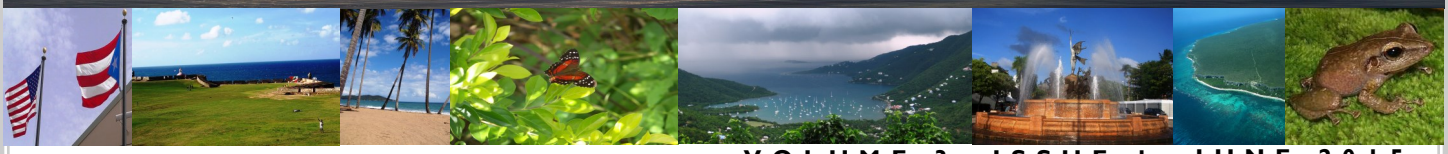
The Whispering Trades

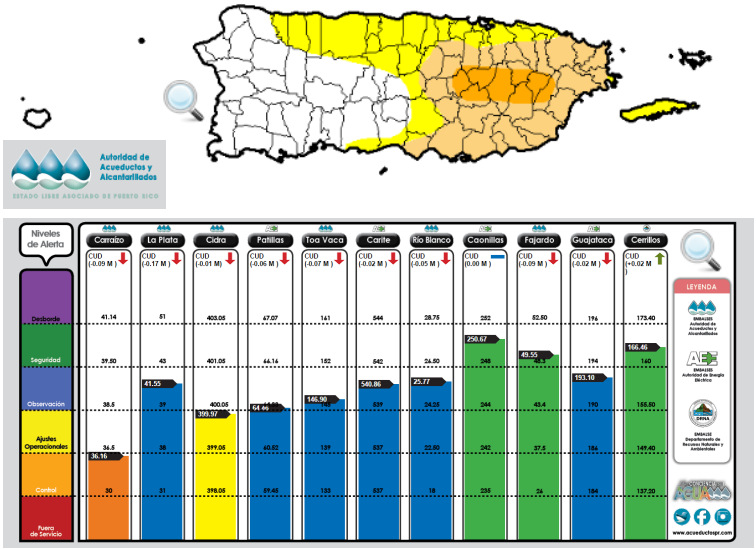
National Weather Service | San Juan, Puerto Rico



VOLUME 3, ISSUE 1 JUNE 2015

Puerto Rico and the U.S. Virgin Islands... in Drought!

U.S. Drought Monitor



Week	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current 2015-06-16	40.73	59.27	34.17	6.40	0.00	0.00
Last Week 2015-06-09	44.91	55.09	29.15	2.97	0.00	0.00
3 Months Ago 2015-03-17	83.41	16.59	0.00	0.00	0.00	0.00
Start of Calendar Year 2014-12-30	96.84	3.16	0.00	0.00	0.00	0.00
Start of Water Year 2014-09-30	81.07	18.93	2.62	0.00	0.00	0.00
One Year Ago 2014-06-17	69.35	30.65	0.00	0.00	0.00	0.00

Population Affected by Drought: **1,556,196**

View More Statistics

Intensity:

- D0 (Abnormally Dry)
- D1 (Moderate Drought)
- D2 (Severe Drought)
- D3 (Extreme Drought)
- D4 (Exceptional Drought)

"When is it going to rain?"

"I have only had a trace of rain in the last three months."- Steve Bullock, St Croix, USVI

Lately, this seems to be the most popular inquiry for WFO San Juan. This summer edition of "The Whispering Trades" will not only enlighten you of the 2015 Hurricane season and other important subjects, but it will also assist you to better understand the term drought and its impacts on society. Throughout the newsletter you will find tips on how to conserve water, keep informed and learn how you can help in times of a drought and how to manage this climatic event.

We hope everyone enjoys our fifth issue of "The Whispering Trades".

INSIDE THIS ISSUE:

Drought, Definitions, Indices and Monitors	2-3	U.S. Coast Guard and WFO San Juan	10	7 years collaborating with Climate Prediction Center (CPC)	12
Fire danger high with extreme dry weather spell during April-May 2015	4-5	WFO San Juan Participated in LANTEX 2015	10	Storm Surge Inundation Meeting held at WFO San Juan	12
Record Breaking February Rainfall in St. Thomas	6	WFO San Juan Supports Puerto Rico Hotel & Tourism Association	10	NOAA's National Water Center in Tuscaloosa Alabama	13
Optimistic, Yet Be Prepared for Hurricane Season	7	NWS San Juan Enhanced the Coastal Water Forecast	11	Learn while having fun!	14
2015 Caribbean Hurricane Awareness Tour (CHAT)	8-9	CoCoRaHS has been expanded to the U.S. Virgin Islands	12		

Drought Definitions, Indices and Monitors

By: Odalys Martinez

Droughts are natural events that occur in nearly all climate zones but with widely variable characteristics. While droughts can be defined as a climate phenomenon, their impacts on humans and the environment can be extreme. Differences in hydro-meteorological variables and socioeconomic factors as well as the stochastic nature of water demands in different regions around the world have become an obstacle to having a precise definition of drought.

Conceptual definitions are formulated in general terms to help people understand. Operational definitions are formulated to identify the beginning, end, and degree of severity of a drought. Droughts are generally classified into four categories based on operational definitions:

Meteorological drought is usually defined on the basis of the degree of dryness (in comparison to some “normal” or average amount) and the duration of the dry period.

Definitions of meteorological drought must be considered as specific to a region since the atmospheric conditions that result in deficiencies of precipitation are highly variable from region to region.

Agricultural drought links various characteristics of meteorological (or hydrological) drought to agricultural impacts, focusing on precipitation shortages, differences between actual and potential evapotranspiration, soil water deficits, reduced groundwater or reservoir levels. Hydrological drought is associated with the effects of periods of precipitation (including snowfall) shortfalls on surface or subsurface water supply (i.e., streamflow, reservoir and lake levels, groundwater). The frequency and severity of hydrological drought is often defined on a watershed or river basin scale.

Socioeconomic - This occurs when physical water shortage starts to affect people, individually and collectively or, in more abstract terms, most socioeconomic definitions of drought are associated with the supply and demand of an economic good. In general, meteorological drought onset is first, followed by agricultural, then hydrological. The sequence is similar for recovery. A number of different indices have been developed to quantify a drought, each with its own strengths and weaknesses.

One of the easiest steps we can take to help mitigate the impacts of drought is conserving water.

Two of the most common indices used to quantify droughts are the Palmer Drought Severity Index (PDSI) and the Standardized Precipitation Index (SPI). The PDSI is a soil moisture algorithm based on precipitation and temperature data, as well as the local available water content of the soil. The SPI calculation is based on the long-term precipitation record for a desired period. Because no single index works under all regimes, a number of drought indices and data are considered to determine the beginning, end, and degree of severity of a drought. Current drought conditions for Continental U.S. as well as Alaska, Hawaii and Puerto Rico are shown on The U.S. Drought Monitor Map.

Drought Definitions, Indices and Monitors

(Cont.)

The U.S. Drought Monitor was established in 1999 and is a weekly map of drought conditions that is produced jointly by the National Oceanic and Atmospheric Administration, the U.S. Department of Agriculture, and the National Drought Mitigation Center (NDMC) at the University of Nebraska-Lincoln. The U.S. Drought Monitor maps are published every Thursday morning at 8:30 am eastern time.

The map is based on measurements of climatic, hydrologic and soil conditions as well as reported impacts and observations from more than 350 contributors around the country. Indices and classification used by the U.S. Drought Monitor are the following:

Drought Severity Classification

			Ranges				
Category	Description	Possible Impacts	Palmer Drought Index	CPC Soil Moisture Model (Percentiles)	USGS Weekly Streamflow (Percentiles)	Standardized Precipitation Index (SPI)	Objective Short and Long-term Drought Indicator Blends (Percentiles)
D0	Abnormally Dry	Going into drought: short-term dryness slowing planting, growth of crops or pastures. Coming out of drought: some lingering water deficits; pastures or crops not fully recovered	-1.0 to -1.9	21-30	21-30	-0.5 to -0.7	21-30
D1	Moderate Drought	Some damage to crops, pastures; streams, reservoirs, or wells low, some water shortages developing or imminent; voluntary water-use restrictions requested	-2.0 to -2.9	11-20	11-20	-0.8 to -1.2	11-20
D2	Severe Drought	Crop or pasture losses likely; water shortages common; water restrictions imposed	-3.0 to -3.9	6-10	6-10	-1.3 to -1.5	6-10
D3	Extreme Drought	Major crop/pasture losses; widespread water shortages or restrictions	-4.0 to -4.9	3-5	3-5	-1.6 to -1.9	3-5
D4	Exceptional Drought	Exceptional and widespread crop/pasture losses; shortages of water in reservoirs, streams, and wells creating water emergencies	-5.0 or less	0-2	0-2	-2.0 or less	0-2

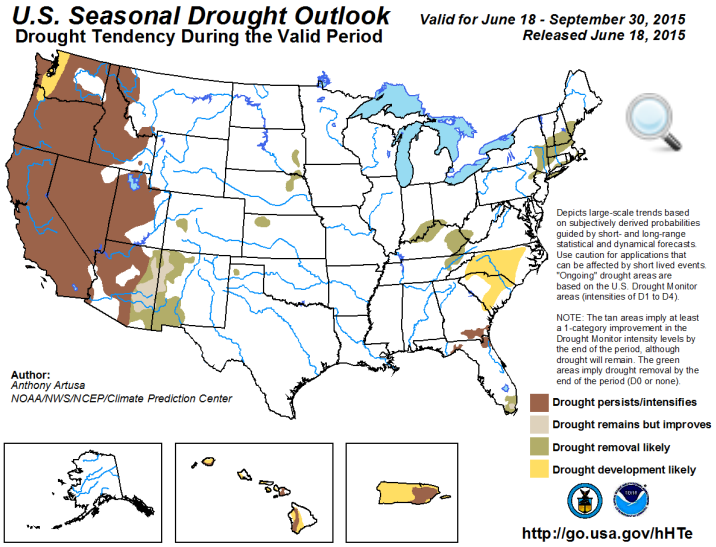
Short-term drought indicator blends focus on 1-3 month precipitation. Long-term blends focus on 6-60 months. Additional indices used, mainly during the growing season, include the USDA/NASS Topsoil Moisture, Keetch-Byram Drought Index (KBDI), and NOAA/NESDIS satellite Vegetation Health Indices. Indices used primarily during the snow season and in the West include snow water content, river basin precipitation, and the Surface Water Supply Index (SWSI). Other indicators include groundwater levels, reservoir storage, and pasture/range conditions.

Use a broom to clean and not a water hose.

Short and long term rainfall deficits are currently observed across most of Puerto Rico. 2015 rainfall deficit, combined with the 2014 deficit has resulted in abnormally dry conditions across most of Puerto Rico with drought conditions across portions of eastern Puerto Rico.

Based on 2014 and 2015 COOP data, deficits between 20 and 40 inches are observed across the coastal areas and the eastern interior of Puerto Rico .

Based on El Niño conditions for this summer, the CPC seasonal outlook, not surprising suggested that drought conditions will persist/intensify by the end of September across Eastern Puerto Rico with drought development likely elsewhere.



Fire danger high with extreme dry weather spell during April-May 2015

By: Robert Mitchell

With hot and dry weather conditions prevailing across most of Puerto Rico and the U.S. Virgin Islands during the latter portions of April and the early part of the month of May, the risk of fire danger became significantly high with several brush and grassland fires occurring. According to reports from the local fire departments and local media, fires were confirmed across portions of northern and the south coastal plains of Puerto Rico and also across Vieques and the East End of Saint Croix. The National Weather Service San Juan office continued to play a significant role in Decision Support Services which included alerting the local fire managers and fire departments and by issuing several Fire Weather statements, watches and warnings.

In previous years, State and Federal partners in PR and the U.S., primarily the U.S. Fish and Wildlife Service, USDA Forest Service, International Institute of Tropical Forestry and PR Fire Corps have requested new and improved fire weather services to alert them to potential dangerous fire weather conditions that could pose a threat to life and property. The National Weather Service WFO San Juan Office provided support and key components which led to being successfully brought on line with a robust Fire Weather program. This program was initiated and implemented by the previous NWS local fire weather focal point, Luis Rosa. Since then, the office has provided Spot Forecasts to assist fire departments in prescribed burns, along with Fire Danger statements and Red Flag Watches and Warnings.

Here is a brief rundown our Fire Weather products:

A **Red Flag Watch** means that critical fire weather conditions are forecast to occur and the issuance of a Red flag Warning is possible.

A **Red Flag Warning** means that extreme and critical fire weather conditions are imminent or occurring and the combination of strong winds, low humidity and warm temperatures all create potential for fire growth. Grass or brush fires that spread have potential to get out of control.

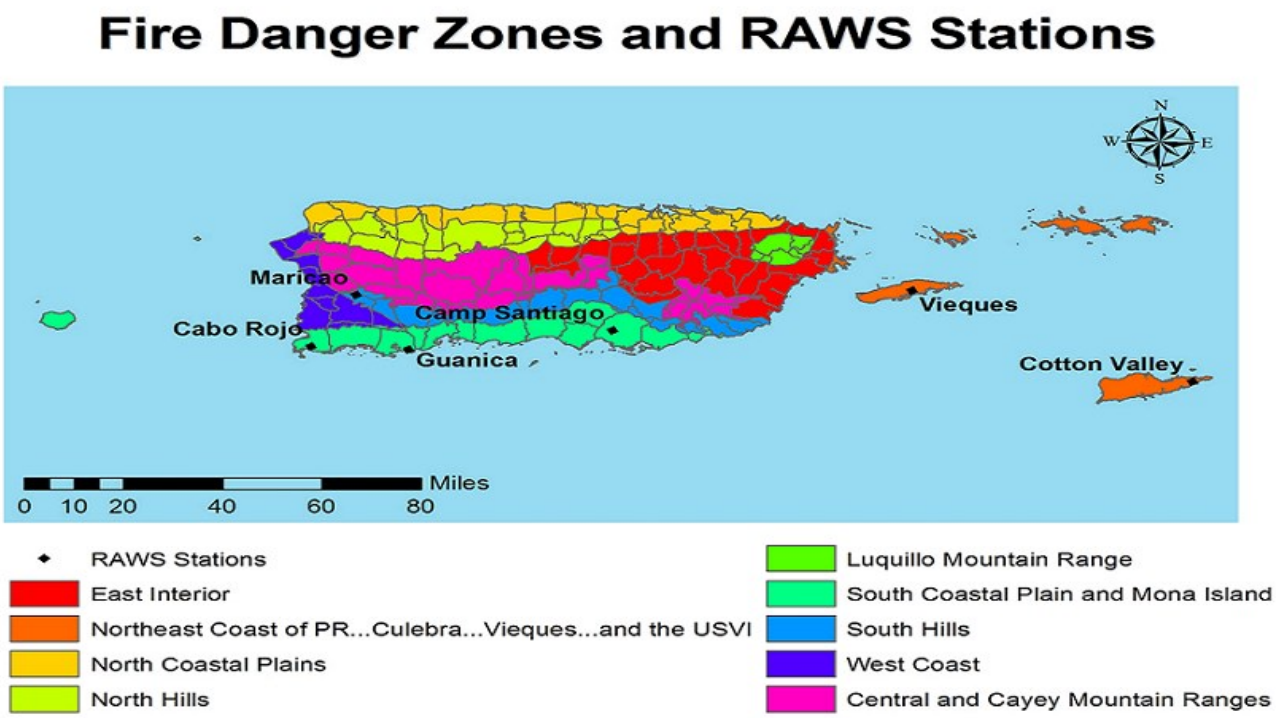
A **Fire Danger Statement** is issued when fire weather conditions are approaching…but not meeting or exceeding…red flag conditions.

Spot Forecasts: are issued by WFOs in support of wildfire management, and natural resource management. These forecasts aid the land management and fire control agencies in protecting life and property during wildland fires, hazardous fuels reduction, and rehabilitation and restoration of natural resources. Spot forecasts are also issued for hazardous materials incidents and other threats to public safety.

Take shorter showers.

Fire danger high with extreme dry weather spell during April-May 2015

(Cont.)



Above is a display of the most recent Fire Danger Zones across Puerto Rico and the Virgin Islands.

Whenever these product are issued… Anyone considering any outside burning should monitor statements from the National Weather Service and from state and local officials before doing so.

Vieques, PR

May 6, 2015

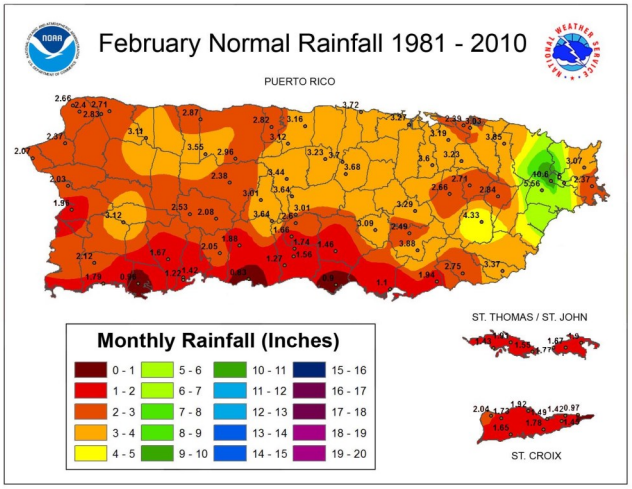
Juncos, PR

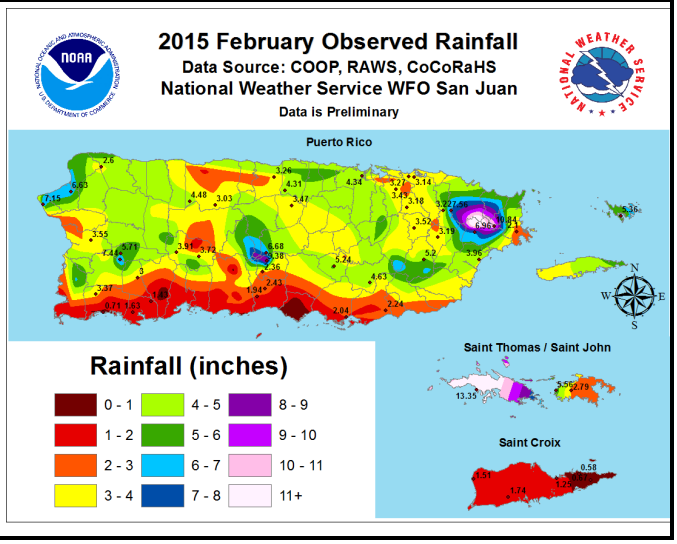
May 6, 2015

Record Breaking February Rainfall in St. Thomas

By: Althea Austin-Smith

February Normal Rainfall versus February 2015 Rainfall





The Automated Surface Observing System (ASOS) rainfall report from Cyril E. King Airport in St. Thomas was a record breaking 13.35 inches for the month of February; 11.92 inches greater than the normal of 1.43 inches. The total was mainly from one very distinct event that was the result of showers that were enhanced by favorable upper air dynamics.

This rainfall occurred late February 13th into early February 14th. Portions of eastern Puerto Rico reported over 8 inches of rainfall during this period but climatologically that was nothing compared to the 11 inches of rainfall on St. Thomas.

Damage reports from USVI Emergency Management (VITEMA):

VITEMA OPERATOR INFORMED 1 UNIT OF HOME
APARTMENT FLOODED AT CLEARVIEW

VITEMA OPERATOR REPORTED WIDESPREAD LOW LYING
AREAS FLOODED ACROSS ST THOMAS ISLAND

STUCK VEHICLE IN A FLOODED ROAD AT ALCONA

VITEMA DIRECTOR CALLED TO INFORMED ABOUT SIGNIFICANT
FLOODING SITUATION AT ST THOMAS...THEY HAD WIDESPREAD FLOODING
AND SEVERAL PROPERTIES WERE FLOODED

FAA TOWER PERSONNEL REPORTED TAXI WAYS AT AIRPORT ARE
FLOODED. OVER 10.94 INCHES HAVE FALLEN IN LAST 13 HOURS

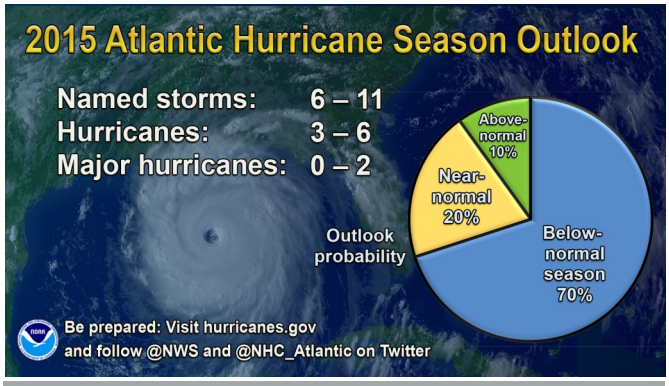
Optimistic, Yet Be Prepared for Hurricane Season

By: Gary Votaw

Several forecasts made over the winter by private companies regarding the upcoming hurricane season varied substantially, with forecasts for the numbers of tropical systems in 2015 both above and below the seasonal normal. However, in recent months, several indicators led forecasters to trend more towards a forecast of low numbers in 2015, especially with the likelihood of a moderate El Nino.

On April 9th, the Climate Prediction Center did issue an El Nino Advisory, stating that there is approximately a 70% chance that an El Nino will persist through this summer and a 60% chance that it will last through autumn. For those in the Atlantic Basin, that is good news in that fewer storms are likely. However, there always remains the possibility, however small, of "the big one" hitting where a lot of people live or where you are.

Therefore, even with this forecast, it is not a reason to get complacent.
While we have already had one 2015 tropical storm (Ana) from May 7th to 10th, that is no sign of the upcoming severity for the season. The 2015 Atlantic hurricane season officially begins on June 1st and continues until November 30th. Below is the NWS Hurricane Season outlook for 2015. Hurricane disasters can occur whether the season is active or relatively quiet.



2014 Atlantic Hurricane Forecast (NOAA)

The table below shows the normal seasonal averages and forecasted numbers from several private companies for named storms (those having sustained winds of at least 39 mph), hurricane (74 mph or more) and major hurricanes (111 mph or more).

It only takes one hurricane (or tropical storm) to cause a disaster. Residents, businesses, and government agencies are urged to prepare for every hurricane season regardless of this, or any other, seasonal outlook. It is also important that one understands the difference between a National Weather Service watch and warning. A tropical storm or hurricane watch means that the conditions specified are possible in the specified area within 48 hours while a warning means those conditions are expected within 36 hours. The times designated are critical elements for preparing for any dangerous weather. Remember, if a tropical storm or hurricane threatens Puerto Rico or the U.S. Virgin Islands, don't wait until the last minute to prepare.

	Normal (seasonal average)	INSMET (Cuba)	The Weather Channel	Colorado State University	Global Weather Oscillations, Inc.
Named Storms	12	8	9	7	10
Hurricanes	6	3	5	3	6
Major Hurricanes	3	n/a	1	1	2

2015 Caribbean Hurricane Awareness Tour (CHAT)

By: Amaryllis Cotto & Ernesto Morales

2015 CHAT

The National Weather Service, emergency management agencies, several media outlets, family and guests all welcomed the 53rd Weather Reconnaissance Squadron in the WC 103J Hercules aircraft on April 24, 2015. Grande Airport in San Juan, PR on April 25, 2015.

The 53rd Weather Reconnaissance Squadron, known as the “Hurricane Hunters”, came to Puerto Rico for the 2015 Caribbean Hurricane Awareness TourAmongst the squadron personnel were Lt. Col. Matthew Muha (Commander), Lt. Col. Jon Talbot (Chief), and Lt. Col. Sean Pierce (Director of Operations). Also, Dr. Rick Knabb (Director of the National Hurricane Center), Dr. Lixon Avila (Senior Hurricane Specialist in the Hurricane Specialist Unit (HSU)), Eric Christensen (Lead Forecaster in the Tropical Analysis and Forecast Branch (TAFB)), and John Pavone (Chief of the Chief, Aerial Reconnaissance Coordination All Hurricanes (CARCAH)) were part of the 2015 CHAT.

2015 Caribbean Hurricane Awareness Tour (CHAT)

(Cont.)

According to the Hurricane Hunters' Association, the primary mission of the 53rd Weather Reconnaissance Squadron (53rd WRS) is to conduct tropical cyclone reconnaissance. When a topical cyclone is beginning to form, the National Hurricane Center will send the 53rd WRS to investigate whether the winds are blowing in a counterclockwise rotation therefore indicating a "closed system. During flight, weather data is continuously collected and sent directly to the National Hurricane Center via satellite communications.

The public had the opportunity to interact with Roberto Garcia (NWS San Juan Meteorologist In-Charge), Ernesto Morales (NWS San Juan Warning Coordination Meteorologist) and other local and state emergency agencies. The Puerto Rico Emergency Management Agency (PREMA) was present with the local and state department, as well as the Port Authority Emergency Management. The Civil Air Patrol and the Puerto Rico Police Department unit, Fuerzas Unidas de Rapida Accion (FURA) also used this tour opportunity to familiarize the public with their aircrafts and helicopter to demonstrate their roles and duties during emergency situations.

Additionally, the Salvation Army actively participated, providing food and water for the public. Like always in these types of events, the Federal Emergency Management Agency (FEMA) participated with local staff educating the public about their mission. Major media outlets were present with live reports and interviews throughout the event. More than 8,000 individuals arrived to participate in the 2015 Caribbean Hurricane Awareness Tour, which purpose was to raise awareness on the impacts of tropical cyclones. The public was invited to experience the logistics and equipment inside the WC-103J aircraft and learn about the roles and duties of the squadron members during the missions.

Here, the public had the opportunity to explore and interact with the squadron and personnel while learning about the details of the mission, as well as the impacts and dangers of tropical cyclones. The planning for this large event began in January 2015 and is a by-product of a multi-agency collaboration which included the Puerto Rico Police department which was responsible for transit control and airplane security at the Isla Grande Airport. PREMA did a fantastic job with all event operations including water distribution, ground transportation and entrance security. Overall, from an operational stand point, the event was a great success and it was a great example of teamwork among all the agencies involved with CHAT 2015.

Dr. Rick Knabb, Dr. Lixon Avila and Eric Christensen took this opportunity to also visit the San Juan Weather Forecast Office and talked with the shift forecasters about current and future products.

We hope this important event can be launched next year in St. Thomas, U.S. Virgin Islands and the municipality of Ponce, Puerto Rico.

U.S. Coast Guard and WFO San Juan

By: Felix Castro

On February 6, Captain Robert W. Warren, the new commander of Sector San Juan visited WFO San Juan for a Familiarization Visit and Office Tour. The marine program leader invited the new captain to talk about current collaboration between NWS San Juan and the U.S. Coast Guard (USCG). During the meeting, the captain learned about NWS operations and the Impact-

Based Decision Support Services (IDSS) custom webpage which was developed specifically to support the USCG operations. At the end of the meeting, the captain awarded the Marine Team, led by Ernesto Rodriguez, with a USCG Recognition Coin for significant contributions to the USCG program, mission and operations.

Use a shut-off nozzle on your hose.

WFO San Juan Participated in LANTEX 2015

By: Felix Castro

On March 25th 2015, a Tsunami Exercise, CARIBE WAVE/LANTEX 2015, took place across our area of responsibility. In collaboration with the FCC and the Puerto Rico Emergency Alert System (EAS) committee, we were able to use a “live product” to activate the “All Hazards NOAA Radio” and the EAS. Registered participants included state, territorial, and local emergency management, government agencies, academic institutions, private businesses and organizations, health facilities, media, as well as communities and individuals. A total of 98,000 people in Puerto Rico, and 4,700 in the U.S. Virgin Islands participated in this exercise.

WFO San Juan Supports Puerto Rico Hotel & Tourism Association

By: Felix Castro

On February 25, 2015 the U.S. National Weather Service Weather Forecast Office San Juan participated in the Puerto Rico Hotel and Tourism Association Security and Safety Meeting held at the Verdanza Hotel San Juan at Carolina, PR. As part of an Impact Decision Support Service, MIC Roberto García, WCM Ernesto Morales and General Forecasters Ernesto Rodriguez and Carlos M. Anselmi-Molina presented the Surf Zone Forecast to the hotel administrators, emergency managers and security officers of the San Juan Metropolitan area.

The purpose of the meeting was to help them understand the dangers for beachgoers in order to reduce the amount of drownings off the northern coast of Puerto Rico.

NWS San Juan Enhanced the Coastal Water Forecast

By: Ernesto Rodriguez

The Coastal Waters Forecast (CWF) is a tool for planning purposes to support and promote safe transportation across the coastal waters. The main components of the CWF product are prevailing winds, significant wave height (the average height of the highest one-third waves), weather and swells (when they impact the regional waters).

Marine customers such as port authorities, harbor masters and dock managers, marine transportation activities: ferries, shippers and tankers, commercial fishermen, cruise ship operators, environmental resource managers; coastal hazard and emergency managers; tourism recreation planners and academia frequently use our CWF in their daily operations.

This diverse audience sometimes needs additional information about the sea state to develop their plans. In order to fulfill their needs and to improve our marine services, the National Weather Service Forecast Office in San Juan has enhanced the information included in the Coastal Water Forecast.

The new components are wave period (time that elapses between the pass of successive waves) and the average height of the highest 10 percent of waves (theoretically calculated using Rayleigh Distribution). The wave period and the highest 10% of the waves in the CWF product provide a more descriptive and accurate assessment of the wave field expected for any particular time across a given marine zone. User knowledge of this information could reduce the number of marine accidents at sea, saving lives.

The old Coastal Water Forecast looks like this:

```
.TONIGHT...EAST SOUTHEAST WINDS 13 TO 18 KNOTS. SEAS 3 FEET.
SCATTERED SHOWERS AND ISOLATED THUNDERSTORMS THROUGH THE NIGHT.
```

The enhanced Coastal Water Forecast looks like this:

```
.TONIGHT...EAST WINDS 10 TO 15 KNOTS. SEAS 2 TO 4 FEET WITH
OCCASIONAL SEAS UP TO 5 FEET. DOMINANT PERIOD 7 SECONDS. ISOLATED SHOWERS.
```

The “OCCASIONAL SEAS” phrase is referring to the average height of the highest 10% of waves.

Turn water off when brushing teeth and soaping hands.

*These additions are part of the routine marine forecast provided online at www.weather.gov/sju/?n=marine01 and broadcast over NOAA Weather Radio All Hazards.

CoCoRaHS has been expanded to the U.S. Virgin Islands

By: Althea Austin-Smith

"The U.S. Virgin Islands is now participating in the Community Collaborative Rain, Hail, and Snow (CoCoRaHS) Network." CoCoRaHS officially began in the U.S. Virgin Islands in April 2015.

http://www.ncdc.noaa.gov/news/cocorahs-us-virgin-islands

In March, it was announced that the White House had joined the CoCoRaHS network so it seems that the community which has over 20,000 participants continues to grow. The NWS San Juan's CoCoRaHS program now has a total of approximately 40 observers across the islands - and growing.

https://twitter.com/nwssanjuan/status/595286811418570752

Kudos to the CoCoRaHS team at NWS San Juan.

Use washing machines for full loads only and purchase a high-efficiency clothes washer. (You can save 20 gallons per load!)

7 years collaborating with Climate Prediction Center (CPC)

WFO San Juan has been translating into Spanish CPC/NCEP/NWS ENSO diagnostic discussions for the last 7 years. Five staff members at WFO San Juan, PR rotates each month to do the translation. The staff members consist of HMT Rosalina Vázquez, General Forecasters, Jesús Figueroa, José Alamo, and Carlos Anselmi and Lead Forecaster, Félix Castro.

ENSO diagnostic discussions are done by CPC on a monthly basis to address the current oceanic and atmospheric conditions in the Pacific and the seasonal climate outlook. This effort has increased the interest in ENSO events among Spanish speakers throughout the Nation as the National Weather Service continues in its effort to support all customers.

Storm Surge Inundation Meeting held at WFO SJU

On February 20, 2015, a multi-agency group including representative from U.S. Geological Survey (USGS), Federal Emergency Management Agency (FEMA), Puerto Rico Emergency Management Agency (PREMA), University of Puerto Rico at Mayagüez, Sea Grant PR and National Weather Service Weather Forecast Office, San Juan participated in a meeting held at the NWS San Juan office. The main purpose of this meeting was to establish Storm Surge Benchmarks for the HOBO data logger sensors along the coastline of mainland Puerto Rico. This effort is a continuation of the NOAA in the Southeast and Caribbean (SECART) Storm Surge Measuring Workshop held on the January 30th, 2015 in Miami FL.

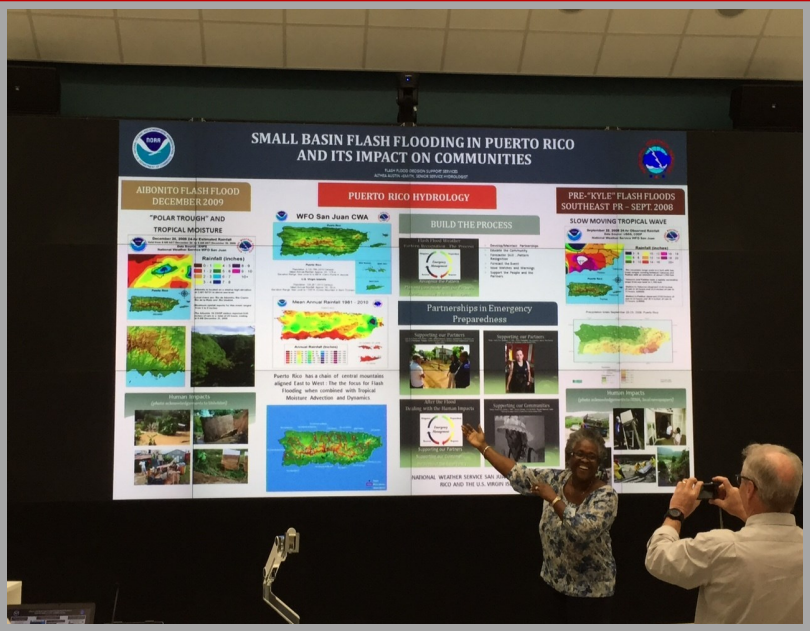
NOAA's National Water Center in Tuscaloosa Alabama

By: Althea Austin-Smith

The week of May 13th 2015, the National Weather Service (NWS) hosted a National Hydrology Program Managers Conference at the newly constructed National Water Center, on the campus of the University of Alabama in Tuscaloosa Alabama.
This conference brought together Weather Forecast Offices' operational staff with the hydrologic research and development scientists from

both within and external to the Agency, where they were able to interact and share ideas. There were presentations from NWS Leadership, our partners, customers and social scientists who had an opportunity to share ideas of how we could better serve them by tweaking the way our information, data and forecasts are currently presented.

The week was a big reunion for many and it affirmed the passion that this group has for hydrology in the NWS.



THE NATIONAL WATER CENTER

The NWC is the "First national water resources facility in the country that will serve as a catalyst for the Integrated Water Resources Science and Services (IWRSS) partnership, or IWRSS". We were given the opportunity to tour the center during an evening "eposter" session and were able to truly appreciate the uniqueness of this state of the art facility.

NWS Learn While Having FUN!

FACT CHECK

1. Water covers more than _____ % of our earth and is found in oceans, lakes, rivers, and even frozen in ice caps and glaciers, and underground.
   a. 80 **b.** 97 **c.** 50
2. _____ % of the earth's water is saltwater – which people and animals cannot drink, and is not good for many plants. That leaves _____% freshwater!
3. **True or False?** Of the remaining 3% of freshwater, nearly 75% of that is frozen in ice caps and glaciers.
4. _____% of water use happens in the bathroom. Average toilets can use up to _____ gallons of water per flush!

WORD SEARCH

DROUGHT

WFO San Juan

O N I N L E P D K Y P Q T D T Y C R
R T D Z X B B M Z N L T Z T M L W B
D A U S D R O U G H T M O N I T O R
M T I Z O K L X Z D Y L D M X N T Z
D E Y N T C W V X G A J A Y Y T L V
R T T T F R I R R R T T V R X A T W
O Z W E J A K O U R E R D J C D J Y
U B V B O D L T E P S Y T I Z M B K
G M J Z D R L L H C L E G L Y L T J
H V Q X L U O E D L O O C W J W L M
T R N G C W N L A E L N R I Q Y K Y
S P M I M O Y M O O F D O D D D J G
P J R P M M R B R G R I Y M W N Z J
B G X E N O K D N T I N C X I T I Z
A T N Z N W Y N D N T C M I R C N J
Z O T B V H V J J D L M A P T R M Z
N R A N B J X B Z G P D B L J S N N

DROUGHTS
CLIMATE PHENOMENON
METEOROLOGICAL
AGRICULTURAL
HYDROLOGICAL
SOCIOECONOMIC
INDICES
US DROUGHT MONITOR
RAINFALL DEFICITS
ABNORMALLY DRY
EL NINO

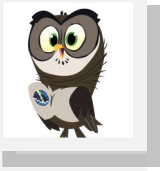
Did you know?

Only .003% of water on Earth is freshwater available for human consumption.

For more information access:

http://www.fema.gov/media-library-data/0154df364fd2da3fdd2a1001a97fd0e9/FEMA_FS_drought_508.pdf

Did you know?



Did you know that there are a lot of fun meteorology activities for kids to do during their summer vacation? Many of our cooperating agencies have kids' activities. These are just a few and they are FREE!

From the NWS: www.youngmeteorologist.org/game/index.html

From UCAR: http://eo.ucar.edu/webweather/

From the USGS: http://education.usgs.gov/kids/

From FEMA: http://www.ready.gov/kids/games

From NASA: http://climatekids.nasa.gov/

If you would like some more fun stuff for the summer for your kids … search around the web. You might just be surprised at what goodies you might find.

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ANSWERS
(1) A
(2) 97%; 3%
(3) True! See why it's a limited resource?
(4) 45%; 7 gallons. That's why you should not flush unless necessary during a drought!