



SCIPP Flash Flood Information Document

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Introduction to Flash Floods

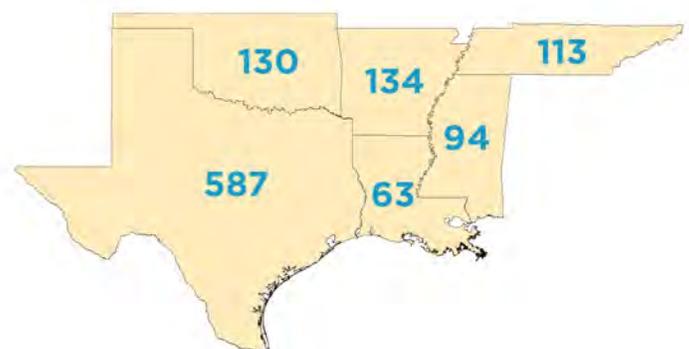
Over the past 30 years, flash flooding was responsible for the highest number of weather related fatalities within the United States (NOAA). On average, more U.S. property damage is due to floods than any other weather related disaster (NOAA). Similar to drought and tornados, flash floods occur in all states and can occur at all times of the year. Some states within the SCIPP region, such as Texas, are particularly susceptible to flash floods (Figure 1). Unlike other weather disasters, flood damage costs have generally increased in the United States throughout the twentieth century due to increased precipitation, population growth, and wealth (Pielke and Downton 2000).

Description

The American Meteorological Society defines a flash flood as a flood that rises and falls quite rapidly with little or no advance warning, usually as the result of intense rainfall over a relatively small area. Flash floods develop very quickly and produce tremendous amounts of rainfall that can flood nearby catchments, streams, and rivers within a matter of hours. Flash floods are unique in that a multitude of factors play a role in their severity. For example, the amount of pre-existing moisture in the soil is important to consider. If the soil is saturated, precipitation will not be absorbed as easily and the flash flood risk may increase. If the ground cover is dry and barren, little vegetation will exist to

absorb the water. Furthermore, the effects of a flash flood are more severe in urban areas compared to rural areas as urbanization changes the land cover of an area resulting in higher runoff rates due to lack of vegetation and natural drainage areas. Flash floods are also a product of rainfall intensity and duration. Flash floods can occur due to a slow moving system that results in persistent rain over long periods of time, but can also occur due to localized thunderstorms that produce large amounts of rain over shorter periods of time. While dam and levee failures can also lead to flash flooding, a large majority of flash floods are the result of convection, or thunderstorms. Multiple thunderstorms moving over the same area can result in enormous amounts of rainfall in just a few hours. While flash floods can occur during any time of the day, a majority occur during the evening hours making it difficult to anticipate the danger. The previously discussed factors indicate that flash floods are not only influenced by meteorological factors, but also hydrological and geological factors as well.

Figure 1: Average Annual Flood Reports from 1999 to 2008 (NWS via The Weather Channel)



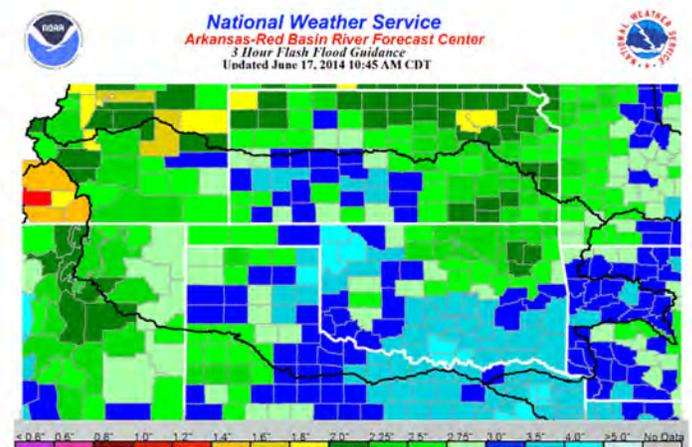
Forecasting Flash Floods

Flash floods are difficult to forecast due to their interdisciplinary nature and how quickly they develop. Thirteen River Forecast Centers (RFCs) exist in the United States to serve Weather Forecast Offices by providing invaluable hydrological information (river levels, streamflow, runoff, etc.) that aid forecasters in issuing flash flood warnings. RFCs within the SCIPP region can be seen in Figure 2. The RFCs also help produce the Flash Flood Guidance (FFG) product. FFG takes into account how much rainfall has fallen in addition to runoff rates for different basins. The final product is produced every 1, 3, and 6 hours and shows the amount of rainfall necessary to flood a basin (Figure 3). FFG is compared to rainfall estimates from radar to aid weather forecasters in deciding whether or not to issue a flash flood watch. When conditions appear favorable for a flash flood event, the National Weather Service issues a flash flood watch. When a flash flood event is occurring or is very close to occurring, the National Weather Service issues a flash flood warning.

Figure 2: River Forecast Centers within the SCIPP Region



Figure 3: Example of a Flash Flood Guidance Map created by the NWS and RFCs



What to do during a Flash Flood Event

1 **Keep your NOAA Weather Radio close by and listen to your local television and radio channels.** Your NOAA Weather Radio is an excellent and official source for real-time weather information and warnings.

2 **Be ready to evacuate.** Make sure to have an emergency kit of bottled water, canned food, any important documents, and medical supplies ready to grab if evacuated. Also be prepared to disconnect electrical appliances as floodwaters that come in contact with electrical outlets could make any return to your house dangerous.

3 **If evacuation orders are issued for your area, leave right away.** Even if it is not raining at your specific location, it can be pouring just upstream and floodwaters from upstream could be on their way to your location. Often it is only a matter of minutes before raging floodwaters reach your area.

4 **Get to higher ground.** If you are in a low-lying area or near a creek or river, immediately seek higher ground.

5 **Do not allow children to play in floodwaters.** Hidden sharp debris, electrical wires, snakes, and other hazardous materials make standing water dangerous to wade in.

6 **Never walk or drive through flooded roadways.** Most people underestimate the power of water. However, it only takes 6 inches of moving water to knock you off your feet. In other words, water rushing as high as the curb can sweep you off your feet. Furthermore, only 12 inches of moving water can float most small cars and 18 inches can carry away most large vehicles (NOAA). Nearly half of all flash flood deaths are vehicle related--don't become a statistic. Turn around and take another route.



Notable Flash Flood Events within the SCIPP Region

Oklahoma City Flash Flood Event: May 31 - June 1, 2013

While many associate May 31st, 2013 with the widest tornado that occurred in U.S. history near El Reno, not many realize that historic flash flooding occurred in Oklahoma City from May 31st through June 1st. Flash flooding occurred as numerous thunderstorms moved over the same area producing heavy rainfall and runoff. At least 23 water rescues were conducted and a total of 13 people lost their lives due to flash flooding.

Albert Pike Recreation Area Flash Flood Event: June 10-11, 2010

Heavy rainfall began to occur on the afternoon of June 10th and intensified throughout the night into the 11th. Campers in the Albert Pike Recreation Area were caught off guard as they awoke to flooded streams and creeks. The Little Missouri River rose almost 20 ft. within a few hours and crested at just over 23 ft. 20 people lost their lives, 24 were injured, and 60 water rescues were conducted. Estimated property damage was \$9 million dollars.

Nashville Flash Flood Event: May 1-2, 2010

Heavy rainfall developed along a stalled front stretching from Arkansas to Illinois. Flash flooding occurred as abundant moisture from the Gulf of Mexico reinforced the storms. In Nashville, 13.57 in. of rain fell in just two days. The Cumberland River reached 51.86 ft. on May 3rd. The regular flood stage is 40 ft. 11,000 structures were damaged and 11 people lost their lives in Nashville. Damage estimates were approximately \$2 billion dollars.



Texas Hill Country (Cuero & Victoria) Flash Flood Event: October 18, 1998

Fueled by moisture from two nearby hurricanes off the coast of Mexico, thunderstorms developed and repeatedly moved over the same area from the 17th through 18th. 31 people lost their lives and more than 10,000 people were displaced. Property damage from the flash flood totaled around \$750 million dollars.

Carencro Flash Flood Event: March 11-12, 2012

Heavy rains and flash flooding began on the evening of the 11th and reached a peak on the morning of the 12th. Carencro received approximately 15 in. of rain in just 24 hrs. The Mississippi River stage rose between 1-2 ft. per hour and crested at 22.5 ft. 500 homes were flooded and multiple water rescues were conducted.

Lower Mississippi River Valley (Jackson) Flash Flood Event: April 6-7, 2003

Heavy rainfall occurred from the 6th through 7th with Jackson International Airport reporting 8.5 in. of rain in 24 hrs. Parts of suburbs in northeastern Jackson reported up to 12 in. within 24 hrs. Heavy rainfall flooded several creeks and tributaries further affecting populated regions within Jackson. The Pearl River that runs through Jackson crested at 35.3 ft.

What You can do to Prepare

Flash floods are difficult to prepare for because they develop so quickly and little can be done in advance to prevent against them. However, steps can be taken to reduce the impacts of flash floods:

1 Know where you are location wise. While everyone lives in a flood zone, some areas are more susceptible to the severe effects of a flash flood. For example, do you live near a creek, stream, or river? Do you live near a dam? Do you live in a valley or near terrain that slopes downward? Do you live in an urban or rural area? All these factors can contribute to the severity of a flash flood event.

2 Know of a place higher up in elevation to go to in case of an emergency. When floodwaters are rapidly rising or approaching, you often have a matter of minutes to get to higher ground. Knowing exactly where to go and the safest route to get there reduces the chance of wasting valuable time.

3 Do not build in a floodplain. If you do live in a flood prone area, consider purchasing flood insurance since many homeowners' insurance policies do not cover damages due to floods.

4 Protect important documents from being damaged. Put important documents in a case that is waterproof or high up where water is unlikely to reach.

5 Keep a designated supply of emergency items. Prepare an emergency supply of canned foods, bottled water, and medical supplies as floodwaters can contaminate drinking water and make food dangerous to consume.

For More Information

1) National Weather Service Flood Safety: Provides a wealth of information concerning what to do before, during, and after a flood.

<http://www.floodsafety.noaa.gov/>

2) National Weather Service: The organization that issues flash flood warnings and weather forecasts for the entire country. Over 100 forecast offices cover small geographic areas.

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

3) Weather Prediction Center Quantitative Precipitation Forecasts: Produces quantitative precipitation forecast maps for the United States up to 7 days out.

<http://www.hpc.ncep.noaa.gov/qpf/qpf2.shtml>

4) National Flood Insurance Program: Distributes information regarding residential and commercial flood insurance policies in addition to analyzing your specific flood risk.

<https://www.floodsmart.gov/floodsmart/>

5) National Weather Service River Forecast Centers: Consists of thirteen River Forecast Centers across the United States that collect and disseminate forecasts and information concerning water resources for major rivers and river basins.

<http://water.weather.gov/ahps/rfc/rfc.php>

Contact Us

Please contact either one of our two program managers for more information about SCIPP or to get involved:

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References

Pielke, A.R., and M.W. Downton, 2000: Precipitation and Damaging Floods: Trends in the United States, 1932-97. *J. Climate*, **13**, 3625-3637

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