United States Flood Loss Report – Water Year 2014

Executive Summary

Direct flood damages during Water Year 2014 (October 1, 2013 – September 30, 2014) totaled $2.86 billion, 36% of the thirty-year average (1984 – 2013) of $7.95 billion (adjusted to 2014 inflation). There were 55 flood-related deaths (65% of the 30-year average of 85). Of these fatalities, 29 were vehicle-related incidents, and 39 were attributed to flash flood events.

In terms of direct flood damages, one event accounted for over 60% of Water Year 2014's flood losses, the Detroit, Michigan floods of August 11, 2014. Four to six inches of rain fell in a four hour period over a relatively small, but densely populated area. Homes, business and infrastructure were inundated by the torrential rains resulting in $1.8 billion in direct flood damages.

Other significant Water Year 2014 flood loss events include the Central Texas Halloween 2013 floods, which caused 7 fatalities and caused $103 million in damages; the lower Ohio River valley December 21-24, 2013 floods which caused 8 fatalities; and the September 2014 Southwest monsoon season floods which caused 9 fatalities.

In most years, land falling hurricanes and tropical storms contribute significantly to the United States Flood Loss Report. In Water Year 2014 only one North Atlantic Hurricane, Hurricane Arthur, made landfall. Hurricane Arthur made landfall on July 3, 2014 and caused surge flooding up to 4 to 5 feet above normal over the central and northern Outer Banks in North Carolina. Since impacts were primarily from storm surge, they are not considered for the purposes of 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.

Detailed summaries and associated flood losses for the most significant events during Water Year 2014 are presented in this report. Additionally, a table of flood losses by state is provided.

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 approximations[1].

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

[1] 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.

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, the 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

Central Texas – October 31, 2013 (7 fatalities, $103 million)
A low pressure system centered across New Mexico and Texas produced heavy rainfall that led to major flooding in Central Texas on October 31, 2013. Twenty-four hour rainfall totals in New Braunfels, Texas ranged from 3.81 to 6.58 inches while in Spring Branch, Texas there were measurements of 10.40 and 11.75 inches. These rainfall totals in the Onion Creek watershed upstream of Austin, Texas caused a flash flood that hit portions of South Austin in the early morning hours. The USGS gauge on Onion Creek at Twin Creeks near Manchaca was overtopped with record flood water. The flood waters continued to move along Onion Creek, passing under I-35 and inundating several neighborhoods between I-35 and US Highway 183. Onion Creek at U.S, Highway 183 crested just over 40 feet at 9:30 AM the morning of October 31st. This was a record crest height for this location and was approximately 16 feet above major flood stage.

Four fatalities resulted from the flooding along Onion Creek and Williamson Creek. In total across Travis County and the City of Austin over 700 homes were damaged by the flooding, of which over 100 were destroyed. Most of the affected homes did not have insurance and were within the 100 year flood plain of Onion Creek. In the San Antonio area, another drowning occurred in the Guadalupe River near Canyon Dam. Two additional vehicle-related flash flood fatalities were reported in Caldwell County, including one victim who drove around a barricaded road.

In total the Central Texas floods caused 7 fatalities and $103 million in damages.

Lower Ohio Valley– December 21-24, 2013 (8 fatalities)
A deep low pressure system brought unseasonably moist air along a slow-moving cold front that passed across the lower Ohio and Middle-Mississippi valleys between December 20th and 22nd. Several low pressure systems moved north-northeast along the front, producing heavy rains, on the order of 2 to 3 inches over these few days. An emergency management official in La Center, Kentucky measured 9.12 inches of rain, most of which fell in 15 hours. The heavy rain led to widespread flash flooding during the morning hours of December 21st across southern Indiana, southern Illinois, Kentucky and Ohio. The Sandusky River at Tiffin, Ohio reached 11.11 feet, just above moderate flood stage.

In Kentucky, Nelson County emergency managers confirmed 3 fatalities occurred when their SUV ran into water covering a low water crossing. In Ballard County, Kentucky

numerous roads were flooded, including at least 16 roads that were impassable. One fatality occurred when a man was swept away by floodwaters after trying to get out of his car. In Indiana, flooding along the White River caused another fatality on State Route 257 east of Petersburg, when a pickup truck drove into floodwaters just south of the State Route 257 Bridge. An Owen County woman drowned when her car hit flood waters. Another fatality occurred when a woman drove her car into the backwaters of the Little Wabash River northeast of Fairfield. In Tiffin, Ohio, flooding impacted city streets and resulted in another fatality.

In total, 8 fatalities occurred across the Lower Ohio River Valley during the December 2013 floods.

Detroit, Michigan – August 11, 2014 ($1.8 billion)

A record rainfall event unfolded over Southeast Michigan on Monday, August 11, leading to widespread urban flooding and road closures. This event was caused by a strengthening low pressure system moving over the area, focusing tropical moisture from the south. The Detroit metropolitan area, with 4.57 inches in 24 hours, experienced the second highest rainfall ever recorded in a single day. The largest 24 hour rainfall ever recorded was 4.74 inches on July 31, 1925. The hardest hit areas included the Detroit metropolitan area and surrounding communities, along with the Flint and Saginaw Valley areas. Wayne, Southern Oakland and Macomb counties saw the worst of the flooding as 4 to 6 inches of rain fell over a 4 hour period. The Rouge River in Detroit hit a moderate flood stage of 17.51 feet; this was the fifth highest recorded crest of this river. The
Ecorse Creek of Dearborn Heights, a southern suburb of Detroit, hit a record flood stage of 10.20 feet, but the period of record for this site is only 10 years. The Clinton River in Sterling Heights hit a record stage of 20.84 feet but fell below flood stage in about 10 hrs.

Around 75,000 homes and businesses suffered damage, with over 3000 experiencing major damage. There was also damage to the roads and bridges, along with the city sewer pumps that were overwhelmed by the torrential rainfall. Farther north, across parts of Saginaw, Bay, and Genesee counties, flooded roads with 2 to 3 feet of water were reported. Total direct damages from the Detroit area flooding was $1.8 billion.

Southwest Monsoons – September 2014 (9 fatalities, $25 million)

The Southwest experienced severe monsoon season flooding in September 2014. Tropical moisture associated with the remnants of Hurricane Norbert was responsible for heavy rainfall on September 8 at Phoenix Sky Harbor International Airport, where a new maximum daily rainfall record of 3.30 inches was established. This is the most rain ever recorded on a calendar day since records began in Phoenix in 1895. Most of this rain fell within a seven hour period. Total precipitation for September at Sky Harbor Airport was 5.11 inches, which is 4.47 inches above normal and the second wettest September on record. Total precipitation for the year reached 7.33 inches, which is 1.41 inches above normal. In Texas, the Lower Colorado River Authority rain gauge network reported rains in the area totaled nearly 4 inches in 30 minutes. In Utah, flooding was widespread across Washington County, with floods reported in Enterprise, Ivins, Santa Clara, St. George, and Springdale, among others. Most rivers and washes in the area experienced flooding, with particularly high flows in the Beaver Dam Wash and the Virgin River. Rock and mud slides were common across the area, temporarily closing

several highways across the county. Very heavy rain also occurred over northeast and central El Paso with over 5 inches of rain reported in about 4 hours.

In Arizona, a fatality occurred when a car was swept against a pedestrian bridge in the Alamo Wash in Pima County. In Pinal County, a motorist drowned in the Cadillac Wash. In New Mexico, flash flooding near Whites City washed away two vehicles near the Carlsbad Caverns Visitor Center, one fatality resulted. Another flood victim was found in the Santa Fe River after heavy rainfall and flash flooding there. In Texas, a flood victim was found near Lake Austin in Travis County. A flood victim drowned in El Paso. In Zion National Park in Utah, two hikers were stranded by the flood waters; one of the hikers escaped to safety, but the other drowned. In St. George, a fatality occurred when flash flood waters at least four feet deep flowed down the normally dry Bittercreek Wash and swept away a vehicle. In California, a fatality occurred when his vehicle was swept down a flooded trail in Joshua Tree National Park.

In total, 9 fatalities and over $25 million in damages were reported during the Southwest Monsoon season of 2014.

FLOOD DEATHS AND DIRECT DAMAGES BY STATE Water Year 2014		
State, Commonwealth or Territory	**Damages** (whole numbers)	**Fatalities**
Alabama	$34,613,460	2
Alaska	$912,000	0
American Samoa	$0	0
Arizona	$13,468,000	2
Arkansas	$29,883,000	0
California	$3,144,300	1
Colorado	$1,773,000	0
Connecticut	$0	0
Delaware	$0	0
District of Columbia	$0	0
Florida	$195,360,830	3
Georgia	$495,500	0
Guam	$0	0
Hawaii	$0	0
Idaho	$17,777,500	0
Illinois	$140,693,000	1
Indiana	$11,760,850	5
Iowa	$46,219,800	1
Kansas	$546,600	0
Kentucky	$5,716,100	7
Louisiana	$1,733,000	2
Maine	$1,994,000	1
Maryland	$5,335,000	0
Massachusetts	$1,003,000	0
Michigan	$1,807,634,000	0
Minnesota	$42,660,500	0
Mississippi	$6,311,000	1
Missouri	$1,013,000	1
Montana	$1,855,500	0
Nebraska	$1,906,000	1
Nevada	$11,632,500	0
New Hampshire	$3,061,000	0
New Jersey	$8,850,250	0
New Mexico	$4,207,100	2
New York	$68,457,499	0
North Carolina	$2,829,000	0

North Dakota	$10,833,000	0
Ohio	$71,149,000	1
Oklahoma	$537,000	0
Oregon	$0	1
Pennsylvania	$10,988,000	0
Puerto Rico	$2,500	0
Rhode Island	$84,000	0
South Carolina	$2,346,500	2
South Dakota	$7,966,000	1
Tennessee	$52,225,000	2
Texas	$214,935,300	15
Utah	$5,375,000	2
Vermont	$3,065,000	0
Virginia	$555,500	1
Virgin Islands	$0	0
Washington	$4,291,000	0
West Virginia	$2,483,000	0
Wisconsin	$464,000	0
Wyoming	$1,280,000	0
TOTAL	**$2,861,426,089**	**55**