



APPENDIX B. RISK ASSESSMENT SUPPLEMENT

This appendix is organized into the following sections:

B.1 Process For Identifying Hazards

B.2 Pre-2010 Occurrences (by Hazard)

B.3 Recent FEMA Disaster Declarations

B.4 Geologic Hazard Information – Abandoned Mines In New Jersey

B.5 Wildfire Fuel And Risk



B.1 PROCESS FOR IDENTIFYING HAZARDS

Table 1 Process for Identifying Natural Hazards

Hazard of Concern	How the hazard was identified	Why the hazard was identified
Coastal Erosion (including enhanced discussion of beach protection)	<ul style="list-style-type: none"> · Input from the SHMT, NJOEM planners, ESF leads, and ROIC analysts 	<ul style="list-style-type: none"> · Coastal communities are most affected by coastal erosion. The Atlantic Ocean makes up the eastern border of New Jersey.
Dam/Levee Failure	<ul style="list-style-type: none"> · Input from the SHMT, NJOEM planners, ESF leads, and ROIC analysts 	<ul style="list-style-type: none"> · In 2022, the State conducted an Enhanced Dam Risk Assessment to identify the risks from High Hazard Potential Dams (HHPD) in accordance with FEMA' HHPD program.
Drought	<ul style="list-style-type: none"> · Review of past disaster declarations · Review of the U.S. Drought Monitor and Drought Impact Reporter · Research including Northeast Regional Climate Center (NRCC), NJDEP · Review of the NCEI Storm Events Database · Review of SHELDUS · Input from the SHMT, NJOEM planners, ESF leads, and ROIC analysts 	<ul style="list-style-type: none"> · The entire State is subject to the effects of drought. · Historically in New Jersey there have been several severe drought periods. Major droughts occurred in the State from 1929 to 1932, 1949 to 1950, 1953 to 1955, 1961 to 1966, 1980 to 1981, 1998 to 2002, and 2016 to 2017 (USGS, 1989; Robinson, 2013, NJDEP, 2017). · The USDA declared 20 drought-related disasters impacting New Jersey from 2012 to 2023.
Earthquakes	<ul style="list-style-type: none"> · Researching including U.S. Geological Survey, New Jersey Geological and Water Survey (NJGWS) · Input from the SHMT, NJOEM planners, and ROIC analysts 	<ul style="list-style-type: none"> · There are two factors that increase the earthquake risk in New Jersey: (1) eastern earthquakes affect areas 10 times larger than western ones of the same magnitude; and (2) New Jersey is the most densely populated state in the United States. · Numerous fault lines are located in New Jersey · From 2010 to 2023, there have been 20 earthquakes impacting New Jersey that have had a magnitude of 2.0 or greater.
Extreme Temperature	<ul style="list-style-type: none"> · Review of the NCEI Storm Events Database · Input from the SHMT, NJOEM planners, ESF leads, and ROIC analysts 	<ul style="list-style-type: none"> · Average temperature and the frequency and intensity of heat waves are anticipated to increase due to climate change.
Flood (riverine, coastal, storm surge, nuisance flooding caused by sea-level rise, and stormwater flooding caused by local drainage and high groundwater levels)	<ul style="list-style-type: none"> · Review of past disaster declarations · Review of the National Centers for Environmental Information (NCEI) Storm Events Database · Review of Spatial Hazard Events and Losses Database for the United States (SHELDUS) · Review of Flood Insurance Rate Maps (FIRMs) · Identification of National Flood Insurance Program (NFIP) Repetitive Loss (RL) and Severe Repetitive Loss (SRL) properties in the State · Research including new media and Internet resources · Input from the SHMT, NJOEM planners, ESF leads, and ROIC analysts 	<ul style="list-style-type: none"> · New Jersey is affected by flooding nearly every year. · Floods can occur almost anywhere in the State. · Floods have been and continue to be the most frequent, destructive, and costly natural hazard in New Jersey. · A majority of the State's damage reported for major disasters is associated with floods. · From 2010 to 2023, there have been 12 flood-related federal disaster declarations in New Jersey.



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Hazard of Concern	How the hazard was identified	Why the hazard was identified
Geological Hazards (landslides, subsidence/sinkholes, radon exposure, and saltwater intrusion)	<ul style="list-style-type: none"> · Research including NJGWS · Input from the SHMT, NJOEM planners, ESF leads, and ROIC analysts 	<ul style="list-style-type: none"> · Naturally occurring subsidence and sinkholes in New Jersey occur within bands of carbonate bedrock; in northern New Jersey, there are more than 225 square miles that are underlain by limestone, dolomite, and marble. In the southern part of New Jersey, there are 100 square miles that are underlain by a limesand, with thin limestone layers. · Since 2010, 153 landslide events have been documented in NJ.
Hurricanes, Tropical Storms and Nor'easters (wind only)	<ul style="list-style-type: none"> · Review of past disaster declarations · Review of the NCEI Storm Events Database · Review of SHELDUS · Research including the National Hurricane Center (NHC), new media and Internet resources · Input from the SHMT, NJOEM planners, ESF leads, and ROIC analysts 	<ul style="list-style-type: none"> · New Jersey has been impacted by hurricanes and tropical storms in the past. · Historic data have shown that a number of storms have impacted the State. · From 2010 to 2023, there have been federally declared disasters related to hurricane, tropical storm, or Nor'easter in New Jersey · The most recent federally declared disaster event in New Jersey (September 2021) was the remnants of Hurricane Ida. · New Jersey experiences between one and two Nor'Easters every year. · The coastal areas of New Jersey have been impacted by Nor'Easters and some events have been widespread in the State.
Severe Weather (high winds, tornadoes, thunderstorms, and hail)	<ul style="list-style-type: none"> · Review of past disaster declarations · Review of the NCEI Storm Events Database · Research including the National Weather Service (NWS), Storm Prediction Center, new media and Internet resources · Input from the SHMT, NJOEM planners, ESF leads, and ROIC analysts 	<ul style="list-style-type: none"> · From 2010 to 2023, there were 5 federally declared disasters in New Jersey related to severe storm events.
Severe Winter Weather (snow, blizzards, and ice storms)	<ul style="list-style-type: none"> · Review of past disaster declarations · Review of the NCEI Storm Events Database · Review of SHELDUS · Input from the SHMT, NJOEM planners, ESF leads, and ROIC analysts 	<ul style="list-style-type: none"> · New Jersey has been impacted by winter storm events in the past and historic data have shown a number of winter storms have impacted the State. · Between 1954 and 2021, FEMA declared that the State of New Jersey experienced ten winter storm-related disasters (DR) or emergencies (EM) classified as one or a combination of the following disaster types: ice conditions, blizzard, snowstorm, or winter storm. · The State's middle-latitude location results in snow falling in all areas of the state each winter.
Wildfire	<ul style="list-style-type: none"> · New Jersey Forest Fire Service statistics · Review of the NCEI Storm events Database · Review of the Wildland Urban Interface · Input from the SHMT, NJOEM planners, ESF leads, and ROIC analysts 	<ul style="list-style-type: none"> · In 2022, 1,175 wildfires occurred in New Jersey, burning approximately 12,664 acres. Between January and April 2023, there were 315 wildfires that burned 920 acres. · The State has been included in two wildfire disaster declarations. · The New Jersey Pine Barrens has one of the most hazardous fuel types for wildfires in the United States · Each year, an average of 1,500 wildfires damage or destroy 7,000 acres in New Jersey.

Table 2 Process for Identifying Human-Caused Hazards

Hazard of Concern	How the hazard was identified	Why the hazard was identified
Animal Disease	<ul style="list-style-type: none"> · Input from the SHMT, NJOEM planners, ESF leads, ROIC analysts, and Department of Agriculture 	<ul style="list-style-type: none"> · Animal diseases in New Jersey include: avian influenza, canine influenza virus, equine herpes virus, eastern equine encephalitis, Johne's disease, West Nile Virus, and rabies. · Between 1989 and 2021, New Jersey had 8,409 reported animal rabies case (New Jersey Department of Health, 2021).



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Hazard of Concern	How the hazard was identified	Why the hazard was identified
Civil Unrest	· Input from the SHMT, NJOEM planners, ESF leads, and ROIC analysts	· There have been reported civil unrest incidents in New Jersey’s history, including the Newark Riots in 1967 that left 26 people dead and injured hundreds. · With New Jersey’s close proximity to New York City, areas of New Jersey may be targets of civil disturbance.
Cyber Attack	· Input from the SHMT, NJOEM planners, ESF leads, and ROIC analysts	· New Jersey is located along a heavy transit corridor of people and goods, which makes the State a vulnerable target. · There have been reports of cyber-attacks in New Jersey, but on the smaller scale.
Crop Failure	· Input from the SHMT, NJOEM planners, ESF leads, ROIC analysts, and Department of Agriculture	· The New Jersey agricultural industry brought in \$984,530,000 in crop sales in 2017 . The industry as a whole is supported by 9,883 farms statewide producing over 100 crop species. · The USDA declared 38 crop-failure-related disaster declaration in New Jersey from 2011 to 2013.
Economic Collapse	· Input from the SHMT, NJOEM planners, ESF leads, and ROIC analysts	· Economic collapse could impact the entire State. · There have been two reported economic collapses in New Jersey’s history, and another economic collapse could occur in the future.
Fishing Failure	· Input from the SHMT, NJOEM planners, ESF leads, and ROIC analysts	· In 2020, there were 2,630 fishermen in the New Jersey commercial fleet, 1,791 seafood processors and dealers, and 4,304 wholesalers and distributors. Commercial fisherman in the New Jersey landed 173,948,000 pounds of finfish and shellfish, earning \$185,264,000 in landings revenue. · · In 2012, Superstorm Sandy caused severe flooding that mandated statewide closures of waters where shellfish are produced. Hatcheries were severely damaged or destroyed. New Jersey’s fishing industry sustained nearly \$120 million in losses. · The economic conditions of the State could be greatly affected by a fishing failure. The value of the seafood harvest extends well beyond the industry itself. The effects of a prosperous seafood industry are felt in other waterfront activities such as shipbuilding, maintenance and repair, support services (equipment, fuel, materials, and supplies), and ecotourism.
Harmful Algal Blooms (HABs)	· Input from the SHMT, NJOEM planners, ESF leads, and ROIC analysts	· In 2022, NJDEP responded to reports of suspected HABs at 89 waterbodies. Of these, 65 waterbodies had at least one site confirmed by laboratory analysis as having a HAB at or above a Watch Alert tier. These 89 reports of suspected HABs represent a 62% increase from 2021, and a 7% increase from 2020 which at the time had the highest occurrence of suspected HAB reports. This translated into a significant increase of waterbodies with confirmed HABs (Watch Alert or above) by 38% since the program began.
Hazardous Substances (fixed sites, in-transit, offshore)	· Input from the SHMT, NJOEM planners, ESF leads, and ROIC analysts	· In New Jersey as of 2021, 321 companies are required to file federal Toxic Chemical Release Inventory (TRI) forms · Between 2007 and 2018, over 68 million pounds of chemicals have been released in New Jersey. · There are approximately 39,000 miles of highway and approximately 1000 miles of rail freight lines in New Jersey and incidents involving hazardous materials in transit can occur anywhere in the State. · Between 2007 and 2018, over 15 million pounds of chemicals have been released off site in New Jersey. · Between 2008 and 2018, there have been over 1,800 accidents in New Jersey involving hazardous materials (air, highway, and rail). · The Port of New York and New Jersey ships a variety of goods, many of which consist of hazardous materials. · There have been several incidents involving hazardous material spills offshore of New Jersey that include the M/T ATHOS I releasing 265,000 gallons of crude oil in the Delaware River in 2004, and an Exxon underwater pipeline rupture in 1990 that released 567,000 gallons of No. 2 fuel oil into the Arthur Kill.
Nuclear Hazards	· Input from the SHMT, NJOEM planners, ESF leads, and ROIC analysts	· One active nuclear power plant is located within the State of New Jersey. There are also facilities in neighboring states that are within the 50-mile ingestion pathway zone that affects New Jersey. New Jersey; however, there have been a few minor incidents. · Due to the number of nuclear power plants in and around New Jersey, incidents will continue to occur.



Hazard of Concern	How the hazard was identified	Why the hazard was identified
Pandemic (influenza and COVID-19)	· Input from the SHMT, NJOEM planners, ESF leads, and ROIC analysts	<ul style="list-style-type: none"> · The COVID-19 pandemic resulted in over 100,000 confirmed cases and almost 600 associated deaths in New Jersey. The pandemic disrupted daily life for years. A 3 month stay-at-home order across the state closed all non-essential retail businesses, but the economic effects of the pandemic continued for years after. · All 21 counties in New Jersey have experienced the effects of a pandemic or disease outbreak (e.g., influenza). · Due to New Jersey’s densely populated areas, a pandemic has the potential to spread more quickly. · There are numerous bodies of water located within the State that assist with the breeding of mosquitos, which can lead to the spread of the West Nile Virus. · The H1N1 outbreak was widespread in New Jersey in July 2009, with 1,414 confirmed cases and 15 deaths. · As the population density increases in New Jersey, so will the probability of a pandemic event. · Extreme weather conditions in New Jersey can lead to an increase in West Nile Virus outbreaks.
Terrorism	· Input from the SHMT, NJOEM planners, ESF leads, and ROIC analysts	<ul style="list-style-type: none"> · Terrorist attacks can occur anywhere; however, New Jersey is an attractive target because of its dense population and location relative to major urban areas. · New Jersey is also home to the busiest commuter rail system in the United States, as well as the headquarters of major corporations for the financial and pharmaceutical industries. · Targets in New Jersey include critical infrastructure such as utilities, roadways, bridges, tunnels, hospitals, schools, civic centers, and reservoirs. · There have been several terrorist attacks in New Jersey’s history and there is the potential for future occurrences.

B.2 PRE-2010 OCCURRENCES

Coastal Erosion

Table 3 Coastal Erosion Historic Occurrences (Pre-2010)

Date	Cause	Location	Description
4/19/1905	Hurricane	Ocean	A Category 2 hurricane hit parallel to the New Jersey coastline. Strong waves flooded much of Long Beach Island and caused severe beach erosion along the coast. Approximately 200 feet of sand near the Barnegat Lighthouse were lost, threatening the foundation of the lighthouse.
4/27/1905	Tropical Storm	Cape May	A tropical storm hit Cape May County after passing through the Delmarva Peninsula, causing severe beach erosion and high tides.
March 6-8, 1962	Nor’Easter	Coastal New Jersey	The most damaging Nor’Easter since the 1888 Blizzard. The damage from this storm was primarily caused by its prolonged duration, resulting in damaging overwash and flooding through five successive high tides. It struck the New Jersey coast for three days and generated a 3.5-foot storm surge over three successive high tides, with each tide peaking at 8.8 feet above mean lower low water (MLLW). Massive waves of up to 40 feet high generated by sustained winds of 45 knots blew over 1,000 miles of open ocean and came crashing towards the coastline. This coastal storm took nine lives, damaged 16,407 structures, and flooded 21,533 structures to various degrees. The storm caused approximately \$120 million in damages.
October 28 – November 4, 1991	Halloween Nor’Easter	Coastal New Jersey	The 1991 Halloween Nor’Easter, also known as the Perfect Storm, caused strong waves of up to 30 feet in height. High tides along the shore were the second highest on record—only surpassed by the 1944 hurricane—while significant bay flooding occurred. Strong waves and persistent intense winds caused extreme beach erosion, amounting to 13.5 million cubic feet of sand lost in one location. In all, damage amounted to \$90 million, though no deaths occurred in the State.



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Date	Cause	Location	Description
September 22-26, 1992	Tropical Storm Danielle	Coastal New Jersey	Tropical Storm Danielle made landfall in the Delmarva Peninsula and caused significant beach erosion across the mid-Atlantic region, including New Jersey. Despite avoiding a direct hit, the State still suffered erosion.
December 10-17, 1992	Coastal Storm	Ocean, Monmouth, Cape May, Cumberland, Bergen, Salem, Middlesex, Atlantic, Union, Essex and Hudson	A peak storm surge of 4.3 feet was measured on December 11, 1992, as the water reached an elevation of 9.14 feet MLLW. The water did not recede until December 14th. Waves of up to 44 feet were measured 30 miles offshore of Long Branch during the storm. This coastal storm took two lives, damaged 3,200 homes, and caused approximately \$750 million in damages.
August 8-30, 1994	Hurricane Felix	Coastal New Jersey	Although the strong winds and heavy rains did not directly affect the United States, large swells generated by Felix produced dangerous surf conditions including some coastal flooding and rip currents from northeastern Florida to New England. Isolated areas of severe beach erosion occurred along the New Jersey coast.
December 22-26, 1994	Storm	Coastal New Jersey	This storm caused \$17 million in damages and tides were 2.5 feet above normal, which led to significant coastal erosion and flooding.
January 7-8, 1996	Blizzard	Atlantic, Burlington, Mercer, Monmouth, and Ocean	A record-breaking snowfall hit most of New Jersey. The storm produced moderate flooding with moderate-to-severe beach erosion from Manasquan south along the Jersey Shore. A total of 28 deaths and numerous injuries were reported, as well as over \$50 million in damages.
7/13/1996	Tropical Storm Bertha	Atlantic, Cape May, Cumberland, and Monmouth	Wind gusts ranged from 43 mph in Atlantic City to 60 mph in Seaside Park. Approximately 40,000 customers were without power. Tidal departures were about two feet or less from normal levels. Monmouth Beach suffered severe beach erosion. Approximately 60 feet of 120-foot-wide beach at the south of the Borough was gone.
February 4-9, 1998	Nor'Easter	Atlantic, Cape May, Cumberland, Monmouth and Ocean	The strongest Nor'easter of the winter hit coastal New Jersey, from Ocean County southward, bringing damaging winds, moderate-to-severe coastal flooding, extensive beach erosion, several dune breaches, and heavy rain. A State of Emergency was declared for all coastal counties, and Atlantic and Cape May Counties were declared federal disaster areas. Beach erosion was the largest problem in Monmouth and Ocean Counties. In Avalon, beach erosion left 10-foot cliffs. Severe beach erosion was reported at Cape May Point. In Brigantine, substantial flooding and beach erosion was experienced, especially at the north end of the island. About 75% of its sand was carried away. In Longport, the ocean met the bay from 11th through 24th Streets and erosion caused vertical cliffs of four to five feet. Longport streets had to be cleared of debris. Ocean County had \$9 million in damages, mainly from beach erosion. Beaches at Point Pleasant to Island Beach State Park suffered moderate to severe erosion. In Bay Head, remnants of its old boardwalk were uncovered and the Borough lost 10 feet of dunes and 130 feet of beach at its south end. Ortle Beach's dune line was flattened. In Harvey Cedars, erosion was worse at the south end of the town where the surf exposed the gravel base. Brant Beach suffered the worst erosion in the County as the ocean broke through at two places. In Monmouth County, moderate-to-severe beach erosion was experienced. Total damage in New Jersey was estimated at \$17 million.
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.



Date	Cause	Location	Description
November 11-15, 2009	Remnants of Tropical Storm Ida (Nor'Easter)	Atlantic, Cape May, and Ocean	Remnants of Hurricane Ida brought 30- to 40-mph winds and 8- to 15-foot swells. Maximum-sustained winds were near 45 mph, with higher gusts at times. This three-day Nor'Easter was considered one of the worst to impact the State in recent years and caused significant erosion along the New Jersey shoreline. Atlantic and Cape May Counties experienced widespread tidal flooding. The north end of Avalon in Cape May County experienced substantial beach erosion as a result of the storm. Beaches on the north end lost 125,700 cubic yards of sand and the dunes in the north end lost 34,000 cubic yards of sand. The large volume of sand loss was evident, as the sea wall under the dune crest was completely exposed. Long Beach Island in Ocean County sustained significant damage from this storm. Harvey Cedars and Holgate suffered the most severe erosion of their beaches and dunes. Large sections of dune were lost throughout Long Beach Island. Several beach-front properties were completely undercut by wave action in Beach Haven while other properties had the dune completely removed seaward of their house.

Dam and Levee Failure Historic Occurrences

Sarubbi Dam Failure 1927

In 1927, the Sarubbi Dam located in Morris County failed during non-storm conditions. Referred to as a “sunny-day failure,” the sudden loss of concrete sections caused this dam to fail in November 1927. Based on anecdotal research, this is the only dam failure that was not a direct result of another hazard.

September 1940 Storm

On September 1, 1940, Southern New Jersey experienced an unusually large storm event associated with a tropical system. The system inundated portions of Camden, Gloucester, Salem, Cumberland, and Atlantic Counties. Damage throughout South Jersey was widespread, from Millville to Clementon. Dozens of roads, bridges, and dams were damaged or destroyed as a result of the ensuing floods. Portions of the area experienced over 24 inches of rain in less than 12 hours. This extraordinary rainfall intensity was experienced over a localized area near Parvin State Park, located northwest of the City of Vineland.

Hurricane Floyd 1999

On September 16, 1999, Hurricane Floyd, a tropical storm by the time it hit New Jersey, combined with a weather system from the west to drop significant rainfall in portions of the State. Hardest hit was the Raritan River Basin. Although the State’s dams were spared the worst and no loss of life or significant property damage was attributed to the failure of a dam, the storm left behind a trail of damage to the State’s dams. In the weeks following the storm, the NJDEP Dam Safety Section inspected over 50 dams to assess the impact of the storm. They documented complete failure of three dams and notable damage to 24 dams (NJDEP, 2012b). Table 5.3-4 lists dams affected by the incident.

Table 4 Dams Affected by Hurricane Floyd in 1999

Dam Name	Township	County
Complete Failure		
Kirbys Mill Dam	Medford Township	Burlington
Bostwick Lake Dam	Upper Deerfield Twp.	Cumberland
Spencer Detention Basin Dam	Morris Twp.	Morris
Notable Damage		
Whites Pond Dam	Borough of Waldwick	Bergen
Diamond Mill Dam	Millburn Twp.	Essex
Orange Reservoir Dam	West Orange Twp.	Essex
Singley Dam	Borough of Runnemede	Gloucester
Amwell Dam No. 2	West Amwell Twp.	Hunterdon



Dam Name	Township	County
Lambertville Dam No. 1	West Amwell Twp.	Hunterdon
Lambertville Dam No. 2	West Amwell Twp.	Hunterdon
Amwell Dam No. 1	West Amwell Twp.	Hunterdon
Amwell Dam No. 3	West Amwell Twp.	Hunterdon
Lake Winona Dam	Jefferson Twp.	Morris
Shongum Lake Dam	Randolph Twp.	Morris
Hudsonia Dam	Rockaway Twp.	Morris
Laurel Lake Dam	West Milford Twp.	Passaic
West Milford Lake Dam	West Milford Twp.	Passaic
Stowaway Lake Dam	West Milford Twp.	Passaic
Pinecliff Lake Dam	West Milford Twp.	Passaic
Gordon Lake Dam	West Milford Twp.	Passaic
Watchung Lake Dam	Borough of Watchung	Somerset
Sunset Lake Dam	Bridgewater Twp.	Somerset
Skillman Dam	Montgomery Twp.	Somerset
Mountain Creek Pond Dam	Vernon Twp.	Sussex
Bloodgoods Dam	Clark Twp.	Union
Shackamaxon Dam	Scotch Plains Twp.	Union
Seeley's Pond Dam	Scotch Plains Twp.	Union

Source: NJDEP, 2012

Sparta Storm August 2000

Another dam failure incident occurred in August 2000 that affected northern counties in New Jersey. Unusually large amounts of rain produced by a series of thunderstorms deluged parts of northwestern New Jersey during the period August 11-14, 2000 (USGS 2001a). Rainfall was greatest in parts of southeastern Sussex County and northwestern Morris County where rainfall totals exceeded 14 inches. A total of four dams completely failed as a result of the ensuing floods. The dams were on Seneca Lake, Tomahawk Lake, Furnace Pond, and Edison Pond in Sussex County. An additional 26 dams in Sussex and Morris Counties were damaged (National Weather Service 2000). Total damage was an estimated \$179 million (USGS 2001b). Table 5 lists dams affected by the incident. Additionally, Figure 5.3-7 shows a photograph of the Tomahawk Lake Dam failure that occurred during this storm.

Table 5 Dams Affected by the 2000 Sparta Storm

Dam Name	Municipality	County
Complete Failure		
Seneca Lake Dam	Sparta	Sussex
Tomahawk Lake Dam	Byram	Sussex
Furnace Pond Dam	Stanhope	Sussex
Edison Pond Dam	Sparta	Sussex
Less Than Complete Failure		
Lake Tamarack Dam	Hardyston	Sussex
NJ No Name No. 51	Jefferson	Morris
Shawnee Lake Dam	Jefferson	Morris
Hawthorne Lake Dam	Sparta	Sussex



Dam Name	Municipality	County
Glen Lake Dam	Sparta	Sussex
Washington Forge Pond	Wharton	Morris
Arapaho Lake Dam	Sparta	Sussex
NJ No Name No. 43	Sparta	Sussex
Rock Island Dam	Sparta	Sussex
Oak Ridge Lake Dam	Jefferson	Morris
Acquacknock Dam	Sparta	Sussex
Sparta Lake Dam	Sparta	Sussex
Cozy Lake Dam	Jefferson.	Morris
Saginaw Lake Dam	Sparta	Sussex
Summit Lake Dam	Hardyston	Sussex
Lower Waterloo Dam	Byram & Mt.	Sussex and Morris
Upper Waterloo Dam	Mt. Olive	Morris
Franklin Pond Dam	Franklin	Sussex
Heaters Pond Dam	Ogdensburg	Sussex
Morris Lake Dam	Sparta	Sussex
Camp Ryker Lake Dam	Sparta	Sussex
Swannanoa South Dam	Jefferson	Morris
Winona Lake Dam	Jefferson	Morris
Saffin Pond Dam	Jefferson	Morris
Lake Hartung Dam	Jefferson	Morris
Elwood Headley Pond	Jefferson	Morris

Source: USGS, 2011

Burlington County Dam Failures 2004

A significant dam failure incident occurred in 2004 as a result of heavy rains. Unusually large amounts of rain deluged parts of Burlington, Camden, and Ocean Counties in southern New Jersey from the morning of July 12 through the early morning hours of July 13, 2004. Doppler radar estimates of total rainfall for the 24-hour period ending 7:00am on July 13 were from eight to 12 inches over central Burlington, western Ocean, and eastern Camden Counties. More than 11 inches of rain was recorded by rain gages in Pemberton and Tabernacle Townships in Burlington County (USGS, 2013).

The NJDEP reported that 17 dams failed and 28 dams were damaged in Burlington County. All 17 dam failures occurred in the Rancocas Creek Basin. Two of the dams were in the North Branch Rancocas Creek Basin, and the remaining 15 were in the upper reaches of the South Branch Rancocas Creek Basin. Of the 28 dams that were damaged, 27 were in the Rancocas Creek Basin, three in the North Branch Rancocas Creek Basin, and 24 were in the South Branch Rancocas Creek Basin. The remaining damaged dam was in the Batsto River Basin (Protz and Reed 2006). Table 5.3-6 lists the dams affected by the storm. Additionally, Figure 5.3-8 shows the locations of damaged and destroyed dams in Burlington County as a result of the incident.

Table 6 Dams Affected by the 2004 Burlington County Storm

Dam Name	Municipality	County
Complete Failure		
Kenilworth #2 Dam	Evesham	Burlington
Strokes-Lower Dam	Medford	Burlington



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Dam Name	Municipality	County
Lake Stockwell Dam	Medford	Burlington
Birchwood Lake Dam	Medford	Burlington
Papoose Lake Dam	Medford Lakes	Burlington
Upper Aetna Dam	Medford Lakes	Burlington
Lower Aetna Dam	Medford Lakes	Burlington
Camp Inawendiwin Lower Dam	Tabernacle	Burlington
Reeves Dam B	Woodland	Burlington
Lower Reeves Bog Dam	Woodland	Burlington
Crane Lake Dam	Evesham	Burlington
Lost Lake Dam	Evesham	Burlington
Hinchman Dam	Medford	Burlington
Third Street Dam	Southampton	Burlington
Blue Lake Dam	Medford	Burlington
Squaw Lake Dam	Medford	Burlington
Less Than Complete Failure		
Saipe Lake Dam	Medford	Burlington
Fostertown Road Dam	Medford	Burlington
Upper Stokes Dam	Medford	Burlington
Golf Course Dam	Evesham	Burlington
Mill Dam	Mount Holly	Burlington
Cranberry Lakes Dam #6	Medford	Burlington
Kirby's Mill Road	Medford	Burlington
Burnt Bod Dam	Medford	Burlington
Oliphants Mill Lake Dam	Medford	Burlington
Old Forge Lake Dam	Southampton	Burlington
Bayberry Street Dam	Pemberton	Burlington
Upper Mimosa Dam	Medford	Burlington
Kenilworth #3 Dam	Evesham	Burlington
Mimosa Lake Dam	Medford	Burlington
Fisher Pond Dam	Southampton	Burlington
Quoque Dam	Medford Lakes	Burlington
JCC Dam	Medford	Burlington
Kenilworth Lake Dam	Evesham	Burlington
Kettle Run Road Dam	Evesham	Burlington
Lebanon Forrest #1 Dam	Pemberton	Burlington
Marlton Lakes Upper Dam	Evesham	Burlington
Batsto Lake Dam	Washington	Burlington
Union Mill Lake Dam	Evesham	Burlington
Van Dal Lake Dam	Evesham	Burlington
Sooy Dam	Woodland	Burlington
New Jersey No Name #8	Southampton	Burlington
Timer Lake Dam	Medford	Burlington
Vincentown Mill Dam	Southampton	Burlington

Source: NJDEP 2004



Gloucester County Levee Breach 2005

Heavy rain associated with the remnants of Tropical Storm Cindy fell across New Jersey on July 8, 2005. Storm totals ranged from 1.5 to five inches. The heavy rain caused poor drainage and roadway flooding. In Logan Township (Gloucester County), emergency repairs were made to a 30-foot breach in a levee off of Floodgate Road to keep the Delaware River at bay (NOAA NCDC, 2013).

Monmouth County Dam Failure 2005

Heavy rain associated with a low-pressure system southeast of New Jersey moved into Monmouth County between October 13 and 14, 2005. The three-day storm totals in the County averaged between four and 11 inches, with the highest amounts near the coast. Dams failed on both Spring Lake and Mill Pond, and Deal Lake overflowed. Nearly 1,200 people were evacuated and a state of emergency was declared. Approximately 100 people were evacuated near the Shark River when a levee along the River broke. In Wall Township, a dam breach on Mill Pond in Allaire State Park caused significant water damage and a roadway collapse in the village within the Park (NOAA NCDC, 2013).

Hunterdon County 2006

Several days of heavy rain throughout the Delaware River Basin culminated with major flooding along the Delaware River between June 28 and 30, 2006. It was the fourth highest crest on record for the Delaware River along Hunterdon County. Rainfall totals in the County averaged from four to eight inches, with storm totals exceeding 10 inches in parts of the Upper Delaware River Basin in New York State. The County was declared a state of emergency. Approximately 1,250 homes and businesses were damaged and four were destroyed. In the Borough of Stockton, a levee breach compounded the flooding. Evacuations occurred from the Delaware River east to New Jersey State Route 29. Most of the flooding was confined to basements. Overall damages from the storm were estimated at \$7.5 million.

Rainbow Lake Dam 2007

A Nor'Easter struck New Jersey between April 15 and 16, 2007, bringing up to 10 inches of rain in parts of the State. Salem County was particularly hit hard, with high flood flows that overflowed and failed the Rainbow Lake Dam on State Route 56 in Pittsgrove Township. The 20-foot-high earth embankment dam impounded an 80-acre lake. The road washed out and a gas main broke (Dam Safety, 2010).

Drought

Table 7 Drought Historic Occurrences (Pre-2010)

Date	Location	Description
May 1929 to 10/1/1932	Statewide	The drought was the second most severe drought in New Jersey history. This regional drought affected most states in the Northeast. Stream flow deficits at gaging stations where data were analyzed had recurrence intervals greater than 25 years. In the Delaware River, the decreased volume of freshwater flow enabled saline water to move upriver from the Delaware Bay to the Camden area and endanger freshwater supplies
February 1949 to 10/1/1950	Hackensack and Passaic Rivers	The drought was much less widespread than the 1929 to 1932 drought. This drought was most severe in northeastern New Jersey, where it had a recurrence interval greater than 10 years. The driest June on record at most gaging stations throughout New Jersey was in 1949. The average statewide precipitation for the month was 0.2 inch, which was 3.6 inches less than normal.
May 1953 to July 1955	Statewide	The drought had recurrence intervals of about 15 years in northern and southern New Jersey, and five to 25 years in the south-central part of the State. Crop yields were decreased because the drought began in May.



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Date	Location	Description
June 1961 to 8/1/1966	Statewide	This event was the longest and most severe of the five previous droughts. Stream flow deficits were greatest in northern New Jersey; which had a recurrence interval exceeding 50 years. In the rest of the State, the recurrence interval ranged from 25 to 50 years. The recurrence interval of the stream flow deficit for the main-stem Delaware River was estimated to be much greater than 100 years. Water conservation was widely practiced, and a state of emergency was declared by the governor on June 12, 1965, for most of northeastern New Jersey. On July 12, 1965, the Delaware River Basin Commission declared a drought emergency and decreased diversions from the Delaware River basin by New York City and New Jersey. In August 1965, the President declared the Delaware River basin a federal drought-disaster area.
June 1980 to April 1981	Statewide	The drought was nearly statewide and had recurrence intervals that ranged from 10 to 25 years except in a few isolated areas. A ban on nonessential water use for 372 municipalities was ordered by the governor in January 1981. Boonton Reservoir, completed in 1904, had record-low water levels at the end of January 1981.
July 1984 to 8/1/1985	Statewide	The drought had a recurrence interval that ranged from 10 to 20 years in the northern and east-central parts of the State and from four to nine years in the north-central and southwestern parts. On January 23, 1985, the Delaware River Basin Commission declared the basin to be in a drought-warning condition. On April 17, 1985, the governor declared a state of emergency for 93 municipalities in northeastern New Jersey.
December 1998	Camden, Cumberland, Eastern Gloucester, Hunterdon, Mercer, Middlesex, Morris, Northwestern Burlington, Salem, Somerset, Sussex, Warren, Western Atlantic, Western Cape May, Western Monmouth, and Western Ocean Atlantic, Eastern Cape May, Eastern Monmouth, Eastern Ocean,	State forestry service extinguished 42 small wildfires the weekend of December 5 and 6. Grain farmers suffered serious losses of corn and late season crops. Reservoir levels fell. Saltwater line of Delaware River was at River Mile 85. This was 11 miles farther upstream than normal and increased corrosion control costs of industries.
January 1999	Camden, Cumberland, Eastern Atlantic, Eastern Cape May, Eastern Monmouth, Eastern Ocean, Gloucester, Hunterdon, Mercer, Middlesex, Morris, Northwestern Burlington, Salem, Somerset, Sussex, Warren, Western Atlantic, Western Cape May, Western Monmouth, and Western Ocean	On January 5, the Delaware River Basin Commission issued a conditional drought emergency. Heavy precipitation on January 3rd gave the area a temporary reprieve from going straight into a drought emergency.
July 1999	Camden, Cumberland, Eastern Atlantic, Eastern Cape May, Eastern Monmouth, Eastern Ocean, Gloucester, Hunterdon, Mercer, Middlesex, Morris, Northwestern Burlington, Salem, Somerset, Sussex, Warren, Western Atlantic, Western Cape May, Western Monmouth, and Western Ocean	Through July 13, there were 44 forest fires in the state. Many shallow wells in northwest ran dry. Rivers and streams had 25% of normal flow. In an effort to maintain a flow of Delaware River, the Delaware River Basin Commission increased releases from the upstate New York reservoirs as well as Beltzville and Blue Marsh Lakes in Pennsylvania. Plant corrosion issues resulted from brackish water. Salt line along Delaware River was 12 miles farther north than usual. Livestock feed crops were at a near-total loss.



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Date	Location	Description
August to September 1999	Camden, Cumberland, Eastern Atlantic, Eastern Cape May, Eastern Monmouth, Eastern Ocean, Gloucester, Hunterdon, Mercer, Middlesex, Morris, Northwestern Burlington, Salem, Somerset, Sussex, Warren, Western Atlantic, Western Cape May, Western Monmouth, and Western Ocean	Crops were greatly affected, especially grain and forage crops in the northern part of the state. Crop losses were estimated at \$80 million. Older wells failed in the northwest particularly Hunterdon and Sussex Counties. Field corn losses in the northern part of the state averaged between 10% and 75%. Many farms were close to total disaster. Livestock dealers auctioned off animals because they did not have enough food to feed them. The upstream advancing salt front along the lower Delaware River stressed fish and wildlife. Some groundwater supplies were also contaminated with the saltier water and had to be treated.
November 2001	Bergen, Camden, Cumberland, Atlantic, Cape May, Monmouth, Ocean, Essex, Hudson, Gloucester, Hunterdon, Mercer, Middlesex, Morris, Burlington, Passaic, Salem, Somerset, Sussex, Warren	The combined storage in the 13 major water supply reservoirs serving northeast New Jersey was 35.3 billion gallons, which was 43.9% capacity. This storage was 4.7 billion gallons less than one month prior and 23.4 billion gallons less than one year prior. Sussex and Atlantic County shallow wells were drying up while permits for deeper wells were increasing. Twenty-five residents in Wawayanda (Sussex County) ran out of water. Winter crops such as rye and grasses were struggling. On a county weighted average, monthly precipitation totals ranged from 0.7 inches in Cape May County to 1.2 inches in Sussex and Warren Counties. All were less than 31% normal.
December 2001	Camden, Cumberland, Eastern Atlantic, Eastern Cape May, Eastern Monmouth, Eastern Ocean, Gloucester, Hunterdon, Mercer, Middlesex, Morris, Northwestern Burlington, Salem, Somerset, Sussex, Warren, Western Atlantic, Western Cape May, Western Monmouth, and Western Ocean	Rainfall was below average for the previous six consecutive months, which yielded an average deficit of 10.36 inches. The combined storage in the 13 major water supply reservoirs serving northeast New Jersey was 47.4% capacity, which was 30% below normal. Current levels stopped declining, comparable to the 1998 to 1999 drought levels. Capacities in the individual systems at the end of the month were Newark Reservoirs at 44.2% (percent capacity) Jersey City Reservoirs at 53.1% North Jersey District at 44.5%, and United Water of New Jersey at 53.6%.
January - February 2002	Bergen, Passaic, Essex, Hudson, Union, Camden, Cumberland, Atlantic, Cape May, Monmouth, Ocean, Gloucester, Hunterdon, Mercer, Middlesex, Morris, Burlington, Salem, Somerset, Sussex, Warren	Northern New Jersey reservoirs were at 42.9% of capacity rather than typical 80% capacity. Issues of saltwater intrusion and corrosion became an issue for industries. Water treatment costs for municipalities that depend on the river for their water supply became an issue. Precipitation was 50% of normal. The combined storage of three major reservoirs serving northeast New Jersey was at 44% capacity, or 36% below normal. In February, dry weather continued, the drop in stream flow and groundwater levels reduced levels in the New York State reservoirs. This forced the NJDEP to continue the drought warning for all New Jersey counties except Union, Middlesex and Somerset Counties. Unseasonably dry weather in February exacerbated the drought and forced several individual counties to declare water emergencies, especially in the northeast. Four northern New Jersey reservoirs remained at 43% capacity, half the normal level.
March to July 2002	Camden, Cumberland, Eastern Atlantic, Eastern Cape May, Eastern Monmouth, Eastern Ocean, Gloucester, Hunterdon, Mercer, Middlesex, Morris, Northwestern Burlington, Salem, Somerset, Sussex, Warren, Western Atlantic, Western Cape May, Western Monmouth, and Western Ocean	Northern reservoirs were at 40% capacity. Most surface streams were 25% normal. Five-hundred wells throughout state needed replacement. Between October and March, the Forest Service responded to 1,116 wildfires. Many streams and ponds used to fight fires were dry. Incidences of salt water infiltrating wells occurred. Consequently many wells became brackish and unusable. The governor estimated the drought cost farmers approximately \$125 million. Crop revenue in some areas was reduced more than 50%.
August – September 2002	Bergen, Passaic, Essex, Hudson, Union, Camden, Cumberland, Atlantic, Cape May, Monmouth, Ocean, Gloucester, Hunterdon, Mercer,	The majority of the streams monitored had stream-flows in the 10 to 24 percentile, which was well below normal. The combined storage in the 13 major reservoirs serving Northeast New Jersey was 67.7% capacity, which was 10% to 15% below normal. Capacities of reservoirs on September 30 were: Newark Reservoirs at 55.0% (percent capacity) Jersey



Date	Location	Description
October 2002	Middlesex, Morris, Burlington, Salem, Somerset, Sussex, Warren	City Reservoirs at 62.5%, North Jersey District at 67.6%, and United Water of New Jersey at 61.8%
October 2002	Statewide	Many New Jersey farmers suffered losses of 50% or more, notably in commodities such as corn and soybean. Combined farming losses approximately \$125 million.
September 2005	Camden, Cumberland, Atlantic, Cape May, Monmouth, Ocean, Gloucester, Hunterdon, Mercer, Middlesex, Morris, Burlington, Salem, Somerset, Southeastern Burlington, Sussex, Warren, and Western Atlantic	Due to the lack of precipitation, caused rain from a storm to build on power lines. Rains in late September led to 9,000 homes and businesses mainly in Atlantic and Cape May Counties losing power. The heat scorched and damaged many agricultural plants. A statewide drought watch was declared on September 13, 2005. Rains in late September led to resuming normal conditions on October 14, 2005.
May to July 2006	Statewide	A statewide drought watch was declared on May 8, 2006. Significant precipitation in June led to lifting the drought watch on July 3, 2006.

Table 8 FEMA Declared Drought Disasters in NJ

Disaster Number	Disaster Type	Declaration Date	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-205	Water Shortage	8/18/1965	8/18/1965	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	21
DR-194	Severe Storms and Inland and Coastal Flooding	10/19/1980	10/19/1980	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	21

Earthquake

Table 9 Earthquake Historic Occurrences (Pre-2010)

Date(s)	Magnitude	Location	Losses/Impacts
12/19/1737	5.2	Greater NYC Area*	Threw down chimneys
11/30/1783	5.3	North-Central New Jersey*	Two foreshocks (11/24 and 11/30) and one aftershock (11/30); threw down chimneys
1/25/1841	0.0	West Orange, NJ	No reference and/or no damage reported.
10/26/1845	3.8	Greater NYC Area*	No reference and/or no damage reported.
9/9/1848	4.4	Greater NYC area*	No reference and/or no damage reported.
3/5/1861	0.0	Newark, NJ	No reference and/or no damage reported.
12/11/1874	3.4	Near Nyack and Tarrytown, NY	No reference and/or no damage reported.
9/10/1877	0.0	Burlington, NJ	No reference and/or no damage reported.
8/10/1880	0.0	Near Morristown, NJ	1 aftershock 9/1/1880.
8/10/1884	5.2	Greater NYC Area	Threw down chimneys; felt from Virginia to Maine



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Date(s)	Magnitude	Location	Losses/Impacts
1/4/1885	3.4	Hudson Valley	No reference and/or no damage reported.
9/1/1895	4.1	Near High Bridge, NJ	Felt over a considerable area to the northeast and southwest. The total felt area covered points from Maine to Virginia in a long, narrow elliptical zone of about 92,000 square kilometers. Articles fell from shelves and buildings rocked (intensity VI) in several Hunterdon County towns. The shock was fairly sharp at Camden and Burlington. At Philadelphia, Pennsylvania, broken windows and overturned crockery were reported.
5/27/1902	0.0	Bayonne-Wayne, NJ	No reference and/or no damage reported.
8/11/1902	0.0	Bayonne-Wayne, NJ	No reference and/or no damage reported.
1/20/1905	4.5	Greater NYC Area*	Probably located offshore
4/23/1910	0.0	Near Atlantic City, NJ	No reference and/or no damage reported.
11/6/1912	0.0	Near Long Beach, NJ	No reference and/or no damage reported.
8/5/1919	0.0	Cinnaminson, NJ	No reference and/or no damage reported.
6/1/1927	3.9	Near Asbury Park, NJ	Occurred in the Asbury Park area. Three shocks were felt along the coast from Sandy Hook to Toms River. Maximum intensities of VII were observed at Asbury Park and Long Branch. Several chimneys fell, plaster cracked, and articles were thrown from shelves. The felt area extended over approximately 7,800 square kilometers.
1/25/1933	0.0	Near Trenton, NJ	A sharp jolt was felt over central New Jersey from Lakehurst to Trenton. Although there is some doubt whether the shock was of seismic origin, the event was felt most strongly at Lakehurst, where people reported they were rolled out of bed (intensity V). Other people reported pictures shaken from walls. The shock was also felt at Bordentown, Burlington, Columbus, Englishtown, Freehold, Hightstown, New Egypt, Robbinsville, and White Horse.
7/19/1937	3.5	Western Long Island, NY	One or few earthquakes beneath Long Island
9/30/1937	0.0	Verona, NJ	No reference and/or no damage reported.
5/16/1938	0.0	Verona, NJ	No reference and/or no damage reported.
8/23/1938	3.8	Northeast of New Egypt, NJ	Caused minor damage at Gloucester City and Hightstown (intensity V). The total felt area was about 13,000 square kilometers, including bordering portions of Delaware and Pennsylvania. Glassware was broken at Gloucester City and Hightstown and some furniture was displaced at Pitman. A few windows and some glassware were reported broken at Ardmore, Pennsylvania. Four smaller shocks occurred on 8/23 and one on 8/26.
8/23/1938	4.0	Freehold, NJ	4 aftershocks felt.
12/6/1938	0.0	Verona, NJ	No reference and/or no damage reported.
9/13/1939	0.0	Union City, NJ	No reference and/or no damage reported.
11/15/1939	3.4	Salem County, NJ	The disturbance was reportedly felt from Trenton to Baltimore, Maryland, and from Cape May to Philadelphia and its adjoining counties. About 16,000 square kilometers were affected. Small objects were reported to have overturned at Deepwater, but little or no damage was noted.
4/1/1947	2.7	Pompton Lakes NJ	No reference and/or no damage reported.
10/16/1949	0.0	Hopewell, NJ	No reference and/or no damage reported.
9/3/1951	3.6	Rockland County, NY	Northeastern New Jersey experienced minor effects.
8/17/1953	3.2	Bergen County, NJ	No reference and/or no damage reported.
3/31/1954	0.0	Long Branch, NJ	No reference and/or no damage reported.
3/23/1957	2.9	Schooley's Mountain, NJ	A shock affected west-central New Jersey, near the site of the 1895 earthquake. Chimneys cracked (intensity VI), windows and dishes broke, and pictures fell at



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Date(s)	Magnitude	Location	Losses/Impacts
			Lebanon. A cracked chimney was also reported from Hamden. At Long Valley, some walls were cracked and plaster fell. The felt area was small in comparison with the other shocks previously described.
12/27/1961	2.7	5 km W of Flemington, NJ	No reference and/or no damage reported.
10/13/1962	0.0	Pompton Lakes, NJ	No reference and/or no damage reported.
12/10/1968	2.7	Southeast of Camden, NJ	No reference and/or no damage reported.
4/25/1969	0.0	Near Sussex, NJ	No reference and/or no damage reported.
10/6/1969	0.0	Ogdensburg, NJ	No reference and/or no damage reported.
2/28/1973	3.5	East of Wilmington, DE	No reference and/or no damage reported.
7/10/1973	2.6	East of Wilmington, DE	No reference and/or no damage reported.
3/11/1976	2.8	Pompton Lakes, NJ	1 aftershock, some damage
4/13/1976	3.1	Near Ridgefield, NJ	The shock was felt widely.
12/5/1976	0.0	N/A	No reference and/or no damage reported.
12/5/1976	1.8	Schooley's Mountain, NJ	1 aftershock felt on 12/07
1/21/1977	2.7	Lakehurst, NJ	No reference and/or no damage reported.
6/10/1977	1.1	High Bridge, NJ	No reference and/or no damage reported.
7/2/1977	2.3	Hampton, NJ	No reference and/or no damage reported.
10/27/1977	1.5	Sparta, NJ	No reference and/or no damage reported.
11/27/1977	1.8	Oakland, NJ	No reference and/or no damage reported.
12/23/1977	2.3	Schooley's Mountain, NJ	Five foreshocks felt between 12/4 to 12/8, and five aftershocks felt on 12/23
2/15/1978	1.6	Boonton, NJ	No reference and/or no damage reported.
4/3/1978	2.0	Off Sandy Hook	No reference and/or no damage reported.
5/18/1978	1.5	Bloomington, NJ	No reference and/or no damage reported.
6/16/1978	0.0	Sparta, NJ	No reference and/or no damage reported.
6/30/1978	2.9	Mahwah-Oakland, NJ	1 aftershock on same day.
1/30/1979	3.5	Cheesequake, NJ	No reference and/or no damage reported.
2/2/1979	1.9	Chester, NJ	No reference and/or no damage reported.
2/23/1979	2.9	Chester, NJ	No reference and/or no damage reported.
3/10/1979 "Cheesequake Earthquake"	3.1	Bernardsville, NJ (epicenter in Morris County)	Felt by some people in Manhattan
3/25/1980	2.8	Hainesburg, NJ	No reference and/or no damage reported.
4/5/1980	2.9	South of Seaside, NJ	No reference and/or no damage reported.
8/2/1980	2.8	Keyport, NJ	No reference and/or no damage reported.
8/30/1980	3.0	Medford Lakes, NJ	No reference and/or no damage reported.
3/19/1981	2.0	Boonton, NJ	No reference and/or no damage reported.
5/18/1981	2.1	Ramsey, NJ	No reference and/or no damage reported.
6/21/1981	1.8	Denville, NJ	No reference and/or no damage reported.
4/12/1982	2.4	Mount Holly, NJ	No reference and/or no damage reported.
7/29/1982	2.4	Seaside Heights, NJ	No reference and/or no damage reported.
9/16/1982	1.6	Franklin, NJ	No reference and/or no damage reported.
2/19/1983	2.7	Oldwick, NJ	No reference and/or no damage reported.
6/1/1983	1.5	Dover, NJ	No reference and/or no damage reported.



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Date(s)	Magnitude	Location	Losses/Impacts
9/6/1983	1.5	Fort Lee, NJ	No reference and/or no damage reported.
9/15/1983	1.5	Ringwood, NJ	No reference and/or no damage reported.
3/12/1984	2.0	Asbury Park, NJ	No reference and/or no damage reported.
5/13/1984	2.1	Mount Hope, NJ	No reference and/or no damage reported.
6/3/1984	1.3	Kinnelon, NJ	No reference and/or no damage reported.
6/6/1984	1.7	Near Morristown, NJ	No reference and/or no damage reported.
8/2/1984	1.7	Mount Olive, NJ	No reference and/or no damage reported.
8/12/1984	2.4	Byram, NJ	No reference and/or no damage reported.
8/12/1984	2.1	Byram, NJ	No reference and/or no damage reported.
10/25/1984	2.0	Near Mount Olive, NJ	No reference and/or no damage reported.
12/3/1984	1.5	Byram, NJ	No reference and/or no damage reported.
12/13/1984	1.7	Byram, NJ	No reference and/or no damage reported.
12/14/1984	1.7	North of Milford, NJ	No reference and/or no damage reported.
12/15/1984	1.8	Byram, NJ	No reference and/or no damage reported.
12/17/1984	1.6	Byram, NJ	No reference and/or no damage reported.
10/19/1985	4.0	Ardsley, NY	Many people in the NYC area felt this earthquake.
2/8/1986	1.7	Flanders, NJ	No reference and/or no damage reported.
2/23/1986	1.8	Port Murray, NJ	No reference and/or no damage reported.
6/29/1986	1.5	Kinnelon, NJ	No reference and/or no damage reported.
7/15/1986	1.5	Franklin, NJ	No reference and/or no damage reported.
9/15/1986	2.3	Near New Egypt, NJ	No reference and/or no damage reported.
9/15/1986	1.9	Near Roebling, NJ	No reference and/or no damage reported.
11/23/1986	2.8	Tranquility, NJ	Felt in Sussex and Warren.
4/24/1987	1.9	South of Lake Mohawk, NJ	No reference and/or no damage reported.
5/16/1987	1.4	Near Paterson, NJ	No reference and/or no damage reported.
8/5/1987	1.7	Southwest of Newton, NJ	No reference and/or no damage reported.
8/6/1987	1.1	Southwest of Newton, NJ	No reference and/or no damage reported.
8/6/1987	1.1	Southwest of Newton, NJ	No reference and/or no damage reported.
12/6/1987	2.1	Burlington, NJ	No reference and/or no damage reported.
4/13/1988	1.4	Dover, NJ	No reference and/or no damage reported.
8/20/1988	1.0	10 km Northwest of Morristown, NJ	No reference and/or no damage reported.
12/22/1988	1.0	Wanaque, NJ	No reference and/or no damage reported.
12/23/1988	1.1	Wanaque, NJ	No reference and/or no damage reported.
1/22/1989	2.0	Englewood, NJ	No reference and/or no damage reported.
1/27/1989	1.1	New York-New Jersey Border	No reference and/or no damage reported.
9/3/1989	2.0	South of Staten Island	No reference and/or no damage reported.
9/3/1989	2.5	South of Staten Island	No reference and/or no damage reported.
1/26/1990	1.0	Franklin, NJ	No reference and/or no damage reported.
5/10/1990	1.8	Mount Freedom, NJ	No reference and/or no damage reported.
8/21/1990	0.7	Wanaque, NJ	No reference and/or no damage reported.
10/23/1990	2.9	Hancock's Bridge, NJ	Felt in New Jersey, Delaware, and Pennsylvania



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Date(s)	Magnitude	Location	Losses/Impacts
5/12/1991	1.3	Wanaque, NJ	No reference and/or no damage reported.
7/5/1991	1.3	Pompton Plains, NJ	No reference and/or no damage reported.
9/29/1991	2.2	Somerdale Borough, NJ	No reference and/or no damage reported.
1/9/1992	3.1	New Brunswick, NJ	No reference and/or no damage reported.
3/4/1992	1.4	Kinnelon, NJ	No reference and/or no damage reported.
6/7/1992	0.4	Jefferson Township, NJ	No reference and/or no damage reported.
10/13/1992	1.0	West Milford, NJ	No reference and/or no damage reported.
2/26/1993	2.5	Cherry Hill, NJ	No reference and/or no damage reported.
5/15/1993	2.6	Perrineville, NJ	No reference and/or no damage reported.
5/23/1994	1.6	Butler, NJ	No reference and/or no damage reported.
1/27/1995	2.3	Rockaway, NJ	No reference and/or no damage reported.
4/1/1995	1.5	Rockaway, NJ	No reference and/or no damage reported.
5/26/1995	1.5	Kinnelon, NJ	No reference and/or no damage reported.
10/27/1995	1.3	Northeast of Newton, NJ	No reference and/or no damage reported.
10/27/1995	1.4	Northeast of Newton, NJ	No reference and/or no damage reported.
2/18/1996	1.5	Ringwood, NJ	No reference and/or no damage reported.
2/19/1996	1.7	Ringwood, NJ	1 aftershock felt 22 minutes later
2/19/1996	0.8	5 km West Ringwood, NJ	No reference and/or no damage reported.
2/23/1996	0.8	6.4 km West of Ringwood, NJ	No reference and/or no damage reported.
2/26/1996	0.0	Near Mount Arlington, NJ	No reference and/or no damage reported.
10/24/1996	2.0	9 km South Crestwood Village, NJ	No reference and/or no damage reported.
11/12/1996	1.3	21 km Northeast of Newton, NJ	No reference and/or no damage reported.
11/12/1996	0.8	21 km Northeast of Newton, NJ	No reference and/or no damage reported.
3/11/1997	0.0	3 km West of Rendall Park, NJ	No reference and/or no damage reported.
5/25/1997	0.5	1 km Northeast of Fort Lee, NJ	No reference and/or no damage reported.
6/27/1997	1.6	4.6 km North of Rockaway, NJ	No reference and/or no damage reported.
7/15/1997	2.3	12 km Northeast of Princeton, NJ	No reference and/or no damage reported.
10/21/1997	0.5	3 km Southwest Woodcliff Lake, NJ	No reference and/or no damage reported.
10/24/1997	0.5	3 km Southwest Secaucus, NJ	No reference and/or no damage reported.
3/25/1998	1.9	13 km South of Salem, NJ	No reference and/or no damage reported.
6/20/1998	1.2	2 km Southeast Kinnelon, NJ	No reference and/or no damage reported.
6/30/1998	1.9	3 km South of Butler, NJ	No reference and/or no damage reported.
1/12/1999	1.4	1 km Northwest of Clifton, NJ	No reference and/or no damage reported.
1/31/1999	1.5	2 km West of Emerson, NJ	No reference and/or no damage reported.
5/31/1999	2.3	8 km West of Fort Dix, NJ	No reference and/or no damage reported.
1/17/2001	2.4	Manhattan	Felt in the Upper East Side of Manhattan, Long Island City, and Queens, NY
7/14/2001	1.9	7.1 km Northeast of Boonton, NJ	No reference and/or no damage reported.
10/17/2001	2.6	Manhattan	Felt in the Upper East Side of Manhattan, Long Island City, Astoria, and Queens, NY



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Date(s)	Magnitude	Location	Losses/Impacts
8/9/2002	1.5	5.4 km North of Somerville, NJ (epicenter in Bridgewater)	No reference and/or no damage reported.
8/24/2003	1.5	6 km Southwest of Morris Plains, NJ	No reference and/or no damage reported.
8/26/2003	3.5	3 km North of Milford, NJ	No reference and/or no damage reported.
3/22/2004	2.1	2 km Northeast of from Runnemede, NJ	No reference and/or no damage reported.
12/17/2004	2.0	6 km Southeast from Pennsville, NJ	No reference and/or no damage reported.
4/23/2005	1.9	1.3 km East of Lodi, NJ	No reference and/or no damage reported.
12/9/2005	2.1	16 km West of Franklin Lakes, NJ	Aftershock felt 55 minutes later
2/16/2006	2.6	22 km Northeast of Newton, NJ	No reference and/or no damage reported.
2/17/2006	0.9	20 km Northeast of Newton, NJ	No reference and/or no damage reported.
2/21/2006	1.3	20.4 km Northeast of Newton, NJ	No reference and/or no damage reported.
5/15/2006	2.0	9 km South of Fair Lawn, NJ	No reference and/or no damage reported.
6/28/2007	2.1	7 km East of Fairfield, NJ	No reference and/or no damage reported.
2/3/2009	3.0	3.5km South-Southwest of Rockaway, NJ	There were reports of people having felt this earthquake throughout New Jersey.
2/14/2009	2.4	5 km North-Northeast of Boonton, NJ	There were reports of people having felt this earthquake throughout New Jersey.
2/18/2009	1.1	3 km South-Southwest of Kinnelon, NJ	No reference and/or no damage reported.
2/16/2009	1.4	1 km East-Southeast of Oradell, NJ	No reference and/or no damage reported.
2/16/2009	2.3	2 km South-Southeast of Dover, NJ	No reference and/or no damage reported.
7/1/2009	2.8	2.25km East-Southeast of Pennsville, NJ	There were reports of people having felt this earthquake throughout New Jersey.
12/21/2009	2.3	13 km South of Phillipsburg, NJ	No reference and/or no damage reported.
12/26/2009	2.0	8 km Northwest of Morris Pains, NJ	No reference and/or no damage reported.
2/5/2010	1.5	3 km Northwest of Far Hills, NJ	No reference and/or no damage reported.
2/7/2010	1.2	3 km Northwest of far Hills, NJ	No reference and/or no damage reported.
2/10/2010	2.2	1 km West of Wanaque	No reference and/or no damage reported.
2/21/2010	2.6	Gladstone, NJ	This earthquake hit just before 9 a.m. and prompted numerous phone calls to police. No damages were reported. Many people in New Jersey reported having felt this earthquake.
2/21/2010	2.3	Gladstone, NJ	This event was most likely an aftershock from the morning's earthquake. Numerous people in New Jersey reported having felt this earthquake.
6/6/2010	2.3	6 km Southeast of Sayreville, NJ	People reported having felt this earthquake throughout New Jersey.
12/25/2010	2.1	1 km West of Clifton, NJ	No reference and/or no damage reported.



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Date(s)	Magnitude	Location	Losses/Impacts
5/8/2011	1.2	1 km Southwest of Clifton, NJ	No reference and/or no damage reported.
5/10/2011	1.9	2 km North of Mount Holly, NJ	No reference and/or no damage reported.
5/29/2011	1.3	3 km South of Fort Lee, NJ	No reference and/or no damage reported.
5/29/2011	1.9	24 km South-Southwest of Lakehurst, NJ	No reference and/or no damage reported.
6/9/2011	1.6	2 km Southeast of S. Plainfield, NJ	No reference and/or no damage reported.
8/23/2011	5.8	Central Virginia	A moderate earthquake occurred in central Virginia and was felt throughout most of the east, from Georgia to southern Canada and from Indiana to coastal Maine. It was followed by four aftershocks. In New Jersey, the intensity ranged from one to four (weak to light). Areas underlain by thick silt and clay felt a stronger ground motion than did those where rock was very close to the surface. The quake was felt in South Brunswick and residents were calling 911 wanting to know what happened; some thought it was an explosion. It was also felt in the offices of Alcatel-Lucent in Murray Hill (Union County). Ceiling tiles fell out at a Sears store in Middletown. In Plainfield (Union County), employees in the Park Madison building were evacuated after the tremor. Union County's administration building in Elizabeth reported continuous shaking. In New Brunswick (Middlesex County), employees were evacuated from the County administration building. Atlantic City (Atlantic County) went into emergency mode with evacuations of high rises, hospitals, schools, casinos, and hotels. The County OEM received reports of a crack in a wall in a house and broken water pipe in a building. There were minor scattered power outages reported throughout the state.
7/17/2012	1.1	16 km Northwest of Morristown, NJ	No reference and/or no damage reported.
7/18/2012	1.1	18 km Northwest of Morristown, NJ	No reference and/or no damage reported.
8/23/2012	1.2	1.4 km East of Ringwood, NJ	No reference and/or no damage reported.
11/5/2012	2.0	3 km Southwest of Mahwah, NJ	People reported having felt this earthquake in various parts of New Jersey.
11/23/2012	2.2	Greater Philadelphia Area/New Jersey	Numerous reports of people having felt the earthquake in southwestern New Jersey.
6/23/2013	1.0	2.7 km SW of Morris Plains, NJ	No reference and/or no damage reported.
5/31/2014	1.7	3.7 km SW of Morris Plains, NJ	No reference and/or no damage reported.
6/19/2014	1.3	1.4 km S of Morris Plains, NJ	No reference and/or no damage reported.
7/8/2014	1.5	2.6 km W of Bellmawr, NJ	No reference and/or no damage reported.
7/18/2014	2.0	16.3 km E of Highlands, NJ	No reference and/or no damage reported.
9/3/2014	0.6	5 km NE of Wanaque, NJ	No reference and/or no damage reported.
12/13/2014	1.0	2 km N of Wanaque, NJ	No reference and/or no damage reported.
12/28/2014	0.5	1 km N of Butler, NJ	No reference and/or no damage reported.
3/27/2015	0.8	2.2 km SW of Clifton, NJ	No reference and/or no damage reported.
7/12/2015	1.1	1 km NW of Butler, NJ	No reference and/or no damage reported.
8/14/2015	0.8	4.4 km N of Butler, NJ	No reference and/or no damage reported.
8/22/2015	1.1	1.1 km NW of Butler, NJ	No reference and/or no damage reported.
1/2/2016	2.1	2.4 km NW of Ringwood, NJ	No reference and/or no damage reported.
2/19/2016	1.4	5 km WNW of Fairfield, NJ	No reference and/or no damage reported.
5/27/2016	2.7	3.5 km N of Bernardsville, NJ	No reference and/or no damage reported.



Date(s)	Magnitude	Location	Losses/Impacts
7/4/2016	1.2	2 km N of Wanaque, NJ	No reference and/or no damage reported.
7/31/2016	1.2	2 km SW of Clifton, NJ	No reference and/or no damage reported.
8/9/2016	1.5	2 km SW of Clifton, NJ	No reference and/or no damage reported.
8/9/2016	1.9	13 km SE of Twin Rivers, NJ	No reference and/or no damage reported.
9/20/2016	1.3	2 km S of Park Ridge, NJ	No reference and/or no damage reported.
11/6/2016	1.2	4 km SW of Ringwood, NJ	No reference and/or no damage reported.
11/6/2016	1.6	3 km W of Jersey City, NJ	No reference and/or no damage reported.
3/25/2017	1.0	13 km SW of Ramblewood, NJ	No reference and/or no damage reported.
9/25/2017	1.9	6 km N of Boonton, NJ	No reference and/or no damage reported.
9/30/2017	2.1	1 km E of Rockaway, NJ	No reference and/or no damage reported.
11/8/2017	1.4	3.5 km NW of Keansburg, NJ	Sandy Hook Bay

Flood

Table 10 Historic Flooding Events (Pre-2010)

Date(s) of Event	Event Type	Counties Affected	Description
4/1/1984	Flood	N/A	This flooding event in the Passaic River Basin claimed three lives and caused \$335 million in damages. 9,400 people had to evacuate their homes.
January 19 to 26, 1996	Flash Flood	N/A	Flashing flooding led to larger flooding, particularly along the Delaware and Raritan Rivers.
10/19/1996	Flooding	N/A	Heavy rain caused widespread and severe flooding throughout northern New Jersey, particularly along the Raritan River and its tributaries, as well as the Rahway and Passaic Rivers.
8/20/1997	Flash Flood	Atlantic	Torrential rain fell across southeast New Jersey as a low-pressure system developed over the Delmarva Peninsula and slowly moved northeast across southern New Jersey. Atlantic County bore the brunt of the storm. Storm totals exceeded eight inches from Estell Manor through Galloway Township, and 13.52 inches at the Atlantic City Airport. This storm caused severe flash flooding with several major roadways washing out and bridges collapsing.
9/16/1999	Flooding associated with Hurricane Floyd	N/A	Hurricane Floyd caused the largest flood on record along the Raritan River. Extensive flooding occurred throughout central and northern New Jersey. Rainfall totals exceeded 12 inches in several locations, with eight to 10-inch totals widespread.
August 12 to 13, 2000	Flooding	Atlantic, Cape May, Monmouth, Morris, Ocean, Sussex	The combination of a weak onshore flow from a nearly stationary low-pressure system off the Delmarva Peninsula and the high tides caused by the full moon led to some minor tidal flooding. A nearly unprecedented torrential downpour (approximately a 1,000-year event) remained stationary for about six hours in eastern Sussex County, resulting in considerable flooding in southeastern Sussex and western Morris Counties. The largest rainfall totals exceeded 12 inches.
7/12/2004	Flash and Poor Drainage Flood	Burlington	Flash flooding occurred during the late afternoon and evening of July 12, as thunderstorms with torrential downpours kept redeveloping along the Interstate 295 corridor in southern Burlington County. This continued for several hours and resulted in widespread storm totals exceeding six inches across most of the Rancocas Creek Basin. A storm total of 13.20 inches was reported in Tabernacle within a 12-hour period and represented a 1,000-year storm. The excessive rain caused record breaking flash flooding along nearly every stream in the Rancocas Basin and led to the failure or damage of 51 dams in Burlington County. Widespread poor drainage flooding also occurred.



Date(s) of Event	Event Type	Counties Affected	Description
9/18/2004	Flooding associated with remnants of Hurricane Ivan	Morris, Sussex, Warren	The remnants of Hurricane Ivan interacting with a slowly moving cold front caused widespread, heavy rain to fall during the first half of September 18 in Warren, Sussex, and Morris Counties. Storm totals averaged between three and six inches. This, in combination with even heavier rain in eastern Pennsylvania and southeastern New York State, resulted in the worst flooding along the Delaware River since 1955.

Table 11 Ice Jams Historic Occurrences (pre-2010)

Event Date	River/Location	County	Description/Losses
3/7/1904	South Branch Raritan River at Stanton	Hunterdon	Maximum annual gage height of 11.2 feet, affected by backwater from ice. Bank- full stage eight feet.
3/8/1904	Delaware River at Trenton	Mercer	Maximum annual gage height of 22.8 feet, affected by backwater from ice.
1/7/1905	South Branch Raritan River at Stanton	Hunterdon	Maximum annual gage height of 12.5 feet, affected by backwater from ice. Bank-full stage eight feet.
1/26/1907	Delaware River at Trenton	Mercer	Maximum annual gage height of 9.0 feet, affected by backwater from ice.
3/5/1920	South Branch Raritan River at Stanton	Hunterdon	Maximum annual gage height of 11.5 feet, affected by backwater from ice. Bank-full stage eight feet.
1/22/1924	Musconetcong River at Hackettstown	Warren	Gage height of 3.44 feet, affected by backwater from ice.
1/23/1924	Beaver Brook at Belvidere	Warren	Gage height of 3.05 feet, affected by backwater from ice. Additional ice-affected gage height of three feet. Bank-full stage four feet.
12/27/1924	Beaver Brook at Belvidere	Warren	Gage height of 3.03 feet, affected by backwater from ice. Additional ice-affected gage height of 4.09 feet (maximum for year), reported on February 12. Discharge 600 cfs. Also, ice affected gage heights of 3.03 feet, reported on February 24, and 2.96 feet reported on February 27. Bank-full stage four feet.
2/12/1925	North Branch Raritan River at Raritan	Somerset	Maximum annual gage height of 9.0 feet, affected by backwater from ice.
2/19/1926	South Branch Raritan River at Stanton	Hunterdon	Maximum annual gage height of 9.52 feet, affected by backwater from ice. Bank- full stage eight feet.
1/16/1927	Beaver Brook at Belvidere	Warren	Maximum gage height of 3.03 feet, affected by backwater from ice. Bank-full stage four feet.
1/20/1927	Lamington (Black) River at Pottersville	Somerset	Gage height of 2.83 feet, affected by backwater from ice. Bank-full stage five feet.
1/21/1927	South Branch Raritan River at Stanton	Hunterdon	Maximum annual gage height of 8.01 feet, affected by backwater from ice. Bank-full stage eight feet.
1/3/1928	Beaver Brook at Belvidere	Warren	Gage height of 3.29 feet, affected by backwater from ice. Additional ice-affected gage height of 3.09 feet was reported on January 22. Bank-full stage four feet.
1/25/1930	Musconetcong River at Hackettstown	Warren	Maximum annual gage height of 3.58 feet, affected by backwater from ice.
1/26/1930	Delaware River at Trenton	Mercer	Maximum annual gage height of 8.08 feet, affected by backwater from ice.
1/27/1930	Beaver Brook at Belvidere	Warren	Maximum annual gage height of 3.10 feet, affected by backwater from ice. Bank- full stage four feet.
12/19/1932	Beaver Brook at Belvidere	Warren	Gage height of 2.94 feet, affected by backwater from ice. Bank-full stage four feet.
2/13/1933	Delaware River at Trenton	Mercer	Gage height of 7.90 feet, affected by backwater from ice.



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Event Date	River/Location	County	Description/Losses
1/4/1934	Delaware River at Trenton	Mercer	Gage height of 11.83 feet, affected by backwater from ice. Additional ice- affected gage height of 14.2 feet (maximum for year), reported March 5.
1/31/1934	Beaver Brook at Belvidere	Warren	Gage height of 3.04 feet, affected by backwater from ice. Additional ice-affected gage height of 3.30 feet (maximum for year), reported on March 3. Bank-full stage four feet.
3/3/1934	Lamington (Black) River at Pottersville	Somerset	Gage height of 3.33 feet, affected by backwater from ice. Additional ice-affected gage height of 3.51 feet, reported on March 4. Bank-full stage five feet.
3/4/1934	South Branch Raritan River at Stanton	Hunterdon	Maximum annual gage height of 10.05 feet, affected by backwater from ice. Daily mean discharge 2,980 cfs. Bank-full stage eight feet.
3/5/1934	Flat Brook at Flatbrookville	Sussex	Maximum annual gage height of 6.40 feet, affected by backwater from ice. Discharge 700 cfs. Bank-full stage five feet.
1/25/1935	Delaware River at Trenton	Mercer	Gage height of 7.12 feet, affected by backwater from ice.
12/26/1935	Delaware River at Trenton	Mercer	Gage height of 6.57 feet, affected by backwater from ice. Additional ice-affected gage height of 16.12 feet, reported on January 3 and ice-affected gage height of 10.20 feet, reported on January 22.
1/3/1936	Beaver Brook at Belvidere	Warren	Gage height of 3.24 feet, affected by backwater from ice. Additional ice-affected gage height of 3.10 feet, reported on January 21. Also, ice-affected gage height of 3.68 feet, reported on January 26. Bank-full stage four feet.
1/3/1936	North Branch Raritan River at Far Hills	Somerset	Maximum annual gage height of 4.81 feet, affected by backwater from ice.
1/3/1936	Wanaque River at Monks	Passaic	Gage height of 1.84 feet, affected by backwater from ice. Additional ice-affected gage height of 1.50 feet, reported on February 15.
1/3/1936	Lamington (Black) River at Pottersville	Somerset	Maximum annual gage height of 4.19 feet, affected by backwater from ice. Discharge 780 cfs. Bank-full stage five feet.
1/3/1936	Lamington (Black) River at Pottersville	Somerset	Maximum gage height of 4.19 feet caused by an ice jam reported by the USGS.
1/25/1936	Musconetcong River at Hackettstown	Warren	Gage height of 4.18 feet, affected by backwater from ice.
1/25/1936	Maurice River at Norma	Salem	Gage height of 4.01 feet, affected by backwater from ice. Bank-full stage 3.5 feet.
2/16/1936	Cedar Creek at Lanoka Harbor	Ocean	Maximum peak stage of 6.50 feet due to backwater from ice and tide.
1/28/1938	Beaver Brook at Belvidere	Warren	Gage height of 3.05 feet, affected by backwater from ice. Additional ice-affected gage height of 3.12 feet reported on January 29. Bank-full stage four feet.
1/27/1939	Delaware River at Trenton	Mercer	The gage reported water levels of 4.2 feet due to an ice gorge at the gage. Flood stage is 7.5 feet. The gorge was reported through January 28 and resulted in water levels of 4.1 feet on January 29 due to an ice gorge below the gage.
1/30/1939	South Branch Raritan River at Stanton	Hunterdon	Gage height of 7.32 feet, affected by backwater from ice. Bank-full stage eight feet.
1/30/1939	Delaware River at Trenton	Mercer	Gage height of 7.40 feet, affected by backwater from ice.
1/15/1940	Flat Brook at Flatbrookville	Sussex	Gage height of 5.47 feet, affected by backwater from ice. Bank-full stage five feet.
1/15/1940	South Branch Raritan River at High Bridge	Hunterdon	Gage height of 10 feet, affected by backwater from ice.
1/15/1940	Lamington (Black) River at Pottersville	Somerset	Gage height of 3.54 feet, affected by backwater from ice. Bank-full stage five feet.
1/15/1940	South Branch Raritan River at Stanton	Hunterdon	Gage height of 7.91 feet, affected by backwater from ice. Additional ice-affected gage height of eight feet reported on February 11. Bank-full stage eight feet.
1/16/1940	Delaware River at Trenton	Mercer	Gage height of 8.12 feet, affected by backwater from ice.
2/15/1940	Wanaque River at Monks	Passaic	Gage height of 1.92 feet, affected by backwater from ice.
3/8/1941	Pequest River at Huntsville	Sussex	Maximum annual gage height of 3.25 feet, affected by backwater from ice. Bank-full stage four feet.



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Event Date	River/Location	County	Description/Losses
2/4/1942	Delaware River at Trenton	Mercer	Gage height of 6.53 feet, affected by backwater from ice.
12/4/1942	Beaver Brook at Belvidere	Warren	Gage height of 2.97 feet, affected by backwater from ice. Bank-full stage four feet.
12/22/1942	Lamington (Black) River at Pottersville	Somerset	Gage height of three feet, affected by backwater from ice. Bank-full stage five feet.
1/5/1943	Pequest River at Huntsville	Sussex	Gage height of 3.32 feet, affected by backwater from ice. Bank-full stage four feet.
2/16/1943	Delaware River at Trenton	Mercer	Gage height of 6.82 feet, affected by backwater from ice. Additional ice-affected gage height of 7.99 feet, reported on February 20.
1/10/1944	Beaver Brook at Belvidere	Warren	Gage height of 3.07 feet, affected by backwater from ice. Additional ice-affected gage height of 3.01 feet reported on February 15. Bank-full stage four feet.
2/15/1944	South Branch Raritan River at High Bridge	Hunterdon	Maximum annual gage height of 10.39 feet, affected by backwater from ice.
1/4/1945	Beaver Brook at Belvidere	Warren	Gage height of 3.03 feet, affected by backwater from ice. Additional ice-affected gage height of 3.03 feet reported on January 19. Ice-affected gage height of 3.02 feet was reported on January 20. Bank-full stage four feet.
1/12/1945	Delaware River at Trenton	Mercer	Gage height of 8.24 feet, affected by backwater from ice. Additional ice-affected gage height of 8.72 feet reported on January 17.
1/17/1945	Delaware River at Trenton	Mercer	Gage height of 8.72 feet, affected by backwater from ice.
2/22/1945	Neshanic River at Reaville	Hunterdon	Gage height of 8.42 feet, affected by backwater from ice. Bank-full stage nine feet.
2/22/1945	South Branch Raritan River at Stanton	Hunterdon	Gage height of 7.73 feet, affected by backwater from ice. Bank-full stage eight feet.
2/27/1945	Passaic River at Chatham	Morris	Maximum annual gage height of 6.67 feet, affected by backwater from ice.
3/4/1945	Delaware River at Montague	Sussex	Maximum annual gage height of 17.54 feet, affected by backwater from ice. Additional ice-affected gage height of 15.42 feet was reported on February 28.
12/20/1945	Delaware River at Trenton	Mercer	Gage height of 8.67 feet, affected by backwater from ice. Additional ice-affected gage height of 11.01 feet (maximum for year), reported on December 26.
12/25/1945	South Branch Raritan River at High Bridge	Hunterdon	Maximum annual gage height of 9.75 feet, affected by backwater ice.
12/25/1945	Lamington (Black) River at Pottersville	Somerset	Gage height of 3.66 feet, affected by backwater from ice. Discharge 450 cfs. Bank-full stage five feet.
12/26/1945	Beaver Brook at Belvidere	Warren	Maximum annual gage height of four feet, affected by backwater from ice. Bank-full stage four feet.
12/26/1945	Walnut Brook at Flemington	Hunterdon	Gage height of 2.32 feet, affected by backwater from ice. Bank-full stage three feet.
12/26/1945	Wanaque River at Monks	Passaic	Gage height of 1.87 feet, affected by backwater from ice.
12/26/1945	South Branch Raritan River at Stanton	Hunterdon	Maximum annual gage height of 9.06 feet, affected by backwater from ice. Bank- full stage eight feet.
12/27/1945	Delaware River at Montague	Sussex	Gage height of 14.7 feet, affected by backwater from ice.
2/10/1947	Delaware River at Trenton	Mercer	Maximum gage height of 7.9 feet, affected by backwater from ice.
1/25/1948	Musconetcong River at Bloomsbury	Hunterdon	Gage height of 3.64 feet, affected by backwater from ice. Bank-full stage four feet.
2/19/1948	South Branch Raritan River at Stanton	Hunterdon	Gage height of 8.54 feet, affected by backwater from ice. Bank-full stage eight feet.



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Event Date	River/Location	County	Description/Losses
2/20/1948	North Branch Raritan River at Raritan	Somerset	Maximum annual gage height of 9.39 feet, affected by backwater from ice.
2/21/1948	Delaware River at Montague	Sussex	Gage height of 17.88 feet, affected by backwater from ice.
2/24/1948	Passaic River at Chatham	Morris	Maximum annual gage height of 6.65 feet, affected by backwater from ice. Additional ice-affected gage height of 6.3 feet reported on February 20. Estimated daily mean discharge 1,000 cfs.
12/30/1948	West Brook at Wanaque	Passaic	Gage height of 2.65 feet, affected by backwater from ice. Discharge 388 cfs.
12/21/1951	Delaware River at Trenton	Mercer	Gage height of 9.48 feet, affected by backwater from ice.
1/21/1954	South Branch Raritan River at High Bridge	Hunterdon	Maximum annual gage height of 8.97 feet, affected by backwater from ice.
2/7/1955	Delaware River at Trenton	Mercer	Gage height of 7.27 feet, affected by backwater from ice.
1/23/1957	South Branch Raritan River at Stanton	Hunterdon	Maximum annual gage height of 6.74 feet, affected by backwater from ice. Bank- full stage eight feet.
3/2/1958	Pequest River at Pequest	Warren	Maximum annual gage height of 3.61 feet, affected by backwater from ice. Bank-full stage four feet.
1/2/1959	South Branch Raritan River at Stanton	Hunterdon	Maximum annual gage height of 7.59 feet, affected by backwater from ice. Discharge 2,310 cfs. Bank-full stage eight feet.
1/6/1959	Great Egg Harbor River at Folsom	Atlantic	Gage height of 4.72 feet, affected by backwater from ice. Bank-full stage five feet.
1/21/1959	Lamington (Black) River at Pottersville	Somerset	Maximum annual gage height of 3.64 feet, affected by backwater from ice. Bank- full stage five feet.
1/22/1959	Pequest River at Pequest	Warren	Gage height of 3.53 feet, affected by backwater from ice. Discharge 640 cfs. Bank-full stage four feet
1/1/1961	Neshanic River at Reaville	Hunterdon	Maximum annual gage height of 7.07 feet, affected by backwater from ice. Bank- full stage nine feet.
2/19/1961	South Branch Raritan River at Stanton	Hunterdon	Maximum annual gage height of 7.28 feet, affected by backwater from ice. Bank-full stage eight feet.
2/20/1961	Flat Brook at Flatbrookville	Sussex	Maximum annual gage height of 5.67 feet, affected by backwater from ice. Bank- full stage five feet.
2/22/1961	Passaic River at Chatham	Morris	Maximum annual gage height of 6.59 feet, affected by backwater from ice.
1/15/1968	Delaware River at Trenton	Mercer	An ice jam was observed at Trenton along the Delaware River.
2/15/1971	Delaware River at Montague	Sussex	The USGS reported an ice jam on February 15 at Montague on the Delaware River. The estimated water discharge was 10,000 cfs. Maximum gage height was 12.57 feet.
1/18/1994	Assunpink Creek at Clarksville	Mercer	A flood warning was issued for this USGS gage. The river gage was reading 6.75 feet at 1:40 a.m. and had risen three feet since 7 p.m. due to an ice jam.
1/28/1994	South Branch Raritan River at High Bridge	Hunterdon	Maximum peak stage of 14.26 feet on January 28 as a result of an ice jam
2/1/1994	Delaware River at Trenton	Mercer	This jam was approximately one mile long with a backwater of approximately three to four feet. Downstream, the jam was a smooth ice cover about 0.5 to one-mile long.
1/21/1996	Delaware River at Trenton	Mercer	Ice jams were reported on the Susquehanna, Delaware, and Schuylkill Rivers on January 21. These jams caused severe flooding in Trenton, forcing the evacuation of 3,000 people in the area. Two local people drowned while seven other deaths in the State of Pennsylvania were reported. Ten thousand people in the Wilkes- Barre region were evacuated. The Delaware had risen 12 feet in 10 hours while the Susquehanna crested at 12 feet above flood stage. In Avondale, 109 people were evacuated by boat while another 90 were evacuated from the Bridgeport Towers apartments. Front Street row houses were evacuated as well. This began with a winter storm dumping incredible amounts of snow across Pennsylvania. Of the 40 inches on the ground, 28 inches of it melted. There were also high winds reaching 58 mph.



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Event Date	River/Location	County	Description/Losses
1/18/1999	Multiple locations	Sussex	The combination of showers and thunderstorms with heavy rain, already saturated ground, and ice jams along area streams caused flooding and led to the collapse of the foundations of three homes in Hamburg Borough and Andover Township.
1/22/1999	Delaware River at Depue Island	Warren	An ice jam formed slightly downstream of an existing jam on the Delaware River. Park Rangers reported that it extended from Depue Island north past Tocks Island to Poxono Island. The ice in the Delaware Water Gap was beginning to break up and was predicted to move out later that day.
2/7/2003	South Branch Raritan River at High Bridge	Hunterdon	A small ice jam formed on the South Branch Raritan River near High Bridge.
2/17/2003	Forked River at Forked River	Ocean	An ice jam about 300 to 400 yards long formed on the canal leading from Barnegat Bay to the Oyster Creek generating station. The head of the jam was at the Route 1 bridge. The jam in this tidal area was composed of broken ice pieces and slush ice. Its formation occurred after extremely cold air temperatures and a large snowstorm. The jam was restricting primary cooling water flow to the generating plant. Mechanical removal of the jam from the upstream end towards the downstream end was recommended.
2/19/2003	Delaware River at Trenton	Mercer	The NWS reported an apparent ice jam on the Delaware River at Trenton on February 19. A significant within-banks rise was occurring on the lower main stem of the Delaware River at Trenton, most likely due to an ice jam at the Calhoun Street Bridge. The stage was 15.1 feet at 6 p.m. The river had risen over two feet since noon but had stabilized at about 15 feet during the evening.
2/23/2003	Passaic River at Chatham	Morris	The NWS reported an ice jam along the Passaic River which caused some minor flooding near Chatham. The river stopped rising just above flood stage and stabilized.
2/24/2003	Passaic River at Chatham	Morris	Maximum gage height of 6.35 feet due to ice effects.
1/31/2004	Delaware River at Trenton	Mercer	The NWS noted that there was an ice jam north of Trenton on the Delaware River.
2/6/2004	Passaic River at Chatham	Morris	Maximum peak stage of 10.93 feet as a result of an ice jam. The average daily discharge was estimated to be 490 cfs.
2/6/2004	Green Brook	Morris	An ice jam developed on the Green Brook. Dynamite was used to break the jam.
2/6/2004	Stony Brook at Princeton	Mercer	Maximum gage height of 5.73 feet due to an ice jam. The average daily discharge was estimated to be 280 cfs.
2/7/2004	Raritan River at Raritan	Somerset	Maximum peak stage of 11.32 feet as a result of an ice jam. The average daily discharge was estimated to be 3,150 cfs.
2/14/2007	Pequest River at Belvidere	Warren	An ice jam formed between two dams on the Pequest River. The lower dam was just above the confluence with the Delaware River, and the upper dam was about 200 yards upstream. Based on descriptions of the ice and local weather, the jam was a freeze-up jam. The ice backed up water into local residents' basements.
1/27/2009	Delaware River at Minisink Island	Sussex	An ice jam at Minisink Island was reported to be creating several feet of backwater.

Table 12 Tsunami Historic Occurrences (Pre-2010)

Event Date	Source Location	County	Description/Losses
September 3, 1821	North Carolina	N/A	A hurricane passed over the Outer Banks of North Carolina and over the Delmarva Peninsula. It entered Cape May County where it traveled up the Garden State Parkway. Miles of sandbars were exposed the next morning. A dull roar approached and then a solid mass of wind and rain came tearing great pines from the ground and moving houses from their foundations. A wall of water struck that carried away people and animals.



Event Date	Source Location	County	Description/Losses
August 10, 1884	Philadelphia, PA	N/A	A 5.6 earthquake generated a tsunami that was reported from Philadelphia, Trenton, and Highlands. In Trenton, the water in the city reservoir was agitated and a small tidal wave was noticed on the canal and feeder. In Highlands, two men were fishing and felt as if the water was had gone out from under their boat and it was grating on the sand.
September 8, 1889	Asbury Park, NJ	Monmouth	This event occurred during the Mudhen Hurricane. Unusually high waves were reported between September 8 and 10 in the Mid-Atlantic Coast. In New Jersey, these waves were reported in Asbury Park, Atlantic City, Sea Isle City, Coney Island, Long Island, Staten Island and other exposed points.
September 1, 1895	High Bridge, NJ	Hunterdon	A 4.3 earthquake centered near High Bridge was felt over a large area to the northeast and southwest. The earthquake was felt from Maine to Virginia. The earthquake knocked articles from shelves and rocked buildings in several towns in New Jersey, Pennsylvania, and New York. In Asbury Park, NJ, plaster was knocked from walls. The earthquake caused a tsunami-like wave on Long Island. There was one run-up associated with this event. It caused one injury.
6/9/1913	Longport, NJ	Atlantic	It was reported that heavy tides were associated with this event. There were no reports of storms or earthquakes in the northeast United States on this date. Damage in Longport occurred at the Thoroughfare waterfront when a 250-foot section of the embankment at 23rd Street was carried away. The washout extended to within 15 feet of the near rail line. The tide tore away the wharf at the Schurch chandlery store and it undermined the soil from the building. The Lavine Wharf was completely torn away. This event caused \$10,000 in damage. There was one injury associated with this event.
8/19/1931	Atlantic City, NJ	Atlantic	There was a sudden and brief onset of 3-meter waves in Atlantic City. Reports state that the surf was rough the day of the event and the waves rolled in shortly before noon. The waves arrived during high tide. There were other high wave events in the region, causing four people to drown. The weather bureau attributed this event to a tropical storm north of Puerto Rico.

Table 13 FEMA Declared Flood Disasters

Disaster Number	Disaster Type	Declaration Date	Counties																	Impacted Counties			
			Atlantic	Bergen	Burlington	Camden	Cape May	Cumberland	Essex	Gloucester	Hudson	Hunterdon	Mercer	Middlesex	Monmouth	Morris	Ocean	Passaic	Salem		Somerset	Sussex	Union
41	Hurricane, Floods	8/20/1955	Not Available																				
124	Severe Storm, High Tides, Flooding	3/9/1962	Not Available																				
245	Heavy Rains, Flooding	6/18/1968		X				X					X		X		X		X		X		7
310	Heavy Rains, Flooding	9/4/1971	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	21
402	Severe Storms, Flooding	8/7/1973						X					X						X		X		4
519	Severe Storms, High Winds, Flooding	8/21/1976	X				X							X		X							4
701	Coastal Storms, Flooding	3/28/1984 to 4/8/1984	X	X			X	X						X	X	X	X						8
973	Coastal Storm, High Tides, Heavy	12/10/1992 to 12/17/1992	X	X			X	X	X		X		X	X		X		X	X		X		12



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Disaster Number	Disaster Type	Declaration Date	Atlantic	Bergen	Burlington	Camden	Cape May	Cumberland	Essex	Gloucester	Hudson	Hunterdon	Mercer	Middlesex	Monmouth	Morris	Ocean	Passaic	Salem	Somerset	Sussex	Union	Warren	Impacted Counties	
	Rain, Flooding																								
1145	Severe Storms/Flooding	10/18/1996 to 10/23/1993									X			X		X					X		X		5
1189	Flooding	8/20/1997 to 8/21/1997	X																		X				1
1295	Hurricane Floyd	9/16/1999 to 9/18/1999		X					X			X	X	X		X		X		X		X			9
1337	Severe Storms, Flooding and Mudslides	8/12/2000 to 8/21/2000														X						X			2
1530	Severe Storms and Flooding	7/12/2004 to 7/23/2004			X	X																			2
1563	Tropical Depression Ivan	9/18/2004 to 10/1/2004										X	X									X		X	4
1588	Severe Storms and Flooding	4/1/2005 to 4/3/2005		X					X	X		X	X			X		X			X		X		9
1653	Severe Storms and Flooding	6/23/2006 to 7/10/2006										X	X									X		X	4
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	X	X	X	14
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
1873	Snowstorm	12/19/2009 to 12/20/2009	X		X	X		X		X							X		X						7

Geohazard

Table 14 Landslide Historic Occurrences (Pre-2010)

Date	Type	County	Trigger	Damage	Description
4/18/1896	Rockfall	Bergen	Weathering	No	A large boulder fell on the south side of the Blackledge Kearney House. It has an inscription on it that the rock fell on April 18, 1896.
5/4/1893	Debris flow	Burlington	Heavy rain	Yes	A two-story home was buried and totally destroyed in a landslide. Heavy rain caused a landslide of a 50-foot bank above the house to fall on the house and knock it off its foundation.
7/23/1887	Debris flow	Warren	Heavy rain/poor drainage	Yes	Two people killed, and railroad tracks damaged by a debris flow after heavy rains near Manunka Chunk Mountain, estimated location.



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Date	Type	County	Trigger	Damage	Description
10/8/1903	Debris flow	Hudson	Heavy rain	No	Report of a landslide after heavy rain in Weehawken at the Weehawken tunnel, the railroad was closed. Estimated location.
10/8/1903	Debris flow	Monmouth	Heavy rain	Yes	Report of a big landslide at Waterwitch, just below the long pier, shut down the Central Railroad of NJ. Estimated location
10/8/1903	Debris flow	Morris	Heavy rain	No	Report of a big landslide near Stanhope, rock and sand slid onto railroad tracks. Estimated location.
11/16/1904	Slump	Monmouth	Atlantic Ocean wave action	Unknown	1782 landslide from newspaper account possibly triggered by undercutting Atlantic Ocean wave action. Noise from the slump was heard for several miles. The block that slumped measured about 400- feet wide and 2,500 feet long.
5/25/1905	Debris flow	Monmouth	Heavy rain	No	Small landslide in 1972.
6/6/1905	Debris flow	Middlesex	Heavy rain	No	In April 1984, after heavy rains and high tides, the southern side of a landfill collapsed and slid into wetlands. New Jersey Department of Environmental Protection closed the landfill later in 1984.
6/15/1905	Rockfall	Hudson	Weathering	Yes	Large falling rock in 1993 demolished a car, numerous other past rockfalls in the same area.
7/6/1905	Rockfall	Sussex	Weathering	No	Small rockfall along old Susquehanna and Western railway bed which is now a hiking trail. Discovered in 2014, could have happened earlier.
7/6/1905	Rockfall	Morris	Weathering	No	Small rockfall adjacent to Timber Ridge Road.
7/6/1905	Rockfall	Warren	Weathering	No	Small rockfall along Rt. 80.
4/13/1915	Rockslide	Warren	Quarrying	No	A quarry worker at the Vulcanite Cement Works was killed by a slide of rock. Estimated location.
11/7/1915	Rockslide	Passaic	Vibration from railroad	Yes	Rockslide down Garret Mountain destroyed 200 feet of the D, L & W railroad tracks. Estimated location.
6/16/1925	Debris flow	Warren	Heavy rain	Yes	Passenger train derailed after hitting landslide material on railroad tracks caused by heavy rain. The train exploded causing multiple death and injuries.
7/5/1928	Rockslide	Bergen	Heavy rain	Yes	Report of a large rockslide: 100 feet of Henry Hudson Drive destroyed, \$15,000 in damage in 1928. Estimated location.
7/11/1929	Rockslide	Warren	Quarrying	No	A rockslide killed one worker and injured five others at the Edison Portland cement quarry. Estimated location.
5/17/1935	Rockslide	Bergen	Weathering	Yes	A 50-ton rock fell from the Palisades onto Rt. 5. The road was closed for five hours.
12/10/1935	Rockslide	Hudson	Heavy rain/weathering	Yes	Rockslide from a promontory on the Palisades crashed into the L.O. Koven Fabricating Company in Hoboken. Many other rockslides in prior years.
3/11/1936	Debris flow	Passaic	Heavy rain	Yes	CCC camp cut off as a result of Rt. 23 landslide due to heavy rain, estimated location.



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Date	Type	County	Trigger	Damage	Description
5/11/1936	Slump	Middlesex	Clay digging	Yes	A boy and two men were buried alive in clay landslide while digging for clay at the Valentine Brothers Clay pit. They were trapped for 30 minutes but were rescued and survived. Estimated location.
7/14/1936	Rockslide	Bergen	Heavy rain	No	A small rock slide occurred in the Palisades Interstate Park near the Yonkers-Alpine Ferry. Triggered by heavy rain from thunderstorms. Estimated location.
11/23/1936	Rockslide	Hudson	Construction	Yes	A large rock pile near the Lincoln Tunnel during its construction slide onto Boulevard East destroying a truck. Estimated location.
1/10/1937	Rockslide	Bergen	Weathering	No	A rockslide on the Alpine Approach Road closed traffic for one hour. Estimated location.
7/23/1938	Rockslide	Bergen	Heavy rain	No	Large rockslide north of Twombly's Landing. Estimated location.
7/23/1938	Debris flow	Bergen	Heavy rain	No	Report of Rt. 6 (now Rt. 46) closed for several hours by landslides after heavy rain. Estimated location.
7/23/1938	Debris flow	Bergen	Heavy rain	No	Report of a landslide, road restricted to one lane by a landslide of mud and stone. Estimated location.
7/23/1938	Rockslide	Bergen	Heavy rain	No	A rockslide on the Palisades creates the likeness of Hitler on the cliffs. Estimated location.
9/21/1938	Rockslide	Bergen	Heavy rain	Yes	Landslides caused by the rain from The Great Hurricane of 1938 closed Henry Hudson Drive between Alpine and the boat basin. Estimated location.
4/1/1939	Rockslide	Bergen	Heavy rain	No	Heavy rain caused a rockslide on Henry Hudson Drive covering 20 feet of the road. Estimated location.
3/5/1941	Rockslide	Hudson	Weathering	Yes	A boulder and rocks fell from the hillside blocking traffic on Holland Street for eight hours. Another rockslide in 1916 nearby. Estimated location.
7/10/1945	Debris flow	Warren	Heavy rain/poor drainage	Yes	Four people died when their apartment was destroyed by a debris flow after a retaining wall collapsed during heavy rain. Estimated location.
3/15/1947	Rockslide	Bergen	Weathering	No	Rockslide destroyed the likeness of Hitler on the Palisades. Estimated location.
11/12/1948	Rockslide	Mercer	Quarrying	No	A rockslide at the Lambertville Quarry killed two workers who were drilling holes in a cliff to insert dynamite when rockslide occurred. Estimated location.
8/6/1952	Rockslide	Bergen	Heavy rain	Yes	Heavy rains caused a rockslide on the Alpine Approach Road blocking the road for 28 hours. Estimated location.
12/13/1952	Rockslide	Sussex	Weathering	No	A rockslide killed a 10-year-old boy. Another 10-year-old boy suffered a broken ankle while playing on Panther Mountain. Estimated location.
8/19/1955	Debris flow	Sussex	Heavy rain	Yes	Rt. 23 closed at Beaver Lake as a result of landslide due to heavy rain from Hurricane Diane. Estimated location.
8/19/1955	Debris flow	Warren	Heavy rain	Yes	Heavy rain from Hurricane Diane triggered a debris flow on Rt. 46 just west of Great Meadows closing Rt. 46.



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Date	Type	County	Trigger	Damage	Description
6/18/1956	Rockslide	Morris	Quarrying	Yes	Three quarry workers, were buried and died in a quarry rockslide of many tons of rocks. Estimated location.
4/8/1957	Rockslide	Bergen	Heavy rain/weathering	Yes	Report of a rockslide triggered by weathering from rain and melting snow, Henry Hudson Drive closed for two days. Estimated location.
1/27/1959	Rockslide	Bergen	Weathering	Yes	Large rockslide slid off the Palisades triggered by freezing and thawing, road closed. Estimated location.
3/6/1959	Rockfall	Bergen	Heavy rain	Yes	A rockfall blocked the Alpine Approach Road, heavy rains combined with early thawing caused the rockfall. Estimated location.
3/6/1959	Rockfall	Bergen	Heavy rain	Yes	A rockfall on Henry Hudson Drive just north of George Washington Bridge, traffic blocked, heavy rains and early thawing triggered rockfall. Estimated location.
8/6/1961	Rockslide	Bergen	Weathering	Yes	Rockslide caused thousands of dollars in damage, 100 feet of road destroyed, rocks stopped 100 feet short of 50 people at the water's edge. Estimated location.
11/10/1963	Rockslide	Passaic	Mining	No	A 15-year-old boy died when he was buried in a large rockslide inside an abandoned open pit iron mine (The Hard Mine). Estimated location.
8/14/1967	Rockfall	Warren	Heavy rain	Unknown	A rockslide after heavy rain blocked part of Rt. 46 near the Delaware River. Estimated location.
8/28/1971	Debris flow	Passaic	Heavy rain	Yes	Debris flow triggered by heavy rains from Hurricane Doria, a large section of the Morris Canal slid onto Vetrone Drive causing substantial property damage.
9/12/1971	Debris flow	Bergen	Heavy rain	No	A 24-year-old man was killed when the earth collapsed on the cliffside parking lot where he worked burying him under three feet of mud and rocks.
9/3/1974	Debris flow	Bergen	Heavy rain	No	A landslide on Rt. 4 blocked a westbound lane from the George Washington Bridge, estimated location.
9/3/1974	Debris flow	Hudson	Heavy rain	No	Report of landslides which delayed traffic at Grand Avenue and Union Turnpike. Estimated location.
9/26/1975	Debris flow	Passaic	Heavy rain	No	Four days of heavy rain triggered a debris flow on Rt. 80 at the ramp to Rt. 20 in Paterson. Estimated location.
12/31/1977	Rockslide	Hudson	Weathering	Yes	A rockslide in an area prone to rockslides from freeze and thaw weathering. \$2,000 to clean up the rocks.
9/21/1989	Debris flow	Morris	Heavy rain	Yes	Landslide of fill material from Rt. 287 construction triggered by heavy rain buried the fifteenth green and sixteenth tee of Sunset Valley golf course with mud, \$75,000 in damages.
5/16/1990	Debris flow	Morris	Heavy rain	Yes	Landslide of fill material from Rt. 287 construction triggered by heavy rain buried the eleventh hole and fairway of Sunset Valley golf course with mud, \$125,000 in damages.



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Date	Type	County	Trigger	Damage	Description
5/16/1990	Debris flow	Morris	Heavy rain	No	A report that Rt. 202 was closed temporarily because of a debris flow from Rt. 287 construction site after heavy rain. Estimated location.
8/17/1991	Debris flow	Union	Heavy rain	No	NJ Transit railroad operations were shut down between Murray Hill and Summit when a debris flow triggered by heavy rain covered railroad tracks. Estimated location.
11/9/1994	Rockslide	Somerset	Quarrying	No	Two men injured, one critically when a ledge collapsed where the men were working, they fell 100 feet into a rock quarry. GPS location at front gate of quarry.
1/17/1995	Rockfall	Essex	Weathering	Unknown	Large rockfall, one lane closed for two days for rock removal.
7/2/1995	Debris flow	Morris	Weathering	Yes	Heavy rains caused a debris flow onto a back porch of a house, driveway and onto Forestdale Road.
10/21/1995	Debris flow	Warren	Heavy rain	No	Landslide after heavy rain, it was 600 feet long. Evidence of past landslides. Estimated location.
1/18/1996	Slump	Middlesex	Construction	Yes	A 40-foot high slope slid during road construction, undermining Old Bridge Turnpike, between Tices Lane and Edgeboro Road. The road was closed.
1/18/1996	Debris flow	Sussex	Heavy rain/snowmelt	No	Debris flow during heavy rain and melting snow on Curtis Drive, school buses could not get through for several days. Estimated location.
1/19/1996	Debris flow	Sussex	Heavy rain/snowmelt	Yes	Two landslides after heavy rain and melting snow, house destroyed.
10/19/1996	Debris flow	Morris	Heavy rain	Unknown	In the Poets Peak development, a debris flow deposited considerable silt into the Ledgewood Brook after heavy rain. Estimated location.
3/18/1998	Rockslide	Bergen	Weathering	Yes	Rockslide on Rt. 95 Southbound local lanes, damage to one car from
6/13/1998	Debris flow	Essex	Heavy rain	Yes	Report of a minor debris flow of mud down a hill into a house after heavy rain. Estimated location.
1/3/1999	Debris flow	Monmouth	Heavy rain	Yes	Landslide, possibly due to fill material failure after heavy rain, one condominium unit destroyed, three others damaged.
9/5/1999	Debris flow	Monmouth	Fossil digging	No	A 36-year-old man was seriously injured when he was buried alive in a landslide while digging for fossils in a 45-foot embankment along Big Brook. Estimated location.
9/8/1999	Debris flow	Hunterdon	Heavy rain	No	Heavy rains swamped some of the city's streets Wednesday afternoon, causing a minor mudslide on Swan Street then onto Rt. 29. The downpour started about 1 p.m. and lasted about an hour. Estimated location.
8/12/2000	Debris flow	Morris	Heavy rain	Yes	Landslide after heavy rain, sections of Rt.15 south collapsed. Estimated location.
8/12/2000	Debris flow	Sussex	Heavy rain	Yes	Massive landslide after heavy rain, property damage, railroad and Glen Road temporarily closed.



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Date	Type	County	Trigger	Damage	Description
8/16/2000	Debris flow	Sussex	Heavy rain	Yes	Massive landslide at least 2000-feet long and over 100-feet deep occurred in Sparta Glen during heavy rain causing much damage to parts of downtown Sparta.
8/27/2000	Debris flow	Somerset	Heavy rain	No	Construction site related landslide during heavy rains on Rt. 22. Estimated location.
4/9/2001	Mudslide	Sussex	Heavy rain	N/A	Heavy rain caused a mudslide in Sparta; Main Street was closed for two hours. The mudslide spread across Spring Brook Trail.
8/5/2003	Debris flow	Bergen	Heavy rain	Unknown	Reported debris flow down the mountain triggered by heavy rain covered a 100-foot section of River Road.
11/20/2003	Debris flow	Warren	Heavy rain	Yes	A 5-foot high and 75-foot wide wall of mud, debris and trees slid onto Rt. 46 after heavy rain, road closed for repairs, 20 yards of guardrail destroyed.
7/23/2004	Rockfall	Bergen	Heavy rain	Unknown	Rockslide after heavy rain.
2/5/2005	Rockfall	Morris	Weathering	Yes	A block of rock weighing an estimated 35 tons fell on Timber Ridge Road damaging a catch basin.
3/29/2005	Rockslide	Bergen	Weathering	No	Rockslide on Rt. 95 Southbound local lanes, right lane was closed for 65 minutes to remove debris. Estimated location.
4/3/2005	Debris flow	Hunterdon	Heavy rain	Yes	Two landslides after heavy rain, 40-feet by 30-feet along County Rt. 619, some utility and property damage.
4/3/2005	Debris flow	Morris	Heavy rain	Yes	Large debris flow occurred along Berkshire Valley Road (Morris County Rt. 699) across from Longwood Lake during heavy rains.
4/3/2005	Debris flow	Sussex	Heavy rain	No	Small debris flow along Macpeek Road after heavy rain.
7/17/2005	Debris flow	Middlesex	Heavy rain	Yes	Significant property damage from landslide, a swimming pool was filled in with mud.
10/8/2005	Debris flow	Bergen	Heavy rain	Yes	Landslide caused some property damage to a two-family house on Farnham Avenue.
10/8/2005	Slump	Monmouth	Heavy rain	Yes	Small backyard slump caused by water saturation after heavy rain, some property damage. Estimated location.
10/8/2005	Debris flow	Monmouth	Heavy rain	Yes	Landslide partially blocked road after heavy rain during road construction.
12/17/2005	Rockslide	Bergen	Weathering	Yes	Significant rockslide, road closed for repairs, location taken at the toe of the landslide in the parking lot where a large boulder bounced into the Hudson River.
6/29/2006	Debris flow	Sussex	Heavy rain	Yes	Heavy rains caused a retaining wall to collapse triggering a debris flow, damaging a deck.
7/22/2006	Debris flow	Bergen	Heavy rain/ broken sewer pipe	Yes	Heavy rain caused a storm sewer line to break triggering a debris flow which damaged a fence and closed Kinderkemack Road for two days.
4/15/2007	Debris flow	Bergen	Heavy rain	Yes	Heavy rain triggered a debris flow on Rt. 208 Southbound near Lincoln Avenue which caused a multiple vehicle accident on the highway, road temporarily closed.



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Date	Type	County	Trigger	Damage	Description
4/15/2007	Debris flow	Bergen	Heavy rain	No	A small debris flow at the bottom of Passaic Avenue and Burr Place was triggered by heavy rain.
4/15/2007	Debris flow	Bergen	Heavy rain	Yes	Landslide after heavy rain on Farnham Avenue. Some property damage, backyard covered in mud, 50 families displaced.
4/15/2007	Debris flow	Bergen	Heavy rain	Yes	Landslide after heavy rain on Farnham Avenue. Some property damage, backyard covered in mud, 50 families displaced.
4/15/2007	Debris flow	Bergen	Heavy rain	Yes	Landslide after heavy rain on Farnham Avenue. Some property damage, backyard covered in mud, 50 families displaced.
4/15/2007	Debris flow	Bergen	Heavy rain	Yes	Landslide onto two family homes on Farnham Avenue. Inside of house destroyed, 70-foot retaining wall collapsed, backyard covered in mud, 50 families displaced.
4/15/2007	Debris flow	Bergen	Heavy rain	Yes	Heavy rain triggered a landslide on Henry Hudson Drive which was closed for one month, damage to road and retaining walls.
4/15/2007	Debris flow	Bergen	Heavy rain	Yes	Heavy rain triggered a landslide on Henry Hudson Drive which was closed for one month, damage to road and retaining walls.
4/15/2007	Debris flow	Bergen	Heavy rain	Yes	Heavy rain triggered a landslide on Henry Hudson Drive which was closed for one month, damage to road and retaining walls.
4/15/2007	Debris flow	Bergen	Heavy rain	Yes	Heavy rain triggered a landslide on Henry Hudson Drive which was closed for one month, damage to road and retaining walls.
4/15/2007	Debris flow	Bergen	Heavy rain	Yes	Heavy rain caused a small landslide near Ross Dock causing damage to retaining walls. Henry Hudson Drive closed for one month.
4/15/2007	Debris flow	Bergen	Heavy rain	Yes	Heavy rain caused a landslide 150-feet wide near Ross Dock causing damage to retaining walls. Henry Hudson Drive closed for one month.
4/15/2007	Debris flow	Hudson	Heavy rain	No	Heavy rain triggered a small rockfall on Sinatra Drive which was closed temporarily.
4/15/2007	Debris flow	Hudson	Heavy rain	Yes	Rock and debris from a 50-foot high retaining wall collapse during heavy rain covered the north wing of the 14th Street Viaduct, road closed.
4/15/2007	Slump	Monmouth	Heavy rain	Yes	Landslide on the bluff between Linden Avenue and Shore Drive, west of Waterwitch Drive in the Atlantic Highlands.
4/15/2007	Debris flow	Passaic	Heavy rain/ broken sewer pipe	Yes	Debris flow after heavy rain on Riverview Drive along the Passaic River, road closed for repairs.



Date	Type	County	Trigger	Damage	Description
4/15/2007	Slump	Somerset	Heavy rain	No	Slump during heavy rain along the shoulder of the Southbound lanes of Rt. 287 during heavy rain.
4/15/2007	Rockfall	Warren	Heavy rain	Yes	A car was damaged when it ran into a landslide as it fell onto Rt. 80 westbound near the Delaware River after heavy rain. Rt. 80 Westbound closed. Estimated location.
4/16/2007	Debris flow	Hudson	Heavy rain	Yes	Retaining wall collapse during heavy rain deposited rock and debris in the Doric Apartments parking lot, \$225,000 in damages. Estimated location.
5/8/2008	Debris flow	Camden	Heavy rain	No	Debris Flow on U.S. 130 Southbound, right lane closed temporarily. Estimated location.
6/22/2008	Debris flow	Essex	Heavy rain	Yes	A contractor was buried to the waist and trapped for three hours
1/5/2009	Debris flow	Bergen	Heavy rain/ snowmelt	Yes	Rock slide on Henry Hudson Drive at Englewood Cliffs, Tenafly border triggered by rain and snow. Road closed for cleanup. Estimated location.
9/16/2009	Debris flow	Bergen	Heavy rain	Yes	Landslide after heavy rain during Hurricane Floyd, three houses
9/16/2009	Debris flow	Hunterdon	Heavy rain	No	County Rt. 523 closed due to debris flow south of Dreahook Road. Estimated location.

Hurricane, Tropical Storm, and Nor'easter

Table 15 Hurricane and Tropical Storm Historic Occurrences (pre-2010)

Date(s) of Event	Event Type	Counties Affected	Description
September 11-12, 1950	Hurricane Dog	Statewide	Average rainfall amounts were 1.07 inches. Maximum rainfall total was 4.34 inches at the Canton station.
August 20-21, 1950	Hurricane Able	Statewide	Average rainfall amounts were 1.29 inches. Maximum rainfall total was 3.5 inches at the Freehold Marlboro (Monmouth County) station.
August 31-September 1, 1952	Hurricane Able	Statewide	Average rainfall amounts were 2.42 inches. Maximum rainfall total was 5.64 inches at the Oak Ridge Reservoir (Morris County) station.
2/4/1952	Tropical Storm	Statewide	Average rainfall amounts were 1.13 inches. Maximum rainfall total was 1.99 inches at the Vineland station.
August 14-15, 1953	Hurricane Barbara	Statewide	Average rainfall amounts were 1.23 inches. Maximum rainfall total was 5.98 inches at the Tuckerton (Ocean County) station.
October 15-16, 1954	Hurricane Hazel	Statewide	Average rainfall amounts were 0.35 inch. Maximum rainfall total was 1.24 inches at the Pleasantville station.
September 10-11, 1954	Hurricane Edna	Statewide	Average rainfall amounts were 3.55 inches. Maximum rainfall total was 6.38 inches at the Lakehurst station.
August 30-31, 1954	Hurricane Carol	Statewide	Average rainfall amounts were 2.61 inches. Maximum rainfall total was 5.25 inches at the Midland Park (Bergen County) station.
September 19-20, 1955	Hurricane Ione	Statewide	Average rainfall amounts were 0.65 inch. Maximum rainfall total was 4.17 inches at the Berlin station.
August 17-19, 1955	Hurricane Diane	Statewide	Average rainfall amounts were 2.91 inches. Maximum rainfall total was 8.1 inches at the Sussex (Sussex County) station.



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August 12-13, 1955	Hurricane Connie	Statewide	Average rainfall amounts were 6.28 inches. Maximum rainfall total was 10.89 inches at the Canistear Reservoir (Sussex County) station.
September 27-28, 1956	Hurricane Flossy	Statewide	Average rainfall amounts were 0.47 inch. Maximum rainfall total was 3.41 inches at the Shiloh station.
August 28-29, 1958	Hurricane Daisy	Statewide	Average rainfall amounts were 0.06 inch. Maximum rainfall total was 0.4 inch at the Belmar/Bass River State Forest station.
September 27-28, 1958	Hurricane Helene	Statewide	Average rainfall amounts were 1.68 inches. Maximum rainfall total was 3.41 inches at the Shiloh station.
September 30-October 1, 1959	Hurricane Gracie	Statewide	Average rainfall amounts were 0.99 inch. Maximum rainfall total was 2.87 inches at the Oak Ridge Reservoir (Morris County) station.
July 10-11, 1959	Hurricane Cindy	Statewide	Average rainfall amounts were 0.9 inch. Maximum rainfall total was 8.43 inches at the Belleplain SF (Cape May County) station.
9/12/1960	Hurricane Donna	Statewide	Average rainfall amounts were 4.91 inches. Maximum rainfall total was 8.99 inches at the Hammonton (Atlantic County) station. Maximum wind gust of 100 mph was observed in Wildwood (Cape May County). Maximum storm surge of seven feet was reported in Long Branch (Monmouth County). Tides were 5.7 feet above normal. Considerable damage to piers and beach front homes. Hurricane Donna caused three fatalities and \$6.9 million in damages in New Jersey.
July 29-30, 1960	Hurricane Brenda	Statewide	Average rainfall amounts were 3.65 inches. Maximum rainfall total was 6.27 inches at the Cedar Grove station.
September 20-21 and 25, 1961	Hurricane Esther	Statewide	Average rainfall amounts were 1.62 inches. Maximum rainfall total was 5.6 inches at the Tuckerton (Ocean County) station. Maximum wind gust of 68 mph was observed in Atlantic City (Atlantic County). High surf and rip tides were also reported.
August 28-29, 1962	Hurricane Alma	Statewide	Average rainfall amounts were 2.14 inches. Maximum rainfall total was 4.85 inches at the Pemberton (Burlington County) station. Maximum wind gusts were below 20 mph. High surf and rip tides were reported.
October 16-18, 1964	Hurricane Isabell	Statewide	Average rainfall amounts were 0.72 inch. Maximum rainfall total was 2.01 inches at the Belleplain SF (Cape May County) station. Maximum wind gusts were below 20 mph.
September 13-14, 1964	Hurricane Dora	Statewide	Average rainfall amounts were 0.44 inch. Maximum rainfall total was 2.9 inches at Hightstown station. Maximum wind gusts were below 20 mph. High surf and rip tides were reported.
June 12-13, 1966	Hurricane Alma	Statewide	Average rainfall amounts were 0.18 inch. Maximum rainfall total was 0.91 inch at the Bass River State Forest station. Maximum wind gusts of 26 mph in Atlantic City (Atlantic County). Maximum storm surge of 4.5 feet was reported in Atlantic City (Atlantic County).
September 15-17, 1967	Hurricane Doria	Statewide	The average rainfall for this event was 0.26 inch, with a maximum of 0.94 inch at the Lakehurst station. A maximum wind gust of 39 mph in Atlantic City (Atlantic County). High surf and rip tides were associated with this storm. Three boaters drown on their way to Boston as a result of this event.
August 19-21, 1969	Hurricane Camille	Statewide	The average rainfall for this event was 0.19 inch, with a maximum of 1.25 inches at the Fortescue (Cumberland County) station. Maximum wind gusts were below 20 mph.
September 8-9, 1969	Hurricane Gerda	Statewide	The average rainfall for this event was 0.58 inch, with a maximum total of 1.78 inches at the Fortescue (Cumberland County) station. Maximum wind gusts were below 20 mph.



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Date(s) of Event	Event Type	Counties Affected	Description
August 27-29, 1971	Hurricane Doria	Statewide	The average rainfall for this event was 7.09 inches, with a maximum total of 10.29 inches at the Little Falls (Passaic County) station. A maximum wind gust of 54 mph was reported at Atlantic City (Atlantic County). A maximum storm surge of 5.3 feet was also reported at Atlantic City (Atlantic County). Total damages in New Jersey were estimated at \$772 M. Three deaths were attributed to this event.
October 2-4, 1971	Hurricane Ginger	Statewide	The average rainfall for this event was 0.23 inch, with a maximum total of 1.64 inches at the Sea Brooks Farms (Cumberland County) station. Maximum wind gusts were below 20 mph. High surf and rip tides were associated with this storm.
June 21-25, 1972	Hurricane Agnes	Statewide	The average rainfall for this event was 3.4 inches, with a maximum total of 6.44 inches at the Canton station. Maximum wind gusts were below 20 mph. Total damages in New Jersey were estimated at \$15 M. One death was attributed to this storm.
September 3-4, 1972	Hurricane Carrie	Statewide	The average rainfall for this event was 0.28 inch, with a maximum total of 1.73 inches at the Cape May (Cape May County) station. Maximum wind gusts were below 20 mph.
September 24-28, 1975	Hurricane Eloise	Statewide	The average rainfall for this event was 5.45 inches, with a maximum total of 8.94 inches at the Hightstown (Mercer County) station. Maximum wind gusts were below 20 mph. High surf and rip tides were associated with this event.
June 30-31, 1975	Hurricane Amy	Statewide	The average rainfall for this event was 0.08 inch, with a maximum total of 0.63 inch at the Morris Plains (Morris County) station. Maximum wind gusts were below 20 mph.
October 27-28, 1975	Hurricane Hallie	Statewide	The average rainfall for this event was 0.02 inch, with a maximum of 0.3 inch at the Fortescue station. Maximum wind gusts were below 20 mph.
August 9-10, 1976	Hurricane Belle	Statewide	The average rainfall for this event was 2.66 inches, with a maximum of 5 inches at the Mays Landing (Atlantic County) station. A maximum wind gust of 90 mph was reported at Ship Bottom. A maximum storm surge of 8.85 feet was reported in Atlantic City (Atlantic County). New Jersey had approximately \$50 million in damages from this event.
September 16-18, 1976	Tropical Depression #8	Statewide	The average rainfall for this event was 1.32 inches, with a maximum of 3.44 inches at the Oak Ridge Reservoir (Morris County) station. Maximum wind gusts were below 20 mph.
September 7-8, 1977	Hurricane Clara	Statewide	The average rainfall for this event was 0.11 inch, with a maximum total of 1.03 inches at the Jersey City (Hudson County) station. Maximum wind gusts were below 20 mph.
September 10-11, 1977	Hurricane Babe	Statewide	The average rainfall for this event was 0.04 inch, with a maximum total of 1.22 inches at the Hammonton (Atlantic County) station. Maximum wind gusts were below 20 mph.
July 15-16, 1979	Hurricane Bob	Statewide	The average rainfall for this event was 0.26 inch, with a maximum total of 1.92 inches at the Hightstown (Atlantic County) station. Maximum wind gusts were below 20 mph.
July 29-30, 1979	Hurricane Claudette	Statewide	The average rainfall for this event was 0.37 inch, with a maximum of 2.05 inches at the Princeton Water Work station. Maximum wind gusts were below 20 mph.
September 14-16, 1979	Hurricane Frederic	Statewide	The average rainfall for this event was 0.47 inch, with a maximum of 1.25 inches at the High Point Park (Sussex County) station. Maximum wind gusts were below 20 mph.
September 6-8, 1979	Hurricane David	Statewide	The average rainfall for this event was 2.94 inches, with a maximum of 5.83 inches at the Ringwood (Passaic County) station. A maximum wind gust of 54 mph was reported in Trenton (Mercer County). High surf and rip tides were associated with this storm. This event caused a tornado outbreak in New Jersey.



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Date(s) of Event	Event Type	Counties Affected	Description
November 15-17, 1981	Tropical Depression #12	Statewide	The average rainfall for this event was 0.48 inch, with a maximum of 1.35 inches at the Cape May (Cape May County) station. Maximum wind gusts were below 20 mph.
June 19-20, 1982	Tropical Storm #2	Statewide	The average rainfall for this event was 0.02 inch, with a maximum of 0.27 inch at the Atlantic City (Atlantic County) station. Maximum wind gusts were below 20 mph.
September 30-October 2, 1983	Hurricane Dean	Statewide	The average rainfall for this event was 1.25 inches, with a maximum of 2.35 inches at the Newark (Essex County) station. Maximum wind gusts were below 20 mph.
July 26-27, 1985	Hurricane Bob	Statewide	The average rainfall for this event was 1.92 inches, with a maximum of 3.52 inches at the Canistear Reservoir (Sussex County) station. Maximum wind gusts were below 20 mph.
August 19-20, 1985	Hurricane Danny	Statewide	The average rainfall for this event was 0.2 inch, with a maximum of 2.32 inches at the Cape May (Cape May County) station. Maximum wind gusts were below 20 mph.
September 23-25, 1985	Hurricane Henri	Statewide	The average rainfall for this event was 0.51 inch, with a maximum of 2.27 inches at the Belvidere (Warren County) station. Maximum wind gusts were below 20 mph.
September 27-28, 1985	Hurricane Gloria	Statewide	The average rainfall for this event was 3.69 inches, with a maximum of six inches at the Charlotteburg Reservoir (Passaic County) station. A maximum wind gust of 45 mph was reported at Ocean City (Cape May County). A maximum storm surge of 1.4 feet was reported at Ventor City Pier. Gloria paralleled the coast of New Jersey, downing trees and leaving 230,000 people without power. Approximately 100,000 coastal residents were evacuated. New Jersey had approximately \$14.7 million in damages from this event.
June 8-9, 1986	Hurricane Andrew	Statewide	The average rainfall for this event was 0.14 inch, with a maximum of 0.6 inch at the Pottersville (Morris County) station. Maximum wind gusts were below 20 mph.
August 18-19, 1986	Hurricane Charley	Statewide	The average rainfall for this event was 0.89 inch, with a maximum of 3.32 inches at the Split Rock Pond station. A maximum wind gust of 54 mph was reported in Atlantic City (Atlantic County). A maximum storm surge of 1.65 feet was reported at Atlantic City (Atlantic County). Two deaths were attributed to this event.
August 7-8, 1988	Hurricane Alberto	Statewide	The average rainfall for this event was 0 inch, with a maximum total of 0.7 inch at the High Point Park (Sussex County) station. Maximum wind gusts were below 20 mph.
August 29-30, 1988	Hurricane Chris	Statewide	The average rainfall for this event was 0.88 inch, with a maximum total of 2.19 inches at the High Point Park (Sussex County) station. Maximum wind gusts were below 20 mph.
September 22-24, 1989	Hurricane Hugo	Statewide	The average rainfall for this event was 0.43 inch, with a maximum total of 2.83 inches at the Belleplain SF (Cape May County) station. Maximum wind gusts were below 20 mph.
October 14-15, 1990	Hurricane Lili	Statewide	The average rainfall for this event was 0.55 inch, with a maximum total of 2.28 inches at the Canoe Brook (Essex County) station. Maximum wind gusts were below 20 mph.
August 18-19, 1991	Hurricane Bob	Statewide	The average rainfall for this event was 1.25 inches, with a maximum total of 3.16 inches at the Millville (Cumberland County) station. Maximum wind gusts were below 20 mph. High surf and rip tides were associated with this event.
September 26-27, 1992	Hurricane Danielle	Statewide	The average rainfall for this event was 0.91 inch, with a maximum total of 2.83 inches at the Belleplain SF (Cape May County) station. Maximum wind gusts were below 20 mph. High surf and rip tides were associated with this event. Two boaters drown from this storm.



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Date(s) of Event	Event Type	Counties Affected	Description
September 1-2, 1993	Hurricane Emily	Statewide	The average rainfall for this event was 0.03 inch, with a maximum total of 0.26 inch at the Atlantic City International Airport (Atlantic County) station. Maximum wind gusts were below 20 mph.
August 17-19, 1994	Hurricane Beryl	Statewide	The average rainfall for this event was 1.09 inches, with a maximum total of 3.82 inches at the Sussex (Sussex County) station. Maximum wind gusts were below 20 mph.
November 17-19, 1994	Hurricane Gordon	Statewide	The average rainfall for this event was 0.2 inch, with a maximum total of 1.07 inches at the Cape May (Cape May County) station. Maximum wind gusts were below 20 mph.
June 7-8, 1995	Hurricane Allison	Statewide	The average rainfall for this event was 0.21 inch, with a maximum total of 2.04 inches at the Millville (Cumberland County) station. Maximum wind gusts were below 20 mph.
August 6-8, 1995	Hurricane Erin	Statewide	The average rainfall for this event was 0.79 inch, with a maximum total of one inch at the Belleplain SF (Cape May County) station. Maximum wind gusts were below 20 mph.
October 5-7, 1995	Hurricane Opal	Statewide	The average rainfall for this event was 2.36 inches, with a maximum total of 4.92 inches at the Sussex (Sussex County) station. Maximum wind gusts were below 20 mph.
June 20-22, 1996	Hurricane Arthur	Statewide	The average rainfall for this event was 0.54 inch, with a maximum total of 2.3 inches at the Mays Landing (Atlantic County) station. Maximum wind gusts were below 20 mph.
July 13-15, 1996	Hurricane Bertha	Statewide	Bertha was an unusually long-lasting and strong supercell. The average rainfall for this event was 2.94 inches, with a maximum total of 6.59 inches at the Estell Manor (Atlantic County) station. A maximum wind gust of 55 mph was reported at Harvey Cedars. A maximum storm surge of 2.27 feet was reported at Atlantic City (Atlantic County). One death was reported in New Jersey because of Bertha.
August 31-September 2, 1996	Hurricane Edouard	Statewide	The average rainfall for this event was zero inches, with a maximum total of 0.07 inch at the Sussex (Sussex County) station. Maximum wind gusts were below 20 mph. High surf and rip tides were associated with this event. There were two deaths in New Jersey because of Edouard.
September 7-9, 1996	Hurricane Fran	Statewide	The average rainfall for this event was 1.1 inches, with a maximum total of 2.72 inches at the Lambertville (Hunterdon County) station. Maximum wind gusts were below 20 mph.
October 9-10, 1996	Hurricane Josephine	Statewide	The average rainfall for this event was 1.69 inches, with a maximum total of three inches at the Canistear Reservoir (Sussex County) station. A maximum wind gust of 70 mph was reported at Atlantic City (Atlantic County).
July 24-26, 1997	Hurricane Danny	Statewide	The average rainfall for this event was 3.32 inches, with a maximum total of 7.76 inches at the Cranford (Union County) station. Maximum wind gusts were below 20 mph.
August 28-29, 1998	Hurricane Earl	Statewide	The average rainfall for this event was zero inches with a maximum total of 0.02 inch at the Moorestown (Burlington County) station. Maximum wind gusts were below 20 mph.
9/5/1998	Hurricane Bonnie	Statewide	The average rainfall for this event was 0.08 inch, with a maximum total of 0.92 inch at the Estell Manor (Atlantic County) station. Maximum wind gusts were below 20 mph. High surf and rip tides were associated with this event.
September 5-9, 1999	Hurricane Dennis	Statewide	The average rainfall was 1.22 inches for this event. Maximum rainfall totaled 5.59 inches at the Greenwood Lake (Passaic County) station. Maximum wind gusts were less than 20 mph. High surf and rip tides were also reported from this storm.



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Date(s) of Event	Event Type	Counties Affected	Description
September 16-17, 1999	Hurricane Floyd	Somerset	The Raritan River basin experienced record flooding as a result of Floyd's heavy rains, 4.5 feet higher than the previous record flood crest. Bound Brook, New Jersey, was especially hard hit by a record flooding event: a 42-foot flood crest, 14 feet above flood stage, sent 12 feet of water on Main Street, and drowned three people. Manville, New Jersey was hit nearly as hard, with record-breaking floods coming from the Raritan River and the nearby Millstone River, which join in Manville. Princeton University in Princeton, New Jersey, for several days declared municipal tap water unsafe to drink, advised students in dorms not to shower, and provided bottled drinking water. Overall, average rainfall totals for Hurricane Floyd was 7.05 inches with maximum rainfall total of 14.13 inches reported in Little Falls. Maximum storm surge was 7.36 feet in Cape May. New Jersey had \$250 million in damages and six deaths from this event.
October 18-19, 1999	Hurricane Irene	Statewide	The average rainfall total was 0.39 inch for this event, with a maximum total of 2.5 inches at the Brant Beach Haven station. Maximum wind gusts were below 20 mph.
September 19-20, 2000	Hurricane Gordon	Mercer	Hurricane Gordon caused heavy precipitation in west central and southwest New Jersey, causing poor drainage flooding in low-lying areas. The heaviest rain fell in Mercer County and caused some minor flooding along the Assunpink Creek. Roadway flooding along U.S. Route 130 was reported in Collingswood.
June 15-19, 2001	Hurricane Allison	Statewide	The average rainfall total was 2.38 inches for this event, with a maximum total of 4.62 inches at the Canoe Brook station. Another source indicated 4.86 inches of rain fell in Howell. A maximum wind gust of 36 mph was reported in Atlantic City (Atlantic County).
September 10-12, 2002	Hurricane Gustav	Statewide	The maximum rainfall total of 0.08 inch was recorded at the New Milford station. A maximum wind gust of 60 mph was reported in Keansburg.
10/12/2002	Hurricane Kyle	Statewide	The average rainfall total for this event was 1.72 inches, with a maximum total of 4.71 inches at the Rahway station. Maximum wind gusts were below 20 mph.
9/13/2003	Tropical Storm Henri	Statewide	Caused up to three inches of rain across the State.
September 18-19, 2003	Tropical Storm Isabel	Atlantic, Cape May, Warren	Tropical Storm Isabel produced strong power outage producing winds, moderate tidal flooding along the Delaware Bay and the Delaware River and erosion and rough surf along the shore. Two deaths were directly attributed to the storm. In Warren County, a 34-year-old woman died in Independence Township when a tree landed and crushed the vehicle in which she was riding. In Cape May County, a 51-year-old man drowned in the rough surf off of Wildwood Crest. Winds gusted up to 62 mph in New Jersey and downed countless numbers of trees, tree limbs and power lines. It was one of the worst power outages on record for area utilities. Jersey Central Power and Light reported that 220,000 of its customers lost power while Conectiv Energy reported about 162,000 of its customers lost power. While tide heights along the ocean side only reached minor levels, wave action caused considerable beach erosion, especially in Cape May and Atlantic Counties. Overall, average rainfall totals for Hurricane Isabel was 0.93 inch and the maximum rainfall of 2.46 was reported at the Ringwood (Passaic County) station. A maximum wind gust of 62 mph was reported at Ship John Shoal. Maximum storm surge of 10.6 feet was recorded in Burlington. Strong waves eroded beaches along the coast. New Jersey had \$25 million in damages and one fatality as a result from this Event
August 3-4, 2004	Hurricane Alex	Statewide	Average rainfall totals were 0.09 inch and the maximum rainfall total of 1.89 inches at the West Deptford station. Maximum wind gusts were below 20 mph.
August 14-16, 2004	Hurricane Charley	Statewide	Average rainfall totals were 0.126 inches and the maximum rainfall of 3.49 inches was reported at the Ringwood station. Maximum wind gusts were below 20 mph.



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Date(s) of Event	Event Type	Counties Affected	Description
August 30-31, 2004	Hurricanes Gaston and Hermin	Statewide	Average rainfall totals were 0.48 inch and the maximum rainfall of 4.06 inches was reported at the Indian Mills station. Maximum wind gusts were below 20 mph.
9/8/2004	Hurricane Francis	Northern New Jersey	Extra-tropical storm dropped around three inches of rain in northern New Jersey.
9/17/2004	Hurricane Ivan	Essex	Dropped 5.5 inches of rain in Maplewood.
9/28/2004	Hurricane Jeanine	Statewide	Passed to the south of the State as an extra-tropical storm, causing up to five inches of rainfall across New Jersey.
August 11-16, 2005	Hurricane Irene	Southeast New Jersey	Passed to the southeast of the State, causing rip currents and strong waves. In Point Pleasant Beach, New Jersey, lifeguards made 150 rescues in a three-day period. Many beaches banned swimming because of the threat.
September 7-8, 2005	Hurricanes Maria and Nate	Statewide	Rip currents from storms killed one and seriously injured another.
October 24-25, 2005	Hurricane Wilma	Statewide	Wilma brought an average rainfall of 1.2 inches, with a maximum rainfall total of 2.66 inches in Atlantic City (Atlantic County). Wind gusts were below 20 mph.
9/3/2006	Tropical Storm Ernesto	Atlantic, Cape May	The interaction between the remnants of the storm and a strong high-pressure system produced intense wind gusts of up to 81 mph in Strathmere (Cape May County). The storm also dropped heavy rainfall, totaling to a maximum of 4.92 inches in Margate. The winds and rain down trees and power lines, resulting in power outages. Overall, Ernesto brought an average of 1.13 inches of rain, with a maximum total of 4.03 inches at the Belleplain SF (Cape May County) station. Another source indicated a maximum rainfall amount of 4.92 inches in Margate. A maximum wind gust of 81 mph was reported in Strathmere (Cape May County). High surf and rip tides were reported as well.
9/6/2008	Tropical Storm Hanna	Cape May	Tropical Storm Hanna brought heavy rain and strong winds in New Jersey as well as some minor tidal flooding in Cape May County, up Delaware Bay, and into the Delaware River on September 6. Rain moved into the region around noon EDT, fell heavy at times during the late afternoon and early evening and ended during the late evening. Storm totals ranged from around two to around five inches with the highest amounts in northern New Jersey. The strongest winds occurred during the afternoon in the southern part of the State and the evening in the northern part of the State. The highest reported wind gust was 58 mph.
August 22-23, 2009	Hurricane Bill	Statewide	Average rainfall total of 1.77 inches for this event with a maximum rainfall total of 6.49 inches at the Estell Manor (Atlantic County) station. Maximum wind gusts were below 20 mph. High surf and rip tides were associated with this event.

Table 16 Nor'easter Historic Occurrences

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).



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Date(s) of Event	Event Type	Counties Affected	Description
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.
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.
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.



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Date(s) of Event	Event Type	Counties Affected	Description
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.

Table 17 FEMA Declared Hurricane, Tropical Storm, and Nor'easter Disasters

Disaster Number	Disaster Type	Incident Period	Counties																			Impacted Number of Counties	
			Atlantic	Bergen	Burlington	Camden	Cape May	Cumberland	Essex	Gloucester	Hudson	Hunterdon	Mercer	Middlesex	Monmouth	Morris	Ocean	Passaic	Salem	Somerset	Sussex		Union
DR-41	Hurricane, Floods	8/20/1955	Not Available																				
DR-124	Severe Storm, High Tides, Flooding	3/9/1962	No Information Available																				
DR-749	Hurricane Gloria	9/27/1985	X			X	X						X										4
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-1295	Hurricane Floyd	9/16/1999 - 9/18/1999		X					X		X	X		X		X		X		X		X	9
DR-1563	Tropical Depression Ivan	10/1/2004								X	X									X		X	4
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		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



Severe Weather

Table 18 High Wind Historic Occurrences (Pre-2010)

Date	Type	Location	Description
11/20/1989	Derecho	Statewide	A line of thunderstorms formed along a cold front over north-central Pennsylvania in the late afternoon on November 20. The storms built south along the front as it moved across Pennsylvania, southeastern New York State, New Jersey, and adjacent portions of Maryland and Delaware. The squall line produced a continuous swath of damaging wind that extended more than 250 miles from the Allegheny Mountains to the New Jersey coast and Long Island. Maximum wind gusts exceeded 58 mph and there were numerous gusts measuring at greater than 70 mph. In New Jersey, wind gusts of 86 mph were recorded in the southern portion. A steeple was blown off a church in Trenton and a roof was blown off of a high-rise apartment building in Burlington County. A falling tree seriously injured a man in Princeton. Overall, this event caused more than \$20 million in damages to Pennsylvania, New Jersey, and New York.
9/7/1998	Derechos ("The Labor Day Derechos of 1998")	Northern New Jersey	A derecho formed over western New York State and moved east in the early morning on September 7. Wind damage occurred in much of the area, with some of the worst storm damage occurring in a band across western and central New York State. Along the path of the derecho, tens of thousands of trees were blown down and over 1,000 homes and businesses were damaged. Damage was estimated at approximately \$130 million. Many homes and businesses were without power.

Table 19 Tornadoes by Year 1950-2009

Year	Tornadoes	Deaths	Injuries	Total Damages
1951	1	0	2	\$ 25,000
1952	4	0	1	\$ 78,000
1953	No incidents reported			
1954	No incidents reported			
1955	1	0	0	N/A
1956	4	0	8	\$ 50,000
1957	1	0	0	\$ 250,000
1958	3	0	0	\$ 277,500
1959	No incidents reported			
1960	5	0	0	\$ 302,750
1961	No incidents reported			
1962	3	0	1	\$ 500,000
1963	No incidents reported			
1964	6	0	10	\$ 775,000
1965	No incidents reported			
1966	No incidents reported			
1967	1	0	0	\$ 25,000



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Year	Tornadoes	Deaths	Injuries	Total Damages
1968	No incidents reported			
1969	No incidents reported			
1970	2	0	0	\$ 275,000
1971	3	0	0	\$ 750,000
1972	No incidents reported			
1973	8	0	12	\$ 530,500
1974	2	0	0	\$ 250
1975	3	0	0	\$ 25,275,000
1976	1	0	0	\$ 250,000
1977	2	0	1	\$ 50,000
1978	No incidents reported			
1979	2	0	1	\$ 252,500
1980	1	0	0	\$ 25,000
1981	3	0	0	\$ 250,000
1982	1	0	0	\$ 2,500,000
1983	1	0	0	\$ 2,500,000
1984	No incidents reported			
1985	2	0	8	\$ 250
1986	1	0	0	\$ 250,000
1987	9	0	3	\$ 257,500
1988	6	0	1	\$ 3,252,500
1989	17	0	2	\$ 10,827,500
1990	7	0	11	\$ 6,000,000
1991	1	0	0	\$ 2,500
1992	4	0	0	\$ 500,000
1993	5	0	0	\$ 505,000
1994	8	0	0	\$10,575,000
1995	5	0	0	N/A
1996	2	0	0	\$ 10,000
1997	2	0	0	\$ 103,000
1998	3	0	0	\$ 2,050,000
1999	2	0	0	\$ 100,000
2000	No incidents reported			
2001	2	0	0	\$ 1,015,000
2002	No incidents reported			
2003	7	1	2	\$ 2,100,000
2004	2	0	2	\$ 600,000
2005	No incidents reported			
2006	1	0	0	\$ 100,000
2007	No incidents reported			



Year	Tornadoes	Deaths	Injuries	Total Damages
2008	No incidents reported			
2009	2	0	0	\$ 1,000,000

Table 20 Tornadoes 1950-2009

Date(s) of Event	Magnitude	Counties Affected	Impacts
4/29/1951	F1	N/A	\$25,000 in property damage; two injuries
4/5/1952	F1	N/A	\$2,500 in property damage
8/10/1952	F1	N/A	\$25,000 in property damage
10/16/1955	F2	N/A	Unknown
5/6/1956	F2	N/A	\$25,000 in property damage
7/13/1956	F1	N/A	8 injuries
7/13/1956	F1	N/A	\$2,500 in property damage
9/6/1956	F2	N/A	Unknown
11/19/1957	F1	N/A	\$250,000 in property damage
6/13/1958	F2	N/A	\$250,000 in property damage; one injury
6/13/1958	Unknown	N/A	\$2,500 in property damage
7/14/1958	F1	N/A	\$25,000 in property damage
4/18/1960	F1	N/A	\$250 in property damage
6/24/1960	Unknown	N/A	\$25,000 in property damage
7/1/1960	F1	N/A	\$2,500 in property damage
7/14/1960	F2	N/A	\$250,000 in property damage; six injuries
11/29/1960	Unknown	N/A	\$25,000 in property damage
5/24/1962	F2	N/A	\$250,000 in property damage; one injury
7/21/1962	F0	N/A	Unknown
8/7/1962	F2	N/A	\$250,000 in property damage
3/10/1964	F1	N/A	\$250,000 in property damage; five injuries
3/26/1964	F0	N/A	\$25,000 in property damage
10/18/1967	F1	N/A	\$25,000 in property damage
7/15/1970	F2	N/A	\$25,000 in property damage
11/4/1970	F2	N/A	\$250,000 in property damage
7/19/1971	F2	N/A	\$250,000 in property damage
7/19/1971	F2	N/A	\$250,000 in property damage
8/27/1971	F2	N/A	\$250,000 in property damage
2/2/1973	F2	N/A	\$2,500 in property damage
2/2/1973	F1	N/A	\$250 in property damage
2/2/1973	F1	N/A	\$250 in property damage
5/28/1973	F3	N/A	\$250,000 in property damage
5/28/1973	F3	N/A	\$250,000 in property damage; 1two injuries
6/29/1973	F1	N/A	\$2,500 in property damage
6/29/1973	F1	N/A	\$25,000 in property damage



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Date(s) of Event	Magnitude	Counties Affected	Impacts
11/28/1973	F0	N/A	Unknown
4/14/1974	F2	N/A	\$250 in property damage
7/24/1974	F1	N/A	Unknown
4/3/1975	F0	N/A	\$25,000 in property damage
7/13/1975	F2	N/A	\$25 million in property damage
7/13/1975	F1	N/A	\$250,000 in property damage
7/7/1976	F1	N/A	\$250,000 in property damage
8/10/1977	F0	N/A	\$25,000 in property damage; one injury
9/26/1977	Unknown	N/A	\$25,000 in property damage
9/6/1979	F1	N/A	\$250,000 in property damage; one injury
11/26/1979	F1	N/A	\$2,500 in property damage
6/3/1980	F1	N/A	\$25,000 in property damage
6/21/1981	F1	N/A	\$250,000 in property damage
7/20/1981	F2	N/A	Unknown
10/26/1981	F2	N/A	Unknown
6/29/1982	F2	N/A	\$2.5 million in property damage
7/21/1983	F3	N/A	\$2.5 million in property damage
9/27/1985	F0	N/A	\$250 in property damage
10/5/1985	F1	N/A	8 injuries
9/23/1986	F0	N/A	\$250,000 in property damage; eight injuries
7/2/1987	F1	N/A	\$250,000 in property damage
7/12/1987	F1	N/A	\$2,500 in property damage
7/14/1987	F0	N/A	Unknown
7/21/1987	F2	N/A	\$2,500 in property damage
7/26/1987	F0	N/A	Unknown
7/26/1987	F1	N/A	Unknown
8/5/1987	F0	N/A	\$2,500 in property damage
5/23/1988	F0	N/A	Unknown
7/20/1988	F1	N/A	Unknown
7/23/1988	F1	N/A	\$250,000 in property damage; one injury
8/17/1988	F2	N/A	\$2.5 million in property damage
8/17/1988	F0	N/A	\$2,500 in property damage
8/17/1988	F2	N/A	\$250,000 in property damage
3/18/1989	F1	N/A	\$25,000 in property damage
3/18/1989	F1	N/A	\$25,000 in property damage
3/18/1989	F1	N/A	Unknown
5/27/1989	F0	N/A	\$2,500 in property damage
6/9/1989	F2	N/A	\$250,000 in property damage
7/10/1989	F1	N/A	\$2.5 million in property damage
7/10/1989	F0	N/A	\$2.5 million in property damage
7/10/1989	F0	N/A	\$2.5 million in property damage



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Date(s) of Event	Magnitude	Counties Affected	Impacts
8/29/1989	F0	N/A	one injury
11/16/1989	F0	N/A	\$250,000 in property damage; one injury
11/16/1989	F1	N/A	\$250,000 in property damage
11/16/1989	F0	N/A	one injury
11/16/1989	F0	N/A	one injury
11/16/1989	F0	N/A	one injury
11/16/1989	F1	N/A	one injury
11/16/1989	F0	N/A	one injury
11/20/1989	F0	N/A	\$2.5 million in property damage
5/10/1990	F0	N/A	\$250,000 in property damage
5/10/1990	F2	N/A	\$250,000 in property damage
8/13/1990	F0	N/A	Unknown
10/18/1990	F3	N/A	\$2.5 million in property damage; eight injuries
10/18/1990	F1	N/A	\$250,000 in property damage
10/18/1990	F0	N/A	\$2.5 million in property damage; three injuries
10/18/1990	F0	N/A	\$250,000 in property damage
8/19/1991	F0	N/A	\$2,500 in property damage
6/24/1992	F1	N/A	\$250,000 in property damage
7/15/1992	F0	N/A	Unknown
7/31/1992	F1	N/A	\$250,000 in property damage
7/31/1992	F1	N/A	Unknown
6/9/1993	F0	N/A	Unknown
6/21/1993	F0	N/A	Unknown
7/10/1993	F0	N/A	Unknown
8/21/1993	F2	N/A	\$250,000 in property damage
9/8/1993	F0	N/A	\$2,500 in property damage
4/13/1994	F1	N/A	\$2.5 million in property damage
5/25/1994	F1	N/A	\$2.5 million in property damage
6/29/1994	F1	N/A	Unknown
7/3/1994	F1	N/A	\$250,000 in property damage
7/26/1994	F1	N/A	\$2.5 million in property damage
8/2/1994	F1	N/A	Unknown
8/17/1994	F1	N/A	Unknown
11/1/1994	F0	N/A	\$250,000 in property damage
5/29/1995	F1	N/A	Unknown
7/16/1995	F1	N/A	Unknown
7/16/1995	F1	N/A	Unknown
7/22/1995	F0	N/A	\$2.5 million in property damage
10/21/1995	F0	N/A	Unknown
6/22/1996	F0	N/A	Unknown
9/8/1996	F0	N/A	\$10,000 in property damage



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Date(s) of Event	Magnitude	Counties Affected	Impacts
8/13/1997	F0	N/A	\$50,000 in property damage
9/11/1997	F1	N/A	\$530,000 in property damage
9/2/1998	F0	N/A	Unknown
9/7/1998	F0	N/A	\$1.5 million in property damage
9/7/1998	F1	N/A	\$5,500 in in property damage
2/12/1999	F1	N/A	\$10,000 in property damage
8/20/1999	F2	N/A	\$4.2 million in property damage; one injury
5/27/2001	F2	N/A	\$1 million in property damage
7/5/2001	F1	N/A	\$10,000 in property damage
7/3/2003	F0	N/A	None
9/23/2003	F1	N/A	\$500,000 in property damage
9/23/2003	F1	N/A	\$600,000 in property damage
9/23/2003	F1	N/A	\$1 million in property damage; two injuries
10/27/2003	F0	N/A	\$2,500 in property damage; 1 fatality
10/27/2003	F0	N/A	Unknown
10/27/2003	F0	N/A	Unknown
7/27/2004	F1	N/A	\$500,000 in property damage; two injuries
9/28/2004	F0	N/A	\$100,000 in property damage
6/2/2006	F0	N/A	\$10,000 in property damage
7/29/2009	EF2	Sussex	An EF2 tornado touched down in Wantage Township at about 2:48 p.m. on July 29. It was the first confirmed tornado in Sussex County since August 1990, the first tornado of F2 or EF2 strength ever in the county since records started in 1950 and the first tornado to reach EF2 or F2 strength in New Jersey since the Manalapan tornado of May 27, 2001. The tornado remained on the ground for 6.6 miles before it crossed the border into New York State. Its maximum width was about 100 yards and its highest estimated wind speed was 120 mph. Approximately \$800,000 in property damage and \$200,000 in crop damage.
7/29/2009	EF2	N/A	\$960,000 in property damage
7/29/2009	EF2	N/A	\$875,000 in property damage

Table 21 Hail Historic Occurrences 1950-2009

County	Number of Reported Incidents	Property Damage	Crop Damage
Atlantic	31	\$ 0	\$ 0
Bergen	30	\$ 0	\$ 0
Burlington	68	\$ 0	\$ 0
Camden	31	\$ 0	\$ 0
Cape May	14	\$ 0	\$ 0
Cumberland	18	\$ 75,000	\$ 0
Essex	20	\$ 0	\$ 0
Gloucester	33	\$ 0	\$ 0



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County	Number of Reported Incidents	Property Damage	Crop Damage
Hudson	11	\$ 0	\$ 0
Hunterdon	26	\$ 0	\$ 0
Mercer	30	\$ 0	\$ 0
Middlesex	24	\$ 10,000	\$ 0
Monmouth	30	\$ 0	\$ 0
Morris	27	\$ 0	\$ 0
Ocean	38	\$ 1,000	\$ 0
Passaic	23	\$ 0	\$ 0
Salem	15	\$ 250,000	\$ 5,000,000
Somerset	23	\$ 100,000	\$ 1,000
Sussex	25	\$ 0	\$ 1,000
Union	21	\$ 0	\$ 0
Warren	16	\$ 0	\$ 0
Total	554	\$ 436,000	\$ 16,502,000



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Date(s) of Event	Counties Affected	Acres Burned	Description
3/7/2000	Burlington	150	Medford Township
4/30/2000	Cumberland, Middlesex, Monmouth	350	A forest fire began about 2:00 p.m. EDT in the vicinity of Hesstown Road and New Jersey State Route 49 in Maurice River Township and spread into the Peaslee Wildlife Management Area. The fire threatened dozens of homes along New Jersey State Route 49 and Estell Manor Road. No residents were evacuated, but 6 miles of the State route were closed to vehicular traffic. The fire was contained at 8:15 p.m. EDT, but not before it scorched about 350 acres.
5/4/2000	Camden	110	Pine Hill Borough
4/25/2001	Camden	120	Waterford Township
4/28/2001	Middlesex	151	The second wildfire of the weekend affected Cheesequake State Park and adjacent parts of Old Bridge Township on the Saturday afternoon and evening of April 28. The fire began about 2 p.m. EDT and forced the evacuation of 25 homes in Old Bridge Township, closed some roadways, and forced the closure and the evacuation of campers within Cheesequake State Park.
4/28/2001	Middlesex	151	Metuchen Borough
4/28/2001	Cumberland	765	The largest wildfire of the weekend (April 28 and 29) began during Saturday afternoon the 28th just east of the Millville Municipal Airport. Before it was under control during on April 29, about 765 acres were burned.
4/29/2001	Hudson	Unknown	A large brush fire began around 6:40 p.m. on Tonnelle Avenue in North Bergen, Hudson County and extended into marshlands along Routes 495 and 3 into Secaucus. Heavy smoke caused several road closures and disrupted both Amtrak and New Jersey Transit train service between New York City and Newark from 7:20 pm to 10:00 p.m. EDT.
5/15/2001	Burlington	100	A wildfire burned out of control behind the New Jersey Performing Arts Center produce warehouse in Florence Township during the evening of May 15. About 100 acres were burned. No serious property damage or injuries were reported.
6/10/2001	Burlington, Ocean	1,600	A wildfire, started by a 25-pound practice bomb, burned about 1,600 acres of pygmy pines before it was placed under control. The fire threatened, but never damaged, homes in the Warren Grove area of Ocean County. It was contained at County Route 539 before it reached the homes the evening of June 10 and was under control the morning of June 11. About 1,600 acres were burned, mainly pygmy pine trees on state and federal land south of New Jersey State Route 72 and west of County Route 539.
3/10/2002	Monmouth	200	A brush fire, largely exacerbated the strong gusty west-northwest winds, scorched about 200 acres of brush in the Port Monmouth section of Middletown Township around 5 p.m. EST. About 100 firefighters fought the blaze, which was extinguished about two hours later.
3/10/2002	Ocean	Unknown	Two separate marsh fires occurred in the Bayville section of Berkeley Township (Ocean County). Strong gusty northwest winds helped spread the fires quickly.
4/18/2002	Atlantic	Unknown	An active thunderstorm caused a couple of lightning strike damage in Hamilton Township during the late afternoon of the 18th. Lightning strikes started a couple of small brush fires, struck a senior citizen center and damaged the township's emergency center telephone lines and radio communications.
6/2/2002	Ocean	1,300	A rapidly moving wildfire aided by strong gusty northwest winds burned about 1,300 acres of forest, destroyed or damaged about 30 permanent structures and caused a major traffic disruption for a Sunday (June 2) as the Garden State Parkway was closed for 12 hours. It was the first time in 17 years that a wildfire destroyed a year- round home. Four firefighters were injured fighting the blaze. At the height of the fire, about 500 homes in the Bayville Section of Berkeley Township were evacuated. Shelters were established at nearby schools and firehouses. About 170 residents of the Crystal Lake Healthcare and Rehabilitation Center were evacuated. In Beachwood Borough, about 5 to 6 families along Pinewald Road were also evacuated. About 350 firefighters battled the blaze. Dense smoke covered the Garden State Parkway and caused its closure at 1:30 p.m. EDT. The Parkway was closed from exit 58 in Little Egg Township to exit 82 in Toms River. While the fire was contained on June 3, it was not declared officially out until the heavy rain that fell on June 6. Two-thirds of all the trees within Jake's Branch County Park burned.
6/10/2002	Camden	746	A wildfire on June 10 in Wharton State Forest quickly consumed about 746 acres, forced the shutdown of an electric transmission line, and the voluntary evacuation of about 100 homes. About 100 firefighters battled the blaze. No homes were damaged and no injuries were reported.



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Date(s) of Event	Counties Affected	Acres Burned	Description
6/20/2002	Ocean	1,200	On June 20, the Jakes Branch Fire destroyed one home with additional property damage exceeding \$1 million dollars.
8/15/2002	Ocean	2,600	Pine Beach Borough
8/15/2002	Burlington, Ocean	3,000	A wildfire on the Fort Dix Military Reservation consumed about 3,000 acres of forest, fields, old cranberry bogs and swamps. The fire began during the afternoon of August 15 during the middle of another stretch of hot and humid weather. It was believed that the sun's heat ignited a practice ammunition round in the Range 71 area. The fire consumed fields and forests from Ranges 61 to 85 in Ocean and Burlington Counties. While it was contained on August 17, underground flare-ups kept firefighters busy until rain at the end of the month finally extinguished it. No serious injuries were reported.
4/16/2003	Camden	343	Waterford Township
3/20/2004	Cape May	125	Middle Township
6/20/2004	Ocean	125	Lavallette Township
6/21/2004	Morris	225	Washington Township
7/3/2004	Salem	125	Pilesgrove Township
7/4/2004	Middlesex	1,225	Plainsboro Township - Assistance was provided for a car crash. A car hit a power pole and the electric line came down on a fence. The electric line caused a fire in the field that spread to the woods.
8/10/2004	Cape May	225	Upper Township
3/15/2005	Middlesex	100	A brushfire with 30- to 40-foot-high flames burned across 75 to 100 acres in Raritan Center within Edison Township. The fire could be seen from Rahway (Union County) to East Brunswick (within Middlesex County). The fire burned for about 6 hours until firefighters finished dousing the blaze.
4/11/2005	Warren	Unknown	Several brush fires were started by trains running along the Norfolk Southern Line during the afternoon of April 10. The fires occurred from Alpha west to West Portal. The fires threatened barns in the area, but no structures caught fire. The fires were extinguished by the end of the afternoon.
4/20/2005	Camden	325	Waterford Township - Goshen Fire
6/6/2005	Warren	Unknown	A lightning strike caused a brush fire on top of Montana Mountain in Harmony Township off of Demeter Road. It was quickly extinguished.
9/26/2005	Gloucester	273	Logan Township
1/27/2006	Middlesex	450	Edison Township - 40 cars, trucks, and trailers were destroyed.
3/14/2006	Hunterdon	Unknown	A wildfire totally engulfed a barn in East Amwell Township. An estimated three to seven horses died in the Black River Farm. Two firefighters were injured fighting the blaze. One had a head injury, another had breathing trouble.
3/21/2006	Burlington	136	Evesham Township
3/22/2006	Burlington	150	A wildfire started in Medford Township in the Sunrise Lake area. About 150 acres were consumed before the fire was contained.
3/27/2006	Middlesex	104	Edison Township
3/5/2007	Atlantic	Unknown	A grass fire in Egg Harbor Township closed the northbound and southbound lanes of the Garden State Parkway near the intersection with the Atlantic City Expressway at 2:30 p.m. EST. The spread of the brush fire was assisted by the gusty northwest winds.
5/6/2007	Gloucester	100	A wildfire charred about 100 acres of brush at a Sunoco Refinery in West Deptford Township (Gloucester County) on the afternoon of May 6. It raged for nearly three hours before about 100 firefighters from 10 different companies were able to control it.



Date(s) of Event	Counties Affected	Acres Burned	Description
5/15/2007	Ocean	15,550	A large forest fire consumed 15,550 acres of forest in Stafford and Barnegat Townships. About 24 square miles of forest were destroyed. The fire also destroyed five homes and significantly damaged 50 other homes. Two New Jersey Forestry Service personnel were injured battling the blaze. At the height of the blaze, about 6,000 people from about 2,500 homes were evacuated from the two townships. In all, about 600 firefighters from as far away as Sussex and Cumberland Counties in New Jersey along with seven aircrafts helped battle the blaze. This was the largest wildfire in New Jersey since April 1995 when about 20,000 acres burned again in Ocean County.
6/1/2007	Atlantic	3,500	A wildfire in the Wharton State Forest near Atsion burned for several days and forced the closing of State Route 206.
8/3/2007	Burlington	2,443	A forest fire started in Wharton State Forest in Washington Township on the afternoon of August 3. It burned 2,443 acres in Washington and Shamong Townships before it was contained. No homes, camping or recreational facilities were threatened. But, The fire was contained at 8:00 a.m. EDT on the 6th. About an inch of rain that fell overnight assisted the fire fighters. No injuries or property damage was reported.
4/19/2008	Ocean	144	A wildfire consumed about 144 acres of woodland in Barnegat Township on April 19. The fire started in a wooded area between the Horizons at Barnegat Development on West Bay Avenue (County Route 544) and New Jersey State Route 72 about 2:00 p.m. EDT. Residents from about 50 homes on Nautilus Drive and West Bay Avenue were ordered to evacuate. The wildfire was under control by nightfall on the April 19. No homes were damaged.
9/1/2008	Ocean	3,200	A wildfire continued to burn 3,200 acres of woodland on the Fort Dix Military Base just on the Ocean County side of the base in early September. The fire started in a containment area of the base and was first reported on August 28. The fire never threatened any buildings on the base and natural fire breaks prevented it from spreading.
3/18/2009	Morris	150	A brush fire caused by a downed utility line damaged 150 acres of Troy Meadows wetlands from the night of March 18 into the morning of the 19th. The fire was reported 100 percent contained at 9:00 a.m. EST on the 19th. No injuries were reported.
4/18/2009	Atlantic	315	A wildfire consumed about 315 acres of woodland in Atlantic County. The fire began about 2:00 p.m. EDT on the 18th. It started near the former Jersey Devil cabin off of Bremen Avenue in Egg Harbor City within the Pinelands National Reserve. The fire briefly caused some evacuations including one woman with respiratory problems. The fire consumed about 315 acres of the Atlantic County white cedar swamp within the Pinelands.
4/28/2009	Middlesex	Unknown	A large brush fire occurred in the area of Olympic Drive near railroad tracks in Woodbridge (Middlesex County). Several fire companies assisted in extinguishing the blaze. No damage to properties or buildings was reported.

B.3 RECENT FEMA DISASTER DECLARATIONS

Between 1954 and 2018, New Jersey has been included in 107 FEMA major disaster declarations (DR), emergency declarations (EM), or fire management assistance declarations (FMA). The 2014 State Plan discussed FEMA declarations in New Jersey that occurred between January 1, 2011 and December 31, 2012. For this Plan update, FEMA declarations for New Jersey that occurred between January 1, 2013 and July 1, 2018 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.

FEMA DR-4231 New Jersey Severe Storm – July 23,2015

On July 13, 2015, Governor Chris Christie requested a major disaster declaration due to a severe storm on June 23, 2015. The Governor requested a declaration for Public Assistance for four counties and Hazard Mitigation statewide. During the period



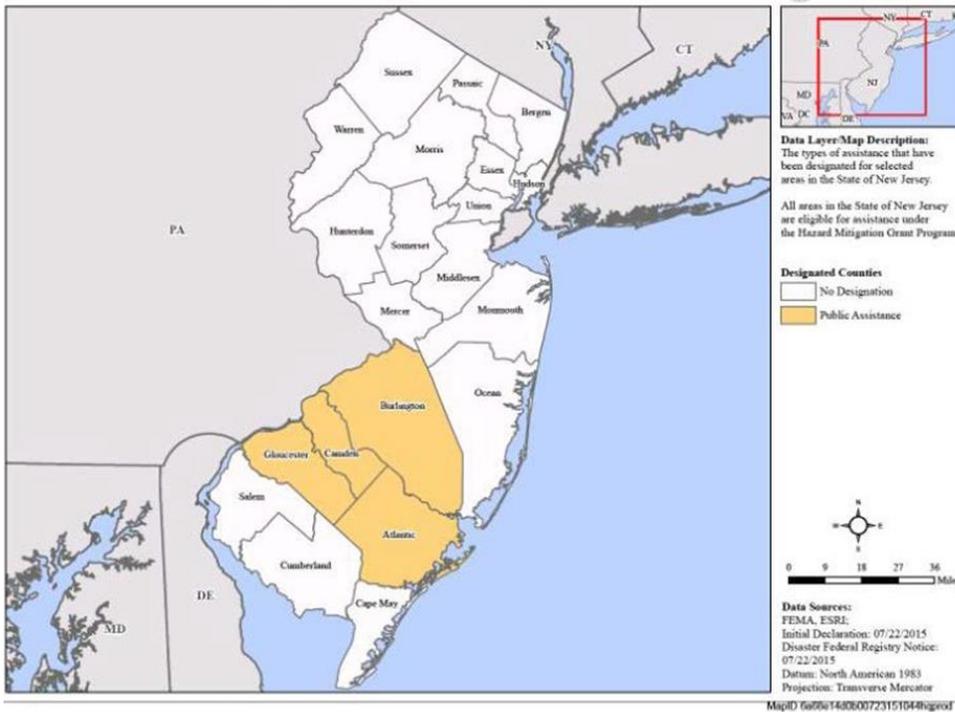
of June 27 to July 9, 2015, joint federal, state, and local government Preliminary Damage Assessments (PDAs) were conducted in the requested counties and are summarized below. PDAs estimate damages immediately after an event and are considered, along with several other factors, in determining whether a disaster is of such severity and magnitude that effective response is beyond the capabilities of the state and the affected local governments, and that Federal assistance is necessary (FEMA, 2018).

On July 22, 2015, President Obama declared that a major disaster exists in the State of New Jersey. This declaration made Public Assistance requested by the Governor available to state and eligible local governments and certain private nonprofit organizations on a cost-sharing basis for emergency work and the repair or replacement of facilities damaged by the severe storm in Atlantic, Burlington, Camden, and Gloucester Counties. This declaration also made Hazard Mitigation Grant Program assistance requested by the Governor available for hazard mitigation measures statewide (FEMA, 2018).

Public Assistance - Dollars Approved

- Total Public Assistance Grants (PA) - Dollars Obligated = \$12,627,290.91
- Emergency Work (Categories A-B) - Dollars Obligated = \$11,716,297.00
- Permanent Work (Categories C-G) - Dollars Obligated = \$499,138.91

Figure B.3-1 Designated Areas for the Designated Severe Storm , FEMA-DR-4231



Source: FEMA, 2018

FEMA DR-4264 New Jersey Severe Winter Storm and Snowstorm – March 14, 2016

On February 11, 2016, Governor Chris Christie requested a major disaster declaration due to a severe winter storm and snowstorm during the period of January 22-24, 2016. The Governor requested a declaration for Public Assistance for 17 counties, snow assistance for 14 counties, and Hazard Mitigation statewide. During the period of February 2-5, 2016, joint federal, state, and local government Preliminary Damage Assessments (PDAs) were conducted in the requested counties and are summarized below. PDAs estimate damages immediately after an event and are considered, along with several other

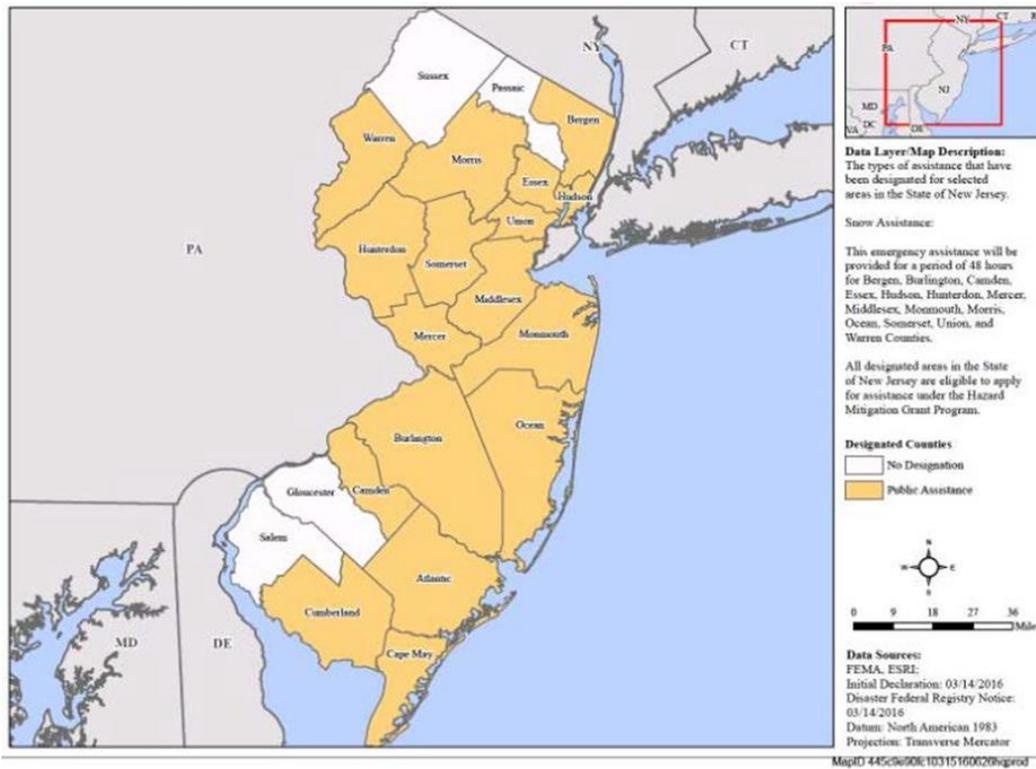


factors, in determining whether a disaster is of such severity and magnitude that effective response is beyond the capabilities of the state and the affected local governments, and that Federal assistance is necessary (FEMA, 2018).

On March 14, 2016, President Obama declared that a major disaster exists in the State of New Jersey. This declaration made Public Assistance requested by the Governor available to state and eligible local governments and certain private nonprofit organizations on a cost-sharing basis for emergency work and the repair or replacement of facilities damaged by the severe winter storm and snowstorm in Atlantic, Bergen, Burlington, Camden, Cape May, Cumberland, Essex, Hudson, Hunterdon, Mercer, Middlesex, Monmouth, Morris, Ocean, Somerset, Union, and Warren Counties. This declaration also authorized snow assistance for a period of 48 hours for the counties of Bergen, Burlington, Camden, Essex, Hudson, Hunterdon, Mercer, Middlesex, Monmouth, Morris, Ocean, Somerset, Union, and Warren. Finally, this declaration made Hazard Mitigation Grant Program assistance requested by the Governor available for hazard mitigation measures statewide (FEMA, 2018).

- Total Public Assistance Grants (PA) - Dollars Obligated = \$75,435,062.2
- Emergency Work (Categories A-B) - Dollars Obligated= \$68,773,902.93
- Permanent Work (Categories C-G) - Dollars Obligated= \$4,201,465.27

Figure B.3-2 Designated Areas for the Designated Severe Winter Storm, FEMA-DR-4264



Source: FEMA, 2018

FEMA DR-4368 New Jersey Severe Winter Storm and Snowstorm – March 6, 2018 to March 7, 2018

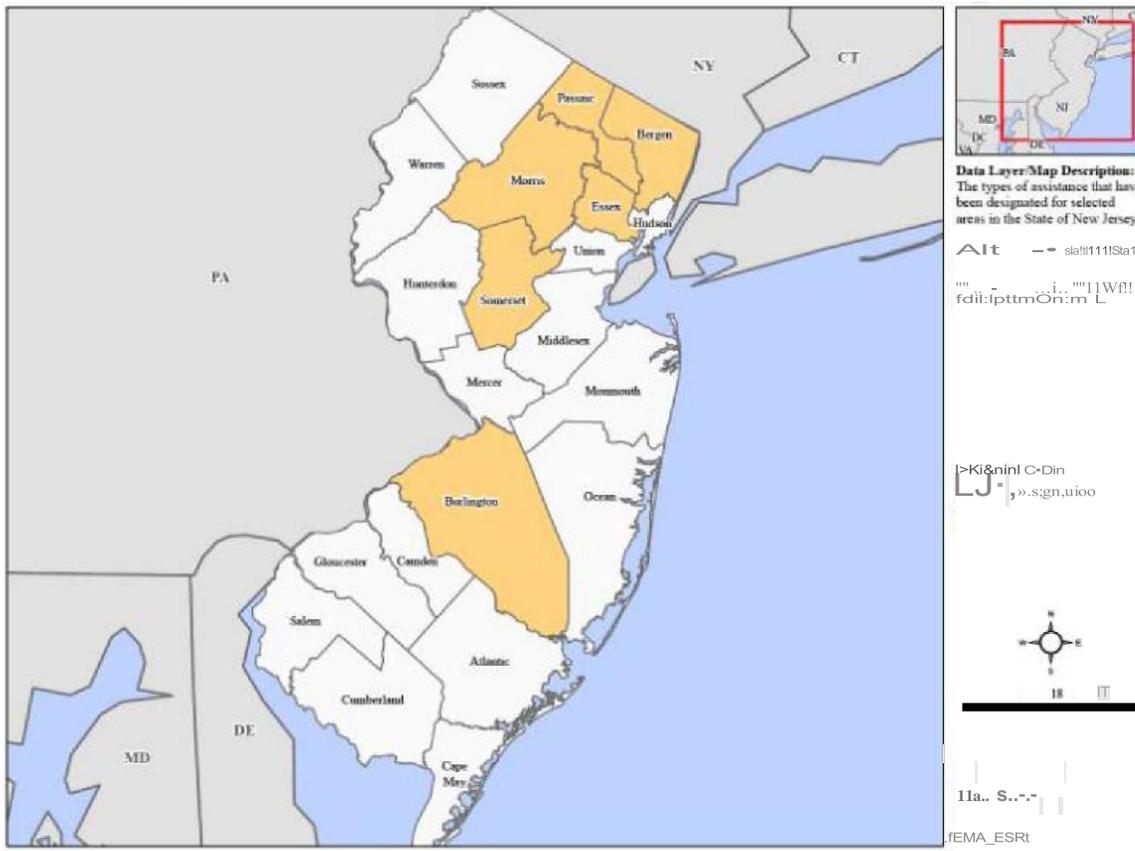
On June 8, 2018, President Trump declared that a major disaster exists in the State of New Jersey. This declaration made Public Assistance requested by the Governor available to state and eligible local governments and certain private nonprofit organizations on a cost-sharing basis for emergency work and the repair or replacement of facilities damaged by the severe winter storm and snowstorm in Bergen, Essex, Morris, Passaic, and Somerset Counties. This declaration also authorized snow



assistance for a period of 48 hours for Bergen and Morris Counties. Finally, this declaration made Hazard Mitigation Grant Program assistance requested by the Governor available for hazard mitigation measures statewide (FEMA, 2020)

- Total Public Assistance Grants (PA)- Dollars Obligated = \$30,198,383.77
- Emergency Work (Categories A-B) - Dollars Obligated = \$28,467,470.33
- Permanent Work (Categories C-G) - Dollars Obligated = \$595,794.24
- Hazard Mitigation Grant Program (HMGP) - Dollars Obligated = \$5,241,225.52

Figure B.3-3 Designated Areas for the Designated Severe Winter Storm, FEMA-DR-4368



Source: FEMA, 2018



B.4 GEOLOGIC HAZARD INFORMATION – ABANDONED MINES IN NEW JERSEY

On September 30, 2013, New Jersey Geological and Water Survey completed a risk analysis of abandoned mines for a FEMA pre-disaster mitigation grant performed under the auspices of NJOEM. About 2700 sites where mining or prospecting occurred were ranked “high” “medium” or “low” for risk of subsidence. Many of these locations were also field inspected and photographed. This data is contained in Table B.4-1 below.

Table 1 Abandoned Mines in New Jersey

Site Name	Mine Type	Begin Date	End Date	Location	County
White Meadow Mine	Iron	1840	1868	Rockaway Twp	Morris
Richard Mine	Iron	1856	0	Rockaway Twp	Morris
Cooper Mine	Iron	1868	1873	Ringwood	Passaic
Unknown	Iron	0	0	Pohatcong	Warren
Unknown	Iron	0	0	Pohatcong	Warren
Unknown	Iron	0	0	Holland Twp	Hunterdon
Hagar Mine	Iron	1879	1880	Holland Twp	Hunterdon
Hagar Mine	Iron	1879	1880	Holland Twp	Hunterdon
Hagar Mine	Iron	1879	1880	Holland Twp	Hunterdon
Hagar Mine	Iron	1879	1880	Holland Twp	Hunterdon
Oak Ridge Mine	Graphite	0	0	Jefferson Twp	Morris
Riker Mine	Iron	1873	1873	Sparta Twp	Sussex
Unnamed Mine	Iron	0	0	Sparta Twp	Sussex
Unnamed Mine	Iron	0	0	Sparta Twp	Sussex
Unnamed Mine	Iron	0	0	Sparta Twp	Sussex
Unnamed Mine	Iron	0	0	Sparta Twp	Sussex
Schofield Mine	Iron	1855	1890	Jefferson Twp	Morris
Ford Mine	Iron	1855	1890	Jefferson Twp	Morris
Unnamed Mine	Iron	0	0	Jefferson Twp	Morris
Dodge Mine	Iron	1868	1884	Jefferson Twp	Morris
Duffee Mine	Iron	1855	1868	Jefferson Twp	Morris



STATE OF NEW JERSEY 2024 ALL-HAZARD MITIGATION PLAN

Site Name	Mine Type	Begin Date	End Date	Location	County
Sherman Farm Mine	Iron	1854	1905	Sparta Twp	Sussex
Sherman Farm Mine	Iron	1854	1905	Sparta Twp	Sussex
Bunker Mine	Iron	1854	1905	Sparta Twp	Sussex
Unnamed Mine	Iron	0	0	Sparta Twp	Sussex
Duffee Mine	Iron	1855	1868	Jefferson Twp	Morris
Duffee Mine	Iron	1855	1868	Jefferson Twp	Morris
Duffee Mine	Iron	1855	1868	Jefferson Twp	Morris
Duffee Mine	Iron	1855	1868	Jefferson Twp	Morris
Duffee Mine	Iron	1855	1868	Jefferson Twp	Morris
Duffee Mine	Iron	1855	1868	Jefferson Twp	Morris
Roberts	Iron	1873	1889	Sparta Twp	Sussex
Roberts	Iron	1873	1889	Sparta Twp	Sussex
Condon Cut	Iron	0	0	Sparta Twp	Sussex
Condon Cut	Iron	0	0	Sparta Twp	Sussex
Condon Cut	Iron	0	0	Sparta Twp	Sussex
Victor Mine	Iron	0	0	Sparta Twp	Sussex
Victor Mine	Iron	0	0	Sparta Twp	Sussex
Davenport	Iron	1873	1880	Sparta Twp	Sussex
Davenport	Iron	1873	1880	Sparta Twp	Sussex
Big Cut	Iron	0	0	Sparta Twp	Sussex
Big Cut	Iron	0	0	Sparta Twp	Sussex
Vulcan Mine	Iron	0	0	Sparta Twp	Sussex



STATE OF NEW JERSEY 2024 ALL-HAZARD MITIGATION PLAN

Site Name	Mine Type	Begin Date	End Date	Location	County
Vulcan Mine	Iron	0	0	Sparta Twp	Sussex
Vulcan Mine	Iron	0	0	Sparta Twp	Sussex
Vulcan Mine	Iron	0	0	Sparta Twp	Sussex
Unnamed Mine	Iron	0	0	Jefferson Twp	Morris
Unnamed Mine	Iron	0	0	Jefferson Twp	Morris
Unnamed Mine	Iron	0	0	Jefferson Twp	Morris
Ogden Mine	Iron	1772	1899	Sparta Twp	Sussex
Ogden Mine	Iron	1772	1899	Sparta Twp	Sussex
Neshanic Mine	Copper	1770	1861	Raritan Twp	Hunterdon
Layton Mine	Iron	1878	0	Vernon Twp	Sussex
Wawayanda Mine	Iron	1854	1891	Vernon Twp	Sussex
Green Mine	Iron	0	0	Vernon Twp	Sussex
Ten Eyck's Exploration	Iron	1855	1879	Vernon Twp	Sussex
Carey Mine	Iron	0	0	West Milford Twp	Passaic
Wrightenour Mine	Iron	0	0	Ringwood Boro	Passaic
Sloat Farm Mine	Iron	1883	0	Ringwood Boro	Passaic
Wanaque- London Mine	Iron	1799	1905	Bloomington Boro	Passaic
Tellington Mine	Iron	1873	0	West Milford Twp	Passaic
Kanouse Mine	Iron	0	0	Wanaque Boro	Passaic
Ryerson De Bow Mine	Iron	1872	1907	Riverdale Boro	Morris
Jackson Mine	Iron	1862	0	Riverdale Boro	Morris
De Bow Mine	Iron	1872	1906	Riverdale Boro	Morris



STATE OF NEW JERSEY 2024 ALL-HAZARD MITIGATION PLAN

Site Name	Mine Type	Begin Date	End Date	Location	County
Lanagan Mine	Iron	0	0	Riverdale Boro	Morris
Kahart Mine	Iron	0	0	Kinnelon Boro	Morris
Auble Mine	Iron	0	1892	Peapack Gladstone	Somerset
Martin Mine	Iron	0	0	Alexandria Twp	Hunterdon
Duckworth Farm Mine	Iron	1776	1879	Holland Twp	Hunterdon
American Mine	Copper	1754	1905	Bridgewater Twp	Somerset
Chimney Rock Mines	Copper	0	0	Bridgewater Twp	Somerset
Unnamed	Copper	0	0	Franklin Twp	Somerset
Dod Mine	Copper	1720	1760	East Orange City	Essex
Griggstown Mine	Copper	1753	1916	Franklin Twp	Somerset
Schuyler Mine	Copper	1710	1903	North Arlington	Bergen
Wigwam Brook Mine	Copper	0	0	Orange City	Essex
Clinton	Manganese	0	0	Clinton Twp	Hunterdon
Kean Mine	Iron	1875	1885	High Bridge Boro	Hunterdon
Apgars Mine	Iron	0	0	Glen Gardner Boro	Hunterdon
Unnamed	Iron	0	0	Lebanon Twp	Hunterdon
Unnamed	Iron	0	0	Bethlehem Twp	Hunterdon
Canfields Phosphate Mine	Iron	1870	1881	Mine Hill Twp	Morris
Cow-Belly Vein	Iron	1713	1883	Mine Hill Twp	Morris
Stephens Mine	Iron	0	0	Roxbury Twp	Morris
Salmon Mine	Iron	0	0	Mount Olive Twp	Morris
Unnamed	Iron	0	0	Mount Olive Twp	Morris



STATE OF NEW JERSEY 2024 ALL-HAZARD MITIGATION PLAN

Site Name	Mine Type	Begin Date	End Date	Location	County
Rarick Farm Exploration	Iron	1870	1879	Washington Twp	Morris
Creamer Mine	Iron	1873	0	Chester Boro	Morris
Blauvelt	Iron	1890	0	Chester Boro	Morris
Unnamed	Iron	0	0	Chester Twp	Morris
Unnamed	Iron	0	0	Chester Twp	Morris
Harden Mine	Iron	1869	0	Chester Twp	Morris
Gulick Mine	Iron	0	0	Chester Twp	Morris
Unnamed	Iron	0	0	Chester Twp	Morris
Rarick Farm Exploration	Iron	1873	0	Chester Twp	Morris
Langdon Mine	Iron	1879	1886	Washington Twp	Morris
Little Mine	Iron	0	0	Oxford Twp	Warren
Aaron Howell Prospect	Copper	0	0	Independence Twp	Warren
Davis Prospect	Copper	1873	1881	Independence Twp	Warren
Charlotte Mine	Uranium	0	0	Byram Twp	Sussex
French Mine	Copper	1750	0	New Brunswick City	Middlesex
Bolmer Mine	Copper	1800	1868	Bridgewater Twp	Somerset
Bolmer Mine	Copper	1800	1868	Bridgewater Twp	Somerset
Bolmer Mine	Copper	1800	1868	Bridgewater Twp	Somerset
Williams Mine	Iron	1815	1833	Vernon Twp	Sussex
Centennial Mine	Iron	1875	1879	West Milford Twp	Passaic
Hope Mountain Mine	Iron	0	1868	Ringwood Boro	Passaic
Hope Mountain Mine	Iron	0	1868	Ringwood Boro	Passaic



STATE OF NEW JERSEY 2024 ALL-HAZARD MITIGATION PLAN

Site Name	Mine Type	Begin Date	End Date	Location	County
Hope Mountain Mine	Iron	0	1868	Ringwood Boro	Passaic
Hope Mountain Mine	Iron	0	1868	Ringwood Boro	Passaic
Hope Mountain Mine	Iron	0	1868	Ringwood Boro	Passaic
Hope Mountain Mine	Iron	0	1868	Ringwood Boro	Passaic
Oak Mine	Iron	1762	1853	Ringwood Boro	Passaic
Unnamed	Iron	0	0	Ringwood Boro	Passaic
Unnamed	Iron	0	0	Ringwood Boro	Passaic
Monks Mine	Iron	0	0	Ringwood Boro	Passaic
Unnamed	Iron	0	0	West Milford Twp	Passaic
Peter Mine	Iron	0	0	Ringwood Boro	Passaic
Cooper Mine	Iron	0	0	Ringwood Boro	Passaic
Keeler Mine	Iron	0	0	Ringwood Boro	Passaic
Miller Mine	Iron	1867	1873	Ringwood Boro	Passaic
St. George Mine	Iron	0	0	Ringwood Boro	Passaic
Ringwood Bush Mine	Iron	0	0	Ringwood Boro	Passaic
Little Blue Mine	Iron	0	0	Ringwood Boro	Passaic
Cannon Mine	Iron	0	0	Ringwood Boro	Passaic
Blue Mine	Iron	0	0	Ringwood Boro	Passaic
Red Mine	Iron	0	0	Ringwood Boro	Passaic
Cannon Mine	Iron	0	0	Ringwood Boro	Passaic
Hard Mine	Iron	0	0	Ringwood Boro	Passaic
Mule Mine	Iron	0	0	Ringwood Boro	Passaic



STATE OF NEW JERSEY 2024 ALL-HAZARD MITIGATION PLAN

Site Name	Mine Type	Begin Date	End Date	Location	County
Hickory Mt. & Valley Mine	Iron	0	0	Ringwood Boro	Passaic
Board Mine	Iron	0	0	Ringwood Boro	Passaic
Unnamed	Iron	0	0	Greenwich Twp	Warren
Unnamed	Iron	0	0	Greenwich Twp	Warren
Unnamed	Iron	0	0	Bethlehem Twp	Hunterdon
Nj Zinc Company Mine	Zinc	0	0	Franklin Boro	Sussex
Nj Zinc Company Mine	Zinc	0	0	Ogdensburg Boro	Sussex
Large Mine	Iron	0	0	Clinton Twp	Hunterdon
Flemington Mine	Copper	1770	1861	Raritan Twp	Hunterdon
Flemington Mine	Copper	1770	1861	Raritan Twp	Hunterdon
Wanaque- Laurel Mine	Iron	0	1890	Bloomingtondale Boro	Passaic
Brown Mine	Iron	0	0	Wanaque Boro	Passaic
Beam Mine	Iron	0	0	Wanaque Boro	Passaic
Butler Mine	Iron	0	0	Mahwah Twp	Bergen
Rheinsmith Farm Mine	Iron	1873	1874	Ringwood Boro	Passaic
Blue Wanaque Mine	Iron	0	0	Bloomingtondale Boro	Passaic
Wortman Mine	Iron	1873	0	Chester Twp	Morris
Bartle Mine	Iron	0	0	Washington Twp	Morris
Hoffman Mine	Copper	1812	1868	Bridgewater Twp	Somerset
Samuel Wilds Mine	Iron	0	0	Riverdale Boro	Morris
Pahaquarry Mine	Copper	1650	1911	Hardwick Twp	Warren
Sussex Lead Mine	Lead	0	0	Sparta Twp	Sussex



STATE OF NEW JERSEY 2024 ALL-HAZARD MITIGATION PLAN

Site Name	Mine Type	Begin Date	End Date	Location	County
Stony Brook Mine	Copper	1800	0	Watchung Boro	Somerset
Menlo Park Mine	Copper	1784	1903	Edison Twp	Middlesex
Hurdtown Apatite Mine	Iron	0	0	Jefferson Twp	Morris
Hurd Mine	Iron	1855	1903	Jefferson Twp	Morris
Baker Mine Lower Hill	Iron	1868	1883	Mine Hill Twp	Morris
Baker Mine	Iron	1868	1879	Mine Hill Twp	Morris
Scrub Oaks Mine	Iron	1856	1959	Mine Hill Twp	Morris
Erb Mine	Iron	1868	1891	Wharton Boro	Morris
Corwin Mine	Iron	1855	1868	Mine Hill Twp	Morris
Sullivan Mine	Iron	1868	0	Wharton Boro	Morris
Johnson Hill Mine	Iron	1868	1869	Wharton Boro	Morris
Huff Mine	Iron	1855	1910	Wharton Boro	Morris
Dolan Mine	Iron	1869	1886	Rockaway Twp	Morris
Baker No 1 Mine	Iron	1868	1891	Mine Hill Twp	Morris
Millen Mine	Iron	1855	1883	Mine Hill Twp	Morris
Randall Hill Mine	Iron	1855	1882	Mine Hill Twp	Morris
Jackson Hill Mine	Iron	1855	1876	Mine Hill Twp	Morris
Spring Mine	Iron	1868	0	Mine Hill Twp	Morris
Stirling Mine	Iron	1640	1885	Wharton Boro	Morris
Hubbard & N. River Mine	Iron	1855	1868	Wharton Boro	Morris
New Stirling Mine	Iron	1890	1900	Wharton Boro	Morris
Hurd Mine	Iron	1855	1920	Wharton Boro	Morris



STATE OF NEW JERSEY 2024 ALL-HAZARD MITIGATION PLAN

Site Name	Mine Type	Begin Date	End Date	Location	County
Orchard Mine	Iron	1850	1893	Wharton Boro	Morris
Washington Forge Mine	Iron	1868	1881	Wharton Boro	Morris
Meadow Mine	Iron	1884	1886	Wharton Boro	Morris
Mount Pleasant Mine	Iron	1786	1896	Wharton Boro	Morris
Cogill Mine	Iron	1868	1910	Rockaway Twp	Morris
Denmark Mine	Iron	1868	0	Rockaway Twp	Morris
Mt Hope Mine Spancer Shft	Iron	1710	1969	Rockaway Twp	Morris
Mt Hope Fowler Shaft Mine	Iron	1710	1969	Rockaway Twp	Morris
Mt. Hope Brown Shaft Mine	Iron	1710	1969	Rockaway Twp	Morris
Mt. Hope New Leonard Mine	Iron	1710	1985	Rockaway Twp	Morris
Mt. Hope Elizabeth Mine	Iron	1710	1969	Rockaway Twp	Morris
Mount Hope Mine	Iron	1710	1969	Rockaway Twp	Morris
Teabo Mine	Iron	1800	1907	Rockaway Twp	Morris
Teabo Mine	Iron	1800	1907	Rockaway Twp	Morris
Teabo Mine	Iron	1800	1907	Rockaway Twp	Morris
Allen Mine	Iron	1855	1882	Rockaway Twp	Morris
Richard Mine	Iron	1803	1958	Rockaway Twp	Morris
Baker Mine	Iron	1866	1905	Rockaway Twp	Morris
West Mt Pleasent Mine	Iron	1880	1896	Wharton Boro	Morris
J.D. King Mine	Iron	0	0	Wharton Boro	Morris
Swedes Mine	Iron	1855	1882	Rockaway Twp	Morris
White Meadow Mine	Iron	1840	1868	Rockaway Twp	Morris



STATE OF NEW JERSEY 2024 ALL-HAZARD MITIGATION PLAN

Site Name	Mine Type	Begin Date	End Date	Location	County
Hickory Hill Mine	Iron	1855	1886	Rockaway Twp	Morris
Sigler Mine	Iron	1868	1869	Rockaway Twp	Morris
Weldon Mine	Iron	1855	1902	Jefferson Twp	Morris
Lower Weldon Mine	Iron	1873	1896	Jefferson Twp	Morris
Harvey Mine	Iron	1855	1920	Wharton Boro	Morris
Davenport Mine	Iron	1868	0	Jefferson Twp	Morris
Mine Tunnel	Iron	1869	1886	Rockaway Twp	Morris
Mount Hope Mine	Iron	1710	1985	Rockaway Twp	Morris
Shoemaker Mine	Iron	1889	1911	White Twp	Warren
Fittz Mine	Iron	1889	1908	White Twp	Warren
Titman Shaft	Iron	1873	1874	White Twp	Warren
Unnamed	Iron	0	0	White Twp	Warren
Unnamed	Iron	0	0	Oxford Twp	Warren
Riddle Mine	Iron	1872	1891	Oxford Twp	Warren
Queen Mine	Iron	1882	1900	Oxford Twp	Warren
Ahles Mine	Iron	1901	1916	Oxford Twp	Warren
Raub Mine	Iron	1872	1891	White Twp	Warren
Roseberry Mine	Iron	0	0	White Twp	Warren
Barton Mine	Iron	1873	1916	White Twp	Warren
Kaiser Mine	Iron	1882	1891	White Twp	Warren
Brewer Mine	Iron	1880	1880	White Twp	Warren
Oxford Mine	Iron	1854	1964	Oxford Twp	Warren



STATE OF NEW JERSEY 2024 ALL-HAZARD MITIGATION PLAN

Site Name	Mine Type	Begin Date	End Date	Location	County
Unnamed	Iron	0	0	Harmony Twp	Warren
Split Rock Pond Mine	Iron	1873	1880	Rockaway Twp	Morris
Beach Glen Mine	Iron	1808	1930	Rockaway Twp	Morris
Righter Mine	Iron	1872	0	Rockaway Twp	Morris
Cobb Mine	Iron	1868	1881	Rockaway Twp	Morris
Birch Mine	Iron	0	0	Rockaway Twp	Morris
Fairview Mine	Iron	0	0	Rockaway Twp	Morris
Hibernia Mine	Iron	1722	1916	Rockaway Twp	Morris
Beach Mine	Iron	1785	1886	Rockaway Twp	Morris
Greenville Mine	Iron	1872	0	Rockaway Twp	Morris
Stony Brook Mine	Iron	1770	1880	Kinnelon Boro	Morris
Meirden Mine	Iron	1868	0	Rockaway Twp	Morris
Tichenor Mine	Iron	1868	1872	Rockaway Twp	Morris
Botts Farm Mine	Iron	1872	1873	Boonton Twp	Morris
Rockaway Valley Mines	Iron	1820	1880	Boonton Twp	Morris
Taylor Mine	Iron	1858	1873	Montville Twp	Morris
Prospect #2 Sims	Iron	0	0	Rockaway Twp	Morris
Prospect #70 Sims	Iron	0	0	Rockaway Twp	Morris
Decker Mine	Iron	0	0	Montville Twp	Morris
Thatcher Mine	Iron	1873	1900	Franklin Twp	Warren
Cline Mine	Iron	1873	1880	Franklin Twp	Warren
Broadway Mine	Iron	1856	1868	Franklin Twp	Warren



STATE OF NEW JERSEY 2024 ALL-HAZARD MITIGATION PLAN

Site Name	Mine Type	Begin Date	End Date	Location	County
Wean Mine	Iron	1874	1881	Bethlehem Twp	Hunterdon
Cline Mine	Iron	1873	1879	Franklin Twp	Warren
Petty Mine	Iron	1880	1880	Alexandria Twp	Hunterdon
Hazard Mine	Iron	1877	1877	Franklin Twp	Warren
Slack Mine	Iron	1899	1899	Franklin Twp	Warren
Hamlen Mine	Iron	1860	1880	Lopatcong Twp	Warren
Hacklebarney Mine	Iron	1760	1896	Chester Twp	Morris
Crane Mine	Iron	1868	1868	Mount Olive Twp	Morris
Stephens Mine	Iron	1848	1879	Mount Olive Twp	Morris
Mount Olive Mine	Iron	1848	1886	Mount Olive Twp	Morris
Solomon Mine	Iron	1886	1886	Mount Olive Twp	Morris
Drake Mine	Iron	1854	1870	Mount Olive Twp	Morris
Drake Mine	Iron	1854	1870	Mount Olive Twp	Morris
Osborne Mine	Iron	1848	1855	Mount Olive Twp	Morris
Baptist Church Mine	Iron	1873	1873	Roxbury Twp	Morris
Hilt Mine	Iron	1855	0	Roxbury Twp	Morris
Hopler Mine	Iron	1868	1881	Washington Twp	Morris
Peach Orchard Mine	Iron	1870	1883	Chester Boro	Morris
Hedges Mine	Iron	1870	1879	Chester Boro	Morris
Dickerson Farm Mine	Iron	1870	1890	Chester Boro	Morris
Topping Mine	Iron	1873	1880	Chester Boro	Morris
Sampson Mine	Iron	1867	1885	Chester Boro	Morris



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Site Name	Mine Type	Begin Date	End Date	Location	County
Skellenger Mine	Iron	1867	1868	Chester Boro	Morris
Cromwell Mine	Iron	1872	1886	Chester Boro	Morris
Collis Farm Exploration	Iron	1873	1873	Chester Boro	Morris
Sweayze Mine	Iron	1870	1886	Chester Boro	Morris
Cooper Mine	Iron	1879	1885	Chester Twp	Morris
Kean Mine	Iron	1883	1883	Chester Twp	Morris
Squier's Mine	Iron	1880	1884	Chester Twp	Morris
Leak Mine	Iron	1866	1882	Chester Twp	Morris
Beemer Mine	Iron	1886	1887	Chester Twp	Morris
Skellenger Mine	Iron	1881	1882	Chester Twp	Morris
Daniel Horton Mine	Iron	1867	1870	Chester Twp	Morris
Barnes Mine	Iron	1869	1872	Chester Twp	Morris
Thorp Mine	Iron	1910	0	Chester Twp	Morris
Gulick Farm Mine	Iron	1870	1886	Chester Twp	Morris
Langdon Mine	Iron	1879	1886	Chester Twp	Morris
Pitney Mine	Iron	1873	1881	Chester Twp	Morris
Child Mine	Iron	1874	1874	Chester Twp	Morris
Woodhull Mine	Iron	1870	1886	Chester Twp	Morris
Budd Mine	Iron	1867	1873	Chester Twp	Morris
Quimby Mine	Iron	1910	0	Chester Twp	Morris
Tiger Mine	Iron	1880	1883	Chester Twp	Morris
Sterling Hill Mine	Iron	1877	1882	Ogdensburg Boro	Sussex



STATE OF NEW JERSEY 2024 ALL-HAZARD MITIGATION PLAN

Site Name	Mine Type	Begin Date	End Date	Location	County
Pikes Peak Mine	Iron	1855	1881	Franklin Boro	Sussex
Hill Mine	Iron	1868	1882	Franklin Boro	Sussex
Amos Sharp Mine	Iron	1868	1873	Sparta Twp	Sussex
Pardee Mine	Iron	1800	1899	Sparta Twp	Sussex
Ford Mine	Iron	1855	1896	Jefferson Twp	Morris
Schofield Mine	Iron	1855	1890	Jefferson Twp	Morris
Sherman Farm Mine	Iron	1854	1875	Sparta Twp	Sussex
Boss Mine	Iron	0	1868	Sparta Twp	Sussex
Goble Mine	Iron	1868	1868	Sparta Twp	Sussex
Losey Exploration	Iron	1881	1881	Franklin Boro	Sussex
Anderson Mine	Iron	1856	1868	Mansfield Twp	Warren
Smith's Mine	Iron	1873	1882	Liberty Twp	Warren
Deats Mine	Iron	1873	1883	Liberty Twp	Warren
Hoagland Mine	Iron	1873	1880	Liberty Twp	Warren
Lanning Mine	Iron	1881	1883	Oxford Twp	Warren
Carwheel Mine	Iron	1700	1883	Oxford Twp	Warren
New Mine	Iron	1868	1880	Oxford Twp	Warren
Mckinley Mine	Iron	1883	1905	Oxford Twp	Warren
Welch Mine	Iron	1879	1882	Oxford Twp	Warren
Staley Mine	Iron	1868	1868	Oxford Twp	Warren
Barker Mine	Iron	1880	1881	Independence Twp	Warren
Pequest Mine	Iron	1869	1880	White Twp	Warren



STATE OF NEW JERSEY 2024 ALL-HAZARD MITIGATION PLAN

Site Name	Mine Type	Begin Date	End Date	Location	County
Hoit Mine	Iron	1870	1875	White Twp	Warren
Creager Mine	Iron	1871	1880	Mansfield Twp	Warren
Mitchell Mine	Iron	1870	1874	Mansfield Twp	Warren
Bald Pate Mine	Iron	1868	1879	Mansfield Twp	Warren
Egbert Church Mine	Iron	1871	1876	Mansfield Twp	Warren
Pohatcong Pit # 1	Iron	1870	1870	Mansfield Twp	Warren
Mattison Mine	Iron	1880	1880	Lebanon Twp	Hunterdon
Pohatcong Pit # 2	Iron	1870	1870	Mansfield Twp	Warren
Staley 2	Iron	1880	0	Oxford Twp	Warren
Canistear Mine	Iron	1870	1880	Vernon Twp	Sussex
Rutherford Mine	Iron	1888	0	West Milford Twp	Passaic
Sigler Mine	Iron	0	0	West Milford Twp	Passaic
Wallace Mine	Iron	1870	0	West Milford Twp	Passaic
Pardee Mine	Iron	1870	1884	Rockaway Twp	Morris
Winter Mine	Iron	1882	1885	Rockaway Twp	Morris
Davenport Mine	Iron	1879	1884	Rockaway Twp	Morris
Green Pond Mine	Iron	1872	1900	Rockaway Twp	Morris
Copperas Mine	Iron	1812	1815	Rockaway Twp	Morris
Howell Tract Mine	Iron	1874	1885	Rockaway Twp	Morris
Charlottesburg Mine	Iron	1765	1888	Rockaway Twp	Morris
Wood Mine	Iron	1873	1883	Rockaway Twp	Morris
Tracy And Crane Farm	Iron	1870	1873	West Milford Twp	Passaic



STATE OF NEW JERSEY 2024 ALL-HAZARD MITIGATION PLAN

Site Name	Mine Type	Begin Date	End Date	Location	County
Henderson Farm Mine	Iron	1872	0	Hardyston Twp	Sussex
Day Mine	Iron	1910	0	West Milford Twp	Passaic
Clinton Tract Mine	Iron	1872	1873	West Milford Twp	Passaic
Wild Cat Mine	Iron	1877	1886	Rockaway Twp	Morris
Shields Mine	Iron	1868	1908	Mansfield Twp	Warren
Thomas Mine	Iron	1873	1880	Mansfield Twp	Warren
Brown Mine	Iron	1874	1880	Mansfield Twp	Warren
Searle Mine	Iron	1868	1868	Independence Twp	Warren
Searle Mine	Iron	1868	1868	Independence Twp	Warren
Creamer Mine	Iron	1854	1875	Mount Olive Twp	Morris
Smith Mine	Iron	1850	1868	Mount Olive Twp	Morris
Fisher Mine	Iron	1864	1873	Washington Twp	Morris
Pidcock Mine	Iron	1800	1880	Lebanon Twp	Hunterdon
Sharp Mine	Iron	1871	1874	Washington Twp	Morris
Marsh Mine	Iron	1855	0	Washington Twp	Morris
Dickinson's Mine	Iron	1855	1860	Washington Twp	Morris
Hann Mine	Iron	1871	1880	Washington Twp	Morris
Derrenberger Farm	Iron	1883	1883	Washington Twp	Morris
Stoutenberg Mine	Iron	1872	1883	Washington Twp	Morris
Naughtright Mine	Iron	1870	1883	Washington Twp	Morris
William Sharp Mine	Iron	1870	1880	Washington Twp	Morris
Dufford Mine	Iron	1879	1880	Washington Twp	Morris



STATE OF NEW JERSEY 2024 ALL-HAZARD MITIGATION PLAN

Site Name	Mine Type	Begin Date	End Date	Location	County
Fisher Exploration	Iron	1880	1880	Washington Twp	Morris
Sickles Mine	Iron	1870	1882	Sparta Twp	Sussex
Cascade Mine	Iron	1850	1883	Byram Twp	Sussex
Allis Exploration	Iron	1873	1879	Byram Twp	Sussex
Byerly Mine	Iron	1873	0	Byram Twp	Sussex
Roseville Mine	Iron	1850	1880	Byram Twp	Sussex
Silver Mine	Iron	1855	0	Byram Twp	Sussex
Mckean Mine	Iron	1873	1880	Byram Twp	Sussex
Bedell Mine	Iron	1890	1900	Byram Twp	Sussex
Gaffney Mine	Iron	1874	1880	Byram Twp	Sussex
Lowrance Mine	Iron	1855	0	Mount Olive Twp	Morris
Hude Mine	Iron	1790	1910	Stanhope Boro	Sussex
Budd Mine	Iron	1875	1906	Stanhope Boro	Sussex
Haggerty Mine	Iron	1885	0	Stanhope Boro	Sussex
Lawson Mine	Iron	1880	0	Hopatcong Boro	Sussex
Lake View Mine	Iron	1863	1882	Mount Arlington Bo	Morris
Nolans Mine	Iron	1855	1868	Jefferson Twp	Morris
Gove Mine	Iron	1874	1881	Mount Arlington	Morris
Lurk Mine	Iron	1904	0	Mount Arlington	Morris
High Ledge Mine	Iron	1880	1883	Roxbury Twp	Morris
Burt Mine	Iron	1882	1883	Mount Arlington	Morris
Passaic Mine	Iron	1882	0	Hopatcong Boro	Sussex



STATE OF NEW JERSEY 2024 ALL-HAZARD MITIGATION PLAN

Site Name	Mine Type	Begin Date	End Date	Location	County
Edward's Prospect	Iron	0	0	Hopatcong Boro	Sussex
Wolf Mine	Iron	1880	1901	Mount Olive Twp	Morris
Lawrence Mine	Iron	1873	0	Byram Twp	Sussex
Black Hills Mine	Iron	1879	1900	Mine Hill Twp	Morris
Dickerson Mine	Iron	1713	1908	Mine Hill Twp	Morris
Canfield Mine	Iron	1870	1873	Mine Hill Twp	Morris
Bryant Mine	Iron	1868	1890	Randolph Twp	Morris
Foulon Mine	Iron	1868	1873	Randolph Twp	Morris
Charles King Mine	Iron	1868	1870	Randolph Twp	Morris
King Mine	Iron	1853	1880	Mine Hill Twp	Morris
Evers Mine	Iron	1868	1883	Mine Hill Twp	Morris
Brotherton Mine	Iron	1855	1901	Mine Hill Twp	Morris
Bryam Mine	Iron	1844	1883	Mine Hill Twp	Morris
Trowbridge Mine	Iron	1868	1869	Randolph Twp	Morris
Dalrymple Mine	Iron	1868	1882	Randolph Twp	Morris
Lawrence Mine	Iron	1878	1883	Randolph Twp	Morris
Dehart Mine	Iron	1868	1886	Randolph Twp	Morris
David Horton Mine	Iron	1868	1873	Randolph Twp	Morris
George Mine	Iron	1855	1873	Randolph Twp	Morris
Henderson Mine	Iron	1868	0	Randolph Twp	Morris
Combs Mine	Iron	1828	1881	Randolph Twp	Morris
Copper Mine	Iron	1870	0	Randolph Twp	Morris



STATE OF NEW JERSEY 2024 ALL-HAZARD MITIGATION PLAN

Site Name	Mine Type	Begin Date	End Date	Location	County
Munson's Mine	Iron	1859	0	Dover Town	Morris
Skellinger Mine	Iron	1878	1880	Randolph Twp	Morris
Lewis Mine	Iron	0	1870	Mendham Twp	Morris
Connet Mine	Iron	1869	1875	Mendham Twp	Morris
Beers Exploration	Iron	1878	1879	Morris Twp	Morris
Janes Mine	Iron	1865	0	Bernardsville Boro	Somerset
Glendon Mine	Iron	1850	1868	Green Twp	Sussex
Haggerty's Farm	Iron	1874	1879	Allamuchy Twp	Warren
Bryant Mine	Iron	1866	1873	Allamuchy Twp	Warren
Waterloo Mine	Iron	1855	1885	Allamuchy Twp	Warren
French's Mine	Iron	1873	1873	Byram Twp	Sussex
Wintermuth's Mine	Iron	1880	1883	Allamuchy Twp	Warren
Wintermuth's Mine	Iron	1880	1883	Allamuchy Twp	Warren
Eureka Mine	Iron	1871	1871	Allamuchy Twp	Warren
Excelsior Mine	Iron	1871	1883	Allamuchy Twp	Warren
Edsall Mine	Iron	1840	1873	Hardyston Twp	Sussex
Simpson Mine	Iron	1850	1854	Vernon Twp	Sussex
Pochuk Mine	Iron	1835	1876	Vernon Twp	Sussex
Copperas Mine	Iron	1816	1816	Vernon Twp	Sussex
Bird Mine	Iron	1868	1868	Vernon Twp	Sussex
Rapp Mine	Iron	1868	1930	Pohatcong Twp	Warren
Carpenter Mine	Iron	1865	1885	Pohatcong Twp	Warren



STATE OF NEW JERSEY 2024 ALL-HAZARD MITIGATION PLAN

Site Name	Mine Type	Begin Date	End Date	Location	County
Carpenter Mine	Iron	1865	1885	Pohatcong Twp	Warren
Riegel Mine	Iron	1879	1888	Pohatcong Twp	Warren
Riegel Mine	Iron	1879	1888	Pohatcong Twp	Warren
Harts Mine Exploration	Iron	0	0	Pohatcong Twp	Warren
Shiloh Mine	Iron	1873	1873	Hope Twp	Warren
Swayze Hematite Mine	Iron	1877	1882	Hope Twp	Warren
Albertson Mine	Iron	1873	1875	Independence Twp	Warren
Cummins Mine	Iron	1868	1882	Independence Twp	Warren
Cook Farm Mine	Iron	1881	1900	Liberty Twp	Warren
Shuster Mine	Iron	1877	1890	Frelinghuysen Twp	Warren
Scranton's Lease	Iron	1873	1883	Independence Twp	Warren
Green Farm Mine	Iron	1873	1884	Independence Twp	Warren
Jenny Jump Mine	Iron	1880	1900	Hope Twp	Warren
Dafford Mine	Iron	1879	1880	Lebanon Twp	Hunterdon
Sharps Mine	Iron	1871	1880	Clinton Twp	Hunterdon
Emery Farm Exploration	Iron	1878	1878	Clinton Twp	Hunterdon
Old Furnance Mine	Iron	1778	1884	Clinton Twp	Hunterdon
Annandale Mine	Iron	1880	1880	Clinton Twp	Hunterdon
Cokesbury Mine	Iron	1776	1873	Tewksbury Twp	Hunterdon
Burrill Mine	Iron	1878	1878	Tewksbury Twp	Hunterdon
Sutton Farm Mine	Iron	1873	1881	Tewksbury Twp	Hunterdon
Fox Hill Mine	Iron	1873	1880	Tewksbury Twp	Hunterdon



STATE OF NEW JERSEY 2024 ALL-HAZARD MITIGATION PLAN

Site Name	Mine Type	Begin Date	End Date	Location	County
Welch Farm Exploration	Iron	1883	1883	Tewksbury Twp	Hunterdon
Neighbor Mine	Iron	1879	1880	Lebanon Twp	Hunterdon
Crestmore Mine	Iron	0	0	Washington Twp	Morris
Ramsey's Mine	Iron	1870	1872	Harmony Twp	Warren
Andover Mine	Iron	1776	1863	Andover Twp	Sussex
Sulphur Hill Mine	Iron	1857	1880	Andover Twp	Sussex
Tar Hill Mine	Iron	1855	1880	Andover Twp	Sussex
Longcore Mine	Iron	1855	0	Andover Twp	Sussex
Sussex Mills Mine	Iron	0	0	Sparta Twp	Sussex
Bird Mine	Iron	1873	1873	Clinton Town	Hunterdon
Rodenbaugh Mine	Iron	1876	1880	Bethlehem Twp	Hunterdon
Maberry Mine	Iron	1880	1880	Bethlehem Twp	Hunterdon
High Bridge Mines	Iron	1720	1889	High Bridge Boro	Hunterdon
Glen Ridge Mine	Copper	1746	0	Glen Ridge Boro	Essex
Raritan Mine	Copper	1840	0	Piscataway Twp	Middlesex
Ahles Mine	Iron	1901	1916	Oxford Twp	Warren
Ahles Mine	Iron	1901	1916	Oxford Twp	Warren
Schuler Mine	Iron	1773	1880	White Twp	Warren
Roseberry Mine	Iron	1872	1890	White Twp	Warren
Unnamed	Iron	0	0	Washington Twp	Warren
Piersons Exploration	Iron	0	0	Mahwah Twp	Bergen
Unnamed	Iron	0	0	Mahwah Twp	Bergen



STATE OF NEW JERSEY 2024 ALL-HAZARD MITIGATION PLAN

Site Name	Mine Type	Begin Date	End Date	Location	County
Unnamed	Copper	0	0	Delaware Twp	Hunterdon
Unnamed	Graphite	0	0	Morris Twp	Morris
Unnamed	Graphite	0	0	Mendham Boro	Morris
Dickinson Mine	Graphite	0	0	Mendham Twp	Morris
Sutton Farm Graphite Mine	Graphite	0	0	Tewksbury Twp	Hunterdon
Annandale Graphite Mine	Graphite	0	0	Clinton Twp	Hunterdon
Fisher Mine	Graphite	0	0	Tewksbury Twp	Hunterdon
Englemann Mine	Graphite	0	0	Chester Twp	Morris
Betts Exploration	Graphite	0	0	Morris Twp	Morris
Unnamed	Graphite	0	0	Bloomingtondale Boro	Passaic
Bloomingtondale Mine	Graphite	0	0	Riverdale Boro	Morris
Bloomingtondale Mine	Graphite	0	0	Riverdale Boro	Morris
Unnamed	Mica	0	0	Mendham Twp	Morris
Feltonville Mine	Copper	1733	1865	Watchung Boro	Somerset
Unnamed	Iron	0	0	Frelinghuysen Twp	Warren
Cummins Mine	Iron	1868	1882	Independence Twp	Warren
Cummins Mine	Iron	1868	1882	Independence Twp	Warren
Unnamed	Iron	0	0	Independence Twp	Warren
Kispaugh Mine North	Iron	1871	1900	Liberty Twp	Warren
Kispaugh Mine South	Iron	1871	1900	Liberty Twp	Warren
Davis Mine	Iron	1873	1883	Independence Twp	Warren
Inshow Exploration	Iron	1872	0	Hope Twp	Warren



STATE OF NEW JERSEY 2024 ALL-HAZARD MITIGATION PLAN

Site Name	Mine Type	Begin Date	End Date	Location	County
Potter Farm Exploration	Iron	1872	1873	Independence Twp	Warren
Garrison Farm Exploration	Iron	1858	1881	Independence Twp	Warren
Stinson Mine	Iron	1881	1883	Independence Twp	Warren
Unnamed	Iron	0	0	Independence Twp	Warren
Unnamed	Iron	0	0	Independence Twp	Warren
Unnamed	Iron	0	0	Independence Twp	Warren
Unnamed	Iron	0	0	Independence Twp	Warren
Unnamed	Sulfide	0	0	Frelinghuysen Twp	Warren
Unnamed	Iron	0	0	Independence Twp	Warren
Stiff Farm Explorations	Iron	1871	0	Hope Twp	Warren
Howell Farm Mine	Iron	1800	1943	Independence Twp	Warren
Howell Farm Mine	Iron	1800	1943	Independence Twp	Warren
Howell Farm Mine	Iron	1800	1943	Independence Twp	Warren
Howell Farm Mine	Iron	1800	1943	Independence Twp	Warren
Howell Farm Mine	Iron	1800	1943	Independence Twp	Warren
Shaw Mine	Iron	1868	1871	Independence Twp	Warren
Unnamed	Sulfide	0	0	Independence Twp	Warren
Unnamed	Iron	0	0	Independence Twp	Warren
Howell Farm Mine	Iron	1800	1943	Independence Twp	Warren
Unnamed	Mica	0	0	Harmony Twp	Warren
Unnamed	Iron	0	0	Franklin Twp Twp	Warren
Terry Mine	Iron	1868	1885	Franklin Twp	Warren



STATE OF NEW JERSEY 2024 ALL-HAZARD MITIGATION PLAN

Site Name	Mine Type	Begin Date	End Date	Location	County
Carter Mine	Iron	1880	1881	Harmony Twp	Warren
Carter Mine	Iron	1880	1881	Harmony Twp	Warren
Carter Mine	Iron	1880	1881	Harmony Twp	Warren
Carter Mine	Iron	1880	1881	Harmony Twp	Warren
Smith's Openings	Iron	0	1873	Franklin Twp	Warren
Unnamed	Iron	0	0	Franklin Twp	Warren
Unnamed	Iron	0	0	Franklin Twp	Warren
Unnamed	Iron	0	0	Franklin Twp	Warren
Unnamed	Iron	0	0	Franklin Twp	Warren
Unnamed	Iron	0	0	Franklin Twp	Warren
Unnamed	Iron	0	0	Franklin Twp	Warren
Unnamed	Iron	0	0	Alexandria Twp	Hunterdon
Turkey Hill Mine	Iron	1872	1886	Bethlehem Twp	Hunterdon
Turkey Hill Mine	Iron	1872	1886	Bethlehem Twp	Hunterdon
Turkey Hill Mine	Iron	1872	1886	Bethlehem Twp	Hunterdon
Turkey Hill Mine	Iron	1872	1886	Bethlehem Twp	Hunterdon
Turkey Hill Mine	Iron	1872	1886	Bethlehem Twp	Hunterdon
Turkey Hill Mine	Iron	1872	1886	Bethlehem Twp	Hunterdon
Turkey Hill Mine	Iron	1872	1886	Bethlehem Twp	Hunterdon
Turkey Hill Mine	Iron	1872	1886	Bethlehem Twp	Hunterdon
Wright Mine	Iron	1880	1881	Alexandria Twp	Hunterdon
Henry Mine	Iron	0	0	Bethlehem Twp	Hunterdon
Henry Mine	Iron	0	0	Bethlehem Twp	Hunterdon



STATE OF NEW JERSEY 2024 ALL-HAZARD MITIGATION PLAN

Site Name	Mine Type	Begin Date	End Date	Location	County
Unnamed	Iron	0	0	Alexandria Twp	Hunterdon
Unnamed	Iron	0	0	Alexandria Twp	Hunterdon
Unnamed	Iron	0	0	Bethlehem Twp	Hunterdon
Unnamed	Iron	0	0	Bethlehem Twp	Hunterdon
Unnamed	Iron	0	0	Bethlehem Twp	Hunterdon
Unnamed	Iron	0	0	Bethlehem Twp	Hunterdon
Unnamed	Iron	0	0	Bethlehem Twp	Hunterdon
Swayze Mine	Iron	1868	1889	Bethlehem Twp	Hunterdon
Swayze Mine	Iron	1868	1889	Bethlehem Twp	Hunterdon
Swayze Mine	Iron	1868	1889	Bethlehem Twp	Hunterdon
Swayze Mine	Iron	1868	1889	Bethlehem Twp	Hunterdon
Swayze Mine	Iron	1868	1889	Bethlehem Twp	Hunterdon
Unnamed	Iron	0	0	Bethlehem Twp	Hunterdon
Unnamed	Iron	0	0	Bethlehem Twp	Hunterdon
Unnamed	Iron	0	0	Bethlehem Twp	Hunterdon
Swayze Mine	Iron	1868	1889	Bethlehem Twp	Hunterdon
Unnamed	Iron	0	0	Bethlehem Twp	Hunterdon
Unnamed	Iron	0	0	Bethlehem Twp	Hunterdon
Unnamed	Iron	0	0	Bethlehem Twp	Hunterdon
Swayze Mine	Iron	1868	1889	Bethlehem Twp	Hunterdon
Wild Cat Mine	Iron	1876	1880	Bethlehem Twp	Hunterdon
Wild Cat Mine	Iron	1876	1880	Bethlehem Twp	Hunterdon



STATE OF NEW JERSEY 2024 ALL-HAZARD MITIGATION PLAN

Site Name	Mine Type	Begin Date	End Date	Location	County
Unnamed	Iron	0	0	Bethlehem Twp	Hunterdon
Unnamed	Iron	0	0	Bethlehem Twp	Hunterdon
Unnamed	Iron	0	0	Bethlehem Twp	Hunterdon
Unnamed	Iron	0	0	Bethlehem Twp	Hunterdon
Unnamed	Iron	0	0	Bethlehem Twp	Hunterdon
Unnamed	Iron	0	0	Holland Twp	Hunterdon
Unnamed	Iron	0	0	Holland Twp	Hunterdon
Unnamed	Iron	0	0	Pohatcong Twp	Warren
Unnamed	Mica	0	0	Harmony Twp	Warren
Silver Spring Mine	Iron	1882	0	Mount Arlington	Morris
Unnamed	Iron	0	0	Bethlehem Twp	Hunterdon
Miller Mine	Iron	1871	1879	Bethlehem Twp	Hunterdon
Miller Mine	Iron	1871	1879	Bethlehem Twp	Hunterdon
High Bridge Mines	Iron	1720	1889	High Bridge Boro	Hunterdon
Kean Mine	Iron	1875	1885	High Bridge Boro	Hunterdon
Kean Mine	Iron	1875	1885	High Bridge Boro	Hunterdon
Readingsburgh Mine	Graphite	0	0	Clinton Twp	Hunterdon
Beavers Farm Mine	Graphite	0	0	High Bridge Boro	Hunterdon
Hackett Mine	Graphite	0	0	High Bridge Boro	Hunterdon
Unnamed	Iron	0	0	Lebanon Twp	Hunterdon
Unnamed	Iron	0	0	Lebanon Twp	Hunterdon
Unnamed	Iron	0	0	Lebanon Twp	Hunterdon



STATE OF NEW JERSEY 2024 ALL-HAZARD MITIGATION PLAN

Site Name	Mine Type	Begin Date	End Date	Location	County
Unnamed	Iron	0	0	Lebanon Twp	Hunterdon
Van Syckle's Mine	Iron	1770	1875	Bethlehem Twp	Hunterdon
Eveland Mine	Iron	1880	0	Glen Gardner	Hunterdon
Alvah Gray	Iron	1873	1880	Lebanon Twp	Hunterdon
Banghart Mine	Iron	1868	1880	Lebanon Twp	Hunterdon
Banghart Mine	Iron	1868	1880	Lebanon Twp	Hunterdon
Banghart Mine	Iron	1868	1880	Lebanon Twp	Hunterdon
Banghart Mine	Iron	1868	1880	Lebanon Twp	Hunterdon
Banghart Mine	Iron	1868	1880	Lebanon Twp	Hunterdon
Unnamed	Iron	0	0	Clinton Twp	Hunterdon
Unnamed	Iron	0	0	Harmony Twp	Warren
Unnamed	Iron	0	0	Harmony Twp	Warren
Marble Mt. Mine	Iron	1860	1887	Lopatcong Twp	Warren
Marble Mt. Mine	Iron	1860	1887	Lopatcong Twp	Warren
Marble Mt. Mine	Iron	1860	1887	Lopatcong Twp	Warren
Asbury	Iron	1854	1879	Bethlehem Twp	Hunterdon

Source: NJDEP, 2018



B.5 WILDFIRE FUEL AND RISK

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