

United States Flood Loss Report – Water Year 2013

Executive Summary

Direct flood damages during Water Year 2013 (October 1, 2012 – September 30, 2013) totaled \$2.15 billion, 27% of the thirty-year average (1983 – 2012) of \$7.98 billion (adjusted to 2013 inflation). There were 69 flood-related deaths (78% of the 30-year average of 89). Of these fatalities, 25 were vehicle-related incidents, and 53 were attributed to flash flood events.

Water Year 2013 surpassed 2012 damage totals four-fold, but remains well below the 30 year average. A strong convective Spring 2013 season brought heavy rainfall and flooding to the Midwest from April 15-19 and to Oklahoma City, Oklahoma on May 31st. The heavy rainfall across the Midwest from Iowa to Michigan and extending eastward through Indiana, Ohio and Kentucky caused significant flood damages particularly in Illinois. These Midwest floods resulted in four fatalities and caused \$465 million in direct damages. On May 31, severe thunderstorms and heavy rainfall across Oklahoma City, Oklahoma, caused 13 flash flood fatalities. September monsoonal moisture produced prolonged periods of heavy rainfall, resulting in devastating flash floods and floods along the Colorado Front Range from September 11-17th. These floods resulted in 9 fatalities and \$715 million in damages.

Other significant Water Year 2013 flood loss events include the January 10, 2013 flood in Southwest Louisiana, which produced \$238 million in damages and the August 6-10, 2013 flooding in Missouri, which caused 3 fatalities and \$77 million in damages.

In years past, land falling hurricanes and tropical storms contributed significantly to the United States Flood Loss Report. In Water Year 2013, Hurricane Sandy was the only hurricane to make landfall in the United States. The impacts to life and property from Hurricane Sandy were immense, however, these impacts were primarily from storm surge and therefore not included in this report. The annual United States Flood Loss Report estimates direct damages from freshwater flooding only; it does not include storm surge or coastal flooding. For an analysis of the impacts of Hurricane Sandy see the *National Hurricane Center Tropical Cyclone Report, Hurricane Sandy*.¹

Detailed summaries and associated flood losses for the most significant events during Water Year 2013 are presented in this report. Additionally, a table of all flood losses by state is provided.

¹ Eric S. Blake, Todd B. Kimberlain, Robert J. Berg, John P. Cangialosi and John L. Beven II. "Tropical Cyclone Report Hurricane Sandy (AL182012) 22 – 29 October 2012" National Hurricane Center, 12 February 2013. Available from <http://www.nhc.noaa.gov/data/>

NWS Role in Flood Loss Statistics

There is no one agency in the United States with specific responsibility for collecting and evaluating detailed flood loss information. The National Weather Service (NWS), through its many field offices, provides loss estimates for significant flooding events. However, this task is ancillary to the primary focus of the NWS, providing forecasts and warnings for events that lead to death and damage. Therefore, the estimates provided here should only be considered approximations².

This report provides a summary of direct flood damages, which account for damage to (a) private property, including structural damage and lost agriculture; and (b) public infrastructure and facilities. Flood loss estimates reported by other entities, such as media, insurance, or other governmental agencies often include additional indirect flood-related costs such as (a) mitigation costs (e.g., sandbagging, temporary levees, and temporary shelters); and (b) projected estimates of economic loss (e.g., disruption to planting and harvesting, lost wages, disruption to transportation, interruption to commerce due to closed facilities, and reduction in tourism). Typically, flood loss estimates inclusive of indirect costs are much larger than the direct flood damage estimates reported here.

It is also important to note this report concerns itself only with freshwater flooding and does not account for coastal flooding related to cyclone-related storm surge. An example of this distinction is Hurricane Katrina in 2005, and again as discussed above in 2013 with Hurricane Sandy. In these events majority of flood deaths were caused by storm surge. Impacts were categorized separately from freshwater flooding (caused by significant rainfall and/or snow melt, dam or levee failures, and ice jams). Storm surge death and damages are not included in this report.

Detailed Major Events Summary

Southwest Louisiana – January 10, 2013 (\$238 million)

A stalled frontal boundary led to an extended duration of rain, thunderstorms, and tornadoes across Southwest Louisiana. Major flooding occurred along the Mermentau River where rainfall totals exceeded one foot in less than a 24-hour period at some locations during the event. Floodwaters slowly drained over a couple of weeks. Flooding was most severe across the western half of Saint Landry Parish and Bayou Des Cannes near Eunice, Louisiana. 235 structures were flooded during the event causing damages of \$238 million.

² Pielke, Jr., R.A., M.W. Downton, and J.Z. Barnard Miller, 2002: *Flood Damage in the United States, 1926-2000: A Reanalysis of National Weather Service Estimates*. Boulder, CO: UCAR.

Midwest Flooding – April 15-19, 2013 (4 fatalities, \$465 million)

A nearly stationary frontal boundary interacting with an unseasonably warm and moist air mass brought widespread showers and thunderstorms across a large swath of the Midwest from Iowa to Michigan and extending eastward through Indiana, Ohio and Kentucky.

Illinois suffered the brunt of this system's damages, particularly Peoria County, where damage to thousands of homes and businesses was reported. Nearly every creek and stream in the county was reportedly at or above bankfull flow. A record crest of 34.4 feet was recorded on the Illinois River at La Salle on April 20, 2013. Nearly every road in the county was impassable, including parts of Interstate 74, which was closed during the event. Concurrently, numerous water rescues were made. Debris flows were reported in the eastern bluffs along the Illinois River.

In La Salle County, Illinois, between Peoria and Chicago, the Des Plaines River reached a record crest of 11.42 feet on April 19th 2013, breaking the previous record of 9.90 feet set in 1987. Emergency management officials estimated over 500 buildings were inundated. In Marseilles, 1500 people were evacuated due to a levee that was compromised after several barges broke loose from a tugboat on the Illinois River and struck the levee. The resulting flooding led to dozens of homes and facilities being inundated along the riverfront. Five of the eight locks were damaged such that they could not close completely. Flooding occurred in Utica, east of Route 178, resulting in evacuations of properties adjacent to the Illinois & Michigan Canal. Creeks were reported out of their banks in Mendota. A fatality occurred on Route 351 at the crossing over the Illinois River near Peru. The victim drove around barricades and became stranded in knee-deep water.

On April 18-19th, two separate incidents near Arcadia, Indiana resulted in fatalities as motorists attempted to cross barricaded roadways that were flooded. Each incident resulted in a single fatality. In Missouri, where up to five inches of rain fell in a 24 hour period causing flash flooding on Joachim Creek in DeSoto, another motor vehicle related fatality occurred.

All told, the April floods of the Midwest resulted in four fatalities and caused \$465 million in direct damages, with \$400 million from Illinois alone.

Oklahoma City, Oklahoma – May 31, 2013 (13 fatalities)

The intersection of a slow-moving front, a dry line, and a zone of low-level, moisture-rich winds resulted in the development of severe thunderstorms with very heavy rain across Oklahoma City, Oklahoma. 8-11 inches of rain fell during the afternoon/evening of May 31st across the metropolitan area. The associated flash flooding led to 13 fatalities, 12 of which came as victims sought shelter from tornadoes in a storm drain that was subsequently flooded. Additionally, emergency management and civil officials reported 23 high-water rescues.

The later half of May 2013 is widely known for its deadly tornadoes impacting the communities of El Reno and Oklahoma City. While the tornadoes, large hail and damaging winds that occurred during the afternoon and evening of May 31, 2013 garnered most of the attention, the flash flooding that occurred in Oklahoma County was the deadliest ever for Oklahoma City, and the most deadly weather event in the state since the May 26-27, 1984 flash flood in Tulsa, when 14 fatalities occurred.

Missouri – August 6-10, 2013 (3 fatalities, \$77 Million)

A stalled frontal boundary led to multiple rounds of thunderstorms training over southern Missouri, which produced intense rainfall rates and very large rainfall totals. Most areas received between one and five inches of rainfall with some localized areas receiving up to 20 inches of rainfall from August 6-10. Portions of southwestern Pulaski County received an estimated 8-10 inches in 24 hours. There were several hundred rescues performed and evacuations of over 500 individuals from their homes across the Missouri Ozarks. Over 380 homes and 130 businesses were damaged by the floods.

Impacts were greatest near Waynesville, Missouri where 90 percent of the roads in Pulaski County were damaged. There were 25 low water crossings that were completely washed out and numerous more needed repairs. Up to 100 homes and businesses were inundated by floodwaters. Numerous cars were flooded or washed away. Most of the flooded homes were located along Mitchell Creek and Roubidoux River near downtown Waynesville, Missouri. Over 100 people were rescued from swift and high water. There were two flash flood fatalities, which occurred near downtown Waynesville, and one fatality in McDonald County, Missouri where a vehicle was washed off Highway 90 at Brush Creek just west of Jane, Missouri. Multiple people were rescued from flooding at campgrounds along the Elk River near Noel, Missouri. In total, the floods associated with this event caused \$77 million in damages and three fatalities.

Colorado Front Range – September 12-16, 2013 (9 fatalities, \$715 Million)

A deep southerly flow over Colorado, ahead of a near stationary low pressure system over the Great Basin, pumped copious amounts of monsoonal moisture into the area. In addition, a weak stationary front stretched along the Front Range Foothills and Palmer Divide which separates the Arkansas and Platte River Basins. As a result, a prolonged period of moderate to heavy rain developed across the region and the I-25 Urban Corridor. By the 14th, storm totals ranged from 6 to 18 inches, with the highest amounts found in the foothills of Boulder County. The peak stream flow discharge on Boulder Creek on the evening of September 12th surpassed the 1969 Boulder flood, but initial indications are that it fell short of the 1938 and 1894 floods.

During September 12-14, every stream and creek from the foothills in northern Jefferson County and Larimer County were in flood. This area drains east, into the South Platte River. Record flood stages were recorded along the South Platte

River in Colorado at Balzac, Weldona and Julesburg. Widespread flooding occurred along the South Platte River for several days as the floodwaters continued to route through the system, with damages reported from Fort Morgan and Brush to where the river reaches Sterling, Colorado and further downstream into Nebraska.

The devastating 2013 floods of the Colorado Front Range encompassed 4,500 square miles, resulted in 9 fatalities, and \$715 million in damages. Further south, isolated flash flooding in New Mexico during the same periods resulted in 2 fatalities. More than 11,000 people were evacuated, reportedly the largest evacuation of residents since Hurricane Katrina.

State, Commonwealth or Territory	Damages (whole numbers)	Fatalities
Alabama	\$3,881,000	0
Alaska	\$27,600,000	0
Arkansas	\$24,351,000	6
Arizona	\$3,162,000	2
California	\$47,838,100	2
Colorado	\$714,536,000	9
Connecticut	\$53,000	0
District of Columbia	\$0	0
Delaware	\$50,000	0
Florida	\$91,068,700	0
Georgia	\$8,086,000	1
Guam	\$700,000	0
Hawaii	\$0	2
Iowa	\$58,823,000	1
Idaho	\$1,233,000	0
Illinois	\$475,416,000	3
Indiana	\$513,250	3
Kansas	\$2,780,100	0
Kentucky	\$5,453,000	1
Louisiana	\$256,189,000	0
Massachusetts	\$640,000	0
Maryland	\$3,651,000	1
Maine	\$415,000	0
Michigan	\$103,533,500	0
Minnesota	\$15,735,000	0
Missouri	\$21,885,000	7
Mississippi	\$4,217,000	0
Montana	\$25,500	0
North Carolina	\$23,657,000	0
North Dakota	\$4,026,000	2
Nebraska	\$1,722,000	0
New Hampshire	\$10,710,000	0
New Jersey	\$1,115,000	0
New Mexico	\$16,469,300	3
Nevada	\$6,121,000	0
New York	\$20,608,000	1

Ohio	\$41,204,000	1
Oklahoma	\$1,244,000	16
Oregon	\$8,030,000	0
Pennsylvania	\$15,894,500	1
Puerto Rico	\$738,500	1
Rhode Island	\$1,788,000	0
South Carolina	\$2,110,000	1
South Dakota	\$1,195,000	0
Tennessee	\$78,102,000	0
Texas	\$10,172,700	3
Utah	\$3,110,000	0
Virginia	\$2,902,500	2
US Virgin Islands	\$20,000	0
Vermont	\$7,108,000	0
Washington	\$1,576,430	0
Wisconsin	\$13,134,000	0
West Virginia	\$5,552,000	0
Wyoming	\$2,272,000	0
TOTAL	\$2,152,417,080	69