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NOAA National Severe Storms Laboratory



SEVERE WEATHER 101

Flood Basics

Weather Briefly: Flooding



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What is flooding?

...occurring ... happen ... over ... a few inches of water, or more, cover a large area to the ... develop ... occur ...

occur within minutes or over a long period, and may last days, weeks, or longer. Floods are the most common and widespread of all weather-related natural disasters.

Flash floods are the most dangerous kind of floods, because they combine the destructive power of a flood with incredible speed. Flash floods occur when heavy rainfall exceeds the ability of the ground to absorb it. They also occur when water fills normally dry creeks or streams or enough water accumulates for streams to overtop their banks, causing rapid rises of water in a short amount of time. They can happen within minutes of the causative rainfall, limiting the time available to warn and protect the public.

Where and when do floods occur?

Flooding occurs in every U.S. state and territory, and is a threat experienced anywhere in the world that receives rain. *In the U.S. floods kill more people each year than tornadoes, hurricanes or lightning.*

What areas are at risk from flash floods?

Densely populated areas are at a high risk for flash floods. The construction of buildings, highways, driveways, and parking lots increases runoff by reducing the amount of rain absorbed by the ground. This runoff increases the flash flood potential.

Sometimes, streams through cities and towns are routed underground into storm drains. During heavy rain, the storm drains can become overwhelmed or plugged by debris and flood the roads and buildings nearby. **Low spots, such as underpasses, underground parking garages, basements, and low water crossings** can become death traps.

Areas near rivers are at risk from floods. Embankments, known as levees, are often built along rivers and are used to prevent high water from flooding bordering land. In 1993, many levees failed along the Mississippi River, resulting in devastating floods. The city of New Orleans experienced massive devastating flooding days after Hurricane Katrina came onshore in 2005 due to the failure of levees designed to protect the city.

Dam failures can send a sudden destructive surge of water downstream. In 1889 a dam break upstream from Johnstown, Pennsylvania, released a 30-40 foot wall of water that killed 2200 people within minutes.

Mountains and steep hills produce rapid runoff, which causes streams to rise quickly. Rocks and shallow, clayey soils do not allow much water to infiltrate into the ground. Saturated soils can also lead to rapid flash flooding. **Camping or recreating along streams or rivers** can be a risk if there are thunderstorms in the area. A creek only 6 inches deep in mountainous areas can swell to a 10-foot deep raging river in less than an hour if a thunderstorm lingers over an area for an extended period of time. Sometimes the thunderstorms that produce the heavy rainfall may happen well upstream from the impacted area, making it harder to recognize a dangerous situation.

Very intense rainfall can produce flooding even on dry soil. In the West, most **canyons, small streams and dry arroyos** are not easily recognizable as a source of danger. The causative rainfall can occur upstream of the canyon, and hikers can be trapped by rapidly rising water. Floodwaters can carry fast-moving debris that pose significant risks to life.

Ice jams and snowmelt can help cause flash floods. A deep snowpack increases runoff produced by melting snow. Heavy spring rains falling on melting snowpack can produce flash flooding. Melting snowpack may also contribute to floods produced by ice jams on creeks and rivers. Thick layers of ice often form on streams and rivers during the winter. Melting snow and/or warm rain running into the streams may lift and break this ice, allowing large chunks of ice to jam against bridges or other structures. This causes the water to rapidly rise behind the ice jam. If the water is suddenly released, serious flash flooding could occur downstream. Huge chunks of ice can be pushed onto the shore and through houses and buildings.

National Weather Service Messaging Terminology

FLASH FLOOD WATCH or FLOOD WATCH

Flash flooding or flooding is possible within the designated watch area — be alert.

FLASH FLOOD WARNING or FLOOD WARNING

Flash flooding or flooding has been reported or is imminent — take necessary precautions at once! Get to higher ground!

Turn around, don't drown! Most fatalities in the US from flash flooding are from vehicles driving into flooded roadways.

URBAN and SMALL STREAM ADVISORY

Flooding of small streams, streets and low-lying areas, such as railroad underpasses and urban storm drains is occurring.

FLASH FLOOD STATEMENT or FLOOD STATEMENT

Follow-up information regarding a flash flood/flood event.

What we do: In order to evaluate the forecasting tools, we need observations of flash flooding. NSSL has assembled flash flood observations from USGS automated discharge measurements, trained spotter reports from the NWS, and from NSSL's [Severe Hazards Analysis and Verification Experiment \(SHAVE\)](#). This database is available for community research purposes.

NSSL has developed the state-of-the-science system for estimating heavy rainfall and resultant flash flooding. The [Multi-Radar Multi-Sensor](#) system provides rainfall rate estimates across the U.S. every two minutes, and these are input to a suite of hydrologic models and forecasting tools within the [Flooded Locations and Simulated Hydrographs \(FLASH\)](#) system.

[Learn more about NSSL's flood research →](#)

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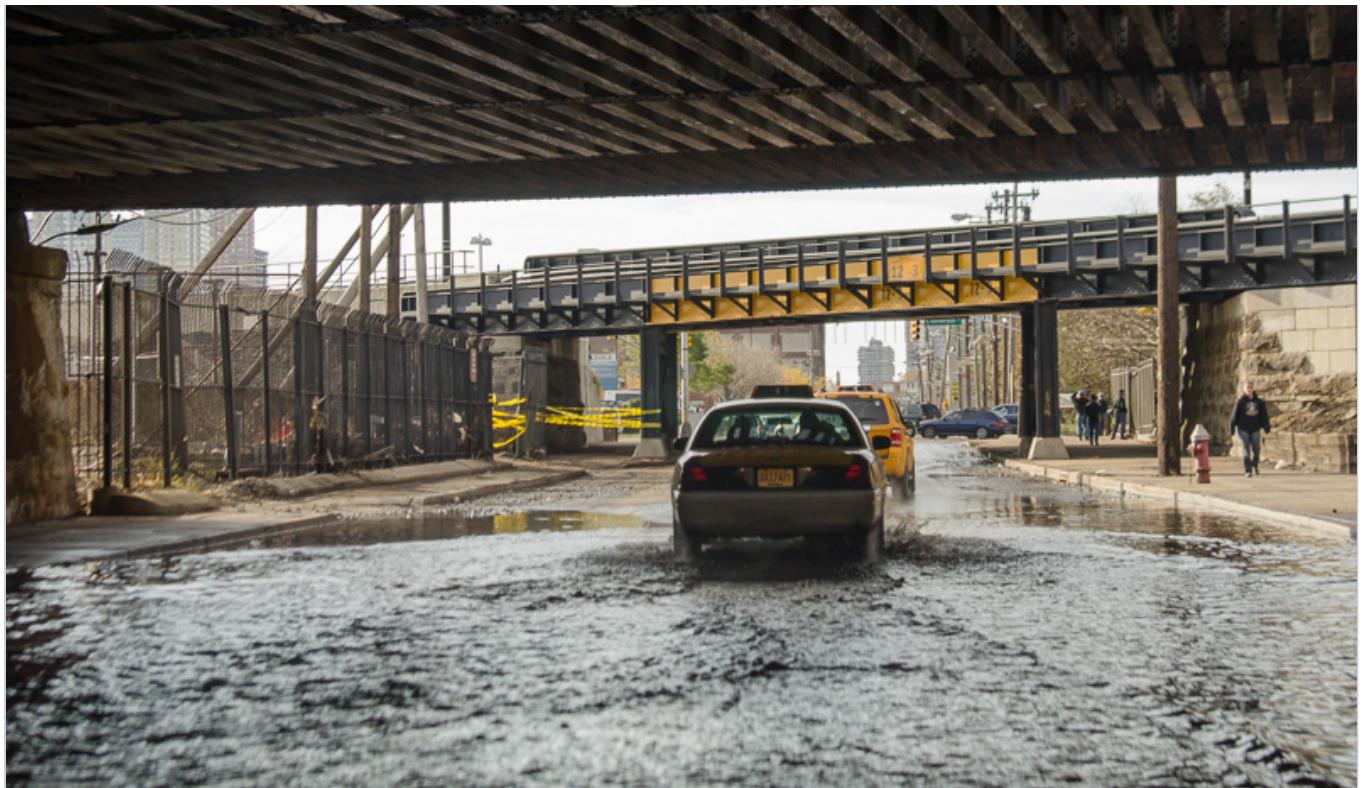
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TURN AROUND. DON'T DROWN.



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NOAA National Severe Storms Laboratory
120 David L. Boren Blvd.
Norman, OK 73072
USA
(405) 325-3620

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