5.9 NOR'EASTER

SECTION 5.9 NOR'EASTERS

5.9.1 HAZARD DESCRIPTION

A Nor'easter is a cyclonic storm that moves along the East Coast of North America. It is called a Nor'easter because the damaging winds over coastal areas blow from a northeasterly direction. Nor'easters can occur any time of the year but are most frequent and strongest between September and April. These storms usually develop between Georgia and New Jersey within 100 miles of the coastline and typically move from southwest to northeast along the Atlantic Coast of the United States (NOAA, 2013).

In order to be called a Nor'easter, a storm must have the following conditions, as per the Northeast Regional Climate Center (NRCC):

- Must persist for at least a 12-hour period
- Have a closed circulation
- Be located within the quadrilateral bounded at 45°N by 65° and 70°W and at 30°N by 85°W and 75°W
- Show general movement from the south-southwest to the north-northeast
- Contain wind speeds greater than 23 miles per hour (mph)

A Nor'easter event can cause storm surges, waves, heavy rain, heavy snow, wind, and coastal flooding. Nor'easters have diameters that can span 1,200 miles, impacting large areas of coastline. The forward speed of a Nor'easter is usually much slower than a hurricane, so with the slower speed, a Nor'easter can linger for days and cause tremendous damage to those areas impacted. Approximately 20 to 40 Nor'easters occur in the northeastern United States every year, with at least two considered severe (Storm Solution). The intensity of a Nor'easter can rival that of a tropical cyclone in that, on occasion, it may flow or stall off the mid-Atlantic coast resulting in prolonged episodes of precipitation, coastal flooding, and high winds. Nor'easters are a common winter occurrence in New Jersey and these storms repeatedly result in flooding, wave and erosion damage to structures, and erosion of natural resources, such as beaches, dunes, and coastal bluffs. The erosion of coastal features commonly results in greater potential for damage to shoreline development from future storms.

Figure 5.9-1 Satellite Image of the March 2014 Nor'easter

Visible satellite image of the March 2014 Nor'easter

5.9.2 LOCATION

The entire State of New Jersey is susceptible to the effects of Nor'easters; however, coastal communities and other low-lying areas of the State are particularly vulnerable. New Jersey and its coastal communities may be vulnerable to the damaging impacts of major storms. As development and re-development increase, less-intense storms and potential sea level rise may lead to costly storm damage. A detailed description of New Jersey's coastline is provided in section 5.2 Coastal Erosion.

5.9.3 EXTENT

The extent of a Nor'easter can be classified by meteorological measurements and by evaluating its societal impacts. NOAA's National Climatic Data Center (NCDC) is currently producing the Regional Snowfall Index (RSI) for significant snowstorms that impact the eastern two-thirds of the United States. The RSI ranks snowstorm impacts on a scale from one to five. It is based on the spatial extent of the storm, the amount of snowfall, and the interaction of the extent and snowfall totals with population (based on the 2000 Census). The NCDC has analyzed and assigned RSI values to over 500 storms since 1900 (NOAA-NCDC, 2011). Table 5.9-1 presents the five categories.

5.9.3.1 COASTAL STORM FREQUENCY CAVEATS

Similar to flood and hurricanes, NOAA categorizes storms based on by return frequencies (e.g., this was a 100-year storm, etc.). However, there are several shortcomings related to trying to categorize storms by return frequencies. First, the historical record of storms is relatively short to accurately assess the true long-term frequency of long period events. Most records only go back about 100 years. Second, when it comes to coastal flood impacts, it is not a level playing field. Potential sea level rise changes the vulnerability such that storms previously calculated at an average 100-year frequency will occur considerably more often. Determining how well that can be quantified is dependent on the accuracy of sea level rise predictions. Third, coastal flood impacts can vary significantly from one locality to another depending upon such factors as onshore wind component and incidence of wave activity to the coastline. Fourth, a storm may have been a 100-year storm for coastal flooding but a 10-year storm for wind, snowfall or rainfall. Also, the impact of a storm can be compounded if it has multiple severe dimensions (e.g., major coastal flooding in addition to very heavy snow and extreme winds) or if it impacts such a large area that mutual aid cannot be exercised. Fifth, development along the coastline or in other vulnerable areas can significantly increase the impact of a storm. Thus, the same storm in 1950 might not have generated the same amount of damage as now with the increased coastal development.

Table 5.9-1 Regional Snowfall Index (RSI) Ranking Categories

Category	Description	RSI Value
1	Notable	1 to 3
2	Significant	3 to 6
3	Major	6 to 10
4	Crippling	10 to 18
5	Extreme	18.0+

Source: NOAA-NCDC 2011

In addition, there is a great deal of misunderstanding surrounding the reference to a "100-year storm" or a return frequency of 100 years. Similar to the flood events, a 100-year storm event does not mean that one should expect such a storm (or a storm of greater intensity) once every 100 years. Instead, a 100-year storm, to use that frequency as an example, is best described as a 1% chance of a storm that magnitude occurring in any given year. There might be two or three such storms in one, hundred year period and then no more for the next 200 or 300 years.

5.9.4 PREVIOUS OCCURRENCES AND LOSSES

New Jersey has a long history of Nor'easters affecting the coastal communities and the rest of the State. Many sources provided information regarding previous occurrences and losses in New Jersey associated with Nor'easter events. With so many sources reviewed for the purpose of this hazard mitigation plan, loss and impact information for many events could vary depending on the source. Therefore, the accuracy of monetary figures discussed is based only on the available information identified during research for this plan.

The 2014 Plan discussed specific Nor'easter events that occurred in New Jersey through 2012. For this Plan update, Nor'easter events were summarized for those that occurred through 2017. Table 5.9-2 includes all events.

5.9.4.1 FEMA DISASTER DECLARATIONS

Between 1954 and 2017, FEMA declared that the State of New Jersey experienced six Nor'easter-related disasters (DR) or emergencies (EM) classified as one or a combination of the following disaster types: severe storm, high tide, flooding, coastal storm, heavy rain, inland and coastal flooding, and tropical depression. Generally, these disasters cover a wide region of the State; therefore, they can impact many counties. However, not all counties were included in the disaster declarations as determined by FEMA (FEMA).

Table 5.9-3 provides information on the FEMA disaster declarations that have been made due to the impact of a Nor'easter. Figure 5.9-2 illustrates the number of FEMA declared disasters by county.

Table 5.9-2 Previous Occurrences of Nor'easters in New Jersey

Date(s) of Event	Event Type	Counties Affected	Description
3/9/1962	Nor'easter	Statewide	The most damaging northeast storm since the 1888 Blizzard struck New Jersey. Although this storm did not produce record surge levels, it inflicted substantially greater overall damages and loss of life than any other storm. This was primarily due to the prolonged duration of the storm that caused damaging over wash and flooding through five successive high tides. Increased development along the coast since the 1944 hurricane also accounted for increased damages. This storm was also responsible for the loss of 22 lives, completely destroyed 1,853 homes and caused major damage to approximately 2,000 additional homes. The total damage caused by this storm to public and private property was about $85 million (1962 dollars).
10/28/1991	Nor'easter	Coastal Counties	The 1991 Halloween Nor'easter, also known as the Perfect Storm, caused strong waves of up to 30 feet (9 meters) in height. High tides along the shore were only surpassed by the 1944 hurricane, while significant bay flooding occurred. Strong waves and persistent intense winds cause extreme beach erosion, amounting to 13.5 million cubic feet (383,000 cubic meters) of sand lost in one location. In all, damage amounts to $90 million (1991 United States dollars equivalent to $142 million 2008 United States dollars), though no deaths occur in the State.

Date(s) of Event	Event Type	Counties Affected	Description
12/18/1992	Severe Storm	Statewide	This storm hit while shore residents were still trying to rebuild the beaches after the October 1991 and January 1992 storms, and during high astronomical tides. The storm developed and moved northeastward along the Mid-Atlantic coastline. Winds gusted to 90 mph at Atlantic City, and to over 60 mph as far inland as the Delaware River. As the storm drifted slowly into the Delmarva Peninsula, the strong onshore winds persisted through two high tides. The storm tide at Atlantic City reached 8.8 feet above mean low water, tying the mark left by Hurricane Gloria in 1985, and just inches below the all-time record of 9.0 feet set during the 1944 hurricane. Hundreds of homes along the coast were destroyed or damaged, and many boardwalks and piers were torn apart. The high tides also caused the Delaware River to back up, and with five inches of rain, sent tributaries over their banks.
12/22/1994 to 12/26/1994	Severe Storm	Statewide	A storm occurred on December 22 and dissipated on December 26. This storm caused $17 million in damages. The long duration of north winds pushed New Jersey tides 2.5 feet above normal, leading to significant coastal erosion and flooding.
10/18/1996 to 10/23/1996	Heavy Rain and Flooding	Statewide	Record rainfall, flooding, and high winds affected New Jersey from Morris County to Middlesex County to Hunterdon County. Hundred-year floods were reached on various streams in Morris, Somerset, and Union Counties. Thousands of electrical customers lost power.
3/3/1998	Nor'easter	Atlantic, Cape May, Ocean	A severe Nor'easter in February impacted Atlantic, Cape May, and Ocean counties.
10/16/2002	Nor'easter	Monmouth, Ocean	A strong northeaster caused minor to locally moderate tidal flooding along the New Jersey coast and in the back bays, wind gusts to around 50 mph and beach erosion. Tides, winds and erosion were worse in Ocean and Monmouth Counties than farther south. Inland the heavy rain on the 16th coupled with the heavy rains on the 10th and 11th softened the ground and wind gusts of around 45 mph pushed over several trees. The trees subsequently pulled down wires and about 6,200 Jersey Central Power and Light and Conectiv Power Delivery customers lost power.
11/22/2005	High Wind	Statewide	The northwest flow around an intensifying northeaster brought strong and in a few instances high winds to New Jersey during the late morning and early afternoon on November 22. Peak wind gusts averaged around 45 mph inland and 50 to 60 mph along the ocean and southern parts of Delaware Bay. Downed tree limbs in East Brunswick (Middlesex County) caused outages to around 500 homes and caused travel disruptions because of non-working street lights.

Date(s) of Event	Event Type	Counties Affected	Description
March 16 to 17, 2007	Nor'easter	Atlantic, Burlington, Cape May, Ocean, Monmouth	The combination of a strong high-pressure system to the north and a Nor'easter low pressure system that passed to the east of New Jersey, produced strong to high winds along coastal areas from Ocean County southward. It also caused heavy rain to fall during the afternoon and evening on the 16th across southeast New Jersey and minor tidal flooding during the morning high tide on the 17th. Storm totals averaged 1.5 to 3.0 inches across southeast New Jersey.
4/16/2007	Nor'easter	Statewide	In the wake of the departing Nor'easter, the combination of strong winds, snow on tree limbs and heavy rain loosening the ground caused many tree limbs, trees and wires to be knocked down on April 16. The strong winds caused about 120,000 homes and businesses in the state to lose power.
5/12/2008	Nor'easter	Atlantic, Cape May, Cumberland, Middlesex, Monmouth, Ocean	The Nor'easter on May 12 downed trees and wires, and flooded streets in dozens of beach municipalities. Tidal flooding forced the closure of schools and roads in parts of coastal New Jersey on May 12 and 13. In Stafford (Ocean County), a truck that was buffeted by the winds got stuck on the Route 72 causeway bridge and blocked traffic. In Ocean County, widespread problems were reported from Stafford Township to Bass River Township due to downed power lines and trees on May 12, most of which were considered nuisances and annoyances. Tidal flooding was widespread along the New Jersey Shore, in the minor to moderate range.
November 12 to 13, 2009	Nor'easter	Statewide	A powerful Nor'easter produced wind gusts to nearly 60 mph, widespread moderate tidal flooding, heavy rain and severe beach erosion along the New Jersey coast from November 12th through the 14th. Initial damage estimates were placed at $180 million. By several measures this was one of the worst Nor'easters to affect New Jersey since 1990.
March 13 to 16, 2010	Nor'easter	Atlantic, Bergen, Burlington, Camden, Cape May, Gloucester, Hunterdon, Mercer, Middlesex, Monmouth, Morris, Ocean, Passaic, Salem, Somerset, Sussex, Union, Warren	A Nor'easter developed off the Delmarva peninsula which produced an extended period of heavy rainfall across the area as it tracked very slowly to the northeast. This caused widespread flooding across portions of northeast New Jersey. The State had over $85 million in property damage from this event.
March 28 to 30, 2010	Nor'easter	Bergen, Passaic, Union	A Nor'easter centered off the Delmarva coast produced an extended period of heavy rainfall across the area as it tracked very slowly to the northeast. This caused widespread flooding across portions of Bergen and Passaic Counties.
10/29/2011	Nor'easter	Statewide	A Nor'easter knocked out power to more than 3 million homes and businesses across the Northeast on Sunday in large part because leaves still on the trees caught more snow, overloading branches that snapped and wreaked havoc. Close to 2 feet of snow fell in some areas.

Date(s) of Event	Event Type	Counties Affected	Description
11/7/2012	Nor'easter	Statewide	A strong Nor'easter caused high winds along the coast, heavy snow in east central New Jersey, 10-foot waves along the ocean front and minor tidal flooding along the ocean front with the overnight high tide on November 7. It caused setbacks with restoration efforts near and along coastal areas caused by post tropical storm Sandy, particularly in Monmouth and Ocean Counties. It also forced some coastal area evacuations again. Elsewhere across the state, winds were lighter, but accumulating snows occurred in most areas. Snowfall averaged one to five inches in most of the state, but reached six to 12 inches in Middlesex, Monmouth and Ocean Counties. The least snow fell in Hunterdon and coastal Cape May Counties.
3/6/2013	Winter Storm / Nor'easter	Coastal Counties	A slow-moving winter storm arrived in New Jersey with strong winds that knocked out power to thousands of homes and businesses Wednesday, ahead of an expected snowfall of two to four inches. But the real problem was expected to be winds, which could gust up to 60 mph. A 58 mph reading was reported in Ocean City.
11/26/2014	Winter Storm / Nor'easter	Sussex, Warren, Morris, Hunterdon, Mercer, Middlesex, Somerset	A winter storm on the 26th, the day before Thanksgiving Day, dropped heavy snow over parts of northwest New Jersey and caused power outages as well as additional traveling difficulties. Governor Chris Christie declared a state of emergency. About 23,000 homes and businesses lost power, mainly in Jersey Central Power and Light's service area in the northwest part of the state. In addition to wintry precipitation inland, the onshore flow around the Nor'easter caused minor tidal flooding along the Atlantic coast from Ocean County southward as well as in lower Delaware Bay during the daytime high tide cycle on the 26th.
12/9/2014 to 12/11/2014	Nor'easter	Sussex, Hunterdon, Cape May, Morris, Middlesex, Monmouth, Ocean, Somerset, Warren	A strong Nor'easter caused strong winds as well as minor to moderate tidal flooding in Upper Delaware Bay and around Raritan Bay and moderate tidal flooding in Lower Delaware Bay and Atlantic Coastal New Jersey on the 9th. The Nor'easter also caused minor to moderate beach erosion. Peak wind gusts averaged 45 to 55 mph along coastal New Jersey and knocked down weak trees, tree limbs and power lines. Tidal flooding affected all of the coastal counties in New Jersey.
1/26/2015 to 1/27/2015	Nor'easter	Essex, Union, Hudson, Bergen	A potent Alberta Clipper low moved from southwestern Canada on January 24th to the Plains states and Ohio Valley on the 25th. The low then redeveloped off the Mid Atlantic coast on the 26th and rapidly intensified into a strong Nor'easter, bringing heavy snow and strong winds to parts of northeast New Jersey just west of New York City.
1/22/2016 to 1/24/2016	Nor'easter	Camden, Cumberland, Atlantic, Cape May, Gloucester, Salem, Burlington, Hunterdon, Middlesex, Morris,	An impulse from the west coast traversed the midsection of the country, then developed into a low-pressure system as it tracked across the Gulf states before intensifying along the Carolina coast into a major Nor'easter, producing record snowfall in parts of New Jersey on January 23rd. It

Date(s) of Event	Event Type	Counties Affected	Description
		Somerset, Monmouth, Ocean, Sussex, Warren	then moved out to sea after passing by the mid-Atlantic coast early on January 24th.
1/24/2017	Heavy Rain	Camden, Atlantic, Sussex, Monmouth, Ocean, Burlington, Morris, Warren, Middlesex	Just over 2 inches of rain fell in association with the Nor'easter
2/9/2017	Winter Storm	Bergen, Essex, Passaic, Union, Hudson, Cape May, Ocean, Burlington, Atlantic, Monmouth	Low pressure developed along a cold front over the Middle Atlantic early Thursday, February 9th. The low rapidly intensified as it moved off the Delmarva coast in the morning and then to the south and east of Long Island late morning into the afternoon. The low brought heavy snow and strong winds to portions of Northeast New Jersey. Numerous flights were cancelled or delayed at Newark Airport
3/14/2017	Winter Storm/ Nor'easter	Camden, Gloucester, Warren, Hunterdon, Mercer, Morris, Sussex, Middlesex, Somerset, Cumberland, Ocean	Low pressure systems across the Ohio Valley and Carolinas phased. This led to a rapidly developing storm which tracked just offshore. Wind, coastal flooding, heavy rain and snow all occurred. Heavy rainfall in Southeast New Jersey ranged from 1-3 inches.
3/1/2018 to 3/3/2018	Nor'easter	Statewide	Sussex County in the northern part of the state reported 10 inches (25 cm) of snow. At the Jersey Shore, the storm caused minor flooding and road closures during the high tide on the morning of March 2. Two local roads in Absecon were closed from flooding and there was flooding on U.S. Route 40 leading into Atlantic City. Flooding also caused lane closures along portions of Route 35 in Brick and Belmar while floodwaters covered roads in Neptune and Highlands. Some flights were cancelled at Newark Liberty International Airport. Atlantic City Electric reported 29,111 customers without power and PSE&G reported tens of thousands of customers without power. New Jersey Transit cancelled some service
3/7/2018	Nor'easter	Statewide	Two to three feet of snow fell from New Jersey to New England. At least one person died from the storm. This was the second of three Nor'easters to hit the east coast in a two-week span. The third Nor'easter on 3/13 did not significantly impact New Jersey.

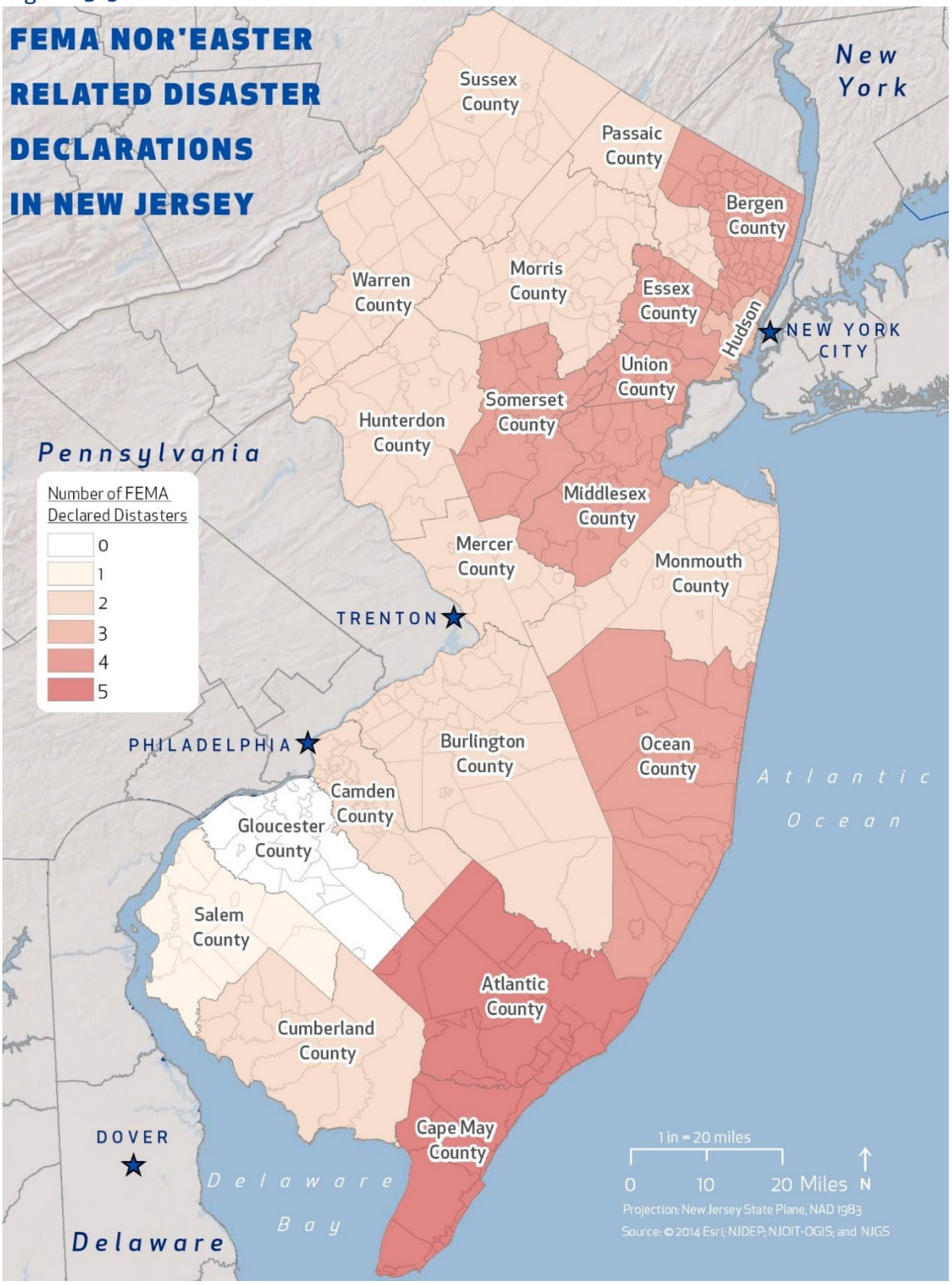
Source: NCDC, 2018

Table 5.9-3 FEMA Nor'easter-Related Disaster Declarations (1954 to 2018)

Disaster Number	Disaster Type	Incident Period	Atlantic	Bergen	Burlington	Camden	Cape May	Cumberland	Essex	Gloucester	Hudson	Hunterdon	Mercer	Middlesex	Monmouth	Morris	Ocean	Passaic	Salem	Somerset	Sussex	Union	Warren	Impacted Number of Counties
DR-124	Severe Storm, High Tides, Flooding	3/9/1962	No Information Available																					
DR-973	Coastal Storm, High Tides, Heavy Rain, Flooding	12/10/1992 to 12/17/1992	X	X			X	X	X		X			X	X		X		X	X		X		12
DR-1206	Coastal Storm	2/4/1998 to 2/8/1998	X				X										X							3
DR-1694	Severe Storms and Inland and Coastal Flooding	4/14/2007 to 4/20/2007	X	X	X	X			X		X		X	X				X		X	X	X		12
DR-1867	Severe Storms and Flooding Associated with Tropical Depression Ida and a Nor'easter	11/11/2009 to 11/15/2009	X				X										X							3
DR-4048	Severe Storm	10/29/2011		X			X		X			X		X		X		X		X	X	X	X	11
DR-4264	Severe Winter Storm and Snowstorm	3/14/2016	X	X	X	X	X	X	X		X	X	X	X	X	X	X			X		X	X	17

Source: FEMA, 2018

Figure 5.9-2 Number of FEMA Nor'easter-Related Disaster Declarations



Source: FEMA, 2017

5.9.5 PROBABILITY OF FUTURE OCCURRENCES

As with any weather phenomenon, it is nearly impossible to assign probabilities to Nor'easters, except over the long-term. High activity seasons are when storm activity exceeds the historical 75th percentile. This means that seasons with this number of storms are expected to occur during one out of four years. Lower activity seasons are defined as when storm activity falls below the historical 75th percentile; meaning this number of storms are expected to occur during three out of four years (East Coast Winter Storms, 2013).

5.9.5.1 POTENTIAL EFFECTS OF CLIMATE CHANGE

Climatologists predict that climate change may play a role in the frequency and intensity of Nor'easters. Two ingredients are needed to produce strong Nor'easters and intense snowfall: (1) temperatures which are just below freezing, and (2) massive moisture coming from the Gulf of Mexico. When temperatures are far below freezing, snow is less likely. As temperatures increase in the winter months they will be closer to freezing rather than frigidly cold. Future climate change has been predicted to produce more moisture, thus increasing the likelihood that these two ingredients (temperatures just below freezing and intense moisture) will cause more intense snow events.

5.9.6 IMPACT ANALYSIS

5.9.6.1 SEVERITY AND WARNING TIME

Nor'easters have the potential to impact society to a greater extent than hurricanes and tornadoes. These storms often have a diameter three to four times larger than a hurricane and therefore, impact much larger areas. More homes and properties become susceptible to damage as the size and strength of a Nor'easter intensifies (Storm Solution). The severity of a Nor'easter depends on several factors including a region's climatological susceptibility to snowstorms, snowfall amounts, snowfall rates, wind speeds, temperatures, visibility, storm duration, topography, time of occurrence during the day (e.g., weekday versus weekend), and time of season.

Meteorologists can often predict the likelihood of a Nor'easter event. The NWS monitors potential Nor'easter events and provides forecasts and information between five and seven days in advance of the storm in order to help prepare for the incident.

5.9.6.2 SECONDARY HAZARDS

Nor'easters bring winds, high tides, beach erosion, flooding, freezing and heavy rain, or snow (NOAA 2013). Nor'easters are common in winter in New Jersey and the greater Mid-Atlantic region. They repeatedly result in flooding, various degrees of wave and erosion damage to structures, and erosion of natural resources, such as beaches, dunes, and coastal bluffs. The erosion of coastal features commonly results in greater potential for damage to shoreline development from future storms.

Perhaps the greatest concern in New Jersey is coastal erosion from Nor'easters. Several of the recent Nor'easters have done tremendous damage to the New Jersey shore. Coastal communities spend millions of dollars to mitigate coastal erosion resulting from Nor'easters. Another issue of concern is the destruction of dune and other protection structures at beaches. In 2012 several coastal communities were evacuated because the dunes were destroyed during Superstorm Sandy.

Another secondary effect is the potential for extensive coastal and inland flooding due to strong winds and heavy precipitation. This secondary effect was evident during the April 2007 Nor'easter when heavy flooding occurred throughout the State. Flooding may also cause environmental contamination issues when facilities producing or storing hazardous materials are flooded.

Widespread utility failure is another potential secondary effect of Nor'easters. The high winds and often heavy wet snow associated with these storms have the potential to cause power outages and other service interruptions. Due to the size and intensity of Nor'easters, power outages are often widespread and demand to restore power is great following cold-weather storms. In the event of extended service

interruptions, another cascading event is the effect of extreme cold temperatures on vulnerable populations in the State and the potential for loss of life.

5.9.6.3 ENVIRONMENTAL IMPACTS

A Nor'easter's environmental impacts are similar to that of a hurricane or tropical storm event. Refer to Section 5.8 Hurricane and Tropical Storm for additional information. However, because these events tend to be longer in duration their impacts may be greater. In addition, depending upon the time of year, the precipitation that accompanies a Nor'easter may be snow or ice. Snow or ice accumulation may down vegetation and damage landscaping and habitat. Further, snowmelt will recharge groundwater but may contribute to localized flooding. Refer to Section 5.11 Severe Winter Weather for additional information.

5.9.7 5.9.2 VULNERABILITY ASSESSMENT

To understand risk, the assets exposed to the hazard areas are identified. For the Nor'easter hazard, the entire State of New Jersey is exposed, specifically to the wind and rain/snow associated with these events. However, certain areas (such as along the coast), and types of building and infrastructure (based on construction) could be at greater risk than others. Storm surges from a Nor'easter pose one of the greatest risks to residents and property.

There are many similarities between Nor'easter and hurricane events. Both types of events can bring high winds and surge inundation resulting in similar impacts on the population, structures, and the economy. Refer to Section 5.8 Hurricane and Tropical Storms for a detailed and quantitative assessment on the wind and storm surge hazards using Hazards U.S. Multi-hazard (HAZUS-MH 4.2). The section below discusses Nor'easter events in a qualitative nature.

5.9.7.1 ASSESSING VULNERABILITY BY JURISDICTION

The impact of a Nor'easter on life, health and safety is dependent upon several factors including the severity of the event and whether or not adequate warning time was provided to residents. Typically, a Nor'easter has a longer duration than a hurricane or tropical storm event, which normally pass through an area in a matter of hours. It is assumed that the entire State's population could be exposed to this hazard (wind and rain/snow) associated with a Nor'easter. Refer to Section 5.8 Hurricane and Tropical Storm which displays impacts of potential wind events.

A Nor'easter surge inundation zone does not exist to estimate the population and assets exposed for this hazard. To estimate the population and area exposed to storm surge, the Sea, Lake, and Overland Surges from Hurricanes (SLOSH) model Category 1 through 4 zones were overlaid upon the 2010 Census block population data in geographic information systems (GIS) (United States Census 2010). Refer to Section 5.8 Hurricane and Tropical Storm which summarizes the 2010 Census population and area located in the Category 1 through 4 SLOSH zones by county.

5.9.7.2 ESTIMATING POTENTIAL LOSSES BY JURISDICTION

In addition to threatening life and safety, Nor'easter events can greatly impact the economy, including: loss of business function, damage to inventory (utility outages), relocation costs, wage loss, and rental loss due to the repair/replacement of buildings. Damages to buildings can impact a community's economy and tax base. Further, residents may be displaced or require temporary to long-term sheltering. Refer to Section 5.8 Hurricane and Tropical Storm for estimated potential loss statistics by county as a result of wind and surge events.

5.9.7.3 ASSESSING VULNERABILITY AND POTENTIAL LOSS TO STATE FACILITIES

All state owned, and leased buildings are exposed to the wind and/or rain/snow from the Nor'easter hazard. State buildings, critical facilities, and infrastructure at greatest risk are those that may be impacted by a storm surge. Refer to section 5.8 Hurricane and Tropical Storms which summarize the State's facilities, critical facilities, and infrastructure that may be prone to the impacts of a Nor'easter as well.