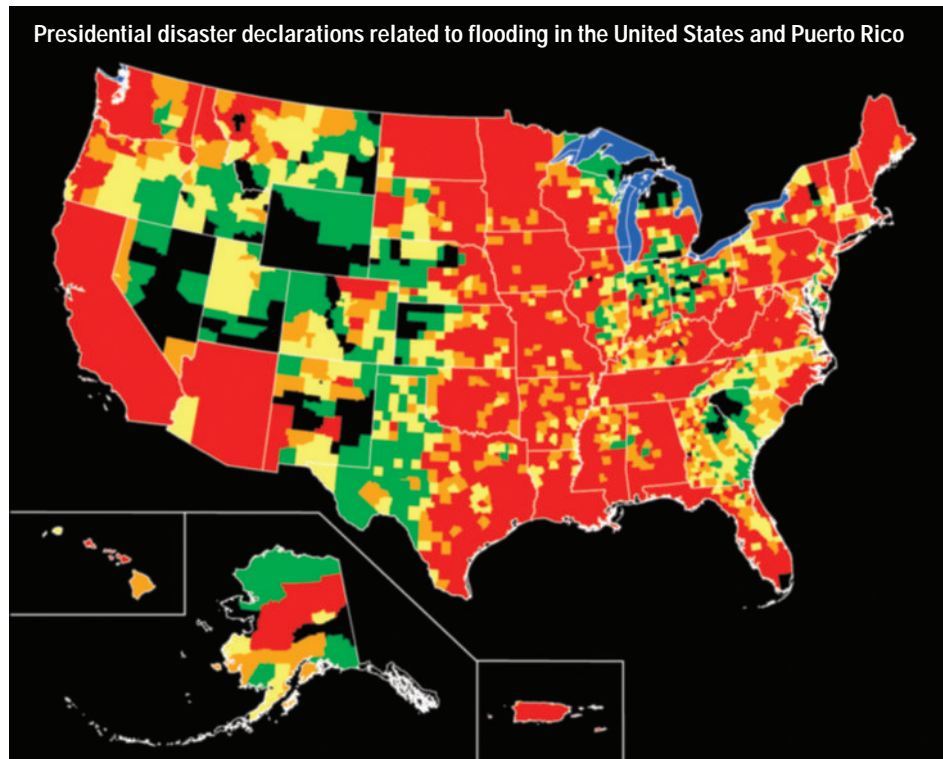




## USGS Science Helps Build Safer Communities

# Flood Hazards—A National Threat



Presidential disaster declarations related to flooding in the United States, shown by county: Green areas represent one declaration; yellow areas represent two declarations; orange areas represent three declarations; red areas represent four or more declarations between June 1, 1965, and June 1, 2003. Map not to scale. Sources: FEMA, Michael Baker Jr., Inc., the National Atlas, and the USGS

### Floods Can Happen Almost Anywhere

In the late summer of 2005, the remarkable flooding brought by Hurricane Katrina, which caused more than \$200 billion in losses, constituted the costliest natural disaster in U.S. history.

However, even in typical years, flooding causes billions of dollars in damage and threatens lives and property in every State.

Natural processes, such as hurricanes, weather systems, and snowmelt, can cause floods. Failure of levees and dams and inadequate drainage in urban areas can also result in flooding.

On average, floods kill about 140 people each year and cause \$6 billion in property damage.

Although loss of life to floods during the past half-century has declined, mostly because of improved warning systems, economic losses have continued to rise due to increased urbanization and coastal development.

### Science Helps Meet the Challenge

Reduction of flood losses must be based on the best possible understanding of how and where floods happen and how they cause damage.



During the 1993 Midwest floods, boaters pass an airport in Chesterfield, Mo., Friday, July 9, 1993. (FEMA photo/Andrea Booher)

Flood Impacts	USGS Science Priorities
<ul style="list-style-type: none"> <li>• Cost \$6 billion in average annual losses</li> <li>• Cause about 140 deaths each year</li> <li>• Damage infrastructure, causing indirect losses due to disruption of economic activity</li> <li>• Threaten greater losses as increased urbanization and coastal development lead to heightened vulnerability</li> </ul>	<ul style="list-style-type: none"> <li>• National Streamflow Information Program: the Federal backbone for acquiring real-time and historical streamflow information</li> <li>• StreamStats: a Web-based capability of estimating streamflow information everywhere, including places lacking gages</li> <li>• Flood forecasting: using historical data to enable flood modeling</li> <li>• Study climate change, which directly affects the intensity and frequency of floods</li> </ul>

For more than 100 years, the U.S. Geological Survey (USGS) has played a critical role in reducing flood losses by operating a nationwide streamgauge network that monitors the water level and flow of the Nation's rivers and streams.

Through satellite and computer technology, streamgages transmit real-time information, which the National Weather Service (NWS) uses to issue warnings so local emergency managers can get people out of harm's way, and operators of flood-control dams and levees use to take action to reduce flood impacts.

This information is also available to the public at <http://waterdata.usgs.gov/nwis/rt/>.

Streamgages provide long-term data that scientists need to better understand floods and to define flood-prone areas as well.

The USGS has developed a flood-mapping method that delivers online flood maps—including time of arrival, depth, and extent of flooding—before a storm hits. See <http://pubs.water.usgs.gov/fs2004-3060/> for more information.

Streamgage data also help in designing structures resilient to flooding and are the basis for the Federal Emergency Management Agency's (FEMA) National Flood Insurance Program, the only Federal insurance program for natural hazards.

The USGS national streamgauge network forms the scientific basis both for long-term planning before and after floods and for emergency response during flooding.

### Collaboration Leads to Protection

The USGS works closely with the NWS, the Army Corps of Engineers, and other Federal agencies and partners in every State, as well as many local governments, to fund and maintain about 7,000 streamgaging stations. These relationships ensure that scientific information is always available.

### Looking Ahead

The USGS will continue research on the physical and statistical characteristics of flooding, determining how flood frequency changes with urbanization, climate variability, and other factors for locations nationwide.

The USGS will also work to modernize the streamgaging network and increase its coverage and robustness.

For areas without streamgages—roughly 90 percent of river basins in the United States—scientists are developing new methods to gather streamflow information.

The USGS helps the public, policy-makers, and the emergency management community make informed decisions on how to prepare for and react to flood hazards and reduce losses from future floods.



During flooding, USGS hydrographers prepare to make a streamflow measurement at the White River at Petersburg, In., Tuesday, January 11, 2005. (Evansville Courier & Press/Vincent Pugliese)



At the Sorlie Bridge between Grand Forks, N. Dak., and East Grand Forks, Minn., floodwaters from the Red River of the North crest at 54.35 feet, Tuesday, April 22, 1997. This depth was more than 24 feet above flood stage and more than 4 feet above the previous record. (USGS photo)



USGS biologists prepare to launch a wetlands research boat for search and rescue in New Orleans during flooding from Hurricane Katrina, Sunday, September 4, 2005. (USGS photo)

### Flood Facts

- The 1993 Midwest flooding was the costliest river-related flood in history, at \$20 billion.
- More than half of all fatalities during floods are auto related, usually the result of drivers misjudging the depth of water on a road and the force of moving water. A car can float in just a few inches of water.
- The principal causes of floods in the Eastern United States and the Gulf Coast are hurricanes and storms.
- The principal causes of floods in the Western United States are snowmelt and rainstorms.
- Flooding is the only natural hazard for which the Federal government provides insurance: FEMA's National Flood Insurance Program.

### For More Information

<http://water.usgs.gov/osw/>

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