NOAA's National Weather Service, Newport/Morehead city NC

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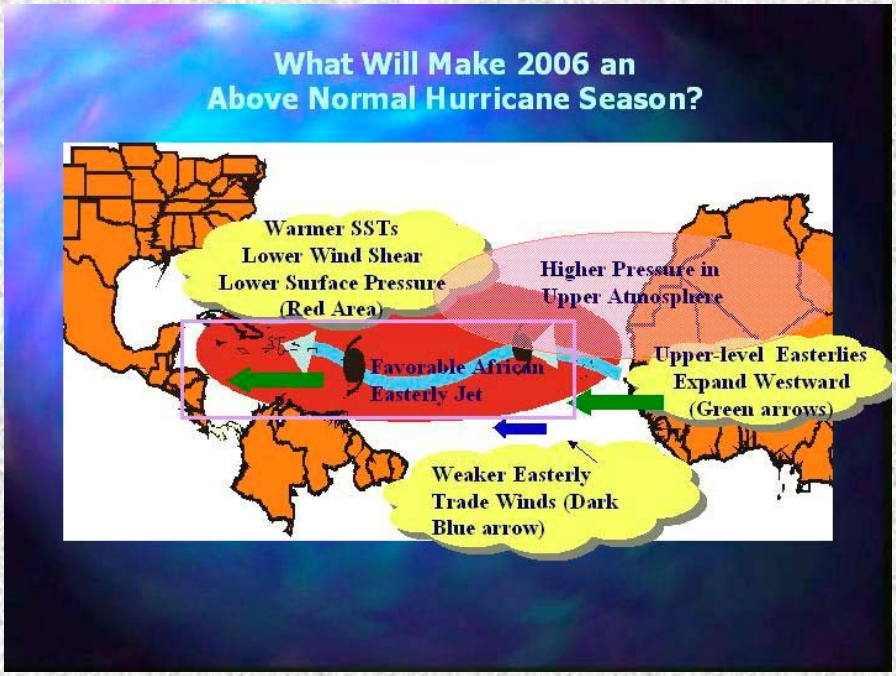
Carolina Sky Watcher

Summer 2006 edition

HURRICANE SEASON 2006 OUTLOOK

By John Cole, Warning Coordination Meteorologist

2006 is expected to be another active year for tropical cyclones in the Atlantic Hurricane Basin. NOAA expects 13-16 named storms, 8-10 hurricanes (sustained winds greater than 74 mph), and 4-6 major hurricanes (sustained winds over 110 mph). Dr. William Gray and his research team at Colorado State University expect 17 named storms, 9 hurricanes, and 4 major hurricanes. During an average hurricane season, which runs from June 1st through Nov. 30th, we have 11 named storms, 6 hurricanes, and 2 major hurricanes. Factors which favor an active year are warmer than normal water temperatures, light mid and upper level winds, and lower pressure in the Atlantic Ocean, Caribbean Sea, and the Gulf of Mexico. The three primary months for hurricane activity are August, September, and October.



Inside this issue:

HURRICANE THREATS: TORNADOES!

By Bob Frederick, Forecaster

Hurricanes pose many threats to life and property when they impact eastern North Carolina. Across the United States approximately 10 percent of hurricane fatalities are a result of tornadoes. Some hurricanes and tropical storms produce little if any tornado activity, while other can produce numerous tornadoes. Almost all tornadoes associated with hurricanes occur on the right front quadrant of the storm (see Figure 1). Hurricanes that make landfall to our south and then move north across the region or just to the west will have the best potential to produce tornadoes over eastern North Carolina. Hurricane Floyd in 1999 made landfall just north of Wilmington, then tracked north-northeast toward southeastern Virginia. Numerous tornadoes developed in the leading spiral bands of Floyd across eastern North Carolina. Overall 26 tornado warnings were issued by the National Weather Service in Newport as Floyd approached and crossed the region. Tornadoes are typically in the leading spiral bands and can occur well ahead of the core of the storm. The remnants of tropical storms and hurricanes can also produce tornadoes for several days as they move well inland. Many tropical systems that make landfall off the Gulf of Mexico will produce tornadoes as they weaken and move north along the U.S. eastern seaboard.

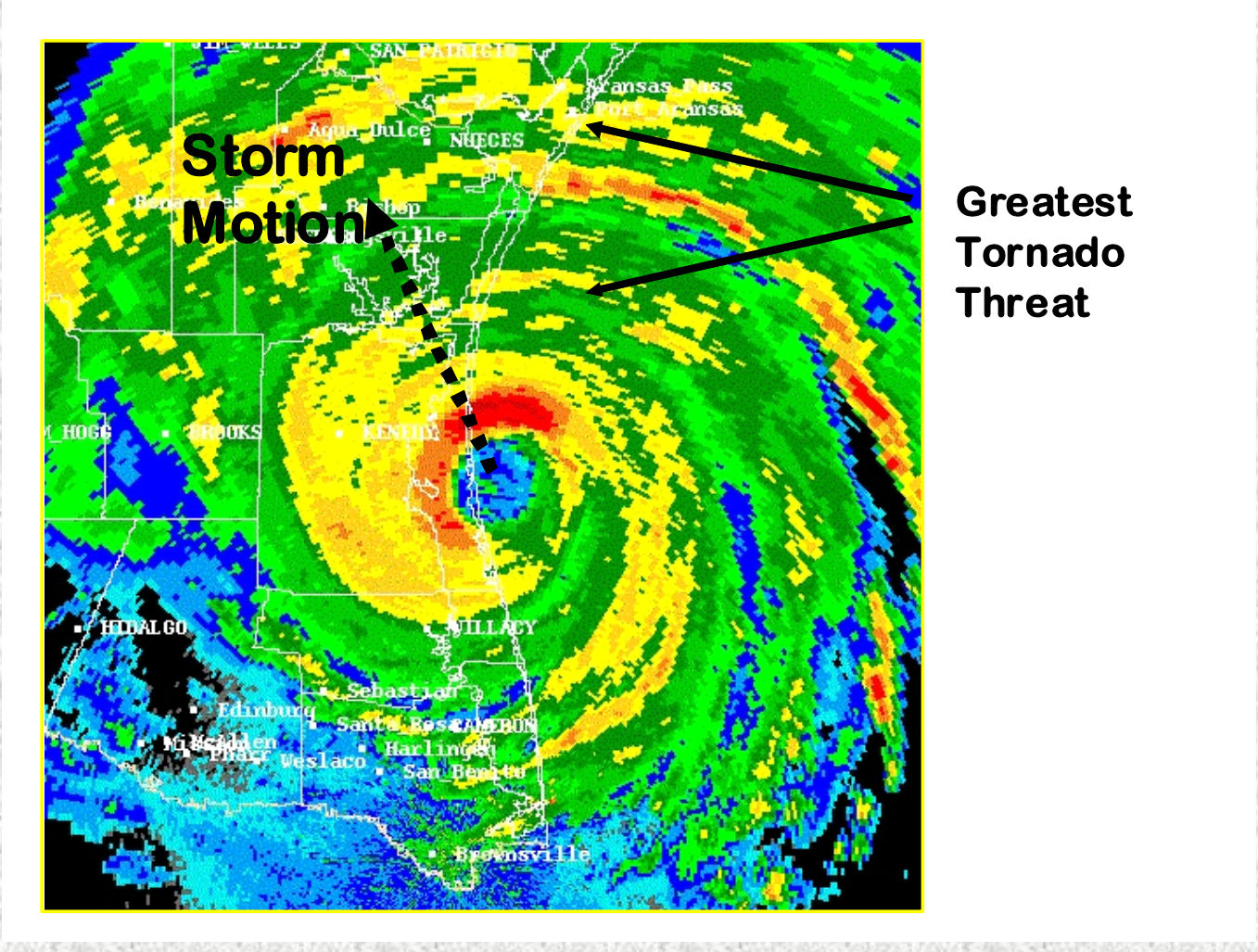


Figure 1). Greatest tornado threat is mainly in the right front sector of the hurricane or tropical storm.

HURRICANE FRAN-10 YEARS AGO

By Sarah Jamison, Forecaster

Hurricane Fran slammed into North Carolina's southern coast on September 5th, 1996 with sustained winds of approximately 115 MPH, and gusts as high as 125 MPH. Fran was moving northward near 15 knots when it made landfall on the North Carolina coast near the Cape Fear area. At some point, 1.7 million customers in North Carolina lost electricity. The overall death toll was 37, including 24 in North Carolina. Flooding was also a severe problem in North Carolina, Virginia, West Virginia, and Maryland. Fran produced rainfall amounts of over 10 inches in parts of eastern North Carolina between the 4th and 7th of September, with the highest amounts along the coastal plains.

Damages for homes and businesses in North Carolina (NC) were estimated at approximately $2.3 billion. Damages/costs related to public property (debris removal, roads and bridges, public buildings, utilities, etc) were estimated at about $1.1 billion for NC. Agricultural damage (crops, livestock, buildings) in NC was over $700 million. Wake County (Raleigh and vicinity) alone reported over $900 million in damage to residential and commercial property. Finally, forestry/timber losses for the state probably exceeded $1 billion.

Taken collectively, total damages/costs for NC are estimated at approximately $5 billion, but the circulation and radius of maximum winds were large and hurricane force winds likely extended over much of the North Carolina coastal areas of Brunswick, New Hanover, Pender, Onslow and Carteret counties. At landfall, the minimum central pressure is estimated at 954 mb and the maximum sustained surface winds are estimated around 100 knots. On the next page there is a table of the highest observed wind speeds, on land and from offshore buoys.

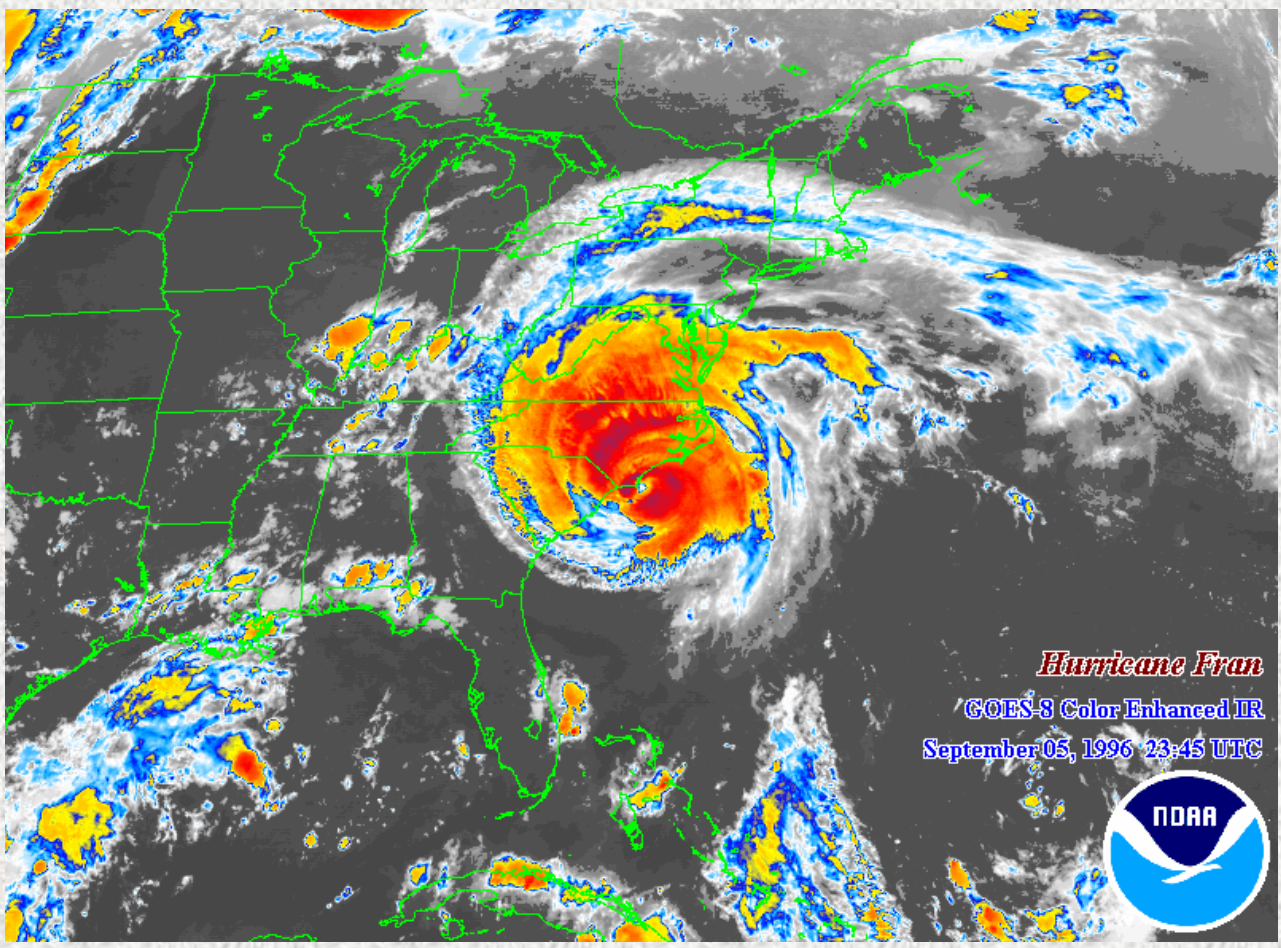


Table 1. Hurricane Fran selected surface observations, September, 1996.

Location	Press. (mb)	Date/ time (UTC)	Sus- tained wind (kt) [a]	Peak gust (kt)	Date/ time (UTC) [b]	Storm surge (ft) [c]	Storm tide (ft) [d]	Storm total rain (in.)
North Carolina								
Atlantic Beach				87				
Butner								6.21
Cape Lookout	987							
Cherry Point MCA (NKT) [M]	993.9	06/0255	43	66	06/0255			
Duck Pier						1.5		
Duke Marine Lab (Beaufort)				80		5.4		
Elizabeth City CG (ECG)	1005.1	06/1147	37	48	06/1255			
Greenville				87				
New River	982	05/0230		82				7.05
Newport								3.24
North Topsail Beach			65		05/0045		8-9 [e]	
Hoffman Forest								13.57
Morehead City								10.91
Oregon Inlet						2.3		
CMAN Stations/Buoys								
Frying Pan Shoals (FPSN7)	960.6	May-00	79	108	May-00			
Diamond Shoals (DSLN7)	1006.6	06/0500	58	65	06/0400			
Cape Lookout (CLKN7)	996.9	06/0100	56	71	06/0300			

HURRICANE QUIZ *By Hal Austin, Forecaster*

1. What is the origin of the word "hurricane"?

a. An Aztec word for "strong wave"

b. A Portuguese coastal town

c. The name of the Carib god of evil

d. A mythical sea monster that devoured sailors

September 2004-Hurricane Frances snapped trees, tore up roofs and flooded parts of Grand Bahama Island.

2. The remnants of which hurricane combined with two other low pressure systems to become "The Perfect Storm" in 1991?

a. Hurricane David

b. Hurricane Grace

c. Hurricane Bonnie

d. Hurricane Andrew

3. Who chooses the names for tropical storms and hurricanes in the Atlantic?

a. The National Hurricane Center

b. The first person to classify it as a tropical storm

c. The World Meteorological Association

4. Prior to 2005, which year had the most named storms?

a. 2003

b. 1933

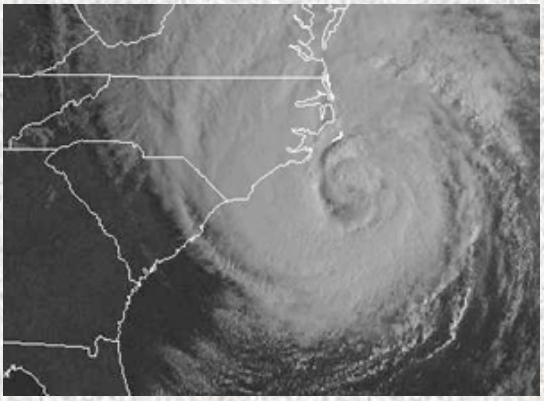
c. 1995

5. Name the portion of the Gulf of Mexico with very warm sea surface temperatures that hurricanes Katrina, Rita and Wilma passed through.

a. Loop Current

b. Gulf Stream

c. Sargrasso Sea



Hurricane Isabel-September 2003

6. How many Category 5 hurricanes developed in the Atlantic in 2005?

a. two

b. four

c. Three

7. How many hurricanes from the 2005 season had their names retired?

a. four

b. three

c. five

d. six

8. When did the U.S. begin using both male and female names for tropical storms and hurricanes?

a. 1948

b. 1979

c. 1967

d. 1955

9. On average, what are the peak months of the hurricane season?

a. July/August

b. September/October

c. June/July

d. August/September

10. How many Category 5 hurricanes have made landfall in the U.S. since 1899?

a. 6

b. 4

c. 3

d. 5

11. Where is a tropical storm or hurricane strongest?

a. Front left

b. Back right

c. Front right

d. Back left

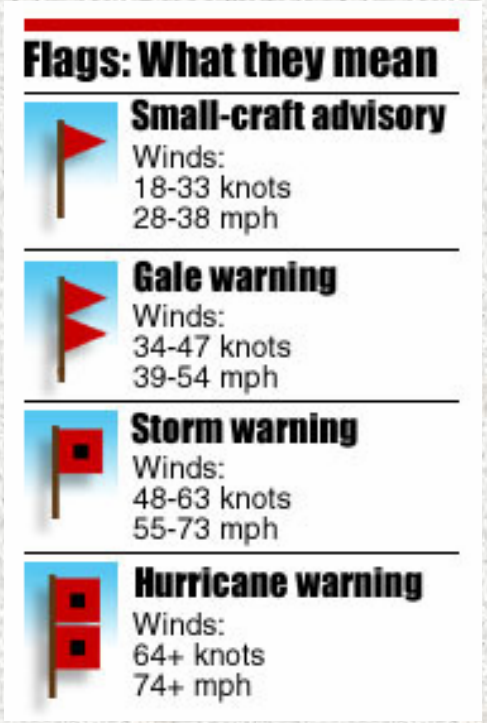
12. Who was the first pilot to intentionally fly into a hurricane's eye?

a. Chuck Yeager

b. Amelia Earhart

c. Joseph Duckworth

d. Charles Lindbergh



Answers on the next page!

SAFFIR WHO? SIMPSON WHO? *By Hal Austin, Forecaster*

Just where did the Saffir-Simpson hurricane scale get its name? Its two namesakes, Herbert S. Saffir and Robert Simpson. Who are these two men? Herbert Saffir is a consulting engineer in Coral Gables, Florida. He is an expert on wind damage and helped write the Dade County, Florida building code. In 1969, the United Nations commissioned him to do a study of wind damage on low-cost housing, which led him to develop a scale to measure the severity of hurricanes. Robert Simpson was director of the National Hurricane Center from 1967-1973. In 1969, he was the first to put in specific forecast amounts of storm surge in advisories for Hurricane Camille. After the storm, he felt he needed a better way to communicate what a storm was capable of doing. He took Saffir's wind-only scale and added in ranges of storm surge, to create the popular scale we use today.

SAFFIR-SIMPSON HURRICANE DAMAGE POTENTIAL SCALE

CATEGORY	1	2	3	4	5
DAMAGE	minimal	moderate	extensive	extreme	catastrophic
BAROMETRIC PRESSURE IN INCHES	>28.94	28.50-28.91	27.91-28.47	27.17-27.8	<27.17
WIND SPEEDS IN MPH	74-95	96-110	111-130	131-155	>155
STORM SURGE IN FEET	4-5	6-8	9-12	13-18	>18

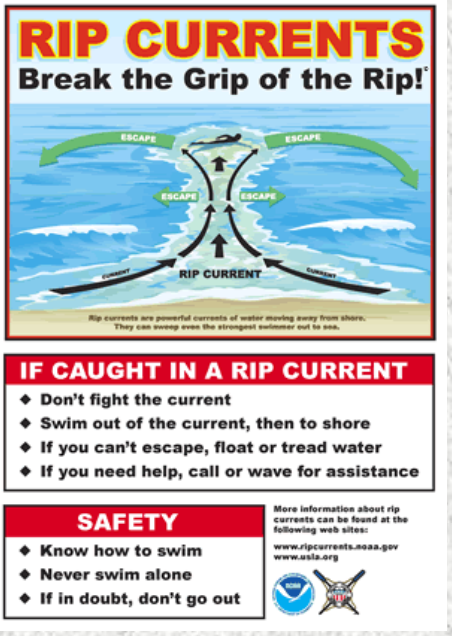
QUIZ ANSWERS

1. **c**
2. **b**
3. **c**
4. **b (21 storms)**
5. **a**
6. **c (Katrina, Rita & Wilma)**
7. **c (Dennis, Katrina, Rita, Stan & Wilma)**
8. **b**
9. **d**
10. **c (The Florida Keys hurricane of 1935, Camille (1969) & Andrew (1992))**
11. **c (The right front quadrant typically brings the highest winds and storm surge)**
12. **On July 17, 1943, Army Air Corps Lt. Col. Joseph P. Duckworth flew his single-engine AT-6 trainer into the eye of a Category 1 hurricane bearing down on Texas**

SO HOW DID YOU DO?

RIP CURRENT DANGER *By Scott Kennedy, Forecaster*

Rip currents are powerful currents of water moving away from shore and are the leading surf hazard for all beachgoers, especially for weak or non swimmers. Even on days when the local weather is tranquil, distant storms may produce swells that bring an increased risk of rip currents to local beaches. On average, more people die every year from rip currents than from shark attacks, tornadoes, lightning or even hurricanes. According to the United States lifesaving association, 80 percent of surf beach rescues are attributed to rip currents and more than 100 people die annually from drowning when they are unable to escape a rip current. In fact, rip current deaths have already occurred on the central North Carolina coast this year.



Rip currents are formed when waves break near the shoreline, piling up water between the breaking waves at the beach. One of the ways this water returns to sea is to form a rip current, a narrow jet of water that moves swiftly offshore, roughly perpendicular to the shoreline. Under most tide and sea conditions the speeds are relatively slow, however under certain wave, tide and beach profile conditions, the speeds can quickly increase to become dangerous to anyone entering the surf, even the most experienced swimmers. Rip currents most typically form at low spots or breaks in sandbars and also near structures such as groins, jetties and piers. Rip currents can be very narrow or extend in widths to hundreds of yards. The seaward pull of rip currents varies from just beyond the line of breaking waves to hundreds of yards offshore.

Some of the clues beachgoers can use to identify rip currents include: a channel of churning, choppy water, an area having a notable difference in water color, a line of foam, seaweed or debris moving steadily seaward, or a break in the incoming wave pattern. The above clues may or may not indicate the presence of rip currents and rip currents are often not readily or easily identifiable to the average beachgoer. If you are concerned about the possibilities of rip currents occurring in the surf, it is best to ask an on duty life guard before entering the water. Additionally, following these safety precautions will help minimize your chances from becoming a victim of rip currents:

- Stay at least 100 feet away from piers and jetties. Permanent rip currents often exist along side these structures.
- Whenever possible, **swim at a lifeguard-protected beach.**
- Never swim alone.
- Learn how to swim in the surf. It's not the same as swimming in a pool or lake.
- Be cautious at all times, especially when swimming at unguarded beaches. If in doubt, don't go out.
- Obey all instructions and orders from lifeguards. Lifeguards are trained to identify potential hazards.
- Pay especially close attention to children and elderly when at the beach. Even in shallow water, wave action can cause loss of footing.

If you are caught in a rip current, remain calm to conserve energy and think clearly. Follow these guidelines to escape the grip of the rip current:

- Never fight against the current.
- Swim out of the current in a direction following the shoreline. When out of the current, swim at an angle--away from the current--towards shore.
- If you are unable to swim out of the rip current, float or calmly tread water. When out of the current, swim towards shore.
- If you are still unable to reach shore, draw attention to yourself by waving your arm and yelling for help.

If you see someone in trouble, don't become a victim yourself, many people drown while trying to save someone else from a rip current. Get help from a lifeguard. If a lifeguard in unavailable, have someone call 911. Throw the rip current victim something that floats such as a lifejacket, cooler, or inflatable ball. Yell instructions on

Continued on next page

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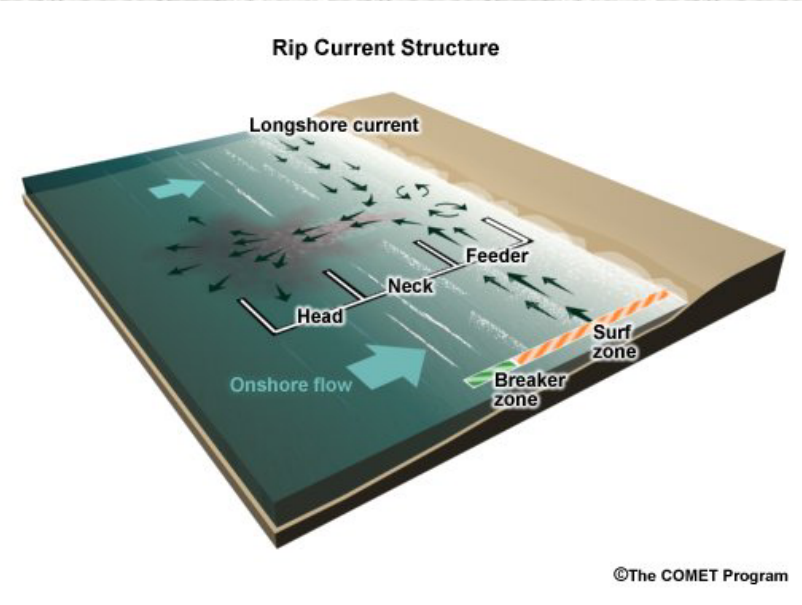
A rip current as seen from above. Compare this with the rip current diagram below. Note how well they match!



RIP CURRENT DANGER *continued*

how to escape.

Most coastal National Weather Service offices provide rip current outlooks for at least the summer months. The outlooks will usually be contained in the surf zone forecast product. Rip current outlooks will have the qualifiers low, moderate and high risk to indicate the rip current threat.

Low Risk of rip currents. Wind and/or wave conditions are not expected to support the development of rip currents; however, rip currents can sometimes occur, especially in the vicinity of groins, jetties, and piers. Know how to swim and heed the advice of lifeguards.

Moderate Risk of rip currents. Wind and/or wave conditions support stronger or more frequent rip currents. Only experienced surf swimmers should enter the water.

High Risk of rip currents. Wind and/or wave conditions support dangerous rip currents. Rip currents are life-threatening to anyone entering the surf.

For more information about rip currents, please visit **www.ripcurrents.noaa.gov** or if you are at the beach, ask an on duty lifeguard. You can also visit **www.erh.noaa.gov/mhx** to see the latest surf zone forecast for the Outer Banks and Crystal Coast.

To report adverse weather conditions 24/7, please call us at:

1-800-889-6889