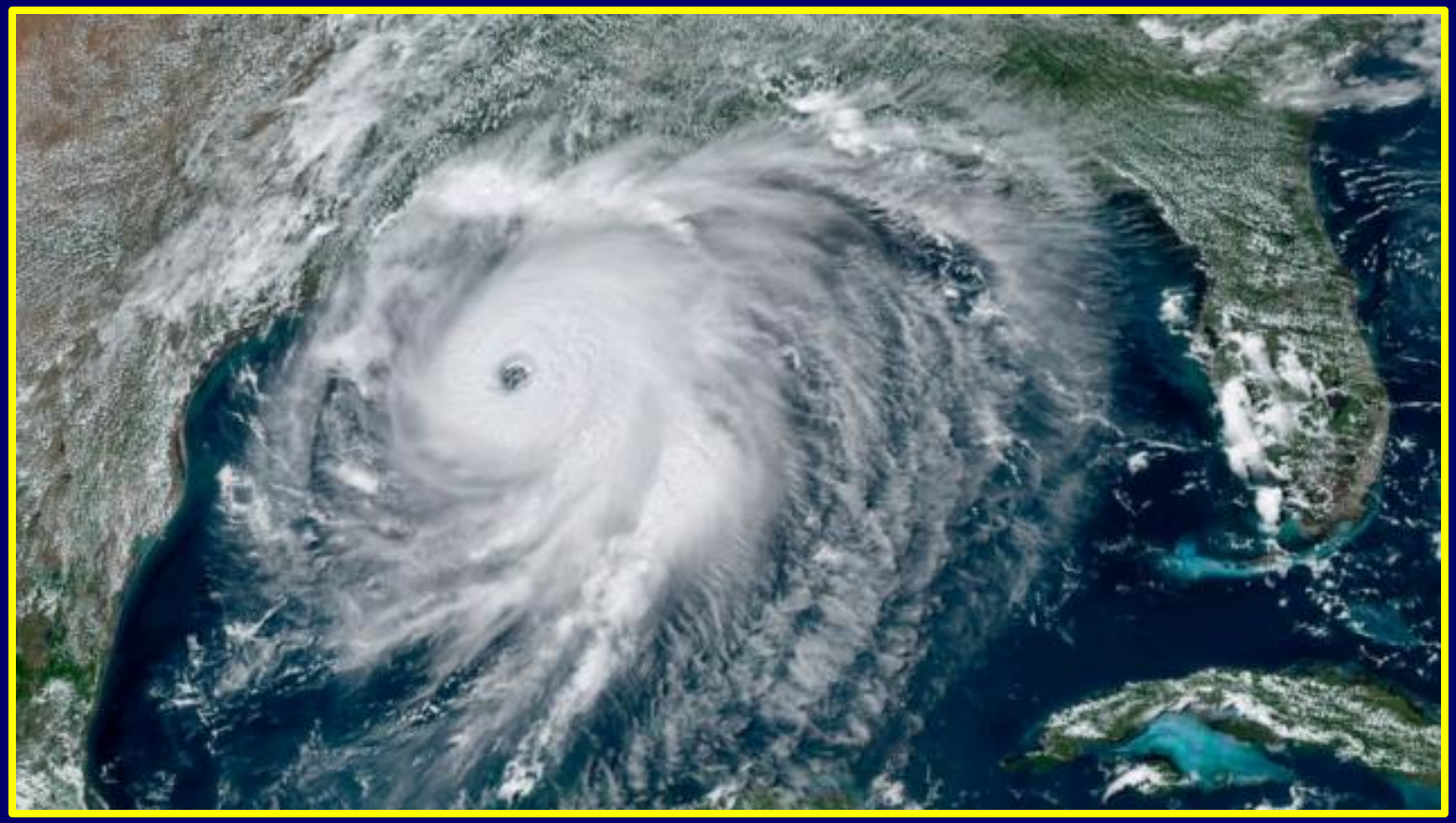
Hurricanes



Essential Standard 2.5

Understand the structure of and processes within our atmosphere.

Learning Objective 2.5.3

Explain how cyclonic storms form based on the interaction of air masses.

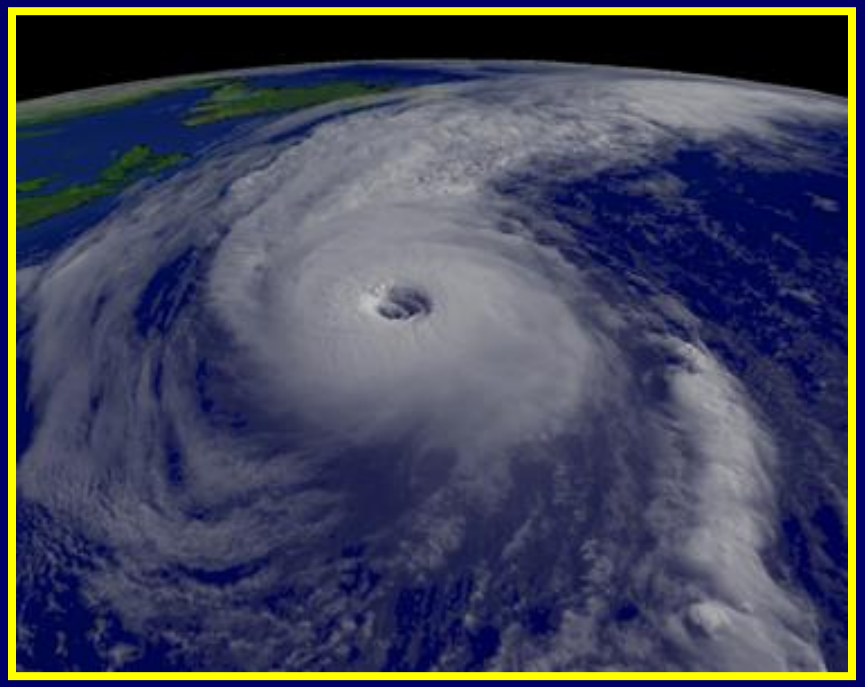
I Can Statements

At the end of this lesson, you should be able to say, with confidence:

- I can explain how hurricanes are formed
- I can describe hazards associated with hurricanes
- I can describe hurricane safety measures

Hurricanes

A hurricane is a large rotating storm with high speed winds that forms over warm waters in tropical areas.

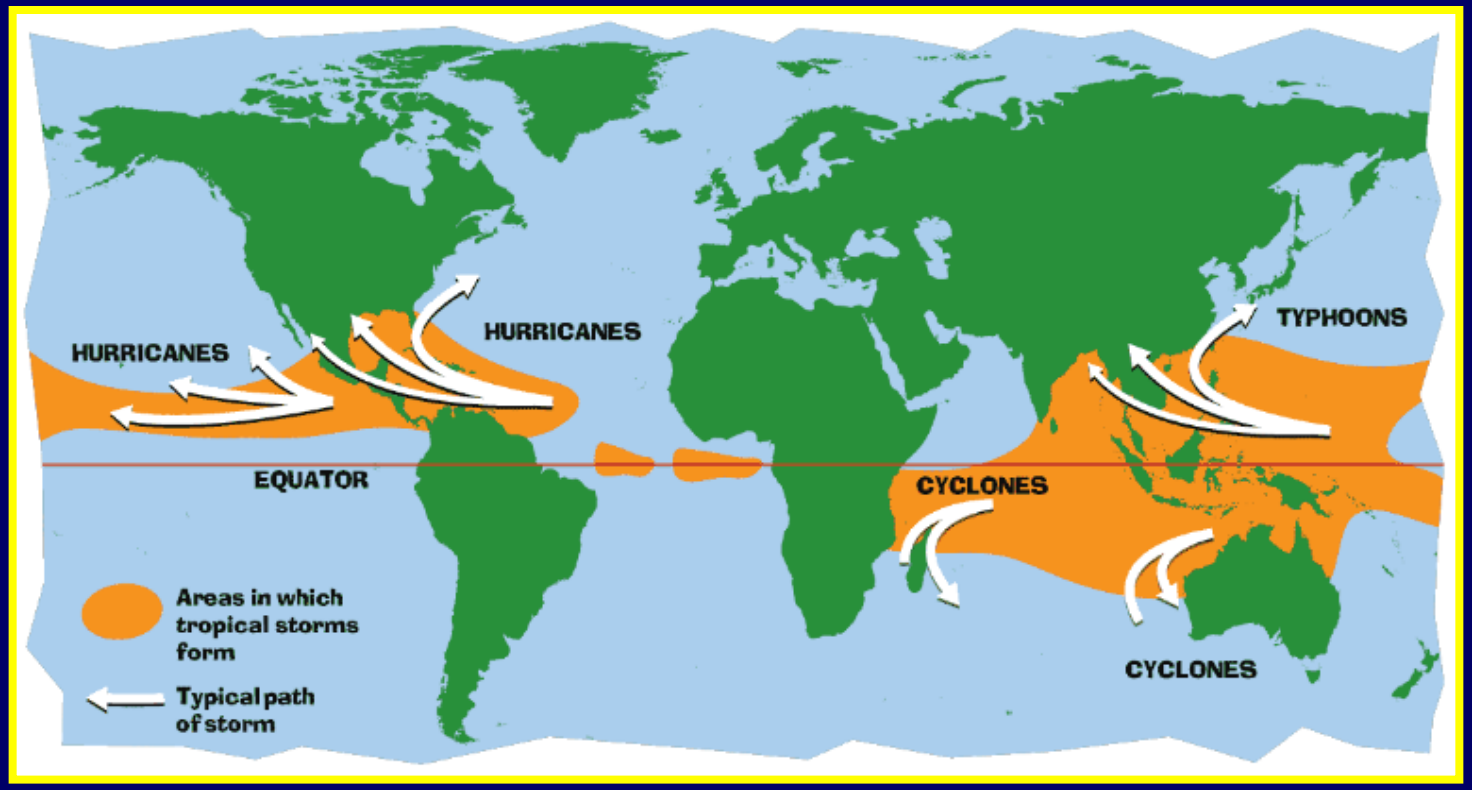


Hurricanes have sustained winds of at least 74 miles per hour and an area of low air pressure in the center called the eye.

Hurricane season lasts from June 1 to November 30.

Hurricanes, Typhoons, & Cyclones

In the North Atlantic, we call these large storms hurricanes. But in the West Pacific, they are called typhoons. While, in the Indian Ocean, they are called cyclones.



Hurricane Formation

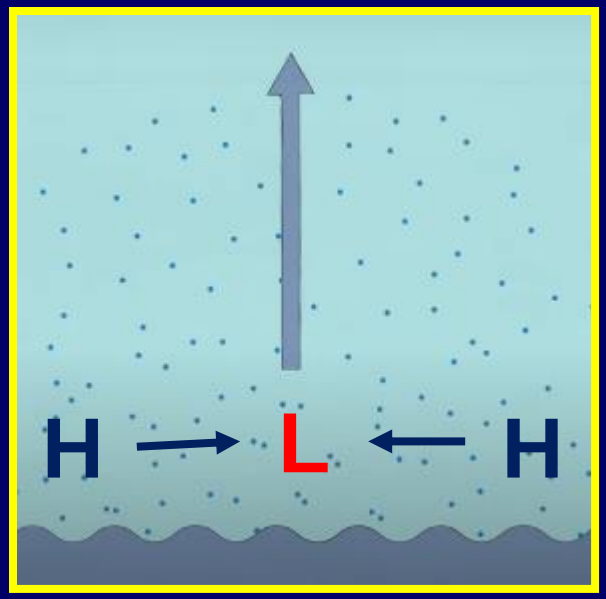
Hurricanes form over warm tropical waters that have temperatures of at least 80º F.

Besides warm water, winds are also needed for hurricanes to form.

Many hurricanes in the United States are caused by winds blowing across the Atlantic Ocean from Africa.

Hurricane Formation

Warm ocean water evaporates creating warm, moist air that continues to rise high into the atmosphere and creates a low pressure region near the surface.



High in the atmosphere, the air begins to cool and the water vapor condenses and begins to form clouds.

Hurricane Formation

As the air continues to rise, it begins blowing in a circular pattern, due to the Coriolis effect, around a low pressure center.

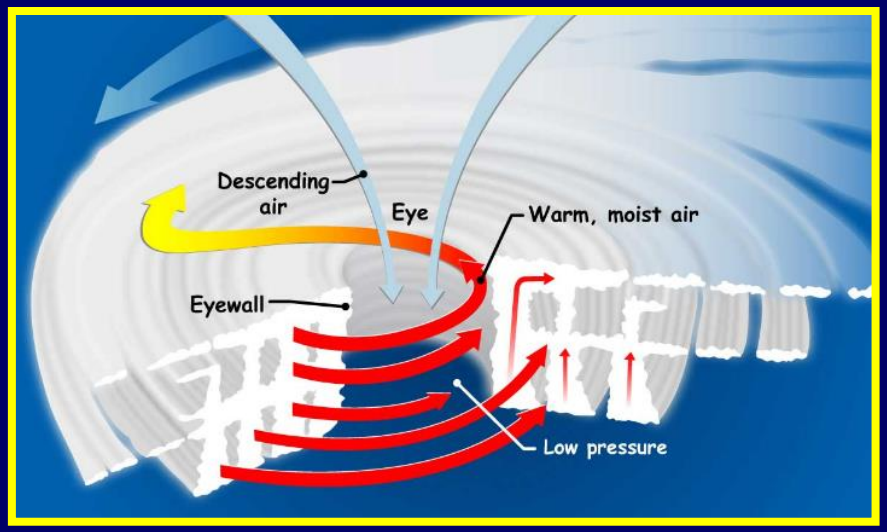
As more warm, moist air is added, a cluster of clouds begin to form around the spiral.

Hurricane Formation

Once the spinning winds reach 74 mph, a hurricane is formed.

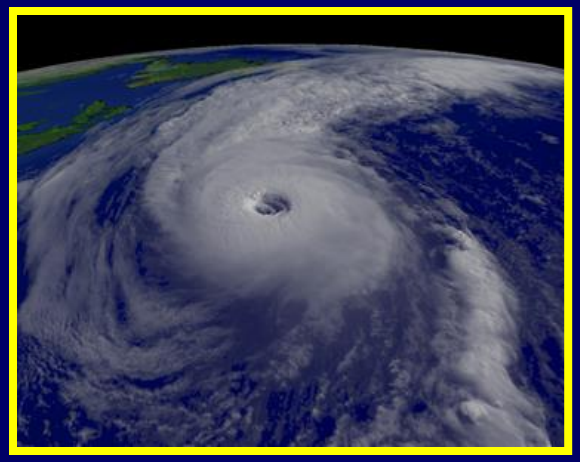
The center of the hurricane is called the eye.

The low pressure inside the eye, causes cool, dry air from above the storm to descend, creating very calm and clear weather inside the eye.



Hurricane Formation

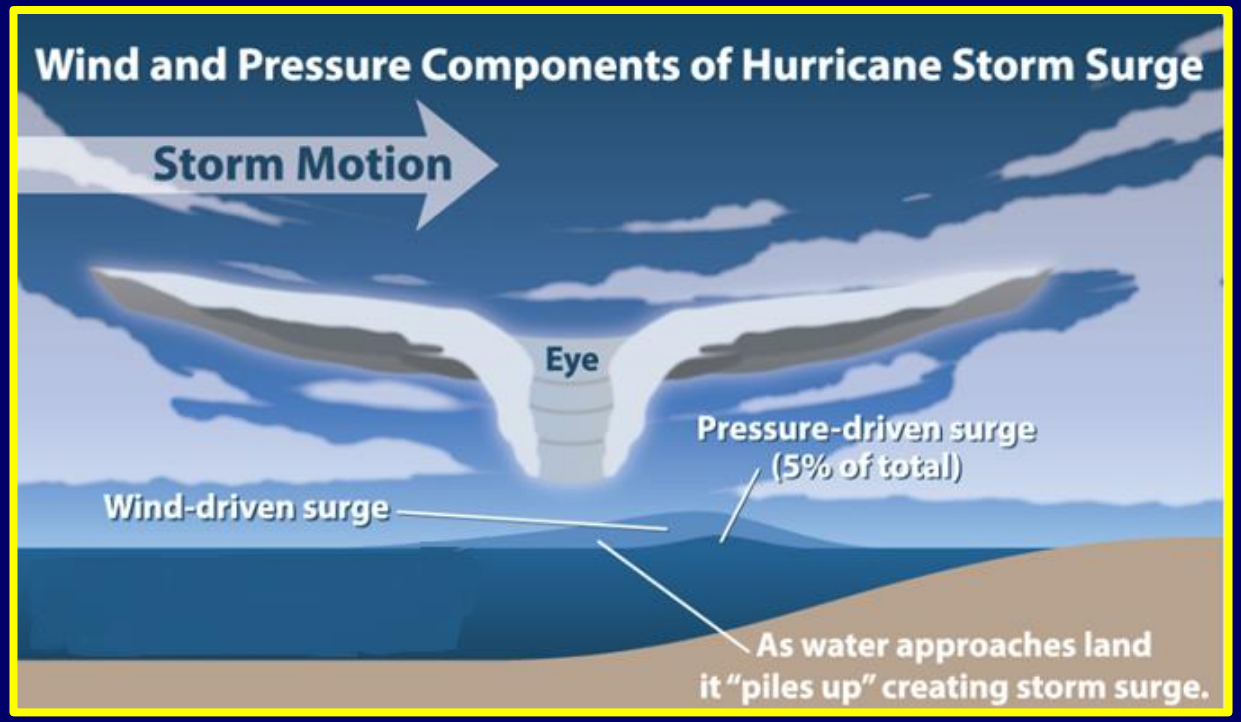
Hurricanes can be 10 miles high and over 1,000 miles wide.



The trade winds push the hurricanes towards the west.

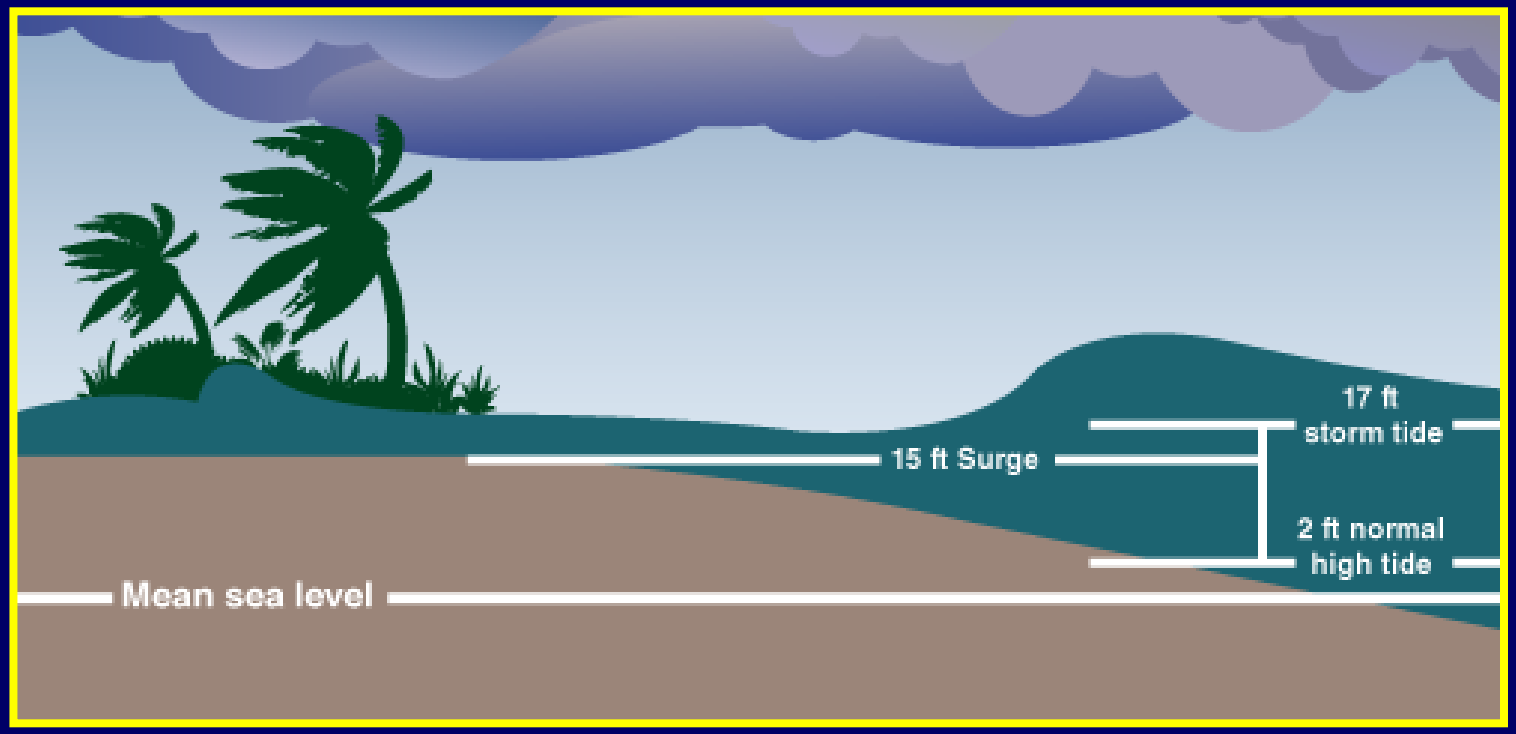
Storm Surge

As the hurricane continues to move across the water, the winds and low pressure system cause a huge mound of water to pile up near the eye of the hurricane creating what is called a storm surge.



Storm Surge

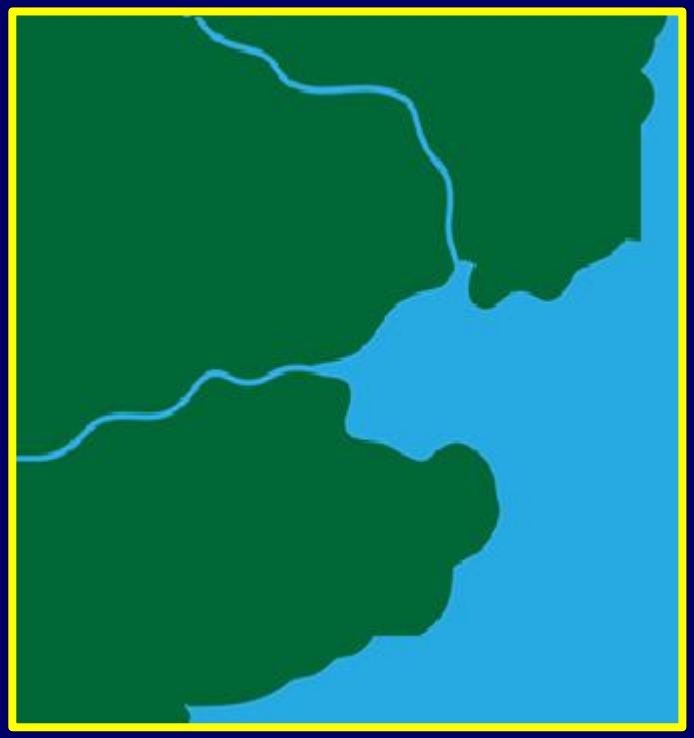
Storm surges are not just one wave or two waves but are an actual increase in sea level.



When a hurricane hits land during high tide, the water level can be as high as 20 feet.

Storm Surge

Storm surges are responsible for a lot of the flooding during a hurricane and can travel up rivers and flood inland areas as well.



Normal Conditions

Storm Surge Conditions

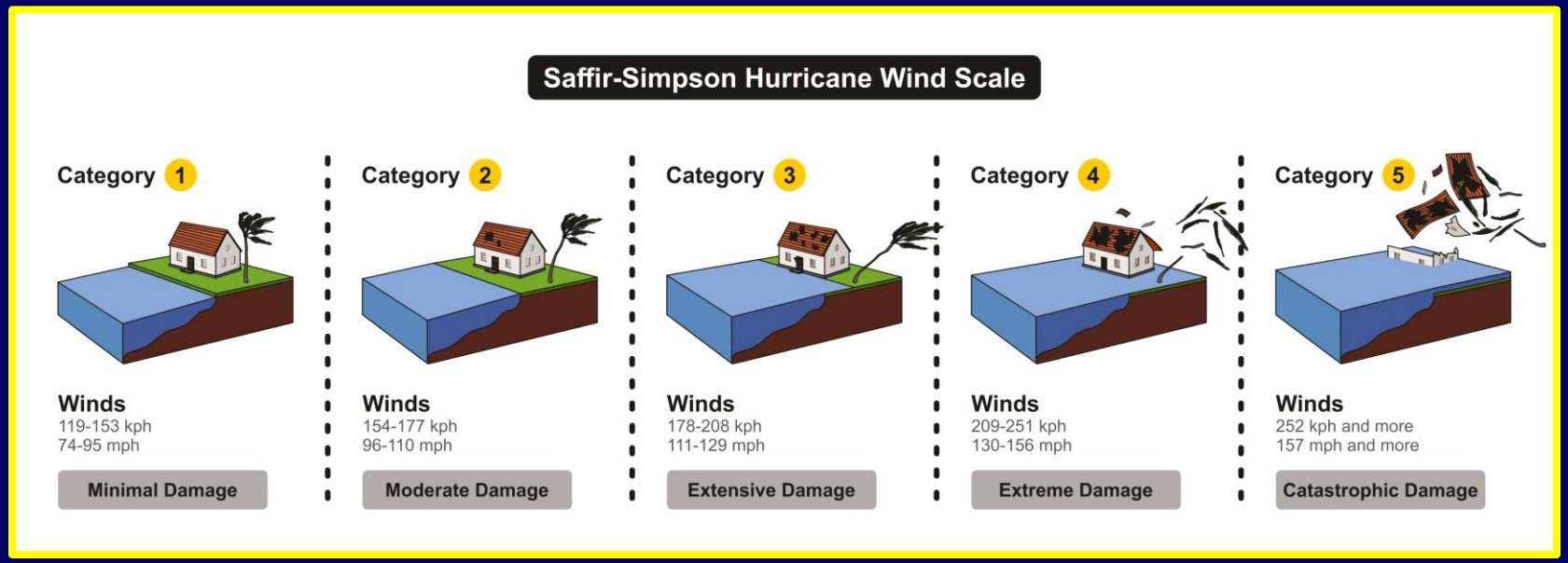
Classification

Hurricanes are classified according to wind speed and associated storm surge.

Category	Wind Speed (mph)	Damage at Landfall	Storm Surge (feet)
1	74-95	Minimal	4-5
2	96-110	Moderate	6-8
3	111-129	Extensive	9-12
4	130-156	Extreme	13-18
5	157 or higher	Catastrophic	19+

Classification

While categories 4 and 5 can cause the most wind damage, flooding and downed trees during categories 2 and 3 can still pose a threat to homes and people.



Hurricane Hazards

Hurricane hazards can include high winds; storm surge; flooding; and the production of tornadoes.

Hurricane Force Winds

Even category 2 hurricanes can produce sustained winds over 100 mph.

Storm Surge

A typical storm surge during a category 2 hurricane can be over 8 feet high, which means anything under 8 feet tall will be under water.

Flooding

Because the storm surge can travel upriver and with the help of heavy rains, flooding can occur hundreds of miles from the coast.

Lumberton, NC is 75 miles from the coast.

Tornadoes

When the hurricane hits land, it brings with it warm, moist air and high winds setting up the perfect conditions for tornadoes to form.

Lifespan

Hurricanes can last for over a week, however as they cross over land or cool water, they lose strength and begin to weaken.

Historic Hurricanes

1989 - Hurricane Hugo, Category 5, Charleston, SC. Killed 67 people and caused damage as far away as Charlotte, NC.

Historic Hurricanes

1992 - Hurricane Andrew, Category 5, Florida.
Killed 15 people and left 250,000 without homes.

Historic Hurricanes

1996 - Hurricane Fran, Category 3, Topsail NC. Killed 27 people. Fran followed two smaller hurricanes, so the ground was saturated, causing thousands of downed trees as far away as Raleigh, NC.

Left 60,000 homes without power, some for up to three weeks.

Historic Hurricanes

1999 - Hurricane Floyd, Category 2, Cape Fear NC. Killed 76 people. Followed a smaller hurricane and caused major flooding in eastern North Carolina.

Hurricane Floyd caused major flooding in the hog farming area of NC, causing major environmental damage to North Carolina waterways.

Historic Hurricanes

2005 - Hurricane Katrina, Category 3, New Orleans. Killed 1,836 people. The levees didn't hold and the entire city flooded, destroying 800,000 homes.

Levees are cement barriers meant to stop flood waters.

Hurricane Safety

Before:

- Secure windows with storm shutters or plywood
- Close all interior doors and brace all external doors
- Secure outdoor objects or bring them inside
- Turn off propane tanks
- Fill car gas tanks
- Trim all trees and shrubs
- Unplug small appliances
- Stock up on supplies for an emergency kit, including a 3-5 day supply of food and water, first aid kit, blankets, water-purifying supplies, prescription medications, baby supplies, personal hygiene items, batteries, copies of personal documents, flashlights, etc.
- Evacuate if advised by the authorities

Hurricane Safety

During:

- Use a battery-powered radio or television to receive hurricane updates
- Turn off electrical power when there is standing water, downed power lines, or an evacuation warning
- Keep away from windows, glass doors, and skylights
- Keep curtains and blinds closed
- Stay in a small interior room on the lowest level until authorities declare the storm has passed

Hurricane Safety

After:

- Avoid drinking tap water unless you are sure it isn't contaminated
- Beware of contaminated buildings or standing water, and stay alert for snakes and insects that may have entered the home during flooding
- Open windows and doors to ventilate your home
- Wash hands after working with debris
- Stay alert for gas leaks or damaged electrical wiring and do not light a match or use candles
- Inform local authorities about chemical spills, dead animals, washed out roads, and downed power lines

The End