



## **Appendix D. Recent FEMA Disaster Declarations**



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Between 1954 and 2012, New Jersey has been included in 49 FEMA major disaster declarations (DR), emergency declarations (EM), or fire management assistance declarations (FMA). The 2011 State Plan discussed FEMA declarations in New Jersey that occurred between September 1999 and December 2010. For this Plan update, FEMA declarations for New Jersey that occurred between January 1, 2011 and December 31, 2012 will be described further in this Appendix. With documentation being so extensive, not all sources have been identified or researched. Therefore, not all information may be included in the descriptions below.

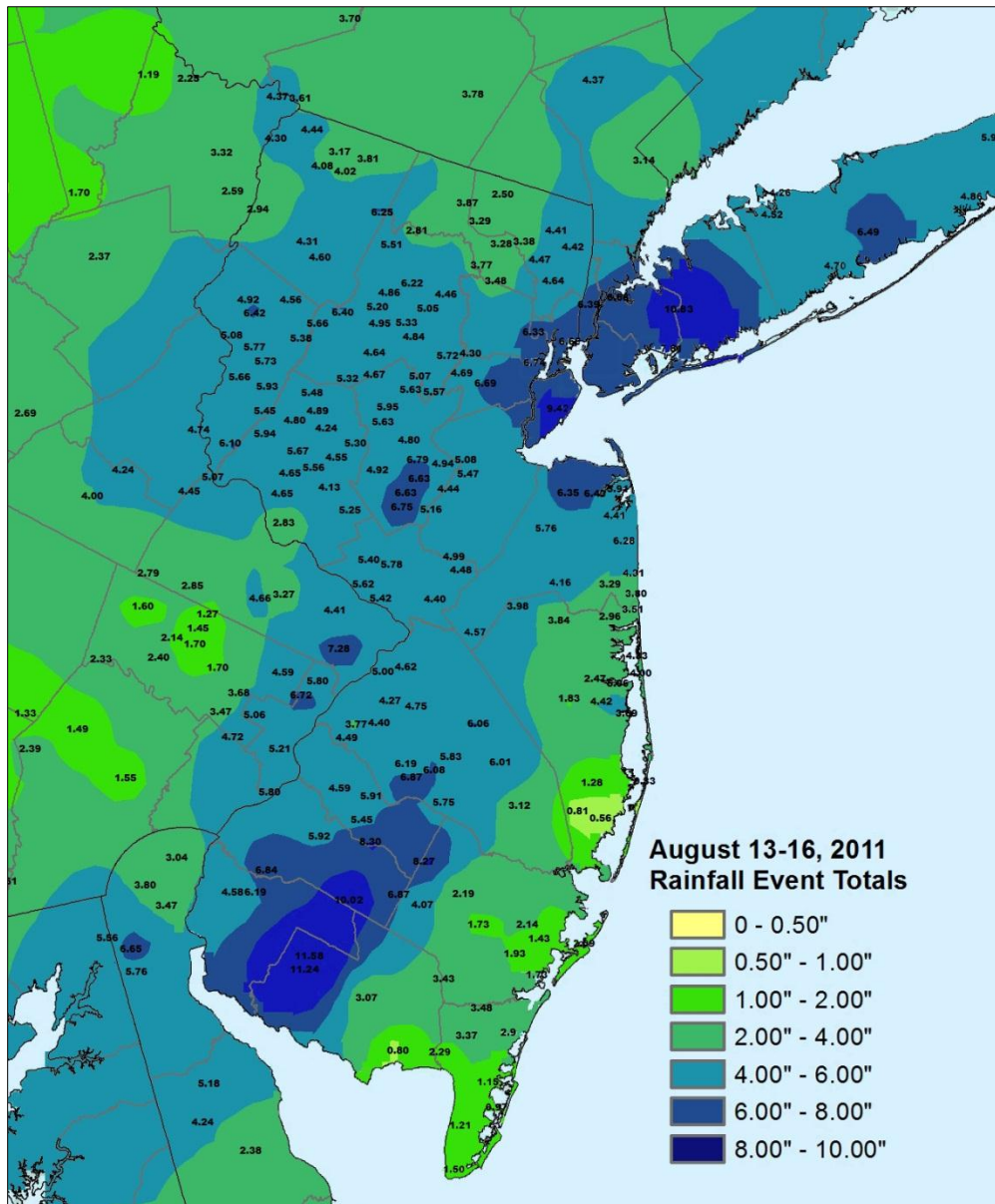
### DR-4033 – Severe Storm and Flooding – August 2011

Between August 13 and 14, 2011, heavy rains brought flash flooding and flooding of several moderate-sized rivers in southwest and central New Jersey. Eastern Salem, western Cumberland, eastern Gloucester, eastern Camden, and western Atlantic Counties were especially hit hard. Roads and several dams were overtopped or destroyed in these counties. Rainfall totals in these counties included 10.82 inches in Upper Deerfield Township (Cumberland County), 8.53 inches in Franklin Township (Gloucester County), 8.04 inches in Winslow Township (Camden County), and 7.51 inches at Hammonton (Atlantic County). Wind gusts downed trees and wires in some locations. A wind gust of 40 miles per hour (mph) was observed at Seaside Heights (Ocean County).

Storms continued in New Jersey on August 15 and impacted those areas that were not damaged from the storms on August 13 and 14, 2011. Rainfall totals included 3.63 inches at Hardyston Township (Sussex County), 3.12 inches in Rockaway Township (Morris County), and 3.40 inches in Upper Township (Cape May County). Pea size hail was reported in Bridgewater Township (Somerset County). Moderate flooding was observed in Sussex and Somerset Counties. On August 16, nearly an inch of rain fell at Buena Vista Township (Atlantic County) and 0.68 inches fell in Rumson (Monmouth County). Figure D-1 shows the rainfall totals for this event.



Figure D-1. August 13-16, 2011 Rainfall Event Totals



Source: Office of the New Jersey State Climatologist (ONJSC) 2011

As a result of the heavy rains, many rivers, creeks and streams crested, reaching near-record flood stage. The Great Egg Harbor at Folsom crested at 8.2 feet on August 16 and the Maurice River at Norma, which drains both Cumberland and Salem Counties, crested at 6.3 feet on August 16, 2011.

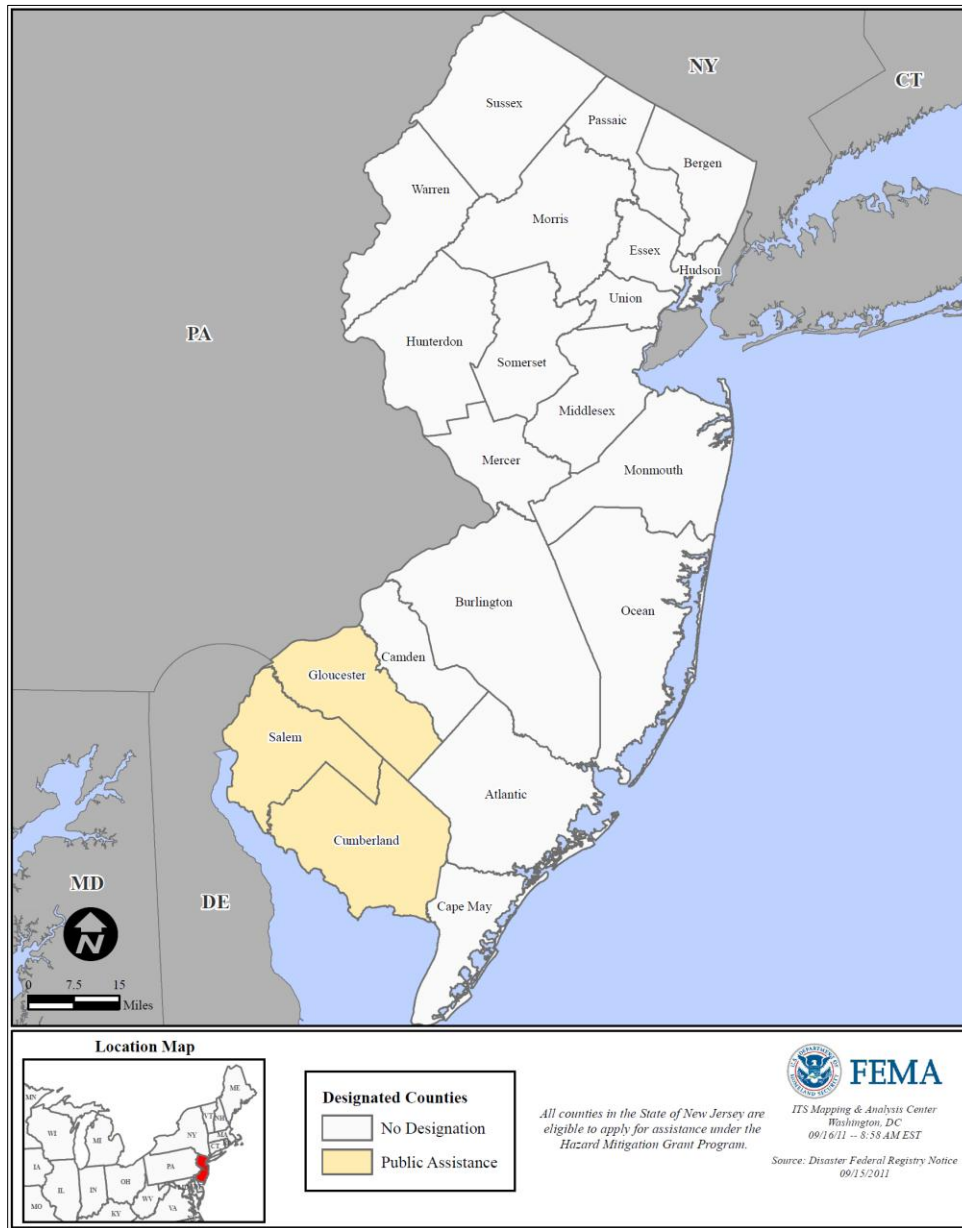
Several dams were affected by this event. In Cumberland County, the Sunset Lake and Raceway Dams in Bridgeton City either breached or failed. The Seelys Mill Pond Dam and Bostwick Dam in Upper Deerfield Township remained intact; however, created significant hazards due to roadways located above the dams. In Salem County, the Elmer Dam in Elmer Borough and the Palatine, Centeron Lake, Parvins Mill and Rainbow Lake dams in Pittsgrove Township, were either breached or held, but presented significant hazard levels because of the roadways above.



In Cumberland, Gloucester, and Salem Counties, more than 181 homes were damaged. Specifically, 33 homes received major damage, 116 homes received minor damage, and 32 homes were considered affected. Many bridges, dams, and roadways were washed away in these counties and Rowan University in Gloucester County sustained substantial water damage.

Overall, this severe storm event resulted in 1 death and over \$25 million in property damages in New Jersey (NOAA-NCDC 2013). FEMA declared a major disaster declaration (DR-4033) for New Jersey, which included Cumberland, Gloucester, and Salem Counties. Figure D-2 shows the designated areas for the FEMA disaster. FEMA obligated a total of \$4,513,243.21 in public assistance (PA) grants.

Figure D-2. Designated Areas for Severe Storm and Flooding, FEMA-DR-4033



Source: FEMA 2011

Note: The yellow indicate the counties that received Public Assistance



### **FEMA DR-4021 - Hurricane Irene – August 2011**

Hurricane Irene struck the State of New Jersey between August 27 and 28, 2011 and moved up the coast, bringing hurricane-force winds and torrential rainfall. Irene was reclassified as a tropical storm prior to making landfall in New Jersey. The storm caused the largest coastal evacuation in State history, record flooding on many rivers, power outages over 700,000 residents, and at least 12 fatalities.

At least one million residents and visitors were evacuated from coastal counties, from Cape May County to Monmouth County. During the storm, rainfall rates exceeded over one inch per hour, with flash flooding becoming a dangerous hazard. Tropical storm force winds throughout New Jersey brought down numerous trees and power lines, resulting in power outages and structural damages. Along the coast, winds gusted at near hurricane force, reaching 69 mph at Harvey Cedars (Ocean County), 66 mph at the Atlantic City Marina (Atlantic County), and 65 mph at Point Pleasant (Ocean County). Inland, gusts ranged between 40 and 60 mph (ONJSC 2011).

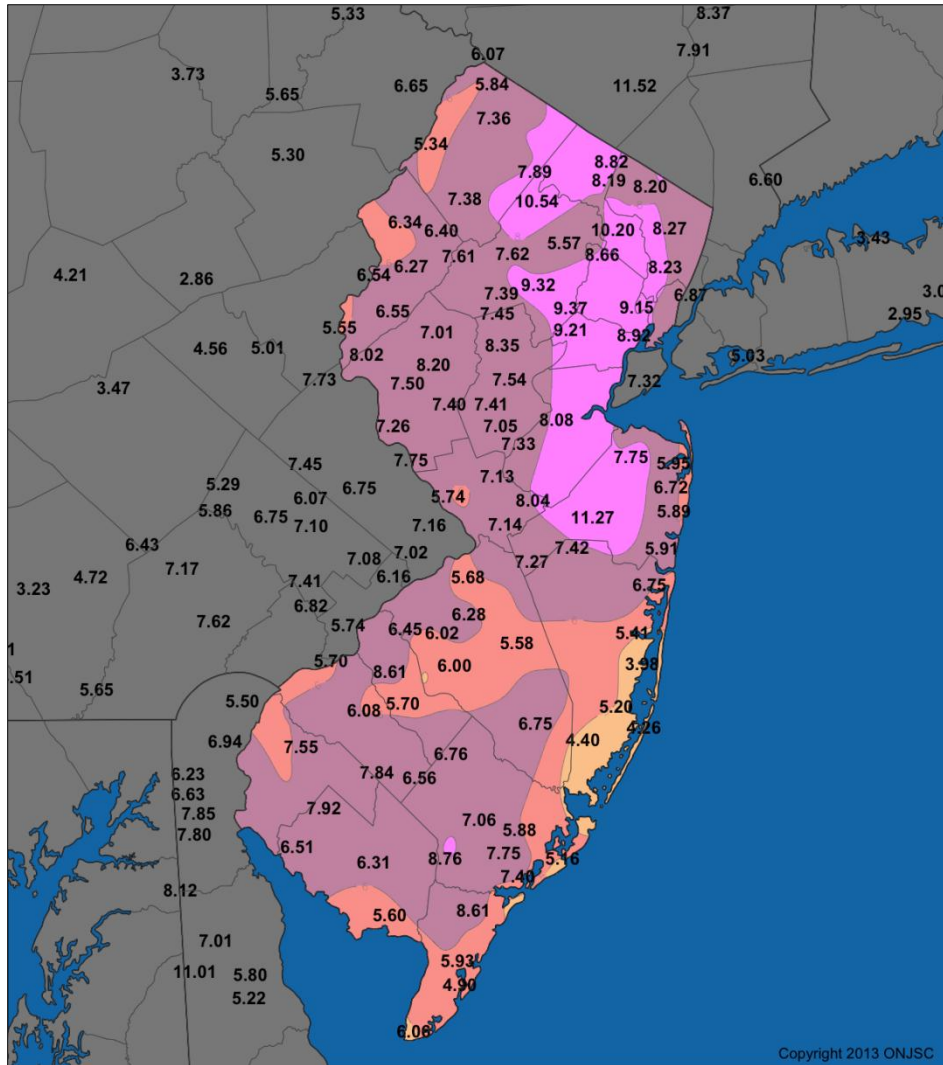
Rainfall totals ranged between 2.13 inches in York Haven and 11.52 inches in Monroe (Figure D-3), which caused major flooding and beach erosion. The statewide rainfall average was approximately 7 inches. Irene was New Jersey's largest rainstorm in over a century. Six weather stations had their highest one-day rainfall totals on August 28, 2011 (ONJSC 2011).

- Canistear Reservoir (Sussex County) – 6.98 inches
- Lambertville (Hunterdon County) – 7.5 inches
- Oak Ridge Reservoir (Morris County) – 7.58 inches
- Hightstown (Mercer County) – 7.89 inches
- New Brunswick (Middlesex County) – 7.96 inches
- Freehold/Marlboro (Monmouth County) – 8.23 inches (ONJSC 2011)

The rain resulted in streams and rivers rising to record or near-record stages. Homes, businesses, and roadways were inundated throughout New Jersey. The Passaic River at Little Falls (Passaic County) crested at approximately 14.2 feet. This is the second highest level on record, only behind the October 10, 1903 crest of 17.5 feet and surpassing 12.9 feet on April 7, 1984. At Bound Brook (Somerset County), the Raritan River crested at 41.9 feet, just behind the 42.1 feet reached on September 17, 1999 following Hurricane Floyd (ONJSC 2011).



Figure D-3. Tropical Storm Irene Storm Total Precipitation, 2011



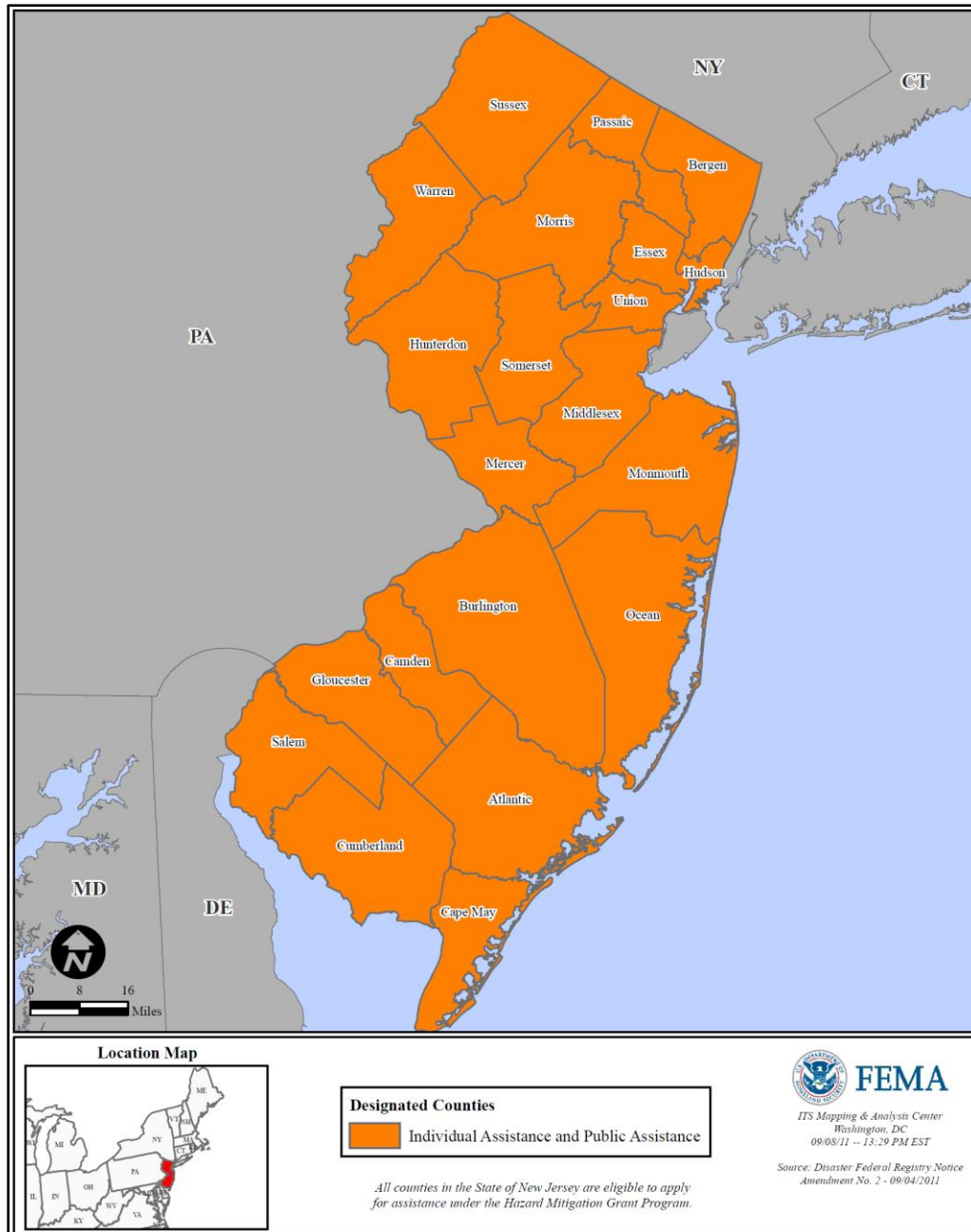
Source: ONJSC 2013

The torrential rains flooded both major and local roadways, causing hundreds of road closures and impeded travel. Portions of State Route 3 in Bergen County; U.S. 46 in Essex County; and I-80, State Route 20, State Route 23, U.S. 202 and U.S. 64 in Passaic County, all remained flooded into early September. In Morris County, a portion of I-287 collapsed. An aerial survey of Bergen, Essex, Morris, Passaic, and Somerset Counties was performed on August 30, 2011. This survey found that at least 2,080 homes suffered major damage, including damage to homes in areas not impacted by past flood events. This damage made it impossible for individuals to return to their homes for an extended period of time.

Overall, Hurricane Irene resulted in 7 deaths and over \$760 million in property damages (ONJSC 2013). FEMA declared a major disaster declaration (DR-4021) for New Jersey, which included all 21 counties in the State. Figure D-4 shows the designated areas for the FEMA disaster. FEMA received a total of 49,280 individual assistance (IA) applications and approved a total of \$176,949,241.27 for IA. FEMA obligated a total of \$114,498,277.19 in public assistance (PA) grants.



Figure D-4. Designated Areas for Hurricane Irene, FEMA-DR-4021



Source: FEMA 2013

### DR-4039 – Remnants of Tropical Storm Lee – September 2011

The remnants of Tropical Storm Lee arrived in New Jersey on September 5, 2011, bringing heavy rains throughout the State. A flood watch for several counties (Hunterdon, Mercer and Sussex Counties) was in effected from September 5 through September 7. On September 6, the NWS issued an alert on the increased threat of moderate to major flooding.



By September 7, 2011, three to five inches of rain fell across the State. Continued flood warnings were issued for rivers in Hunterdon and Passaic Counties. Evacuations and sheltering activities were ongoing in several counties. As a result of the heavy rains, major flooding of the Passaic River occurred in Little Falls and Pine Brook, the Pompton River at Pompton Plains, and moderate flooding along parts of the Delaware River.

The flooding caused road closures across New Jersey, including:

- Hunterdon County – I-78, U.S. 22, and State Routes 29 and 179
- Mercer County – I-95, U.S. 1 and State Routes 175 and 29
- Passaic County – State Routes 20 and 23
- Warren County – State Route 57 and U.S. 46
- Sussex County – State Routes 15, 182, and 57

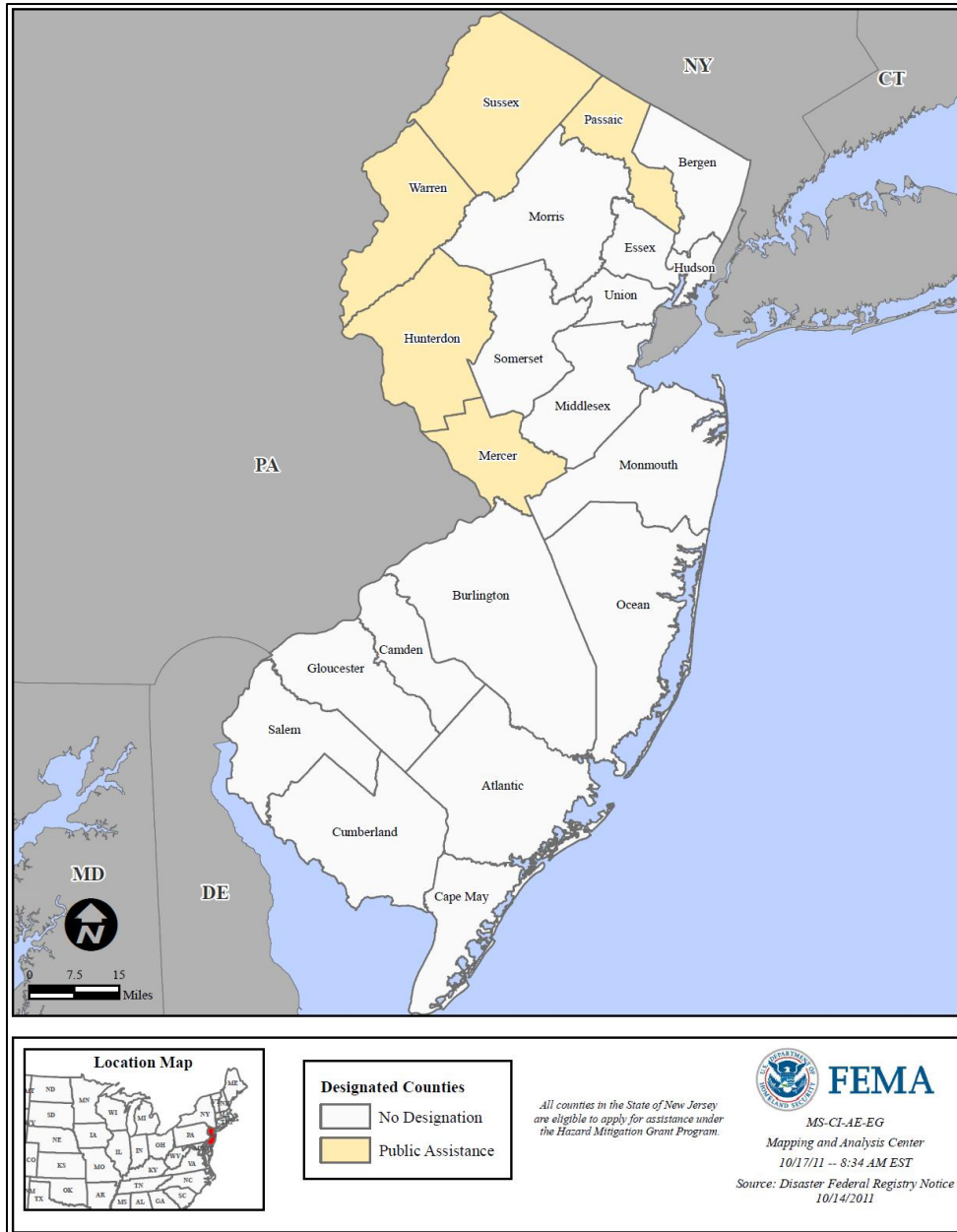
The Delaware River Joint Toll Bridge Commission closed four bridges into Pennsylvania on September 8: New Hope-Lambertville Bridge, the Centre Bridge-Stockton Bridge, the Uhlerstown-Frenchtown Bridge, and the Lumberville-Raven Rock Pedestrian Bridge. The City of Trenton evacuated approximately 1,200 residents in the area of Riverside Drive and Lee Avenue. The Rivers Edge Apartments in Ewing Township had approximately 300 residents displaced. The New Jersey Department of Treasury initiated emergency protective measures to minimize damage at the State House in the City of Trenton.

Overall, New Jersey had approximately \$10 million in property damage from the remnants of Tropical Storm Lee (NOAA-NCDC 2013). FEMA declared a major disaster declaration (DR-4039) for New Jersey, which included five counties (Hunterdon, Mercer, Passaic, Sussex, and Warren Counties). Figure D-4 shows the designated areas for the FEMA disaster. FEMA obligated a total of \$4,152,279.29 in public assistance (PA) grants.





Figure D-5. Designated Areas for Remnants of Tropical Storm Lee, FEMA-DR-4039



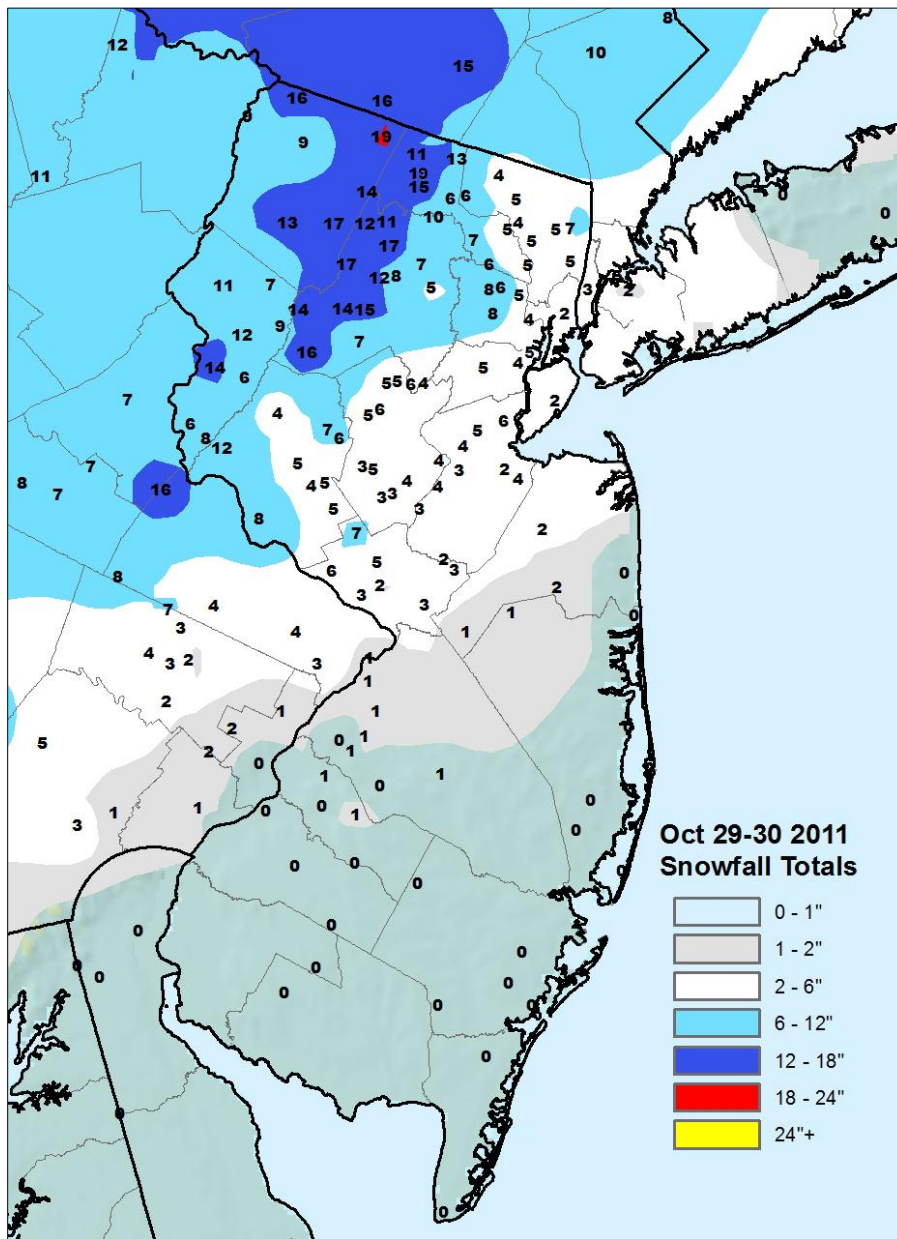
Source: FEMA 2011



DR-4048 – Severe Storms – October 2011

Rain began to fall in southern New Jersey early on October 29, 2011 and spread north. Some northern areas of the State saw the precipitation begin as snow and during the morning, the rain turned to snow in central and northern New Jersey. Moderate to heavy snow continued into the afternoon, mixing with sleet in lower elevations. Once the snow tapered off during the morning of October 30, 2011, New Jersey had experienced its largest October snowstorm since the late 18<sup>th</sup> century. Snowfall totals ranged from 0.2 inches in several locations to 19.1 inches in Vernon Township (Sussex County) (record storm total). Several other locations broke records for October snowfall totals (ONJSC 2011). Figure D-6 shows the snowfall totals throughout the State.

Figure D-6. October 29-30, 2011 Snowfall Totals



Source: ONJSC 2011

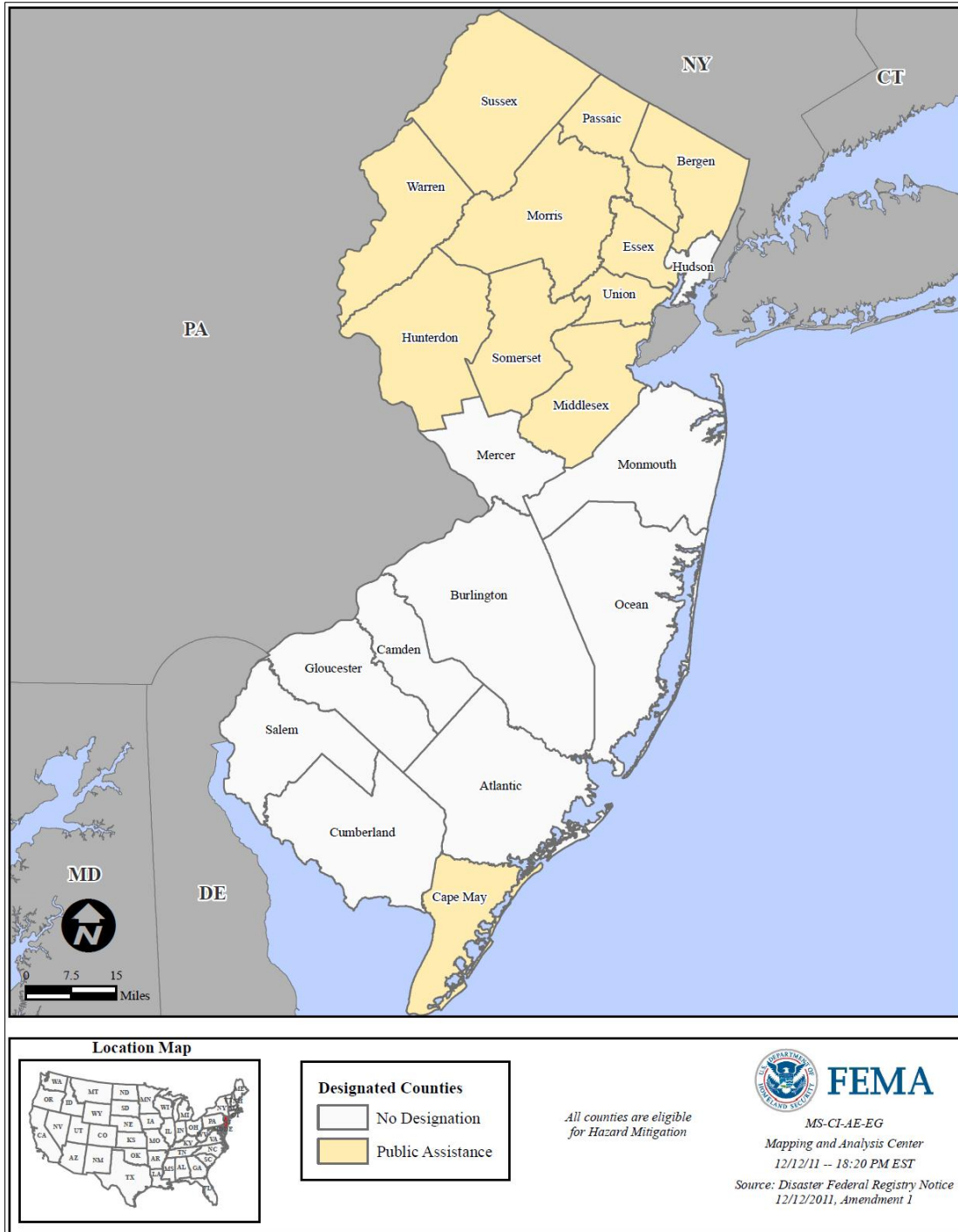


Once several inches of snow had accumulated, tree branches and entire trees began to snap and crash onto homes, power lines and cars. By the end of the storm, over 600,000 customers lost power, with some remaining without power for over a week. The areas impacted by snow did not experience large wind gusts. However, areas along the shore did. Wind gusts of 56 mph were observed at the Atlantic City Marina (Atlantic County), 51 mph at Seaside Heights (Ocean County), 49 mph at Harvey Cedars (Ocean County), 40 mph at Point Pleasant (Ocean County), and 40 mph at Bivalve (Cumberland County) (ONJSC 2011).

Overall, this severe storm event resulted in eight deaths (ONJSC 2011). FEMA declared a major disaster declaration (DR-4048) for New Jersey, which included 11 counties (Bergen, Cape May, Essex, Hunterdon, Middlesex, Morris, Passaic, Somerset, Sussex, Union, and Warren). Figure D-7 shows the designated areas for the FEMA disaster. FEMA obligated a total of \$24,843,185.64 in public assistance (PA) grants.



Figure D-7. Designated Areas for the Severe Storm, FEMA-DR-4048



Source: FEMA 2011

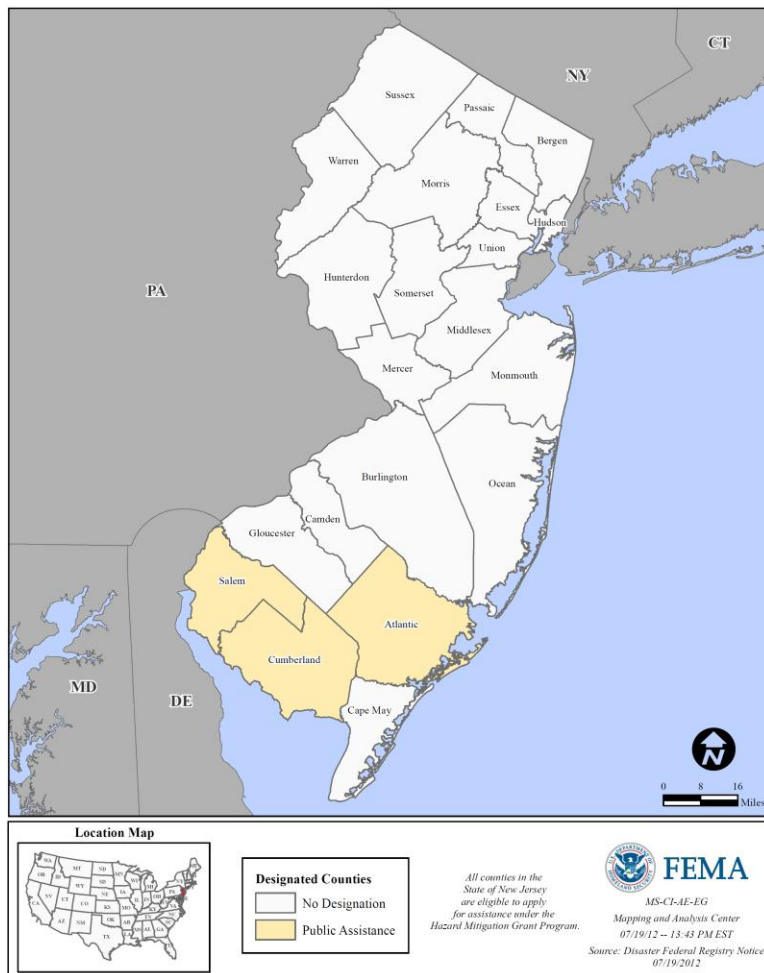


DR-4070 – Severe Storms and Wind - June 2012

On June 30, 2012, a storm traveled through southern New Jersey, bringing widespread wind gusts exceeding 60 mph that downed trees and power lines. A derecho crossed the State that lasted about 10 minutes and brought straight-line winds that caused tremendous damage to those areas impacted. Rainfall totals from this storm included 1.48 inches in Upper Deerfield (Cumberland County) and 1.46 inches in West Creek (Ocean County). Wind gusts were recorded at 81 miles per hour (mph) in Tuckerton (Atlantic County), 74 mph in Absecon (Atlantic County), 67 mph in Bivalve (Cumberland County), 66 mph at the Atlantic City Marina (Atlantic County), 64 mph in Mullica (Atlantic County), and 62 mph in Upper Deerfield (Cumberland County). Hail up to 0.75 inch to 1.25 inches in diameter was reported in Absecon, Tuckerton, and Egg Harbor Townships (Atlantic County) (ONJSC 2012).

Overall, New Jersey had approximately \$20 million in property damage and three storm-related fatalities. FEMA declared a major disaster declaration (DR-4070) for New Jersey, which included three counties (Atlantic, Cumberland, and Salem). Figure D-8 shows the designated areas for the FEMA disaster. FEMA obligated a total of \$9,744,730.09 in public assistance (PA) grants.

Figure D-8. Designated Areas for the Severe Storm and Wind, FEMA-DR-4070



Source: FEMA 2012



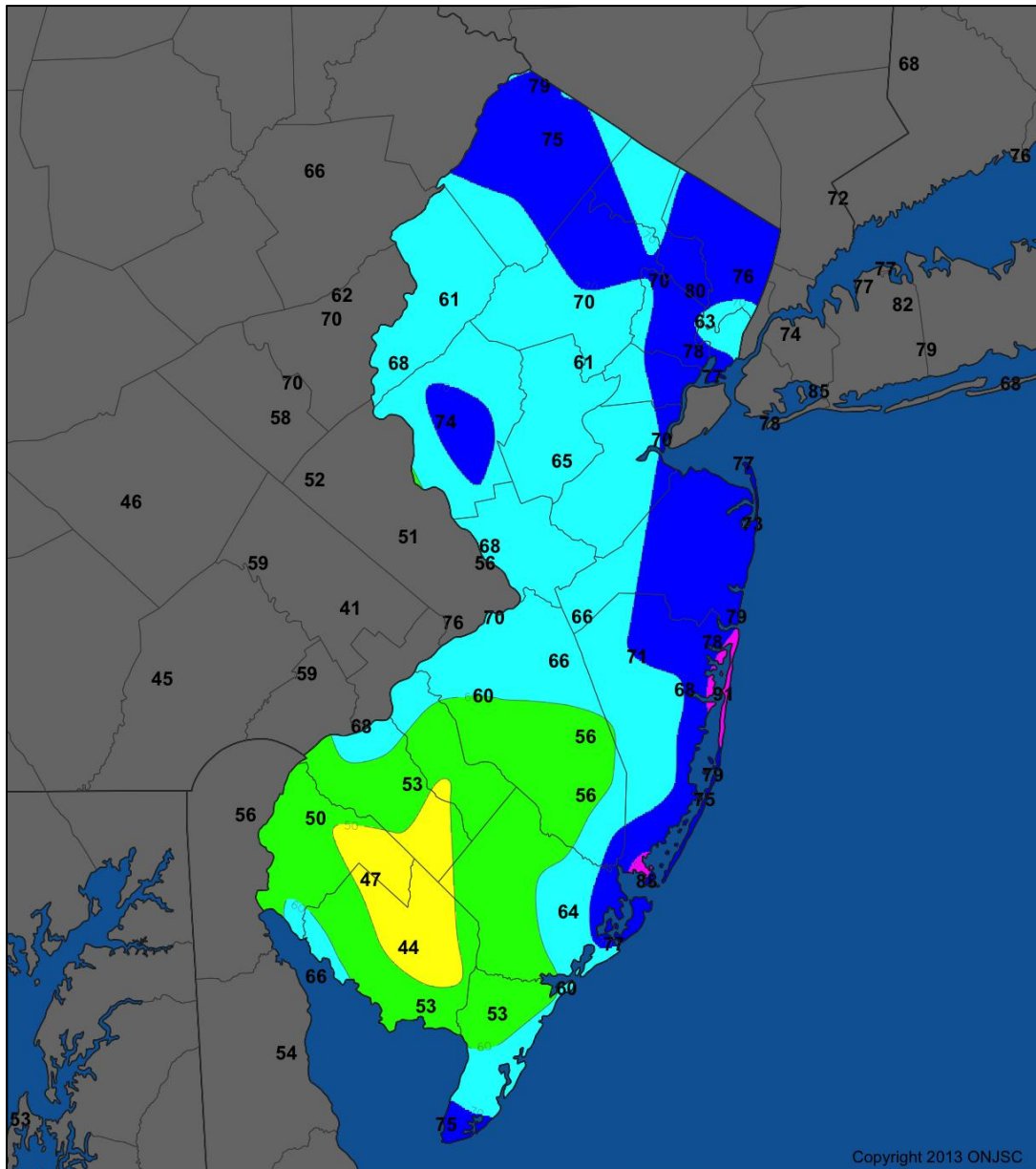
**DR-4086 – Hurricane Sandy – October-November 2012**

Hurricane Sandy was the eighteenth named storm and the tenth hurricane of the 2012 hurricane season. A surface high pressure blocking pattern over northern New England, combined with a strong mid-level trough moving east from the Midwest were the two primary factors which established Sandy's landfall trajectory into southern New Jersey (NWS 2013).

Hurricane Sandy was classified as a Category 1 hurricane as it approached the New Jersey coastline on the morning of October 29, 2012, and a post-tropical cyclone as it came ashore near Atlantic City during the evening. This storm brought hurricane-force wind gusts to coastal and inland parts of the State, nearly a foot of rain in the far southern portions, a State record low barometric pressure, and a record storm surge along the coast and in adjacent water bodies. Hurricane Sandy's damages to the State equaled or surpassed the worst coastal damage on record. The storm surge along the northern coast of New Jersey exceeded the previous record at Sandy Hook by over three feet. Rainfall totals ranged less than one inch to 12.71 inches in Stone Harbor (Cape May County). Wind gusts ranged from 44 mph in Millville (Cumberland County) to 91 mph in Seaside Heights (Ocean County) (ONJSC 2012). Figure D-9 shows the peak wind gusts during Hurricane Sandy.



Figure D-9. Hurricane Sandy Wind Gusts



Source: ONJSC 2013

Richard Stockton College researchers noted nearly all of their 105 monitored beach sites showed evidence of sand volume losses (Richard Stockton College 2013). Despite early USACE estimates that 12 million cubic yards of sand were lost as a result of the storm, later reports indicated that only 6.2 million cubic yards were lost as a result of Sandy (Thompson 2013). However, even this reduced estimate of sand loss is enough to fill a 170-acre landfill (Mooney 2012). Displacement occurred primarily in Monmouth and Ocean counties, though points in south Jersey beaches also experienced sand loss (Thompson 2013). For further information regarding the post-storm survey and assessment after Hurricane Sandy, see <http://intraweb.stockton.edu/eyos/page.cfm?siteID=149&pageID=160>.



Areas starting from Long Beach Island and extending south along the coastline experienced the most severe beach erosion during the storm. Coastal communities along Long Beach Island (Ocean County) lost approximately 5 to 6 feet of vertical beach. In Atlantic County, beaches at Atlantic City, Ventnor, Margate and Longport lost an average of 4 feet of sand vertically. In Cape May County, Ocean City experienced a 6- to 8-foot vertical cut in the beach, and Stone Harbor lost approximately 2 to 3 feet of vertical sand along the entire beach. Stone Harbor also lost approximately 13,000 feet of sand fence (NJDEP 2013).

Figure D-10 illustrates the impact of Hurricane Sandy on New Jersey beach communities. Generally communities that had undergone aggressive beach nourishment projects over the past several years fared better than those that did not. For additional photographs of impacts from the storm, see <http://intraweb.stockton.edu/eyos/page.cfm?siteID=149&pageID=160>.





Figure D-10. Pre- and Post-Hurricane Sandy Ariel Photo – Mantoloking, NJ



Source: USGS 2012

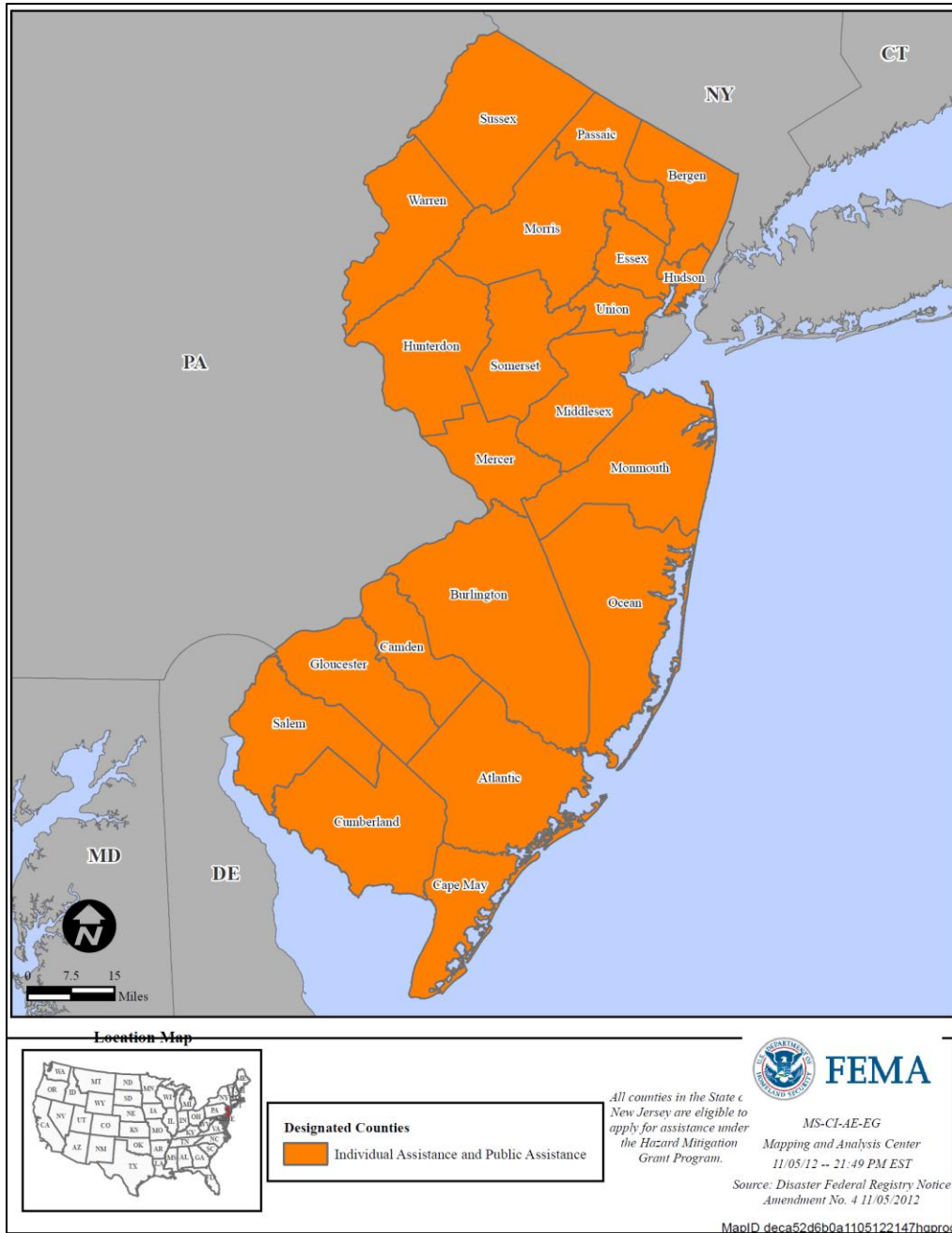
Note: The yellow arrow indicates the location of the structure in Mantoloking, NJ prior to and after Hurricane Sandy.

Overall, New Jersey had over \$24 billion in damages, 34 deaths, over 72,000 homes and businesses damaged or destroyed, 2.7 million people without power, and 8.7 million cubic yards of debris left behind (Associated Press 2012; FEMA 2013; NOAA-NCDC 2013). FEMA declared a major disaster declaration (DR-4086) for New Jersey, which included all 21 counties. Figure D-11 shows the designated areas for the FEMA disaster.



FEMA received a total of 61,402 individual assistance (IA) applications and approved a total of \$415,909,898.82 for IA. FEMA obligated a total of \$997,828,622.17 in public assistance (PA) grants (FEMA 2012).

Figure D-11. Designated Areas for Hurricane Sandy, FEMA-DR-4086



Source: FEMA 2012