

## 14. WILDFIRES

### Section III: Natural Hazard Risk Assessment

#### A. Hazard Profile

##### i. Hazard Description

Wildfires, also called wildland fires or brushfires, are uncontrolled fires that are ignited in woodland, brush, or grassland areas with minimal development. When wildfires burn out of control and begin to threaten buildings or other manmade structures, they are referred to as wildland-urban interface (WUI) fires. This is because WUI is the area, or zone, where structures and other human developments come into contact with undeveloped areas or vegetative fuels.

For wildfires to ignite, grow, and sustain themselves, they require optimal weather conditions, a fuel source, and an ignition source. Optimal weather conditions include lack of precipitation, high temperatures, and low relative humidity (which allow vegetation and brush to burn more easily) and high winds (which cause the fire to spread). During periods of unusually dry weather or sustained drought, dry leaves, brush, and grass accumulate, forming a hazardous source of fuel. Tall perennial grasses called phragmites, typically found in temperate wetland areas, significantly contribute to the risk of wildfires. The combination of high fuel loads and WUI development create a dangerous scenario when weather conditions are favorable. Once the right combination of fuel and weather is in place, all that is required is an ignition source. Ignition sources can be natural, such as lightning, but are more commonly the result of human activities (such as dropped cigarette butts, campfires, or intentional "prescribed" fires that burn out of control).

A recent New York City Fire Department (FDNY) analysis of wildfires within the Gateway National Recreation Area (which includes parts of the Rockaway Peninsula, southeastern Brooklyn, and Jamaica Bay) indicates that the New York City area has a bimodal fire season; that is, during a given year there is an increase in brushfires during two separate periods: one during spring and one during fall. Although wildfires may occur during any time of year, conditions are most conducive for the start of brushfires during these periods due to low relative humidity and strong winds. Most wildfires (65.1%) occur during the first six months of a year, with 14.6% occurring in winter and 50.5% in spring. The occurrence of fires drops to 12.6% in summer but rises again to 22.3% in fall. FDNY has defined the spring fire season as March 17 through April 30 and the fall fire season as October 15 until November 30; during these periods, the FDNY's brushfire units are staffed daily.

##### ii. Severity

The severity of wildfires is dependent on weather conditions (temperature, precipitation, relative humidity, and wind) and the type and amount of fuel available. If favorable weather conditions persist for a significant period, more fuel will accumulate and any fires that are sparked will be more severe.

The flammability of fuel is determined by moisture content, chemical makeup, and density of fuel particles. Typically, fuel sources containing oils or resins that promote combustion and have low moisture content (partially determined by the weather) are most likely to burn easily,

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quickly, and intensely. Fuel particles also need to be close enough together so that they will ignite each other, but not so close as to prevent air circulation.

There are three recognized levels of intensity and patterns of wildfire spread. At the lowest level are ground fires, which are sustained by glowing combustion and primarily burn organic matter and leaves in the soil. At the next level are surface fires, which burn leaf litter, fallen branches, and other fuels at ground level. The hottest and most dangerous fires are crown fires, which can reach significant heights and burn the top layer of foliage on trees, known as the canopy or crown. Crown fires are also the most difficult type of fire to contain.

When fires begin to threaten the built environment, they are classified according to the alarm assignment system. Alarm assignments start at one and increase with fire severity; the more significant the fire, the higher the alarm assignment number. There is technically no maximum alarm assignment, although fires are rarely classified above five alarm.

#### iii. Probability

Wildfires occur many times a year throughout New York City, although the frequency and recurrence interval vary depending on the exact location.

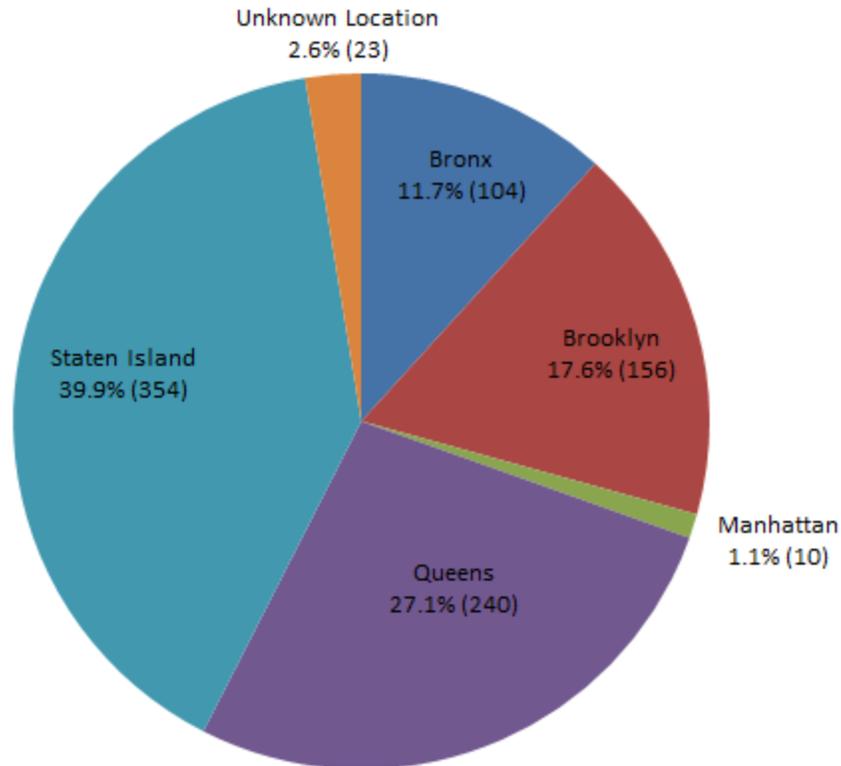
#### iv. Location

While New York City does not experience the devastating wildfires that often rage through the western United States, certain areas of the city face a significant risk. Staten Island is the most vulnerable of the five boroughs (particularly along the eastern shore), although parts of southern Queens and Brooklyn around the wetlands of Jamaica Bay are also prone to wildfires. These areas contain the highest concentration of phragmites in the city, and the grasses become highly flammable during optimal weather conditions. In addition, Staten Island has the highest percentage of wooded area in the city as well as the largest WUI zone.

Although wildfires occur many times a year throughout the city, most of them are small fires and do not affect built structures. Wildfires that are considered 2-alarm or higher, i.e. "all-hands", are more serious. Between 1996 and 2013, New York City experienced 887 such fires (an average of almost 50 per year). Of these, 354 were in Staten Island (an average of almost 20 per year), 240 were in Queens (an average of about 13 per year), 156 in Brooklyn (an average of about 9 per year), 104 in the Bronx (an average of about 6 per year), 10 in Manhattan (an average of one fire every 1.8 years), and 23 in unknown locations. Figure 1 shows the percentage of serious wildfires by borough between 1996 and 2013.

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**Figure 1: Serious wildfires in New York City by borough 1996 to 2013 (Source: FDNY)**

In 2012, the New York City Department of Parks & Recreation (DPR), in collaboration with the New York City Department of Environmental Protection (DEP), FDNY, the New York State Department of Environmental Conservation (NYS DEC) and the United States National Park Service (NPS), developed a Community Wildfire Protection Plan (CWPP) for the borough of Staten Island. The goal was to establish recommendations and priorities to help vulnerable communities protect residents, homes, infrastructure, and the natural environment from the impacts of wildfires. The Staten Island CWPP encompasses the area of Staten Island bounded to the north and east by Lower New York Bay, to the south by the southern boundary of Great Kills Park, and to the west by Maryland Avenue and Hylan Boulevard (see Figure 2). This area includes the communities of Oakwood Beach, Midland Beach, South Beach, Old Town, Grasmere, Arrochar, and Shore Acres. The population of this area is 51,200 residents.

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Figure 2: Area covered by Staten Island Community Wildfire Protection Plan (Source: Staten Island CWPP, 2012)

#### v. Historic Occurrences

Table 1 lists and describes some significant wildfires in New York City between 2008 and 2011.

Date	Category	Location	Description
July 8, 2008	Wildfire	Staten Island	<ul style="list-style-type: none"> <li>Brushfire near Hopkins Avenue and Hylan Blvd. in Staten Island</li> </ul>
September 15, 2008	Wildfire	Staten Island	<ul style="list-style-type: none"> <li>Two large brushfires burn over 40 acres in Staten Island</li> </ul>
March 23, 2009	Wildfire	Staten Island	<ul style="list-style-type: none"> <li>Brushfire near Richard Avenue and Hylan Blvd.</li> </ul>
March 24, 2009	Wildfire	Staten Island	<ul style="list-style-type: none"> <li>2-alarm brushfire near 2900 Veterans Rd.</li> </ul>
March 25, 2009	Wildfire	Bronx	<ul style="list-style-type: none"> <li>Brushfire breaks out just north of NYPD shooting range at Rodman's Neck</li> <li>No injuries reported</li> <li>Operations not interrupted</li> </ul>
April 4, 2009	Wildfire	Brooklyn	<ul style="list-style-type: none"> <li>2-alarm brushfire near 77-75 Flatbush Ave.</li> </ul>
April 12, 2009	Wildfire	Staten Island	<ul style="list-style-type: none"> <li>Large brushfire near Kissam Avenue on Staten Island spreads to three adjacent structures</li> </ul>
April 16, 2009	Wildfire	Queens	<ul style="list-style-type: none"> <li>Brushfire in Howard Beach area of Queens</li> </ul>
January 12, 2010	Wildfire	Queens/Brooklyn	<ul style="list-style-type: none"> <li>2-alarm brushfire in Gateway National Park</li> </ul>

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Date	Category	Location	Description
June 30, 2010	Wildfire	Queens	<ul style="list-style-type: none"><li>• Brushfire in Howard Beach area of Queens</li></ul>
July 18, 2010	Wildfire	Queens	<ul style="list-style-type: none"><li>• Brushfire near 165th Avenue and 83rd Street, in Howard Beach area of Queens</li></ul>
September 8, 2010	Wildfire	Staten Island	<ul style="list-style-type: none"><li>• Brushfire near Woodrow Road and Alexander Avenue</li></ul>
September 9, 2010	Wildfire	Staten Island	<ul style="list-style-type: none"><li>• Brushfire in Great Kills Park</li></ul>
October 16, 2010	Wildfire	Staten Island	<ul style="list-style-type: none"><li>• Brushfire near Great Kills Park</li></ul>
October 23, 2010	Wildfire	Staten Island	<ul style="list-style-type: none"><li>• Large brushfire near Forest Hill Road and Richmond Avenue</li></ul>
November 12, 2010	Wildfire	Staten Island	<ul style="list-style-type: none"><li>• 5-alarm, 100-acre brushfire near Kissam Avenue and Mill Road on Staten Island spreads to nearby garage and delays traffic</li></ul>
December 9, 2010	Wildfire	Staten Island	<ul style="list-style-type: none"><li>• Large brushfire near Richmond Hill Road and Old Mill Road on Staten Island</li></ul>
March 28, 2011	Wildfire	Staten Island	<ul style="list-style-type: none"><li>• Brushfire in Siedenburg Park, Staten Island</li></ul>

**Table 1: Wildfires in New York City 2008 to 2011**

### B. Vulnerability Assessment

#### i. Social Environment

In developed parts of New York City, wildfires tend to present a greater risk to firefighters and first responders than to residents or their property. When wildfires do threaten populated areas, residents may be at risk, especially those who choose not to evacuate. The situation may be particularly dangerous in the case of fires that spread quickly or unpredictably, which can result in little or no advanced warning or evacuations. Secondary health effects may result from smoke inhalation and poor air quality in the vicinity of these fires. Populations that may be particularly vulnerable include the elderly, residents with pre-existing respiratory conditions, and, in the event of an evacuation, people with mobility impairments (for more information on vulnerable populations, see Risk Assessment Section 4: New York City's Hazard Environment).

#### ii. Built Environment

When wildfires reach the WUI, they have the potential to cause significant damage to the built environment. In New York City, particularly on Staten Island, there are many areas where the built environment is directly adjacent to open areas with minimal or no natural buffers. This can potentially put many homes and critical facilities at risk. In addition, these fires are often more difficult to contain than normal building fires due to their size, abundant natural fuel sources, and weather conditions. Buildings constructed of wood and other combustible materials are particularly at risk, especially if they have wooden exteriors. Utilities, transportation, and telecommunications infrastructure are also vulnerable to the effects of wildfires, which may in turn lead to service disruptions.

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The CWPP area on Staten Island is primarily comprised of residential homes, light commercial zones, open space, and manufacturing areas. The area contains 13 schools, 11 daycare facilities, 12 historical sites, one hospital, and one psychiatric facility.

The Consolidated Edison Company has substantial utility distribution infrastructure in the CWPP area, but only some of it is vulnerable to wildfire damage. There are four electric substations in the CWPP, but only one is near enough to a fire prone area to be at any risk. Con Edison's distribution of electricity, however, is almost exclusively via wooden street poles and overhead power lines, making that system vulnerable, especially in areas where phragmites grow.

One of DEP's wastewater treatment plants, located in the southwest portion of the Oakwood Beach watershed, is also at risk of periodic fire.

#### iii. Natural Environment

Depending on the type and severity of the wildfire, the impacts of fire on the natural environment can be either positive or negative. For certain ecosystems, fires are a necessary part of the ecological cycle and promote the overall health and longevity of these environments. Benefits of fires include insect pest control, removal of invasive species, addition of nutrients for trees and other types of vegetation, and removal of undergrowth that may prevent the growth of native species. Certain types of vegetation are also dependent on periodic fires for survival. Additionally, burned trees may provide homes for certain species of birds and mammals and a base from which new plants can grow.

Although low-intensity fires may be beneficial to the environment, high-intensity fires can be devastating. In addition to burning large stands of trees, these fires cause soil destruction and the removal of debris needed to protect seedlings. In extreme cases, wildfires can destroy entire habitats and threaten numerous species.

Although certain ecosystems require periodic fires to sustain themselves, a dangerous situation can arise if too frequent. In these cases, fuel can accumulate to dangerous levels and result in devastating fires. Periodic intentional burning (also known as "prescribed" or "controlled" fires) is a tactic often used to reduce the amount of fuel available for large fires and to promote healthy ecosystem function.

#### iv. Future Environment

Wildfires are a frequent occurrence in certain areas of the city and will likely continue into the future. Since wildfires are largely dependent on weather conditions, climate change may affect the frequency of wildfires in the future. However, there is still much uncertainty as to what effect climate change will have and how significant it would be. Other factors that may play a role in determining future vulnerability are the rate of future development within fire hazard areas and the presence of buffers between urban infrastructure and wooded areas.

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