Section 5. Risk Assessment

5.12 Wildfire

For the 2014 Plan update, the wildfire hazard profile and vulnerability assessment were significantly enhanced to include updated, best-available data. Information was integrated from the New Jersey Forest Fire Service (NJFFS) including locational information, risk, and past occurrences. Detailed descriptions of past incidents were added to the profile, which includes information from the National Weather Service (NWS) and the NJFFS. The vulnerability assessment assesses vulnerability and estimates potential losses by jurisdiction and to State facilities. This information can be used by both the State agencies in developing mitigation strategies, as well as local jurisdictions as they develop their mitigation plans.

5.12.1 Profile

Hazard Description

A wildland fire can be defined as any non-structural fire that occurs in the wildland. Three distinct types of wildland fires have been defined and include wildfire naturally occurring wildfire, human-caused wildfire, and prescribed fire. Many of these are highly destructive and can be very uncontrollable. They occur in forested, semi-forested, or less developed area. Wildland fires can be caused by lightning, human carelessness, and arson. Most frequently, wildland fires in the State of New Jersey are caused by humans. Wildland fires can be naturally occurring—such as those ignited when lightning or wind-falling trees collide with power lines—or caused by humans, which is the primary cause of all types of fires. Wildfires result in the uncontrolled destruction of forests, brush, field crops, grasslands, real estate, and personal property, and have secondary impacts on other hazards such as flooding, by removing vegetation and destroying watersheds.

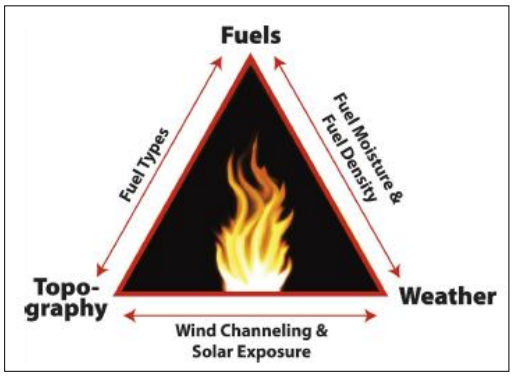
New Jersey's high population density has created land use pressures in which more people are moving from urban areas to build homes in rural wildland areas. With more people living in the State's wildlands, the number of fires started could increase. A potentially explosive combination is created when hazardous wildland fuels interface home development, and an increased risk of human-caused ignition come together under extreme fire weather conditions.

The height of wildland fire season in New Jersey is typically considered the spring (March through May) and typically culminates in early May, corresponding with the driest live fuel moisture periods of the year. Although the spring months are the most severe, the summer and fall months may also experience extensive fires in the State. While the spring season is historically the period in which wildfire danger is the highest, wildland fires can occur every month of the year. Drought, snow pack, and local weather conditions can expand the length of the fire season. The early and late shoulders of the fire season usually are associated with human-caused fires. Lightning generally is the cause of most fires in the peak season.

In the State of New Jersey, an average of 1,500 wildfires damage or destroy 7,000 acres of the State's forests. Wildfires not only damage woodlands, but could threaten homeowners who live within or adjacent to forest environments. From January 1, 2012 to September 2, 2013, 668 wildfires occurred in New Jersey, burning approximately 930 acres (NJFFS 2013).

Fire Ecology and Wildfire Behavior

The "wildfire behavior triangle" illustrates how three primary factors influence wildfire behavior: fuel, topography, and weather. Each point of the triangle represents one of the three factors; the sides represent the interplay between the factors. For example, drier and warmer weather combined with dense fuel loads and steeper slopes will cause more hazardous fires than light fuels on flat ground.



A fire needs all of the following three elements in the right combination to start and grow: a heat source, fuel, and oxygen. The growth of the fire primarily depends on the characteristics of available fuel, weather conditions, and terrain, and climate change is also considered a potential source of influence. These four factors are described below:

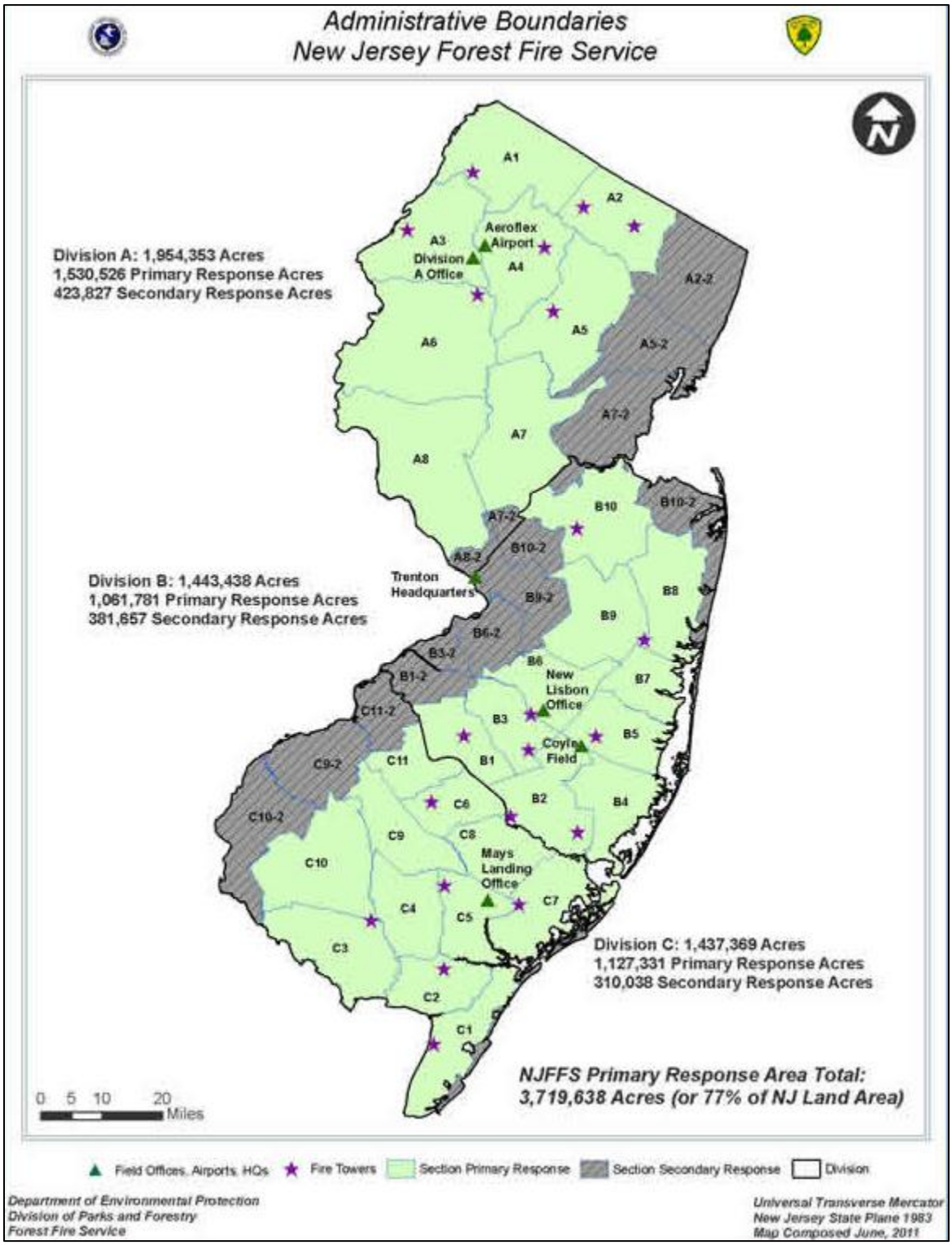
- Fuel
  - Lighter fuels such as grasses, leaves, and needles quickly expel moisture and burn rapidly, while heavier fuels such as tree branches, logs, and trunks take more time to warm and ignite.
  - Snags and hazard trees–especially those that are diseased, dying, or dead—are quickly engulfed and allow fires to spread quickly.
- Weather
  - Strong winds within the vicinity of the flames produce extreme fire conditions. Of particular concern are wind events that potentially persist for longer periods of time, or ones with significant wind speeds, which can sustain and quickly promote the spread of fire through movement of embers or exposure within tree crowns.
  - Spring and summer drying months, many of which maintain drought-like conditions extending beyond the normal season, also expand the average fire season. Likewise, the passage of a dry, cold front through the region can result in a sudden increase in wind speeds and a change in wind direction affecting fire spread.
  - Thunderstorm activity, which typically begins with wet storms, turns dry with little or no precipitation reaching the ground as the seasons progress.
- Terrain
  - Topography of a region or local area influences the amount and moisture of fuel.
  - Barriers such as highways and lakes can affect the spread of fire.
  - Elevation and slope of landforms affect fire spread, and flames move more easily uphill than downhill.
- Changes to Environment
  - Without an increase in summer precipitation (greater than any predicted by climate models), areas susceptible to future burning are very likely to increase.
  - Infestation from insects is also of concern as it may impact forest health. Potential insect populations may increase with warmer temperatures as a result of warmer temperatures. Infested, stressed trees increase fuel amount.
  - Tree species composition will change as species respond uniquely to a changing climate.
  - Wildfires cause both short-term and long term losses. Short-term losses can include destruction of timber, wildlife habitat, scenic vistas, and watersheds. Long-term effects include smaller

timber harvests, reduced access to affected recreational areas, and the destruction of cultural and economic resources and community infrastructure.

NJFFS, a division of the New Jersey Department of Environmental Protection (NJDEP), is responsible for protecting the 3.25 million acres of wildland in the State. NJFFS is under the direction of the State firewarden and is headquartered in Trenton. NJFFS has 85 full-time employees that provide an array of services including staffing the State's 21 fire towers, which are operational during the months of March, April, May, October, and November.

NJFFS divides the State into three regions (Northern, Central, Southern) each totaling about 1,250,000 acres. There are 29 125,000 acre sections with a dedicated forest fire warden in each; and 269 districts each consisting of 15,000-20,000 acres In total, 29 section forest fire wardens, 269 district forest fire wardens and 2,000 trained crew members respond to fires on an as-needed basis (NJFFS 2013). Figure 5.12-1 illustrates the NJFFS region divisions within the State.

Figure 5.12-1. Fire Divisions of New Jersey



Source: NJDEP 2013

Location

The ecosystems that are most susceptible to the hazard are pitch pine, scrub oak, and oak forests. These are the vegetative fuels that are the most flammable.

In New Jersey's north, northern hardwood, white pine, eastern hemlock, mixed oak, and a variety of other species including isolated stands of red spruce are part of the forest composition. The oak/hickory-type group is, and has been, the most common-type forest in New Jersey. This group makes up nearly half of New Jersey's forested area. This forest contains many mast-producing species that provide important forage for wildlife.

While wildfires in other parts of the State rarely attain the intensity as found in the Pine Barrens, northern New Jersey fires spread rapidly in dry leaf litter and downed, gypsy moth-killed hardwoods. Slope becomes a significant factor in both the spread and the difficulty in suppressing these fires. These higher intensity fires, or those fires that burn during drought conditions, consume the soil organic layers and can be damaging to the relatively thin-barked trees. Adding to the temperature intensity are the various species of rhododendron and laurel that are found on soils with high iron content.

Especially on the Outer Coastal Plain, soils tend to be sandier, more drought-prone, and lower in many plant nutrients. Differences in these edaphic factors–especially limitations in available soil moisture—are ultimately responsible for the much of the unique vegetation in the region. Despite the fact that, like the rest of the State, our Pinelands average over 42 inches of rain-equivalent per-year, upland plant communities are all dominated by xeriphytic species adapted to establishment, growth, and reproduction in drought-prone sites (NJFFS 2013).

New Jersey Pinelands and Pine Barrens

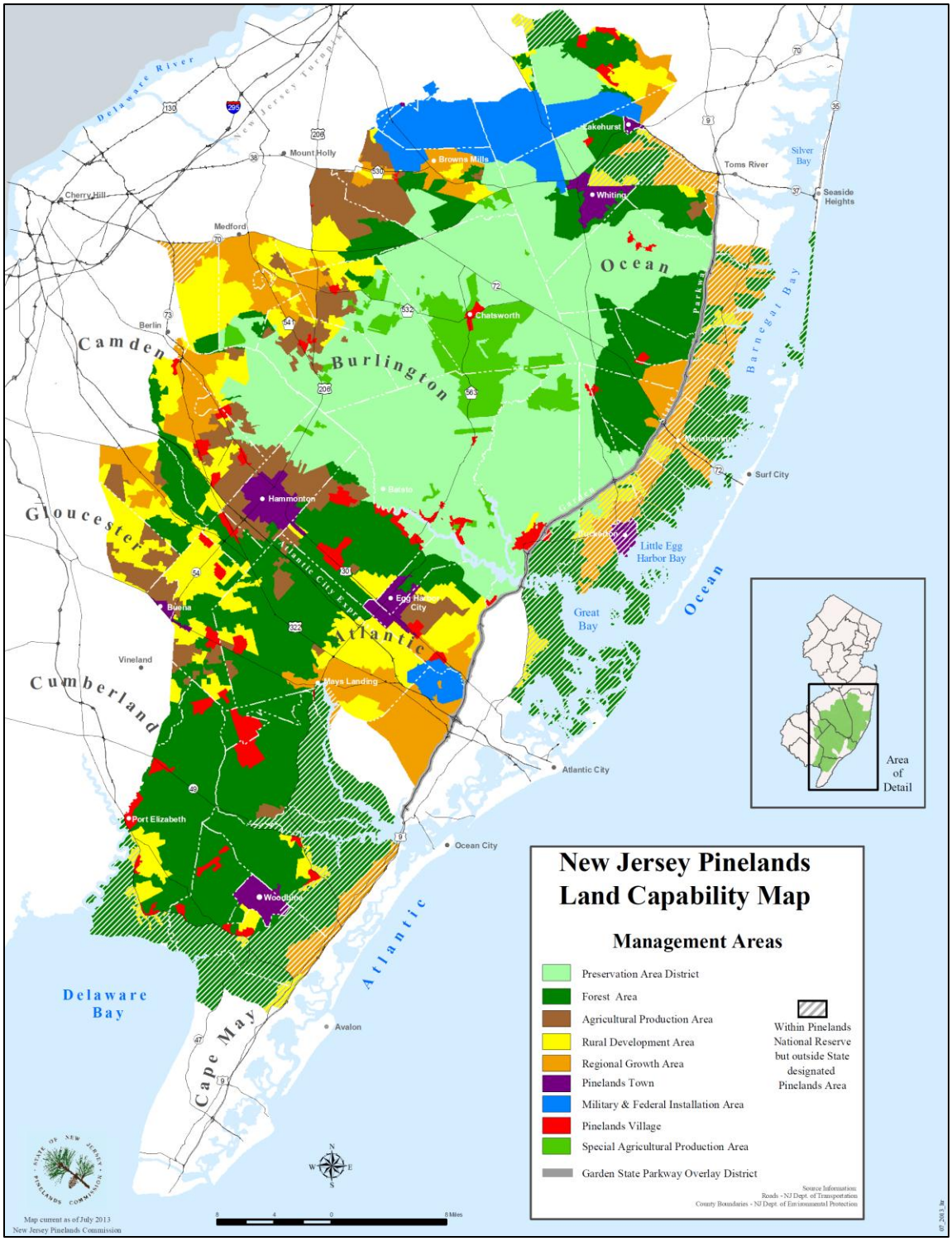
The New Jersey Pinelands is a fire-adapted forest ecosystem that depends on wildfire for reproduction and the control of fuel buildup. This forest community is one of the most hazardous wildland fuel types in the nation. Pinelands fires burn extremely hot and spread rapidly. New Jersey has a high population density and more people are moving from urban areas to build homes in rural wildland areas. With more people living in and enjoying the State's wildlands for various forms of recreation, the number of potential fire starts and the seriousness of their consequences increases. A potentially explosive combination is created when hazardous wildland fuels, home development, and an increased risk of human-caused ignition come together under extreme fire weather conditions.

The New Jersey Pine Barrens are characterized by low, dense forests of pine and oak, ribbons of cedar and hardwood swamps bordering drainage courses, pitch pine lowlands, and bogs and marshes combined to produce an expansive vegetative mosaic unsurpassed in the northeastern United States. The Pine Barrens was recognized as a nationally and internationally important ecological region when, in 1978, Congress created the Pinelands National Reserve, the United States' first National Reserve and a United States Biosphere Reserve of the Man and the Biosphere Program. The Pinelands National Reserve encompasses approximately 1.1 million acres statewide, occupying 22% of New Jersey's land area and covering portions of seven counties and all or parts of 56 municipalities. It is the largest area of open space on the Mid-Atlantic seaboard between Richmond and Boston, and is underlain by aquifers containing 17 trillion gallons of some of the purest water in the region. Through the creation of the Pinelands Commission, the State of New Jersey formed the necessary partnerships to preserve, protect, and enhance the natural and cultural resources of the Pinelands (NJDEP 2010).

The Pinelands are divided into nine land-use management areas, shown on Figure 5.12-2. The New Jersey Pinelands Commission describes the nine land-use management areas below:

- The **Preservation Area District** is 288,300 acres in the heart of the Pinelands environment and is the most critical ecological region. It is a large, contiguous wilderness-like area of forest that supports diverse plant and animal communities, including many threatened and endangered species. There is no residential development except for one 1-acre lot in an infill area (2,072 acres in size) and special cultural housing exceptions on minimum 3.2-acre lots for properties owned prior to 1979.
- The **Special Agricultural Production Area** covers 40,300 acres and is primarily used for berry agriculture and horticulture of native Pinelands plants. Only residential farm-related housing on 40 acres and expansion of existing non-residential uses permitted.
- The Forest Area of the Pinelands covers 245,500 acres. It is a largely undeveloped area and contains high-quality water resources and wetlands that provides suitable habitat for many threatened and endangered species. Permitted residential densities average one home for every 28 acres.
- The **Agricultural Production Area** covers 68,500 acres and is dedicated to active agricultural use. Farm-related housing on 10 acres and non-farm housing on 40 acres are allowed. Permitted non-residential uses are agricultural commercial and roadside retail within 300 feet of pre-existing commercial uses.
- The **Rural Development Area** covers 112,500 acres and is a transitional area that balances environmental and development values between conservation and growth areas. Limited, low-density development and roadside retail is permitted. Residential densities average one home per every 5 acres.
- The **Military and Federal Installation Area** covers 46,000 acres and is an area of federal enclaves within the Pinelands. Permitted uses are those associated with function of the installation or other public purpose uses.
- **Pinelands Villages** include 24,200 acres and 47 small, existing, spatially discrete settlements that are appropriate for infill residential, commercial and industrial development compatible with their existing character. Residential development is permitted on minimum 1-acre lots if not sewered.
- **Pinelands Towns** include 21,500 acres and six large, existing spatially discrete settlements. Residential development is permitted on minimum 1-acre lots if not sewered and two to four homes per acres with sewers. Commercial and industrial uses are also permitted.
- The **Regional Growth Area** covers 77,200 acres and is an area of existing growth. The adjacent undeveloped lands are capable of accommodating regional growth influences while protecting the essential character and environment of the Pinelands. Residential development is approximately three homes per acre with sewers. Commercial and industrial uses are also permitted.

Figure 5.12-2. Pinelands Management Areas



Source: New Jersey Pinelands Commission 2012

Extent

The extent (that is, magnitude or severity) of wildfires depends on weather and human activity. NJFFS uses two indices to measure and monitor dryness of forest fuels and the possibility of fire ignitions becoming wildfires. These indices include the National Fire Danger Rating System's Buildup Index, and the Keetch-Byram Drought Index. Both are used for fire preparedness planning, which includes the following: campfire and burning restrictions, fire patrol assignments, staffing of fire lookout towers, and readiness status for both observation and firefighting aircraft.

- The **Buildup Index (BUI)** is a number that reflects the combined cumulative effects of daily drying and precipitation in fuels with a 10-day time lag constant. The BUI can represent three to four inches of compacted litter or can represent up to six inches or more of loose litter (North Carolina Forest Service 2009).
- The **Keetch-Byram Drought Index (KBDI)** is a drought index designed for fire potential assessment as defined by the United States Department of Agriculture Forest Service. It is a number representing the net effect of evapotranspiration and precipitation in producing cumulative moisture deficiency in deep duff and upper soil layers. The index increases each day without rain and decreases when it rains. The scale ranges from zero (no moisture deficit) to 800 (maximum drought possible). The Florida Forest Service states that the range of the index is determined by assuming that 8 inches of moisture in a saturated soil is readily available to the vegetation. For different soil types, the depth of soil required to hold eight inches of moisture varies. A prolonged drought influences fire intensity, largely because more fuel is available for combustion. The drying of organic material in the soil can lead to increased difficulty in fire suppression.

Several tools are available to estimate fire potential, extent, danger and growth, including (but not limited to) the following:

- **Wildland/Urban Interface (WUI)** is the area where houses and wildland vegetation coincide. Interface neighborhoods are found all across the United States, and include many of the sprawling areas that grew during the 1990s. Housing developments alter the structure and function of forests and other wildland areas. The outcomes of the fire in the WUI are negative for residents; some may only experience smoke or evacuation, while others may lose their homes to a wildfire. All states have at least a small amount of land classified as WUI. To determine the WUI, structures per acre and population per square mile are used. Across the United States, 9.3% of all land is classified as WUI. The WUI in the area is divided into two categories: intermix and interface. Intermix areas have more than one house per 40 acres and have more than 50% vegetation. Interface areas have more than one house per 40 acres, have less than 50% vegetation, and are within 1.5 miles of an area over 1,235 acres that is more than 75% vegetated (Stewart et al. 2006).

  Concentrations of WUI can be seen along the east coast of the United States, where housing density rarely falls below the threshold of one housing unit per 40 acres and forest cover is abundant. In the mid-Atlantic and north central regions of the United States, the areas not dominated by agriculture have interspersed WUI and low density vegetated areas. Areas where recreation and tourism dominate are also places where WUI is common, especially in the northern Great Lakes and Missouri Ozarks (Stewart et al. 2006).

- **Wildland Fire Assessment System (WFAS)** is an Internet-based information system that provides a national view of weather and fire potential, including national fires danger, weather maps and satellite-derived "greenness" maps. As per the USFS, the WFAS was developed by the Fire Behavior

unit at the Fire Sciences Laboratory in Missoula, Montana, and is currently supported and maintained at the National Interagency Fire Center (NIFC) in Boise, Idaho.

As per the NWS, each day during the fire season, national maps of selected fire weather and fire danger components of the National Fire Danger Rating System (NFDRS) are produced by the WFAS. The USFS indicates that the Fire Danger Rating level takes into account current and antecedent weather, fuel types, and both live and dead fuel moisture. This information is provided by local station managers. Table 5.12-1 describes the fire danger ratings and color codes.

Table 5.12-1. Fire Danger Rating and Color Code

Fire Danger Rating and Color Code	Description
Low (L) (Dark Green)	Fuels do not ignite readily from small firebrands although a more intense heat source, such as lightning, may start fires in duff or punky wood. Fires in open cured grasslands may burn freely a few hours after rain, but woods fires spread slowly by creeping or smoldering, and burn in irregular fingers. There is little danger of spotting.
Moderate (M) (Light Green or Blue)	Fires can start from most accidental causes, but with the exception of lightning fires in some areas, the number of starts is generally low. Fires in open cured grasslands will burn briskly and spread rapidly on windy days. Timber fires spread slowly to moderately fast. The average fire is of moderate intensity, although heavy concentrations of fuel, especially draped fuel, may burn hot. Short-distance spotting may occur, but is not persistent. Fires are not likely to become serious and control is relatively easy.
High (H) (Yellow)	All fine dead fuels ignite readily and fires start easily from most causes. Unattended brush and campfires are likely to escape. Fires spread rapidly and short-distance spotting is common. High-intensity burning may develop on slopes or in concentrations of fine fuels. Fires may become serious and their control difficult unless they are attacked successfully while small.
Very High (VH) (Orange)	Fires start easily from all causes and, immediately after ignition, spread rapidly and increase quickly in intensity. Spot fires are a constant danger. Fires burning in light fuels may quickly develop high-intensity characteristics such as long-distance spotting and fire whirlwinds when they burn into heavier fuels.
Extreme (E) (Red)	Fires start quickly, spread furiously, and burn intensely. All fires are potentially serious. Development into high-intensity burning will usually be faster and occur from smaller fires than in the very high fire danger class. Direct attack is rarely possible and may be dangerous except immediately after ignition. Fires that develop headway in heavy slash (trunks, branches, and tree tops) or in conifer stands may be unmanageable while the extreme burning condition lasts. Under these conditions the only effective and safe control action is on the flanks until the weather changes or the fuel supply lessens.

Source: USFS 2014

- The **Fire Potential Index (FPI)** is derived by combining daily weather and vegetation condition information and can identify the areas most susceptible to fire ignition. The combination of relative greenness and weather information identifies the moisture condition of the live and dead vegetation. The weather information also identifies areas of low humidity, high temperature, and no precipitation to determine which areas are most susceptible to fire ignition. The FPI enables local and regional fire planners to quantitatively measure fire ignition risk (USGS 2005). The United States Forest Service provides FPI maps on a daily basis. The scale ranges from 0 (low) to 100 (high). The calculations used in the NFDRS are not part of the FPI, except for a 10-hour moisture content (Burgan et al. 2000).

- **Fuel Moisture (FM)** content is the quantity of water in a fuel particle expressed as a percent of the oven-dry weight of the fuel particle. The NWS indicates that the FM content is an expression of the cumulative effects of past and present weather events and must be considered in evaluating the effects

of current or future weather on fire potential. FM is computed by dividing the weight of the "water" in the fuel by the oven-dry weight of the fuel and then multiplying by 100 to get the percent of moisture in a fuel.

NOAA states that there are two kinds of FM: live and dead. Live FM is much slower to respond to environmental changes and is most influenced by things such as a long drought period, natural disease and insect infestation, annuals curing out early in the season, timber harvesting, and changes in the fuel models caused by being blown down from windstorms and ice storms. Dead FM is the moisture in any cured or dead plant part, whether attached to a still-living plant or not. Dead fuels absorb moisture through physical contact with water (such as rain and dew) and absorb water vapor from the atmosphere. The drying of dead fuels is accomplished by evaporation. These drying and wetting processes of dead fuels are such that the moisture content of these fuels is strongly affected by fuel sizes, weather, topography, decay classes, fuel composition, surface coatings, fuel compactness, and arrangement (Schroeder and Buck 1970).

Fuels are classified into four categories that respond to changes in moisture. This response time is referred to as a time lag. A fuel's time lag is proportional to its diameter and is loosely defined as the time it takes a fuel particle to reach two-thirds of its way to equilibrium with its local environment. The four categories include:

- 1-hour fuels: up to 0.25-inch diameter – fine, flashy fuels that respond quickly to weather changes. Computed from observation time, temperature, humidity, and cloudiness.
- 10-hour fuels: 0.25-inch to 1-inch diameter - computed from observation time, temperature, humidity, and cloudiness or can be an observed value.
- 100-hour fuels: 1-inch to 3-inch diameter - computed from 24-hour average boundary condition composed of day length (daylight hours), hours of rain, and daily temperature/humidity ranges
- 1,000-hour fuels: 3-inch to 8-inch diameter - computed from a seven-day average boundary condition composed of day length, hours of rain, and daily temperature/humidity ranges (National Park Service 2013)

- The **Haines Index**, also known as the Lower Atmosphere Stability Index, is a fire-weather index based on stability and moisture content of the lower atmosphere that measures the potential for existing fires to become large fires. It is named after its developer, Donald Haines, a Forest Service research meteorologist, who did the initial work and published the scale in 1988 (Storm Prediction Center [SPC] 2014).

  The Haines Index can range between two and six. The drier and more unstable the lower atmosphere is, the higher the index. It is calculated by combining the stability and moisture content to the lower atmosphere into a number that correlates well with large fire growth. The stability term is determined by the temperature difference between two atmospheric layers; the moisture term is determined by the temperature and dew point difference. The index has shown to correlate with large fire growth on initiating and existing fires where surface winds do not dominate fire behavior (USFS 2014). The Haines Index levels are described below:

  - Very Low Potential (2) – moist, stable lower atmosphere
  - Very Low Potential (3)
  - Low Potential (4)

- Moderate Potential (5)
- High Potential (6) – dry, unstable lower atmosphere (USFS 2014)

The SPC states that the Haines Index is intended to be used all over the United States. It is adaptable for three elevation regimes: low elevation, middle elevation, and high elevation. Low elevation is for fires at or very near sea level. Middle elevation is for fires burning in the 1,000 to 3,000 feet in elevation range. High elevation is intended for fires burning above 3,000 feet in elevation.

New Jersey Wildfire Fuel Hazard

NJFFS, a division of NJDEP, has developed Wildfire Fuel Hazard data for the State based upon NJDEP's 2002 Land Use/Land Cover (LU/LC) datasets and NJDEP's 2002 10-meter Digital Elevation Grid datasets. NJFFS took the NJDEP Modified Anderson Land Use/Land Cover Classification System 2002 and assigned Wildfire Fuel Hazard Rankings to it. NJFFS used NJDEP's 2002 10-meter Digital Elevation Grids and calculated areas of 30% or greater slope throughout New Jersey. For areas of Wildfire Fuel Hazard one to four (i.e. Low to Very High) that were coincident with areas of 30% or greater slope, the Wildfire Fuel Hazard Ranking was increased by one value (i.e. Low was increased to Moderate, Moderate to High, etc.). For areas of Wildfire Fuel Hazard zero, and five through eight, the Wildfire Fuel Hazard Ranking remained the same. Once the LU/LC was coded according to Wildfire Fuel Hazard, taking into account 30% or greater slopes, the data were divided by county. The project was completed in May 2009. Refer to Appendix T which contains a map for each County depicting their fire risk.

Previous Occurrences and Losses

There are a number of early accounts and newspaper stories of fires burning thousands of acres of New Jersey woodlands, causing extensive damage to improved property and untold loss of life. One such account from 1755 reports a fire 30 miles long between Barnegat and Little Egg Harbor. In 1895, John Gifford reported to the State geologist that 49 fires burned 60,000 acres in Burlington, Atlantic, and Ocean Counties. Other early surveys, including those from 1872 and 1885, indicate that as many as 100,000 to 130,000 acres burned annually in the Pine Barrens region alone.

Many sources provided historical information regarding previous occurrences and losses associated with wildfire events throughout the State of New Jersey. With so many sources reviewed for the purpose of this HMP, loss and impact information for many events could vary depending on the source. Therefore, the accuracy of monetary figures discussed is based only on the available information identified during research for this HMP. Table 5.12-2 outlines the history of wildfire events in New Jersey and includes only events that are considered major wildfires (burning a total of greater than 100 acres) or considered significant wildfires as indicated in the previous State HMP. Figure 5.12-3 illustrates the location of these wildfire events that occurred between 1924 and 2007 in the State of New Jersey, based on the best-available spatial data.

Table 5.12-2. Wildland Fire Incidents (1905 – 2012)

Date(s) of Event	Counties Affected	Acres Burned	Description
April 13, 1905	Various Locations	267,547	The worst year for forest fires on record in New Jersey. A huge fire in May of that year destroyed the town of Forked River.
April 19, 1905	Burlington	58,000	Five Civilian Conservation Corps fire fighters were killed fighting a forest fire near Bass River.
April 24, 1905	Ocean	Unknown	Huge fires destroyed 400 structures in the Lakewood and Lakehurst area.
March 21, 1929	Monmouth	125	Middletown Township
March 21, 1929	Middlesex	350	Monroe Township
March 22, 1929	Ocean	600	Lacey Township
April 2, 1929	Burlington	200	Washington Township
April 4, 1929	Burlington	300	Washington Township
May 11, 1929	Ocean	175	Jackson Township
May 12, 1929	Ocean	152	Manchester Township
May 17, 1929	Ocean	300	Brick Township
June 1, 1929	Ocean	3,456	Little Egg Harbor Township
July 7, 1929	Ocean	225	Lacey Township
July 12, 1929	Ocean	150	Manchester Township
July 16, 1929	Burlington	225	Woodland Township
July 18, 1929	Ocean	300	Lacey Township
April 24, 1936	Ocean	125	Berkeley Township
May 1, 1936	Ocean	120	Brick Township
May 2, 1936	Ocean	1,850	Stafford Township
May 9, 1936	Middlesex	200	Old Bridge Township
May 24, 1936	Burlington	470	Pemberton Township
April 19, 1937	Monmouth	190	Millstone Township
April 24, 1939	Burlington	135	Woodland Township
May 12, 1939	Burlington	130	Woodland Township
May 12, 1939	Burlington	676	Woodland Township

Date(s) of Event	Counties Affected	Acres Burned	Description
May 19, 1939	Monmouth	450	Atlantic Highlands Borough
May 19, 1939	Burlington	1,152	Bass River Township
November 16, 1939	Ocean	700	Manchester Township
March 25, 1940	Middlesex	155	Monroe Township
April 1, 1940	Ocean	275	Toms River Township
May 13, 1940	Ocean	245	Berkeley Township
June 6, 1940	Burlington	175	Washington Township
July 19, 1940	Ocean	125	Brick Township
April 13, 1941	Burlington	325	Southampton Township
April 14, 1941	Monmouth	2,180	Union Beach Borough - This fire was started in extremely low humidity after a prolonged dry spell with a strong wind from the west north-west. This fire was safely locked in by midnight on April 14, but was intentionally reset by incendiaries unknown on the morning of April 15, 1941.
April 15, 1941	Monmouth	250	Wall Township
April 15, 1941	Monmouth	1,500	Union Beach Borough
March 25, 1942	Monmouth	150	Wall Township
April 24, 1942	Middlesex	300	Sayreville Borough
April 25, 1942	Ocean	400	Toms River Township
April 26, 1942	Monmouth	100	Howell Township
April 26, 1942	Ocean	590	Berkeley Township - South side of Whitings Road, near Double Trouble. Two fires were set at the same time.
April 27, 1942	Ocean	1,570	Lacey Township - Double Trouble to Cedar Crest..
April 30, 1942	Middlesex	175	East Brunswick Township
May 5, 1942	Monmouth	200	Ocean Township
May 5, 1942	Ocean	1,375	Little Egg Harbor Township
April 5, 1943	Burlington	11,225	Bass River Township
April 10, 1943	Ocean	486	Manchester Township
April 29, 1943	Monmouth	300	Howell Township
May 6, 1943	Ocean	250	Jackson Township
May 7, 1943	Monmouth	550	Shrewsbury Township

Date(s) of Event	Counties Affected	Acres Burned	Description
May 7, 1943	Monmouth	580	Millstone Township
May 8, 1943	Monmouth	165	Howell Township
May 8, 1943	Monmouth	175	Wall Township
May 8, 1943	Ocean	250	Pt Pleasant Borough
May 8, 1943	Monmouth	1,220	Wall Township
May 8, 1943	Middlesex	1,525	Monroe Township
September 9, 1943	Burlington	125	Tabernacle Township
September 19, 1943	Burlington	175	Washington Township
December 20, 1943	Burlington	675	Washington Township
December 20, 1943	Burlington	700	Washington Township
December 20, 1943	Burlington	800	Shamong Township
April 7, 1944	Ocean	500	Toms River Township
April 14, 1944	Burlington	147	Pemberton Township
April 30, 1944	Burlington	858	Medford Township
May 1, 1944	Burlington	850	Washington Township
May 6, 1944	Monmouth	350	Howell Township
July 11, 1944	Ocean	371	Manchester Township
July 24, 1944	Monmouth	115	Union Beach Borough
August 30, 1944	Ocean	800	Manchester Township
1954	Burlington	20,000	A fire starting in Moore's Meadows threatened the town of Chatsworth.
1955	Ocean	Unknown	Section Firewarden George Herbert was killed during an Easter Sunday fire in Ocean County when his power wagon was burned by the fire.
April 20 - 21, 1963	Various Locations	193,000	A series of 37 major fires burned on April 20-22. In the process, 186 homes and 197 outbuildings were burned, seven people were killed, and $8.5 million in property damage was caused. One fire burned 76,000 acres, traveling 21 miles from New Lisbon to the Garden State Parkway.
1971	Ocean	21,000	The Manahawkin Fire burned 21,000 acres in seven hours and 13 minutes.
March 31, 1977	Atlantic, Bergen, Ocean	15,000	A 15,000-acre fire on March 31 burned six homes and caused extensive damage in Burlington, Ocean, and Atlantic Counties. On July 22, a 2,300-acre fire in Bass River State Forest killed four firefighters from Eagleswood Volunteer Fire Department and forced the evacuation of the Bass River Recreation Area.

Date(s) of Event	Counties Affected	Acres Burned	Description
April 7, 1991	Burlington	505	Tabernacle Township
April 11, 1991	Atlantic	200	Buena Vista Township
May 12, 1991	Atlantic	400	Egg Harbor Township
April 8, 1992	Salem	250	Elmer Borough
May 2, 1992	Salem	101	Elmer Borough
May 3, 1992	Camden	210	Waterford Township
May 3, 1992	Burlington	2,900	Woodland Township
May 3, 1992	Ocean	4,832	Jackson Township
May 23, 1992	Ocean	1,000	Pine Beach Borough
June 13, 1992	Ocean	5,284	Jackson Township
June 13, 1992	Ocean	14,000	A series of four major fires burned 14,000 acres on May 3. A 4,800-acre fire in Lacey Township, Ocean County, threatened and closed down the Oyster Creek Nuclear Power Plant. A 2,900-acre fire in Woodland Township, Burlington County, destroyed one home and threatened 100 others. On June 13, a 5,400-acre fire burned through Lacey Township.
August 4, 1993	Ocean	120	Pine Beach Borough
April 19, 1994	Burlington	223	Bass River Township
April 24, 1994	Atlantic	100	Bunea Vista Township
April 24, 1994	Sussex	500	Sandyston Township
June 12, 1994	Ocean	145	Jackson Township
June 20, 1994	Ocean	140	Pine Beach Borough
March 18, 1995	Salem	100	Elsinboro Township
April 4, 1995	Ocean	19,225	On April 4, a wind-driven 19,225-acre fire burned through Manchester, Lacey, and Ocean Townships in Ocean County, threatening the Wynnewood and Bamber Lake communities.
May 7, 1995	Atlantic	115	Estell Manor City
June 1, 1995	Hunterdon	325	Union Township
August 24, 1995	Ocean	200	Lavallette Township
August 31, 1995	Warren	750	No reference and/or no damage reported.
February 26, 1997	Burlington	100	Washington Township
July 18, 1997	Ocean	150	Long Beach Township

Date(s) of Event	Counties Affected	Acres Burned	Description
July 19, 1997	Ocean	702	Long Beach Township
July 19, 1997	Ocean	2,700	On July 19, the 800-acre Wrangle Brook wildfire damaged 52 homes and threatened over 300 additional Ocean County homes. Later that month, on July 29, the 1,900 Rockwood II wildfire threatened the Batsto Historic Site and 80 Atlantic County homes.
July 29, 1997	Atlantic	1,900	Hammonton Town
November 6, 1997	Morris	350	Parsippany Township
April 1, 1999	Middlesex	100	Sayreville Borough
April 1, 1999	Warren	623	Hardwick Township
April 1, 1999	Burlington	11,765	Bass River Township
April 30, 1999	Burlington	11,975	On April 30, the Bass River fire burned 11,975 acres and threatened Bass River State Forest.
May 1, 1999	Burlington	300	Woodland Township
July 1, 1999	Burlington	500	Shamong Township
January 18, 2000	Cape May	158	Lower Township
March 5, 2000	Atlantic	Unknown	A fast-moving brush fire, exacerbated by strong gusty northwest winds, forced the evacuation of an apartment complex in Somers Point and the closure of the Garden State Parkway for 80 minutes.
March 7, 2000	Burlington	150	Medford Township
April 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.
May 4, 2000	Camden	110	Pine Hill Borough
April 25, 2001	Camden	120	Waterford Township
April 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.
April 28, 2001	Middlesex	151	Metuchen Borough
April 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.
April 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

Date(s) of Event	Counties Affected	Acres Burned	Description
			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.
May 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.
June 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.
March 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.
March 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.
April 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.
June 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.
June 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.
June 20, 2002	Ocean County	1,200	On June 20, the Jakes Branch Fire destroyed one home with additional property damage exceeding $1 million dollars.
August 15, 2002	Ocean	2,600	Pine Beach Borough
August 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

Date(s) of Event	Counties Affected	Acres Burned	Description
			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.
April 16, 2003	Camden	343	Waterford Township
March 20, 2004	Cape May	125	Middle Township
June 20, 2004	Ocean	125	Lavallette Township
June 21, 2004	Morris	225	Washington Township
July 3, 2004	Salem	125	Pilesgrove Township
July 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.
August 10, 2004	Cape May	225	Upper Township
March 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.
April 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.
April 20, 2005	Camden	325	Waterford Township - Goshen Fire
June 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.
September 26, 2005	Gloucester	273	Logan Township
January 27, 2006	Middlesex	450	Edison Township - 40 cars, trucks, and trailers were destroyed.
March 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.
March 21, 2006	Burlington	136	Evesham Township
March 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.
March 27, 2006	Middlesex	104	Edison Township
March 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.

Date(s) of Event	Counties Affected	Acres Burned	Description
May 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.
May 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.
June 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.
August 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.
April 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.
September 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.
March 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.
April 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.
April 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.
March 20, 2010	Ocean	540	A wildfire consumed about 540 acres of brush and pine in the Brookville section of Barnegat Township until it was contained. The wildfire was located between New Jersey State Route 72 and West Bay Avenue. Homes between the Horizons Development on Old Brookville Road and Brookville Road were evacuated. A total of

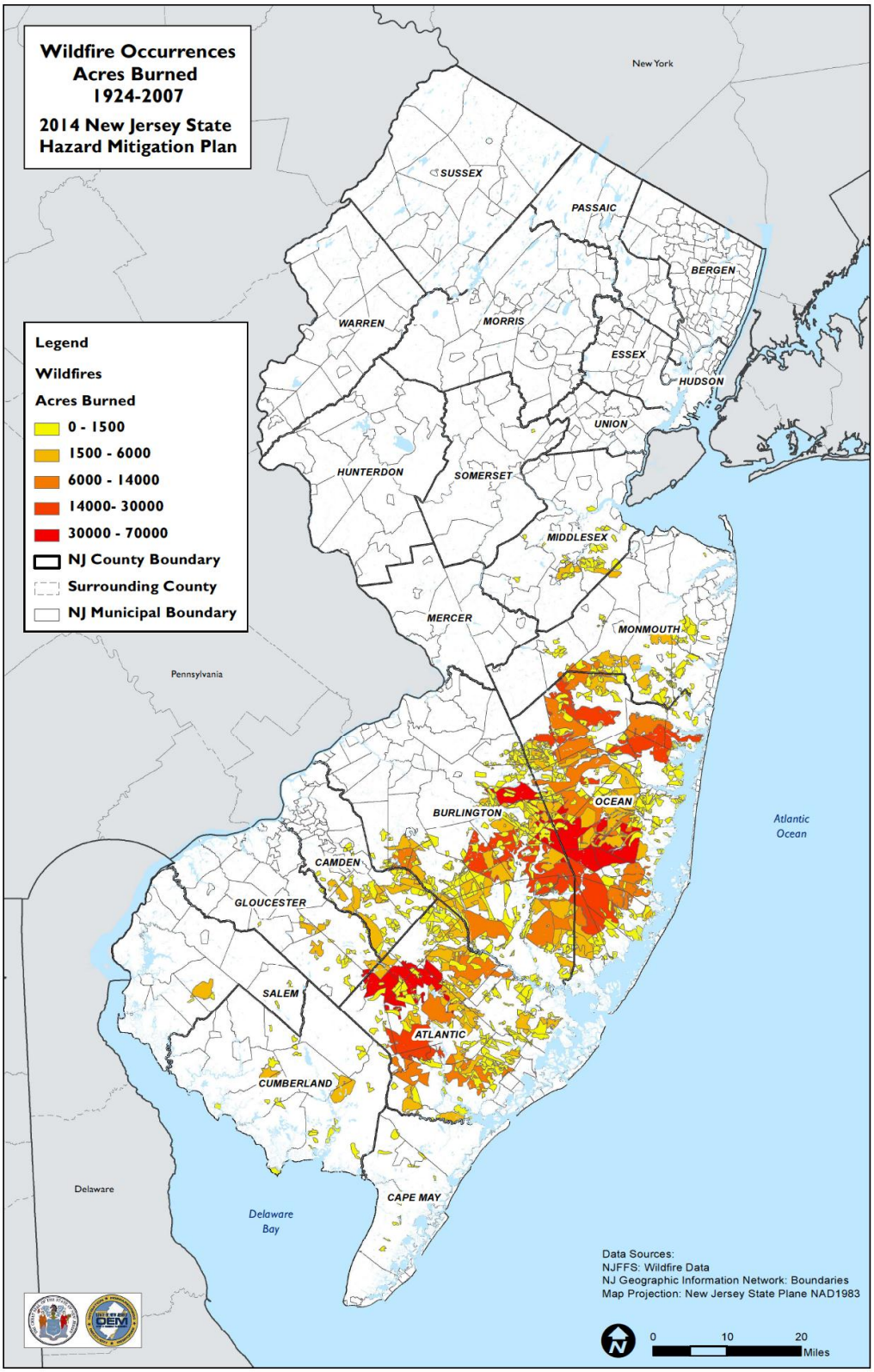
Date(s) of Event	Counties Affected	Acres Burned	Description
			67 children and 18 adults at the Joseph Citta Boy Scout Reservation were also evacuated, as were six people in the Long Beach Recreational Vehicle Park. The fire was totally contained at 5:30 p.m. EDT on March 21.
May 8, 2010	Burlington, Camden	100	Strong gusty west winds and dry weather during the past couple of days helped spread two wildfires in New Jersey on May 8. In Camden County, in Waterford Township, about 100 acres of forest were burned in Wharton State Forest. A smaller wildfire also occurred in Voorhees Township. In Pemberton Township, Burlington County, a 500-acre wildfire in the Brendan Byrne State Forest forced the closure of busy New Jersey State Route 70. No homes were damaged or injuries reported with either wildfire.
June 24, 2010	Ocean	890	A major brush fire damaged 890 acres in an isolated area in the Barnegat section of Stafford Township in Ocean County from June 24 -27. The wildfire started from a lightning strike of a pine tree on the 24th. It smoldered within the tree for about two days before it started to spread. It was first reported about 12:30 p.m. EDT on June 26. It was located south of New Jersey State Route 72 and west of County Route 539 near the Cedar Bridge sand and gravel plant. The fire forced the closure of several nearby roadways including County Route 539, but no evacuations occurred. There were about 30 homes near the fire. The swampy area where the wildfire occurred hindered firefighters, but also made it difficult for the fire to spread. Little to no wind in the area also helped keep the blaze from spreading faster. The recent unseasonably hot and dry weather helped fuel the fire. The fire was considered one hundred percent contained at 4:00 p.m. EDT on June 27. About 45 firefighters from both State and local jurisdictions battled the blaze. Firefighters used a helicopter, bulldozers, and fire engines to fight the blaze; some of the bulldozers were getting stuck in the swampy ground. No serious injuries were reported.
July 1, 2010	Ocean	4,000	A wildfire began on the south side of a weapons range at the McGuire-Fort Dix-Lakehurst Joint Military Base approximately 1.5 miles north of New Jersey State Route 70 near the Ocean and Burlington County border on June 28. The wildfire continued to burn until heavy rain fell on July 14. Approximately 4,000 acres were consumed.
July 25, 2010	Burlington	677	A lightning strike on July 25 started a wildfire within the Bass River State Forest in Burlington County. The wildfire occurred within a swampy area north of Dan Bridge Road in Bass River Township. The fire was first spotted on June 26 and caused the evacuation of about 22 families that were within the campsite and recreation area. Approximately 677 acres were consumed by the wildfire.
August 6, 2010	Warren	250	A wildfire near Sunfish Pond in the Worthington State Forest in the Delaware Water Gap National Recreational Area in Pahaquarry Township in Warren County consumed about 250 acres of scrub and hardwood forest before it was contained. The New Jersey Forest Fire Service contained the fire on August 10.
February 19, 2011	Cape May, Camden, Cumberland, Middlesex, Monmouth, Ocean	Unknown	The combination of the strong west-northwest winds, low humidity levels, and recent dry weather helped cause the rapid spread of wildfires across New Jersey during the day on February 19. In all, 10 wildfires were reported across the State. The largest and most stubborn wildfire started about 5:30 a.m. EST in a mulch pile near the Reliable Wood Products on Broadway Road in South Brunswick Township in Middlesex County. A total of 58 fire fighters from three counties and the New Jersey Forestry Service worked to extinguish the blaze by around 9:30 a.m. EST on February 19. In West Tuckerton (Ocean County), a wildfire consumed 20 acres before it was contained during the late afternoon of the 19th next to the Atlantis Golf Club. In Manalapan (Monmouth County), a brush fire reached 200 yards in length on Smithburg Road before it was contained. In Dennis Township (Cape May County), it took six fire departments 2 hours to contain a wildfire that started

Date(s) of Event	Counties Affected	Acres Burned	Description
			near a shed (destroyed it) and spread into nearby brush. Other wildfires were reported in Sayreville and Old Bridge in Monmouth County, Vineland in Cumberland County and Gloucester Township in Camden County.
June 9, 2011	Burlington	152	A lightning strike started a wildfire in Wharton State Forest off of U.S. Route 206 in Shamong Township. Approximately 152 acres were consumed before it was contained.
June 27, 2011	Burlington	171	A lightning strike started a wildfire in Wharton State Forest off of U.S. Route 206 in Shamong Township. Approximately 171 acres were consumed before it was contained. Heavier rain helped to contain the fire. About 50 firefighters battled the blaze. No property was in danger, but a State campground was closed.
March 26, 2012	Camden, Hunterdon, Middlesex, Sussex	300	The combination of strong winds, low humidity levels, and an unseasonably dry winter in 2012 led to several wildfires throughout New Jersey on March 26. The largest was a 25- to 30-acre brush fire behind the Raritan Center in Edison Township (Middlesex County). The fire started near Sweetwater Lane at 11:00 a.m. EDT on March 26. Also in Middlesex County, there were four separate small brush fires in Sayreville during the afternoon of the March 26. In Winslow Township (Camden County), a multi-acre wildfire was caused by a downed utility wire near the intersection of Russell and North Central Avenues. While there were homes in the area, none were damaged. In Hunterdon County, two brush fires occurred near Interstate 78 and also in Delaware Township. In Hopatcong Borough (Sussex County), a brush fire occurred during the evening of March 26 on Stevens Trail.
April 4, 2012	Hunterdon	Unknown	A brush fire occurred near Westbound Interstate 78 in Hunterdon County in Lebanon Township near exits 20A and 20B on the 4th. Two fires companies extinguished the blaze. Strong north winds contributed to the spread of the blaze as peak wind gusts averaged around 30 mph.
April 6, 2012	Camden, Sussex	400	A pair of wildfires that were allegedly set burned a combined 400 acres near the Atlantic City Expressway in in Camden County. Because of the north to northwest winds, traffic was not affected on the Atlantic City Expressway itself, but eastbound exit 33 was closed. Additionally, the eastbound shoulder of the Atlantic City Expressway was closed between mile markers 31 and 33 for New Jersey Forestry operational needs. The smaller fire was contained on the afternoon of April 6. At 12:00 noon EDT on the 7th, the smaller fire remained 100% contained and the larger one was 95% contained. Gusty north-to-northwest winds on April 6 (peak gust 35 mph at the Atlantic City International Airport) and the unusually dry weather helped spread the fire quickly. In addition to that wildfire, there was also a wildfire on April 6 in Sussex County in Wawayanda State Park. The Pinwheel Fire was a brush fire that was brought under control by the late morning of April 6. New Jersey Forest Fire Services (also used helicopters) and New Jersey Department of Environmental Protection firefighters battled the blaze.

Date(s) of Event	Counties Affected	Acres Burned	Description
April 9, 2012	Burlington, Mercer, Middlesex, Sussex	1,700	The unseasonably dry weather coupled with strong winds helped quickly spread two wildfires on April 9 in central Burlington County. The South Park fire started just after 12:00 midnight EDT on the 9th in Woodland Township in Burlington County near South Park and Sooy Roads. Most of it occurred on the grounds of the South Park Hunting Club. The strong winds helped spread the fire quickly. Over 250 local and state forestry fire fighters helped battle the blaze. It was expected to consume about 1,000 acres before total containment was reached. A second wildfire occurred on the Fort Dix Military Installation, near the Burlington and Ocean County border on April 9. It was totally contained on April 10. The fire consumed about 300 acres. Other smaller wildfires also occurred in Monroe Township (Middlesex County) on Disbrow Road on the afternoon of April 9 and in West Windsor Township (Mercer County) off Meadow Road. In all, 33 wildfires were reported throughout the State of New Jersey on the April 9.
April 16, 2012	Morris	100	A wildfire occurred at the Picatinny Arsenal during the afternoon and evening of the 16th in Dover Township in Morris County. The fire began about 1:00 p.m. EDT when personnel were doing routine demolition of munitions from their bunker in a wooded area. The fire jumped out of their explosives pit and proceeded to move outward and up the local ridge line. The Picatinny Arsenal Fire Department, Directorate of Emergency Services and the New Jersey Forest Fire Service battled the blaze. The blaze was considered fully contained at 7:00 p.m. EDT after it burned 100 acres.
July 5, 2012	Burlington, Camden	300	A wildfire began during the afternoon of July 5. Before it was contained on the evening of July 6, the fire scorched about 300 acres along the Camden and Burlington County line in the Wharton State Forest in Waterford and Shamong Townships. The fire could be seen as far away as Atlantic City. The wildfire was believed to have started as a small brush fire in the Goshen Pond Camping Area within the State forest off of Atsion Road and the Raritan Avenue Spur. About 40 firefighters battled the blaze in this remote area off of U.S. Route 206.
Total Acres Burned between 1905 – 2012 (Approximate):		**424,636**	

Source: NOAA-NCDC 2013; NJFFS 2013
Notes:
EDT = Eastern Daylight Time
E.S.E. = East southeast
Mph = Miles per hour

Figure 5.12-3. Past Occurrences of Wildland Fires in New Jersey



Source: NJFFS 2013

FEMA Disaster Declarations

Between 1954 and 2012, Federal Emergency Management Agency (FEMA) made two Fire Management Assistance Declarations (FM) related to wildfires in the State of New Jersey. Because these disasters generally cover a wide range of the State, each incident may have impacted many counties. However, not all counties were included in the declarations as determined by FEMA (FEMA 2013).

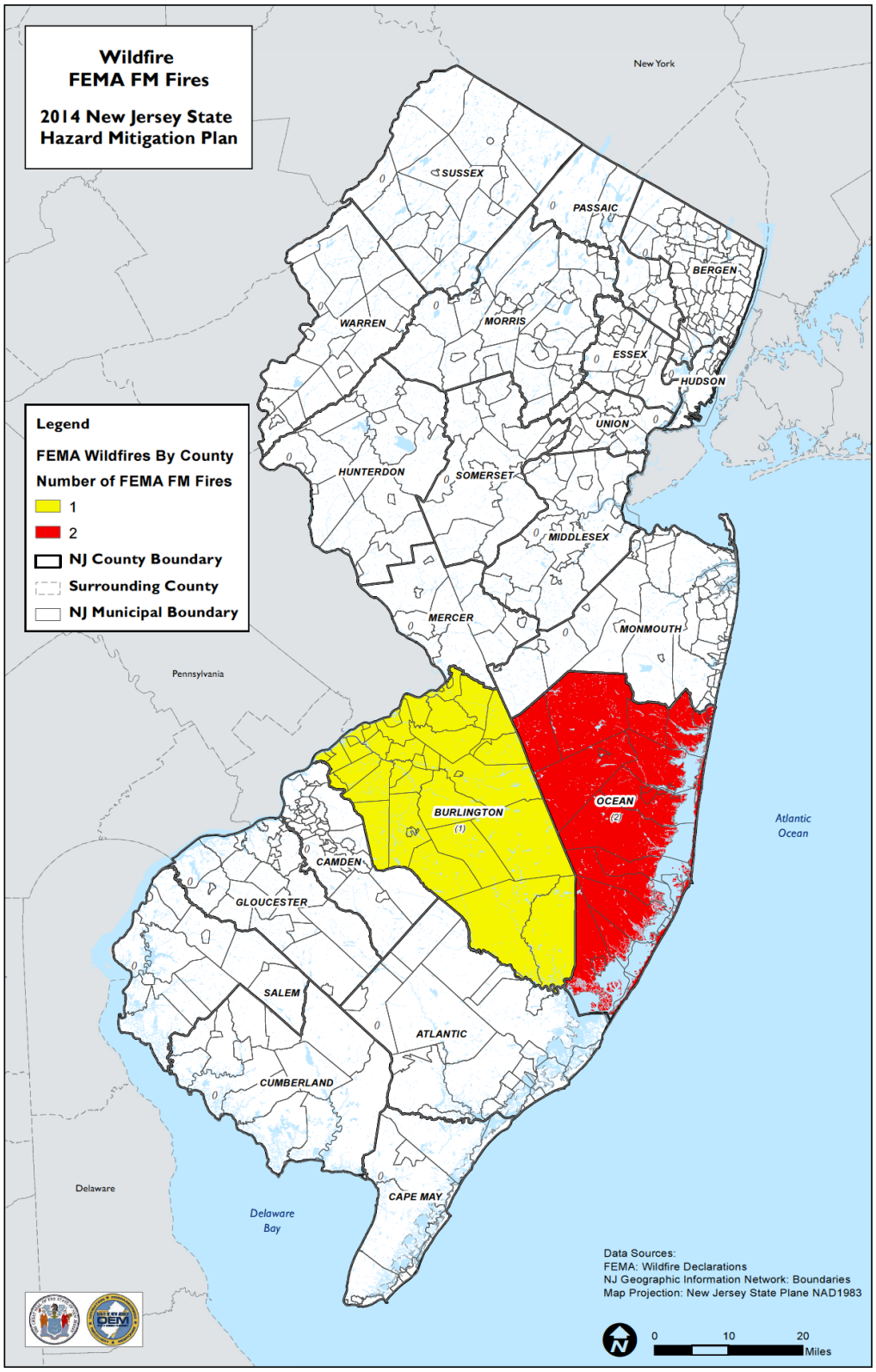
Based on all sources researched, known wildfire events that have affected New Jersey and were declared a FEMA disaster are listed in Table 5.12-3. Figure 5.12-4 illustrates the number of FEMA-declared wildfire disasters by County.

Table 5.12-3. FEMA Disaster Declarations

Disaster #	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	# Counties Impacted
2411	Double Trouble Fire	6/2/2002	6/2/2002															X							1
2695	Warren Grove Fire	5/16/2007	5/15/2007			X												X							2

Source: FEMA 2013

Figure 5.12-4. FEMA-Declared Wildfire Disasters by County



Source: FEMA 2013

Probability of Future Occurrences

For the purpose of this plan, the probability of future occurrences is defined by the number of events that have occurred over a specified period of time. The historic record indicates the State has experienced two federally declared Fire Management Assistance Declarations (FM) from 1954 to 2012. This figure greatly underestimates how often fires occur and impact the State. The probability exists that New Jersey will continue to face an average of three fires greater than 100-acres each year.

The likelihood of urban fires and wildfires is difficult to predict in a probabilistic manner; in other words estimating the approximate number of a catastrophic wildfire to occur in New Jersey every year is next to impossible. This is because a number of variable factors impact the potential for a fire to occur and because some conditions (for example, ongoing land use development patterns, location, fuel sources, and construction sites) exert increasing pressure on the WUI zone. Based on available data, urban fires and wildfires may continue to present a risk.

Given the numerous factors that can impact urban fire and wildfire potential, the likelihood of a fire event starting and sustaining itself should be gauged by professional fire managers on a daily basis.

Severity

Potential losses from wildfire include human life, structures and other improvements, and natural resources. Given the immediate response times to reported wildfires, the likelihood of injuries and casualties is minimal. Smoke and air pollution from wildfires can be a health hazard, especially for sensitive populations including children, the elderly, and those with respiratory and cardiovascular diseases. Wildfire may also threaten the health and safety of those fighting the fires. First responders are exposed to the dangers from the initial incident and after-effects from smoke inhalation and heat stroke. In addition, wildfire can lead to ancillary impacts such as landslides in steep ravine areas and flooding caused by the impacts of silt in local watersheds.

Warning Time

Because wildfires are often caused by humans (intentionally or accidentally), there is no way to predict accurately when one might break out. Because fireworks often cause brush fires, extra diligence is warranted around the Fourth of July holiday when the use of fireworks is highest. Dry seasons and droughts are factors that greatly increase fire likelihood. Dry lightning may trigger wildfires. Severe weather can be predicted; therefore, special attention can be paid during weather events that might include lightning. Reliable NWS lightning warnings are available on average 24 to 48 hours prior to a significant electrical storm.

If a fire does break out and spread rapidly, residents may need to evacuate within days or hours. A fire's peak burning period generally is between 1:00 p.m. and 6:00 p.m. Once a fire has started, fire alerting is reasonably rapid in most cases. The rapid spread of cellular and two-way radio communications in recent years has further contributed to a significant improvement in warning time.

Secondary Hazards

Wildfires can generate a range of secondary effects, which in some cases may cause more widespread and prolonged damage than the fire itself. Fires can cause direct economic losses in the reduction of harvestable timber and indirect economic losses in reduced tourism. Wildfires could cause the contamination of reservoirs, destroy transmission lines, and contribute to flooding. They can strip slopes of vegetation, exposing them to greater amounts of runoff. This in turn can weaken soils and cause failures on slopes. Major landslides can occur several years after a wildfire. Most wildfires burn hot and for long durations that can bake soils,

especially those high in clay content, thus increasing the imperviousness of the ground. This increases the runoff generated by storm events, thus increasing the chance of flooding.

Climate Change Impacts

Fire is determined by climate variability, local topography, and human intervention. Hot, dry spells create the highest fire risk. Increased temperatures may intensify wildfire danger by warming and drying out vegetation. When climate alters fuel loads and fuel moisture, this changes the forest susceptibility to wildfires. Climate changes also may increase winds that spread fires. Faster fires are harder to contain, and thus are more likely to expand into residential neighborhoods.

Providing projections of future climate change for a specific region is challenging. Shorter term projections are more closely tied to existing trends making longer term projections even more challenging. The further out a prediction reaches the more subject to changing dynamics it becomes.

The New Jersey Climate Adaptation Alliance is a network of policymakers, public and private-sector practitioners, academics, non-governmental organizations (NGO), and business leaders aligned to build climate change preparedness in the state of New Jersey. The Alliance is facilitated by Rutgers University, which provides science and technical support, facilitates the Alliance's operations and advances its recommendations. A document titled *Change in New Jersey: Trends and Projections* was developed to identify recommendations for State and local public policy that will be designed to enhance climate change preparedness and resilience in New Jersey (Rutgers 2013).

Temperatures in the Northeast United States have increased 1.5 degrees Fahrenheit (°F) on average since 1900. Most of this warming has occurred since 1970. The State of New Jersey, for example, has observed an increase in average annual temperatures of 1.2°F between the period of 1971-2000 and the most recent decade of 2001-2010 (ONJSC, 2011). Winter temperatures across the Northeast have seen an increase in average temperature of 4 °F since 1970 (Northeast Climate Impacts Assessment [NECIA] 2007). By the 2020s, the average annual temperature in New Jersey is projected to increase by 1.5°F to 3°F above the statewide baseline (1971 to 2000), which was 52.7°F. By 2050, the temperature is projected to increase 3°F to 5°F (Sustainable Jersey Climate Change Adaptation Task Force 2013).

Both northern and southern New Jersey have become wetter over the past century. Northern New Jersey's 1971-2000 precipitation average was over five inches (12%) greater than the average from 1895-1970. Southern New Jersey became two inches (five-percent) wetter late in the 20th century (Office of New Jersey State Climatologist). Average annual precipitation is projected to increase in the region by five-percent by the 2020s and up to 10% by the 2050s. Most of the additional precipitation is expected to come during the winter months (New York City Panel on Climate Change [NYCPCC] 2009).

5.12.2 Vulnerability Assessment

The New Jersey Forest Fire Service (NJFFS) uses Wildfire Fuel Hazard data to assign wildfire fuel hazard rankings across the State. This data, developed in 2009, is based upon NJDEP's 2002 Land Use/Land Cover datasets and NJDEP's 2002 10-meter Digital Elevation Grid datasets. Maps presented in Appendix T illustrate the defined wildfire fuel hazard rankings by county. For the wildfire hazard, the NJFFS Wildfire Fuel Hazard "extreme', 'very high' and 'high' areas are identified as the wildfire hazard area. The statistics in the 'moderate' to 'low' areas are also reported.

To determine vulnerability, a spatial analysis was conducted using the NJFFS Fuel Hazard Area guidelines. When the analysis determined the hazard area would impact the area in a jurisdiction, or the location of State buildings and critical facilities, these locations were deemed vulnerable to the hazard. Loss estimates were determined based on the value of the facilities potentially impacted. The limitations of this analysis are recognized, and as such the analysis is only used to provide a general estimate.

This section addresses assessing vulnerability and estimating potential losses by jurisdiction and to State facilities.

Assessing Vulnerability by Jurisdiction

NJFFS prepared a Statewide mapping of the 2009 Wildfire Fuel Hazard data and Fire Risk data. Appendix R includes for these maps per County. The total land area located in the NJFFS Wildfire Fuel Hazard areas was calculated for each jurisdiction, as presented in Table 5.12-4 below.

Table 5.12-4. Total Land Area Located in the Wildfire Hazard Areas

County	Total Area (sq. mi.)	Extreme, Very High and High (sq. mi.)	% Total	Moderate and Low (sq. mi.)	% Total
Atlantic	610.65	196.75	32.2%	250.45	41.0%
Bergen	239.83	7.32	3.1%	80.47	33.6%
Burlington	820.32	321.54	39.2%	263.30	32.1%
Camden	227.57	40.61	17.8%	69.08	30.4%
Cape May	286.13	61.81	21.6%	137.79	48.2%
Cumberland	501.8	118.51	23.6%	211.46	42.1%
Essex	129.72	2.05	1.6%	38.80	29.9%
Gloucester	336.2	37.21	11.1%	129.36	38.5%
Hudson	51.53	4.81	9.3%	8.01	15.5%
Hunterdon	437.32	41.05	9.4%	228.10	52.2%
Mercer	228.8	14.15	6.2%	91.83	40.1%
Middlesex	316.97	22.23	7.0%	110.81	35.0%
Monmouth	485.68	37.53	7.7%	215.65	44.4%
Morris	481.44	17.78	3.7%	294.30	61.1%
Ocean	757.93	298.98	39.4%	173.22	22.9%
Passaic	198.32	15.56	7.8%	102.65	51.8%

County	Total Area (sq. mi.)	Extreme, Very High and High (sq. mi.)	% Total	Moderate and Low (sq. mi.)	% Total
Salem	347.12	51.68	14.9%	127.87	36.8%
Somerset	304.88	26.38	8.7%	148.43	48.7%
Sussex	535.47	69.45	13.0%	346.85	64.8%
Union	105.38	1.59	1.5%	25.56	24.3%
Warren	362.59	32.73	9.0%	204.62	56.4%
Total	**7765.65**	**1419.7**	**18.3%**	**3258.59**	**42.0%**

Source: NJFFS 2013

All 20 New Jersey counties with hazard mitigation plans included wildfire as a hazard of concern in their hazard mitigation plans. Refer to Table 5.1-2 in Section 5.1 (State Risk Assessment Overview). As discussed earlier in this profile, the New Jersey Pinelands is one of the most hazardous wildland fuel types in the nation. A review of the historic record indicates a majority of the wildfire events in the State have occurred in the New Jersey Pinelands located in Atlantic, Burlington, Camden, Cape May, Cumberland, Gloucester, and Ocean Counties. Table 5.12-5 summarizes the number of wildfire events from 1905 to 2012 by County.

Table 5.12-5. Number of Wildfire Events by County from 1924 to 2007

County	Number	Acres Burned
Atlantic	218	228,666.77
Bergen	0	NA
Burlington	924	333,523.86
Camden	71	38,880.53
Cape May	11	3,448.72
Cumberland	29	16,158.36
Essex	0	NA
Gloucester	20	8,453.26
Hudson	0	NA
Hunterdon	0	NA
Mercer	0	NA
Middlesex	42	21,683.33
Monmouth	151	42,598.18
Morris	0	NA
Ocean	692	533,812.81
Passaic	0	NA
Salem	6	5,058.71
Somerset	1	105.40
Sussex	0	NA
Union	0	NA
Warren	0	NA

County	Number	Acres Burned
Total	**2,165**	**1,232,389.93**

Source: NOAA-NCDC 2013; NJFFS 2013
Notes: NA = Not applicable.

To estimate the population vulnerable to the wildfire hazard, the hazard areas were overlaid on the 2010 Census population data (United States Census 2010). The United States Census blocks with their centroid in the hazard area were used to calculate the estimated population exposed to the wildfire hazard. In total, there are 307,256 people (or nearly four-percent of the State's total population) living in the 'extreme to high' wildfire hazard area. Table 5.12-6 summarizes the estimated population within the defined hazard area by County.

Table 5.12-6. 2010 Population in the Wildfire Hazard Areas

County	Total Population	Extreme, Very High and High	% Total	Moderate and Low	% Total
Atlantic	274,549	33,164	12.1%	62,425	22.7%
Bergen	905,116	3,624	0.4%	115,400	12.7%
Burlington	448,734	23,664	5.3%	93,571	20.9%
Camden	513,657	19,419	3.8%	66,516	12.9%
Cape May	97,265	12,772	13.1%	18,584	19.1%
Cumberland	156,898	16,932	10.8%	31,379	20.0%
Essex	783,969	1,800	0.2%	65,050	8.3%
Gloucester	288,288	13,679	4.7%	63,617	22.1%
Hudson	634,266	7,598	1.2%	18,365	2.9%
Hunterdon	128,349	8,476	6.6%	59,472	46.3%
Mercer	366,513	5,312	1.4%	61,759	16.9%
Middlesex	809,858	16,524	2.0%	106,495	13.1%
Monmouth	630,380	17,080	2.7%	144,661	22.9%
Morris	492,276	8,634	1.8%	183,855	37.3%
Ocean	576,567	74,320	12.9%	90,792	15.7%
Passaic	501,226	4,265	0.9%	65,119	13.0%
Salem	66,083	4,453	6.7%	19,147	29.0%
Somerset	323,444	18,375	5.7%	100,948	31.2%
Sussex	149,265	11,077	7.4%	73,850	49.5%
Union	536,499	1,569	0.3%	40,493	7.5%
Warren	108,692	4,519	4.2%	37,540	34.5%
Total	**8,791,894**	**307,256**	**3.5%**	**1,519,038**	**17.3%**

Source: United States Census 2010; NJFFS 2013

Wildfire specifically is a hazard that has and will continue to impact development on or near the suburban and rural fringe. Although many areas of the Pinelands are publically owned, permanently preserved land, much of the undeveloped privately owned land is located in the suburban rural fringe surrounding the Pinelands. As more of this area becomes developed, the vulnerability to wildfire will increase. The May 15, 2007 wildfire destroyed five homes and severely impacted over 50 additional homes located in the suburban rural fringe

adjacent to the Pinelands. Accordingly, population in these areas of Burlington and Ocean County will continue to be the most vulnerable to the impacts of wildfires.

Assessing Vulnerability to State Facilities

To assess the vulnerability of the State-owned and leased facilities provided by the New Jersey Office of Management and Budget (OMB), an analysis was conducted with the wildfire hazard areas. Using ArcGIS software, these hazard areas were overlaid with the State facility data to determine the number of State facilities vulnerable. Table 5.12-7 summarizes the State-owned and leased facilities vulnerable to wildfire by County. Table 5.12-8 summarizes the facilities by State agency.

Table 5.12-7. Number of State-Owned and Leased Buildings in the Wildfire Hazard Area by County

County	Total Number of Buildings	Number of State Buildings in the Extreme, Very High and High Areas			Number of State Buildings in the Moderate and Low Areas		
		Owned	Leased	Total	Owned	Leased	Total
Atlantic	87	0	1	1	43	1	44
Bergen	46	1	0	1	16	0	16
Burlington	345	2	0	2	63	2	65
Camden	70	0	0	0	17	0	17
Cape May	114	0	0	0	26	0	26
Cumberland	367	0	0	0	44	0	44
Essex	74	1	0	1	11	2	13
Gloucester	46	0	0	0	25	0	25
Hudson	22	0	0	0	8	1	9
Hunterdon	333	1	0	1	71	0	71
Mercer	390	0	0	0	56	0	56
Middlesex	264	1	0	1	52	2	54
Monmouth	163	0	1	1	46	1	47
Morris	103	0	0	0	63	1	64
Ocean	103	2	1	3	42	1	43
Passaic	71	0	0	0	11	1	12
Salem	56	3	0	3	35	0	35
Somerset	38	0	0	0	10	0	10
Sussex	63	0	0	0	42	1	43
Union	35	0	0	0	14	0	14
Warren	120	5	0	5	47	0	47
Total	**2,910**	**16**	**3**	**19**	**742**	**13**	**755**

Source: New Jersey Office of Management and Budget 2013; NJFFS 2013

Table 5.12-8. Number of State-Owned and Leased Buildings in the Wildfire Hazard Area by Agency

State Agency	Total Number of Buildings	Number of State Buildings in the Extreme, Very High and High Areas			Number of State Buildings in the Moderate and Low Areas		
		Owned	Leased	Total	Owned	Leased	Total
Agriculture	1	0	0	0	0	0	0
Banking and Insurance	1	0	0	0	0	0	0
Chief Executive	1	0	0	0	0	1	1
Children and Families	90	0	2	2	2	0	2
Community Affairs	9	0	0	0	0	0	0
Corrections	696	3	1	4	56	0	56
Education	64	0	0	0	5	0	5
Environmental Protection	330	8	0	8	136	1	137
Health	3	0	0	0	0	0	0
Human Services	463	1	0	1	31	0	31
Judiciary	4	0	0	0	0	0	0
Juvenile Justice Commission	181	1	0	1	53	0	53
Labor and Work Force Dev.	6	0	0	0	0	0	0
Law and Public Safety	11	0	0	0	0	0	0
Legislature	4	0	0	0	0	0	0
Military and Veterans Affairs	262	1	0	1	19	0	19
Miscellaneous Commissions	1	0	0	0	0	0	0
Motor Vehicles Commission	69	0	0	0	6	0	6
Personnel	1	0	0	0	0	0	0
State	9	0	0	0	0	0	0
State Police	122	0	0	0	14	10	24
Transportation	565	2	0	2	420	0	420
Treasury	17	0	0	0	0	1	1
Total	**2,910**	**16**	**3**	**19**	**742**	**13**	**755**

Source: New Jersey Office of Management and Budget 2013; NJFFS 2013

For the purposes of this planning effort, the critical facilities located in the wildfire hazard areas are considered vulnerable to the wildfire hazard. Table 5.12-9 identifies the number of critical facilities exposed to the wildfire hazard in the State, listed by County.

Table 5.12-9. Critical Facilities Exposed to the Wildfire Hazard Areas (Extreme to High Area)

County	Total Count	Airport	Special Needs	Communication	Correctional Institutions	Dam	Electric Power	EMS	EOC	Ferry	Fire	Highway Bridge	Highway Tunnel	Light Rail Facility	Medical	Military	Natural Gas	Oil	Police	Port	Potable Water	Rail Facility	Rail Tunnel	School	Shelter	Storage of Critical Records	Wastewater
Atlantic	388	0	2	0	0	11	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	0	0
Bergen	1,148	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Burlington	747	0	0	0	0	34	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	5	0	0
Camden	701	0	3	0	0	6	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0
Cape May	229	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Cumberland	251	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	0	0
Essex	784	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Gloucester	346	0	0	0	0	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hudson	493	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hunterdon	328	0	0	0	0	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	1	0	0
Mercer	538	0	1	0	0	8	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Middlesex	816	0	0	0	0	1	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	4	1	0	0
Monmouth	905	0	1	0	0	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0
Morris	913	0	0	0	0	8	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ocean	621	0	2	0	0	19	0	1	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	10	1	0	0
Passaic	648	0	1	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	0
Salem	201	0	0	0	0	6	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Somerset	539	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0
Sussex	542	0	0	0	0	17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	6	0	0
Union	607	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Warren	351	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Total	**12,096**	**0**	**10**	**0**	**0**	**146**	**0**	**8**	**2**	**0**	**5**	**2**	**0**	**0**	**0**	**0**	**0**	**1**	**1**	**0**	**0**	**0**	**0**	**32**	**24**	**0**	**0**

Most roads and railroads would not be damaged except in the worst-case wildfire scenarios. Fires can create conditions that block or prevent access and can isolate residents and emergency service providers. Power lines are the most at risk to wildfire because most poles are made of wood and susceptible to burning. In the event of a wildfire, pipelines that provide a source of fuel could be ignited, leading to a catastrophic explosion. The wildfire hazard typically does not have a major direct impact on bridges, but it can create conditions in which bridges are obstructed or weakened.

New Jersey has a substantial amount of major highway that runs through areas vulnerable to wildfire. State Highway Route 206 runs through the center of the Pinelands, which is the area most potentially vulnerable to wildfires. Several wildfire events have occurred in the last in 10 years that have caused the temporary closure of this roadway. County Route 539 also runs through the center of the Pinelands and has been impacted by several wildfires in the past decade. The stretches of this roadway that are the most vulnerable are located in the southern portions of Burlington and Ocean Counties. The Garden State Parkway is also vulnerable to wildfire; more specifically the stretches that run through the southern portion of Ocean County. State Highway Route 72 and Route 70 are also vulnerable and have also been closed as a result of fires in the past decade. The sections of these highways that run through the eastern part of Burlington County and the western area of Ocean County are considered highly vulnerable. Specific instances of roadway impacts are included in Table 5.12-2 – Wildland Fire Incidents (1905 – 2012).

Estimating Potential Losses by Jurisdiction

Wildfire events can have major economic impacts on a community from the initial loss of structures and the subsequent loss of revenue from destroyed business and decrease in tourism. Wildfires can cost thousands of taxpayer dollars to suppress and control and involve hundreds of operating hours on fire apparatus and thousands of volunteer man hours from the volunteer firefighters. There are also many direct and indirect costs to local businesses that excuse volunteers from working to fight these fires.

To estimate potential losses by jurisdiction, the exposure analysis methodology was used. Table 5.12-10 identifies a total risk exposure of greater than $289 billion for buildings vulnerable to wildfire in New Jersey (greater than $46 billion in the extreme, very high and high areas and greater than $242 billion in the moderate and low risk areas). This figure assumes 100% loss to each structure and its contents. This potential loss estimate is considered high given that it is not likely that a wildfire event would occur across the entire hazard area at the same time from one event. Nonetheless, the total replacement cost value of buildings within this area represents an estimated total loss value for these counties. As more current replacement cost data become available at the structure level, this section of the plan will be updated.

Table 5.12-10. Building Replacement Cost Value Exposed to Wildfire

County	Total Building RCV	RCV in the Extreme, Very High and High Areas	% Total	RCV in the Moderate and Low Areas	% Total
Atlantic	$38,043,171,000	$3,794,489,000	9.97%	$6,678,894,000	17.56%
Bergen	$154,077,482,000	$1,505,364,000	0.98%	$21,875,531,000	14.20%
Burlington	$62,700,794,000	$3,351,972,000	5.35%	$14,651,590,000	23.37%
Camden	$70,467,051,000	$2,460,559,000	3.49%	$10,992,378,000	15.60%
Cape May	$24,665,528,000	$1,738,002,000	7.05%	$3,102,671,000	12.58%
Cumberland	$18,128,613,000	$1,798,234,000	9.92%	$4,225,121,000	23.31%
Essex	$113,124,687,000	$417,966,000	0.37%	$13,584,676,000	12.01%
Gloucester	$33,534,660,000	$1,442,085,000	4.30%	$8,185,744,000	24.41%
Hudson	$82,290,184,000	$1,961,643,000	2.38%	$4,618,768,000	5.61%
Hunterdon	$21,720,513,000	$1,628,056,000	7.50%	$9,881,531,000	45.49%
Mercer	$56,194,660,000	$1,498,955,000	2.67%	$9,564,230,000	17.02%
Middlesex	$119,947,782,000	$3,446,763,000	2.87%	$18,994,905,000	15.84%
Monmouth	$96,235,266,000	$3,620,831,000	3.76%	$24,390,371,000	25.34%
Morris	$86,634,810,000	$1,627,179,000	1.88%	$30,336,147,000	35.02%
Ocean	$73,559,915,000	$8,342,668,000	11.34%	$9,097,837,000	12.37%
Passaic	$66,705,864,000	$575,480,000	0.86%	$10,240,610,000	15.35%
Salem	$8,092,037,000	$429,360,000	5.31%	$2,334,473,000	28.85%
Somerset	$52,513,253,000	$4,336,992,000	8.26%	$16,674,926,000	31.75%
Sussex	$20,979,595,000	$1,451,406,000	6.92%	$9,937,764,000	47.37%
Union	$79,329,736,000	$515,930,000	0.65%	$8,943,716,000	11.27%
Warren	$14,442,755,000	$570,184,000	3.95%	$4,905,909,000	33.97%
Total	**$1,293,388,356,000**	**$46,514,118,000**	**3.60%**	**$243,217,792,000**	**18.80%**

Source: HAZUS-MH 2.1; NJFFS 2013
Note: The total building replacement cost values (RCV) are for all occupancy types (residential, commercial, industrial, religious, government, and education) and represent both structure and contents.

As the State of New Jersey continues to grow from a development standpoint; vulnerability may increase. As described earlier in this section, there is the potential for growth and development in the suburban rural fringe that surrounds the Pinelands, which is the area most prone to wildfires. As this area continues to grow, so will the risk for potential losses caused by wildfire. Accordingly, buildings in these areas of Burlington and Ocean County may potentially be the most vulnerable to the impacts of wildfires.

Estimating Potential Losses to State Facilities

Table 5.12-11 below identifies a total risk exposure of nearly $65 million for State buildings vulnerable to wildfire (extreme, very high, and high-risk areas). These figures assume 100% loss to each structure and its contents. This potential loss estimate is considered high given it is not likely a single wildfire event would occur across the entire State's hazard area. Nonetheless, the total replacement cost value of buildings within this area represents an estimated total loss value. Tables 5.12-11 and 5.12-12 below summarize the potential loss by county and State agency.

Table 5.12-11. Estimated Potential Loss of State-Owned and Leased Buildings in the Wildfire Hazard Areas by County

County	RCV of Buildings	RCV in the Extreme, Very High, and High Areas			RCV in the Moderate and Low Areas		
		Owned	Leased	Total	Owned	Leased	Total
Atlantic	$358,024,830		$3,053,351	$3,053,351	$17,478,732	$3,695,008	$21,173,740
Bergen	$219,423,769	$1,018,773		$1,018,773	$18,405,875		$18,405,875
Burlington	$892,775,538	$12,944		$12,944	$24,219,157	$1,321,825	$25,540,982
Camden	$640,350,857			$0	$8,202,941		$8,202,941
Cape May	$117,950,706			$0	$8,293,883		$8,293,883
Cumberland	$813,708,672			$0	$13,734,759		$13,734,759
Essex	$674,467,788	$68,605		$68,605	$10,854,919	$10,449,229	$21,304,148
Gloucester	$76,531,777			$0	$7,415,753		$7,415,753
Hudson	$164,209,619			$0	$44,369,033	$145,944	$44,514,978
Hunterdon	$411,264,979	$44,333		$44,333	$17,438,946		$17,438,946
Mercer	$3,477,412,371			$0	$32,228,338		$32,228,338
Middlesex	$651,385,213	$43,056		$43,056	$21,872,981	$11,085,658	$32,958,638
Monmouth	$247,560,648		$10,752,396	$10,752,396	$36,282,483	$596,809	$36,879,293
Morris	$459,016,431			$0	$21,280,940	$12,653,376	$33,934,316
Ocean	$172,110,712	$52,027	$49,333,440	$49,385,467	$27,577,355	$580,145	$28,157,500
Passaic	$292,868,078			$0	$4,209,113	$185,413	$4,394,526
Salem	$57,046,533	$352,794		$352,794	$11,029,410		$11,029,410
Somerset	$233,331,698			$0	$7,043,687		$7,043,687
Sussex	$49,168,422			$0	$15,835,984	$84,083	$15,920,066
Union	$85,257,584			$0	$4,380,389		$4,380,389
Warren	$106,656,334	$1,162,290		$1,162,290	$15,165,976		$15,165,976
Total	**$10,200,522,559**	**$2,754,822**	**$63,139,187**	**$65,894,010**	**$367,320,654**	**$40,797,489**	**$408,118,144**

Source: New Jersey Office of Management and Budget 2013; NJFFS 2013
Note: The total building replacement cost values (RCV) represent both structure and estimated contents value.

Table 5.12-12. Estimated Potential Loss of State-Owned and Leased Buildings in the Wildfire Hazard Areas by Agency

State Agency	Total RCV	RCV in the Extreme, Very High and High Areas			RCV in the Moderate and Low Areas		
		Owned	Leased	Total	Owned	Leased	Total
Agriculture	$2,876,615			$0			$0
Banking and Insurance	$83,777,640			$0			$0
Chief Executive	$12,653,376			$0			$0
Children and Families	$855,320,877		$21,176,988	$21,176,988	$27,642		$27,642
Community Affairs	$142,133,954			$0			$0
Corrections	$1,705,111,918	$81,549	$3,053,351	$3,134,901	$10,940,877	$81,549	$11,022,427
Education	$313,825,668			$0	$8,594,498		$8,594,498
Environmental Protection	$466,946,331	$689,876		$689,876	$79,933,584	$689,876	$80,623,460
Health	$146,433,703			$0			$0
Human Services	$1,689,928,602	$44,333		$44,333	$4,123,571	$44,333	$4,167,905
Judiciary	$114,021,053			$0			$0
Juvenile Justice Commission	$258,880,851	$43,056		$43,056	$19,626,252	$43,056	$19,669,308
Labor and Work Force Dev.	$242,663,875			$0			$0
Law and Public Safety	$498,665,653			$0			$0
Legislature	$165,085,389			$0			$0
Military and Veterans Affairs	$954,650,961	$38,908,848		$38,908,848	$31,543,155	$38,908,848	$70,452,003
Miscellaneous Commissions	$15,650,656			$0			$0
Motor Vehicles Commission	$928,029,459			$0	$17,104,737		$17,104,737
Personnel	$8,513,417			$0			$0
State	$208,816,705			$0			$0
State Police	$473,621,856			$0	$5,262,525		$5,262,525
Transportation	$512,199,066	$1,896,008		$1,896,008	$190,163,813	$1,896,008	$192,059,821
Treasury	$400,714,935			$0			$0
Total	**$10,200,522,559**	**$41,663,670**	**$24,230,339**	**$65,894,010**	**$367,320,654**	**$41,663,670**	**$408,984,325**

Source: New Jersey Office of Management and Budget 2013; NJFFS 2013
Note: The total building replacement cost values (RCV) represent both structure and estimated contents value.

As discussed in Section 5.1 (Risk Assessment Overview), the replacement cost value for the State critical facilities identified outside of the Land and Building Asset Management System (LBAM) was not available for the 2014 Plan update. A total risk exposure would be equal to the full replacement value of each critical facility exposed.

Environmental Impacts

Wildfire events can have significant positive and negative impacts on the environment. The loss of vegetation, biodiversity and habitat is a concern, especially where threatened and endangered species are located. However, many of the State's listed threatened and endangered species thrive in the open conditions that had historically resulted from the natural fire regime (NJFFS 2013).

Exposed soils are vulnerable to wind and water erosion which may impact the quality of downstream water bodies and drinking water supplies. The composition of plant communities, as well as their vegetative and growth characteristics, is affected by fire. For example, many plant species have adapted to fire and are dependent on it for reproduction (NJFFS 2013).