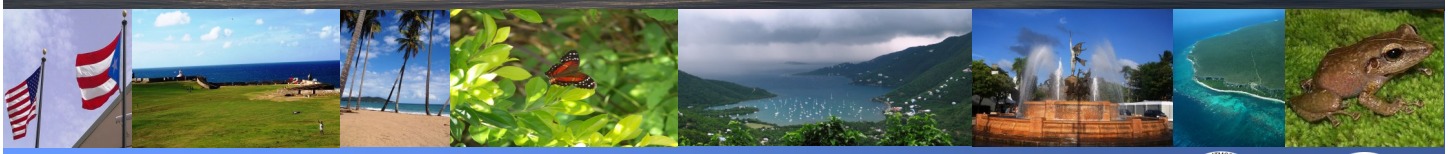
The Whispering Trades



VOLUME 2, ISSUE 2

DECEMBER 2014

National Weather Service | San Juan, Puerto Rico

From the Desk of the Meteorologist In Charge

By: Roberto García

"Happy Holidays!"

As the Meteorologist-In-Charge of the National Weather Service Forecast Office in San Juan, Puerto Rico, it is always an honor to serve the Puerto Rico and U.S. Virgin Island residents and visitors. I believe we can all agree and be thankful that the 2014 hurricane season was significantly quiet for the eastern Caribbean. However, it was not uneventful. We experienced the relatively minor impact of a developing tropical cyclone, Tropical Storm Bertha during the first week of August, whose associated rainfall turned out to be somewhat of a relief to the prevailing drought conditions during the first half of 2014. We also experienced the threat of a major hurricane, Hurricane Gonzalo, which reminded us that even as late as mid-October; we can be threatened by one of these systems. Fortunately, Gonzalo changed its path resulting in no significant impact to our local area. The Atlantic 2014 Hurricane Season is now over, and we are in our way to the driest and coolest portion of the year, December through March. During this part of the year, we are more focused on the festivities and weather conditions tend to be relegated to second place. However, this season is also the season when large northerly swells, generated by powerful North Atlantic winter storms, begin to reach and impact the north coasts of the U.S. Virgin Islands and Puerto Rico. These large swells, not only result in high surf conditions, but could also result in coastal flooding, beach erosion and deadly Rip Currents. Rip Currents are responsible for an excess of 30 deaths across the U.S. Virgin Islands and Puerto Rico each year. Even experienced and strong swimmers are not exempt from being affected or even killed by these treacherous submarine currents. In trying to achieve our mission of saving lives and protect property, here at the National Weather Service Forecast Office in San Juan, we continue to strive to provide timely and effective advisories and warnings to our customers. This season, the beachgoers in Puerto Rico and the U.S. Virgin Islands will be able to count on a new product, the Surf Zone Forecast (SRF). With this product users will not only have access to expected weather conditions on selected beaches across the U.S. Virgin Islands and Puerto Rico, but also, and most importantly, to Rip Current hazards. Of course, no amount of information, advisories or warnings would be effective if people do not heed them. This year I invite you to celebrate responsibly with your relatives and keep aware of the latest weather and beach conditions and forecasts by visiting our webpage at weather.gov/sju. You can reach us also through our Facebook page at facebook.com/NWSSan Juan, and on Twitter at twitter.com/NWSSan Juan. I hope you find the following articles in this 2014 winter (holiday) version of WFO San Juan Newsletter informative.

INSIDE THIS ISSUE:

Preliminary 2014 Hurricane Season	2
"The Surf Zone Forecast"	3
Portugues Dam dedicated in 2014	4-5
Climate Review for PR and USVI	6-7
Rip Currents	8
PR Drought Comittee	9
Did You Know?	10

Preliminary 2014 Hurricane Season

By: Gary Votaw

Before the 2014 hurricane season began, various organizations forecasted how many hurricanes and tropical storms would occur. Table 1 shows the numbers as shown in our June newsletter but updated to include the numbers of storms that occurred (up to November 15) in each category. The forecasts were very good even though the expected primary reason for the below normal forecast (El Nino) has not quite developed. Figure 1 shows a preliminary tracking chart from the National Hurricane Center (NHC).

There was one hurricane (Gonzalo) to affect the Puerto Rico and U.S. Virgin Island forecast region this season, also one tropical storm (Bertha) and one strong tropical wave which eventually became Hurricane Cristobal once northeast of the Bahamas. It was the tropical wave that produced the most rainfall and flooding for Puerto Rico.

Table 1. Pre-hurricane season forecasts updated with verification (as of Nov. 15).

2014	Normal (seasonal average)	NOAA	Met Office (U.K.)	The Weather Channel	Colorado State University	Verified (as of Nov. 15)
Named storms	12	8-13	7-13	11	9	8
Hurricanes	6	3-6	3-9	5	3	6
Major Hurricanes	3	1-2		2	1	2

Bertha resulted in tropical storm watches and warnings issued for the local area from July 31 to August 2. It produced wind gusts reaching well into tropical storm force, especially over the U.S. Virgin Islands, Culebra and Vieques, with a maximum of 67 mph recorded at Buoy 41051 which is south of St. Thomas. Moisture in Bertha was relatively limited so most of the islands received rainfall of less than two inches, which also limited the strength of the storm. However the interior of mainland Puerto Rico recorded some very high two-day rainfall totals with the highest at 11.11 inches at Lago Adjuntas near Adjuntas. A tropical wave developed into Hurricane Cristobal while moving northward, east of the Bahamas late in August. That was several days after the center of the wave passed the local islands without much wind but it carried copious amounts of moisture which induced heavy rainfall. This wave created the most widespread three-day heavy rainfall and flooding of the season. The heaviest rains occurred on the southern Puerto Rico mountains and south facing slopes. The highest recorded rain was 13.21 inches on the Rio Portugues near Tibes and 9.94 inches of that occurring on the 24th and more than five inches occurred on St. Thomas.

Hurricane Gonzalo was the strongest system to pass through the San Juan forecast area this season. Tropical storm watches and warnings were issued for Puerto Rico and the U.S. Virgin Islands when it was still well east of the Leeward Islands. Warnings were in effect from Oct. 12 until very early on Oct. 14 but a hurricane watch was issued concurrently for the entire area. The only local islands to later have a hurricane warning were St. Thomas and St. John, valid on Monday the 13th which extended into that night. Radar and satellite sensors suggested strong winds as it passed just northeast of Anegada Monday night and then later into the northeast corner of San Juan National Weather Service Forecast Office's marine zone AMZ710. Air Force Reserve reconnaissance aircraft estimated that the hurricane approached major hurricane status (111 mph) as it moved into the open Atlantic that night. Gonzalo was gratefully a near miss for the local area.

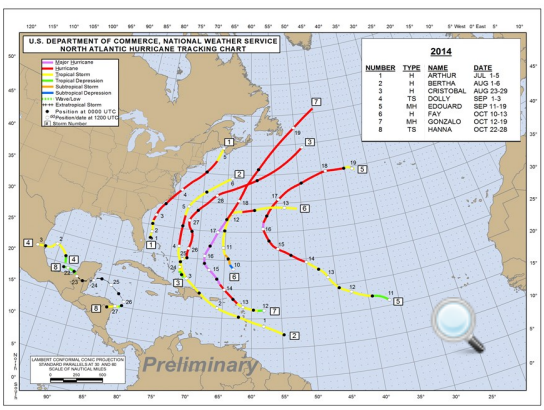


Figure 1. Preliminary Tracking Chart for Atlantic Ocean in 2014 from NHC.

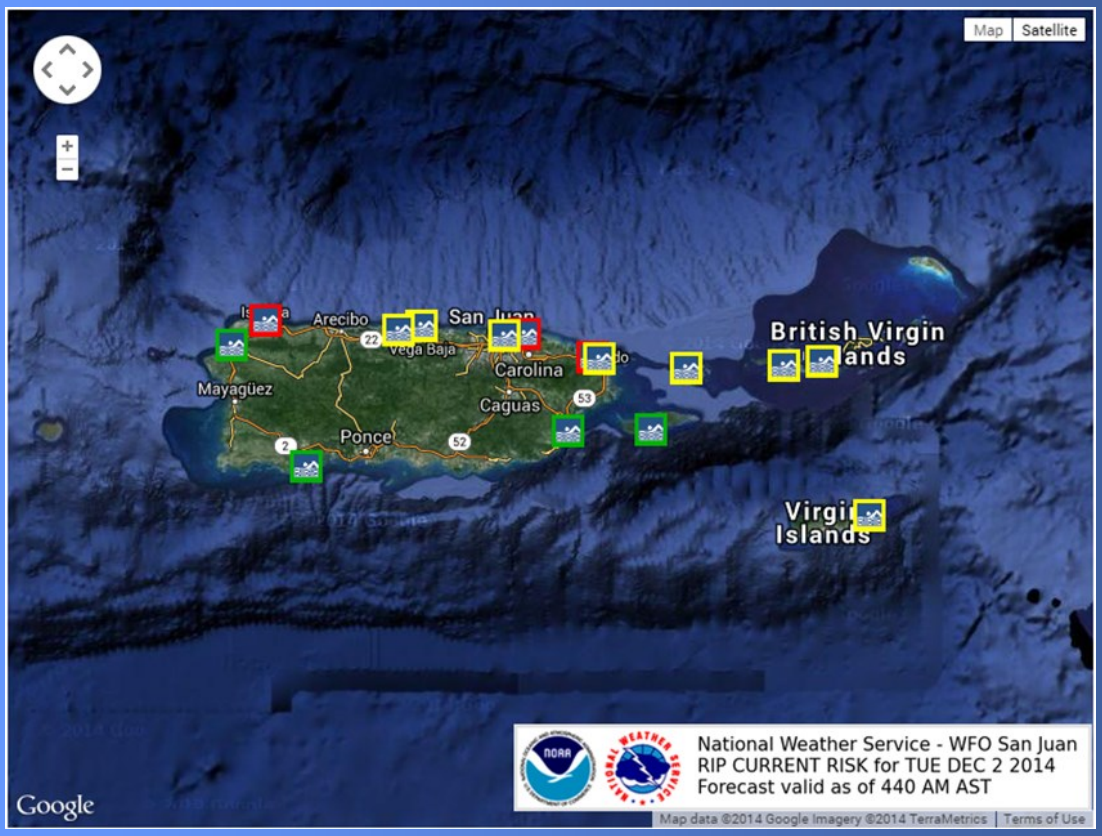
NWS San Juan launches a new beach forecast: "The Surf Zone Forecast"

By: Ernesto Rodriguez

The local swell season started on November 1st and extends until April 30th. During this season, long period swells affect our regional waters several times each month. Although, surfers love these swells, beach goers are at risk due to the accompanying rip currents. These wave induced currents, result in at least 30 reported deaths a year in Puerto Rico and U.S. Virgin Islands. In order to achieve our mission of saving lives, the National Weather Service Forecast Office in San Juan began issuing the Surf Zone Forecast for 15 beaches in Puerto Rico and U.S. Virgin Islands on November 1st, 2014. This product is issued daily.

The Surf Zone Forecast (SRF) provides valuable and life-saving information, pertaining to hazards in the surf zone, to the beachfront community, including the general public and providers of beachfront safety services, such as lifeguards and emergency managers. The SRF product includes the following information for selected beaches in Puerto Rico and U.S. Virgin Islands: location, breaking wave height, rip current risk and forecasts for wind, weather and temperature. Rip current risk in the Surf Zone Forecast uses the following 3-tiered text qualifiers: low risk, moderate risk and high risk. This effort is the result of the collaboration among NOAA partners including: National Weather Service Forecast Office in San Juan (NWS-SJU), Caribbean Coastal Ocean Observing System (CariCOOS) and Sea Grant Puerto Rico.

In summary, before you venture out to the beach, check the latest Surf Zone Forecast (SRF) at http://go.usa.gov/7U9G



Portugues Dam is "dedicated" and filled in 2014

By: Althea Austin-Smith

The Portugues Dam, which is located in Southern Puerto Rico, just north of Ponce was completed and a dedication ceremony was held Feb. 5th, 2014. The CORPS of Engineers designed this 220 foot, roller compacted concrete (RCC) dam to reduce the impacts of flooding along the Portugues River.

http://media.dma.mil/2014/Feb/12/2000779395/-1/-1/0/140205-A-HQ290-002.JPG - (Photo by John H. Campbell)

Construction was officially completed in December 2013, and the next hurdle was the filling of the dam in order to move into the operational testing phase. The question was how to get "Mother Nature" to provide the rainfall needed to fill the dam.

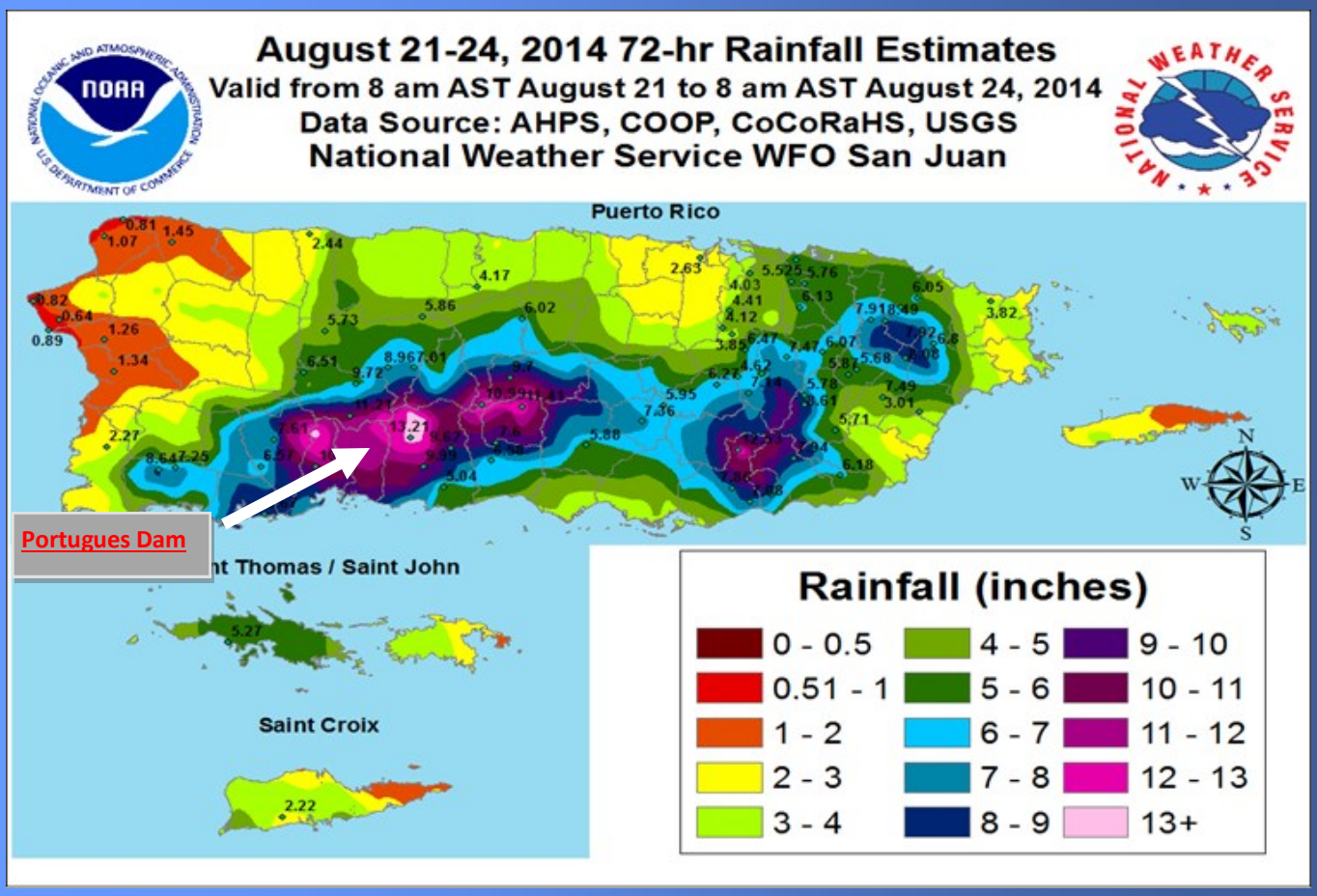
The answer was in a tropical wave that moved through the region toward the end of August which eventually became Hurricane Cristobal after passing through our forecast area. This tropical wave proved to be an efficient "rainmaker" that would provide the runoff to fill the dam which would be a welcome test for its flood operations. By the time the wave exited the region on August 24th, the three day maximum rainfall totals exceeded 10 inches across the Portugues basin with its headwaters in Adjuntas.

Reported rainfall (ins) from Aug.21 to Aug.24, daily totals ending at 1200 UTC (700 am AST) on designated date

Reporting Rain Gage	Aug. 22	Aug. 23	Aug. 24	Total
Rio Portugues near Tibes	0.02	3.25	9.94	13.21
Villalba – Bo Apeadero	0.16	3.08	8.17	11.41
Adjuntas – Lago Garzas	0.01	4.41	6.79	11.21
Ponce below Portugues Dam	0.00	2.10	7.89	9.99
Lago Adjuntas near Adjuntas	0.60	2.78	6.34	9.72
Lago de Matrullas	0.69	2.11	6.90	9.70
Lago Cerrillos at Damsite	0.00	2.66	6.96	9.62

Portugues Dam is "dedicated" and filled in 2014 cont.

By: Althea Austin-Smith



Flood Reported Impacts:

August 23, 306 pm – Ponce, road flooded at Real Anon Sector at Corral Falso.

August 23, 308 pm – Ponce, branches down on PR-10 from Ponce to Adjuntas.

August 23, 418 pm – Santa Isabel, urban flooding downtown.

August 23, 1055 pm – Ponce, flash flood as PR-1 and PR-2 highways were flooded and Rio Inabon was out of its banks.

The CORPS of Engineers data indicated that the initial target filling level was exceeded after this rainfall with no unexpected problems. It is also noteworthy that no major flooding was reported along the Rio Portugues, even with a basin average rainfall of over 9 inches.

2014 Climate Review for Puerto Rico and the U.S. Virgin Islands

By: Odalys Martinez

2014 can be described as a dry year across Puerto Rico and the northern U.S. Virgin Islands. Statistically, based on Cooperative Observer Network Data (COOP), widespread rainfall deficits between 40 and 80% of accumulated normal rainfall were observed from January through July across Puerto Rico (Table 1) as well as Saint Thomas and Saint John. The scenario changed the first week of August when the outer rain bands of Tropical Storm Bertha affected the forecast area. Rainfall accumulations associated with this tropical storm exceeded 10 inches across portions of the Central and Western Interior of Puerto Rico. As August moved into its third week, a second rainfall event took place with rainfall accumulations exceeding 13 inches across portions of the Cordillera Central and the Southern Slopes of Puerto Rico. This rainfall event was the result of a strong tropical wave that eventually became Hurricane Cristobal. Although some relief was noted in terms of percent of accumulated normal rainfall and abnormally dry to drought conditions across most of Puerto Rico, the islandwide rainfall deficit persisted (Table 1). Showers and thunderstorms locally induced by local effects as well as embedded in passing easterly disturbances were noted across Puerto Rico and the US Virgin Islands during the month of September and October. Rainfall accumulations were marginal both months even with the passage of Hurricane Gonzalo across our far northeast Atlantic waters on Tuesday October 14th.

A second round of significant showers and thunderstorms was observed during the first week of November associated with an upper level trough across the Eastern Caribbean. This feature resulted in widespread flooding across Saint Croix as well as portions of the Eastern half of Puerto Rico. Not surprisingly, in the last 75 years of record, 2014 ranks as the 8th driest year. An average rainfall total of 54.92 inches has been measured since January 1st thru December 14th, which is 11.60 inches below normal. In terms of temperature, the islandwide mean annual temperature was 77.6ºF which is approximately 0.8 ºF warmer than the 30-year average from the National Climate Data Center (NCDC). The highest maximum temperature recorded this year was 98ºF at Lajas Substation and Ponce 4E on Tuesday July 29th and Friday August 22nd respectively. The lowest minimum temperature recorded was 49ºF on Monday December 8th at Adjuntas Substation.

In terms of rainfall at the primary climatological data sites, 2014 currently ranks as the 43rd, 15th and 25th driest year on record at the San Juan Metro Area (TJSJ), Cyril King Airport/St Thomas (TIST) and Henry E Rohlsen Airport/St Croix (TISX) respectively. A rainfall total of 54.51, 35.15 and 38.44 inches has been measured at TJSJ, TIST and TISX since January 1st thru December 15th. This is 1.84, 4.19, 0.23 inches below normal. The mean annual temperature at TJSJ was approximately 1.0 ºF warmer than the 30-year average from the National Climate Data Center (NCDC). Statistically, 2014 ranks as the 3rd warmest year on record in nearly 116 years of record keeping at the San Juan Metro Area. Across the U.S. Virgin Islands, the mean annual temperature at TISX and TIST was 81.4 and 81.2 ºF, which is 0.4 above normal and 0.4 ºF below normal respectively.

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
ACCUMULATED	1.85	4.29	6.10	10.18	16.98	18.64	22.11	34.23	41.45	45.74	53.52	54.92
NORMAL ACCUMULATION	4.81	7.47	10.41	15.26	22.47	27.15	32.28	38.50	46.63	54.93	61.80	65.93
% PON ACCUMULATED	38	57	59	67	76	69	68	89	89	83	87	83

Table 1. Puerto Rico percent of normal accumulated rainfall

2014 Climate Review for Puerto Rico and the U.S. Virgin Islands cont.

By: Odalys Martinez

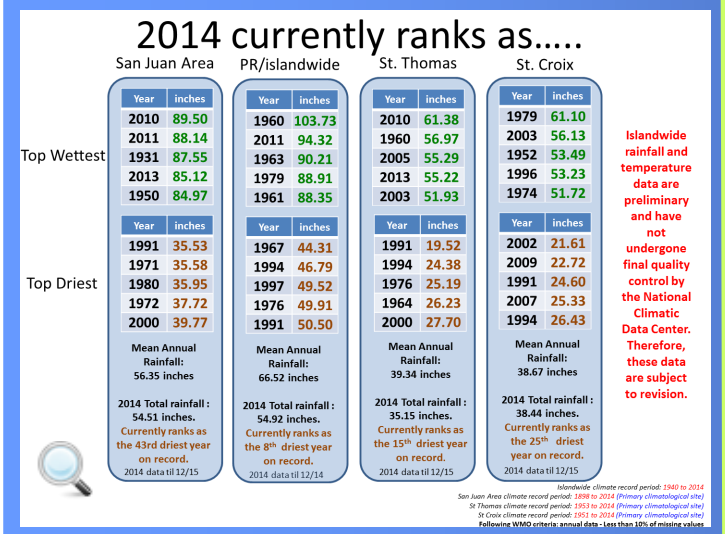
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
ACCUMULATED	1.54	3.74	4.03	4.98	11.01	11.89	13.00	19.79	21.83	24.40	28.19	28.19
NORMAL ACCUMULATION	2.72	4.42	5.89	8.81	12.71	15.25	18.58	22.36	27.70	33.01	39.81	43.55
% PON ACCUMULATED	57	84	68	57	87	78	70	89	79	74	71	65

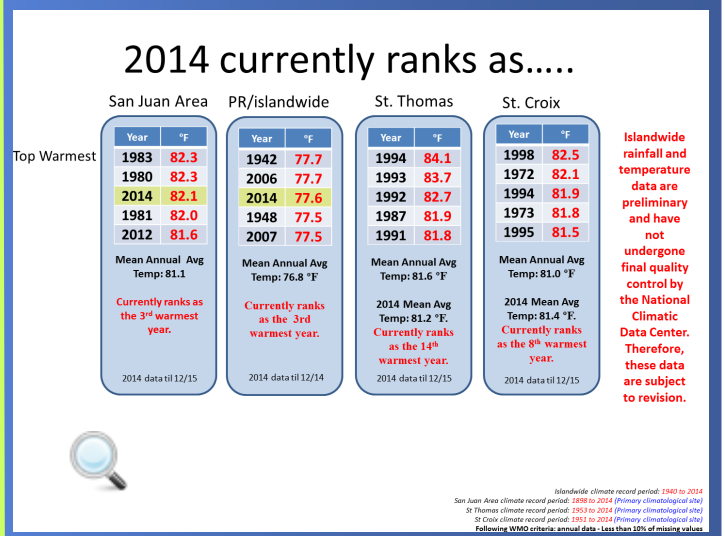
Table 2. Saint Thomas/Saint John Islandwide percent of normal accumulated rainfall

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
ACCUMULATED	1.54	3.16	4.59	8.02	14.56	15.26	16.67	24.53	27.85	31.38	40.18	40.88
NORMAL ACCUMULATION	2.00	3.61	5.13	7.61	11.49	14.08	17.32	20.54	25.51	30.93	36.60	39.58
% PON ACCUMULATED	77	88	89	105	127	108	96	119	109	101	110	103

Table 3. Saint Croix Islandwide percent of normal accumulated rainfall

Note: Islandwide rainfall and temperature data are preliminary and have not undergone final quality control by the National Climatic Data Center. Therefore, these data are subject to revision.





RIP CURRENTS
Did you know?

By: Ernesto Rodriguez

How do rip currents form?

Information source: http://www.ripcurrents.noaa.gov/

Rip currents form when waves break near the shoreline, piling up water between the breaking waves and the beach. One of the ways this water returns to sea is to form a rip current, a narrow stream of water moving swiftly away from shore, often perpendicular to the shoreline.

How big are rip currents?

Rip currents can be as narrow as 10 or 20 feet in width though they may be up to ten times wider. The length of the rip current also varies. Rip currents begin to slow down as they move offshore, beyond the breaking waves, but sometimes extend for hundreds of feet beyond the surf zone.

How fast are rip currents?

Rip current speeds can vary. Sometimes they are too slow to be considered dangerous. However, under certain wave, tide, and beach shape conditions the speeds can quickly become dangerous. Rip currents have been measured to exceed 5 mph, slower than you can run but faster than you or even an Olympic swimmer can swim.

Rip Current Terms– Word Search

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

1. Surf Zone
2. Swell
3. Wind Waves
4. Seas
5. Shoreline
6. Rip Current
7. Wave Height
8. Tide
9. Breaker
10. Runup
11. Backwash
12. Jetty
13. Rip Channel
14. Groin
15. Cusp

Definitions: Rip Current Glossary -
http://www.ripcurrents.noaa.gov/glossary.shtml

Federal and Local Agencies together to establish the Puerto Rico Drought Committee

By: Odalys Martinez

The Puerto Rico Emergency Management Agency (PREMA) and the National Weather Service (NWS) San Juan Forecast Office in collaboration with the Puerto Rico Water Authority (AAA), the Department of Natural Resources (DRNA) and the U.S. Geological Survey (USGS) organized the Puerto Rico Drought Committee in May 2014. This committee was created to address the observed rainfall trends and future projections, as well as to identify action items based on possible drought scenarios. NWS San Juan was responsible for providing historical data, weekly briefings and technical knowledge (Image 1.) in order to discuss rainfall deficits and forecast. Statistically, the dry season was drier than normal as well as most of the wet season, with a drastic decrease observed in the lakes and rivers levels (Image 2). This collaboration between federal and local agencies successfully resulted in a source of reliable information during the decision making process to avoid a major water supply crisis.

Image 1. Weekly Meetings – Technical Discussion

Image 2. Naranjito Brigde. La Plata River. (Image from El Nuevo Dia)

National Weather Service's Mission

""The National Weather Service (NWS) provides weather, hydrologic, and climate forecasts and warnings for the United States, its territories, adjacent waters and ocean areas, for the protection of life and property and the enhancement of the national economy.

NWS data and products form a national information database and infrastructure which can be used by other governmental agencies, the private sector, public, and global community."

Did you know?

Submitted by: Carlos Anselmi

Today we are going to talk about Lightning. We want to know; how is lightning created? Lightning is a giant spark of electricity in the atmosphere or between the atmosphere and the ground. It is the outcome of many complicated processes and can occur within the thunderstorm cloud (Intra Cloud Lightning) or between opposite charges on the ground (Cloud-To-Ground Lightning (CG)) (Figure 1). The violent movement inside the Cumulonimbus cloud creates charge separation, the upper portion of the cloud becomes positive and the lower portion becomes negative (Figure 1). As the electric field becomes stronger, the air mass is more likely to conduct electricity. Cloud-to-ground lightning is divided into two different types of flashes depending on the charge in the cloud where the lightning originates (Figure 1). Each cloud-to-ground lightning flash consists of one or more "leaders" followed by one or more return strokes. The leader is the initial step in the lightning flash and establishes the conductive channel for the electrical discharge (lightning). In other words, exploratory pathways descend from the negative portion of the cloud. In response, the object on the ground produces a positive streamer that stretches upward seeking for connection and this is when the discharge or lightning is observed. That is how lightning is created.

The information was obtained from ALL ABOUT WEATHER KNOWLEDGE CARDS ©GeoNova Publishing, Inc. (www.pomegrante.com) and The National Weather Service Lightning Safety http://www.lightningsafety.noaa.gov/)

Figure 1. Cumulonimbus Cloud with Positive Cloud-to-Ground Flash (top left), Intra-Cloud Flashes (top right) and Negative Cloud-to-Ground (bottom)

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