

INLAND FLOODING

"In the last 30 years, inland flooding has been responsible for more than half the deaths associated with tropical cyclones in the United States."

Ed Rappaport
National Hurricane Center

Consider the following:

When it comes to hurricanes, wind speeds do not tell the whole story. Hurricanes produce storm surges, tornadoes, and often the most deadly of all - inland flooding.

While storm surge is always a potential threat, more people have died from inland flooding in the last 30 years. Intense rainfall is not directly related to the wind speed of tropical cyclones. In fact, some of the greatest rainfall amounts occur from weaker storms that drift slowly or stall over an area.



Tropical Storm Allison
Harris County Flood Control District

Inland flooding can be a major threat to communities hundreds of miles from the coast as intense rain falls from these huge tropical air masses.

Tropical Storm Allison (2001) produced extremely heavy rainfall and catastrophic floods in the Houston, Texas area. Allison then acquired subtropical characteristics and continued to produce heavy rainfall and flooding near its track from Louisiana eastward to North Carolina, and then northward along the U.S. east coast to Massachusetts. Forty-one deaths were directly related to the heavy rain, flooding, tornadoes, and high surf. Damage estimates reported by the Federal Emergency Management Agency (FEMA) were near \$5 billion, with approximately \$4.8 billion in the Houston metropolitan area alone

Hurricane Floyd (1999) brought intense rains and record flooding to the Eastern U.S. Of the 56 people who perished, 50 drowned due to inland flooding.



Hurricane Floyd Courtesy of NASA/GSFC

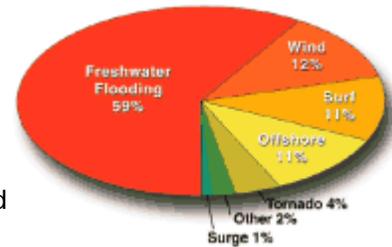
Tropical Storm Alberto (1994) drifted over the Southeast United States and produced torrential rainfall. More than 21 inches of rain fell at Americus, Georgia. Thirty-three people drowned. Damages exceeded \$750 million.

Tropical Storm Claudette (1979) brought 45 inches of rain to an area near Alvin, Texas, contributing to more than \$600 million in damages.

Hurricane Agnes (1972) produced floods in the Northeast United States which contributed to 122 deaths and \$6.4 billion in damages.

Long after the winds from Hurricane Diane (1955) subsided, the storm brought inland flooding to Pennsylvania, New York, and New England contributing to nearly 200 deaths and \$4.2 billion in damages.

Freshwater floods accounted for more than half (59%) of U.S. tropical cyclone deaths over the past 30 years. These floods are why 63% of U.S. tropical cyclone deaths during that period occurred in inland counties. At least 23% of U.S. tropical cyclone deaths occur to people who drown in, or attempting to abandon, their cars. 78% of children killed by tropical cyclones drowned in freshwater floods. So, the next time you hear hurricane -- think inland flooding!



What can you do?

- When you hear hurricane, think inland flooding.
- Determine whether you live in a potential flood zone.
- If advised to evacuate, do so immediately.
- Keep abreast of road conditions through the news media.
- Move to a safe area before access is cut off by flood water.
- Do not attempt to cross flowing water. As little as six inches of water may cause you to lose control of your vehicle.
- Develop a flood emergency action plan.
- Have flood insurance. Flood damage is not usually covered by homeowners insurance. Do not make assumptions. Check your policy.

The National Flood Insurance Program is a pre-disaster flood mitigation and insurance protection program. The National Flood Insurance Program makes federally backed flood insurance available to residents and business owners

[National Flood Insurance Program](#) call **1-888-CALL-FLOOD ext. 445, TDD# 1-800-427-5593**.

Inland Flooding Safety Actions

- ▶ When you hear hurricane, think inland flooding.
- ▶ Learn your vulnerability to flooding by determining the elevation of your property.
- ▶ Evaluate your insurance coverage; as construction grows around areas, floodplains change. If you are in a flood area, consider what mitigation measure you can do in advance. More from the [National Flood Insurance Program](#).
- ▶ In highly flood-prone areas, keep materials on hand like sandbags, plywood, plastic sheeting, plastic garbage bags, lumber, shovels, work boots and gloves. Call your local emergency management agency to learn how to construct proper protective measures around your home.
- ▶ Be aware of streams, drainage channels and areas known to flood, so you or your evacuation routes are not cut off.
- ▶ Monitor [NOAA Weather Radio](#).
- ▶ Avoid driving into water of unknown depth. Moving water can quickly sweep your vehicle away.
- ▶ Restrict children from playing in flooded areas.

- ▶ Test drinking water for potability; wells should be pumped out and the water tested before drinking.
- ▶ Do not use fresh food that has come in contact with floodwaters. Wash canned goods that come in contact with floodwaters with soap and hot water.
- ▶ Stay away from downed power lines.

Rainfall: Rule of thumb

- ▶ **Rainfall is generally heaviest with slower moving storms (less than 10 mph).**

To **estimate** the total rainfall in inches from a hurricane, divide 100 by the forward speed of the storm in miles per hour ($100 / \text{forward speed} = \text{estimated inches of rain}$).

Your local NWS forecast office may have a more accurate estimation method for your area.

Source: The National Hurricane center (<http://www.nhc.noaa.gov/>) – August 2002