



## 5.4.11 Wildfire

The following section provides the hazard profile (hazard description, location, extent, previous occurrences and losses, probability of future occurrences, and impact of climate change) and vulnerability assessment for the wildfire hazard in Cape May County.

### 2021 HMP Update Changes

- New and updated figures from federal, state, and county agencies are incorporated. New Jersey Forest Fire Service (NJFFS) Wildfire Fuel Hazard data was used to identify wildfire events.
- Previous occurrences were updated with events that occurred between 2010 and 2020.

#### 5.4.11.1 Profile

##### Hazard Description

Wildfires are any non-structural fire that occurs in the wildland. Three distinct types of wildfires have been defined and include: naturally occurring wildfire, human-caused wildfire, and prescribed fire. Many of these are highly destructive and can be difficult to control. They occur in forested, semi-forested, or less developed areas. 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. 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.

Wildfires can increase the probability of other natural disasters, specifically floods and mudflows. Wildfires, particular large-scale fires, can dramatically alter the terrain and ground conditions, making land already devastated by fire susceptible to floods. Lands impacted by wildfire increase the risk of flooding and mudflow in those areas impacted by wildfire. Normally, vegetation absorbs rainfall, reducing runoff. However, wildfires leave the ground charred, barren, and unable to absorb water; thus, creating conditions perfect for flash flooding and mudflows. Flood risk in these impacted areas remain significantly higher until vegetation is restored, which can take up to five years after a wildfire (FEMA 2012).

Flooding after a wildfire is often more severe, as debris and ash left from the fire can form mudflows. During and after a rain event, as water moves across charred and denuded ground, it can also pick up soil and sediment and carry it in a stream of floodwaters. These mudflows have the potential to cause significant damage to impacted areas. Areas directly affected by fires and those located below or downstream of burn areas are most at risk for flooding (FEMA 2013). For detailed information regarding flooding, see Section 5.4.5 (Flood).

The height of wildland fire season in New Jersey is typically in spring (March through May) and 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, each year, an average of 1,500 wildfires damage or destroy 7,000 acres of the state's forests. Wildfires not only damage woodlands, but threaten homeowners who live within or adjacent to forest environments. From January 1, 2020, to August 13, 2020, there were 853 wildfires in New Jersey that burned 4,695 acres (New Jersey Forest Fire Service [NJFFS] 2020).



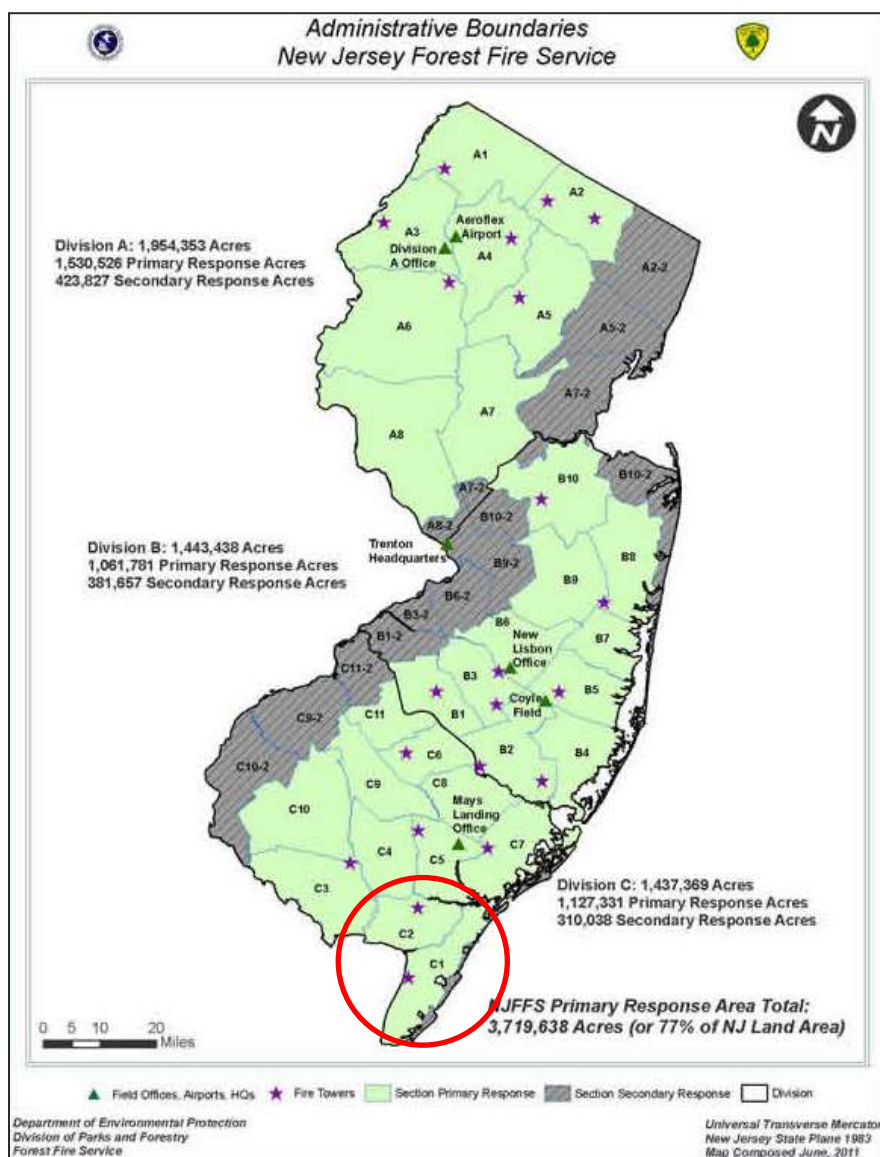


### Location

NJFFS, a division of NJDEP, is responsible for protecting the 3.15 million acres of public and private wildland in the state. NJFFS is under the direction of the state fire warden 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.

The NJFFS is broken up into three divisions (A, B, C). Each division is responsible for responding to wildfire events within their boundaries. Cape May County is located in Division C. All of Cape May County is susceptible to wildfires and they can occur anywhere and at any time. Additionally, a portion of Cape May County is located within the New Jersey Pine Barrens. The Townships of Upper and Dennis and the Borough of Woodbine are all located in the Pine Barrens (Figure 5.4.11-2).

Figure 5.4.11-1. Fire Divisions of New Jersey



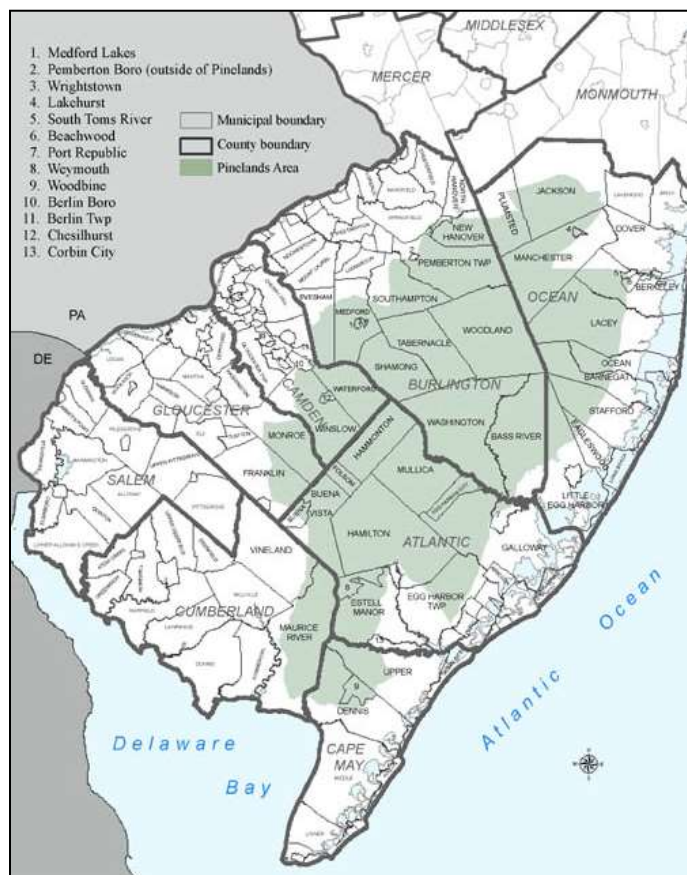
Source: NJDEP 2013

Note: The red circle indicates the location of Cape May County. The County is located in Fire Division C.





Figure 5.4.11-2. Municipalities of the New Jersey Pine Barrens



Source: Piney Power 2013

The Pine Barrens is one of the most fire-prone areas in the United States due to the type of vegetation found there. Each year, wildfires burn portions of the Pine Barrens. These fires are important for the land's ecology; however, it also poses a threat to life and property to those in and around the Pine Barrens. With the northwest portion of Cape May County located within the Pine Barrens, wildfire risk for that area may be increased.

NJFFS 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. For details of these figures, please refer to: [http://www.state.nj.us/dep/parksandforests/fire/wildfire\\_hazard\\_mitigation.htm](http://www.state.nj.us/dep/parksandforests/fire/wildfire_hazard_mitigation.htm). Wildfire fuel hazard for Cape May County ranges from low to extreme and are spread evenly throughout the County. There are more concentrated areas of extreme fuel hazard areas in the northern section of the County. As for wildfire risk, the portion of the County that is located in the Pine Barrens has the highest risk and the central and southern portions of Cape May County have low to moderate fire risk. Table 5.4.11-1 indicates the amount of land in each of the wildfire fuel hazard ranking zones for Cape May County. Table 5.4.11-2 explains the approximate area in the NJFFS risk areas in the County. According to these tables, the Townships of Dennis, Lower, Middle, and Upper and the Borough of Woodbine have the highest percentage of land in the high to extreme fuel hazard areas.

Table 5.4.11-1. Approximate Area in the Wildfire Fuel Hazard Areas in Cape May County

Hazard Area	Area (Square Miles)
Extreme	18.7





**Table 5.4.11-1. Approximate Area in the Wildfire Fuel Hazard Areas in Cape May County**

Hazard Area	Area (Square Miles)
Very High	7.5
High	35.5
Moderate	90.1
Low	47.7

Source: NJFFS 2010

**Table 5.4.11-2. Approximate Area in Wildfire Fuel Hazard Areas in Cape May County**

Municipality	Total Area (Square Miles)	New Jersey Forest Fire Service Fuel Hazard Areas			
		Low to Moderate	% in Hazard Area	High to Extreme	% in Hazard Area
Avalon Borough	4.9	2.1	42.9%	0.3	6.1%
Cape May City	2.7	0.6	22.2%	0.2	7.4%
Cape May Point Borough	0.3	0	0.0%	0	0.0%
Dennis Township	63.8	34.8	54.5%	19.3	30.3%
Lower Township	30.9	12.5	40.5%	4.9	15.9%
Middle Township	82.7	43	52.0%	16	19.3%
North Wildwood City	2.2	0.3	13.6%	0.1	4.5%
Ocean City	11.8	2.9	24.6%	0.4	3.4%
Sea Isle City	2.7	0.8	29.6%	0.2	7.4%
Stone Harbor Borough	2.2	0.2	9.1%	0.1	4.5%
Upper Township	68.4	36.5	53.4%	17.2	25.1%
West Cape May Borough	1.2	0.4	33.3%	0.1	8.3%
West Wildwood Borough	0.4	0.1	25.0%	0	0.0%
Wildwood City	1.6	0.1	6.3%	0	0.0%
Wildwood Crest Borough	1.5	0.1	6.7%	0	0.0%
Woodbine Borough	8.0	3.4	42.5%	2.7	33.8%
<b>Cape May County (Total)</b>	<b>285.2</b>	<b>137.8</b>	<b>48.3%</b>	<b>61.8</b>	<b>21.7%</b>

Source: NJFFS 2010





Figure 5.4.11-3. Wildfire Fuel Hazard for Cape May County

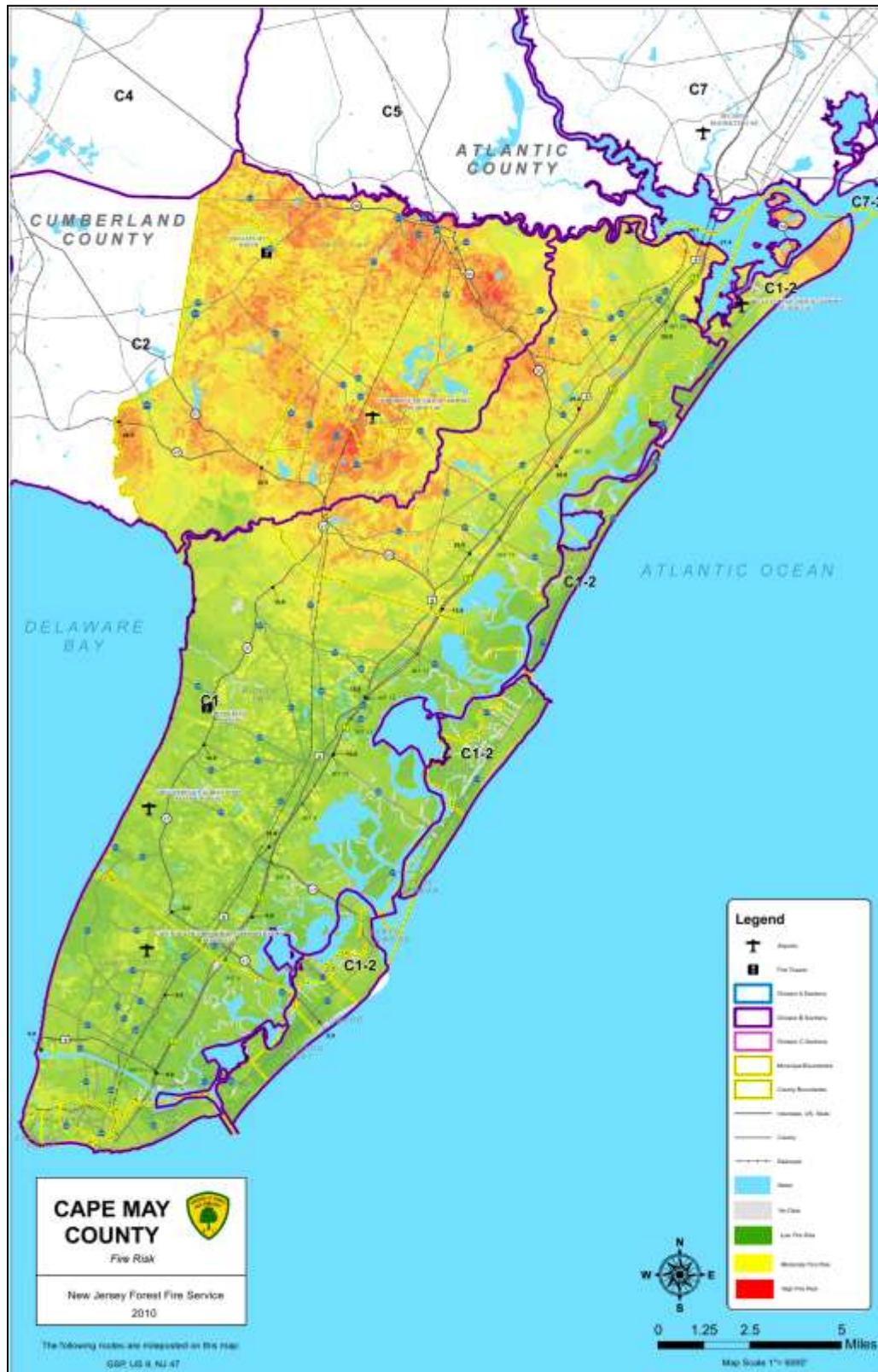


Source: New Jersey Forest Fire Service 2010





Figure 5.4.11-4. Wildfire Risk for Cape May County



Source: New Jersey Forest Fire Service 2010





### 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 (NFDRS) Buildup Index (BUI), and the Keetch-Byram Drought Index (KBDI). Both are used for fire preparedness planning, which includes the following: campfire and burning restrictions, fire patrol assignments, fire lookout tower staffing, and readiness status for both observation and firefighting aircraft (NJFFS 2015).

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 U.S. Forest Service (USFS). It is a number representing the net effect of evapotranspiration and precipitation in producing cumulative moisture deficiency in deep duff and upper soil layers. It is a continuous index, relating to the flammability of organic material in the ground. The KBDI attempts to measure the amount of precipitation necessary to return the soil to full field capacity. It is a closed system ranging from 0 to 800 units and represents a moisture regime from 0 to 8 inches of water through the soil layer. Zero is the point of no moisture deficiency and 800 is the maximum drought that is possible. At any point along the scale, the index number indicates the amount of net rainfall that is required to reduce the index to 0, or saturation (USFS-Wildland Fire Assessment System [WFAS] 2015; Florida Forest Service N.D.).

Additionally, the NFDRS is used to provide a measure of the relative seriousness of burning conditions and threat of fire throughout the United States. It allows fire managers to estimate the day’s fire danger for a given area. The NFDRS uses a five color-coded system to help the public understand fire potential; this color scale has been adapted slightly for NJFFS purposes. The NFDRS (with the NJFFS color scheme) is as follows:

**Table 5.4.11-3. Fire Danger Rating and Color Code**

Fire Danger Rating and Color Code	Description
Low (L) (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) (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





**Table 5.4.11-3. Fire Danger Rating and Color Code**

Fire Danger Rating and Color Code	Description
	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: NJFFS 2015, WFAS 2015

### Previous Occurrences and Losses

Many sources provided wildfire information regarding previous occurrences and losses associated with wildfire throughout New Jersey and Cape May County. With many sources reviewed for the purpose of this HMP Update, 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 update.

### FEMA Major Disasters and Emergency Declarations

Between 1954 and 2020, New Jersey was included in two FEMA fire management assistance (FMA) declarations. Generally, these disasters cover a wide range of the State; therefore, the disaster may have impacted many counties. Cape May County was not included in either declaration.

### U.S. Department of Agriculture Disaster Declarations

The Secretary of Agriculture from the U.S. Department of Agriculture (USDA) is authorized to designate counties as disaster areas to make emergency loans to producers suffering losses in those counties and in counties that are contiguous to a designated county. Between 2015 and 2020, Cape May County was included in two USDA disaster declarations (S4071 and S4424), neither of which were due to wildfire conditions.

### Wildfire Events

Based on information provided by NJFFS, Cape May County has experienced 381 wildfire incidents between 2010 and 2019, burning 139 acres in total. Over the past ten years, Middle Township has seen the greatest frequency of incidents (143) and acreage burned (43.5), followed by Lower Township, Upper Township, and Dennis Township respectively. Wildfires typically impact mainland communities with significant forest and vegetation cover as opposed to barrier island communities that are significantly more developed. Acreage and incident counts are shown in the following table.

**Table 5.4.11-4. Wildfire Incidents in Cape May County by Municipality, 2010-2019**

Municipality	Number of Incidents	Acreage Burned
Middle Twp.	143	43.5
Lower Twp.	88	33
Upper Twp.	69	29.75
Dennis Twp.	66	25
Woodbine	12	4.75
Cape May City	1	1.25
West Cape May	1	1
North Wildwood	1	0.75
<b>Total</b>	<b>381</b>	<b>139</b>

Source: NJ Forest Fire Service, 2020







On a Countywide average, approximately 14 acres are burned in wildfires each year since 2010. 2010 saw the highest number of fires (65) and acres burned (23). Since 2015, both the number of fires and acreage burned has fluctuated. In 2018, an increase in brush fires in Upper Township led to an increase in acres burned.

**Table 5.4.11-5. Wildfire Events in Cape May County (2015-2019)**

	2015		2016		2017		2018		2019	
	Number of Events	Acres Burned	Number of Events	Acres Burned	Number of Events	Acres Burned	Number of Events	Acres Burned	Number of Events	Acres Burned
Cape May City	0	0	1	1.25	0	0	0	0	0	0
Dennis Twp	9	2.25	3	1	6	2.25	4	1	13	3.5
Lower Twp	6	1.5	5	3.5	7	3.25	6	2.75	3	1
Middle Twp	11	3.5	9	3.5	15	3.75	12	3.75	16	4
Upper Twp	5	3	2	1.75	8	3	10	8.25	5	1.75
West Cape May	0	0	0	0	1	1	0	0	0	0
Woodbine	1	0.25	3	2	1	0.25	0	0	0	0
<b>County Totals</b>	<b>32</b>	<b>10.5</b>	<b>23</b>	<b>13</b>	<b>38</b>	<b>13.5</b>	<b>32</b>	<b>15.75</b>	<b>37</b>	<b>10.25</b>

Source: NJ Forest Fire Service, 2020

### Probability of Future Occurrences

Estimating the approximate number of wildfires to occur in Cape May County is difficult to predict in a probabilistic manner. 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 wildfire fuel and risk zones. Based on available data, wildfires will continue to present a risk to Cape May County. Given the numerous factors that can impact wildfire potential, the likelihood of a fire event starting and sustaining itself should be gauged by professional fire managers on a daily basis. Although a definite prediction of future wildfire events cannot be noted, an analysis of the frequency of past occurrences can give professionals a rough guide as to how many potential events may occur each year if current trends continue.

In order to determine the probability of wildfire occurrences in Cape May County, the New Jersey Forest Fire Service and online searches were used to identify previous events. Please note that information regarding previous events and losses, wildfire occurrences that were readily available via online research were used and that events prior to 2009 were not examined. Therefore, the probability calculations does not include all wildfire events that occurred in the County. Based on the number of events found, Cape May County has a 100 percent chance of a wildfire occurring in any given year.

**Table 5.4.11-6. Probability of Future Occurrence of Wildfire Events**

Hazard Type	Number of Occurrences Between 2010 and 2019	% Chance of Occurring in Any Given Year
Wildfire	381	100

Source: New Jersey Forest Fire Service, 2020

In Section 5.3, the identified hazards of concern for Cape May County were ranked. The probability of occurrence, or likelihood of the event, is one parameter used for ranking hazards. Based on historical records and input from the Planning Partnership, the probability of occurrence for wildfire in the County is considered ‘occasional’ (between 10 and 100% chance of occurring in any given year). Though brush fires occur frequently in certain portions of the County, they are rare events in the County’s densest areas.





## Climate Change Impacts

Climate change includes major changes in temperature, precipitation, or wind patterns, which occur over several decades or longer. Due to the increase in greenhouse gas concentrations since the end of the 1890s, New Jersey has experienced a 3.5° F (1.9° C) increase in the State’s average temperature (Office of the New Jersey State Climatologist 2020), which is faster than the rest of the Northeast region (2° F [1.1° C]) (Melillo et al. 2014) and the world (1.5° F [0.8° C]) (IPCC 2014). This warming trend is expected to continue. By 2050, temperatures in New Jersey are expected to increase by 4.1 to 5.7° F (2.3° C to 3.2° C) (Horton et al. 2015). Thus, New Jersey can expect to experience an average annual temperature that is warmer than any to date (low emissions scenario) and future temperatures could be as much as 10° F (5.6° C) warmer (high emissions scenario) (Runkle et al. 2017). New Jersey can also expect that by the middle of the 21st century, 70% of summers will be hotter than the warmest summer experienced to date (Runkle et al. 2017). The increase in temperatures is expected to be felt more during the winter months (December, January, and February), resulting in less intense cold waves, fewer sub-freezing days, and less snow accumulation.

As temperatures increase, Earth’s atmosphere can hold more water vapor which leads to a greater potential for precipitation. Currently, New Jersey receives an average of 46 inches of precipitation each year (Office of the New Jersey State Climatologist 2020). Since the end of the twentieth century, New Jersey has experienced slight increases in the amount of precipitation it receives each year, and over the last 10 years there has been a 7.9% increase. By 2050, annual precipitation in New Jersey could increase by 4% to 11% (Horton et al. 2015). By the end of this century, heavy precipitation events are projected to occur two to five times more often (Walsh et al. 2014) and with more intensity (Huang et al. 2017) than in the last century. New Jersey will experience more intense rain events, less snow, and more rainfalls (Fan et al. 2014, Demaria et al. 2016, Runkle et al. 2017). Also, small decreases in the amount of precipitation may occur in the summer months, resulting in greater potential for more frequent and prolonged droughts (Trenberth 2011).

A gradual change in temperatures will alter the growing environment of many tree species throughout the United States and New Jersey, reducing the growth of some trees and increasing the growth of others. Tree growth and regeneration may be affected more by extreme weather events and climatic conditions than by gradual changes in temperature or precipitation. While an increase in annual precipitation is expected, warmer temperatures may lead to longer dry seasons and multi-year droughts, creating triggers for wildfires, insects, and invasive species. Increased temperature and change in precipitation will also affect fuel moisture during wildfire season and the length of time during which wildfires can burn during a given year (U.S. Department of Agriculture [USDA] 2012). Climate change may also increase the frequency of lightning strikes. A warmer atmosphere holds more moisture which is one of the key items for triggering a lightning strike. Lightning strikes cause approximately half the wildfires in the United States. If the frequency of lightning strikes increases, the potential for wildfires from these strikes also increases (Lee 2014). Wildfire incidents are predicted to increase throughout the United States due to climate change, causing at least a doubling of areas burned within the next century (USDA 2012).

As stated above, according to the temperature projections Cape May County can expect warmer conditions with drier conditions likely to occur in the summer months which may increase the frequency and intensity of wildfires. Higher temperatures are expected to increase the amount of moisture that evaporates from land and water. These changes have the potential to lead to more frequent and severe droughts, which, in turn, increases the likelihood of wildfires (U.S. EPA 2009).

Sea level rise is expected to accelerate in rate of increase in the future. Rising sea levels will inundate inland areas that are currently dry coastal uplands. Additionally, natural and man-made topographic features prevent flooded upland areas from discharging floodwaters after periods of flooding. This was observed in the wake of Superstorm Sandy, when standing pools of water killed inland trees and vegetation throughout the Jersey Shore. In Dennis Township, historic sea level rise has contributed to the phenomenon of “ghost forests”, where stands



of dead trees result from saltwater infiltration. An increase in sea level also implies that storm surges will operate from an elevated base, so severe coastal flooding may be more frequent in the future (NJ Climate Adaptation Alliance 2016). Increased sea levels are connected to saltwater intrusion. Continued flooding and infiltration will result in dead vegetation that serves as fuel for wildfire.

### 5.4.11.2 Vulnerability Assessment

To understand risk, a community must evaluate what assets are exposed or vulnerable in the identified hazard area. For the wildfire hazard, the Wildland-Urban Interface (Interface and Intermix) obtained through the SILVIS Laboratory, Department of Forest Ecology and Management, University of Wisconsin – Madison, was referenced to delineate wildfire hazard areas. The University of Wisconsin – Madison wildland fire hazard areas are based on the 2010 Census and 2006 National Land Cover Dataset and the Protected Areas Database. For this risk assessment, the high-, medium-, and low-density interface areas were combined and used as the “Interface” hazard area, and the high, medium-, and low-density intermix areas were combined and used as the “Intermix” hazard areas.

#### Impact on Life, Health and Safety

Wildfires have the potential to impact human health and life of residents and responders, structures, infrastructure, and natural resources. The most vulnerable populations include emergency responders and those within a short distance of the interface between the built environment and the wildland environment. First responders are exposed to the dangers from the initial incident and after-effects from smoke inhalation and heat stroke. **Table 5.4.11-7** summarizes the estimated population exposed to the wildfire hazard by municipality.

Based on the analysis, an estimated 1,566 residents, or 1.7-percent of the County’s population, are located in the extreme, high, and very high wildfire hazard areas. Overall, the Middle Township has the greatest number of individuals located in the “extreme,” “very high,” and “high” hazard areas (i.e., 998 persons).

Of the population exposed, the most vulnerable include the economically disadvantaged and the population over age 65. Economically disadvantaged populations are more vulnerable because they are likely to evaluate their risk and make decisions to evacuate based on net economic impacts on their families. The population over age 65 is also more vulnerable because they are more likely to seek or need medical attention that may not be available due to isolation during a wildfire event, and they may have more difficulty evacuating. In Cape May County, there are 10,140 persons in poverty and 23,572 persons over 65 years old.

**Table 5.4.11-7. Estimated Vulnerable Population**

Jurisdiction	American Community Survey (2014-2018) Population	Estimated Number of Persons Exposed to Wildland-Urban Interface/Intermix Areas				Estimated Number of Persons Exposed to Wildfire Fuel Hazard Area	
		Number of Persons Exposed to Wildland-Urban Interface Area	Percent of Total	Number of Persons Exposed to Wildland-Urban Intermix Area	Percent of Total	Number of Persons Exposed to Wildfire Fuel Extreme, Very High, and High Hazard Area	Percent of Total
Avalon Borough	1,409	274	19.4%	0	0.0%	0	0.0%
Cape May City	3,491	0	0.0%	68	1.9%	0	0.0%
Cape May Point Borough	188	0	0.0%	0	0.0%	1	0.4%
Dennis Township	6,244	2,164	34.6%	3,566	57.1%	136	2.2%





**Table 5.4.11-7. Estimated Vulnerable Population**

Jurisdiction	American Community Survey (2014-2018) Population	Estimated Number of Persons Exposed to Wildland-Urban Interface/Intermix Areas				Estimated Number of Persons Exposed to Wildfire Fuel Hazard Area	
		Number of Persons Exposed to Wildland-Urban Interface Area	Percent of Total	Number of Persons Exposed to Wildland-Urban Intermix Area	Percent of Total	Number of Persons Exposed to Wildfire Fuel Extreme, Very High, and High Hazard Area	Percent of Total
Lower Township	21,838	10,728	49.1%	1,623	7.4%	125	0.6%
Middle Township	18,492	8,898	48.1%	9,057	49.0%	998	5.4%
North Wildwood City	3,849	0	0.0%	0	0.0%	0	0.0%
Ocean City	11,202	3,999	35.7%	73	0.7%	6	0.1%
Sea Isle City	1,955	1,858	95.0%	51	2.6%	1	0.0%
Stone Harbor Borough	955	0	0.0%	0	0.0%	0	0.0%
Upper Township	11,909	7,910	66.4%	3,771	31.7%	250	2.1%
West Cape May Borough	1,103	0	0.0%	26	2.3%	4	0.4%
West Wildwood Borough	376	0	0.0%	0	0.0%	0	0.0%
Wildwood City	5,073	0	0.0%	0	0.0%	0	0.0%
Wildwood Crest Borough	3,131	0	0.0%	0	0.0%	0	0.0%
Woodbine Borough	2,490	1,242	49.9%	1,126	45.2%	46	1.9%
<b>Cape May County (Total)</b>	<b>93,705</b>	<b>37,072</b>	<b>39.6%</b>	<b>19,362</b>	<b>20.7%</b>	<b>1,566</b>	<b>1.7%</b>

**Impact on General Building Stock**

Buildings located within the NJFFS identified extreme, very high or high fuel hazard areas are exposed and considered vulnerable to the wildfire hazard. Buildings constructed of wood or vinyl siding are generally more likely to be impacted by the fire hazard than buildings constructed of brick or concrete. Table 5.4.11-8 summarizes the estimated building stock inventory located in the hazard area by municipality. Less than 2% (\$1.4 billion) of the County’s building replacement cost value is located in the extreme/very high/high hazard area. Middle Township has the greatest number of buildings located in the extreme/very high/high hazard area (850 structures – 4.7% of its total) and has the greatest replacement cost value located in the hazard area (\$858 million – 7.4% of its total).

All state and federal park areas in the County are under the control of state and federal agencies. The NJFFS conducts brush maintenance in state parks to reduce the risks which includes prescribed burns, clearing underbrush, etc. At a local level, municipalities supply water and manpower to assist during a brush fire.







**Table 5.4.11-8. Building Stock Replacement Cost Value Located in Wildfire Fuel Hazard Ranking Zones**

Jurisdiction	Number of Buildings	Total Replacement Cost Value (RCV)	Estimated Building Stock Exposed to Wildland-Urban Interface/Intermix Areas								Estimated Building Stock Exposed to Wildfire Fuel Hazard Area			
			Number of Buildings Exposed to Wildland-Interface Area	Percent of Total	Total Replacement Cost Value Exposed to Wildland-Interface Area	Percent of Total	Number of Buildings Exposed to Wildland-Intermix Area	Percent of Total	Total Replacement Cost Value Exposed to Wildland-Intermix Area	Percent of Total	Number of Buildings Exposed to Wildfire Fuel Extreme, Very High, and High Hazard Area	Percent of Total	Total Replacement Cost Value Exposed to Wildfire Fuel Extreme, Very High, and High Hazard Area	Percent of Total
Avalon Borough	5,867	\$8,232,959,879	1,125	19.2%	\$1,862,679,796	22.6%	0	0.0%	\$0	0.0%	5	0.1%	\$10,012,829	0.1%
Cape May City	4,234	\$5,153,049,612	0	0.0%	\$0	0.0%	85	2.0%	\$135,204,722	2.6%	2	0.0%	\$1,002,611	0.0%
Cape May Point Borough	785	\$663,183,164	0	0.0%	\$0	0.0%	0	0.0%	\$0	0.0%	3	0.4%	\$4,651,609	0.7%
Dennis Township	7,301	\$3,813,425,173	2,040	27.9%	\$1,134,008,537	29.7%	4,586	62.8%	\$2,373,007,081	62.2%	288	3.9%	\$171,673,821	4.5%
Lower Township	19,597	\$9,950,232,225	9,323	47.6%	\$3,912,810,869	39.3%	1,708	8.7%	\$836,435,323	8.4%	124	0.6%	\$107,028,377	1.1%
Middle Township	18,197	\$11,557,342,752	7,659	42.1%	\$4,978,808,236	43.1%	9,259	50.9%	\$4,508,725,296	39.0%	850	4.7%	\$858,500,905	7.4%
North Wildwood City	4,729	\$4,423,365,953	0	0.0%	\$0	0.0%	0	0.0%	\$0	0.0%	1	0.0%	\$876,400	0.0%
Ocean City	18,172	\$17,100,920,036	6,375	35.1%	\$4,666,412,341	27.3%	116	0.6%	\$79,665,674	0.5%	15	0.1%	\$19,117,926	0.1%
Sea Isle City	6,712	\$7,663,928,227	6,358	94.7%	\$7,273,680,056	94.9%	172	2.6%	\$217,581,345	2.8%	4	0.1%	\$3,229,626	0.0%
Stone Harbor Borough	3,836	\$3,291,756,871	0	0.0%	\$0	0.0%	0	0.0%	\$0	0.0%	1	0.0%	\$535,656	0.0%
Upper Township	9,627	\$6,506,171,365	5,947	61.8%	\$4,116,504,194	63.3%	3,385	35.2%	\$2,116,086,539	32.5%	203	2.1%	\$218,154,552	3.4%
West Cape May Borough	1,623	\$1,178,516,373	0	0.0%	\$0	0.0%	61	3.8%	\$65,172,492	5.5%	7	0.4%	\$6,196,622	0.5%
West Wildwood Borough	805	\$459,103,094	0	0.0%	\$0	0.0%	0	0.0%	\$0	0.0%	0	0.0%	\$0	0.0%
Wildwood City	3,679	\$4,379,038,844	0	0.0%	\$0	0.0%	0	0.0%	\$0	0.0%	0	0.0%	\$0	0.0%
Wildwood Crest Borough	5,410	\$4,552,156,876	0	0.0%	\$0	0.0%	0	0.0%	\$0	0.0%	1	0.0%	\$418,569	0.0%
Woodbine Borough	1,416	\$1,335,589,432	657	46.4%	\$465,543,808	34.9%	567	40.0%	\$290,704,047	21.8%	26	1.8%	\$25,522,628	1.9%
<b>Cape May County (Total)</b>	<b>111,990</b>	<b>\$90,260,739,877</b>	<b>39,484</b>	<b>35.3%</b>	<b>\$28,410,447,837</b>	<b>31.5%</b>	<b>19,939</b>	<b>17.8%</b>	<b>\$10,622,582,518</b>	<b>11.8%</b>	<b>1,530</b>	<b>1.4%</b>	<b>\$1,426,922,130</b>	<b>1.6%</b>





### Impact on Critical Facilities

It is recognized that a number of critical facilities are located in the wildfire hazard area, and are also vulnerable to the threat of wildfire. Many of these facilities are the locations for vulnerable populations (i.e., schools, senior facilities) and responding agencies to wildfire events (i.e., fire, police). Table 5.4.11-9 through Table 5.4.11-11 summarize the critical facilities located within the wildfire fuel hazard ranking zones by jurisdiction.

**Table 5.4.11-9. Facilities in High Wildfire Fuel Hazard Ranking Zone in Cape May County**

Jurisdiction	Critical Facilities Exposed to the Wildfire Fuel High Hazard Area							
	Communications Tower	Dams	Marinas	Recreation	Secondary Education	Superfund Sites	Wastewater Facilities	Wastewater Pump Station
Avalon Borough	0	0	0	0	0	0	0	2
Lower Township	0	0	0	0	1	0	0	0
Middle Township	1	0	0	0	0	1	0	1
Ocean City	0	0	0	1	0	0	1	0
Sea Isle City	0	0	1	0	0	0	0	0
Upper Township	0	1	1	0	0	0	0	0
<b>Cape May County (Total)</b>	<b>1</b>	<b>1</b>	<b>2</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>3</b>

**Table 5.4.11-10. Facilities in Very High Fuel Hazard Ranking Zone in Cape May County**

Jurisdiction	Critical Facilities Exposed to the Wildfire Fuel Very High Hazard Area				
	Communications Tower	County Facilities	EMS	Wastewater Facilities	Wastewater Pump Station
Lower Township	0	0	0	0	1
Middle Township	0	0	0	1	0
Upper Township	1	1	1	0	0
<b>Cape May County (Total)</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>

**Table 5.4.11-11. Facilities in Extreme Fuel Hazard Ranking Zone in Cape May County**

Jurisdiction	Critical Facilities Exposed to the Wildfire Fuel Extreme Hazard Area						
	Communications Tower	Day Care	Potable Water Tower	Primary Education	Superfund Sites	Wastewater Pump Station	Well
Dennis Township	2	0	0	1	0	0	1
Middle Township	1	0	0	0	0	1	0
Upper Township	1	1	1	0	0	0	0
Woodbine Borough	0	0	0	0	1	0	0
<b>Cape May County (Total)</b>	<b>4</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>

### Impact on Economy

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.

### Impact on the Environment

According to the USGS, post-fire runoff polluted with debris and contaminants can be extremely harmful to ecosystem and aquatic life (USGS 2018). Studies show that urban fires in particular are more harmful to the environment compared to forest fires (USGS 2018). The age and density of infrastructure within Cape May County can exacerbate consequences of fires on the environment because of the increased amount of chemicals and contaminants that would be released from burning infrastructure. These chemicals, such as iron lead, and zinc, may leach into the storm water, contaminate nearby streams, and impair aquatic life.

### Future Changes That May Impact Vulnerability

Understanding future changes that affect vulnerability can assist in planning for future development and ensure establishment of appropriate mitigation, planning, and preparedness measures. The County considered the following factors to examine potential conditions that may affect hazard vulnerability:

- Potential or projected development
- Projected changes in population
- Other identified conditions as relevant and appropriate, including the impacts of climate change

### Projected Development

As discussed in Section 4, areas targeted for future growth and development have been identified across the County. Any areas of growth located in the defined wildfire hazard areas could be potentially impacted by wildfire similar to those that currently exist within the County. Refer to the jurisdictional annexes in Volume II of this HMP. It is anticipated that any new development and new residents in the extreme, very high or high fuel hazard areas will be exposed to the wildfire hazard.

### Projected Changes in Population

The 2010 Census data indicates a county population of 97,265. However, more current data, according to U.S. Census Bureau, 2018 American Community Survey 5-Year Estimate, estimates a County population of approximately 93,705, which is a decrease in population since 2010. It is likely that a slight decrease in population will continue to occur in the near future.

### Climate Change

According to the U.S. Fire Service (USFS), climate change will likely alter the atmospheric patterns that affect fire weather. Changes in fire patterns will, in turn, impact carbon cycling, forest structure, and species composition. Climate change associated with elevated greenhouse gas concentrations may create an atmospheric and fuel environment that is more conducive to large, severe fires (USFS 2020). Under a changing climate, wildfires are expected to increase by 50 percent across the United States (USFS 2020).

Fire interacts with climate and vegetation (fuel) in predictable ways. Understanding the climate/fire/vegetation interactions is essential for addressing issues associated with climate change that include:

- Effects on regional circulation and other atmospheric patterns that affect fire weather
- Effects of changing fire regimes on the carbon cycle, forest structure, and species composition, and
- Complications from land use change, invasive species and an increasing wildland-urban interface (USFS 2020).



It is projected that higher summer temperatures will likely increase the high fire risk by 10 to 30-percent. Fire occurrence and/or area burned could increase across the U.S. due to the increase of lightning activity, the frequency of surface pressure and associated circulation patterns conducive to surface drying, and fire-weather conditions, in general, which is conducive to severe wildfires. Warmer temperatures will also increase the effects of drought and increase the number of days each year with flammable fuels and extending fire seasons and areas burned (USFS 2020).

Future changes in fire frequency and severity are difficult to predict. Global and regional climate changes associated with elevated greenhouse gas concentrations could alter large weather patterns, thereby affecting fire-weather conducive to extreme fire behavior (USFS 2020).

### **Change of Vulnerability Since 2016 HMP**

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Since the 2016 analysis, population statistics have been updated using the 2014-2018 American Community Survey. The updated building stock inventory was created using building footprints and parcel data from the County, which was supplemented with 2013 MOV-ID tax assessor data and 2019 RS Means replacement cost value for building and content replacement costs. This provides an up-to-date look at the entire building stock for Cape May County and gives more accurate results for the exposure and loss estimation analysis.

The NJFFS Wildfire Fuel Hazard spatial layer has not been updated since the last HMP; therefore, changes and increases in overall wildfire hazard exposure are attributed to increases in population and new development.