2011 Year in Review

The year 2011 had weather events that will be remembered for a long time. Two significant tornado outbreaks in April, widespread damage and power outages from Hurricane Irene in August and the second warmest summer on record are among the top stories. The year as a whole was also one of the warmest. Precipitation was above normal in most areas. Snowfall was well below normal for the calendar year.

TORNADOES

Eleven tornadoes touched down in our county warning area on April 16th. Unfortunately, there were some deaths from these touchdowns, 12 in Bertie County, NC and 2 in Gloucester County, VA, both EF3 tornadoes. Significant tornadoes also struck parts of central North Carolina (outside our area). See the following link at our website for details:
http://www.erh.noaa.gov/er/akq/wx_events/severe/apr_16_2011/index.html

The other outbreak occurred soon after the much talked about deadly tornadoes in Alabama. There were four EF1 tornadoes north and west of Richmond on the evening of April 27th. Fortunately there were no injuries or deaths but some good tornado footage was produced. See the following link for more details and tornado pictures:

http://www.erh.noaa.gov/er/akq/wx_events/severe/april27-28_2011/index.html?site=AKQ&issuedby=AKQ&product=LSR&format=CI&version=1&glossary=1&highlight=on

A late season tornado event occurred on October 13th. An EF1 tornado went across a portion of New Kent County and another did EF1 damage in Louisa County at Sylvania Plantation, a historic home built in 1746.

http://www.erh.noaa.gov/er/akq/wx_events/severe/oct_13_2011/index.html

HURRICANES

There were two tropical systems that affected our area. Hurricane Irene struck on August 27th almost rivaling Isabel of 2003 in terms of downed trees and power outages. The center of Irene passed over the southern tip of Currituck County of North Carolina and just east of Virginia Beach. Wind gusts reached near hurricane force over a wide swath extending west to the Richmond area.

http://www.erh.noaa.gov/er/akq/wx_events/hur/Irene/irene_track.jpg

Just over a week later, several days of rain from the 5th to the 9th of September were the result of the remnants of Tropical Storm Lee. Lee came onshore on the Gulf Coast. This system affected many states with heavy rainfall and the highest storm total occurred in our own Westmoreland County, VA, On the Potomac River, Colonial Beach recorded 20.96 inches. Flash flooding was reported across several counties on the evening of September 7th.

TEMPERATURES

Norfolk had their 2nd warmest year on record in 2011. In addition, the summer was the 2nd warmest. At Richmond, the summer was also the 2nd warmest and the year as a whole the 3rd warmest. In both cases, the summers were beaten by the previous year of 2010.

The only month of widespread below normal temperatures was January. Temperatures ranged from 2 degrees below normal at Richmond to 5 degrees below at Elizabeth City. The coldest part of January was from the 22nd to the 24th. On the 22nd, temperatures failed to reach freezing at each of our climate sites. On the 24th, the temperature dropped to 8 degrees at Salisbury, the only single digit reading of the year.

This was followed by a warm February with high temperatures averaging in the low to mid 50s. February featured the first significant 70 degree weather of the 2010-2011 winter with mid to upper 70s reported on a few of the days. The highest was 81 degrees on the 28th at Elizabeth City.

March had temperatures near or slightly above normal. April was much warmer than normal with several days with highs in mid to upper 80s during the last 10 days of the month. For Norfolk, April was the 3rd warmest on record and at Richmond, the 7th warmest on record.

The much above normal temperatures continued through the next several months. Norfolk had the 6th warmest June and 9th warmest July on record. Richmond had its 7th warmest June and 4th warmest July on record. Fairly persistent hot weather began on the 30th of May with periodic events of high temperatures in the upper 90s continuing into early August. High temperatures reached 90 and above on 54 days at Richmond and 43 days at Norfolk. The readings were 95 and above 23 times at Richmond and 16 at Norfolk. Finally, the high was 100 and above on 3 days at Richmond and 2 days at Norfolk. The high for the year was 103 at Norfolk and 102 at Richmond both on July 22nd. Humidity levels (and dew points) ran somewhat higher during the summer 2011 compared with 2010, resulting in unusually warm nighttime temperatures. A low of 81 at Richmond on July 12th was the first ever daily low of 80 and above. A steady southwest wind overnight contributed to this event. A low of 82 on the 22nd at Norfolk tied for second as the highest minimum temperature ever recorded there.

November and December were also much above normal temperature wise. November was the 10th warmest on record at Richmond and the 9th warmest at Norfolk. In December, the average temperature at both Norfolk and Richmond was the 7th warmest on record. At Richmond, there were only 5 days that failed to reach 50. At Norfolk there were only 3 days stayed below 50 degrees, tying the record with several prior years. Finally, a related note, the lowest maximum temperatures for December of 44 at Richmond and 47 at Norfolk are both records. All other Decembers had at least one occurrence when a daily high temperature was lower than these readings.

Ironically, one year earlier, December 2010 averaged 14 to 16 degrees colder than December 2011. In that month, both Richmond and Norfolk had records for the most days with high temperatures below 50 degrees.

RAINFALL

The first half of the year produced abnormally dry conditions along with moderate drought in portions of southeast Virginia and northeast North Carolina. A fire in the Great Dismal Swamp (and others in eastern North Carolina) spread smoke on occasion across much of the area during the early summer. The Dismal swamp fire was virtually put out after Hurricane Irene.

The rainfall from the aforementioned precipitation makers helped to boost the year's rainfall to above normal levels at most locations. Almost eleven inches of rain fell at Norfolk during both July and August, putting 2011 in 9th wettest for those respective months. September rainfall of 8.95 inches at Richmond made it the 7th wettest September on record. Although our records for top 10 events at Salisbury are not complete, it is safe to say that August was one of the wettest for that location with 11.79 inches.

SNOWFALL

After two calendar years of high snowfall, below normal snowfall was recorded in 2011. The big snowfall of the 2010-2011 season occurred in December. The most significant snowfall in 2011 was in southeast Virginia and northeast North Carolina on the 9th and 10th of February, most of it on the morning of the 10th. At Norfolk, snowfall totaled 3.8 inches with this event. There were also 2 to 4 inches of snow across central Virginia to the north of Richmond and into the northern neck on the 27th of January.

No snowfall was recorded in December but it is not uncommon for the last month of the calendar year to go snow free. There were several unofficial reports of sleet to the west of Richmond, including Glen Allen, on the 29th of October.

Annual/Seasonal and Monthly Tables for 2011:

Richmond, VA 2011 Summary Data

	TEMPERATURE				PRECIPITATION				Significance / Remarks	
	ACTUAL			Dep	Total (in)		# Days			
	Max	Min	Avg		Actual	Dep	.01"+	Dep	Temperature	Precipitation
Jan	42.8	25.9	34.4	-3.5	2.48	-0.56	11	1		
Feb	56.5	33.1	44.8	3.9	2.09	-0.66	8	-1		
Mar	58.9	38.4	48.7	0.1	4.28	0.24	12	2		
Apr	73.6	49.9	61.8	3.5	2.63	-0.63	10	0	#7 Warmest	
May	80.0	58.2	69.1	2.7	4.35	0.57	9	-2		
Jun	88.9	67.2	78.0	2.7	3.03	-0.90	9	-1	#7 Warmest	
Jul	92.8	71.1	82.0	2.7	3.63	-0.88	9	-2	#4 Warmest	
Aug	89.5	68.4	78.9	1.4	7.10	2.44	11	2		
Sep	80.6	64.5	72.5	1.9	8.95	4.83	10	2		#9 Wettest
Oct	69.3	49.4	59.3	-0.4	2.79	-0.19	9	2		
Nov	65.0	41.9	53.5	3.0	4.18	0.95	7	-1	#10 Warmest	
Dec	57.1	35.5	46.3	5.3	2.03	-1.24	6	-4	#8 Warmest	
ANNUAL	71.2	50.3	60.8	1.9	47.54	3.96	111	-3	#4 Warmest	
*Winter	46.9	28.0	37.5	-2.5	7.98	-1.08	27	-1		
Spring	70.8	48.8	59.8	2.1	11.26	0.18	31	0	#9 Warmest	
Summer	90.4	68.9	79.6	2.2	13.76	0.66	29	-2	#2 Warmest	
Fall	71.6	51.9	61.8	1.5	15.92	5.58	26	2		#10 Wettest

Detailed monthly data for 2011 for the three main climate sites, Richmond, Norfolk, and Salisbury are shown in the tables below and to the left.

Dep= Departures from the 1981-2010 means. Values are color coded for Temperature: orange (warmer) and blue (cooler) and for Precipitation: tan (drier) and green (wetter).

For Richmond and Norfolk (both of which have a period of record greater than 100 years), monthly, seasonal, and annual rankings are included if they attain top ten status.

Norfolk, VA 2011 Summary Data

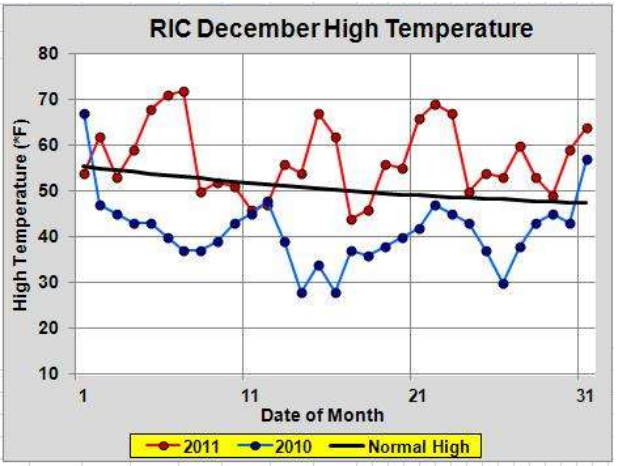
	TEMPERATURE				PRECIPITATION				Significance / Remarks	
	ACTUAL			Dep	Total (in)		# Days			
	Max	Min	Avg		Actual	Dep	.01"+	Dep	Temperature	Precipitation
Jan	42.8	29.2	36.0	-4.4	3.64	0.24	8	-2		
Feb	55.9	35.2	45.6	2.9	2.24	-0.88	10	1		
Mar	57.2	41.3	49.2	-0.2	2.96	-0.72	10	-1		
Apr	73.2	53.5	63.3	5.1	1.21	-2.19	8	-2	#3 Warmest	
May	79.6	60.1	69.9	3.2	1.95	-1.46	9	-2		
Jun	87.2	70.4	78.8	3.4	4.63	0.37	10	0	#6 Warmest	
Jul	90.8	73.7	82.3	2.6	10.89	5.75	10	-1	#9 Warmest	#9 Wettest
Aug	87.0	72.9	80.0	2.0	10.79	5.36	11	1		#9 Wettest
Sep	81.9	67.8	74.9	2.5	7.26	2.51	12	3		
Oct	71.0	53.5	62.2	0.1	2.13	-1.28	6	-2		
Nov	66.0	46.7	56.4	3.5	1.84	-1.31	8	-1	#9 Warmest	
Dec	59.2	41.5	50.3	6.2	1.56	-1.70	8	-2	#8 Warmest	
ANNUAL	71.0	53.8	62.4	2.2	51.10	4.68	110	-7	#2 Warmest	
*Winter	47.1	32.2	39.7	-2.8	8.76	-1.02	28	-2		
Spring	70.0	51.6	60.8	2.7	6.12	-4.37	27	-4		#8 Driest
Summer	88.3	72.3	80.3	2.7	26.31	11.48	31	0	#2 Warmest	#4 Wettest
Fall	73.0	56.0	64.5	2.0	11.23	-0.09	26	1		

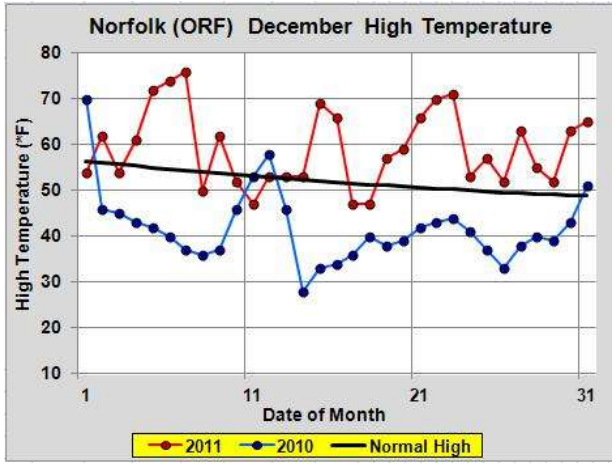
Salisbury, MD 2011 Summary Data

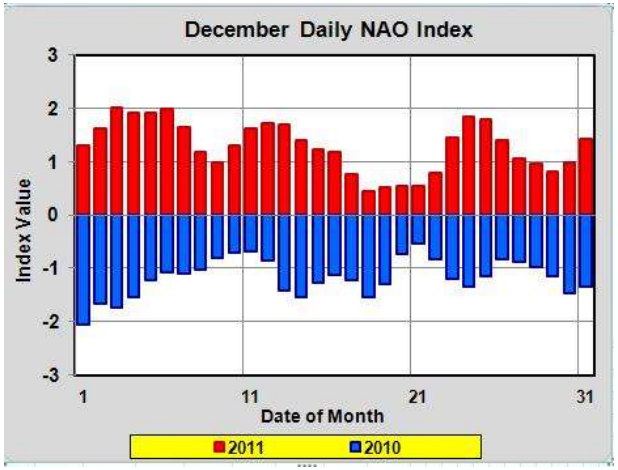
	TEMPERATURE				PRECIPITATION				Significance / Remarks	
	ACTUAL			Dep	Total (in)		# Days			
	Max	Min	Avg		Actual	Dep	.01"+	Dep	Temperature	Precipitation
Jan	39.6	23.7	31.6	-4.0	3.01	-0.59	12	2		
Feb	52.0	28.8	40.4	2.5	1.71	-1.64	9	-1		
Mar	54.1	35.5	44.8	-0.2	3.53	-0.89	12	1		
Apr	69.8	48.5	59.1	4.9	1.70	-1.85	9	-2		
May	78.5	56.2	67.3	4.5	1.68	-1.93	9	-2		
Jun	87.8	64.1	76.0	3.8	1.19	-2.58	14	4		
Jul	92.5	70.4	81.5	4.5	3.79	-0.69	9	-1		
Aug	87.0	66.7	76.8	1.8	11.79	7.38	14	5		
Sep	80.9	64.2	72.5	4.2	4.76	0.78	14	6		
Oct	69.8	48.0	58.9	1.5	2.00	-1.49	11	3		
Nov	64.4	41.4	52.9	4.5	2.31	-1.11	10	1		
Dec	57.0	33.8	45.4	6.2	1.69	-2.02	8	-2		
ANNUAL	69.5	48.4	58.9	2.9	39.16	-6.63	131	14		
*Winter	43.8	25.6	34.7	-2.9	6.02	-4.64	25	-5		
Spring	67.4	46.7	57.1	3.1	6.91	-4.68	30	-3		
Summer	89.1	67.0	78.1	3.4	16.77	4.12	37	8		
Fall	71.7	51.2	61.5	3.4	9.07	-1.82	35	10		

Comparing December 2011 to December 2010

One interesting thing to note about this winter (2011-12) is how different it has been from last winter (2010-11) so far. Looking at the month of December reveals a striking contrast: December 2010 was very cold and snowy, ranking as 7th coldest on record at Richmond and the 4th coldest on record at Norfolk. December 2011 was the 8th warmest on record at both sites. Surprisingly, both winters have the same ENSO conditions (La Nina). However, one significant difference exists: the phase of the North Atlantic Oscillation (NAO). The graph below labeled "December Daily NAO Index" shows that in 2010 every single day of the month experienced the ***negative phase*** of the NAO (which tends to bring colder than average temperatures to the eastern U.S. during the winter months). Conversely, in December 2011, the NAO was in its ***positive phase*** for every day of the month. The results are shown in the daily high temperature graphs: in 2010 nearly every day of the month was colder than average, in many cases by more than 10 degrees. Almost the opposite occurred in December 2011: nearly every day of the month experienced high temperatures that are warmer than average. The images at the bottom of the page show the typical mid and upper atmospheric conditions that occur with the negative phase (left image) and positive phase (right image) of the NAO. In 2011, the positive NAO phase has dominated; with a progressive jet stream and mid-level flow, keeping cold air locked up in Canada and the far northern tier of the U.S.







Source: CPC

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