

# The Wilmington Wave

National Weather Service, Wilmington, NC

VOLUME VI, ISSUE I

FALL 2016



## “See a Flash, Dash Inside!”

-Sandy LaCorte

“When Thunder Roars, Go Indoors”, has been the catchy and memorable safety slogan used by NOAA’s National Weather Service for years, saving lives by educating the scientific fact that if you can hear thunder, you are close enough in proximity to a thunderstorm to potentially be struck by lightning. The only downfall to the widespread utilization and teaching of this slogan is that it relies solely on one’s ability to hear which unfortunately is not accommodating to all individuals.

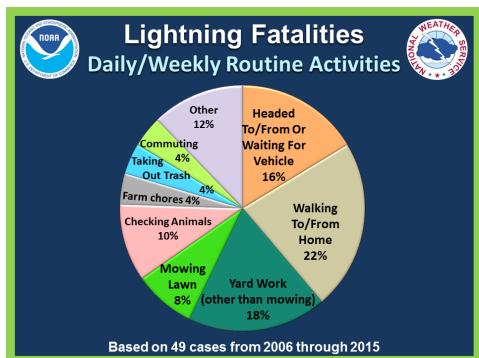
A team made up of National Weather Service employees have worked together over the past year to develop and create a new slogan that individuals within the Deaf and Hard of Hearing community are able to utilize. In June 2016, “See A Flash, Dash Inside!” debuted as the newest safety campaign slogan in efforts to protect more people from lightning strikes. The PSA from NOAA was produced in partnership with experts from Gallaudet University and the North Carolina Division Services for the Deaf and Hard of Hearing.

For more information and to view the new NOAA National Public Service Announcement (PSA) video:

<http://www.noaa.gov/stories/see-flash-dash-inside-new-lightning-safety-slogan-rolls-out>

NOAA’s NWS Lightning Safety: <http://www.lightningsafety.noaa.gov/>

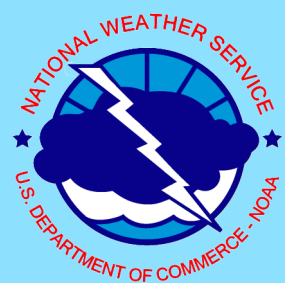
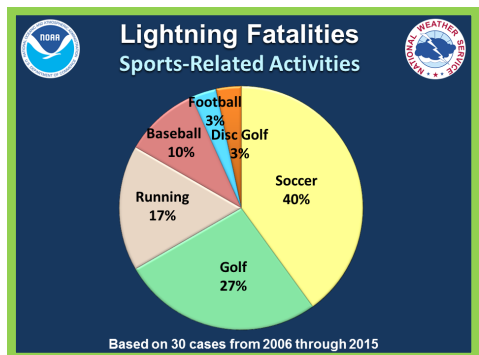
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Left: Lightning Fatality Statistics (2006-2015). Source: NWS Lightning Safety



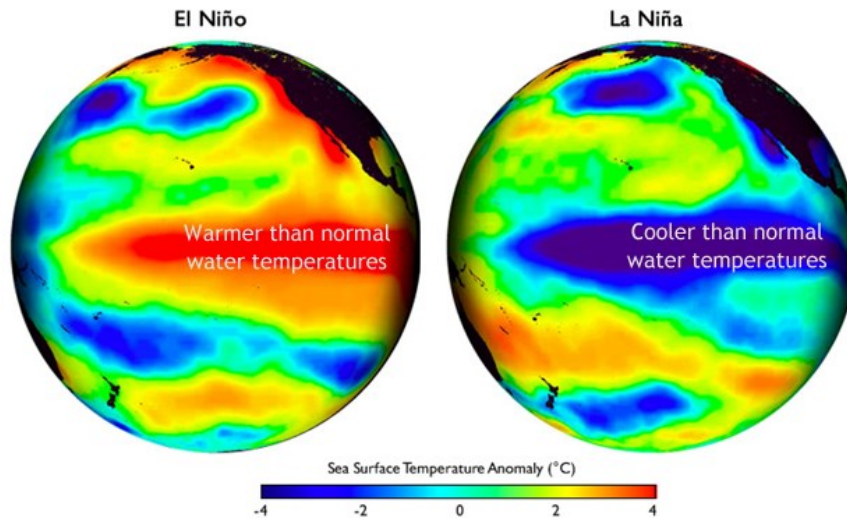
Right: NOAA’s NWS Lightning Safety Slogans



# Winter Outlook 2016-2017

- Tim Armstrong

One of the most powerful El Niños in recorded history provided a very wet winter across the eastern Carolinas last year. December through February rainfall in Florence, SC was the 7th wettest in history at 14.55 inches, and in Wilmington, NC it was the 5th wettest with 17.57 inches of rain. Last winter's El Niño quickly faded away back in the spring. For this upcoming winter the pattern to watch is El Niño's opposite: **La Niña**.



During La Niña, tropical Pacific Ocean temperature anomalies are reversed from those observed during El Niño. Cooler than normal water develops over the tropical East Pacific Ocean, and this suppresses the widespread thunderstorm activity that typically exists there. Instead of frequent storminess and heavy rainfall across the eastern Carolinas, La Niña typically provides the eastern Carolinas with dry, mild days, punctuated by occasional cold arctic outbreaks. The La Niña expected to develop for the winter of 2016-2017 should be a weak one. This means the atmospheric response should also be weak. However, we can still use climate history as a guide to see what we might expect for this winter.

Since 1950 there have been 25 winters with weak La Niña conditions similar to what we expect to see this winter. Among those, 15 also had the Atlantic Multidecadal Oscillation<sup>[1]</sup> in its warm phase as we will have this winter. And of those 15, five had the Quasi-Biennial Oscillation<sup>[2]</sup> in its positive phase as we should also have this winter. Let's look more closely at these five *analog* winters: **1959-1960, 1961-1962, 2001-2002, 2008-2009, and 2013-2014**.

## Rainfall

El Niño and La Niña's largest impact in the Carolinas deals with wintertime rainfall totals. El Niño is typically associated with wetter than average winter weather, while La Niña is associated with drier than average winter weather. Our five La Niña analog winters fit this pattern quite well with observed precipitation totals averaging 20% below normal. In fact, during the 2001-2002 and 2008-2009 La Niña winters, precipitation totals were only half of their normal values! **For the winter of 2016-2017 we are expecting precipitation totals to be lower than normal. Confidence is medium to high.**

	Average Winter Precipitation (1981-2010)	1959 - 1960	1961- 1962	2001 - 2002	2008 - 2009	2013 - 2014	Average of these five analog winters
New Bern, NC	10.93	15.44	8.80	8.15	7.68	8.92	9.80
Wilmington, NC	11.10	11.66	9.03	5.10	6.64	7.19	7.92
Florence, SC	9.10	13.87	9.25	3.65	4.82	10.05	8.33
Charleston, SC	9.74	12.36	6.3	6.32	2.97	7.00	6.99

## Temperatures

El Niño and La Niña episodes aren't consistent in how they affect winter temperatures across the eastern Carolinas. There is a tendency for El Niño winters to have below-normal temperatures and for La Niña winters to have above-normal temperatures, but there are also many exceptions. Examining the five winters we're using as analogs for this upcoming winter, temperatures averaged warmer than normal by one degree or less, but 20-40% of the time winter temperatures were actually below normal. **For the winter of 2016-2017, we expect temperatures to average above normal, however, confidence is only low to medium.**

	Average Winter Temperature (1981-2010)	1959 - 1960	1961 - 1962	2001 - 2002	2008 - 2009	2013 - 2014	Average of these five analog winters
New Bern, NC	46.1	46.3	47.7	49.0	45.7	46.8	47.1 (+1.0)
Wilmington, NC	47.7	46.8	48.5	50.6	48.3	48.0	48.5 (+0.3)
Florence, SC	47.1	46.5	47.8	49.6	47.8	46.6	47.7 (+0.6)
Charleston, SC	50.6	49.1	51.4	53.1	51.3	51.8	51.3 (+0.7)

We can also examine winter temperatures by looking at just the coldest temperature recorded at any point in the winter. This minimum winter temperature can have agricultural impacts for cold sensitive winter field crops like collards, lettuce, spinach, and kale, and can also have infrastructure and sociological impacts if water pipes become frozen or if the power grid becomes overwhelmed by high electrical demand for heating.

Our five analog winters show in most cases the coldest winter temperature was within +/- 3 degrees of normal values for each location, deviating above or below that range an average of 25% of the time. But this is a tiny sample size. **Our outlook is for this winter's coldest temperature to reach near-normal values, but with low confidence.**

	Average Coldest Winter Temp (1981-2010)	1959 - 1960	1961 - 1962	2001 - 2002	2008 - 2009	2013 - 2014	Average of these five analog winters
New Bern, NC	15	19	13	23	15	12	16
Wilmington, NC	16	19	16	23	15	14	17
Florence, SC	15	18	16	19	14	12	16
Charleston, SC	19	20	16	21	19	17	19

In most winters the coldest temperatures occur during short-lived arctic outbreaks associated with a strongly negative phase of the North Atlantic Oscillation (NAO). It is not possible to forecast the phase of the NAO more than 1-2 weeks in advance, and it is unknown what NAO phase will dominate this winter.

## Snowfall

Snow is quite rare across eastern South Carolina, and occurs infrequently enough over eastern North Carolina that standard statistical analysis is difficult. For example, Wilmington's annual average snowfall is 1.7 inches. However, snowfall statistics show we average less than one measurable snowfall event per year. The standard deviation computed for Wilmington's historic snowfall events is much larger than the annual average!

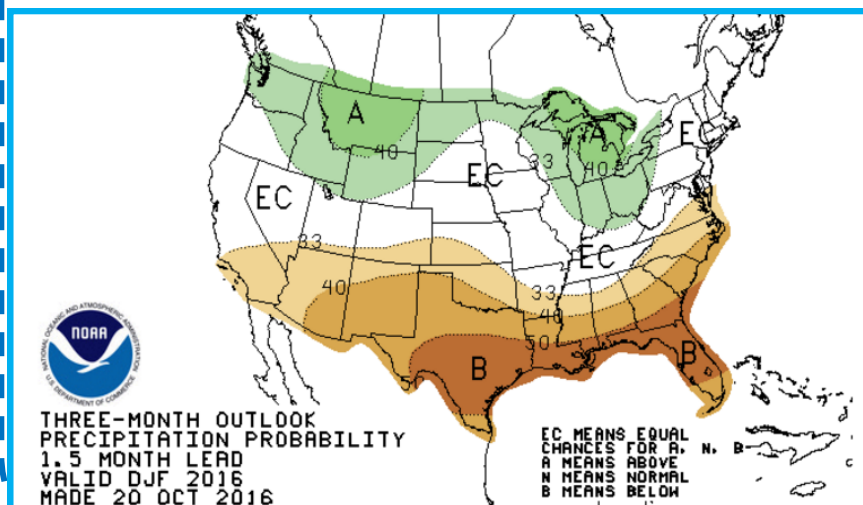
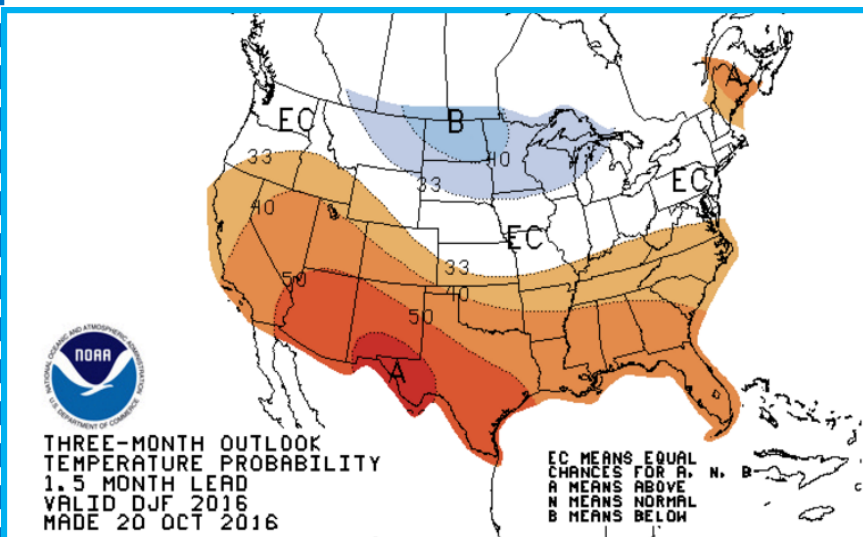
Of the five winters we are using as analogs for this upcoming winter, a simple average shows greater than normal snowfall for most locations in the eastern Carolinas. Charleston, SC is a notable exception. However, that average snowfall statistic is dominated by two or three individual snowstorms that skew the averages sharply upward.

	Average Snowfall November-April (1981-2010)	1959 - 1960	1961 - 1962	2001 - 2002	2008 - 2009	2013 - 2014	Average of these five analog winters
New Bern, NC	1.4	12.0	3.0	7.0 <sup>[3]</sup>	Trace	10.0	6.4
Wilmington, NC	1.7	6.2	3.1	1.8	1.0	1.0	2.6
Florence, SC	1.5	6.2	0.3	4.0 <sup>[4]</sup>	2.5 <sup>[4]</sup>	2.0 <sup>[4]</sup>	3.0
Charleston, SC	0.5	0.5	Trace	Trace	Trace	Trace	0.1

It is interesting that in all five of these analog winters, Wilmington and Florence have received at least some measurable snowfall. This indicates the three climate oscillations we are tracking this winter (La Niña, AMO, and QBO) don't necessarily rule a snowstorm out!

### Official NWS Climate Prediction Center Outlooks

The latest outlooks for this winter from the [Climate Prediction Center](#) show the odds are skewed in favor of warmer than normal temperatures and drier than normal precipitation totals for the eastern Carolinas. These outlooks are updated once per month.



### Footnotes

- [1] The Atlantic Multidecadal Oscillation (AMO) is an approximately 60-70 year cycle in water temperatures over the North Atlantic Ocean. The cycle consists of a ~30 year warm phase followed by a ~30 year cool phase, with impacts noted on Atlantic hurricane frequency and the severity of winter temperatures.
- [2] The Quasi-biennial Oscillation (QBO) is a natural cycle in the direction of equatorial stratospheric winds. A complete QBO cycle averages about 28 months, split between an easterly (negative) and westerly (positive) phase in wind directions. When the easterly phase occurs during winter, it tends to create a weaker polar vortex allowing cold air to more easily dive southward across Northern Hemisphere landmasses.
- [3] New Bern, NC snowfall was missing for the 2001-2002 winter, data was taken from the nearby Trenton, NC cooperative station.
- [4] Florence, SC official snowfall data ended when the ASOS was installed at the Florence airport in 1999. This data is an unofficial extension constructed with help from Meteorologist Frank Johnson at WBTW TV.

# Fall & Winter Hazards: Weather-Ready Nation

With the Atlantic Hurricane Season coming to an end on November 30th and the season of Fall well under way, it's important to be aware and make a plan for the numerous hazardous conditions that are possible through every single season. Are you ready for Fall and Winter weather hazards?

## From NOAA's Weather-Ready Nation

([www.nws.noaa.gov/com/weatherreadynation/](http://www.nws.noaa.gov/com/weatherreadynation/))



As the days get shorter and temperatures fall, a new round of weather hazards are on the rise. This transitional season often features weather hazards seen during both warm and cold months, including hurricanes, wildfires, intense winds, flooding, droughts, early season snow and more.

Get ready for fall weather with preparedness tips from the National Weather Service. Stay safe this fall!. #FallSafety

## Know your Risk, Take Action, Be a Force of Nature!



While dangerous road conditions are one of the most deadly hazards during winter, it's not the only threat you may encounter. Other winter hazards include brutal cold, heavy snow and ice, dangerous flooding, extreme wind, and treacherous fog. #WinterSafety

## Local Coop Weather Observer: 35 Years Dedication



*From NOAA Partnerships: Cooperative Observer Program*

For 120 years, citizens have partnered with the National Weather Service, volunteering their time to provide weather information utilized by forecasters across the United States. As of today, around 10,000 sites are up and running as observers report daily maximum and minimum temperatures, rain and snowfall totals, etc, to local NWS offices each day. Their hard work and dedication is a great public service to local communities and a great asset to weather data history.

**Congratulations and thank you Robert and Cheryl Baker for your 35 years of dedication as Coop Weather Observers for NWS Wilmington NC!**

**For more information about the Cooperative Observer Program:**

[http://www.nws.noaa.gov/om/coop/Publications/coop\\_factsheet.pdf](http://www.nws.noaa.gov/om/coop/Publications/coop_factsheet.pdf)

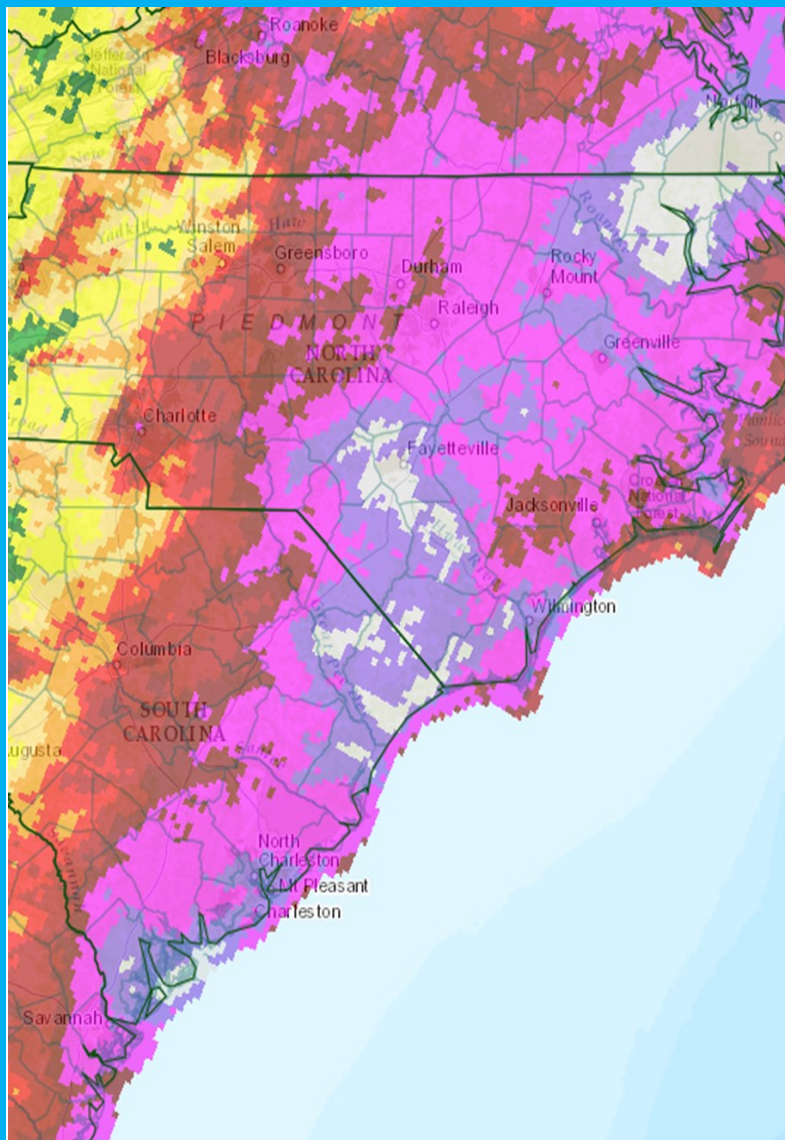
**Interested in becoming a weather observer? [www.nws.noaa.gov/om/coop](http://www.nws.noaa.gov/om/coop)**

# A Look at 45-Day Rainfall Totals

- Tim Armstrong

## September 1 - October 15, 2016

*Including Tropical Storms Julia, Tropical Storm Hermine, and Hurricane Matthew*



	45-Day Rainfall	Return Period
<b><u>South Carolina</u></b>		
North Myrtle Beach	27.77"	100 years
Mullins	26.62"	500 years
Charleston	22.75"	25 years
Florence	22.59"	50 years
<b><u>North Carolina</u></b>		
Plymouth	27.74"	100 years
Williamston	27.33"	100 years
Gum Neck	26.84"	100 years
Fayetteville	26.14"	500 years
Red Springs	24.72"	500 years
Surf City	23.60"	25 years
Castle Hayne	23.54"	25 years
Washington	23.44"	50 years
Greenville	22.64"	50 years
Tarboro	22.56"	100 years
Wilmington	22.54"	10 years
Elizabeth City	22.04"	50 years
Whiteville	21.94"	25 years
Lumberton	19.97"	10 years
<b><u>Virginia</u></b>		
Norfolk	22.88"	100 years

If you add up rainfall from Hurricane Matthew, Tropical Storm Julia, and Tropical Storm Hermine, rainfall totals from September 1st through October 15th are 20-28 inches across large sections of eastern North and South Carolina. In some spots rainfall amounts this large in a 45-day period are only expected to occur only once in 500 years!

# Want to Become a Weather-Ready Nation Ambassador?

- Steve Pfaff

It's no surprise for many that live in southeast NC and northeast SC that we are susceptible to a wide variety of weather impacts. In fact, our part of the country is like no other when it comes to the different hazards we have to prepare for including wind driven wildfires, hurricanes, ice storms, flooding, tornado outbreaks, severe thunderstorms, drought, etc. Although many of these events do not occur routinely, if we fail to plan for them then many will become caught off guard by their impacts. The National Weather Service (NWS) is responsible for doing storm survey assessments of areas hit hard by severe weather, and a common theme we hear from those who were hit hardest is – "I can't believe this happened to me". While most people agree that we have an exposure to hazardous weather, only a small segment of the population is ideally prepared to deal with extreme weather events.

During a typical year the United States has 100,000 severe thunderstorms, 5,000 floods and flash floods, 1,000 tornadoes, and 2 land-falling hurricanes. It's no wonder why our Nation needs to be Weather-Ready. While there have been advancements in weather related technology and research that have led to the increased accuracy and warning lead time over the last decade, people are still being killed in great numbers. For instance, during 2011 there were 549 fatalities from tornadoes – almost 300 people during the Alabama outbreak on a single day! As a result, the NWS has started a new program called Weather-Ready Nation to enhance community resilience in the face of extreme weather events across the Nation.

The Weather-Ready Nation Ambassador program is the initiative that recognizes a wide variety of partners in their efforts to advocate weather safety and planning. The Ambassadors help to unify weather safety efforts, are action-oriented, inclusive, and help lead to new partnership opportunities with the NWS. The Ambassador program is open to any club, organization, company, civic group, or government agency (Local/State/Federal) and is free to join. There are no formal guidelines or requirements to become an Ambassador other than to sign-up and become integrated into the pipeline of weather safety information through the Weather-Ready Nation program. Consider the following - does weather potentially impact your family, friends, club members, staff or co-workers? If you answered yes then consider joining to become a Weather-Ready Nation Ambassador. Help the NWS to better serve our local communities by signing up!

**For more information visit: <http://www.weather.gov/ilm/wrn>**



# Be Prepared for Winter Weather

- Sandy LaCorte

Exposure to extreme cold, fires and poisoning due to the improper use of heaters, and vehicle accidents are just a few reasons as to why dozens of fatalities are reported each year due to winter weather, an overlooked significant threat. Now you may be thinking that the winter season across the Coastal Carolinas is nothing compared to, for example, the New England region. Well, we have our share of winter weather across the Carolinas, thus you should always be prepared.

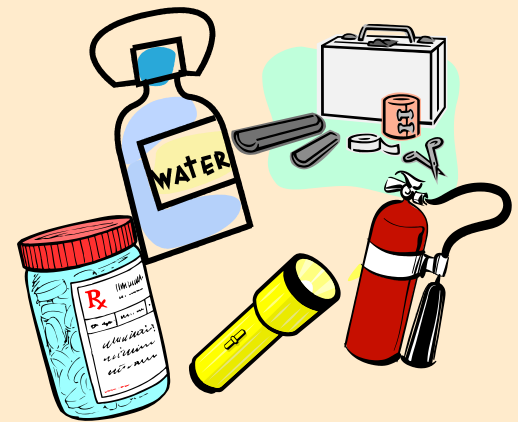
In preparation for a winter weather event, keep in mind that the primary concern will be the loss of heat, power outages, and shortage of supplies if storm or proceeding conditions persist for more than one day.

Before winter weather strikes, be sure to take necessary precautions such as maintaining, cleaning, and annually inspecting chimneys and other heating equipment, and making sure your vehicle is prepared by having a full gas tank and inspecting the antifreeze levels, brakes, battery, and more!

***For additional information, visit [www.ready.gov](http://www.ready.gov)***

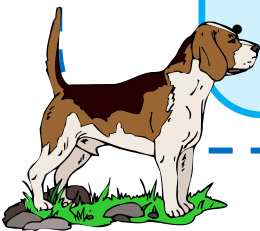
## Disaster Kit: Home/Work

- Flashlight and extra batteries
- Battery-powered NOAA Weather Radio
- Extra food and water (one gallon of water per person, per day)
- Prescription medicines
- Special items for infant, elderly or disabled family members
- Emergency tools
- Cash and a credit card, emergency phone numbers
- Important documents
- Blankets and change of clothing per person
- First aid supplies
- Fire extinguisher/smoke alarm/carbon monoxide detector
- Heating fuel
- Emergency heat source (fireplace, space heater, etc)



## Safety Tips: Animals/Pets

- Move animals to sheltered locations
  - Have extra feed on hand or near feeding areas
  - Have water available (animals may die from dehydration)
- Make sure pets have plenty of food, water and shelter



...Continued on Page 9





## Disaster Kit: Vehicle

- Mobile phone, charger, batteries
- windshield scraper and small broom
- flashlight with extra batteries
- battery powered radio
- compass and road maps
- water and snack food
- matches
- extra hats, socks, mittens, and clothing
- first aid kit with pocket knife
- necessary medications
- blanket(s)/sleeping bags
- tow chain and/or rope
- road salt and sand, booster cables
- emergency flares/fluorescent distress flag

## Safety Tips: Vehicle

- Drive only if it is absolutely necessary. If you must drive: travel during the day; don't travel alone; keep others informed of your schedule; stay on main roads and avoid back road shortcuts.
- If driving on snow or ice-covered roadways, reduce your speed. Driving at the regular speed limit will reduce your ability to control the car if you begin to slide. Leave plenty of room between you and other vehicles.
- If conditions worsen and you can no longer drive safely, pull off the highway. Stay calm and remain in your vehicle. Do not set out on foot unless you can see a building close by where you know you can take shelter.
- Let someone know your destination, your route, and when you expect to arrive. If your car gets stuck along the way, help can be sent along your predetermined route.

## Carbon Monoxide: The Invisible Killer

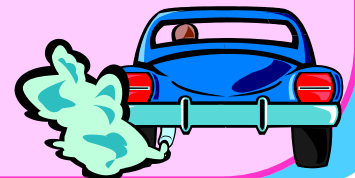
Carbon monoxide (CO) is a deadly odorless, colorless, and poisonous gas that is the cause of fatalities each year, especially during the winter weather season. It is a result of the incomplete burning of various fuels (ie coal, wood, kerosene, propane) from equipment such as generators and cars.

### Symptoms

- Dizziness, nausea, fatigue, headache, shortness of breath
- High level of CO poisoning: vomiting, mental confusion, loss of consciousness

### Prevent CO poisoning:

- Never operate equipment in enclosed spaces, such as a garage or locations within a home.
- Never leave car running in an attached garage (even with garage door open)
- Never burn charcoal inside home, vehicle, garage
- Never use gas appliances to heat your home (ovens, clothes dryers, etc)
- Never operate equipment where people are sleeping
- Install carbon monoxide alarms in central locations on every level of your home
- If carbon monoxide alarm sounds, move quickly to fresh air



# Weather.gov on Your Mobile Phone

*From: Weather-Ready Nation*

Take the weather with you on your mobile phone! Wherever you are, you can get the local weather forecast from the National Weather Service with one click on your home screen. Bookmark **mobile.weather.gov** to make sure that you have the latest weather news and information on the go.

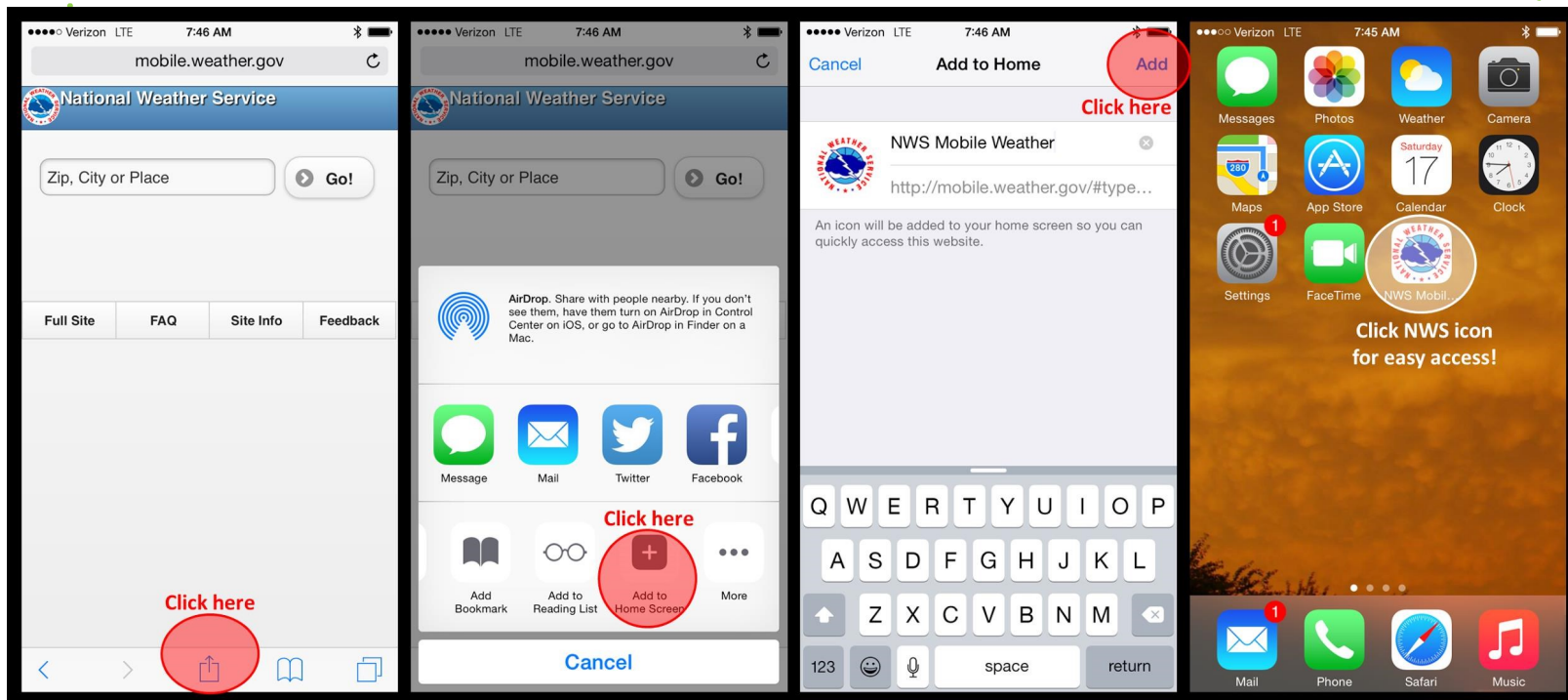
How can you add mobile.weather.gov to your mobile phone's Home Screen? It's easy! Learn how to add the mobile version of weather.gov to your iPhone or Android phone.

Follow these three steps for one-click access to your local forecast.

## If you have an iPhone...

Visit **mobile.weather.gov** using Safari on your iPhone.

1. Click the Send button at the bottom of the screen.
2. Choose "Add to Home Screen" and tap "Add."



# Weather.gov on Your Mobile Phone

From: Weather-Ready Nation

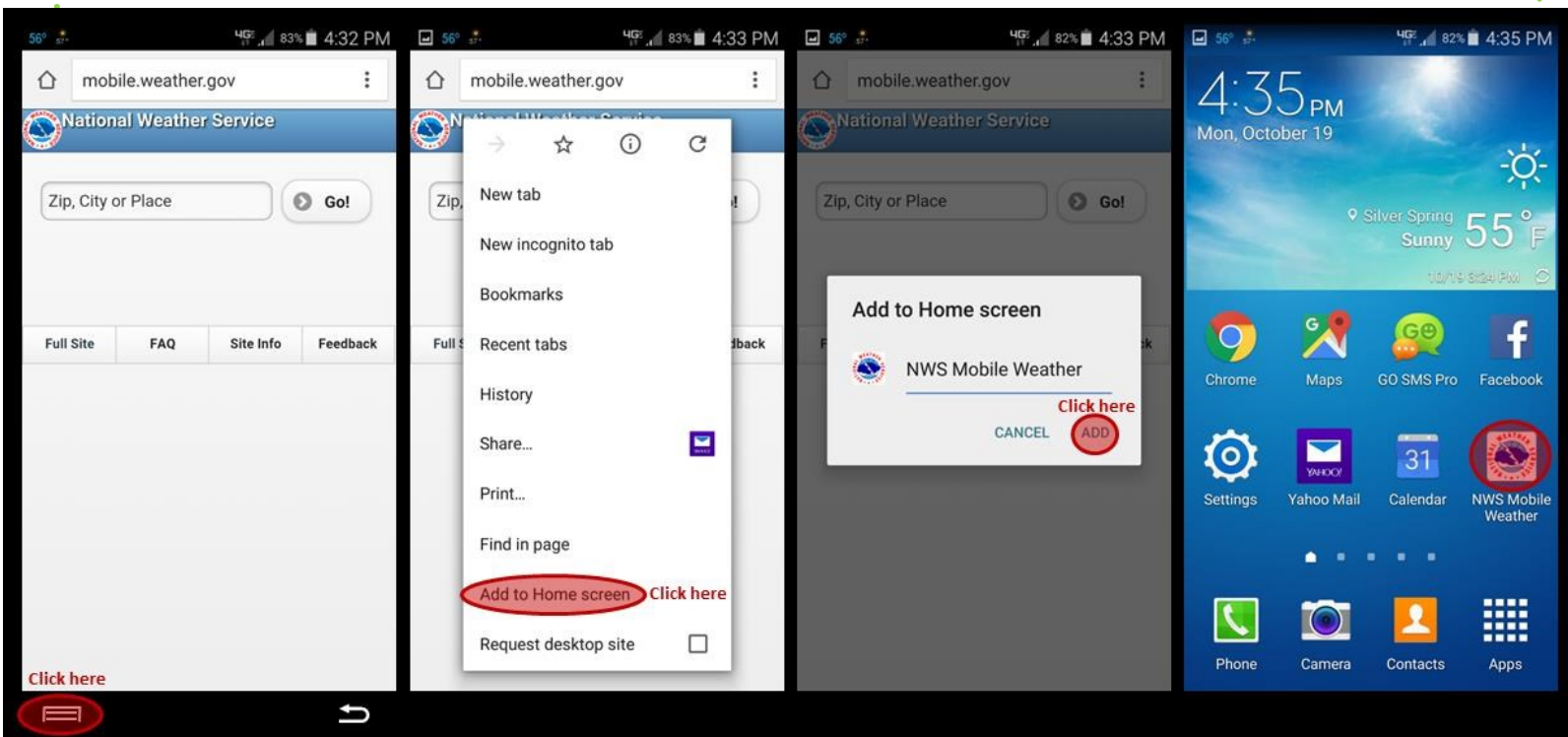
## If you have an Android mobile device...

There are a number of browsers that will allow you to add mobile.weather.gov to your home screen. For example, on Chrome for Android:

Visit **mobile.weather.gov** using Chrome on your Android phone

1. Click the menu button

Choose "Add to Home Screen."



That's it! That's all it takes to get local weather information from the National Weather Service on your iPhone or other device.

For other mobile platforms, if you do not know how to bookmark a page on your phone, open your browser and search "how to bookmark a page on \_\_\_\_\_" with the blank being filled in with your model of phone.

Interested in other sources for weather alerts? Go **www.weather.gov/subscribe** for alternative options for weather alerting services or visit your mobile phone's app store for commercial app options.

# NWS Wilmington Office History

They say everyone has a story, and for the National Weather Service office in Wilmington, NC, that story begins with December of 1870. It was then that the U.S. Signal Corps began taking sporadic snowfall measurements. Jump ahead a few years to 1874, when in April, the first complete and continuous set of weather observations began in a building located in downtown Wilmington, which no longer exists. From historic weather events to multiple moves for the office location, a lot has happened since 1870.



U.S. Post Office building slowly demolished beginning in 1936.

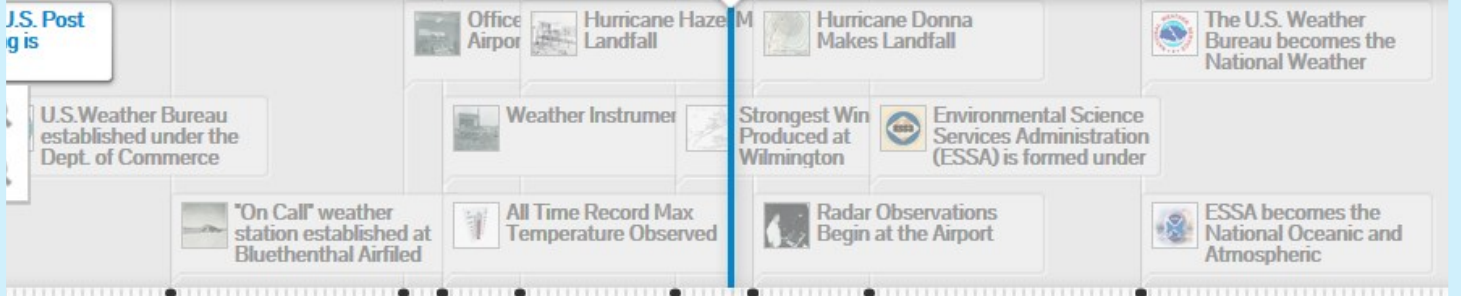
1936

## Old office in U.S. Post Office building is demolished.

After being located in the U.S. Post office building for 41 years (1890-1931) the old building was demolished in 1936.

1931  
Office moves to  
Water St.

1940  
U.S. Weather  
Bureau  
established under  
the Dept. of  
Commerce



Take a ride down memory lane through our office history timeline:

<http://www.weather.gov/ilm/TimelineNWSILM>

National Weather Service  
Weather Forecast Office  
Wilmington, North Carolina

2015 Gardner Drive  
Wilmington, NC 28405  
Phone: (910) 762-4289  
[www.weather.gov/ilm](http://www.weather.gov/ilm)



Webmaster's Email: [ILM.webmaster@noaa.gov](mailto:ILM.webmaster@noaa.gov)



### **We need your Storm Reports!!**

Events of tornadoes, hail, damaging winds,  
and flooding are very important to us.

**Please call: 1-800-697-3901**

*\*Storm reports **ONLY**\**

Email: [ilm.wxreports@noaa.gov](mailto:ilm.wxreports@noaa.gov)

The Wilmington Wave  
Volume IV, Issue I

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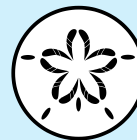
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*Where we share adverse weather information and historical weather events,  
and you share storm reports and any weather questions you might have!*