4.3.3 DROUGHT

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 drought hazard in Sussex County.

2021 HMP Changes

- New and updated figures from federal and state agencies are incorporated.
- Previous occurrences were updated with events that occurred between 2015 and 2020.
- The County's 2017 5-year American Community Survey population was considered when determining its exposure and vulnerability to the drought hazard.

Profile

Hazard Description

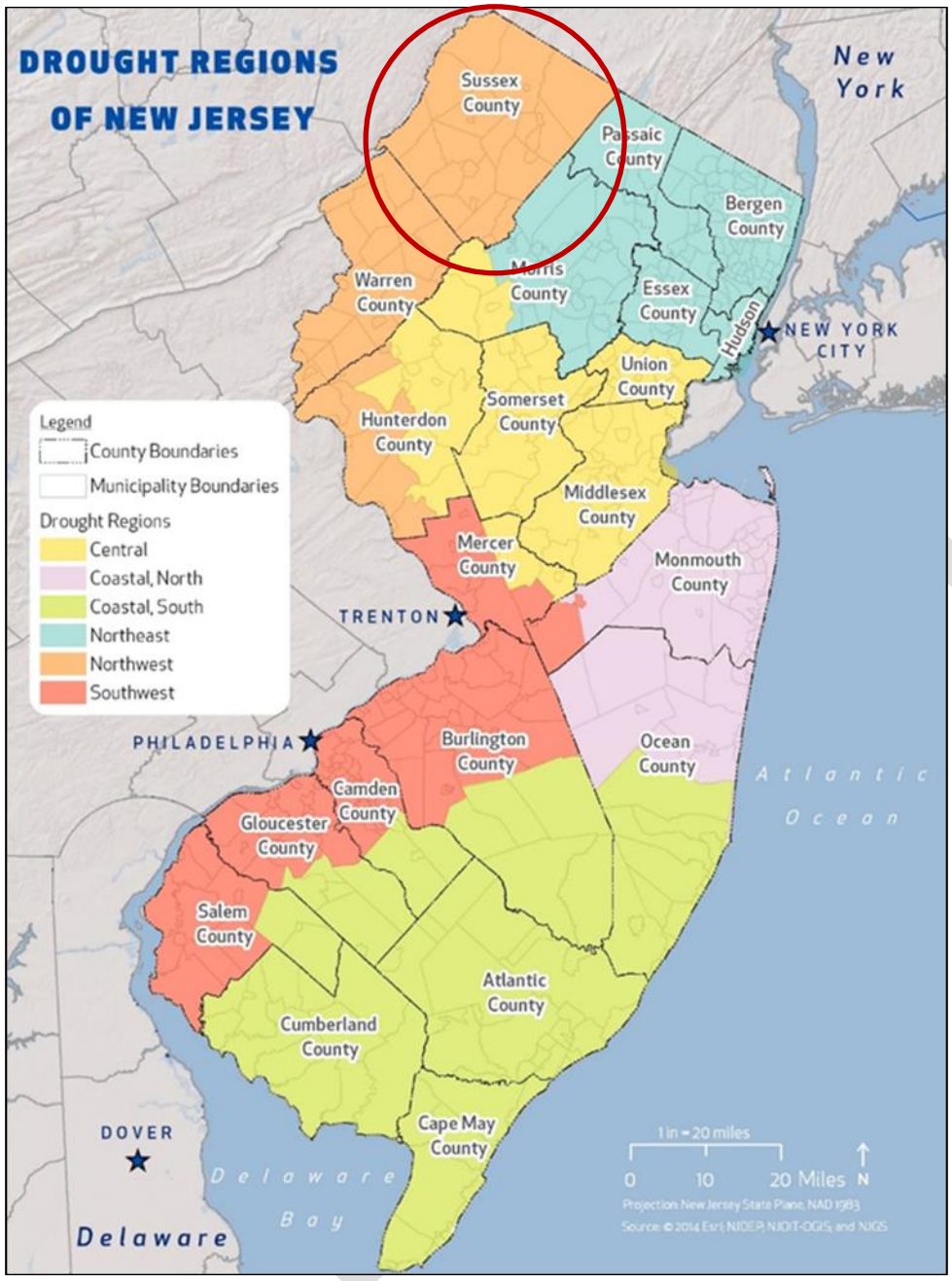
Drought is a period characterized by long durations of below normal precipitation. Drought conditions occur in virtually all climatic zones, yet characteristics of drought vary significantly from one region to another, relative to normal precipitation within respective regions. Drought can affect agriculture, water supply, aquatic ecology, wildlife, and plant life. Drought is a temporary irregularity in typical weather patterns and differs from aridity, which reflects low rainfall within a specific region and is a permanent feature of the climate of that area.

Location

Climate divisions are regions within a state that are climatically homogenous. The National Oceanic and Atmospheric Administration (NOAA) has divided the U.S. into 359 climate divisions. The boundaries of these divisions typically coincide with the county boundaries, except in the western U.S., where they are based largely on drainage basins (U.S. Energy Information Administration, Date Unknown). According to NOAA, New Jersey is made up of three climate divisions: Northern, Southern, and Coastal; Sussex County is located in the Northern Climate Division (NOAA, 2012).

Drought regions allow New Jersey to respond to changing conditions without imposing restrictions on areas not experiencing water supply shortages. New Jersey is divided into six drought regions that are based on regional similarities in water supply sources and rainfall patterns (Hoffman and Domber, 2003). Sussex County is located in the Northwest Drought Region. Other counties in the Northwest Drought region include Hunterdon and Warren Counties (Hoffman and Domber, 2003) (see Figure 4.3.3-1). These regions were developed based upon hydro-geologic conditions, watershed boundaries, municipal boundaries, and water supply characteristics. Drought region boundaries are contiguous with municipal boundaries because during a water emergency, the primary enforcement mechanism for restrictions is municipal police forces.

Figure 4.3.3-1. Drought Regions of New Jersey

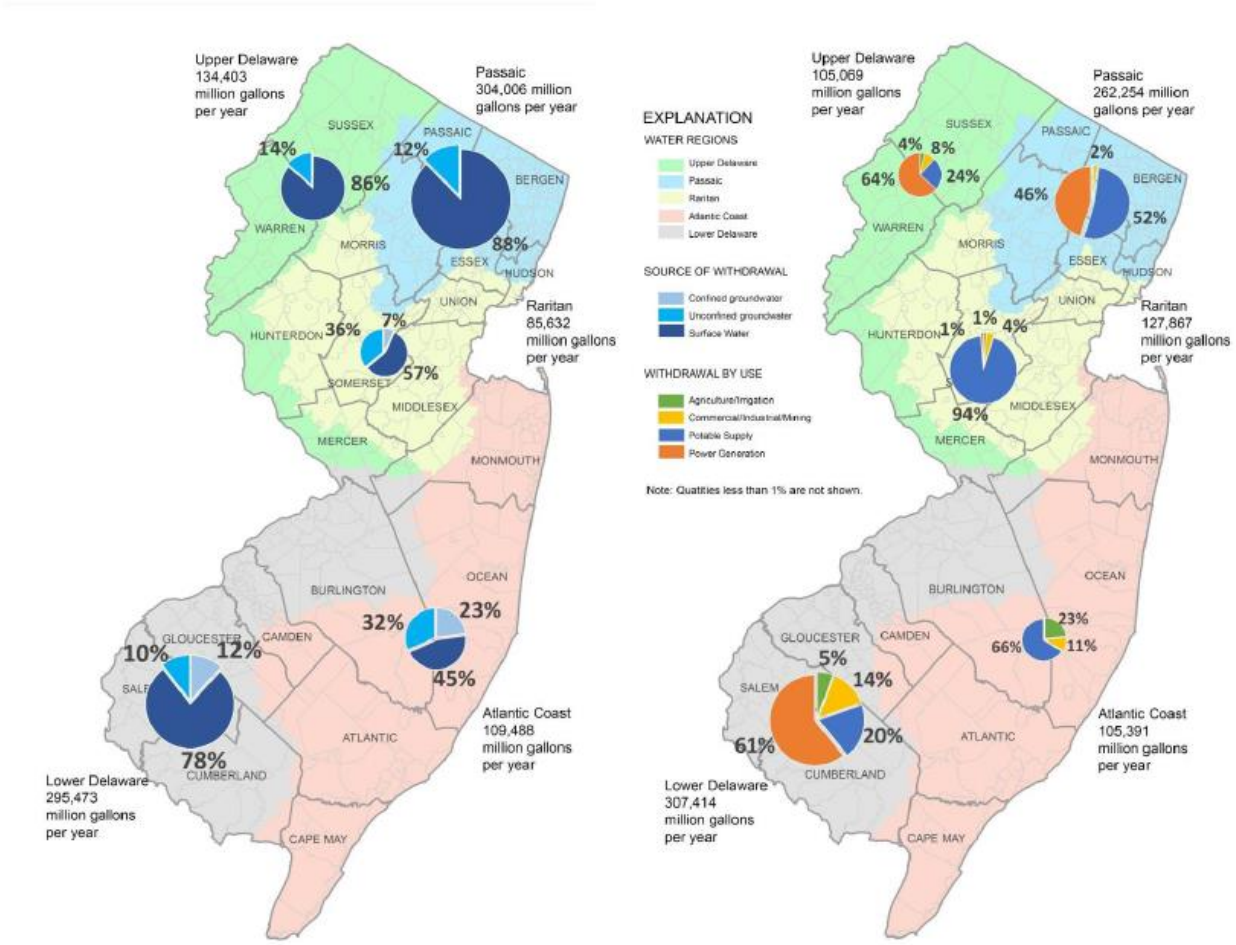


Source: *NJHMP 2019*

Note: *The red circle indicates the location of Sussex County. The County is located within the Northwest Drought Region of New Jersey.*

There are five water regions across the State (compiled from HUCH11 Watershed Management Areas). Sussex County is located in the Upper Delaware water region with a small area along the southeast border with Passaic County located in the Passaic water region; refer to Figure 4.3.3-2. The County's water supply sources are from surface water and unconfined groundwater sources. In terms of annual water withdrawal by sector, the majority is for power generation, followed by potable water supply, commercial/industrial/mining, and agriculture. Water use trends, similar to withdrawal trends, vary from month to month with water use typically peaking during summer months when outdoor and irrigation demands are high (NJDEP 2017).

Figure 4.3.3-2. Water Regions, Sources and Withdrawal by Sector in New Jersey



Source: NJDEP 2017

According to the 2017 Census of Agriculture, Sussex County is home to 1,008 farms covering 59,755 acres. Roughly 407 acres are irrigated (USDA 2017). Farms are considered to be at a higher risk for drought impacts than other types of land use. Table 4.3.3-1 shows the agricultural land use area within Sussex County jurisdictions.

Table 4.3.3-1. Agricultural Land Use Area by Jurisdiction

Jurisdiction	Total Area (Acres)	Agriculture	
		Area (Acres)	Percent of Total Area
Andover (B)	872	211	24.2%
Andover (Twp)	13,304	1,407	10.6%
Branchville (B)	383	7	1.9%
Byram (Twp)	14,536	74	0.5%
Frankford (Twp)	22,585	4,360	19.3%
Franklin (B)	2,833	188	6.6%

Jurisdiction	Total Area (Acres)	Agriculture	
		Area (Acres)	Percent of Total Area
Fredon (Twp)	11,464	2,619	22.8%
Green (Twp)	10,429	2,575	24.7%
Hamburg (B)	747	10	1.3%
Hampton (Twp)	16,305	1,959	12.0%
Hardyston (Twp)	20,892	985	4.7%
Hopatcong (B)	7,949	25	0.3%
Lafayette (Twp)	11,499	2,930	25.5%
Montague (Twp)	29,840	1,088	3.6%
Newton (T)	2,164	42	1.9%
Ogdensburg (B)	1,438	13	0.9%
Sandyston (Twp)	26,926	1,841	6.8%
Sparta (Twp)	24,828	1,007	4.1%
Stanhope (B)	1,341	0	0.0%
Stillwater (Twp)	18,076	1,509	8.3%
Sussex (B)	399	8	1.9%
Vernon (Twp)	44,769	1,756	3.9%
Walpack (Twp)	15,945	369	2.3%
Wantage (Twp)	43,175	9,761	22.6%
Sussex County (Total)	**342,701**	**34,745**	**10.1%**

Source: NJDEP, 2015
Note: B = Borough; T = Town; Twp = Township; % = Percent

Extent

The severity of a drought depends on the degree of moisture deficiency, the duration, and the size and location of the affected area. The longer the duration of the drought and the larger the area impacted, the more severe the potential impacts. The State of New Jersey uses a multi-index system that takes advantage of some of these indices to determine the severity of a drought or extended period of dry conditions.

Palmer Drought Severity Index

The Palmer Drought Severity Index is commonly used by drought monitoring agencies for drought reporting. The PDSI is primarily based on soil conditions. Soil with decreased moisture content is the first indicator of an overall moisture deficit. Table 4.3.3-2 lists the PDSI classifications. At the one end of the spectrum, 0 is used as normal and drought is indicated by negative numbers. For example, -2 is moderate drought, -3 is severe drought, and -4 is extreme drought. The PDSI also reflects excess precipitation using positive numbers; however, this is not shown in Table 4.3.3-2 (National Drought Mitigation Center [NDMC] 2013).

Table 4.3.3-2. Palmer Drought Category Descriptions

Category	Description	Possible Impacts	Palmer Drought Index
D0	Abnormally Dry	Going into drought: short-term dryness slowing	-1.0 to -1.99

Category	Description	Possible Impacts	Palmer Drought Index
		planting and growth of crops or pastures; fire risk above average. Coming out of drought: some lingering water deficits; pastures or crops not fully recovered.	
D1	Moderate drought	Some damage to crops and pastures; fire risk high; streams, reservoirs, or wells low; some water shortages developing or imminent; voluntary water-use restrictions requested.	-2.0 to -2.99
D2	Severe drought	Crop or pasture losses likely; fire risk very high; water shortages common; water restrictions imposed.	-3.0 to -3.99
D3	Extreme drought	Major crop or pasture losses; extreme fire danger; widespread water shortages or restrictions.	-4.0 to -4.99
D4	Exceptional drought	Exceptional and widespread crop/pasture losses; exceptional fire risk; shortages of water in reservoirs, streams, and wells, creating water emergencies.	-5.0 or less

Source: NDMC 2013

The Division of Water Supply and Geoscience within the NJDEP, regularly monitors various water supply conditions within the state based on the different Water Supply Regions. The water supply conditions aid the Department in declaring the regions as being within one of the four stages of water supply drought, Normal, Drought Watch, Drought Warning, and Drought Emergency.

- A ***Drought Watch*** is an administrative designation made by the Department when drought or other factors begin to adversely affect water supply conditions. A Watch indicates that conditions are dry but not yet significantly so. During a drought Watch, the Department closely monitors drought indicators (including precipitation, stream flows and reservoir and ground water levels, and water demands) and consults with affected water suppliers.
- A ***Drought Warning*** represents a non-emergency phase of managing available water supplies during the developing stages of drought and falls between the Watch and Emergency levels of drought response. The aim of a Drought Watch is to avert a more serious water shortage that would necessitate declaration of a water emergency and the imposition of mandatory water use restrictions, bans on water use, or other potentially drastic measures.
- A ***Drought Emergency*** can only be declared by the governor. While drought warning actions focus on increasing or shifting the supply of water, efforts initiated under a water emergency focus on reducing water demands. During a water emergency, a phased approach to restricting water consumption is typically initiated. Phase I water use restrictions typically target non-essential, outdoor water use (NJDEP Division of Water Supply and Geoscience 2018).

Previous Occurrences and Losses

Precipitation variability, coupled with concentrated population centers, can produce wide fluctuations in water availability and demands. The State and County have experienced several episodes of drought that have resulted in water shortages of varying degrees (e.g., mid-1960's, early to mid-1980's and 2001-2002) (NJDEP 2017).

Federal Disaster Declarations

Between 1954 and 2020, the State of New Jersey experienced two FEMA declared drought-related major disasters (DR) or emergencies (EM) classified as a water shortage. Generally, these disasters cover a wide region

of the State; therefore, they may have impacted many counties. Of those two declarations, Sussex County has been included in both declarations (FEMA 2020).

Table 4.3.3-3. FEMA DR and EM Declarations Since 2008 for Drought Events in Sussex County

FEMA Declaration Number	Date(s) of Event	Declaration Date	Event Description
DR-205	August 18, 1965	August 18, 1965	Drought: Water Shortage
EM-3083	October 19, 1980	October 19, 1980	Drought: Water Shortage

Source: FEMA 2020

USDA Disaster Declarations

Agriculture-related drought disasters are quite common. The USDA Secretary of Agriculture 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. In 2015, Sussex County was included in declaration S3930 for excessive heat and drought with losses for all other crops totaling $47,315.10 (USDA 2020a, USDA 2020b).

Drought events identified for Sussex County between 2015 and 2020 are listed in Table 4.3.3-4. For this 2021 HMP update, known drought events that have impacted Sussex County prior to 2015 are identified in Appendix E (Risk Assessment Supplement).

Table 4.3.3-4. Drought Incidents in Sussex County, 2015 to 2020

Date(s) of Event	Event Type	FEMA Declaration Number (if applicable)	Sussex County Designated?	Description
August 26, 2014 – June 29, 2015	Drought	N/A	N/A	According to the U.S. Drought Monitor, conditions held at a D0 or "abnormally dry" status across Sussex County from August 26, 2014 – May 18, 2015; D1 or "moderate drought" status from May 19, 2015 – June 22, 2015; D0 or "abnormally dry" from June 23, 2015 – June 29, 2015. Residents around Lake Hopatcong, concerned about the lake level, sought a reduction in water release.
August 11, 2015 – January 11, 2016	Drought	N/A	N/A	According to the U.S. Drought Monitor, conditions held at a D0 or "abnormally dry" status across Sussex County from August 11, 2015 – January 11, 2016. Boats were pulled early from Lake Hopatcong. Water restrictions were placed in Newton.
February 2-28, 2016	Drought	N/A	N/A	According to the U.S. Drought Monitor, conditions held at a D0 or "abnormally dry" status across Sussex County from February 2-28, 2016.
March 29, 2016 – April 10, 2017	Drought	N/A	N/A	According to the U.S. Drought Monitor, conditions held at a D0 or "abnormally dry" status across Sussex County from March 29, 2016 – June 13, 2016; D1 or "moderate drought" status from June 14, 2016 – August 15, 2016; D0 or "abnormally dry" status from August 16, 2016 – September 12, 2016; D1 or "moderate drought" status from September 13, 2016 – October 17, 2016; D2 or "severe drought" from October 18, 2016 – March 20,

Date(s) of Event	Event Type	FEMA Declaration Number (if applicable)	Sussex County Designated?	Description
				2017; D1 or "moderate drought" from– March 20, 2017 – April 10. Warm, low waters negatively impacted New Jersey trout. A drought watch was issued in July 2016. A drought warning was issued in October 2016. Water conservation was urged in northern New Jersey. The warning was lifted in April 2017.
October 3-30, 2017	Drought	N/A	N/A	According to the U.S. Drought Monitor, conditions held at a D0 or "abnormally dry" status across Sussex County from October 3- 30, 2017.
November 28, 2017 – February 12, 2018	Drought	N/A	N/A	According to the U.S. Drought Monitor, conditions held at a D0 or "abnormally dry" status across Sussex County from November 28, 2017 – February 12, 2018. Low reservoirs were reported in northern New Jersey.
September 24, 2019 – November 11, 2019	Drought	N/A	N/A	According to the U.S. Drought Monitor, conditions held at a D0 or "abnormally dry" status across Sussex County from September 24, 2019 – November 11, 2019. A fire restriction was issued in northern New Jersey.
March 17-30, 2020.	Drought	N/A	N/A	According to the U.S. Drought Monitor, conditions held at a D0 or "abnormally dry" status across Sussex County from March 17-30, 2020.
July 7-August 11, 2020	Drought	N/A	N/A	According to the U.S. Drought Monitor, conditions held at a D0 or "abnormally dry" status across Sussex County from July 7-August 11, 2020.

Source: USDA 2020, NDMC 2020, FEMA 2020, US Drought Monitor 2020
Please note that not all events that have occurred in Sussex County are included due to the extent of documentation and the fact that not all sources may have been identified or researched. Loss and impact information 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.

Probability of Future Occurrences

Based on the historical occurrences for drought, it is likely that droughts will occur across New Jersey and Sussex County in the future. Drought affects groundwater sources but not as quickly as surface water supplies. In addition, as temperatures increase (see climate change impacts), the probability for future droughts will likely increase as well.

It is estimated that Sussex County will continue to experience direct and indirect impacts of drought and its impacts on occasion, with the secondary effects causing potential disruption or damage to agricultural activities and creating shortages in water supply within communities.

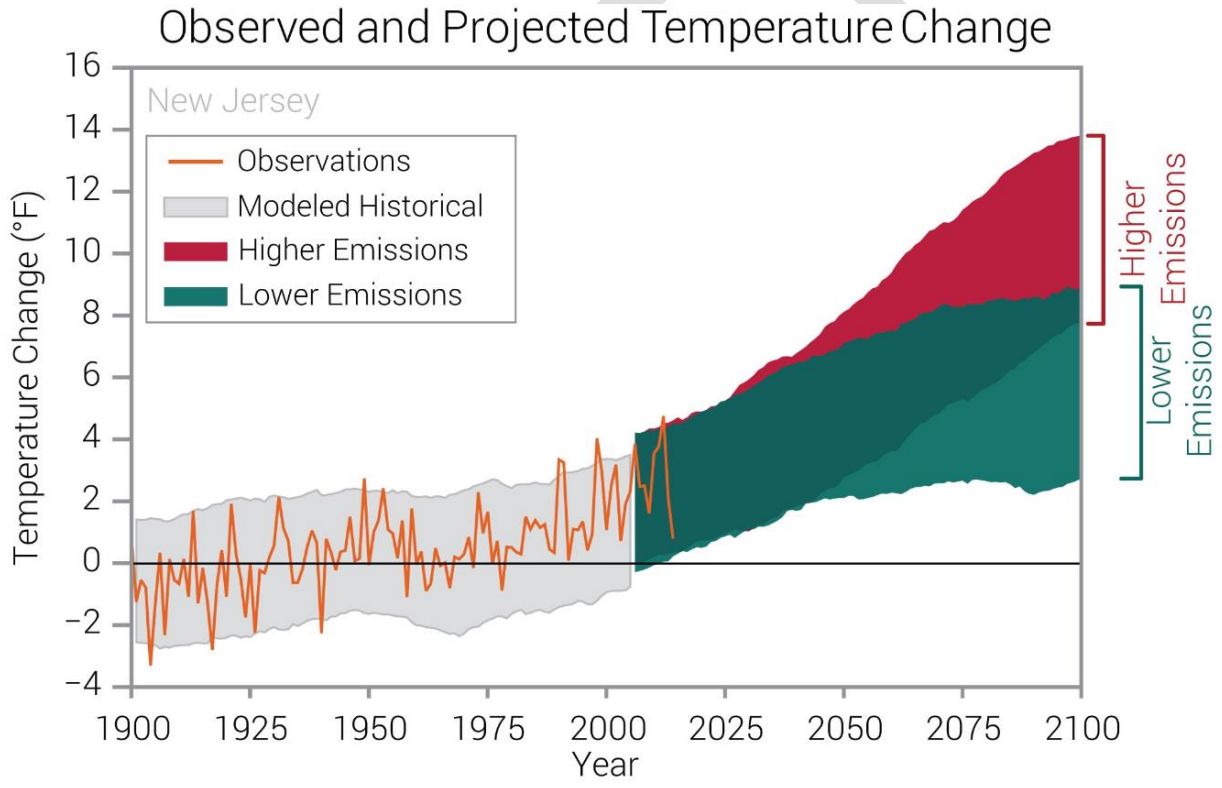
In Section 4.4, the identified hazards of concern for Sussex County were ranked. The probability of occurrence, or likelihood of the event, is one parameter used for hazard rankings. Based on historical records and input from the Planning Partnership, the probability of occurrence for drought is considered 'frequent' (100 percent annual probability; a hazard event may occur multiple times per year, as presented in Table 4.4-1). The ranking of the drought hazard for individual municipalities is presented in the jurisdictional annexes.

Climate Change Impacts

Water resources are important to both society and ecosystems. Humans depend on reliable, clean supply of drinking water to sustain their health. Water is also needed for agriculture, energy production, navigation, recreation, and manufacturing. These water uses put pressure on water resources and are most likely to be worsened by climate change in the future.

The climate of New Jersey is already changing and will continue to change over the course of this century. Since 1900, temperatures in New Jersey have increased an average of 3 degrees Fahrenheit (°F). Historically unprecedented warming is projected by the end of the 21st century. Heat waves are projected to be more intense while cold waves are projected to be less intense. (Office of the New Jersey State Climatologist [ONJSC] 2020). New Jersey has consistently been above the 1900-2014 mean during the 21st century with the highest 5-year average number occurring during 2010-2014 (NOAA NCICS 2020). Figure 4.3.3-3 depicts the observed and projected temperature change for New Jersey from 1900 to 2100.

Figure 4.3.3-3. Observed and Projected Temperature Change in New Jersey



Source: NOAA NCICS 2020

Either under a high or lower emissions pathway, historically unprecedented warming is projected by the end of the 21st century. Increases in the number of extremely hot days and decreases in the number of extremely cold days are projected to accompany the overall warming. According to state-level analysis, by the middle of the 21st century an estimated 70% of summers in this northeast region are anticipated to be hotter than what we now recognize as the warmest summer on record. (NOAA NCICS 2020) These trends will certainly affect the probability and frequency of dry conditions that could lead to drought events in Sussex County.

Vulnerability Assessment

To understand risk, a community must evaluate what assets are exposed or vulnerable in the identified hazard area. The following discusses Sussex County's vulnerability, in a qualitative nature, to the drought hazard.

Impact on Life, Health and Safety

The entire population of Sussex County is exposed to drought events (population of 142,298 people, according to the 2014-2018 American Community Survey population estimates). Drought conditions can cause a shortage of potable water for human consumption, both in quantity and quality. A decrease in available water may also impact power generation and availability to residents.

Public health impacts may include an increase in heat-related illnesses, waterborne illnesses, recreational risks, limited food availability, and reduced living conditions. Vulnerable populations could be particularly susceptible to the drought hazard and cascading impacts due to age, health conditions, and limited ability to mobilize to shelter, cooling and medical resources. Other possible impacts to health due to drought include increased recreational risks; effects on air quality; diminished living conditions related to energy, air quality, and sanitation and hygiene; compromised food and nutrition; and increased incidence of illness and disease. Health implications of drought are numerous. Some drought-related health effects are short-term while others can be long-term (CDC 2020).

Surface water supplies are affected more quickly during droughts than groundwater sources; however, groundwater supplies generally take longer to recover. According to the NJ Drinking Water Watch List, there are 490 suppliers of water to Sussex County (NJ Drinking Water Watch 2020). Of these suppliers, only two suppliers provide water from surface water sources. All other suppliers provide water from groundwater sources. The EPA classifies water suppliers into three major categories: community water systems, non-transient non-community water systems, transient non-community water systems.

- ***Community Water System* (CWS):** A public water system that supplies water to the same population year-round.
- ***Non-Transient Non-Community Water System* (NTNCWS)**: A public water system that regularly supplies water to at least 25 of the same people at least six months per year. Some examples are schools, factories, office buildings, and hospitals which have their own water systems.
- ***Transient Non-Community Water System* (TNCWS)**: A public water system that provides water in a place such as a gas station or campground where people do not remain for long periods of time (EPA 2020).

Overall, in Sussex County, 347 sources are transient non-community water suppliers, 78 are non-transient non-community suppliers, 63 are community suppliers, and 2 are non-public water supplies. Some County residents and organizations also rely on private wells for their water supply needs.

The CDC 2016 Social Vulnerability Index (SVI) ranks U.S. Census tracts on socioeconomic status, household composition and disability, minority status and language, and housing and transportation. Sussex County's overall score is 0.0325, indicating that its communities have very low social vulnerability (CDC 2016). Out of all the census tracts in the County, only one has very high vulnerability which is located in south central Sussex County.

Impact on General Building Stock

No structures are anticipated to be directly affected by a drought event. However, droughts contribute to conditions conducive to wildfires and reduce fire-fighting capabilities. Risk to life and property is greatest in those areas where forested areas adjoin urbanized areas (high density residential, commercial and industrial) also known as the wildfire urban interface (WUI) or where areas are made up of species that are highly susceptible

to erupting into wildfire events. Therefore, all assets in and adjacent to the WUI zone and wildfire fuel hazard areas, including population, structures, critical facilities, lifelines, and businesses are considered vulnerable to wildfire. Refer to Section 4.3.13 for the Wildfire risk assessment.

Impact on Critical Facilities and Lifelines

As mentioned, drought events generally do not impact buildings; however, droughts have the potential to impact agriculture-related facilities, critical facilities and lifelines that are associated with water supplies such as potable water used with fire-fighting services. The impacts droughts cause to agricultural-related facilities is particularly important to Sussex County due to its high amount of acreage devoted to farmland. Critical facilities and lifelines in and adjacent to the wildfire hazard areas are also considered vulnerable to drought.

Water systems and thus distribution to the population may also be impacted by other hazards such as extreme weather events. A good example is Superstorm Sandy where storm surge damaged critical water supply infrastructure along the coast and high winds impacted energy distribution across the State which in turn impacted the ability to supply water. As a result, NJDEP has developed new guidance aimed to ensure that repairs, reconstruction, new facilities and operations/maintenance are focused on enhancing the resilience of critical infrastructure (NJDEP 2017).

Impact on the Economy

Drought can produce a range of impacts that span many economic sectors and can reach beyond an area experiencing physical drought. As previously discussed, water withdrawals are not only used for potable water but for use in the commercial/industrial/mining sectors and power generation. When a state of water emergency is declared by the Governor (when a potential or actual water shortage endangers the public health, safety and welfare), the NJDEP may impose mandatory water restrictions and require specific actions to be taken by water suppliers. According to the New Jersey Water Supply Plan, a water emergency seeks to cause as little disruption as possible to commercial activity and employment (NJDEP 2017).

A prolonged drought can have a serious economic impact on a community. When drought conditions persist with little to no relief, water restrictions may be put into place by local or state governments. These restrictions may include placing limitations on when or how frequent lawns can be watered, car washing services, or any other recreational/commercial outdoor use of water supplies. In exceptional drought conditions, watering of lawns and crops may not be an option. If crops are not able to receive water, farmland will dry out and crops will die. This can lead to crop shortages, which, in turn, increases the price of food.

Increased demand for water and electricity can also result in shortages and higher costs for these resources. Industries that rely on water for business could be impacted the most (e.g., landscaping businesses). Although most businesses will still be operational, they may be impacted aesthetically. These aesthetic impacts are most significant within the recreation and tourism industry. Moreover, droughts within another area could impact the food supply and price of food for residents within the County.

Direct impacts of drought include reduced crop yield, increased fire hazard, reduced water levels, and damage to wildlife and fish habitat. The many impacts of drought can be listed as economic, environmental, or social. Direct and indirect losses include the following:

- Damage to crop quality and crop losses.
- Insect infestation leading to crop and tree losses.
- Plant diseases leading to loss of agricultural crops and trees.
- Reduction in outdoor activities.
- Increased risk of brush fires and wildfires due to dried crops, grasses, and dying trees.

When a drought occurs, the agricultural industry is most at risk in terms of economic impact and damage. For example, crops may not mature leading to a lessened crop yield, wildlife and livestock may become undernourished, land values could decrease, and ultimately there could be a financial loss for the farmer. Based on the 2017 Census of Agriculture, Sussex County farms had a total market value of products sold of approximately $10.8-million in crop sales and $7.4-million in livestock sales. Table 4.3.3-5 summarizes the acreage of agricultural land exposed to the drought hazard.

Table 4.3.3-5. Agricultural Land in Sussex County in 2017

Number of Farms	Land in Farms (acres)	Total Cropland (acres)	Harvested Cropland (acres)	Irrigated Land (acres)
1,008	59,766	25,671	20,441	407

Source: USDA 2017

Impact on the Environment

Droughts can impact the environment because these events can trigger wildfires, increase insect infestations, and exacerbate the spread of disease (NOAA 2020). Droughts will also impact water resources that are relied upon by aquatic and terrestrial species. Ecologically sensitive areas, such as wetlands, can be particularly vulnerable to drought periods because they are dependent on steady water levels and soil moisture availability to sustain growth. As a result, these types of habitats can be negatively impacted after long periods of dryness (NJDEP 2017).

Droughts also have the potential to lead to water pollution due to the lack of rainwater to dilute any chemicals in water sources. Contaminated water supplies may be harmful to plans and animals. If water is not getting into the soils, the ground will dry up and become unstable for plant species. Maintaining stability prevents erosion and treefall that is susceptible to catching fire and starting wildfire events (North Carolina State University 2020).

Future Changes That May Impact Vulnerability

Understanding future changes that impact vulnerability in the County can assist in planning for future development and ensuring that appropriate mitigation, planning, and preparedness measures are in place. 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 3 (County Profile), areas targeted for future growth and development have been identified across Sussex County. The New Jersey Water Supply Plan indicates seasonal outdoor water use is rising statewide and is attributable to continued suburbanization and increases in residential and commercial lawn and landscape maintenance. Changes in water demands by commercial/industrial users will depend on future development of this water type use and how effectively efficiency techniques are implemented (NJDEP 2017).

Projected Changes in Population

Potable water use is the second largest water use sector and largest consumptive use in New Jersey. As such, population projections, per capital water use and percent non-residential water use by water system are important factors to consider when assessing future water needs. According to the 2018 5-year population estimates from

the American Community Survey, the population of Sussex County (i.e., 142,298 persons) has decreased by approximately 4.7-percent since 2010. Even though the population has decreased, any changes in the distribution of the population can impact the source of water resources required to sustain the user demand of each household, agricultural operation, and business operation.

Climate Change

As discussed above, most studies project that the State of New Jersey will see an increase in average annual temperatures. Additionally, the State is projected to experience more frequency droughts which may affect the availability of water supplies, primarily placing an increased stress on the population and their available potable water. Agricultural needs may increase if the climate grows warmer but may decrease if more efficient irrigation techniques are adopted broadly or if precipitation increases. A decrease in water supply, or increase in water supply demand, may increase the County's vulnerability to structural fire and wildfire events. Critical water-related service sectors may need to adjust management practices and actively manage resources to accommodate for future changes.

Vulnerability Change Since the 2016 HMP

When examining the change in the County's vulnerability to drought events from the 2016 HMP to this update, it is important to look at each entity that is exposed and vulnerable. The total population across the County has experienced a slight decrease, which can place less stress on the water supply during a drought event. However, the number of farm operations has increased since the 2012 USDA report by over 10-percent, which may increase the overall stress on the water supply during a drought event.