Key West. City of Key West officials estimated that about 60 percent of Key West was inundated by salt water. Major flooding occurred in Stock Island, where salt water up to 3 feet deep was reported in the residential streets of the Key West Golf and Country Club. Maximum storm tides of 5 to 8 feet AMSL were estimated from Boca Chica to Big Pine Key. Numerous homes were flooded and thousands of vehicles were rendered permanently inoperable in the Lower Keys. Peak storm tides of 5 to 8 feet AMSL were estimated in the Middle Keys, flooding businesses, homes and the Florida Keys Marathon Airport. Peak storm tides of 5 feet AMSL were estimated in Islamorada, with most homes along Florida Bay flooded. Maximum storm tides of 4.5 feet AMSL were estimated along the Overseas Highway near Jewfish Creek and at mile marker 110, where the road was flooded with several inches of water.

Damage to housing and commercial buildings, including widespread tree damage was reported. The Florida Keys Marathon Airport and Key West International Airport were both closed for several days after Hurricane Wilma, with reduced operations persisting well into November 2005.

Severe beach erosion occurred along Atlantic shores of the Florida Keys, with severe erosion also noted along Gulf side beaches in Key West. Most beaches were completely inundated by salt water near the time of the peak storm tide. Six foot breaking waves were estimated along the Upper Keys. South Roosevelt Boulevard in Key West was closed to traffic for almost three weeks, while crews removed tons of sand and large pieces of seawall from the road.

In commemoration of the 10th year anniversary, Krizia Negrón, Florida Keys NWS meteorologist, took pictures of some of the locations that suffered damage during Hurricane Wilma. To the right is an example of the height of the flooding observed near Old Town, Key West and how it looked back in October 2015. You can visit the complete photo album in our webpage www.weather.gov/key > Photo Gallery.



The Persistent Coastal Flooding of Blackwater Sound—September and October 2015

By: Christopher Rothwell

On September 26, 2015, the National Weather Service (NWS) in Key West fielded a call from a resident of Adams Drive in Key Largo, a bayside community of Blackwater Sound (see Figure 1). She was concerned with the rising water levels in her neighborhood which prevented her from leaving her house. According to the caller, water levels began to rise five days prior (September 21). The Blackwater Sound tide gauge (BWSF1) measured 1.91 ft above Mean Lower Low Water (MLLW) on the 21st and 2.28 ft on the 26th. Somewhere near the 2.00 ft level, the caller's neighborhood became impassable with saltwater flooding.

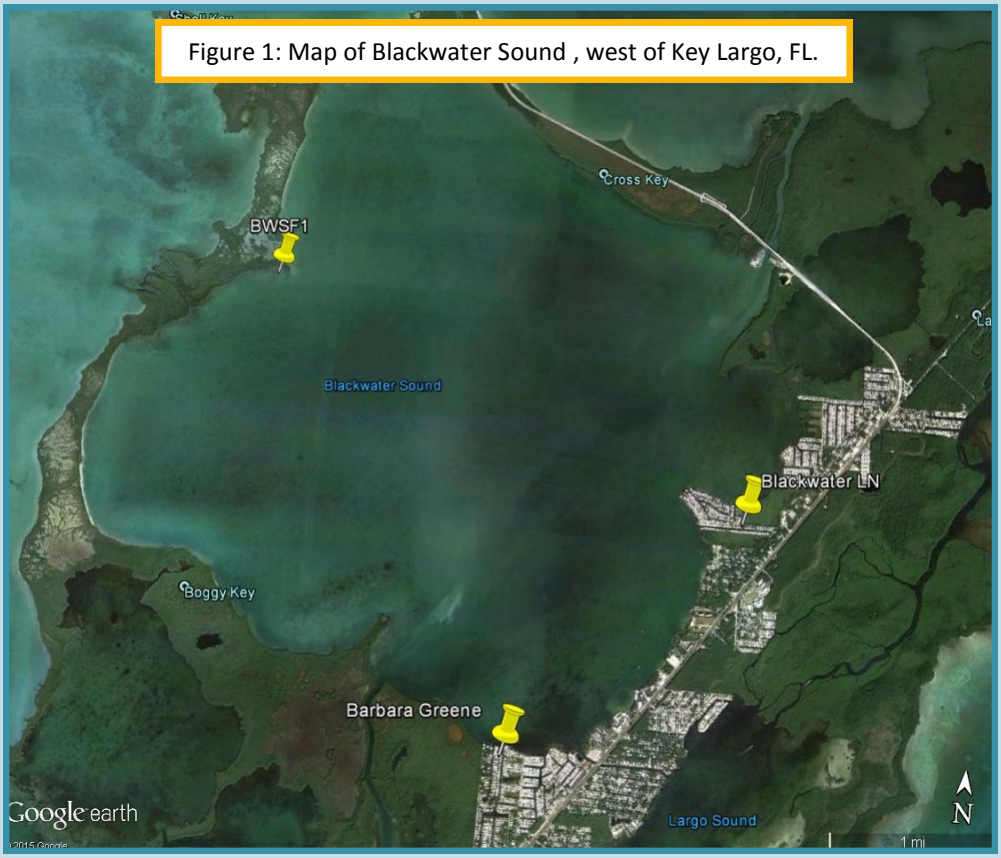


Figure 1: Map of Blackwater Sound , west of Key Largo, FL.

The saltwater-laden streets continued for several weeks within the bayside communities of Blackwater Sound (see Figure 2). In fact, the Facebook group "Key Largo Community Swamp" was created as a community action project in order to echo the sentiments of an annoyed public, dismayed with their storm water drainage. By our calculations, BWSF1 remained above 2.0 ft for nearly 39 days (late September through late October). For comparison, the second longest streak above 2.0 ft in the gauge's history was nine days in November of 2012.

Late fall and early winter feature the climatological maximum for water levels in the western Caribbean and the Gulf of Mexico. Warm basin-wide sea surface temperatures combined with peaks in solar-lunar forcing, result in the highest spring tides of the year. The media have used "King Tide" as the term to describe these highest of the high tides. The water levels during this event were not especially high given the historical data available from BWSF1. However, this event stands out for its remarkable duration.

A contributing factor for the flooding was the persistent gales east of the Carolinas. Low pressure systems in the western North Atlantic have been theorized to disrupt the flow of water within the Gulf Stream. Surface observations from the Virginia Beach buoy reveal near-gale northeast winds persisted for nearly a week. The wind field east of the Carolinas suggests wave and swell action within the oceanic boundary layer can perturb the nearly laminar poleward flow of the Gulf Stream. Unfortunately, there are very few available data sets which describe changes in the volume of poleward transport in the Gulf Stream; therefore, proof of this theory is difficult. The flooding was not limited to the Florida Keys, late September water levels from South Carolina to New Orleans were anomalously high, indicating a basin-wide event. While water levels receded across the eastern Gulf of Mexico and the southeastern Atlantic coasts,

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The Persistent Coastal Flooding of Blackwater Sound—September and October 2015 *(cont.)*

the geography of Florida Bay prevented drainage. Add in complicating factors such as westerly winds (which have been known to pile-up water within the bay) and heavy rains, and there is some explanation for the nearly 40 days worth of flooding.

Figure 2: Photo from Blackwater Lane, taken September 29, courtesy of Emilie Caldwell Stewart. See Figure 1 for relative location of address.

Wanted! Rainfall Observers along the Florida Keys

By: Krizia Negrón, *based on CoCoRaHS.org*

Interested in weather and measuring precipitation after a rain event? You can join the local CoCoRaHS network. CoCoRaHS stands for the Community Collaborative Rain, Hail and Snow Network. CoCoRaHS is a unique, non-profit, community-based network of volunteers of all ages and backgrounds working together to measure and map precipitation (rain, hail and snow, for those up north). By using low-cost measurement tools, stressing training and education, and utilizing an interactive Web-site, CoCoRaHS's aim is to provide the highest quality data for natural resource, education, and research applications.

Volunteers along the Florida Keys take daily measurements of precipitation and record their observations at the CoCoRaHS Web site www.cocorahs.org, or by using the CoCoRaHS phone app. The data are then displayed in tables and maps, ready to be analyzed and applied to daily situations ranging from water resource analysis and severe storm warnings, to neighbors comparing how much rain fell in their backyards.

CoCoRaHS is used by a wide variety of organizations and individuals. The National Weather Service, other meteorologists, hydrologists, emergency managers, city utilities (water supply/conservation, storm water), insurance adjusters, USDA, engineers, mosquito control, outdoor & recreation interests, teachers, students, and neighbors in the community are just some examples of those who visit their Web site and use their data.

If you want to be a CoCoRaHS Volunteer Observer you will need:

(1) access to the internet,
(2) an official-type CoCoRaHS rain gauge (available for purchase on their website),
(3) a site on your property with good exposure, and
(4) be willing to enter your rainfall data on a daily basis.

You can sign up by visiting their main website at www.cocorahs.org or by contacting the Florida Keys Coordinator at *krizia.negron@noaa.gov*.

New Situational Awareness Display

By: Christopher Rothwell

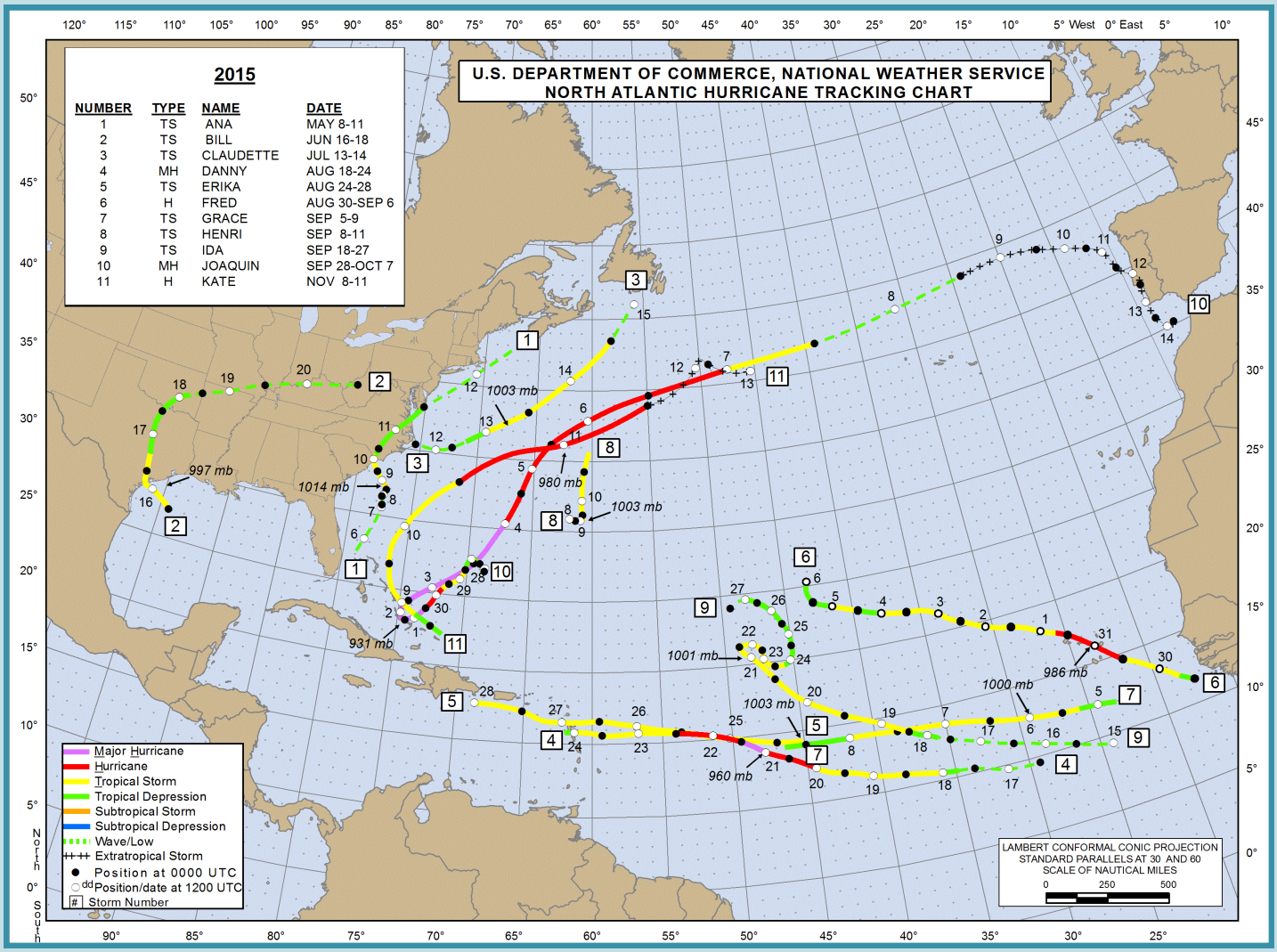
Florida Keys NWS reorganized their operations area in August of 2015. The new configuration allows better integration among our various forecast systems.

2015 Atlantic Basin Hurricane Season Summary

By: Bill South

For the 2015 Atlantic Basin Hurricane Season, 11 named storms formed, of which four became hurricanes, and two of those hurricanes reached major hurricane status (i.e. Category 3 with sustained winds above 110 mph). There was also one unnamed tropical depression. While the number of named storms, hurricanes, and major hurricanes was only slightly below the long-term averages of 12, 6, and 3, respectively, many of the named storms were relatively weak and short-lived.

Name	Dates	Maximum Wind (mph)
Tropical Storm Ana	May 8th – May 11th	60
Tropical Storm Bill	June 16th – June 18th	60
Tropical Storm Claudette	July 13th – July 14th	50
Major Hurricane Danny	August 18th – August 24th	115
Tropical Storm Erika	August 25th – August 29th	50
Hurricane Fred	August 30th – September 6th	85
Tropical Storm Grace	September 5th – September 9th	60
Tropical Storm Henri	September 8th – September 11th	50
Tropical Depression Nine	September 16th – September 19th	35
Tropical Storm Ida	September 18th – September 27th	50
Major Hurricane Joaquin	September 28th – October 7th	155
Hurricane Kate	November 9th – November 12th	75



Tracks of the tropical storms and hurricanes of the 2015 Atlantic Hurricane Season.

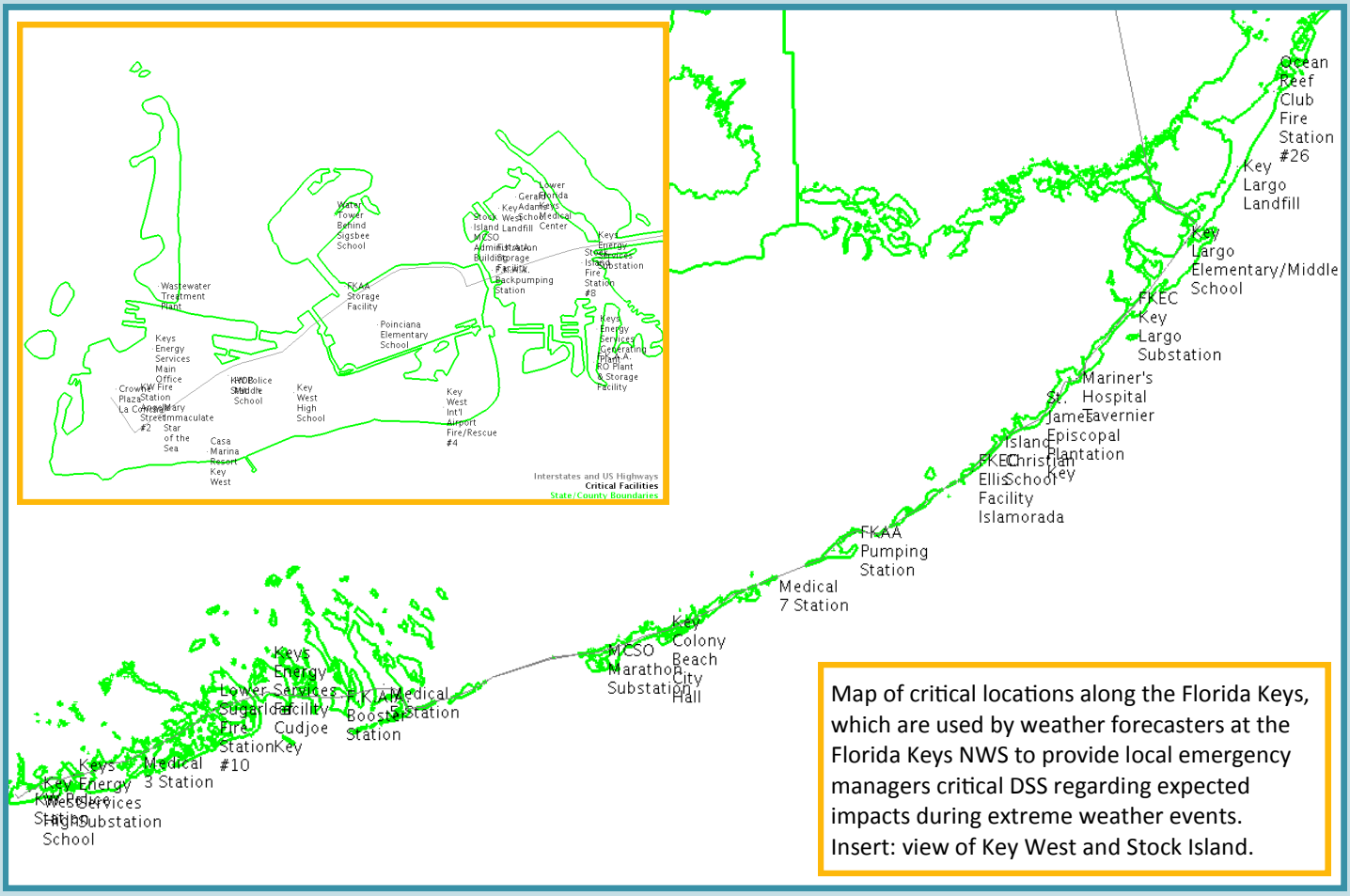
Geographic Information Systems: Supporting Decision Support Services at NWS Key West

By: David Adam Futterman

The mission of each National Weather Service (NWS) Forecast Office relies on communication with the core partners within its County Warning Area (CWA). The CWA includes one or more counties in that office's area of responsibility. The NWS mission includes the protection of life and property, and that involves forecasters providing decision support service (DSS) in the form of detailed technical briefings during a weather emergency. In the case of a hurricane, the two primary threats to life and property are storm surge inundation and high winds. This is especially true in the case of the Florida Keys, arguably one of the most geographically precarious areas in the continental United States. ArcGIS software, used by forecasters in the NWS, is a preferred tool in the production of DSS briefings, as it produces higher resolution mapping which better illustrates the impacts from storm surge and wind damage.

Using ArcGIS, a higher resolution map composed of Monroe County Emergency Management (MCEM) data was created. This map includes point locations in geographic coordinates of schools, hospitals, and police stations, as well as locations of critical infrastructure including electric substations, water pump stations, and radio towers for emergency broadcasts. Monroe County is the only county in the United States which requires evacuation of all non-emergency personnel.

This new map was imported into the local forecast system, used by forecasters to issue forecasts and warnings. These maps allow forecasters to zoom to the location of these new points. ArcGIS also produces varied map layouts for use in DSS reports created by Florida Keys NWS.



Map of critical locations along the Florida Keys, which are used by weather forecasters at the Florida Keys NWS to provide local emergency managers critical DSS regarding expected impacts during extreme weather events. Insert: view of Key West and Stock Island.

2015 Climate Summary

By: Brandon Fling

The 2015 was the warmest year ever measured at Key West, surpassing the 143 years worth of temperature records with an average temperature of 79.9 degrees Fahrenheit. A total of 64 daily temperature records were tied or broken throughout the year. The Spring of 2015 (March – May) was the warmest on record, coming in with an average temperature of 79.6 degrees Fahrenheit. This was followed by two top ten seasonal finishes with the 8th warmest Summer and the 2nd warmest Fall on record.

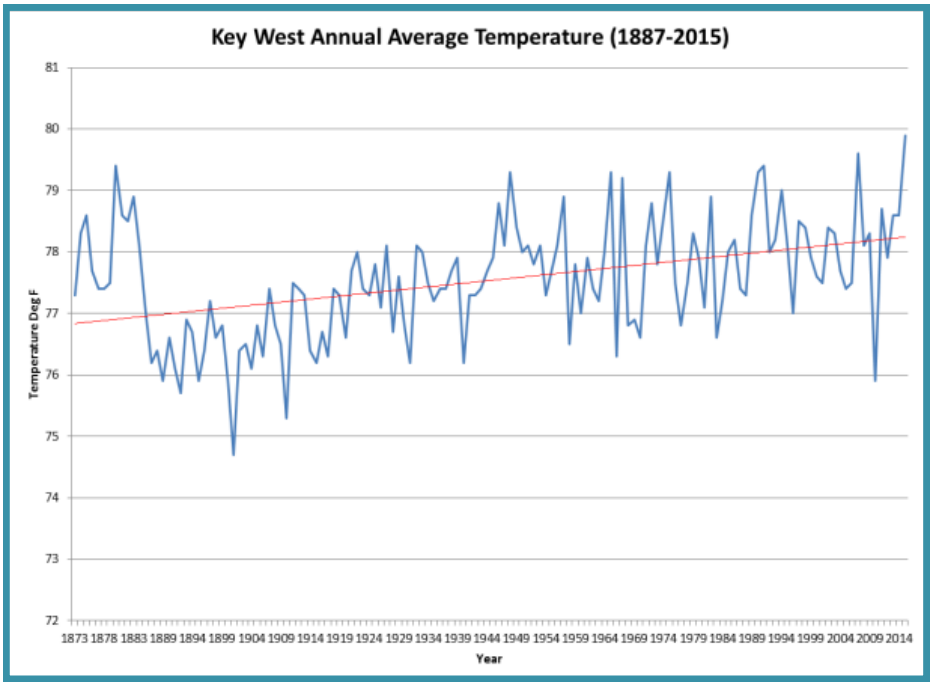
WARMEST YEARS IN KEY WEST

RANK	AVG TEMP	YEAR
1	79.9°	2015
2	79.6°	2007
3	79.4°	1991
	79.4°	1880
5	79.3°	1990
	79.3°	1975
	79.3°	1965
	79.3°	1948
9	79.2°	1967
10	79.0°	1994

WARM SEASONAL TEMPERATURE RANKINGS

Season	Avg Temp	Rank
Winter (DJF) (2014-2015)	71.2°	60th
Spring (MAM)	79.6°	1st
Summer (JJA)	85.1°	8th
Fall (SON)	82.1°	2nd

The graph below depicts how 2015 measured up with the previous years of record in terms of the annual average temperature. As you can see, 2015 stood out above the rest as the warmest year on record, with the trend line (red) indicating the increase in temperatures over time.

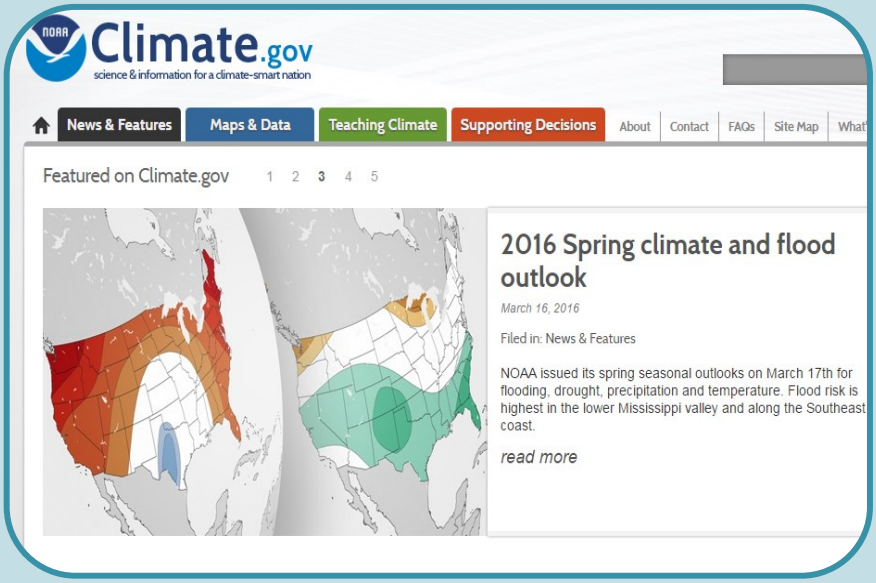


Even though 2015 was the warmest year on record in Key West, not all the months set records. Only the month of December was the warmest on record when compared to the other Decembers in Key West's 143 year history. However, seven of the other 11 months finished in the top 10 warmest months on record, including every month from July through December.

The overall warmth of 2015 led to a total of 53 daily warm minimum temperature records. The month of December saw the majority with 15 total records, 11 of which were new daily warm minimum temperature records.

It wasn't just Key West and the Florida Keys that experienced record warmth in 2015, in fact it was the warmest year on record globally and for the United States as a whole. One of the major influences behind the record heat in 2015 was the very strong El Niño event, which typically contributes to above normal temperatures. For further information, please visit our local Climate page at www.weather.gov/key or http://www.srh.noaa.gov/media/key2015KeyWestClimateSummary.pdf.

New NOAA Climate Webpage



By: Krizia Negrón

Everything you need to know about the El Niño-Southern Oscillation (ENSO) is now in one place! Bookmark the new ENSO webpage at www.climate.gov/enso.

Find the latest updates on the current El Niño/La Niña event and see the outlook for the next few months/seasons. You can also browse the collection of El Niño and La Niña resources to learn more about their impacts on regions of the U.S. and across the globe.

Florida Keys NWS Participates of Eco-Discovery Science Saturday

By: Elizabeth Vickery

On June 20, 2015, Meteorologists Elizabeth Vickery, Krizia Negrón, and Brandon Fling from the Florida Keys National Weather Service (NWS) participated in Science Saturday at the Florida Keys Eco-Discovery Center in Key West, educating children ages 5-12 about weather safety.

The presentation focused on weather safety and covered topics such as hurricanes, tornadoes, and lightning. Additionally, there was a hands-on project where students participated in crafting weather satellites. This part of the presentation was to educate students on one of the many ways meteorologists obtain information to issue life-saving warnings.

To reinforce lightning safety concepts, the children played NOAA's Leon the Lion's Lightning Safety Game. The game creates simple scenarios for kids to determine and answer if the presented situations are safe or not safe. This exercise provides a fun and informative session to kids and adults alike.

The event itself was a great educational opportunity for the public and is another example of how Florida Keys NWS supports its community and promotes the NWS mission to develop a Weather-Ready Nation while protecting life and property. Through continued outreach events, vital weather safety information can be provided directly to the public from its local meteorologists.

Florida Keys NWS's Science Officer Receives Tropical Meteorology Award

By: Matt Moreland

Andy Devanas, the Science Officer for Florida Keys National Weather Service (NWS), received the Tropical Meteorology Award at the 2015 Florida Governor's Hurricane Conference. He received the award alongside Dave Sharp, the Science Officer at NWS Melbourne.

Since the very busy 2004 and 2005 hurricane seasons, Andy and Dave have sought to share their extensive and diverse experiences by developing effective training materials, then deliver this training through residence courses, professional conferences, regional seminars/webinars, intra-office exercises, and recorded modules. They have also conducted applied research in both the related physical and social sciences, and have included multiple perspectives from emergency management customers and partners. The two have served as a highly skilled and visionary duo with keen insight relative to hurricane forecast/warning operations within coastal Weather Forecast Offices. Andy and Dave's bold leadership has helped to shape evolving decision support services needed to confront future hurricane emergencies in Florida.

Andy helped co-develop and steward a series of recorded training modules on tropical meteorology for the NWS Learning Management Series. He is one of the major curriculum developers and core instructors for the Effective Hurricane Messaging Course, which was held again this year at the National Hurricane Center. This course is designed to train NWS meteorologists on tropical cyclone operations and to more effectively provide decision support during hurricane emergencies. Andy was an instructor for a regional training webinar on NWS tropical cyclone operations in 2013. He has participated and provided training at a number of regional and national conferences including the NOAA Hurricane Conference, the 2014 and 2015 National Hurricane Conferences, and the World Meteorological Organization Workshop on Hurricane Forecasting and Warning.

Congratulations again to Andy and thanks for all of your hard work!

Left to right: Andy Devanas, Florida Keys NWS, Steven Cooper, NWS Southern Region Director, and Dave Sharp, NWS Melbourne. On the right, a photo of the award presented to Andy Devanas.

Commemoration of the Labor Day Hurricane of 1935

By: Bill South

The Labor Day Hurricane of 1935 rapidly intensified from a Category 1 hurricane near Andros Island into a Category 5 hurricane in less than 36 hours as it approached the Florida Keys. This hurricane made landfall near what is now the village of Islamorada on September 2, 1935, with maximum sustained winds of around 185 mph. The Labor Day Hurricane is the most intense hurricane (by lowest pressure) to make landfall in the United States since reliable records began in 1851.

The Labor Day Hurricane left a path of near-complete destruction along a 30-mile swath from Tavernier to Marathon. Almost every structure was demolished, and some bridges and railway embankments were washed away. The Islamorada area had been devastated, though the hurricane's destructive path was narrower than that of most tropical cyclones. Damage was minimal in Key West and the Lower Keys.

There were 408 fatalities in the Florida Keys, making the Labor Day Hurricane the 8th deadliest hurricane in the history of the United States since reliable records began in 1851. This hurricane is the only known hurricane to make landfall in the United States with a minimum central pressure below 900 millibars. Only two other hurricanes have struck the United States with winds of category 5 strength, Hurricane Camille in 1969 and Hurricane Andrew in 1992. The Labor Day Hurricane remains the 3rd strongest Atlantic Basin hurricane on record, surpassed only by Hurricane Wilma in 2005 and Hurricane Gilbert in 1988. This hurricane caused $106 million+ (2016 USD) worth of damage in the Florida Keys.

In commemoration of this historic hurricane, our office Twitter account, @NWSKeyWest, issued 28 real time tweets on the first and second of September of 2015, documenting the events leading up to landfall, and of the devastation caused by the Labor Day Hurricane of 1935. We were also active on Facebook (www.facebook.com/NWSKeyWest), with several posts regarding this destructive hurricane. We conducted a live interview with the Weather Channel on September 2 regarding this historic hurricane. We participated in an 80th anniversary symposium at the Keys History and Discovery Center in Islamorada also on September 2. Presenters included Florida Keys National Weather Service (NWS) Meteorologist-in-Charge Matt Moreland, former National Hurricane Center Director Max Mayfield, and local historian Jerry Wilkinson, who studied the Labor Day Hurricane of 1935 for decades and worked to establish individual markers for veterans who perished in this hurricane.

We work to maintain close ties with a wide range of partners, including local, county, and regional emergency managers; and the Monroe County Tourist Development Council, which provides official NWS hurricane updates to hotels and resorts in the Florida Keys. These strong relationships and our teamwork-oriented approach ensure that decision makers remain vigilant against the prospect of another devastating hurricane making landfall in the Florida Keys.

On the right, is the Florida Keys Memorial "dedicated to the memory of the civilians and war veterans whose lives were lost in the Hurricane of September Second 1935." Photo courtesy of Krizia Negrón taken on September 2, 2015.

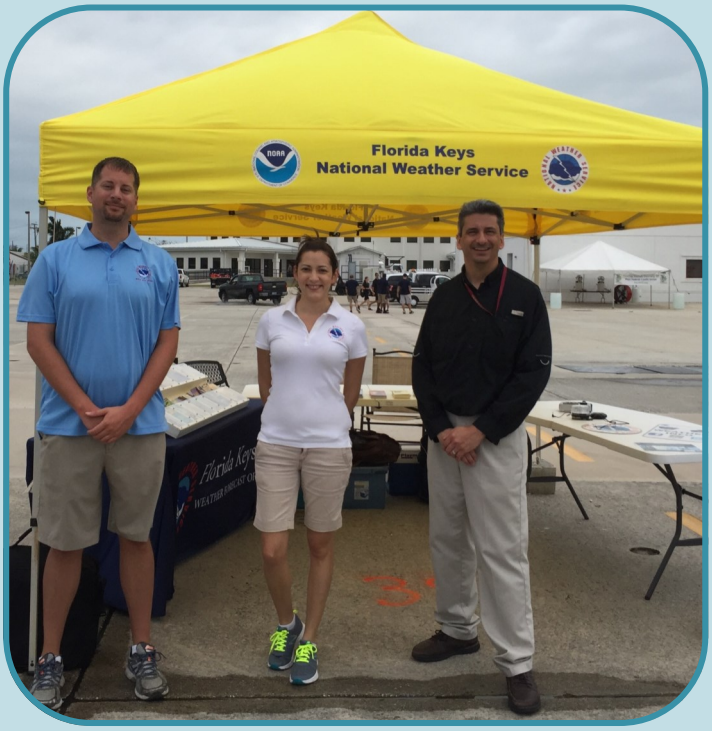
A Busy Outreach Weekend

By: Krizia Negrón

During the first weekend of April 2016, the staff of the Florida Keys National Weather Service stayed busy by doing one of our main core missions: spreading awareness information to our residents and visitors. On Saturday, April 2, two simultaneous outreach events occurred in the Lower Keys, one in Key West and one at Boca Chica Field. The 7th Annual Mote Marine Florida Keys Ocean Festival & Watercraft Show was held at the Florida Keys Eco-Discovery Center in Key West. During this festival, the public had the opportunity to learn about how to protect our natural resources, like coral reefs and marine animals. Meteorologists Chip Kasper, Brandon Fling, and Krizia Negrón interacted with visitors and showcased the services our office provides to the local community and mariners.

We staffed a second outreach tent both Saturday and Sunday at the Southernmost Air Spectacular air show at the Naval Air Station, Boca Chica Field. Civilian and military personnel, including the US Navy Blue Angels, performed aerobatic acts for the enjoyment of visitors of all ages. Meteorologists Matt Moreland, Jon Rizzo, Stephen Chesser, David Adam Futterman, Brandon Fling and Krizia Negrón were available to assist the public with their preparedness actions and current forecast questions.

Our office takes pride in all the available outreach opportunities across the Florida Keys. If you haven't been able to meet us, monitor our Facebook and Twitter pages as we always announce where you could find us next!



Left: Meteorologist Chip Kasper and the mascot from The Turtle Hospital at the 7th Annual Mote Marine Florida Keys Ocean Festival & Watercraft Show.

Right: Meteorologists Brandon Fling, Krizia Negrón and Jon Rizzo at the Southernmost Air Spectacular.

Learning Media Techniques for Crisis Situations

By: Krizia Negrón

On March 24, 2016, the Florida Keys National Weather Service (NWS) office in Key West had the opportunity to host a crisis communications and media response course conducted by media expert Mr. Richard Brundage. Federal, state, and local partners were in attendance, including the Mayor of Key West, the recently selected Monroe County Emergency Management Director, and the Emergency Management Planner.

As part of the course, attendees learned techniques on how to handle media requests during crisis situations that any agency or corporation might find invaluable. Mr. Brundage shared his stories of good and bad scenarios he has encountered through his career as a tv presenter and trainer. The attendees were then separated into groups with similar backgrounds and given a fictional case study. Each group had to come up with different ways to properly and honestly handle any media requests. This one-day workshop enabled the staff of Florida Keys NWS to engage and thrive in possible uncomfortable scenarios, as our staff regularly handles over 100 media interviews per year, covering many different topics.

Over 20 people from Florida Keys NWS, federal, state and local and agencies participated in the "Hi-Touch Communications in a Hi-Tech Era, Crisis Communications & Media Response Training for Today's Leaders" workshop conducted by Richard Brundage, President of Center for Advanced Media Studies. Photo by Brandon Fling.

Florida Keys NWS Partners with SKYWARN to Protect Local Communities

By: Jon Rizzo

When hazardous weather threatens the Florida Keys, meteorologists at your local National Weather Service (NWS) office partner with SKYWARN storm spotters. SKYWARN storm spotters form a volunteer corps of specially-trained weather observers who help enhance local public safety by accurately reporting weather observations and storm damage directly to their local NWS office.

In contrast with the SKYWARN program's organization in the early 1970s, today around 290,000 trained volunteer weather observers nationwide help serve to identify and report the 10,000 severe thunderstorms, 5,000 floods, and 1,000 tornadoes that on average impact the United States each year. The reports provided by these volunteer storm spotters are used in combination with Doppler radar, automated weather observations, and meteorologist experience to provide more timely and accurate severe weather warnings. With more accurate warnings, emergency managers, first responders, and the public will have more time to take necessary actions to protect life and property.

To become a SKYWARN storm spotter, meteorologists at the Florida Keys NWS lead free classes in severe weather observation and reporting. A SKYWARN class typically takes two and one half hours to complete, and covers the basics of thunderstorm development and structure, identification of tornadoes, waterspouts, damaging winds and hail, how to report information, and basic severe weather safety. The volunteers of SKYWARN include fire and police personnel, dispatchers, and utility workers. However, anyone with an interest in public service and a way to communicate with the NWS may become a SKYWARN storm spotter.

Several methods of communication are available for submitting storm reports, including by phone, an internet web page form, Facebook and Twitter, and through a special online communication service called NWSChat. SKYWARN classes are announced on the NWS website at www.weather.gov/keywest, as well as on Facebook and Twitter. Through SKYWARN, you can greatly help the Florida Keys NWS in its mission to protect lives and property in your community.

National Weather Service

Weather Forecast Office

1315 White Street,

Key West, FL 33040

Tel: (305) 295-1316

Fax: (305) 296-2011

Contact Us:

Web: www.weather.gov/key

Email: sr-key.webmaster@noaa.gov

Facebook: NWSKeyWest

Twitter: @NWSKeyWest

1st Edition Editors

Krizia Negrón, General Forecaster

Laura Kasper, Administrative Support Assistant

Andrew Devanas, Science Officer

Christopher Rothwell, General Forecaster

Matt Moreland, Meteorologist-in-Charge

Cover photo: Sunrise at White Street Pier, Key West by Krizia Negrón.