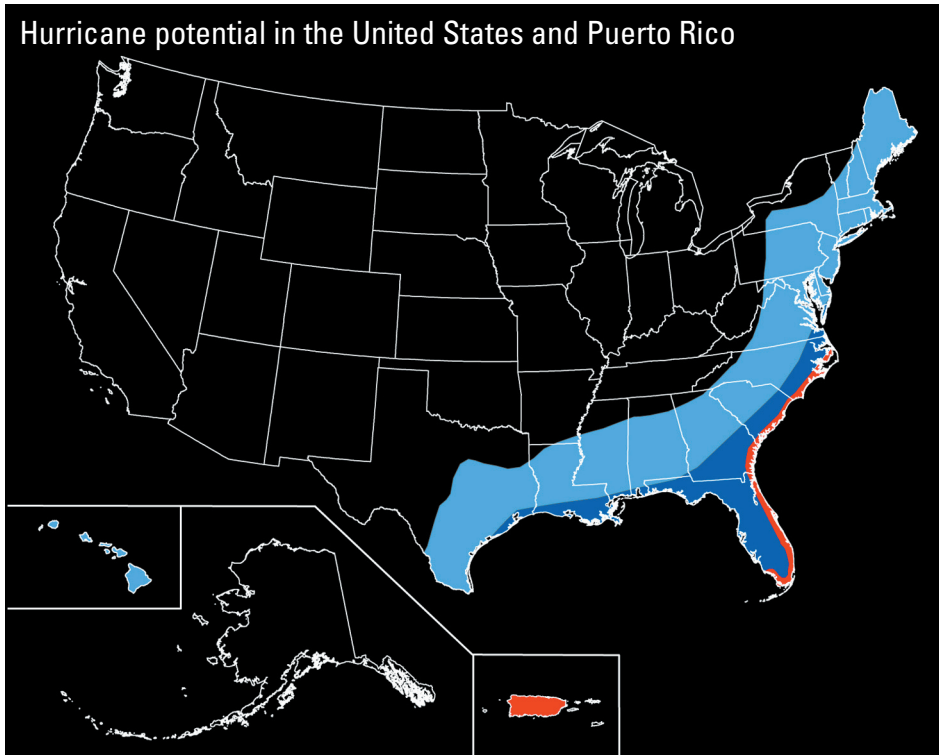




## USGS Science Helps Build Safer Communities

# Hurricane Hazards — A National Threat



The number of hurricanes expected to occur during a 100-year period based on historical data—light blue area, 20 to 40; dark blue area, 40 to 60; red area, more than 60. Map not to scale. Source: the National Atlas and the USGS

### A Population in Jeopardy

Hurricanes bring destructive winds, storm surge, torrential rain, flooding, and tornadoes. A single storm can wreak havoc on coastal and inland communities and on natural areas over thousands of square miles.

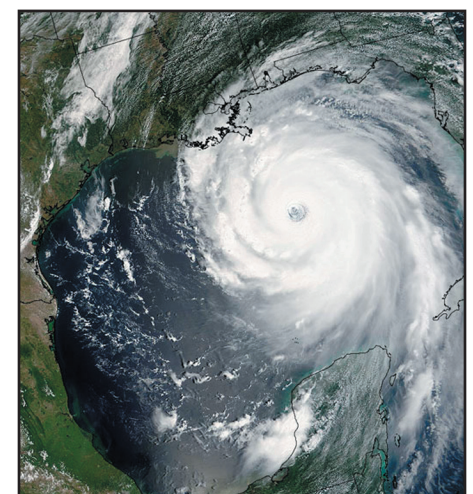
In 2005, Hurricanes Katrina, Rita, and Wilma demonstrated the devastation that hurricanes can inflict and the importance of hurricane hazards research and preparedness.

More than half of the U.S. population lives within 50 miles of a coast, and this number is increasing. Many of these areas, especially the Atlantic and Gulf coasts, will be in the direct path of future hurricanes. Hawaii is also vulnerable to hurricanes.

### Losing Land and Property

As seaside populations and development escalate, so does property damage from hurricanes. Recent Atlantic hurricane seasons have been the costliest on record, with losses of \$42 billion in 2004 and in the hundreds of billions in 2005.

Research suggests that Americans should brace for more of the same, because the Atlantic basin is in an active period that might persist for decades.



Hurricane Katrina caused billions of dollars in damage and killed hundreds in August 2005.

Hurricane Impacts	USGS Science Priorities
<ul style="list-style-type: none"> <li>• Hurricane hazards include intense wind, high waves, strong currents, flooding, storm surge, tornadoes, landslides, and coastal erosion.</li> <li>• Storm surge, a dome of ocean water, can exceed 20 feet in height and extend along shore for 100 miles.</li> <li>• Hurricanes can affect the Nation's energy supply; more than one-fourth of U.S. crude oil production is from the Gulf of Mexico.</li> <li>• Hurricanes often leave an area more vulnerable to subsequent storms.</li> </ul>	<ul style="list-style-type: none"> <li>• Develop ability to make near real-time maps for emergency planning and response</li> <li>• Increase ability to record hurricane impact and recovery of natural systems</li> <li>• Use airborne and other remote sensing techniques with hurricane response models to improve coastal mapping and to predict where barrier islands and evacuation routes will likely be severed or washed over in an approaching hurricane</li> <li>• Expand the network of near real-time streamgages for flood forecasting</li> <li>• Develop an ecological alert system based on a hurricane's potential to spread wildlife diseases and invasive species</li> </ul>

Barrier islands and coastal wetlands are the first line of defense for many Atlantic and Gulf coast communities, and many are rapidly eroding.

Since the 1930s, Louisiana has lost about 1,900 square miles of coastal land from subsidence, inundation, and erosion during hurricanes. Hurricane Katrina eliminated about 35 square miles of wetlands protecting New Orleans. In 2004, Hurricane Ivan eroded Alabama's coast an average of 40 feet.

### Coordinated Federal Efforts

The National Oceanic and Atmospheric Administration (NOAA) is responsible for forecasting, tracking, predicting the landfall of, and issuing warnings for hurricanes and tropical storms in the United States and its territories to the public, the media, and other government agencies and authorities. Science to forecast hurricane impacts is a collaborative effort among the U.S. Geological Survey (USGS), NOAA, the National Aeronautics and Space Administration, the U.S. Army Corps of Engineers, and others.

### USGS Science Can Help

Before a hurricane makes landfall, the USGS ensures that equipment along the Gulf and Atlantic coasts is ready to monitor coastal change. A USGS network of

streamgages also reports real-time stream flow to officials issuing flood warnings.

USGS geospatial databases and maps assist pre-storm evacuation planning and post-storm rescue and recovery.

Before and after major storms, scientists survey habitats and document erosion on coasts and barrier islands by using airborne and satellite imagery. The USGS deploys amphibious aircraft to conduct environmental assessments and to aid emergency response.

Immediately after Hurricane Katrina, the USGS used satellite and aerial imagery to create maps linking 911 calls to locations where people needed to be rescued. USGS scientists also assisted Federal and State agencies by conducting water quality and sediment testing to indicate the safety of water for human contact.

Scientists also complete ground surveys to help land managers with habitat and wildlife impact assessments and to secure scientific equipment in remote field sites.

The USGS provides scientific research and analyses that help the public, policy makers, and the emergency management community make informed decisions on how to prepare for and react to hurricane hazards and reduce losses from future hurricanes.



These images are from New Orleans in the aftermath of Hurricane Katrina in August 2005. (USGS photos)

## Hurricane Facts

- Hurricanes are revolving storms originating near the equator that are accompanied by torrential rain and wind speeds exceeding 74 mph.
- In the Atlantic and eastern Pacific, including Hawaii, these whirling storms are called hurricanes. In the western Pacific, including East Asia and Australia, they are typhoons. In the Indian Ocean, they are cyclones.
- The Saffir-Simpson Hurricane Scale expresses a hurricane's strength by its sustained wind speed—Category 1: 74-95 mph; Category 2: 96-110 mph; Category 3: 111-130 mph; Category 4: 131-155 mph; Category 5: in excess of 155 mph. August and September are the peak months of the hurricane season, which lasts from June 1 to November 30.
- Hurricanes can be as much as 400 miles wide.
- The 1938 New England hurricane was the costliest natural disaster of its time, with about \$3 billion in damage. Losses from Hurricane Hugo, which hit South Carolina in 1989, were almost \$11 billion. Hurricane Andrew in 1992 destroyed more than \$20 billion in property. All figures are in 2005 dollars.
- The deadliest natural disaster in U.S. history was the 1900 Galveston hurricane, which took an estimated 8,000 lives. Six of the 10 costliest U.S. disasters resulted from tropical weather systems.

### For More Information

<http://www.nwrc.usgs.gov/hurricane/hurr2001.htm/>

<http://coastal.er.usgs.gov/hurricanes/>

<http://www.usgs.gov/>